June 2011 Epidemics and AIDS Update

1. Monthly sex worker tests are ridiculous, health experts say
2. More to the drugs debate than injecting rooms
3. The Hidden Price of Drugs
4. Groups Split over How to Fight AIDS
5. Are Gay Men More at Risk for Cancer?
6. 1 in 4 new HIV infections in Ontario are among women: Study
7. New antibiotics a step closer with discovery of bacterial protein structure
8. NIH-funded researchers find new ways to confuse blood-seeking mosquitoes
9. Decades-Old Molecular Mystery Linked to Blood Clotting Solved
10. Hair concentrations of atazanavir are associated with the success of HIV treatment
11. HIV & Islam—Responsible religious response to HIV & AIDS in Malaysia
12. HIV Google Map Gives New Perspective on Epidemic
13. Determining the Impact of Text Messaging for Sexual Health Promotion to Young People
14. Previously Unknown E. Coli Strain Affects More Than 1,500 In Europe; Source Remains Unknown
15. Media Outlets Examine Case Of Man Cured Of HIV, Leukemia Through Bone Marrow Transplant
16. UF researchers suggest cholera vaccination strategies for Zimbabwe
17. Eating dirt can be good for the belly, researchers find
19. Overuse of Antimicrobials in Livestock Risks Human Health, Warn Experts
20. MRSA Transmission May Be Occurring in Fire Stations, Study Suggests
21. Lifelong Antiretroviral Therapy Unsustainable, Experts Say
22. Drug policy: Supply and demand
24. Black MSM Focus of New HIV Campaign
25. Safe Sex Ads to Return to Bus Shelters
26. High Prevalence of Food Insecurity Among HIV-Infected Individuals Receiving HAART in a Resource-Rich Setting
27. European E. Coli Strain Never Seen Before In Humans, Scientists Say
28. U.S. Foreign Aid Recipients Own Billions In Treasury Securities, CRS Report Says
29. International Drug Policy Panel Calls For Legalization Of Some Drugs, De-Criminalizing Drug Use
30. Bacterial roundabouts determine cell shape
31. NIH scientists reactivate immune cells exhausted by chronic HIV
32. Deadly Bacteria May Mimic Human Proteins to Evolve Antibiotic Resistance
33. Mechanism in Saliva Production Discovered
34. UN Says New AIDS Infections Dropped Since 2001
35. Tests for HIV, Safe Practices Crucial
36. HIV tests every 3 to 6 months suggested for all sexually active gay men in US
37. Cash cure for the AIDS epidemic?
38. CDC Study: Gay, Bisexual Teens Do Riskier Things
39. Care for Women with HIV Unequal, Need to Target Immigrants, Aboriginals: Study
40. Adolescent Experiences of Discrimination, Harassment, Connectedness to Community and Comfort with Sexual Orientation Reported by Adult Men Who Have Sex with Men as a Predictor of Adult HIV Status
41. Researchers Reverse HIV-Related B-Cell Exhaustion
42. Health Officials Rule Out Sprouts As Source Of German E. Coli Outbreak
43. Hiding Under a Cap
44. Tropism impacts on virological success of first-line HIV therapy
45. Availability of Serologic and Virologic Testing for Herpes Simplex Virus in the Largest Sexually Transmitted Disease Clinics in the United States
46. Number Of New E. Coli Cases Abating But More Deaths Expected
47. Connection discovered between the nervous system and the vascular system
48. Universal Flu Vaccine Clinical Trials Show Promise
49. SOUTH AFRICA: Mother-to-child HIV transmission plummets
50. Young Drug Users Forgotten amid India AIDS Success
51. Prevalence of Chlamydia Trachomatis and Neisseria Gonorrhoeae and Repeat Infection Among Pregnant Urban Adolescents
52. How killer immune cells avoid killing themselves
53. An Alternative to Antibiotics
54. HIV damages B-cells as well as T-cells: new treatment targets identified
55. Rich nations step up assault on generic Aids drugs
56. Romantic Relationships and Sexual Activities of the First Generation of Youth living with HIV Since Birth
57. German Officials Again Claim Sprouts As Source Of E. Coli Outbreak
58. Low-Cost Meningitis Vaccine Cuts Cases In African Countries, Data Show
59. Dominican Republic Health Workers Strike Over Sanitary Conditions In Hospital
60. Two isolates from E. coli outbreak available
61. We are all mutants
62. Chasing EHEC Via Computer: Scientists in Germany Provide Free Access to Enteric Pathogen's Genetic Regulation Data
63. Calls to lift ban on gay men giving blood
64. Belgium: First criminal conviction under poisoning law, advocates caught unawares
65. Treatment Refusal = Criminal?
66. Premature aging seen as issue for AIDS survivors
67. How HIV Shapes Everyday Life
68. Discussion of Sexual Risk Behavior in HIV Care Is Infrequent and Appears Ineffectual: A Mixed Methods Study
69. Dengue Vaccine Could Be Available In Four Years
70. Heavy Rains Increasing Number Of Cholera Cases In Haiti
71. Vaccines
72. The ghost of personalized medicine
73. SA, US to test new HIV gel
74. HIV Patient Timothy Brown Is the Boy Who Lived
75. Do HIV+ People Have Higher Stroke Risk?
76. Proving Darwin Right: New Study Supports Hypothesis That Competition Is Stronger Between More Closely Related Species
77. New Cell Type Offers Immunology Hope
78. Gates Foundation's global vaccinations scheme too friendly to drug industry, critics say
79. MenAfriVac More Effective, Less Expensive Than Older Meningitis Vaccines, Studies Say
80. Sugar-Binding Protein May Play a Role in HIV Infection
81. 49 Percent of 12th-Grade Students Reported Being Sexually Active: Time to Have 'The Talk'?
82. Findings Prompt More Research into Anti-HIV Gel
83. Syphilis Testing Could Dramatically Cut Baby Deaths
84. AIDS-Hit Swaziland Sees Reason for Hope
85. NIH Scientists Attenuate B-Cell Exhaustion in Chronic HIV
86. Study Examines Impact of Baseline HIV Tropism on Viral Response in HIV-Infected People Receiving First-Line Antiretroviral Therapy
87. Knowingly transmitting HIV is a criminal offence in Romania
88. Fewer Girls Develop Cervical Abnormalities After HPV Vaccine
89. International team works out secrets of one of world's most successful patient safety programs
90. Scientists Develop a Fatty 'Kryptonite' to Defeat Multidrug-Resistant 'Super Bugs'
91. How the Immune System Fights Back Against Anthrax Infections
92. Lyme Disease Bacteria Take Cover in Lymph Nodes
93. A Shot in the Arm
94. Newly blacklisted pathogens
95. Intensive and targeted PEP counselling leads to less risky sex afterwards, fewer HIV infections
96. Invitation to test for HIV ups test rate among male partners of pregnant women in South Africa
97. Researchers Take Another Step Closer to HIV Prevention Product for Use During Pregnancy
98. New Math in HIV Fight
99. NCDs Responsible For Majority Of Deaths Worldwide And Cost Trillions, Report Says
100. Results Of African Malaria Vaccine Trial Expected Later This Year
101. Ghana's Vice President Discusses Country's Efforts To Fight HIV/AIDS
102. Poor Governance Is No Excuse For Withholding Aid
103. Annual HIV Testing for MSM May Not Be Enough
104. Significant Rise in HPV-Related Throat Cancer in Men
106. Sugar-Binding Protein Facilitates HIV Cell Entry
107. How dense is a cell?
108. Scientists reveal HIV weakness
109. Non-coding RNA has role in inherited neurological disorder—and maybe other brain diseases too
110. Mimivirus Isolated, Genome Amputated
111. Size Matters—In Virulent Fungal Spores—And Suggests Ways to Stop a Killer
112. Gatekeepers: How Microbes Make It Past Tight Spaces Between Cells
113. How the Immune System Responds to Hepatitis A Virus
114. HIV/AIDS: Anal sex HIV risk misunderstood among heterosexuals
115. Erection-boosting condom gets EU backing
116. Study: Doctors Overtesting for Cervical Cancer Virus
117. Unusual Traits Blended in Germany E. Coli Strain
118. Sexual Health an Issue for Boomers
119. HIV Seroadaptation Among Individuals, Within Sexual Dyads, and by Sexual Episodes, Men Who Have Sex with Men, San Francisco, 2008
120. Congo’s Cholera Outbreak Spreads To Crowded Capital City
121. Nature News Examines Controversy Surrounding Indian HPV Vaccine Trial
122. Chemist solves riddle of killer diseases
123. Synthesis succeeds where biologists gave up
124. Study of phytoremediation benefits of 86 indoor plants published
125. United States: opt-out HIV testing in clinical settings boosts HIV diagnoses among hard-to-reach groups
126. Iran giving out condoms for criminals to rape us, say jailed activists
127. AIDS group to appeal court ruling on HIV transmission among porn actors
128. Type 2 diabetes in newly diagnosed 'can be reversed'
129. HIV Testing Project Discovers 18,000 New Cases
130. One Session of Transtheoretical Model-Tailored Condom Use Feedback: a Pilot Study Among At-Risk Women in the Bronx
131. Man Contends Illinois Jail Denied Him HIV Drugs
132. Hybrid Leishmania Parasites On the Loose
133. Who Goes There? Novel Complex Senses Viral Infection
134. No Two Strands Are Alike: New Mechanism for Elongation of Viral Genome Termini
135. Premature aging caused by some HIV drugs, study shows
136. Rogue blood cells may contribute to post-surgery organ damage
137. Kivexa and Truvada-based combinations associated with long-term gains in limb fat, not fat loss
138. SIV-resistant monkeys close the gates to viral infection
139. Factors Associated with Refusal of Rapid HIV Testing in an Emergency Department
140. Meta-analysis reveals patterns of bacteria-virus infection networks
141. Living Antibiotic Effective Against Salmonella, Study Suggests
142. New study finds rise in global malaria R&D funds leads to largest ever pipeline of new products
143. Zimbabwe MP accused of infecting journo with HIV
144. CDC Reports Extended HIV/AIDS Surveillance Data
145. HIV Coreceptor Tropism Affects Treatment Outcomes
146. Drug-Resistant Scarlet Fever Outbreak Has Infected Nearly 550 People In Hong Kong
147. South African Circumcision Program Moving Forward With Support From Zulu King
148. HIV disrupts blood-brain barrier
149. Tiny Cell Patterns Reveal the Progression of Development and Disease
150. Study Examines Lipodystrophy in Treatment-Naive HIV-Infected People
151. Genome Digest
152. If you’re HIV positive, safe sex isn’t just about condoms
153. New rapid test tells difference between bacterial and viral infections
154. Deadly Bovine Disease Ousted
155. The Anal Dialogues
156. AIDS Drug Supplies Dwindling in Swaziland
157. Chlamydia Trachomatis Infection Among Women Reporting Sexual Activity with Women Screened in Family Planning Clinics in the Pacific Northwest, 1997 to 2005
158. ‘Exact Correlation’ Between Peacekeeper Arrival And Cholera Outbreak In Haiti, Study Says
159. Multinational Drug Companies’ Scam
160. ‘Goat plague’ threat to global food security and economy must be tackled, experts warn
Monthly sex worker tests are ridiculous, health experts say
Julia Medew
May 31, 2011

Health Minister David Davis has backed down from a plan for Victorian sex workers to have fewer tests for sexually transmitted infections, prompting sharp criticism from public health experts who say the plan should go ahead.

Last week, a Department of Health project officer told a health and sex work conference the government had approved a move from monthly to three-monthly tests for sex workers in the regulated industry from September.

Legal sex workers applauded the move, saying monthly testing was unnecessary as they always used protection. But a spokeswoman for Mr Davis said that although he had received a proposal for three-monthly testing, he would not approve it.

Health Minister David Davis has backed down from a plan for Victorian sex workers to have fewer tests for sexually transmitted infections, prompting sharp criticism from public health experts who say the plan should go ahead.

Last week, a Department of Health project officer told a health and sex work conference the government had approved a move from monthly to three-monthly tests for sex workers in the regulated industry from September.

Legal sex workers applauded the move, saying monthly testing was unnecessary as they always used protection. But a spokeswoman for Mr Davis said that although he had received a proposal for three-monthly testing, he would not approve it.

"The minister has currently not been persuaded that the proposed changes are appropriate," she said.

Health and human rights experts said it was ridiculous to force sex workers to have monthly tests when they were at extremely low risk of contracting sexually transmitted infections.

Three Australian studies have found that about one in every six men admit to having paid for sex at least once.

Professor of Sexual Health at Melbourne University, Christopher Fairley, said research showed monthly testing was unnecessary and a waste of public health resources because sex workers have much lower rates of STIs than other people.

This was backed by a recent study of patients at the Melbourne Sexual Health Centre which showed that of 2896 female sex workers tested for STIs over three years, only 3 per cent were positive.

In contrast, the study found that 41 per cent of 4208 STIs diagnosed at the clinic over the three years were in men having sex with men.

"You are at lower risk of catching an STI if you have sex with a sex worker than if you have sex with a member of the public," Professor Fairley said.

Professor Fairley said the monthly testing of legal sex workers also meant doctors were turning away thousands of patients seeking STI tests each year because they were tied up with low risk sex workers.

He said about 1200 people could not be tested at the centre in the first quarter of this year because it was tied up with monthly sex worker tests.

If the government approved three-monthly tests, he said the centre could see another 3000 patients a year who are likely to be at much higher risk of STIs.

Director of the Michael Kirby Centre for Public Health and Human Rights, Bebe Loff, said she was astonished the Victorian Government was insisting on monthly tests, given the principles of informed consent in medicine and human rights to privacy and bodily integrity.

"Any basic ethics course stresses the value of informed consent. It’s stressed not just to protect the health care workers but because there are things achieved through that process. It provides a supportive environment where patients can freely discuss their concerns," Associate Professor Loff said.

The founder of the Australian Prostitutes Collective, Cheryl Overs, said monthly testing was a waste of resources and could lead to more demands for unprotected sex because consumers presumed all sex workers were "clean".

She said that having frequent sex did not mean sex workers wanted to offer their bodies up to doctors more often than was necessary.

"Sex workers are just like everyone else, they don’t like getting up on the couch. We all hate it, don’t we?" she said.
More to the drugs debate than injecting rooms
Craig Fry
May 31, 2011

Injecting rooms are back in the news almost a decade after the first bill to establish a medically supervised injecting centre failed to be passed in the Victorian parliament.

The problem is that the debate hasn’t altered at all. We need to change the record on the policy debate surrounding supervised injecting rooms in this city.

Melbourne first started talking about injecting rooms in the mid-1990s, with a City of Greater Dandenong report on "safety clinics", and local member Eddie Micallef proposing a trial for Springvale in 1997.

Two years later in November 1999, the newly elected Labor premier Steve Bracks established a Drug Policy Expert Committee to advise on the feasibility of a multi-suburb injecting rooms trial.

Labor’s plans eventually stalled after their Injecting Facilities Trial Bill was rejected in the Legislative Council of parliament in November 2000. Bracks’ ALP dropped its injecting room policy in October 2002 before the next state election.

And now supporters of a Richmond injecting room trial argue that it would save lives, reduce the street drugs trade and public injecting, and move drug users into treatment. They remind us that evidence from abroad and the injecting room in Sydney shows these facilities work.

We’ve heard all of this before. It was all true 10 years ago.

Richmond injecting room opponents argued last week that such places send the wrong message, that the evidence is equivocal, and that a trial would create a "honey pot" effect attracting drug dealers and users from everywhere.

We’ve heard all this before too. These arguments were incorrect a decade ago, and they’re no closer to the truth today.

I was a public supporter of the proposed injecting room trial in Melbourne 10 years ago. I conducted research on drug user attitudes about such an idea and the likelihood of injecting room attendance. My findings informed state and local government deliberations during 1999 and 2000. I have visited injecting rooms in Sydney, Switzerland and Canada.

I still support a Melbourne trial in principle as part of a multi-faceted harm reduction approach. I believe this would be the right thing to do, regardless of the divided public opinion and lack of political interest. Leadership in public health policy is not always about what is popular.

But I don’t believe there will ever be an injecting room trial in our city.

The most significant impetus for previous injecting room calls in Melbourne was the growth from the mid-1990’s of street-based heroin markets across suburbs such as Collingwood, Fitzroy, Footscray, Springvale, Dandenong, St Kilda, and the CBD. In addition to the public nuisances of street injecting, syringe litter, and begging, these open heroin markets delivered a steady increase in overdose deaths from 84 in 1994 to 359 by the end of 1999.

Fortunately, today the drug market is very different, and the public and individual impact is nothing like that witnessed on our streets the last time injecting rooms were considered. There were 91 heroin-related overdose deaths in Victoria during 2009 – still too high it is true, but way short of the late ‘90s peak when these fatalities rivalled the road toll.

This time around in the Melbourne injecting room debate there are no government-appointed expert committees, no celebrities or other public leaders standing up in support, and no organised community action groups. Politically, there is no chance at all that a legislative process will deliver us a government and police sanctioned trial. Neither the Victorian Coalition government nor the ALP in opposition has progressive drug policies. And while the Greens publicly support injecting rooms, the value of their policy in this area is moot.

This time in the Melbourne debate we need to hear something new. We need a different focus.

If I am honest, even at the height of my support for injecting rooms in the late 1990’s, I always wondered if the resources needed for a careful Melbourne trial would be better invested elsewhere. Conservatively, a single injecting room trial would cost a minimum of $1 million per year, including site development, staffing, insurance, equipment, other overheads and the costs of rigorous evaluation. A trial would need to run for at least three years to gather the evidence required to assess outcomes.

I wonder about the wisdom of lobbying for a new expensive strategy that would have, at best, only a local reach and impact. Why not look to bolster prevention and early intervention programs that seek to address “upstream” social determinants of public drug dealing and injecting, rather than the
"downstream" impacts? Things such as homelessness and housing uncertainty, early school leaving and disruptions in the school-to-work transition and work and income instability.

Why not argue to spend more in improving existing effective strategies such as drug substitution treatment, community outreach, peer education initiatives, and needle and syringe programs? These are the questions we should be focusing on in this latest Melbourne injecting room debate. Progressive drug policy doesn't always require that we adopt the latest ideas, especially when our existing proven strategies could be made even better.

May 31, 2011, 4:09 pm

The Hidden Price of Drugs
By ANDREW POLLACK

Pharmaceutical companies are happy to tout the benefits of their newest drugs. But sometimes they seem far less willing to let the public know the price of the product.

The latest example occurred on Tuesday morning when Optimer Pharmaceuticals announced that its new drug to treat diarrhea caused by the bacterium Clostridium difficile would cost $2,800, about twice as much as the existing approved drug.

On Friday, Optimer announced in a press release that the Food and Drug Administration had approved its drug, called Dificid. But the company kept the price out of the press release, saying it would not reveal it until its conference call with securities analysts Tuesday morning.

Whatever the reason for the tactic, it had the result of keeping discussions about what many would consider eye-popping prices out of initial articles about the drug’s approval.

Vertex Pharmaceuticals did this as well after the recent approval of its hepatitis C drug, Incivek. The press release contained a lot of information about how generous the company was going to be in helping customers with their insurance co-payments. But it did not include how much the drug would actually cost — $49,000.

In that case, however, the call with analysts in which the price was unveiled came only about two hours after the approval was announced.

It could be pointed out that analyst calls are also a more supportive environment for a company. Analysts often applaud “premium” pricing because it means higher sales for a drug, whereas patients and insurers would have the opposite view.

Merck did put the $1,100-a-week price of its new hepatitis C drug, Victrelis, in its press release. But the price was mentioned in a single short sentence at the very bottom of a press release that was more than 250 lines long.

Dr. Jeffrey H. Albrecht, a gastroenterologist at Hennepin County Medical Center and a professor of medicine at the University of Minnesota, said he was frustrated trying to find documented information, outside of news reports, on the price of the new hepatitis C drugs.

“When you take a step back,” he said in an e-mail, “it is really remarkable that patients and physicians often don’t know how much treatments or tests cost.”

Actually, Merck, Vertex and Optimer did more to make their prices public than some companies, which never reveal their prices. And some companies say they do not want to reveal the price until they actually begin marketing the drug, which in some cases can be weeks or even months after the regulatory approval.

A spokeswoman for Vertex said that price was complicated since patients did not usually pay the listed wholesale price. An analyst call, therefore, was a better way to reveal the information.

“We wanted to get the information out quickly but also avoid confusion about an important and complicated topic,” she said.

A spokesman for Optimer said it was not customary to put prices in press releases, and that telling the price to analysts allowed the company put the information in context.

On the call Tuesday morning, Optimer’s chief executive, Pedro Lichtinger argued that the $2,800 price for a 10-day course of treatment with Dificid was in line with prices for some other new antibiotics.

He said Dificid would be cost-effective because it might cut down on hospital stays and other costs associated with treating C. difficile. In clinical trials, Dificid was superior to the only other approved drug, Vancocin, in providing a “sustained clinical response,” he said.

Vancocin, an oral form of the antibiotic vancomycin sold by ViroPharma, costs $1,000 to $1,500 for a 10- to 14-day course of treatment at the lowest dose, Mr. Lichtinger said. But some patients get higher doses or longer treatments, multiplying the cost.
ViroPharma has been steadily raising the price of Vancocin and has taken legal action to try to delay approval of generic versions of the drug. Still, many hospitals get around the price of Vancocin by using the intravenous form of vancomycin, which is generic, in a manner that lets patients take it orally.

Groups Split over How to Fight AIDS

Wall Street Journal, (05.27.2011) Betsy McKay; Mark Schoofs

The larger goal of eliminating AIDS globally is being mired in debate over how to best achieve that target, with governments and advocacy groups currently unable to reach consensus ahead of the UN High Level Meeting in New York, June 8-10.

Tensions center on what actions the UN will commit to, whether patent rights for AIDS drugs will be honored, and how to best approach high-risk groups. The declaration that is expected to be approved at the meeting had more than quadrupled in size as of May 27, according to a source close to the negotiations.

Matters such as how to deal with men who have sex with men have become divisive, for example. AIDS organizations such as the US-based Health GAP are arguing for well-defined programs for gay men. “We need a response to HIV that is tailored to meet the needs of those key populations who are often marginalized and have a hard time accessing services,” said Matthew Kavanagh, Health GAP’s director of US advocacy.

Others disagree with that view. “Many countries are actually being bullied into accepting many of the wrong approaches to the AIDS pandemic, and they’re being encouraged to promote the highest-risk behavior,” said Sharon Slater, president of the US-based Family Watch International. “Ours is not an anti-homosexual” position, she added. FWI is offering UN delegates talking points and suggesting wording for amendments, including those from “all of the African countries, I believe,” Slater said.

Sharonann Lynch, a Doctors Without Borders HIV/AIDS policy adviser, said the infighting represents a real threat. “Really, there are so many authors and editors they might make it so we miss the opportunity to get ahead of the wave of infections,” she noted.

Are Gay Men More at Risk for Cancer?

Reuters, (05.09.2011) Genevra Pittman

Data on cancer survivorship among lesbian, gay, and bisexual populations are lacking, prompting a new study to examine the prevalence of survival and patients’ self-reported health by sexual orientation.

Ulrike Boehmer, of the Boston University School of Public Health, and colleagues studied three years of responses to the California Health Interview survey, which included more than 120,000 adult residents. As part of the survey, participants were asked if they had ever been diagnosed with cancer and whether they identified as gay, lesbian, bisexual or heterosexual.

Of 51,000 male respondents, 3,700 reported an adult cancer diagnosis. More than 8 percent of gay men reported a history of cancer, compared with 5 percent for straight men—even after the team controlled for differences in race, age, and income.

Roughly 7,300 of the 71,000 female respondents had been diagnosed with cancer, though overall cancer rates did not differ among straight, lesbian or bisexual women. Of female cancer survivors, however, lesbians and bisexuals were more likely to report only fair or poor health.

Boehmer suggested that gay men’s higher rates of HIV may be related to their increased risk of cancer, though the researchers did not specifically study that possibility. Regardless, “Because more gay men report as cancer survivors, we need foremost programs for gay men that focus on primary cancer prevention and early cancer detection,” she said.

“Because more lesbian and bisexual women than heterosexual women with cancer report that they are in poor health, we need foremost programs and services that improve the well-being of lesbian and bisexual cancer survivors,” said Boehmer.

The study, “Cancer Survivorship and Sexual Orientation,” was published early online in the journal Cancer (2011; doi:10.1002/cncr.25950).

1 in 4 new HIV infections in Ontario are among women: Study

TORONTO, June 1, 2011— Despite significant clinical advances in HIV care, an estimated 25 per cent of new HIV infections in Ontario from 2006 to 2008 were among women, according to a health study by researchers from the Institute for Clinical Evaluative Sciences (ICES) and St. Michael’s Hospital. The researchers say 93 per cent of new infections among women are acquired through sexual transmission
and seven per cent through injection drug use. About 60 per cent of newly infected women are immigrants. The findings, the latest from the POWER (Project for an Ontario Women’s Health Evidence-Based Report) study, suggest targeted prevention and intervention efforts are necessary to eliminate gaps and inequities in care for HIV patients.

"We have made real progress in preventing HIV infection and in treating people living with HIV, but we also identified several groups for whom important disparities persist, including older women, Aboriginal women, and women who have immigrated from countries where HIV is endemic," says Dr. Ahmed Bayoumi, lead author on the chapter and a physician at St. Michael's Hospital. "We also identified differences related to poverty, injection drug use, and geography. Our findings suggest that addressing such factors will be important for delivering universal, high-quality HIV care in Ontario."

The POWER Study — a joint study from St. Michael's Hospital and ICES — is the first in the province to provide a comprehensive overview of women’s health in relation to income, education, ethnicity and geography. The findings are detailed in the report titled HIV Infection—the 11th chapter to be released as part of the study. Findings can be used by policymakers and health-care providers to improve access, quality and outcomes of care for Ontario women. The POWER Study was funded by Echo: Improving Women’s Health in Ontario, an agency of the Ontario Ministry of Health and Long-Term Care.

"The POWER Study HIV Infection chapter reveals important gaps in prevention, access and clinical care," says Pat Campbell, CEO, Echo: Improving Women’s Health in Ontario. "Findings support the need for strategies to promote HIV prevention and testing directed at hard to reach groups. We also need to improve access to care for women aged 55 and older to ensure earlier diagnosis and/or earlier entry to care. At the same time findings are helping to track improvements in care, evident in the high prenatal HIV screening rate (95%)."

The POWER study chapter, released today, examined the impact of HIV infection on Ontarians. Key findings include:

- More than 4,700 women are living with HIV in Ontario, most of whom acquired HIV through sexual contact. This represents 18% of the estimated HIV infections in the province.
- Women who emigrated from a country where HIV is endemic account for more than half of all new infections in 2008 among women.
- Women reported lower rates of condom use than men.
- Women who inject drugs report riskier injection behaviours than men.
- One third of users of community based HIV services are women
- Over 90% of HIV-positive pregnant women who knew their HIV status received antiretrovirals during pregnancy, which could prevent transmission to the newborn.

"High rates of prenatal HIV screening show that when we have an organized and targeted program we can achieve measurable improvements in care," says Dr. Arlene Bierman, a physician at St. Michael’s Hospital and principal investigator of the study. "We need to develop programs that ensure that all women who are at risk are screened and when tests are positive that they receive HIV care in a timely manner. Routine monitoring of quality indicators will allow us to evaluate these programs," adds Dr. Bierman, also an ICES investigator.

**New antibiotics a step closer with discovery of bacterial protein structure**

Scientists have uncovered the structure of the protein complex that assembles the tiny hair-like strands that cover the outside of bacteria. Called pili, these 'hairs' allow bacteria to group together and stick to human cells to cause infection—and are therefore a key target for a new generation of antibiotics.

Published today in Nature, scientists at the Institute of Structural and Molecular Biology (a joint institute between University College London (UCL) and Birkbeck) have revealed the structure of a complex protein called FimD that acts as an assembly platform for the pili of cystitis bacteria. The structure of the FimD protein means scientists can see the process of pili assembly, from individual protein subunits to complete structures, for the first time.

Pili are tiny hair-like strands on the outside of bacteria that help them to link together in groups. In the case of cystitis, pili allow bacteria to attach themselves to the wall of the bladder, leading to bladder cells engulfing the bacterium. Once the bacteria have invaded the bladder cells, they escape traditional antibiotic treatment and lie dormant, making recurrent infections very common.

Scientists believe that antibiotics could be developed that disrupt the FimD protein, and therefore the production line of pili proteins. The UCL/Birkbeck group, together with collaborators in the USA, have...
already discovered small molecules able to interfere with pilus biogenesis. Without their pili, bacteria cannot attach to each other or the host, making infection much less likely.

Professor Gabriel Waksman from the UCL Research Department of Structural and Molecular Biology and the Birkbeck Department of Biological Sciences, who led the research, said: "Cystitis is one of the most common gram negative bacterial infections; it can also be extremely painful and surprisingly hard to treat – especially repeat infections."

"Pili are a prime target for a new breed of antibiotics to target cystitis and other conditions, as without pili bacteria are unable to attach themselves to each other or the walls of human cells, and therefore much less likely to cause serious infections."

Pili protein subunits are made inside bacteria and initially transported through the inner cell wall. Each subunit is then picked up by a 'chaperone' protein which takes it across to a protein in the outer cell wall called the 'usher'.

The usher protein coordinates the ordered assembly of pilus subunits, i.e. the growth of the pili. This research, funded by the Medical Research Council, has isolated and crystallised the usher protein in cystitis bacteria, FimD, while it's bound to the chaperone/subunit combination.

The structure of FimD provides insights into pilus biogenesis because it unravels the entire mechanism of subunit polymerization and transport across the outer wall of the bacteria. "Scientists have been working for a number of years to work out the how pili are assembled. This is the first view of the transportation and assembly of pili in action," said Professor Waksman.

**NIH-funded researchers find new ways to confuse blood-seeking mosquitoes**

Female blood-feeding mosquitoes, some species of which can transmit deadly diseases such as malaria and dengue to humans, largely find their human blood meals by detecting carbon dioxide emitted when people exhale. In a new study funded by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, a research team led by Anandasankar Ray of the University of California, Riverside, identified three types of odor molecules that disrupt the carbon dioxide-sensing machinery of mosquitoes. One molecule switches the mosquitoes' olfactory nerves "on" for prolonged periods, one turns the olfactory nerves "off" and a third type mimics carbon dioxide.

According to the researchers, their finding could lead to a new generation of repellents and lures that might help prevent mosquito-borne human diseases such as yellow fever and West Nile virus as well as malaria and dengue. Experts agree that new mosquito deterrents are needed because the most effective existing repellent, known as DEET, is expensive, impractical in tropical regions and toxic if used inappropriately.


**Decades-Old Molecular Mystery Linked to Blood Clotting Solved**
ScienceDaily (June 1, 2011) — Blood clotting is a complicated business, particularly for those trying to understand how the body responds to injury. In a new study, researchers report that they are the first to describe in atomic detail a chemical interaction that is vital to blood clotting. This interaction—between a clotting factor and a cell membrane—has baffled scientists for decades.

The study appears online in the Journal of Biological Chemistry.

"For decades, people have known that blood-clotting proteins have to bind to a cell membrane in order for the clotting reaction to happen," said University of Illinois biochemistry professor James Morrissey, who led the study with chemistry professor Chad Rienstra and biochemistry, biophysics and pharmacology professor Emad Tajkhorshid. "If you take clotting factors off the membrane, they're thousands of times less active."

The researchers combined laboratory detective work with supercomputer simulations and solid-state nuclear magnetic resonance (SSNMR) to get at the problem from every angle. They also made use of tiny rafts of lipid membranes called nanodiscs, using an approach developed at Illinois by biochemistry professor Stephen Sligar.

Previous studies had shown that each clotting factor contains a region, called the GLA domain, which interacts with specific lipids in cell membranes to start the cascade of chemical reactions that drive blood clotting.

One study, published in 2003 in the journal Nature Structural Biology, indicated that the GLA domain binds to a special phospholipid, phosphatidylserine (PS), which is embedded in the membrane. Other studies had shown that PS binds weakly to the clotting factor on its own, but in the presence of another phospholipid, phosphatidylethanolamine (PE), the interaction is much stronger.

Both PS and PE are abundant in the inner—but not the outer—leaflets of the double-layered membranes of cells. This keeps these lipids from coming into contact with clotting factors in the blood. But any injury that ruptures the cells brings PS and PE together with the clotting factors, initiating a chain of events that leads to blood clotting.

Researchers have developed many hypotheses to explain why clotting factors bind most readily to PS when PE is present. But none of these could fully explain the data.

In the new study, Morrissey’s lab engineered nanodiscs with high concentrations of PS and PE, and conducted functional tests to determine if they responded like normal membranes.

"We found that the nanodisc actually is very representative of what really happens in the cell in terms of the reaction of the lipids and the role that they play," Morrissey said.

Then Tajkhorshid’s lab used advanced modeling and simulation methods to position every atom in the system and simulated the molecular interactions on a supercomputer. The simulations indicated that one PS molecule was linking directly to the GLA domain of the clotting factor via an amino acid (serine) on its head-group (the non-oily region of a phospholipid that orients toward the membrane surface).

More surprisingly, the simulations indicated that six other phospholipids also were drawing close to the GLA domain. These lipids, however, were bending their head-groups out of the way so that their phosphates, which are negatively charged, could interact with positively charged calcium ions associated with the GLA domain. (Watch a movie of the simulation.)

"The simulations were a breakthrough for us," Morrissey said. "They provided a detailed view of how things might come together during membrane binding of coagulation factors. But these predictions had to be tested experimentally."

Rienstra’s lab then analyzed the samples using SSNMR, a technique that allows researchers to precisely measure the distances and angles between individual atoms in large molecules or groups of interacting molecules. His group found that one of every six or seven PS molecules was binding directly to the GLA domain of the clotting factor via an amino acid (serine) on its head-group (the non-oily region of a phospholipid that orients toward the membrane surface).

That turned out to be a key insight that we contributed to this study," Rienstra said.

The team reasoned that if the PE head-groups were simply bending out of the way, then any phospholipid with a sufficiently small head-group should work as well as PE in the presence of PS. This also explained why only one PS molecule was actually binding to a GLA domain. The other phospholipids nearby were also interacting with the clotting factor, but more weakly.

The finding explained another mystery that had long daunted researchers. A different type of membrane lipid, phosphatidylcholine (PC), which has a very large head-group and is most abundant on the outer surface of cells, was known to block any association between the membrane and the clotting factor, even in the presence of PS.
Follow-up experiments showed that any phospholipid but PC enhanced the binding of PS to the GLA domain. This led to the "ABC" hypothesis: when PS is present, the GLA domain will interact with "Anything But Choline."

"This is the first real insight at an atomic level of how most of the blood-clotting proteins interact with membranes, an interaction that's known to be essential to blood clotting," Morrissey said. The findings offer new targets for the development of drugs to regulate blood clotting, he said.

Morrissey and Tajkhorshid have their primary appointments in the U. of I. College of Medicine. Tajkhorshid also is an affiliate of the Beckman Institute at Illinois.

The National Heart, Lung and Blood Institute and the National Institute for General Medical Sciences provided funding for this study.

Watch a movie of the supercomputer simulation of the blood clotting factor interacting with the membrane. The GLA domain of the clotting factor is depicted as a purple tube; individual GLA amino acids are yellow; tightly bound calcium ions are pink spheres; and the interacting phospholipids that make up the membrane are below. | Courtesy Emad Tajkhorshid.

**Journal Reference:**

**Hair concentrations of atazanavir are associated with the success of HIV treatment**

Michael Carter
Published: 02 June 2011

Hair concentrations of the HIV protease inhibitor atazanavir (*Reyataz*) are strongly associated with suppression of viral load, US investigators report in the May 15th edition of *Clinical Infectious Diseases*.

"We reveal that antiretroviral concentrations in hair are the strongest independent predictor of virologic suppression," comment the authors, "because low hair antiretroviral concentrations can predict virologic failure prior to its development, this measurement may be useful in designing interventions aimed at prolonging the durability of cART [combination antiretroviral therapy]."

Thanks to antiretroviral therapy many patients with HIV now have a normal prognosis. The goal of treatment is an undetectable viral load in blood, and to achieve this outcome it is necessary to maintain therapeutic levels of anti-HIV drugs in the blood.

A snap-shot impression of drug concentrations can be obtained using therapeutic drug monitoring, and checking adherence is also a useful measure of drug exposure. However, neither of these methods is perfect, involving either expensive laboratory tests, or relying on patient recall, which can be inaccurate.

Research conducted by investigators from the Women’s Interagency HIV Study (WIHS) has previously shown that antiretroviral drug concentrations can be accurately monitored by analysing hair samples.

Now the same team of investigators wished to see how well atazanavir levels in hair predicted treatment outcomes.

"Levels of medications in hair reflect drug uptake from the systemic circulation over periods of weeks to months and capture average, as well as individual pharmacokinetic information," explain the investigators. "A level measured in hair synthesizes adherence and pharmacokinetic variability over time to provide a robust exposure measure in a single assay."

Their study involved 424 HIV-positive women, all of whom were taking antiretroviral therapy that included atazanavir, with or without a ritonavir booster.

Small hair samples were cut from close to the scalp, just below the crown of the head.

Using 2 mg of human hair, atazanavir can be detected at levels as low as 0.05 ng/ml, and ritonavir can be detected at a level of just 0.01 ng/ml.

The patients’ records were studied to determine how many achieved virological suppression (defined as a blood viral load below 80 copies/ml). A series of statistical analyses were then performed to see if suppression of HIV was associated with atazanavir levels in hair.

Most of the women (51%) were African American and had previous experience of therapy with a protease inhibitor (76%).

The patients contributed 1443 person visits during the study. Adherence above the target 95% was reported at 77% of these visits, and HIV was suppressed to below 80 copies/ml at 64% of visits.
Atazanavir concentrations in hair were divided into quintiles. The investigators found a strong association between hair levels of the drug and self-reported adherence (above 95% vs. below 95%; p < 0.001).

Viral load was suppressed in only 25% of visits in which hair concentrations of atazanavir were in the lowest quintile (below 0.658 ng/ml). In contrast, viral load was below 80 copies/ml in 87% of visits when levels of the drug were in the highest quintile (above 5.19 ng/mg).

The odds of patient having an undetectable viral load improved as hair concentrations increased. For patients in the top quintile the odds ratio (OR) was 63.3 (95% CI, 30.8-130.0; p < 0.001).

Factors associated with viral suppression included a pre-treatment viral load below 100,000 copies/ml compared to a higher viral load (OR = 3.2; 95% CI, 1.5-6.9; p = 0.02) and self-reported adherence above 95% compared to adherence below 75% (OR = 4.0; 95% CI, 1.9-8.6; p < 0.001).

However, the strongest predictor of a virologic response to therapy was hair concentrations of atazanavir in the highest quintile (OR = 59.8; 95% CI, 29.0-123.2; p < 0.001).

Results were similar when analysis was restricted to the 1132 person visits during which ritonavir was used to boost atazanavir.

There was an even stronger association between hair concentrations of atazanavir and resuppression of viral load in the subgroups of patients who had had poor adherence (OR = 210.0; 95% CI, 46.0-961.1); previous low hair levels (OR = 132.8; 95% CI, 26.5-666.0); or detectable viral load (OR = 400.0; 95% CI, 52.3-3069.7).

“Our models show that antiretroviral exposure as measured in hair far surpasses commonly used covariates to predict HIV treatment outcomes,” comment the authors.

They believe that analysis of drug levels in hair samples could help identify patients who are at risk of virologic failure.

“Hair measures in the clinical setting could...trigger interventions to correct adherence or low pharmacokinetic levels.”

The researchers also believe that monitoring hair samples has a number of advantages for both patients and healthcare providers.

“Hair collection is noninvasive and does not require specific skills, sterile equipment, or specialized storage conditions...[it] merely requires a pair of scissors, and storage is at room temperature.”

They conclude, “the results of the analyses presented here argue for the possibility of hair antiretroviral concentrations serving as a method of HIV therapeutic drug monitoring that may increase the durability of current antiretroviral regimens in a variety of settings.”

Reference

HIV & Islam—Responsible religious response to HIV & AIDS in Malaysia
Since the HIV epidemic was first established in 1986, a total of 65,235 cases of HIV have been cumulatively reported in the Malay Muslim community, which constitute 71% of the total caseload. Injecting drug use, the main driver of the epidemic in Malaysia, is another factor that predisposes Muslim Malays to the risk of HIV infection.

The profile of injecting drug users (IDU) in the country has been, through the years, predominantly male, young, of Malay ethnicity and heterosexual. Strict and prohibitive legal, religious and socio-cultural environments also negatively impact on access to appropriate HIV and AIDS education, and treatment, care and support services in the Muslim Malay population.

Recognising the low level of engagement of Islamic religious authorities in the community-based responses to HIV and AIDS, the Malaysian AIDS Council took the pragmatic approach of building strategic partnerships with national and state level religious departments. The HIV & Islam programme was born out of this initiative in 2009, breaking new grounds in amplifying the visibility of Islamic authorities leading the efforts to address the needs of Muslim PLHIV and other most at risk populations. Partnership with principal collaborator, the religious policy-making Department of Islamic Development (JAKIM) in particular has successfully opened doors of opportunities for, inter alia, more meaningful engagement with religious leaders and other key players in open intellectual discourses to advocate for evidence-informed public health approaches to effectively respond to the HIV and AIDS epidemic. As a result, principles previously founded on staunch conservatism have now been replaced with pragmatism.
HIV Google Map Gives New Perspective on Epidemic
By Dave Mosher

The 30th anniversary of HIV is just around the corner, and a new interactive map reveals U.S. data on the disease’s distribution. The information is as granular as individual counties and, for some cities, even zip codes.

The nonprofit mapping effort, called AIDSVu, isn’t a perfect representation of the disease in the United States. The visualization is based on 2008 data, and some states didn’t contribute the county or demographic information that others did. The map shows only diagnosed rates and cases. An estimated one in five HIV carriers in the United States are undiagnosed.

Despite these limitations, it may be the most thorough geographical depiction of HIV ever created. “It shows HIV doesn’t respect borders like statistical reports do, and shows how far it’s reached into every part of the country, even rural areas,” said epidemiologist Patrick Sullivan of Emory University, one of the project’s leaders. “You can, for example, see a corridor of infection that goes down through the southeast. This is a new way of looking at this epidemic.”

Laws in every U.S. state require testing centers to report HIV-positive diagnoses, stripped of private information, to the Centers for Disease Control and Prevention. Yet, building a map using this data was a massive undertaking.

AIDSVu leaders spent more than a year and a half coordinating the data’s entry into a single Google map. With just a few clicks, it shows county-by-county HIV cases and rates, and the epidemic’s patterns by gender, poverty, ethnicity and other demographics.

New York City and Washington D.C. even show the disease’s reach by zip code. For example, in zip code 10036, where this story was written, the rate of people diagnosed with HIV is at least 1.95 percent. That’s about three times New York state’s average.

The AIDSVu map will be continually updated as fresh data arrives. The organization hopes states and counties that didn’t provide more detailed data will change their minds, helping create an even more complete picture of the epidemic.

Determining the Impact of Text Messaging for Sexual Health Promotion to Young People

Young people are the greatest users of new technology, including the Internet and mobile phones, and they are also at greatest risk of STIs. The current study evaluated the impact of text messaging as a vehicle to deliver sexual health promotion to youths.

Participants—individuals ages 16 to 29, who were recruited at a music festival in Melbourne in January 2008—were asked to complete a short survey and provide their cell phone numbers. Every two
weeks for four months, participants received short messaging service (SMS) texts relating to sexual health. They then completed an online follow-up survey. The data collected were weighted to account for those lost to follow-up. Changes in survey responses were compared using McNemar’s test.

In all, 1,771 sexually active individuals with valid mobile phone numbers at baseline were included in the analysis. During the broadcast period, 18 percent (319) withdrew from receiving the texts. Forty percent (587) completed the follow-up survey. Of these, 80 percent found the texts entertaining; 68 percent rated them as informative; and 73 percent showed the texts to others.

“Weighted analyses found a significant increase in knowledge (P<0.01) and STI testing (P<0.05) over time in both males and females,” the authors wrote. The findings indicate that the text messaging approach appears “to be a feasible, popular and effective method of sexual health promotion to young people with a relatively low withdrawal rate, positive feedback, and an observed improvement in sexual health knowledge and STI testing.”

Previously Unknown E. Coli Strain Affects More Than 1,500 In Europe; Source Remains Unknown
The WHO on Thursday said "that an unusually lethal strain of E. coli, which has infected more than 1,500 people in Germany, mystified public health officials and threatened to touch off panic in Europe, was a previously unknown variant of the bacteria, raising new concerns about the extent and severity of the contagion," the New York Times reports. The outbreak, which seems to have begun in Germany, has killed at least 17 people, the newspaper notes (Cowell/Neuman, 6/2).

"The source of the food-borne outbreak is still unknown, though German officials had earlier suggested that the bacteria was spread on tainted cucumbers shipped from Spain," TIME's "Healthland" blog reports. Though tests for the bacteria on Spanish produce have been negative, German officials are continuing to warn against eating raw cucumbers, lettuce and tomatoes, the blog notes (Melnick, 6/1). Officials are investigating another batch of cucumbers that originated in either the Netherlands or Denmark, and they noted that vegetables could be contaminated along the long transport routes, according to the Associated Press/Herald Mail (5/31).

With Germany, Belgium and Russia already banning the import of Spanish vegetables, Spanish farmers "fear the damage to their livelihoods is already done, with millions of euros in losses that threaten to destabilize the whole country’s already-ailing economy," VOA News reports (Frayer, 6/1). European Union Health Commissioner John Dalli "said he was looking at what the European Commission could do about the impact on producers," according to Reuters (Dunmore/Busemann, 6/1).

Media Outlets Examine Case Of Man Cured Of HIV, Leukemia Through Bone Marrow Transplant
In a special report, Reuters examines the case of Timothy Ray Brown, who was cured of HIV and leukemia after undergoing "a bone marrow transplant using cells from a donor with a rare genetic mutation, known as CCR5 delta 32," which researchers knew conveyed resistance to HIV infection. Also known as "the Berlin patient," Brown’s case "has injected new energy into a field where people for years believed talk of a cure was irresponsible," the news service reports (Kelland, 6/1).

The June 6 issue of New York Magazine also includes a feature on Brown's case. "What cured Timothy Brown is obviously not a cure for the rest of the world. But it is proof of concept," the magazine writes (Rosenberg, 5/29).

UF researchers suggest cholera vaccination strategies for Zimbabwe
GAINESVILLE, Fla. — Mathematical models analyzing how a cholera outbreak spread in Zimbabwe are providing new insights into the most effective vaccination strategies for preventing future cholera epidemics, according to University of Florida researchers.

The mathematical models employed to analyze a large cholera outbreak in Zimbabwe in 2008-2009 suggest that mass vaccinations deployed strategically could prevent future cholera epidemics in that county and others.

The researchers' findings, published online in late April in the Proceedings of the National Academy of Sciences, provide a tool for aid agencies in Zimbabwe and in other nations prone to cholera to deliver treatments more cost-effectively.

"We wanted to know where the hot spots of the outbreaks were occurring, and we needed to factor how many people one sick person could potentially infect," said the paper's lead author, Zindoga
Mukandavire, a postdoctoral associate from Zimbabwe with an appointment at UF’s Emerging Pathogens Institute.

To find answers, the UF-led research team examined how cultural, political and economic factors influenced routes of cholera transmission. Cholera is a waterborne disease caused by a bacterium that affects the human intestinal track and an afflicted person may experience days of diarrhea and dehydration, which can lead to death.

The cholera bacterium is not native to the natural environment of Zimbabwe and researchers think it was imported from neighboring nations during the 1970s. During the 2008-2009 cholera epidemic, nearly 100,000 people were sickened and 4,300 died. UF researchers estimate the majority of those cases were the result of human-to-human transmission.

Researchers looked closely at cultural and other practices that might contribute to the spread of the epidemic. In order to account for regional differences in such factors, the researchers tracked weekly cholera incidence rates for each of the country’s 10 provinces.

One practice that stood out was funeral feasts, which are common in Zimbabwe and other African countries. At these feasts, people often eat in a communal fashion, and it is also customary to shake hands with the bereaved, who may have been infected as they cared for the deceased under unsanitary conditions. The bodies are often transported from towns and cities for burial in the rural areas.

"Cholera transmission through these types of direct contacts among people accounted for much of the observed illness," said Dr. J. Glenn Morris Jr., director of the UF Emerging Pathogens Institute and an author of the paper. "There were also striking differences in transmission patterns from province to province, reflecting differences in environment, socio-economic conditions, and cultural practices."

The country’s economic meltdown during the study period likely contributed to cholera outbreaks. As the public health system and infrastructure collapsed, burst sewers and unprotected wells lead to contaminated drinking water. In addition, the economic crisis made life-saving oral rehydration medication financially unaffordable for many Zimbabweans afflicted by cholera.

The differences observed among provinces suggest that approaches to disease control should be tailored to specific regional characteristics. For example, different areas may require different rates of vaccination to control the disease, potentially resulting in cost savings in less severely affected regions.

Eating dirt can be good for the belly, researchers find

Most of us never considered eating the mud pies we made as kids, but for many people all over the world, dining on dirt is nothing out of the ordinary. Now an extensive meta-analysis forthcoming in the June issue of The Quarterly Review of Biology helps explain why.

According to the research, the most probable explanation for human geophagy—the eating of earth—is that it protects the stomach against toxins, parasites, and pathogens.

The first written account of human geophagy comes from Hippocrates more than 2,000 years ago, says Sera Young, a researcher at Cornell University and the study’s lead author. Since then, the eating of earth has been reported on every inhabited continent and in almost every country.

Despite its ubiquity, scientists up to now have been unable to definitively explain why people crave earth. Several hypotheses had been considered plausible. Some researchers think geophagy is simply a consequence of food shortage. In other words, people eat dirt to ease the pangs of hunger, even though it doesn’t provide any nutritional value. Others have suggested that nutrition is exactly why dirt is consumed; perhaps people crave dirt because it provides nutrients they lack, such as iron, zinc, or calcium. Still others posit that earth has a protective effect, working as a shield against ingested parasites, pathogens, and plant toxins.

To sort through the possible explanations, Young and her colleagues analyzed reports from missionaries, plantation doctors, explorers, and anthropologists to put together a database of more than 480 cultural accounts of geophagy. The database includes as many details as possible about the circumstances under which earth was consumed, and by whom. The researchers could then use patterns in the data to evaluate each potential explanation.

They found the hunger hypothesis unlikely. Studies in the database indicate that geophagy is common even when food is plentiful. Moreover, when people eat dirt they tend to eat only small quantities that are unlikely to fill an empty stomach.

The nutrition hypothesis was also a poor fit to the data. The database shows that the kind of earth people eat most often is a type of clay that contains low amounts of nutrients like iron, zinc, and calcium. Plus, if calcium deficiency drove people to eat dirt, one would expect them to do it most often at life stages
when they need calcium the most—adolescence or old age. But that isn't the case, according to the database. Reports do indicate that geophagy is often associated with anemia, but several studies have shown that cravings for earth continue even after people are given iron supplements. What's more, some research suggests that clay can bind to nutrients in the stomach, making them hard to digest. If that's true, it's not a lack of nutrients that causes geophagy; rather it could be the other way around.

Overall, the protection hypothesis fits the data best, the Cornell researchers found. The database shows that geophagy is documented most commonly in women in the early stages of pregnancy and in pre-adolescent children. Both categories of people are especially sensitive to parasites and pathogens, according to Young and her colleagues. In addition, geophagy is most common in tropical climates where foodborne microbes are abundant. Finally, the database shows that people often eat earth during episodes of gastrointestinal stress. It's unlikely the intestinal problems are caused by the dirt itself because the type of clay people usually eat comes from deep in the ground, where pathogens and parasites are unlikely to contaminate it. Plus, people usually boil the clay before eating it.

More study would be helpful to confirm the protection hypothesis, the researchers say, but the available data at this point clearly support it over the other explanations.

"We hope this paper stimulates [more] research," Young and her colleagues write. "More importantly, we hope readers agree that it is time to stop regarding geophagy as a bizarre, non-adaptive gustatory mistake."

"With these data, it is clear that geophagy is a widespread behavior in humans ... that occurs during both vulnerable life stages and when facing ecological conditions that require protection." Sera L. Young, Paul W. Sherman, Julius Beau Lucks, Gretel H. Pelto, "Why on Earth?: Evaluating Hypotheses about the Physiological Functions of Human Geophagy." The Quarterly Review of Biology 86:2 (June 2011).

What Odors Throw Off Mosquitoes? New Findings Hold Big Promise for Fight Against Mosquito-Borne Diseases

ScienceDaily (June 2, 2011) — Female mosquitoes are efficient carriers of deadly diseases such as malaria, dengue and yellow fever, resulting each year in several million deaths and hundreds of millions of cases.

To find human hosts to bite and spread disease, these mosquitoes use exhaled carbon dioxide as a vital cue. A disruption of the vital carbon dioxide detection machinery of mosquitoes, which would help control the spread of diseases they transmit, has therefore been a long sought-after goal.

Anandasankar Ray, an assistant professor of entomology at the University of California, Riverside, and colleagues report in the June 2 issue of Nature (cover story) that they have identified in the lab and in semi-field trials in Africa three classes of volatile odor molecules that can severely impair, if not completely disrupt, the mosquitoes’ carbon dioxide detection machinery.

The breakthrough research covers three of the deadliest species of mosquitoes: Anopheles gambiae (spreads malaria), Aedes aegypti (spreads dengue and yellow fever), and Culex quinquefasciatus (spreads filariasis and West Nile virus).

The odor molecules that the researchers identified work by affecting the mosquitoes’ carbon dioxide receptors, which are located in tiny, antennae-like appendages—called maxillary palps—close to the mouths of the mosquitoes.

The three classes of the odor molecules are:

- **Inhibitors**: Odor molecules, like hexanol and butanal, that inhibit the carbon dioxide receptor in mosquitoes and flies.

  - **Imitators**: Odor molecules, like 2-butanal, that mimic carbon dioxide and could be used as lures for traps to attract mosquitoes away from humans.
Blinders: Odors molecules, like 2,3-butanedione, that cause ultra-prolonged activation of the carbon dioxide sensing neurons, effectively "blinding" the mosquitoes and disabling their carbon dioxide detection machinery for several minutes.

"These chemicals offer powerful advantages as potential tools for reducing mosquito-human contact, and can lead to the development of new generations of insect repellents and lures," said Ray, who led the study. "The identification of such odor molecules—which can work even at low concentrations, and are therefore economical—could be enormously effective in compromising the ability of mosquitoes to seek humans, thus helping control the spread of mosquito-borne diseases."

Female mosquitoes spread disease by first obtaining a blood meal from an infected person and subsequently finding an uninfected person to bite. Extremely sensitive to minute changes in carbon dioxide concentrations, they can sense carbon dioxide in our breath from long distances. Upon encountering a carbon dioxide plume, the mosquitoes orient and fly upwind, arriving eventually near us.

Most mosquito-trapping devices also use carbon dioxide to attract mosquitoes. But these devices tend to be expensive and bulky, and suffer from the usual difficulties associated with supplying carbon dioxide via gas cylinders, dry ice or propane combustion.

"Odor molecules that mimic carbon dioxide activity, on the other hand, can lead to the development of small and inexpensive lures to trap mosquitoes—a great benefit, especially to developing countries," Ray said. "These highly portable, convenient and easily replenishable lures can be used wherever mosquitoes are a menace."

In the case of the "blinder" class of molecules, Ray's group found that even a brief exposure to these odor molecules (presented in a blend of four odors: 2,3-butanedione, 1-hexanol, 1-butanal and 1-pentanal) activated the carbon dioxide-sensitive neurons in mosquitoes for at least five and a half minutes, and evoked such a strong and prolonged response in the neurons that the mosquitoes' responses to subsequent carbon dioxide stimuli were severely reduced for several minutes.

In collaboration with Ring Cardé, a distinguished professor of entomology at UCR, Ray's lab tested the effectiveness of this blend in wind-tunnels, and found that the flight of the blend-exposed mosquitoes toward sources of carbon dioxide in the wind-tunnels was disrupted.

Subsequently, Ray's lab tested the effectiveness of the blend of odors in a semi-field study performed in Kenya in collaboration with scientists Tom Guda and John Githure at the International Centre of Insect Physiology and Ecology (ICIPE), Kenya.

The research team released Culex quiquefasciatus females in a large enclosed greenhouse that contained two hut-like structures with carbon dioxide-emitting traps placed in each of them. The researchers then included in one of the huts a source of the ultra-prolonged blend in the form of a small fan-driven odor dispenser. They found that only a few mosquitoes entered this hut and made it to the carbon dioxide trap.

"The majority of the mosquitoes were blinded by the blend, and their behavior was disrupted so that they could not detect the carbon dioxide trap," Ray explained. "We observed no such disruption of attractive behavior in mosquitoes in the control hut—the one with just the carbon dioxide trap and no blend."

The research was funded by a grant to Ray from the Bill & Melinda Gates Foundation through the Grand Challenges Exploration Initiative and a grant to Ray from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health.

Journal Reference:

Overuse of Antimicrobials in Livestock Risks Human Health, Warn Experts

ScienceDaily (June 1, 2011) — Excessive use of antimicrobials in livestock promotes resistance and risks the future health of both animals and humans, warn experts in an editorial published by Student BMJ on June 1, 2011.

Jørgen Schlundt and colleagues at the National Food Institute in Denmark argue that the routine use of antimicrobials can be reduced substantially, while maintaining profitable animal production, and call for their use to be monitored in all countries.

Antimicrobials are essential for treating bacterial infections in humans and animals. Substantial amounts are used in modern animal production, but their use can result in bacteria that are resistant to treatment.

Resistant bacteria can spread from animals to humans, mainly through the food chain.
Three of four recently emerging infections in humans originate from animals: avian influenza H5N1, severe acute respiratory syndrome (SARS), and Salmonella.

Several global organisations have proposed a range of different actions to contain antimicrobial resistance from animals, including restricting use in animals of the most critically important antimicrobials for humans. The European Union has also begun monitoring resistance in food animals and is implementing mandatory monitoring of antimicrobial usage in all member states.

Such monitoring already occurs in Denmark, along with progressively tighter rules on the use of antimicrobials in the raising of livestock since 1995.

Yet tighter rules do not lead to lower productivity. In Denmark, use of antimicrobial agents per kilogram of pork produced is estimated to be less than a fifth of that in the United States, yet Denmark continues to be the world’s largest exporter of pork and productivity is now higher than ever before.

Data from Norway also show that improving fish farm management and introducing effective vaccines can reduce the use of antimicrobials more than 20 fold.

"We have major tasks ahead for global containment of resistance, in relation to both veterinary and human medicine," write the authors. "Antimicrobials are too precious to be wasted, and both sectors have plenty of room for improvement.”

They conclude: “Substantial reduction of antimicrobial use in livestock is feasible and necessary if we want to preserve the power of antimicrobials for future generations of both animals and humans.”

**Journal Reference:**

**MRSA Transmission May Be Occurring in Fire Stations, Study Suggests**

ScienceDaily (June 2, 2011) — MRSA transmission may be occurring in fire stations, according to a study published in the June issue of the *American Journal of Infection Control*, the official publication of APIC—the Association for Professionals in Infection Control and Epidemiology.

The purpose of the study, conducted by investigators from the University of Washington School of Public Health, was to determine potential areas within the fire stations that were contaminated with methicillin-resistant *Staphylococcus aureus* (MRSA) and characterize the isolates to determine if they were related to hospital (HA-MRSA) and/or community (CA-MRSA) strains.

"This is the first study to molecularly characterize MRSA isolates from fire station environmental surfaces and the first study to sample both fire station surfaces and personnel as well as one of the first studies to characterize non-health care environmental MRSA," commented lead investigator Marilyn C. Roberts, PhD, University of Washington School of Public Health.

Researchers assessed nine different areas in two fire stations that included 1) medic trucks; 2) fire trucks and fire engines; 3) outer fire gear; 4) garages; 5) kitchens; 6) bathrooms; 7) bedrooms; 8) gyms; and 9) other areas. After the first sampling, an educational program was conducted at each station, and hand sanitizers were installed. A second set of samples was collected 7-9 months later at the same two stations. During the second sampling, nasal samples were obtained from 40 healthy fire personnel from 13 stations to evaluate MRSA carriage.

A total of 1,064 samples were collected, 600 in the first sampling and 464 in the second. Each sample was analyzed for MRSA, staphylococci that were not *S. aureus* but were resistant to methicillin (labeled methicillin-resistant coagulase negative *Staphylococcus* spp. [MRCoNS]), and staphylococci that were not methicillin resistant (labeled as coagulase negative *Staphylococcus* spp. [CoNS]).

At the first sampling, 26 (4.3%) of the 600 surface samples were MRSA positive, with MRSA positive samples found in all nine areas sampled. The most common area for MRSA contamination was the medic trucks with 13 (50%), the kitchens with 3 (11.5%) and other areas such as computer keyboards and computer desks with 2 (7.7%).

At the second sampling, 18 (3.9%) of the 464 surface samples were MRSA positive, with MRSA positive samples again found in all nine areas sampled. The kitchen and outer gear both had 4 (22%) MRSA positive samples, while the medic truck had 3 (16.6%), other areas had 1-2 MRSA positive samples each. Two samples contained a strain of MRSA (MRSA SCCmec type II), which is commonly found in hospitals, and were isolated from the fire truck/engine and garage areas.

Thirty percent of the nasal cultures were positive for MRSA (9 samples) or *S. aureus* (3 samples). The majority (58%) of the nasal MRSA and *S. aureus* were genetically related to environmental surface isolates suggesting transmission between personnel and the environmental surfaces may be occurring.
Investigators conclude that "Fire personnel interact with both hospital and community population as part of their job and thus have the potential for exposure to MRSA from both sources...MRSA SCCmec type II isolates, commonly found in the hospital, were also identified in the study, demonstrated that both community- and hospital-like MRSA can contaminate the fire station surfaces. The isolation of the same strain in the fire apparatuses and garage as well as the living quarters suggests that the transmission of MRSA may be occurring between these two areas...Clearly more research is needed to determine if the current findings are representative of fire stations surfaces and personnel throughout the country."

MRSA is an antibiotic-resistant bacteria that can lead to severe infections and is associated with approximately 19,000 deaths annually, according to the Centers for Disease Control and Prevention (CDC). Community-acquired MRSA infections are on the rise, and outbreaks of such infections have occurred among previously healthy individuals on school and professional sports teams, in day care centers, jails, and the military. Risk factors for CA-MRSA include shared personal care products, frequent skin-to-skin contact, skin abrasions and crowded living conditions.

Journal Reference:

Lifelong Antiretroviral Therapy Unsustainable, Experts Say
One-Time HIV Treatments Must Replace ART
Robert Lowes
May 31, 2011 — Although more HIV-infected individuals are receiving life-saving antiretroviral therapy (ART) 30 years after AIDS was identified, researchers must also find cures and vaccines to eliminate the need for this lifelong and challenging treatment, according to an article published online May 31 in the Annals of Internal Medicine by 2 leaders of the National Institute of Allergy and Infectious Diseases (NIAID).

Carl Dieffenbach, PhD, director of the NIAID Division of AIDS, and NIAID director Anthony Fauci, MD, write that lifelong, daily-dosage ART is not a sustainable strategy in a world where 2.5 million people become infected with HIV each year.

To help them stick to their drug regimen, patients receiving ART require a healthcare system capable of delivering long-term care similar to the model used in the United States to manage patients with diabetes.

In an obvious nod to developing nations ravaged by HIV, the authors write that the need for long-term care creates a formidable challenge for "resource-limited settings and for patients who lack adequate health care coverage." They note that ART is given to only 1 in 3 HIV-infected individuals in the world who need it.

Cure Possibilities
One solution, write Drs. Dieffenbach and Fauci, is devising a 1-time cure for HIV, which could fall into 2 different categories. Researchers could find a true "sterilizing" cure that completely eradicates the virus from the body or a "functional" cure that permanently suppresses the virus to a harmless level.

In the case of a sterilizing cure, researchers must solve the problem of cells remaining latently infected even though ART has reduced blood levels of HIV to near zero. When ART ends, these latently infected cells cause the infection to recur.

Investigators are experimenting with ways to flush out the virus from "this persistent reservoir" so it can be treated with ART. Key to the success of this strategy is the development of a simpler, more accurate way of measuring the latent HIV reservoir.

Despite its treatment limitations, ART nevertheless promises to play an important role in preventing HIV infection through preexposure prophylaxis (PrEP) and treatment-as-prevention, according to Drs. Dieffenbach and Fauci. They point to the CAPRISA 004 trial, in which a vaginal gel containing tenofovir lowered the risk for HIV infection in sexually active women by 39%.

Likewise, the iPrEx study showed that a daily regimen of emtricitabine, 200 mg, and tenofovir disoproxil fumarate, 300 mg (Truvada, Gilead Sciences), was 44% effective in preventing infection in men who have sex with men and in transgendered women. The risk for infection decreased by 73% in those who took their pills on 90% or more of the days in the study.
Cautious Optimism
An example of treatment-as-prevention, not discussed in the article, is a recent trial showing that ART given to a group of HIV-infected individuals — most of whom were heterosexual — with relatively healthy immune systems was 96% effective in preventing infection in their partners.

The "ideal cornerstone" of a prevention strategy, the authors write, would be a safe and effective vaccine. The quest for such a vaccine has met with repeated failures, although several recent advances have led to "a degree of cautious optimism." For example, researchers have found that sexual transmission of HIV often appears to begin with a single "founder virus" that differs from the various strains that develop over time in an infected person.

This insight may create new targets for vaccines. In addition, a 2009 vaccine trial in Thailand reported 31% efficacy in preventing HIV infection — a modest success that future trials can build on.

A vaccine that guards against all forms of sexual transmission — including blood-borne transmission — would work in tandem with a growing number of other evidence-based prevention strategies ranging from PrEP to adult male circumcision, according to Drs. Dieffenbach and Fauci.

"Researchers are unlikely to achieve transformative successes in HIV with a unidimensional approach," they write. "Instead, this will require various versions of combination prevention strategies, depending on the target population."

Drug policy: Supply and demand
The argument over treatment is being won. Now for the battle over supply
Jun 2nd 2011 | MEXICO CITY | from the print edition

NARCOTICS liberalisation was once the cause of freethinkers and hippies. Now a more sober bunch is criticising the "war on drugs". On June 2nd the Global Commission on Drug Policy, a group including ex-presidents of Brazil, Mexico, Colombia and Switzerland; the prime minister of Greece; a former secretary-general of the United Nations; and, from America, an ex-secretary of state and ex-chairman of the Federal Reserve, called for the decriminalisation of all drug taking, and for experiments in the legal regulation of the sale of drugs, starting with cannabis.

Calls for a rethink of the 50-year-old policy of prohibition have been growing. As the report pointed out, drug consumption has continued to rise, even as billions of dollars and tens of thousands of lives have been spent trying to stamp it out. In the ten years to 2008, the most recent data available, the number taking cannabis worldwide increased by 8.5%, of cocaine by 27%, and of opiates by 34.5%. America’s federal government alone spent $15 billion in 2010 on drug control; perhaps $25 billion more went in other public spending.

Prohibition has brought many short-term wins but no lasting ones. The authorities drove cocaine smugglers out of the Caribbean in the 1980s. But they then popped up in Mexico. A campaign against “narco” there has cost at least 35,000 lives in the past five years—and is driving them into the chaotic countries of Central America. Guatemalan officers found 27 headless bodies near the Mexican border last month, and blamed the Mexican Zetas “cartel”.

A similar merry-go-round is spinning in the Andes, where production driven out of Peru and Bolivia and into Colombia in the 1990s is now being swept back in the other direction. As cocaine taking has fallen in America it has risen in Europe: Latin American “cartels” have diversified their export strategy (wrecking parts of West Africa, a convenient staging post, along the way).

The Global Commission backs basic measures to protect drug takers and save money: providing clean needles, for instance, does not stop people taking the drug, but does stop them getting infected. In Britain, Germany, Switzerland and Australia—which all got on the clean-needle bandwagon early—HIV rates among injecting drug takers are lower than 4%. But they are more than 12% in France, and over 15% in America and Portugal, which came late to the idea. Thailand and Russia, still not keen, have rates of around 40%.

Prescribing heroin, as Switzerland and the Netherlands do, seems to cut the number of users a lot, as dealer-addicts are taken out of the equation, breaking the link between wholesalers and casual customers. Decriminalising the possession of cannabis in Western Australia and Portugal (which decriminalised possession of all drugs in 2001) had no impact on consumption, but saved a lot of money. A study of American states found no link between the diligence of enforcement and changes in user numbers. When Britain reclassified cannabis as a less serious drug in 2004, consumption slumped. (Despite that, the government backtracked five years later.)
Going easy on users may save money and lives. But many in Latin America worry that decriminalising only consumption will increase demand but do nothing to take the trade away from criminals. The Global Commission had much less to say on the question of legalising supply, calling only for more “experimentation” with models of legal regulation, and lighter sentences for small-scale dealers. That would do nothing to deter outfits like the Zetas.

Debates on legalisation are vetoed by consumer countries, which fear an increase in addiction were drugs to be made more freely available. For embattled transit countries such as Mexico, where a former president, Vicente Fox, has called for supply and distribution to be legalised, that is a gamble worth taking.

The gulf in opinion may narrow. The traditional distinction between producer and consumer countries is blurring, as drug use grows among producers and domestic output grows among the consumers. Cocaine use has been rising in South America, where average rates of lifetime use are now about the same as in Europe. In Mexico the rate doubled between 2002 and 2008 (though it is still well below America’s). At the same time, cannabis cultivation is big business in America and parts of Europe, and crystal meth can be cooked up anywhere (though it is easier where law enforcement is weak). As the drug problems of the rich and poor world converge, governments may be more likely to see eye to eye.

Longevity of AIDS Patients Presents New Risks: US

Agence France Presse, (06.02.2011)

CDC is marking the 30th anniversary of AIDS this week by calling on Americans to recommit themselves to HIV prevention, testing, and treatment efforts.

“Over the last three decades, prevention efforts have helped reduce new infections and treatment advances have allowed people with HIV to live longer, healthier lives,” said CDC Director Dr. Thomas R. Frieden. “But as these improvements have taken place, our nation’s collective sense of crisis has waned. Far too many Americans underestimate their risk of infection or believe HIV is no longer a serious health threat, but they must understand that HIV remains an incurable infection.”

“Currently, more than 1.1 million people in the United States live with HIV, and as this number increases, so does the risk of transmission,” Frieden said.

The agency released updated data Thursday showing that 20 percent of teenagers and adults with HIV are unaware of their infection. Approximately 1,819 of every 100,000 African Americans have HIV, 593 of Hispanics or Latinos and 238 of whites. The rate of new HIV infection for black men is six times that of white men, and about three times that of Hispanic men. Black women are 15 times more likely to have HIV compared to their white peers, and almost four times more likely than Hispanic women. Among Hispanics, the rate of new infections among men is more than double that of white men, and the rate among Latinas is almost four times that of white women.

Men who have sex with men continue to be disproportionately impacted by the disease, accounting for nearly 50 percent of people living with HIV.

“Today, the most infections are among people under 30, a new generation that has never known a time without effective HIV treatments and who may not fully understand the significant health threat HIV poses,” Frieden noted.


Black MSM Focus of New HIV Campaign

Bay Area Reporter (San Francisco), (05.26.2011) Matthew S. Bajko

CDC’s “Know Where You Stand” prevention campaign urges African-American men who have sex with men to learn their HIV status. Launching in 14 cities, the outreach has recently put up billboards in Oakland and San Francisco calling for black MSM to “Get Tested. Know More.”

Banner ads touting the same message are running on several websites that target black MSM, including LOL Darian, Black Gay Chat Live, and DowneLink. The campaign also will feature prominently at Black Pride events across the country this summer.

CDC consulted 19 black MSM stakeholders to assist in developing the campaign, a group that ranged from community leaders to researchers. Ernest Hopkins, legislative director for the San Francisco AIDS Foundation, was one of those who helped CDC “go through the literature and test campaign ideas to really begin to understand what would be needed in order to address this population in a culturally appropriate way.”
Another consultant was Venton Jones, a D.C.-based senior program associate for communications and member education at the National Black Gay Men’s Advocacy Coalition. The campaign message of “knowing your truth” is designed to get men not only to test for HIV but also take care of their health in general, he said. “It is powerful just in the title itself to know where you stand, and that is making sure you get tested and if you are positive, to start treatment,” Jones noted.

“Know Where You Stand” is part of CDC’s Act Against AIDS, which launched in 2009 as a multi-pronged, five-year campaign.

Data show black MSM are the group most disproportionately affected by HIV/AIDS. A 2008 CDC study of 21 US cities found that 28 percent of black MSM were HIV-positive, of which 59 percent were unaware of their infection.

Safe Sex Ads to Return to Bus Shelters
Australian Associated Press, (06.01.2011) Gabrielle Dunlevy
Ads advocating protected sex are set to return to Brisbane bus stops after being removed following complaints. The ads depict a fully dressed same-sex couple grasping a wrapped condom.

The Australian Christian Lobby (ACL) accused the “Rip and Roll” campaign of illustrating foreplay and being inappropriate for public display. The week of the ad’s debut, the advertising firm Adshel, the billboard vendor Goa and the Advertising Standards Bureau logged 30 complaints.

The ad presents contact information for Healthy Communities, a recipient of local government support for sex education marketing since 1988. A Healthy Communities-spearheaded demonstration disputing the ad’s ouster drew 30 protesters to Adshel’s Brisbane headquarters Wednesday. A Facebook campaign signed up 30,000 supporters.

Adshel CEO Steve McCarthy said the discovery that the complaints were the result of a “coordinated ACL campaign” caused the company to revisit its decision and replace the ads.

According to Healthy Communities Executive Director Paul Martin, surveys and the quick response to the ads’ removal demonstrate widespread support for gay rights. “We keep drawing attention to that evidence, but some people give undue weight to a vocal minority in the community—like people connected to ACL,” said Martin.

Wendy Francis, ACL’s Queensland director, said she led the campaign to oppose its sexual nature, irrespective of the homosexual context. “I think it’s another loss for our children, I really do,” said Francis.

Queensland Treasurer Andrew Fraser admonished Francis to “Check the calendar, it’s 2011.” “I think we should call it for what it is and this is basic homophobia,” said Fraser.

High Prevalence of Food Insecurity Among HIV-Infected Individuals Receiving HAART in a Resource-Rich Setting
AIDS Care Vol. 23; No. 2: P. 221-230, (02..2011) A. Anema; S.D. Weiser; K.A. Fernandes; E. Ding; E.K. Brandson; A. Palmer; J.S.G. Montaner; R.S. Hogg
The researchers set out to assess the prevalence and correlates of food insecurity in a cohort of HIV-positive persons receiving highly active antiretroviral therapy in British Columbia. The adults receiving HAART had voluntarily enrolled in the Longitudinal Investigations into Supportive and Ancillary Health Services (LISA) cohort.

A modified version of the Radimer/Cornell questionnaire was used to measure individual food insecurity, while bivariate analyses determined the differences between explanatory variables for individuals who were food secure and food insecure. Independent predictors of food insecurity were determined through logistic regression.

There were 457 individuals enrolled in the LISA cohort; of these, 324 (71 percent) were classified as food insecure. Multivariate analysis determined that the individuals more likely to be food insecure were those who had incomes of less than $15,000 (odds ratio 3.15, 95 percent confidence interval 1.83, 5.44), used illicit drugs (OR 1.85, 95 percent CI 1.03, 3.33), smoked tobacco (OR 2.30, 95 percent CI 1.30, 4.07), had depressive symptoms (OR 2.34, 95 percent CI 1.38, 3.96), and were younger (OR 0.95, 95 percent CI 0.92, 0.98).

“Our results demonstrated a high (71 percent) prevalence of food insecurity among HIV-infected individuals receiving HAART in this resource-rich setting, and that food insecurity is associated with a compendium of environmental and behavioral factors,” the authors concluded. “More research is needed to understand the biological and social pathways linking food insecurity to these variables in order to identify program strategies that can effectively improve food security among HIV-infected populations.”
**European E. Coli Strain Never Seen Before In Humans, Scientists Say**
The food safety office of the WHO on Thursday announced that the bacterium responsible for the E. coli outbreak in Europe is a strain never seen before in humans and could mean "the infection could prove unusually difficult to bring under control," *Nature News* reports (Turner, 6/2).

At least 16 people have died and 1,624 cases have been reported, according to the WHO, making it "the deadliest outbreak of the bacteria on record as a rare strain is causing kidney failure in unprecedented numbers, U.S. health officials said," *Bloomberg* reports (Randall/Larkin, 6/3).

"According to WHO, of more than 1,600 people sickened by this E. coli strain, 499 developed a rare and potentially fatal kidney-failure complication known as hemolytic uremic syndrome – a complication that can shut down the kidneys and normally occurs in only a small percentage of people sickened during an E. coli outbreak. It is also unusual in that most of those affected are young adults — and mostly women. E. coli infections normally hit young children and the elderly hardest," the *Wall Street Journal* writes (Martin/Stevens/Miller, 6/3).

The origins of the outbreak remain unknown, and "[t]en countries have now reported cases, but virtually all of them have been traced to northern Germany, where the outbreak began several weeks ago," according to the *New York Times* (Cowell/Kanter, 6/2).

**U.S. Foreign Aid Recipients Own Billions In Treasury Securities, CRS Report Says**
"The Congressional Research Service released a report last month, a copy of which Fox News exclusively obtained, showing that in fiscal year 2010, the latest year that data was available, the U.S. handed out a total of $1.4 billion to 16 foreign countries that held at least $10 billion in Treasury securities," *FoxNews.com* reports. Countries that hold U.S. Treasury securities and also receive foreign aid, which is earmarked for a variety of programs, such as fighting HIV/AIDS or terrorism, include Brazil, China, Russia, India, Mexico and Egypt, according to FoxNews.com.

"Borrowing money from countries who receive our aid is dangerous for both the donor and recipient," Senator Tom Coburn (R-Okla.), who requested the report, said in a statement. "If countries can afford to buy our debt, perhaps they can afford to fund assistance programs on their own," he added. FoxNews.com notes the State Department did not respond to a request for comment (6/3).

**International Drug Policy Panel Calls For Legalization Of Some Drugs, De-Criminalizing Drug Use**
The Global Commission on Drug Policy — a panel that includes former U.N. Secretary-General Kofi Annan, Global Fund to Fight AIDS, Tuberculosis and Malaria Executive Director Michel Kazatchkine, and several other current and former world leaders — has released a report calling for "the legalization of some types of drugs and an end to the criminalization of drug users," *The Voice of Russia* reports (Vladimir, 6/2).

"In its 2011 report, the Global Commission endorses approaching drug use as a public health problem as well as examining alternatives to the incarceration of drug users, farmers, and petty sellers. But it also recommends more revolutionary approaches like decriminalisation of drug use and the possibility of legal regulation," *Inter Press Service* writes (Crowe, 6/2).

**Bacterial roundabouts determine cell shape**
*Max Planck scientists decipher important mechanisms of bacterial cell wall synthesis*
**June 03, 2011**

Almost all bacteria owe their structure to an outer cell wall that interacts closely with the supporting MreB protein inside the cell. As scientists at the Max Planck Institute for Biochemistry and at the French INRA now show, MreB molecules assemble into larger units, but not — as previously believed — into continuous helical structures. The circular movement of these units along the inside of the bacterial envelope is mediated by cell wall synthesis, which in turn requires the support of MreB. This mutual interaction may be a widespread phenomenon among bacteria and opens up new avenues for therapeutic intervention. The bacterial cell wall is already a major target for antibiotics. (*Science*, June 3, 2011)
Even single cells have to maintain their shape: In higher organisms, the supporting structures of the cytoskeleton, which include filament networks made of the protein actin, take care of this job. The much smaller bacterial cells possess similar cytoskeletal structures, such as the actin related protein MreB. Up to now, scientists believed that this molecule forms spiral structures on the inside of the cell membrane in non-spherical bacteria, which serve as a scaffold for the assembly of the comparatively rigid cell wall.

Using innovative imaging technologies based on fluorescent microscopy, the scientists in the laboratory of Roland Wedlich-Söldner have now been able to show that MreB proteins do not form such highly ordered structures – and yet are organized in more complex ways than they had previously assumed. “MreB molecules assemble into larger units, or patches. They move in circular paths along the inside of the cell membrane, but without following a preferred direction”, explains Julia Domínguez-Escobar, PhD student at the Max Planck Institute of Biochemistry.

A highly unexpected finding of the study was that the movement of MreB patches relies on a functioning cell wall. MreB structures cannot move on their own but are pulled along the bacterial envelope by the newly synthesized cell wall material. The MreB patches are located at the inside, the cell wall at the outside of the cell membrane. Thus, interaction is likely mediated by molecules that span the cell membrane. These molecular adapters link the incorporation of newly synthesized cellular material with the MreB units, which thereby follow the permanently growing cell wall structures.

Many parts of the cell wall are almost universally conserved in bacteria, making it likely that the newly discovered mechanism is widespread. Hence, the results could play an important role for the further investigation of bacterial cells, but also for medicine: “Cell wall synthesis already is a key target for antibiotics. New insights into the structure of the cell wall could open up urgently needed therapeutic alternatives”, hopes Wedlich-Söldner.

**NIH scientists reactivate immune cells exhausted by chronic HIV**

Scientists at the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, have demonstrated why certain immune cells chronically exposed to HIV shut down, and how they can be reactivated.

Healthy B cells have a balanced mix of surface proteins that the immune system can use, like the gas pedal and brake of a car, either to activate the cell or to damp down its activity. However, in people with long-term HIV infection who have not begun antiretroviral therapy, their B cells—responsible for producing anti-HIV antibodies—display a surplus of inhibitory receptors, the surface proteins used to apply the brakes on a B cell. Scientists from the NIAID Laboratory of Immunoregulation led by Lela Kardava, Ph.D., Susan Moir, Ph.D., and Anthony S. Fauci, M.D., NIAID Director and Chief of the laboratory, wanted to know if this phenomenon can help explain why B cells become “exhausted” and essentially shut down in people who are HIV-infected but treatment-naive.

To test their hypothesis, the scientists used molecules called small interfering RNAs (siRNAs), which acted at the genetic level to prevent exhausted B cells from replenishing inhibitory receptors. After treatment with siRNAs, the exhausted cells responded more normally to conditions that typically would spur a B cell into action, such as the presence of a virus, demonstrating that the excess of inhibitory receptors may explain why exhausted B cells are so unresponsive.

Because B cells generally are difficult to manipulate, the new siRNA-based approach may hold promise for scientists seeking to develop therapies to improve the human antibody response against HIV and other pathogens by altering the expression of specific B-cell genes.

Deadly Bacteria May Mimic Human Proteins to Evolve Antibiotic Resistance

ScienceDaily (June 2, 2011) — Deadly bacteria may be evolving antibiotic resistance by mimicking human proteins, according to a new study by the Translational Genomics Research Institute (TGen).

This process of "molecular mimicry" may help explain why bacterial human pathogens, many of which were at one time easily treatable with antibiotics, have re-emerged in recent years as highly infectious public health threats, according to the study appearing in the online journal *PLoS ONE*, published by the Public Library of Science.

"This mimicry allows the bacteria to evade its host's defense responses, side-stepping our immune system," said Dr. Mia Champion, an Assistant Professor in TGen's Pathogen Genomics Division, and the study's author.

Using genomic sequencing, the spelling out of billions of genetic instructions stored in DNA, the study identified several methyltransferase protein families that are very similar in otherwise very distantly related human bacterial pathogens. These proteins also were found in hosts such as humans, mouse and rat.

Researchers found methyltransferase in the pathogen Francisella tularensis subspecies tularensis, the most virulent form of Francisella. Just one cell can be lethal. Methyltransferase is a potential virulence factor in this pathogen, which causes Tularemia, an infection common in wild rodents, especially rabbits, that can be transmitted to humans through bites, touch, eating or drinking contaminated food or water, or even breathing in the bacteria. It is severely debilitating and even fatal, if not treated.

Similar methyltransferase proteins are found in other highly infectious bacteria, including the pathogen *Mycobacterium tuberculosis* that causes Tuberculosis, a disease that results in more than 1 million deaths annually. The study also identified distinct methyltransferase subtypes in human pathogens such as Coxiella, Legionella, and Pseudomonas.

In general, these bacterial pathogens are considered "highly clonal," meaning that the overall gene content of each species is very similar. However, the study said, "The evolution of pathogenic bacterial species from nonpathogenic ancestors is ... marked by relatively small changes in the overall gene content."

Genomic comparisons were made with several strains of the bacteria, as well as with plants and animals, including humans. The methyltransferase protein also was found to have an ortholog, or similar counterpart, in human DNA. Although the overall sequence of the orthologs is highly similar, the study identifies a protein domain carrying distinct amino acid variations present in the different organisms.

"Altogether, evidence suggests a role of the Francisella tularensis protein in a mechanism of molecular mimicry. Upon infection, bacterial pathogens dump more than 200 proteins into human macrophage cells called 'effector proteins.' Because these proteins are so similar to the human proteins, it mimics them and enables them to interfere with the body's immunity response, thereby protecting the pathogen," Dr. Champion said.

"These findings not only provide insights into the evolution of virulence in Francisella, but have broader implications regarding the molecular mechanisms that mediate host-pathogen relationships," she added.

Identifying small differences between the pathogen and human proteins through Next Generation genome-wide datasets could help develop molecular targets in the development of new drug treatments, she said.

**Journal Reference:**

Mechanism in Saliva Production Discovered

ScienceDaily (June 3, 2011) — University of Louisville researchers are one step closer to helping millions of people whose salivary glands no longer work because of disease or damage from treatment of diseases.

The scientific finding of Douglas Darling, PhD, professor, Department of Oral Health and Rehabilitation, UofL School of Dentistry, and his team identified a protein sorting mechanism used by the salivary gland. The National Institutes of Health supported study published online first this week in the *Journal of Dental Research*.

The scientific discovery could form the basis for advanced therapies for patients whose salivary glands are damaged or no longer function due to radiation therapy, prescription drugs or Sjogren's
Syndrome—an immune system disorder often defined by its two most common symptoms—dry eyes and a dry mouth.

The salivary glands are essential for lubrication, defense and beginning digestion in the mouth. The largest of the salivary glands—the parotid—secretes important proteins into the saliva. As with all salivary glands, it has multiple secretion pathways, therefore it must sort proteins destined for saliva into the correct pathway for secretion. This can be tricky as there are seven possible pathways. One pathway takes proteins to the salivary duct, other pathways carry different proteins to the ‘back’ side of the cell to be secreted into the blood or to form a supportive matrix for the cells. Transport along these pathways occurs by sorting the proteins into vesicles (hollow membrane sacs) that carry their "cargo" to the correct destination.

Conventional thought was that cargo proteins are moved into the forming vesicles by attaching to sorting receptor proteins. Darling and his team have discovered a completely new approach, suggesting the reason no salivary sorting receptor protein has been found is that it may not exist.

In Darling’s new model, the salivary cargo protein, Parotid Secretory Protein (PSP), selectively and directly binds to a rare lipid, a type of fat molecule called PtdIns(3,4)P2, present only in certain cell membranes—and only present on one side of the membrane. Darling also found PtdIns(3,4)P2 can flip to the inner part of the vesicle membrane -giving PSP the opportunity to bind it.

"These data imply that phosphatidylinositol-phosphate lipids like PtdIns(3,4)P2 may have multiple functions on the outer surface of organelles," Darling said. "This is contrary to the current belief that their functions are always limited to one surface of the cell membrane."

The next step is for Darling and his team to identify the molecular components used for flipping PtdIns(3,4)P2, and develop approaches to test ways to manipulate this potential protein sorting mechanism.

**Journal Reference:**

**UN Says New AIDS Infections Dropped Since 2001**
*Associated Press*, (06.03.2011) Edith M. Lederer

Since the turn of the new millennium, HIV infection rates have dropped almost 25 percent; fewer people are dying of AIDS; and unparalleled strides have been made in accessibility to therapy and prevention assistance, according to “AIDS at 30: Nations at the Crossroads,” a report released Thursday by UNAIDS.

The report notes that 2.6 million people became HIV-positive in 2009, raising the number of people living with HIV to 34 million at the close of 2010. Although approximately 6.6 million people living in developing countries are on antiretrovirals, an additional 9 million stand in need of the drugs.

“"We have made tremendous progress in stabilizing or reducing rates of new infections in nearly 60 countries," UNAIDS Executive Director Michel Sidibe wrote. However, he pointed out that this success further underscores the "rampant stigma and discrimination that contributes to rising infection rates among key populations at high risk, and to the vulnerability of women and girls."

Sex workers, according to the report, experienced an increase in HIV prevalence from 44 to 50 percent between 2008 and 2010. At the same time, HIV prevalence among men who have sex with men went from 30 percent to 36 percent. Additionally, one in five of the 15.9 million intravenous drug users around the world are HIV-positive.

Resources donated to help developing countries grapple with AIDS jumped by $14.3 billion from 2001-09. However, despite the persistent need, such funding recently declined for the first time.

Compared to HIV’s staggering growth between 1981 and 2000, the report states worldwide reaction to HIV has realized “important achievements”—while still falling short of global and national prevention targets.

“People in rich countries don’t die from AIDS anymore, but those in poor countries still do and that’s just not acceptable,” former President Bill Clinton wrote in the report.

**Tests for HIV, Safe Practices Crucial**
*Atlanta Journal-Constitution*, (06.05.2011) James W. Curran, MD, MPH

“The virus causing AIDS was discovered in 1983, and soon it was learned that infection with HIV was lifelong and universally fatal. Furthermore, millions of people throughout the world had already been infected without knowing it. Complacency turned into panic, and activism confronted individual denial and the scarcity of governmental attention and funding.
“... By 1995, combination therapy for HIV had reduced death rates in the United States by 80 percent. Despite extensive costs, these treatment benefits have been extended to over 5 million HIV-infected persons worldwide.

“Time to relax and count our blessings? Hardly!

“In the United States, more than 1.1 million people are infected with HIV and will require lifelong therapy if they are diagnosed in time. CDC estimates that more than 50,000 people are newly infected each year in the United States and that more than half acquire their infection from the estimated 225,000 HIV-infected persons who have not been tested and are unaware of their own infection.

“Denial and complacency have returned as many people have unprotected sex in this sea of ignorance about HIV. And the global epidemic is of even greater concern.

“We need continued strong science to seek an effective vaccine, curative therapy, and more effective prevention methods. Since approximately 4 million people are having sex for the first time each year in the United States, education and prevention efforts must be renewed.

“We can’t forget the lessons from 30 years ago about AIDS.

“The epidemic is still with us. Be informed. Get tested. Be safe.”

The author is the former director of CDC’s HIV/AIDS Division and also served as assistant US surgeon general. Currently the dean of Emory University’s Rollins School of Public Health, he received the 2011 Ryan White Distinguished Leadership Award for his lifetime contributions to AIDS prevention.

**HIV tests every 3 to 6 months suggested for all sexually active gay men in US**

Michael Carter
Published: 07 June 2011

Sexually active gay and other men who have sex with men (MSM) should have an HIV test every three to six months, US investigators suggest in the June 3rd edition of Morbidity and Mortality Weekly Report.

The investigators make the recommendation after examining HIV prevalence and risk behaviour in over 7000 gay men who believed themselves to be HIV-negative.

Overall, 9% of men tested HIV-positive.

Current US guidance recommends annual HIV tests for all sexually active gay men, and more frequent tests (every three to six months) for men deemed to be at higher risk of HIV – those with multiple partners, or engaging in unprotected sex, as well as users of methamphetamine or other drugs during sex.

However, HIV prevalence in the current study did not differ between men who were considered “higher risk” and those deemed to have a lower risk of infection.

This finding lead the investigators to comment: “self-reported risk behaviors might not determine which MSM should be tested more frequently...more frequent testing, perhaps as often as every 3 to 6 months, might be warranted among all sexually active MSM, regardless of their risk behaviors.”

In June 1981 the first clusters of what was to become known as AIDS were reported in young gay men in New York and San Francisco. Thirty years later gay men still remain a major focus of the HIV epidemic in the US and many other cities.

Testing is a central plank of HIV prevention efforts. “Persons often reduce their risk behaviors when they receive a diagnosis of HIV infection and persons who do not know they are infected are estimated to account for more than half of sexually transmitted HIV,” explain the investigators.

With this in mind, the researchers wished to gain a clearer understanding of testing and risk behaviours in gay and other MSM in the US.

The study sample comprised 7271 gay men recruited in 21 cities in 2008 who participated in the National HIV Behavioral Surveillance System.

All the men reported sex with another man, and completed questionnaires about HIV testing and sexual risk. Only men who believed themselves to be HIV-negative were eligible for inclusion in the study.

Overall HIV prevalence was 9%. Just under a fifth of men testing positive reported never having an HIV test, and 29% reported a previous test within the past six months.

Analysis was focused on the 4453 individuals (61%) who reported an HIV test within the past twelve months. In all, 7% of these men were found to be HIV-positive. Prevalence differed by race, and was higher in African Americans than other groups (15%, vs 7% Hispanics vs 3% whites).

Of the 3672 men who reported high-risk behaviour in the past twelve months, 7% were HIV-positive. This compared to a prevalence rate of 8% in men who did not report higher-risk sex or drug use.
The danger of relying on self-reported behaviour to assess HIV risk was starkly demonstrated by one of the study’s findings. Participants were asked to report if they had had unprotected sex in the previous twelve months.

Analysis restricted to individuals who had had a previous HIV test within this period revealed that 8% of men reporting no unprotected sex were HIV-infected compared to 6% of individuals who reported unprotected sex.

“This analysis demonstrates that MSM remain a key population for expanded HIV testing efforts,” comment the authors, who conclude that current HIV screening guidelines need to be reconsidered, and testing every three to six months should be recommended for all gay men, regardless of their report risk behaviour.

Reference

Cash cure for the AIDS epidemic?
South African researchers are testing whether financial incentives can stop HIV infection in teenagers. Priya Shetty

Students in KwaZulu-Natal are being offered cash incentives to stay in school and HIV-free. Getty Images

South African teenagers could pocket as much as 2,700 rand (US$400) over the next 18 months in exchange for staying HIV-free. South Africa has 17% of the world’s HIV-infected people, with young girls one of the highest risk groups, because poverty drives them to have sex in exchange for gifts. Researchers now want to see whether using cash payments as a reward for getting good grades and having annual HIV tests could curb the girls’ risky sexual behaviour.

Last September, the Centre for the AIDS Programme of Research in South Africa (CAPRISA) in Durban enrolled male and female students at 14 schools in a rural district in KwaZulu-Natal in a trial to test the cash incentive scheme. Students aged 13 years and older at seven schools were offered the payments, and students at the other seven schools were used as controls.

A similar study of Malawian schoolgirls who were offered cash to stay in school found that the HIV infection rate was 60% lower than those not receiving the money, causing a flurry of excitement at the 2010 International AIDS conference in Vienna. But that trial measured HIV rates only as an afterthought, so the team couldn’t reliably say whether the two study groups started with similar infection rates, says Quarraisha Abdool Karim, lead researcher on the CAPRISA trial, which is named RHIVA (Reducing HIV in Adolescents).

Test drive
“Girls in South Africa have sex for the same reason that girls elsewhere have sex.”

South Africa is currently undertaking a mammoth drive to test 15 million people for HIV by the end of this month; 12 million have been tested so far. The country’s health minister, Aaron Motsoaledi, is keen to test schoolchildren too, which has stirred controversy among human-rights groups and parents, who argue that teenagers may not be emotionally equipped to deal with an HIV-positive diagnosis. But Abdool Karim doesn’t see any other option. In 14-year-old South African girls, HIV prevalence is about 2% and there is a steady rise with age — by age 20, as many as 16% could be infected.

The CAPRISA trial, which is due to run until the end of 2012, differs from most HIV-prevention programmes by trying to influence male behaviour as well. Too many target only women, says Sarah Hawkes, a sexual-health expert at University College London. She notes: "Men are driving the epidemic — through their sexual behaviours, drug-taking, risk-taking and the fact that they often hold the balance of power in decision-making in intimate relationships." It is hoped that the boys involved in this project will be less likely to engage in risky behaviours in the future.

Many health experts are enthusiastic about the use of cash incentives — whereas educating people about health risks may not always change behaviour, paying them might. For instance, India’s cash scheme to encourage women to give birth in medical facilities has produced good results. Financial incentives have also led to higher rates of smoking cessation in the United States.

Cash controversy
Yet the idea has its detractors. "Development practitioners and governments across the world need to question where incentivizing behaviour change through money will end," says Sophie Harman, an HIV/AIDS policy expert at City University, London.
Elizabeth Pisani, an AIDS epidemiologist, formerly with the UN programme on HIV/AIDS (UNAIDS), is concerned that such schemes are well intentioned but unrealistic. "Girls in South Africa have sex for the same reason that girls elsewhere have sex: because they fancy the bloke, because sex is fun, because it makes them feel grown-up, or loved, or desirable, or cool. Will cash make a girl have safer sex, use condoms more frequently? If so, there's every chance that the condoms will disappear once the bribes do."

Jerome Singh, an ethicist on the CAPRISA trial and ethics director for the Grand Challenges in Global Health initiative, funded by the Bill & Melinda Gates Foundation, points out that the students aren't just handed the cash. "Study participants are taught life-orientation skills, including how to manage their personal finances."

The urgency of the AIDS epidemic warrants trying whatever might work, says Abdool Karim. "We have to think out of the box. Young women are infected before they even have a glimpse of what their life could be like," she says.

References
1. Baird, S., Chirwa, E., McIntosh, C. and Ozler, B. Health Econ. 19, (suppl.), 55-68 (2010). | Article | ISI |

CDC Study: Gay, Bisexual Teens Do Riskier Things
Associated Press , (06.06.2011) Mike Stobbe
The largest federal survey of sexual orientation and risk behavior in teens shows gay and bisexual youths are more likely to engage in activities that place their health at risk—like alcohol use, sex or drug use—than their heterosexual peers.

The CDC report on results from the Youth Risk Behavior Surveillance System (2001-09) included data from large population-based samples of public school students in grades nine through 12; eligible sites were those that asked questions about sexual identity, sex of partner, or both.

The survey results, which vary by site, indicated:
- 20 percent to 48 percent of sexual minority youths said they currently smoked cigarettes, compared with 8 percent to 18 percent of heterosexual students.
- 21 percent to 32 percent of bisexual students reported an attempted suicide in the previous year, compared with 15 percent to 34 percent of gay and lesbian youths, and 4 percent to 10 percent of heterosexual youths.

"Many risk behaviors are related to how people feel about themselves and the environment they're in," noted Laura Kann, of CDC's Division of Adolescent and School Health, who presented the findings at the first-ever Department of Education summit for gay, lesbian and bisexual youth in Washington.

The study, "Sexual Identity, Sex of Sexual Contacts, and Health Risk Behaviors Among Students in Grades 9-12—Youth Risk Behavior Surveillance, Selected Sites, United States, 2001-2009," was published as an early release in CDC's Morbidity and Mortality Weekly Report (2011;60:1-133). To view the document, visit http://www.cdc.gov/mmwr/preview/mmwrhtml/ss60e0606a1.htm?s_cid=ss60e0606a1_w.

Care for Women with HIV Unequal, Need to Target Immigrants, Aboriginals: Study
Canadian Press , (06.01.2011)
Women represent one-fourth of Ontario's new HIV infections, and prevention and therapy approaches for them need bolstering, according to the Project for an Ontario Women's Health Evidence-Based Report (POWER) study.

The research, conducted during 2006-08 by the Toronto-based St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, also delineates that approximately 60 percent of Toronto’s newly HIV-positive women are immigrants.

"We have made real progress in preventing HIV infection and in treating people living with HIV, but we also identified several groups for whom important disparities persist, including older women, aboriginal women, and women who have immigrated from countries where HIV is endemic," stated study co-author Dr. Ahmed Bayoumi.

The POWER study, funded by Echo: Improving Women's Health in Ontario, is Ontario's first to present an across-the-board assessment of women’s health issues stratified by income, education, ethnicity, and geography. According to Echo CEO Pat Campbell, the study reveals “important gaps in prevention, access, and clinical care,” as well as the need to improve access to care for women aged 55 and older to ensure earlier diagnosis and/or earlier entry to care.

Other significant findings on women and HIV in Ontario include:
Women comprise 18 percent of the province’s HIV population.

93 percent of new infections are acquired sexually; the remainder are linked to intravenous drug use.

Female addicts acknowledge more unsafe drug-use practices than males.

One in three clients of local HIV services are female.

Upwards of 90 percent of expectant mothers knowledgeable of their HIV-positive status received antiretrovirals to block transmission to their unborn children.

“We need to develop programs that ensure that all women who are at risk are screened, and when tests are positive that they receive HIV care in a timely manner,” said principal investigator Dr. Arlene Bierman of St. Michael’s Hospital.

**Adolescent Experiences of Discrimination, Harassment, Connectedness to Community and Comfort with Sexual Orientation Reported by Adult Men Who Have Sex with Men as a Predictor of Adult HIV Status**

_AIDS and Behavior Vol. 15; No. 3: P. 550-556, (04..2011)  _H. Fisher Raymond; Yea-Hung Chen; Ron D. Stall; Willi McFarland_

The association of negative life factors during adolescence and adult HIV status was examined in the current study by using data from a probability-based sample of adult men who have sex with men. A total of 521 MSM reported their experiences of community connectedness, comfort with sexuality, harassment and discrimination due to their sexual orientation at ages 12-18. Serologic testing was performed to determine HIV status.

MSM reported moderate levels of harassment and discrimination and high levels of feeling disconnected from gay communities; they also reported high levels of discomfort with their sexuality at those ages. However, analyses of scores on these factors showed higher experiences of harassment, higher levels of discrimination, and more discomfort at sexuality at those ages were associated with HIV-negative status in adulthood.

“This study suggests that the relationship between negative adolescent experiences among MSM and adult HIV infection may not be straightforward, but may also be dependent upon aspects of the intensity of the negative experiences, the relationship of the victim and the perpetrator(s), the sexual identity of the victim at the time and/or the number of these experiences or the length of time over which they occurred,” concluded the researchers, who called for more studies investigating specific multiple stressors in adolescent gay development and their effect on adult health outcomes.

**Researchers Reverse HIV-Related B-Cell Exhaustion**

**SUMMARY**

Chronic HIV infection reduces B-cell activity and production of antibodies against the virus, but gene therapy may restore memory B-cell proliferation and responsiveness.

Chronic HIV infection is associated with persistent immune activation, even among people with undetectable viral load. Most attention in the field has focused on CD4 T-cells—the primary target of HIV—and CD8 T-cells that play a role in cell-mediated immune response.

But B-cells, which produce antibodies, have also been found to show exhaustion in HIV positive people not treated with antiretroviral therapy, as indicated by changes in cell surface markers.

In the _June 1, 2011, Journal of Clinical Investigation_ Anthony Fauci from the National Institute of Allergy and Infectious Diseases (NIAID) and colleagues reported that increased expression of B-cell inhibitory receptors leads to inefficient HIV-specific antibody responses. Conversely, they found, using small interfering RNA pieces (siRNAs) to down-regulate several of these receptors led to increased tissue-like memory B-cell proliferation, cytokine production, and responsiveness against HIV.

“These findings on HIV-associated B cell exhaustion define potential targets for reversing the deleterious effect of inhibitory receptors on immune responses against persistent viral infections,” the study authors wrote.
Below is an edited excerpt from a NIAID press release describing the research and its findings.

NIH Scientists Reactivate Immune Cells Exhausted by Chronic HIV

June 3, 2011—Scientists at the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, have demonstrated why certain immune cells chronically exposed to HIV shut down, and how they can be reactivated.

Healthy B cells have a balanced mix of surface proteins that the immune system can use, like the gas pedal and brake of a car, either to activate the cell or to damp down its activity. However, in people with long-term HIV infection who have not begun antiretroviral therapy, their B cells—responsible for producing anti-HIV antibodies—display a surplus of inhibitory receptors, the surface proteins used to apply the brakes on a B cell. Scientists from the NIAID Laboratory of Immunoregulation led by Lela Kardava, PhD, Susan Moir, PhD, and Anthony S. Fauci, MD, NIAID Director and Chief of the laboratory, wanted to know if this phenomenon can help explain why B cells become "exhausted" and essentially shut down in people who are HIV-infected but treatment-naive.

To test their hypothesis, the scientists used molecules called small interfering RNAs (siRNAs), which acted at the genetic level to prevent exhausted B cells from replenishing inhibitory receptors. After treatment with siRNAs, the exhausted cells responded more normally to conditions that typically would spur a B cell into action, such as the presence of a virus, demonstrating that the excess of inhibitory receptors may explain why exhausted B cells are so unresponsive.

Because B cells generally are difficult to manipulate, the new siRNA-based approach may hold promise for scientists seeking to develop therapies to improve the human antibody response against HIV and other pathogens by altering the expression of specific B-cell genes.

Reference


Health Officials Rule Out Sprouts As Source Of German E. Coli Outbreak

Health officials in Germany are continuing to search for the source of an E. coli outbreak after tests on suspected sprouts from a farm in the north of the country came back negative, Deutsche Welle reports. The outbreak has killed 22 people and sickened more than 2,000 (Hallam/Penfold, 6/6).

"One of the worst features of the German infection has been the large number of people falling ill with HUS [hemolytic-uremic syndrome], which causes kidney failure and death," the Daily Mirror writes (Swain, 6/7). In addition, ScienceInsider notes that while only a few percent of HUS patients usually show neurological symptoms, about 50 percent in this outbreak are experiencing symptoms such as problems finding words and muscle twitching (Kupferschmidt, 6/6).

Speaking ahead of emergency talks by EU agricultural ministers to address the outbreak and subsequent food import bans instituted by some countries, EU Health Commissioner John Dalli "criticised Germany for rushing out 'premature conclusions' about the source of a mass E. coli outbreak, saying such actions spread alarm among the public and damaged the agriculture sector," according to the Guardian (Dowling/Walker/Gabbatt, 6/7).
The paper
The finding
As it is synthesized, eukaryotic messenger RNA (mRNA) is capped with a guanine molecule, and the first nucleotide of the nascent mRNA strand is modified in higher eukaryotes with a 2’-O-methylation. Many viruses infecting eukaryotic cells do the same. Volker Thiel, at Kantonal Hospital St. Gallen in Switzerland, and colleagues have shown that an invading virus uses this modification to hide from the host’s immune system.
The virus
Coronavirus bypasses the cell’s type I interferon (IFN) response, which stimulates macrophages and natural killer cells to attack virus-infected cells. How the virus escapes was unclear, but Thiel’s group showed that mutant viruses lacking the cap modification are unable to evade IFN defenses, stimulating a response via a sensor called Mda5 that recognizes viral dsRNA.
The methylation
Although eukaryotic 2’-O-methylation was discovered 35 years ago, “there was no clue why this modification was made,” Thiel says. It’s now clear that the cell uses it to distinguish between its own and foreign mRNA—a method that fails during coronavirus infection.
The future
Stanley Perlman at the University of Iowa writes in his F1000 evaluation that, since other viruses also cap their mRNA, “it is likely that this mechanism of virus-mediated evasion of the IFN response is widely used by pathogens.” Thiel is now beginning to study what functions other modifications to cap proteins might have.
Tropism impacts on virological success of first-line HIV therapy
Michael Carter
Published: 08 June 2011
HIV tropism has a significant impact on the virological success of first-line antiretroviral therapy, a Spanish study published in the July 1st edition of the Journal of Infectious Diseases suggests.

Individuals whose HIV used the CXCR4 co-receptor were significantly less likely to achieve an undetectable viral load than patients whose virus used the CCR5 co-receptor. The association between the CXCR4 co-receptor and poorer outcomes was especially strong in patients infected with HIV subtype B. In this study patients were receiving treatment with tenofovir/FTC (Truvada) and either nevirapine or atazanavir/ritonavir. No patients received a drug from the CCR5 inhibitor class.

“It may be worthwhile to perform baseline viral tropism testing before beginning any antiretroviral regimen,” comment the investigators.

HIV uses a co-receptor to latch onto CD4 cells.

In the earlier stages of infection, virus using the CCR5 co-receptor predominate, whereas virus utilising CXCR4 tends to be associated with the later stages of HIV infection. The preference for a receptor type is called tropism, and can be determined by tropism testing.

In patients who are not taking antiretroviral treatment, the presence of CXCR4 virus has been associated with faster disease progression. Tropism testing is recommended before starting treatment with the CCR5 inhibitor maraviroc (Celsentri), the only licensed drug in this class of antiretroviral.

However, the impact of co-receptor tropism on the outcomes of first-line HIV treatment that does not contain a CCR5 inhibitor is largely unknown.

Investigators from the Hospital Carlos III in Madrid therefore performed a retrospective study involving treatment-naïve patients who were enrolled into a randomised study. This was designed to compare the efficacy of therapy based on atazanavir (Reyataz) boosted by ritonavir (Norvir) with treatment including nevirapine (Viramune). The patients also took Truvada (FTC/tenofovir), and results showed that the combinations were equally effective.

Blood samples obtained at the start of therapy were tested to determine which co-receptor was used by patients’ virus.

Changes in viral load and CD4 cell count after six and twelve months of treatment were compared according to co-receptor.

A total of 569 patients were randomised and 428 completed 48 weeks of treatment.

At baseline, patients with CXCR4 virus had significantly higher viral load (5.4 vs. 5.2 log10 copies/ml; p = 0.044) and lower CD4 cell counts (145 vs. 188 cells/mm3; p < 0.001) than individuals with virus using the CCR5 co-receptor.

After a year of therapy, patients with CXCR4 virus were significantly less likely than individuals with CCR5 virus to have an undetectable viral load (77% vs. 92%; p = 0.009).

This association between the CXCR4 co-receptor and poorer virological control at week 24 (p = 0.012) was confirmed in multivariate analysis. There was also a trend towards poorer treatment response at week 48.

It is harder to isolate HIV tropism in patients with non-B subtypes. Therefore the investigators performed further analysis, which was this time restricted to individuals with HIV subtype B.

This showed a strong association between the CXCR4 co-receptor and poorer virological control at both week 24 (p = 0.001) and week 48 (p < 0.001).

“When we limited our analyses to participants infected with clade B viruses, the strength of the impact of viral tropism on virological response was more robust than in the whole study population,” observe the authors.

Unlike some other research, there was no evidence that the CXCR4 co-receptor had a negative impact on CD4 cell recovery.

“In antiretroviral-naïve patients beginning antiretroviral therapy, baseline HIV-1 tropism seems to be an independent predictor of virologic response,” conclude the investigators, adding “this observation may have important clinical implications for the monitoring of antiretroviral therapy and interpretation of comparative trials.”

Reference
Availability of Serologic and Virologic Testing for Herpes Simplex Virus in the Largest Sexually Transmitted Disease Clinics in the United States

Sexually Transmitted Diseases Vol. 38; No. 4: P. 267-269, (04..2011)  Terri Warren; Lisa Gilbert, Mark Hayley

In the United States, the prevalence of herpes simplex virus is estimated to be 57.7 percent for type 1 (HSV-1) and 17.0 percent for type 2 (HSV-2). CDC recommends that both virologic and serologic tests for herpes be available at clinics that care for patients at risk of STDs.

Through a telephone survey, the researchers polled the 230 largest US STD clinics regarding the availability of virologic and serologic HSV tests at their facilities.

The results showed that 87 clinics (37 percent) had neither serologic nor virologic testing available. At 87 clinics (36 percent), only virologic testing was available, while eight (4 percent) had only serologic testing. Fifty clinics (23 percent) offered both virologic and serologic testing. States in the West and North were more likely to offer any type of HSV testing compared to states in the South and Midwest (P<0.05).

The ability and techniques used to diagnose HSV varied widely by site, ranging from diagnosing by clinical examinations only to offering serological testing for all patients.

“Almost three-quarters of the clinics did not comply with [CDC] recommendations,” the authors concluded. “Further efforts are needed to implement national guidelines for HSV testing.”

Number Of New E. Coli Cases Abating But More Deaths Expected

"Germany reported two more deaths and 300 more E. coli cases Wednesday, but its health minister insisted that new infections were dropping, giving some hope that the world's deadliest E. coli outbreak was abating," Associated Press reports (Greishaber, 6/8).

"We cannot give the all-clear but based on the evaluation of the data from the Robert Koch Institute (RKI, the national health centre), there is reason for justified optimism that we have the worst behind us at the national level," German Health Minister Daniel Bahr told reporters, according to Agence France-Presse. "RKI said it was not certain whether the decline in new cases was linked to consumers avoiding the vegetables that have been blacklisted," the news agency writes.

As of Tuesday, the number of confirmed cases in Germany stood at 2,648, with 25 deaths, according to RKI, AFP reports. One more woman died in Sweden after recently returning from Germany. Cases have been reported in more than 12 countries worldwide, according to the news agency (Cole, 6/8). Bahr said although the number of new cases was slowing, the country should expect to see additional deaths related to the outbreak, Reuters notes (Rohan, 6/8).

Connection discovered between the nervous system and the vascular system

IRCM researchers show that a key molecule of the vascular system is essential for the formation of neural circuits

Montréal, June 8, 2011 – Dr. Frédéric Charron, researcher at the Institut de recherches cliniques de Montréal (IRCM), and his team have shown for the first time that a key molecule of the vascular system directs axons during the formation of neural circuits. This connection between the nervous system and the vascular system could be a good starting point for the development of therapies for neurodegenerative diseases. The discovery will be published tomorrow by Neuron, a scientific journal of the Cell Press group.

"To properly form neural circuits, developing axons (long extensions of neurons that make the nerves) need molecules to guide them towards their target, in the same way that road signs guide us when we drive," explains Pierre Fabre, doctoral student in Dr. Charron's team and first co-author of the article.

The nervous system is not the only system formed during human embryo development. Blood vessels are also organized into a very complex network, which led to the idea that certain molecules could be reused by both the nervous system and the vascular system. In fact, recent studies revealed that the reference points used to guide axons also help blood vessels reach their targets.

"One of the key molecules of the vascular system is the vascular endothelial growth factor, better known as VEGF," adds Mr. Fabre. "We discovered that VEGF is able to attract nervous system axons. More specifically, we identified Flk-1 as the receptor responsible for this effect, making it a prime target for the development of therapies to re-grow axons after lesions of the central nervous system or neurodegenerative diseases."

This scientific breakthrough was possible due to an innovative technique developed by Dr. Charron's laboratory a few years ago. The system uses a microscopic device to control and observe, in real time, the
axon's behaviour in response to guidance molecules. This technique allowed the researchers to follow the axon's trajectory and revealed VEGF's role in directing axons.

"This research could have an important long-term impact in the field of spinal cord repair, as the results will help us better understand the development of the spinal cord," says Dr. Charron, Director of the IRCM's Molecular Biology of Neural Development research unit. "The more we learn about the molecules needed to appropriately guide axons, the more it will become possible to develop a therapy to treat spinal cord injuries."

"These new findings are of great interest to the research community as they offer new hope for the treatment of neurodegenerative diseases," says Dr. Anthony Phillips, CIHR's Scientific Director of the Institute of Neurosciences, Mental Health and Addiction. "CIHR recognizes the important work of Dr. Charron's team and this novel discovery linking blood vessels and neurons to neural circuit formation."

**Universal Flu Vaccine Clinical Trials Show Promise**
ScienceDaily (June 7, 2011) — A universal influenza vaccine targeting a protein common to all strains of influenza A has safely produced an immune response in humans. If proven effective, the vaccine could eliminate the practice of creating a new flu vaccine annually to match predicted strains, with major implications for global health.

The results of the clinical trials, led by the University of Texas Medical Branch at Galveston in collaboration with biotechnology company VaxInnate and funded by $9.5 million grant from the Bill and Melinda Gates Foundation, were published online in the journal *Vaccine*.

The vaccine candidate, VAX102, targets a protein known as M2e, found on the surface of the influenza A virus, that has remained relatively unchanged over the last century. VAX102 consists of 4 copies of M2e fused to the protein flagellin, a TLR5 ligand used as an adjuvant. The M2e antigen had been completely unchanged from 1918 until the recent pandemic, making it of interest to researchers searching for a target for the immune response to influenza that would be stable over many seasons.

Unlike traditional flu vaccines, which target antigens that change continuously, the prototype VAX102 represents a vaccine that would not require annual updates, an important barrier to influenza prevention throughout the world. The technology used to produce the candidate vaccine would eliminate many of the limitations of current influenza vaccines, including inefficiencies related to manufacturing—such as limited production capability and the inability to change the target antigen should the vaccine not match the circulating strains.

"As we saw in the 2009 influenza pandemic, there is a great public and global health need for a rapid, scalable model for vaccine production," said lead author Christine B. Turley, M.D., Vice Chair for Clinical Services, Department of Pediatrics and a member of UTMB's Sealy Center for Vaccine Development. "If ultimately proven effective, VAX102 will meet this need and offer a completely new approach to global flu prevention and control."

Two studies, conducted at UTMB and Johnson County Clinical-Trials in Lenexa, Kansas, assessed the safety, tolerability and immunogenicity—the induced immune response—of VAX102.

Healthy adults ages 18-49 were randomly assigned to receive two doses of either vaccine or placebo. The two studies established the dose range for further study. Doses ranging from 0.03 to 10 micrograms were studied. Individuals at the highest doses had more systemic reactions; doses of 1 microgram or less were safe. All vaccinated subjects showed some degree of antibody response, with a more than four-fold increase noted in all groups by 14 days after the second dose of vaccine.

An important next step will be studies to determine the degree to which the vaccine may be effective against influenza infection. Future studies would also investigate the durability of the antibody response and more closely assess cytokine responses—proteins released as part of the immune response—in an effort to better understand, predict and potentially prevent the adverse reactions noted at highest doses.

Pending results of future trials, VAX102 could be used as a stand-alone vaccine to prevent influenza A infection. Other possible strategies include use in conjunction with vaccines that target traditional influenza antigens, as a part of an approach to increase efficacy when infection occurs with mismatched strains.

VAX102 efficacy would have major global health implications, as worldwide annual influenza vaccination is not currently available due to limitations of licensed vaccines and international immunization infrastructure.
According to Turley, an influenza vaccine that can be produced rapidly and with great economies of scale, such as VAX102 through simple bacterial fermentation, allows for an entirely new approach to international influenza control. Further, because the M2e-based vaccine would not require annual updates, it could be useful to offer protection over multiple influenza seasons.

Finally, VAX102 holds promise as an improved vaccine for the elderly. "Our immune response deteriorates with age," said Turley. "Currently, the elderly aren't afforded as much protection from the flu vaccine as younger individuals. Rather than giving the elderly higher doses of a vaccine each year, VAX102 could afford long-term protection or be used as a booster strategy, maximizing immune memory."

**Journal Reference:**

**SOUTH AFRICA: Mother-to-child HIV transmission plummets**

DURBAN, 9 June 2011 (PlusNews) – The rate of mother-to-child HIV transmission has fallen to 3.5 percent according to a national survey by the South African Medical Research Council (MRC) and researchers say the virtual elimination of vertical HIV transmission may now be possible by 2015.

Without access to public services for prevention of mother-to-child transmission (PMTCT), which provide antiretrovirals (ARV) to both mothers and babies to prevent HIV infection, up to 40 percent of babies born to HIV-positive mums could contract the virus before or during birth.

Released at the SA AIDS 2011 Conference in the port city of Durban, the survey results show a drop of at least five percent in HIV transmission rates compared to previous surveys of PMTCT programmes in South Africa.

Researchers from the MRC and partner organizations such as the UN Children’s Fund (UNICEF) and South Africa’s University of the Western Cape interviewed 9,915 mothers at primary health centres and clinics at the time of their babies' first immunisations.

During the visits, drops of blood from the infants were collected on cards and left to dry before being sent to a laboratory in Johannesburg, where tests then determined whether the babies had been exposed to HIV before birth, and whether they were HIV-positive.

Although 31 percent of mothers were HIV-positive during pregnancy, only a small proportion of infants had contracted the virus from their mothers during that time.

**The road to elimination**

The survey also showed that mother-to-child HIV transmission rates varied widely among South Africa’s nine provinces. In those with problematic PMTCT coverage, such as Free State and the largely rural Mpumalanga, up to nearly 6 percent of infants born to HIV-positive mothers had acquired the virus.

According to MRC researcher Dr Ameena Goga these children have a limited chance of being diagnosed early, as only about 30 percent of mums said they intended to take their child for HIV testing.

Although rates of infant testing have climbed in recent years, child immunisation uptake is almost 99 percent and Goga suggested that provider-initiated infant HIV testing may need to be offered alongside a child’s first shots. In an effort to reduce infant and child mortality, all HIV-positive infants under the age of one are eligible for ARVs under South Africa’s treatment guidelines.

About 99 percent of women reported they had been tested for HIV as part of PMTCT services during pregnancy, but the survey found a gap in repeat HIV testing in the later stages of pregnancy and couples testing for pregnant women and their partners.

About four percent of women said they were HIV-negative when they were in fact HIV-positive. Goga said this could be because these women may have contracted HIV later in pregnancy, after their initial HIV test.

“Every woman who initially tests HIV-negative has to have the test repeated at 32 weeks, according to our guidelines,” said Precious Robinson, PMTCT manager at the national department of health. “Our problem is that our women book [appointments] too late. We need to tell health workers to offer them testing whenever they come.”

One-third of South Africa’s pregnant women will have their first visit to an antenatal clinic in the third trimester of their pregnancy, said Dr Yogan Pillay, deputy director general of Strategic Health Programmes at the National Department of Health.
Early testing is preferable, but “Those who do come early [to the clinic] are often told to come back later,” said Dr Helen Rees, executive director of the Wits Reproductive Health and HIV Institute. “There is a disconnect between the provision of early antenatal care and what women are asking for.”

Several presentations at the SA AIDS 2011 Conference highlighted the problem of HIV-infection and Pillay said condom use among expecting couples should be promoted.

Policy problem solving
The MRC and its partners plan to repeat the survey in 2011/12 and again in 2014 to form part of the country’s Millennium Development Goals report in 2015, Goga said.

The department of health will also be convening a meeting in early August to discuss clearer messaging on infant feeding practices for HIV-positive mums, because according to the MRC survey about 20 percent are still giving their babies “mixed” feeding of both formula and breast milk. Mixed feeding has been shown to increase a baby’s risk of contracting HIV via breast milk up to four times.

Pillay said the department is considering cutting its provision of formula to HIV-positive mums to promote safer, exclusive breastfeeding.

Young Drug Users Forgotten amid India AIDS Success

Reuters, (06.07.2011) Sunil Kataria
HIV infection rates in India fell by 50 percent—twice the global decline—from 2001 to 2009, according to UNAIDS. Yet health workers there worry that the growing population of young injecting drug users (IDUs) is being marginalized from prevention efforts.

India’s 2.3 million reported AIDS cases make it an epicenter of the disease, similar to sub-Saharan Africa. Of the 200,000 Indian IDUs, upwards of 15 percent are HIV-positive, compared to the global average of 10 percent. However, that rate has been recorded as high as 50 percent in some areas.

According to India’s UNAIDS Country Coordinator Charles Gilks, young IDUs become especially vulnerable to HIV infection when families banish them to the streets, often forcing them to “resort to prostitution or petty crime to get enough money to service their habit.” Under such dire circumstances, needle-sharing becomes commonplace.

Furthermore, Gilks said efforts to provide youths with survival skills to navigate life transitions, such as the onset of sexual activity, get mired in “strong views by different religious communities” about just what exactly “sex education should consist of.”

Global statistics indicate that the 2009 antiretroviral access rate of children, 28 percent, lagged behind that of adults, 36 percent. However, from 2008 to 2010, the number of children on antiretrovirals jumped 50 percent to 420,000.

Rajesh Kumar founded India’s first juvenile rehab center for Delhi inmates. Legal barriers to testing children without parental consent contribute to the spread of the virus by the undiagnosed, he said. The center uses counseling, medication, and education to help equip the adolescents to reenter society.

“This is one group which needs special attention because awareness level is nil. They do not know about HIV; they do not know the problem of drug-related issues and HIV,” said Kumar.

Prevalence of Chlamydia Trachomatis and Neisseria Gonorrhoeae and Repeat Infection Among Pregnant Urban Adolescents

Sexually Transmitted Diseases Vol. 38; No. 3: P. 172-174, (03..2011) Erica K. Berggren; Loral Patchen
Chlamydia trachomatis and Neisseria gonorrhoeae infection during pregnancy pose risks to the health of both a woman and her fetus. CDC recommends routine screening for STDs at the first prenatal visit; repeat screening in the third trimester, specifically for C. trachomatis, is recommended for women under age 25 and those at increased risk of infection. However, the effect of repeat screening on diagnosis during pregnancy for adolescents is not well documented.

The current study examined a prospective cohort of 125 pregnant adolescents with at least one prenatal screening for C. trachomatis and N. gonorrhoeae. All the participants received prenatal care and delivered their babies at one urban teaching hospital in Washington, D.C. Screening results for both STDs were documented. Descriptive and univariate analyses were conducted to describe disease prevalence.

During pregnancy, 31 percent of the females were diagnosed with either C. trachomatis or N. gonorrhoeae. Ninety-five (75 percent) of the patients had more than one screening test; of these, 10 (11 percent) had a re-infection, and seven (7 percent) had a new infection on repeat screening. Nine patients (9 percent) had recurrent C. trachomatis, and four (4 percent) had a new diagnosis. Three patients (3
percent) had recurrent N. gonorrhoeae, and four (4 percent) had a new diagnosis. At either initial or repeat testing, some had both infections.

“Screening for C. trachomatis and N. gonorrhoeae is recommended during pregnancy. In this sample of pregnant adolescents, the overall high incidence and recurrence of C. trachomatis and N. gonorrhoeae support [CDC] screening and rescreening recommendations, regardless of initial test results,” the authors concluded.

**How killer immune cells avoid killing themselves**

After eight years of work, researchers have unearthed what has been a well-kept secret of our immune system's success. The findings published online on June 9th in *Immunity*, a Cell Press publication, offer an explanation for how specialized immune cells are able to kill infected or cancerous cells without killing themselves in the process.

The focus of the study is a molecule known as perforin, whose job it is to open up a pore in cells targeted for destruction. With that pore in place, proteases known as granzymes can enter target cells and destroy them.

Perforin is one of the most critical ingredients for a functional immune system. Without it, mice succumb to viral illness and lymphoma. Humans born without a working perforin gene develop an aggressive immunoregulatory disorder in the first few months of life and usually die unless treated with cytotoxic drugs or a bone marrow transplant.

But perforin itself is an incredibly destructive molecule. "Perforin forms a massive pore," said Ilia Voskoboinik of the Peter MacCallum Cancer Centre in Australia. "It allows almost any protein to diffuse into a target cell. A few hundred molecules of perforin is sufficient to obliterate any cell."

When the immune cells known as cytotoxic lymphocytes (including cytotoxic T lymphocytes and natural killer cells) are activated, "they produce a massive amount of perforin, yet the cells are fine," Voskoboinik said. The question was: how do our immune cells manage such toxic cargo without endangering themselves?

Before perforin is released, the cells that produce it have to transport it from one part of the cell to another. That transport chain starts in a component of the cell known as the endoplasmic reticulum (ER). From there, it moves to the Golgi and into secretory granules where it is packaged together with granzymes. It is those secretory granules that ultimately fuse with the plasma membrane of the cytotoxic cell and allow its release into the junctions between the immune cell and the cell it aims to kill.

Scientists used to think perforin had an inhibitory domain within its structure that was only removed once they were safely stored in the secretory granules. (The acidic environment within secretory granules keeps perforin inactive until its release.) But Voskoboinik's team purified perforin and found that the protein was always active regardless of whether they had removed the supposed inhibitory domain or not.

"It seeded doubt about how perforin is inhibited," he says. "It was a puzzle. Perforin was fully functional but for some reason it couldn't kill the cell [in which it was synthesized]."

The real danger zone for the cell when it comes to perforin is the ER, Voskoboinik explained. Conditions there should be ideal for perforin to work, but something keeps it from doing so. The new study links that protection to a single amino acid at one end of the perforin protein. When that amino acid is substituted with another, perforin doesn't make it to the Golgi compartment, it builds up in the ER, and the cell dies.

"Perforin goes from zero to extremely high levels within 24 hours and it has everything it needs to be functional," Voskoboinik said. "The cell relies on a really efficient transport system to move perforin away from the danger zone and as a result the cell is absolutely protected."

The findings "close a chapter" in our understanding of the immune system that has existed in the field since perforin was discovered almost 25 years ago, Voskoboinik says. "It was one of those things that was out there on Olympus untouched. Everyone would just stare at it. That's what got us interested."
An Alternative to Antibiotics

ScienceDaily (June 9, 2011) — Antibiotics are among the greatest achievements of medical science. But lately the former multi-purpose weapon fails in the battle against infectious diseases. Bacteria are increasingly developing resistance to antibiotics. Researchers have now found a therapeutic equivalent which could replace penicillin and related pharmaceuticals.

More and more pathogens are becoming immune to antibiotics. Some bacteria can no longer be combated. The World Health Organization WHO is warning about resistance to drugs which were once so potent. The WHO’s director-general Margaret Chan has pointed out that if measures are not taken quickly, it may soon not be possible to treat many frequently occurring infections. Figures released by the WHO show that in 2010 nearly half-a-million people were infected with a strain of tuberculosis which is resistant to many antibiotics—one third of those infected died. The Organization states that the growing spread of resistant pathogens is attributable to the indiscriminate use of penicillin and other antibiotics. Research scientists at the Fraunhofer Institute for Cell Therapy and Immunology IZI in Leipzig have found an alternative to the established antibiotics. In the future, antimicrobial peptides will take up the battle against pathogens.

"We have already identified 20 of these short chains of amino acids which kill numerous microbes, including enterococci, yeasts and molds, as well as human pathogenic bacteria such as Streptococcus mutans, which is found in the human oral cavity and causes tooth decay. Even the multi-resistant hospital bug Staphylococcus aureus is not immune, and in our tests its growth was considerably inhibited," says Dr. Andreas Schubert, group manager at Fraunhofer IZI.

From familiar fungicidal and bactericidal peptides the research scientists produced sequence variations and tested them in vitro on various microbes. Putrefactive bacteria, for example, were incubated for an hour with the artificially produced antimicrobial peptides. As the new peptides contain cationic amino acid residues, they can bond with the negatively charged bacterial membrane and penetrate it. In their tests the research scientists compared the survivability of the pathogens with an untreated control. The experts focused on peptides with a length of less than 20 amino acids.

"Antibiotic peptides unlock their microbicidal effect within a few minutes. They also work at a concentration of less than 1 µM, compared with conventional antibiotics which require a concentration of 10 µM," states Schubert, summarizing the test results. "The spectrum of efficacy of the tested peptides includes not only bacteria and molds but also lipid-enveloped viruses. Another key factor is that the peptides identified in our tests do not harm healthy body cells," the scientist explains.

The food sector could also benefit from the antimicrobial peptides given that the bacterial contamination of food products costs the industry billions every year. Fresh lettuce and other salad greens, for example, are badly contaminated by yeasts and molds. The shelf-life of foodstuffs could be improved by adding antimicrobial peptides during the production process. "This is a definite possibility because the short-chain peptides tested during the project do not exhibit any allergological risk on being added to foodstuffs," says Schubert. Magdeburg-based company ÖHMI Analytic GmbH is the project partner in the development of peptides for salad greens. The research scientist is convinced that many possible applications exist, including in machinery manufacture—for instance to keep hydraulic fluids free of microbes. As a next step the expert and his team are going to test the antimicrobial peptides in vivo on infection models.

HIV damages B-cells as well as T-cells: new treatment targets identified

Gus Cairns

Published: 10 June 2011

The signature effect of HIV infection, and the cause of AIDS, is disruption of the T-lymphocyte branch of the immune system and in particular the destruction of CD4+ T-helper cells.

A team of researchers at the US National Institute of Allergies and Infectious Diseases (NIAID) has now found that HIV also causes a very specific form of damage to the other half of the adaptive immune
system, the B-cells, and in particular the memory B-cells, which recognise previously-experienced infections and generate antibodies against them.

By using probes to delete specific genes within B-cells, they discovered that HIV infection creates an unusual population of exhausted, non-responsive cells called tissue-like B-memory cells. In previous experiments with cells taken from HIV-negative people, they found that these cells were characterised by reduced expression of inhibitory proteins that inhibit cell function and that these proteins had an especially strong effect on B-cell function.

Now, in cells taken from people with HIV, they have found that, by deleting the genes that manufactured these inhibitory proteins, they could restore the anti-HIV activity of these B-cells, at least in the test tube. This suggests that this rejuvenated activity was long-lasting, and that the cells exhibited a number of other markers of increased immune activity.

Although the gene-therapy techniques used in these experiments were sophisticated and can cause unpredictable immune reactions in themselves, the inhibitory proteins thus identified could become new therapeutic targets.

**Background**

One of the puzzles of HIV infection has always been that, while the immune system does mount an antibody response to HIV – indeed it is these antibodies that are detected in the standard HIV test – this response only partially controls viral replication, and eventually fails to entirely.

B-lymphocytes are the bone-marrow cells and their job is to secrete antibodies. Antibodies are soluble protein molecules that either directly destroy foreign invaders, render them harmless, or tag them for destruction by other parts of the immune system.

A strong antibody response to a pathogen can either prevent an infection happening altogether or can clear it from the system. Once an infection is experienced, the body creates a population of ‘memory’ B-cells that swiftly mount an antibody response if the invading pathogen is encountered again.

Vaccines generally work by imitating an infection and thus setting up a memory B-cell response in advance of an actual infection. T-cells, the thymus cells, work in a similar way but destroy infected cells rather than manufacture antibodies.

In HIV infection, the body mounts a very strong antibody response in the first few weeks that partially works, bringing the viral load down from millions to, on average, about 50,000 copies/ml. However it does not contain viral replication any further or eliminate HIV infection, and eventually weakens so that the viral load increases again.

**Research findings**

Dr Lela Kardava and her team from NIAID discovered that people with HIV have an unusual subset of B-memory cells called tissue-like cells that were characterised by the presence, on their surface, of a variety of inhibitory receptor molecules. The cells behaved much the same as exhausted T-cells do in HIV infection: they were sluggish and failed to react to foreign substances and to HIV itself.

In a series of experiments, Kardava’s team knocked out specific genes coding for these inhibitory proteins and found that by doing so they were able to restore some of the B-cells’ antibody responses. They did so by incubating cells with pieces of small interfering RNA (siRNA), molecules that target and interfere with specific genes. Previous experiments in cells taken from HIV-negative people had shown that ‘downregulating’ the inhibitory proteins with siRNA led to an 80–90% increase in the ability of the B-cells to proliferate.

They deleted nine inhibitory molecules in turn in cells taken from a group of people with chronic HIV infection. These individuals were either not taking ARV therapy or had only recently started and had an average viral load of 2096 copies/ml, with an average CD4 count of 427 cells/mm³.

They found that the deletion of two inhibitory receptors called FCRL4 and SIGLEC6 had particularly strong rejuvenating effects. The siRNA targeting the genes coding for these proteins led to a 30–66% reduction in the expression of these proteins in the cell. This in turn led to a doubling of the number of cells which, in response to standard immune stimuli, secreted anti-HIV antibodies.

These responses were long-lasting; the anti-HIV antibody responses of the cells that had had FCRL4 and SIGLEC6 ‘downregulated’ (reduced) demonstrated a similar increase in responsiveness to HIV several weeks later. Cells with the downregulated inhibitory proteins also secreted five times as much of the powerful pro-inflammatory chemical (cytokine) interleukin-6 and 50% more of the chemokine MIP-1α, indicating that modulating B-cell exhaustion may have a number of other immune-modulating effects.

**Implications**

The NIAID team are working on the hypothesis that the exhaustion seen in the B-cells of people with HIV is very similar to that seen in T-cells: the cells essentially stop working as a defensive manoeuvre against a
virus whose constant stimulation would otherwise cause more damage by exciting the body into a constantly inflammatory state.

If, however, therapies could be devised than enabled B-cells to mount better antibody responses to HIV without undesirable side-effects, they could in theory form part of a ‘functional cure’ that rendered HIV infection less harmful – or might even be part of a way to eliminate HIV from the body.

The NIAID team say: “Our findings suggest that the development of strategies aimed at reversing the deleterious effects of these inhibitory receptors may improve immune responses against...persisting viruses.”

Reference

Rich nations step up assault on generic Aids drugs
Moves by the US, the EU and Japan to strengthen intellectual property laws could limit the production of generic drugs that account for 80% of treatment worldwide

Moves by developed nations such as the US to tighten intellectual property laws are threatening to limit production and distribution of generic drugs, which experts say have been and will remain key in the prevention and treatment of HIV and Aids and currently account for 80% of treatment.

These efforts are taking shape in two spheres. The first is in discussions on the outcome document that member states are expected to adopt by the end of this week's UN high level meeting on Aids. The second is in bilateral trade negotiations between developed and developing nations.

Generic drugs are essential to treating HIV and Aids on a global scale because of their low cost and because they drive down the cost of brand name drugs. Additionally, according to recent research, treatment is prevention. Studies have shown that treating patients for HIV reduces the risk of their transmitting the disease by 96%.

In negotiations over the outcome document, which outlines priorities and strategies in the global effort to combat HIV and Aids, some developed countries are seeking to make intellectual property laws stricter by extending patents or limiting other public health-related flexibilities within the international Trade-Related Aspects of Intellectual Property Rights (Trips) agreement. These restrictions are known as Trips-plus provisions, and can inhibit the production of generic drugs.

According to Michelle Childs, director of policy and advocacy with Médecins Sans Frontières' campaign for access to essential medicines, the US, the European Union and Japan are trying to make laws "even stricter and narrow the opportunities for generic producers to make [and] to export those drugs".

However, Christopher Matthews, press officer for the EU delegation to the UN, told IPS that the EU was not advocating Trips-plus provisions in the outcome document. "The EU recognises the critical importance of affordable medicines in reducing levels of HIV infections and related deaths," he said.

Meanwhile, according to the 2010 Global Report (pdf) of the Joint UN Programme on HIV and Aids (UNAids), bilateral and regional trade agreements between low- or middle-income countries and high-income countries also pose a threat to the production of generic drugs. These agreements "impose intellectual property protection that is stricter than necessary", and that may limit developing countries' abilities to "promote access to affordable HIV medicines", said the report.

For instance, "The EU is currently negotiating a free trade agreement with India, which is the pharmacy of the developing world," Childs told IPS. In that agreement, the EU is pushing for clauses that "limit the ability for generics to manufacture", she added.

This information is not confirmed by the EU.

By reducing generic competition, Trips-plus provisions inherently run counter to efforts to keep drugs affordable, a crucial aspect of ensuring that those with HIV receive treatment. "Obviously if you can lower the cost of the drugs, you can treat more people," said Childs.

"We do not want to see bilateral trade agreements add additional restrictions that won't allow access to patents for generic drug manufacturers or for low-cost proprietary drugs," Paul DeLay, deputy executive director of UNAids, said in an interview with IPS. "Generic drugs have been critical to the response."

Not only is the vast majority of treatment now done with generic drugs, but the price of proprietary drugs has also declined dramatically in response to the competition presented by generic manufacturers.

In 2001, brand name antiretroviral (ARV) drugs used to treat HIV cost over $10,000 per person per year – a prohibitive price for treating large numbers of people in developing countries. Then Cipla, an
Indian pharmaceutical company, began to produce the same cocktail of drugs for a dollar a day, Childs said.

Since then, the cost of ARVs has fallen to 1% of their original price. "Generics competition is a price-busting strategy," Sharonann Lynch, HIV and Aids policy adviser for MSF’s campaign, told reporters Monday. However, "you’ve got member states who are acting out of self-interest, and here I would put the US'. These states are "helping to prop up the pharmaceutical interest by pursuing patent protection in these negotiations.

"There is no excuse where developed countries would be pushing for Trips-plus provisions that would greatly curtail developing countries to know the strategies that we know work, which is to foster generic competition."

UNAids has said that reaching a treatment target of 15 million people by 2015 would eliminate 7m unnecessary deaths and 12m new infections by 2020. This treatment target is still being debated in outcome document negotiations, but the challenge of reaching it will undoubtedly be magnified if drug costs increase.

Besides intellectual property rights and treatment target levels, funding is another hotly debated topic that is left to be resolved by the end of the high level meeting. UNAids has said $6bn per year is needed to reach the 15m treatment target by 2015. Global HIV and Aids funding has been declining since 2009.

So although intellectual property rights and generic drugs remain "a contentious area" in the negotiations, government "squabbling" has not been limited to this topic, said Lynch.

And the non-material cost of these high-level arguments? "People living with HIV are being lost in the shuffle," Lynch concluded.

Romantic Relationships and Sexual Activities of the First Generation of Youth Living with HIV Since Birth

Romantic Relationships and Sexual Activities of the First Generation of Youth Living with HIV Since Birth

The study employed a mixed-method embedded strategy (qualitative supported by quantitative). It describes the perspectives of youths living with HIV since birth concerning romantic involvement and sexuality, and risk management, including the risk of HIV transmission and partner serostatus disclosure. In Montreal, 18 youths ages 13 to 22 took part in individual semi-structured interviews and completed self-report questionnaires.

Most youths reported participating in non-penetrative sexual acts. Ten reported having had vaginal and three anal intercourse at an average age of 14 for girls and 15 for boys. Having used a condom at least once was reported by all the youths who were sexually active. Among those who reported using protection during their first sexual relationship, more than half had taken risks (e.g., unprotected sex, multiple partners, etc.) in subsequent relationships.

The responses of sexually inactive youths illustrated “the interrelatedness of romantic involvement, sexual initiation, and potential serostatus disclosure,” the authors wrote. “Involvement in a sexual relationship would not be conceivable unless the partner was informed of their serostatus.” Among sexually active respondents, risk management implies HIV transmission and partner disclosure. These young people “have emotional issues regarding disclosure in romantic relationships, and few risked potential rejection by disclosing.”

“Condom use acts as a reminder of the infection and a barrier to intimacy,” the authors concluded. “The narratives illustrate how risk perception changes and becomes relative with time and experience, especially when the viral load is undetectable and when past experience has convinced the adolescent that his/her partner might not become infected. Findings reinforce the need to prioritize sexual health issues for young people with perinatally acquired HIV.”

German Officials Again Claim Sprouts As Source Of E. Coli Outbreak

"After days of confusion, German authorities finally concluded on Friday that an E. coli infection, which has claimed at least 29 lives, unsettled the nation and thrown European agriculture into disarray, had been caused by contaminated bean sprouts and not, as first was feared, by other produce," the New York Times reports.
Though no contaminated sprout samples could be confirmed, officials said interviews with patients and restaurants where they had eaten showed those who consumed sprouts were nine times more likely to become infected than those who did not eat them, the newspaper notes. The head of Germany’s Risk Assessment Agency, Andreas Hensel, urged consumers to avoid eating sprouts but said they no longer had to avoid cucumbers, lettuce and tomatoes imported from Spain, which were originally thought to be the source of infection, according to the New York Times (Cowell, 6/10).

Those initial warnings prompted several countries to ban vegetable imports from Spain, and Russia and some other countries have banned all vegetable imports from the EU, VOA News reports. "After heated discussions Wednesday, EU Farm Commissioner Dacian Cioloș raised his aid package offer to $306 million to help farmers recoup some of their losses from unsold vegetables because of the E. coli crisis. He had initially proposed $220 million in aid," the news service writes (6/9).

Low-Cost Meningitis Vaccine Cuts Cases In African Countries, Data Show
Burkina Faso, Mali and Niger recorded the lowest number of meningitis A cases in an epidemic season this year after the MenAfriVac vaccine was introduced, data from the WHO show, the nonprofit that helped develop the shot, Meningitis Vaccine Project (MVP), said on Thursday, Reuters reports.

"Three of the four cases were in people from neighboring Togo who crossed the border for medical care, and the fourth was in a citizen of Burkina Faso who had not been vaccinated, MVP said. No confirmed cases were reported in Mali, while four cases were reported in Niger, all in unvaccinated people," the news service writes (Kelland, 6/9). The data, which was published in the journal Health Affairs, "shows that introducing this vaccine in seven highly endemic African countries could save as much as US$300 million over a decade and prevent a million cases of disease," according to an MVP release (.pdf) (6/9).

S. African Government Program Reduced MTCT HIV Transmission Rate To 3.5%, Study Shows
The South African government’s program to prevent mother-to-child transmission (PMTCT) of HIV has reduced the rate of virus transmission to about 3.5 percent, "potentially sparing some 67,000 babies from HIV infection," according to research presented on Wednesday by the Medical Research Council at the 5th South African AIDS Conference in Durban, Health-e/allAfrica.com reports (Thom, 6/9).

"An inaugural national evaluation survey among the world’s biggest AIDS population tested 9,915 infants at public clinics, of whom 31.4 percent were exposed to the virus but only 3.5 percent tested positive, the government research body said," according to Agence France-Presse. The study will be repeated for two more years, and infants will be followed for 18 months, the news service notes (6/9).

Also at the conference, Mark Heywood, deputy chair of the South African National AIDS Council (Sanac), said about 1.4 million South Africans were receiving antiretroviral therapy, a number closer to the goal set forth in the national strategic plan than was expected, the Mail & Guardian reports. "Several sessions at the AIDS conference attempted to garner input on what should be included in the next plan, which will guide the country’s response to HIV/Aids over the next four years," the newspaper writes (Thom, 6/10).

Dominican Republic Health Workers Strike Over Sanitary Conditions In Hospital
Medical workers at a hospital in Santo Domingo, Dominican Republic, went on strike Thursday after a nurse was suspected of contracting cholera, the Associated Press/Kansas City Star reports. "Workers are demanding better sanitary conditions at Francisco Moscoso Puello Hospital, which often lacks water, medication and a system to safely dispose of waste, said Felipe de la Rosa, general secretary for a medical workers union," the news service writes. Health Minister Bautista Rojas called the strike an act of "incredible irresponsibility." Union leaders said the government needs to improve the hygiene situation (Lopez, 6/9).

Two isolates from E. coli outbreak available
An outbreak of Escherichia coli causing a severe illness called hemolytic-uremic syndrome (HUS) began in Germany on May 2, 2011 and has killed more than 20 people and sickened more than 2,000. The organism causing the outbreak has been identified as a strain of E. coli O104:H4 that produces a Shiga toxin and causes an illness similar to infection with E. coli O157:H7. Two isolates from this outbreak have been sequenced. Both strains, TY-2482 and LB226692, have been annotated and are now available from Virginia Bioinformatics Institute’s (VBI’s) Pathosystems Resource Integration Center (PATRIC, patricbrc.org), which is funded by the National Institute of Allergy and Infectious Diseases.
In the rush to save lives, many laboratories are analyzing these genomes and providing data to the research community. Bruno Sobral, PATRIC's principal investigator, commented, "The PATRIC team is working around the clock to help the scientific community address this emergency. Analyses such as these provide insights into the origin of highly pathogenic strains and potential response strategies."

The two genomes have been annotated with Rapid Annotation using Subsystem Technology (RAST), making them consistent with the 184 E. coli genomes and the total 2,865 bacterial genomes available at PATRIC. The proteins conserved across all E. coli have been used to generate a preliminary phylogenetic tree that is based on 166640 characters across 527 genes in 354 taxa. This tree shows that the two new strains are most closely related to the pathogenic, enteroaggregative strain 559899, which may give additional insight into its origin.

The tree is available in interactive form on the PATRIC website (http://patricbrc.org/portal/portal/patric/Phylogeny?cType=taxon&cId=561). For a comparison of the RAST annotations with the other publicized annotations, visit http://theseed.org/coli/.

As can be seen in the PATRIC Protein Family Sorter (http://patricbrc.org/portal/portal/patric/FIGfamSorterB?cType=taxon&cId=561&dm=result), the proteins from these two new pathogenic strains have several unique islands as compared to other E. coli genomes. Further investigation of these islands and unique proteins may yield clues as to virulence or intervention strategies for the new strains. The “heatmap” tab of the Protein Family Sorter presents a graphical view presence and absence of the proteins across the E. coli genomes.

Much of the information in PATRIC is updated on an ongoing basis including:
- An interactive Disease Map with outbreak information. Visit http://patricbrc.org/portal/portal/patric/DiseaseOverview?cType=taxon&cId=562 and then select the Disease Map tab.

PATRIC is performing additional analyses, including collecting a list of the important genes identified, and will be providing gene trees and multiple sequence alignments of the genes with their closest homologs. Updates will be posted at http://enews.patricbrc.org/

**We are all mutants**

**First direct whole-genome measure of human mutation predicts 60 new mutations in each of us**

Each one of us receives approximately 60 new mutations in our genome from our parents. This striking value is reported in the first-ever direct measure of new mutations coming from mother and father in whole human genomes published today.

For the first time, researchers have been able to answer the questions: how many new mutations does a child have and did most of them come from mum or dad? The researchers measured directly the numbers of mutations in two families, using whole genome sequences from the 1000 Genomes Project. The results also reveal that human genomes, like all genomes, are changed by the forces of mutation: our DNA is altered by differences in its code from that of our parents. Mutations that occur in sperm or egg cells will be ‘new’ mutations not seen in our parents.

Although most of our variety comes from reshuffling of genes from our parents, new mutations are the ultimate source from which new variation is drawn. Finding new mutations is extremely technically challenging as, on average, only 1 in every 100 million letters of DNA is altered each generation.

Previous measures of the mutation rate in humans has either averaged across both sexes or measured over several generations. There has been no measure of the new mutations passed from a specific parent to a child among multiple individuals or families.

"We human geneticists have theorised that mutation rates might be different between the sexes or between people," explains Dr Matt Hurles, Senior Group Leader at the Wellcome Trust Sanger Institute, who co-led the study with scientists at Montreal and Boston, "We know now that, in some families, most mutations might arise from the mother, in others most will arise from the father. This is a surprise: many people expected that in all families most mutations would come from the father, due to the additional number of times that the genome needs to be copied to make a sperm, as opposed to an egg.”

Professor Philip Awadalla, who also co-led the project and is at University of Montreal explained: "Today, we have been able to test previous theories through new developments in experimental technologies and our analytical algorithms. This has allowed us to find these new mutations, which are like very small needles in a very large haystack.”
The unexpected findings came from a careful study of two families consisting of both parents and one child. The researchers looked for new mutations present in the DNA from the children that were absent from their parents’ genomes. They looked at almost 6000 possible mutations in the genome sequences.

They sorted the mutations into those that occurred during the production of sperm or eggs of the parents and those that may have occurred during the life of the child: it is the mutation rate in sperm or eggs that is important in evolution. Remarkably, in one family 92 per cent of the mutations derived from the father, whereas in the other family only 36 per cent were from the father.

This fascinating result had not been anticipated, and it raises as many questions as it answers. In each case, the team looked at a single child and so cannot tell from this first study whether the variation in numbers of new mutations is the result of differences in mutation processes between parents, or differences between individual sperm and eggs within a parent.

Using the new techniques and algorithms, the team can look at more families to answer these new riddles, and address such issues as the impact of parental age and different environment exposures on rates of new mutations, which might concern any would-be parent.

Equally remarkably, the number of mutations passed on from a parent to a child varied between parents by as much as tenfold. A person with a high natural mutation rate might be at greater risk of misdiagnosis of a genetic disease because the samples used for diagnosis might contain mutations that are not present in other cells in their body: most of their cells would be unaffected.

Publication Details
Conrad DF et al. (2011) Variation in genome-wide mutation rates within and between human families. Nature Genetics, published online 12 June 2011 doi:10.1038/ng.856

Chasing EHEC Via Computer: Scientists in Germany Provide Free Access to Enteric Pathogen’s Genetic Regulation Data
ScienceDaily (June 12, 2011) — Just a few genes make enterohaemorrhagic E. coli (EHEC) extremely dangerous to humans. If it were not for these genes, EHEC would hardly differ from harmless enteric bacteria. Bioinformatics scientists from the Saarbrücken Cluster of Excellence want to exploit this similarity to find starting points for effective drugs against the EHEC pathogen. In a very short time, the scientists have constructed EhecRegNet, a database and analysis platform that incorporates all known interactions between enteric E. coli genes. Using integrated simulations, genetic switches for the dangerous EHEC genes can be identified much faster and used medically. The virtual laboratory will thus help biomedical scientists and pharmacists all over the world to develop new drugs.

All human beings carry roughly one to two kg of bacteria in their bodies. The most common enteric bacterium is Escherichia coli, which is also the best-studied microorganism on earth. "Its genetic composition has been documented in detail and we know of around 3,500 gene interactions, i.e., ca. 40% of the regulatory processes that go on in the bacterium," says Jan Baumbach, who heads a research group at the Cluster of Excellence for computer science at Saarland University. Together with his team at the Max Planck Institute for Informatics in Saarbrücken, he quickly realised that the current rampant EHEC pathogen is closely related to normal intestinal bacteria. "We assume that no more than ten genes make the EHEC pathogen life-threatening. Some genes emerged a long time ago, over the course of evolution, but others were modified through an inter-bacterial exchange of plasmids. It is a kind of primitive sex that the bacteria use to transmit genetic information. This often leads to resistance to antibiotics," the bioinformatics scientist explains.

His research team has registered all the information concerning the harmless enteric bacteria's genome and interactions in a database, which also lists the genetic data of the dangerous EHEC pathogen. On the computer, the EhecRegNet system compares the genetic data of the EHEC bacteria with the data from harmless bacteria to track down genetic switches in EHEC. The goal is to use these switches to disable the genes which cause severe renal failure in some patients. "Genes can be switched on and off, much like a light bulb. But first you have to find the right switch. At the moment, you could say that we are throwing stones at the light bulb to put out the light. We still do not know where the switches are for EHEC, but we do know where they are located in evolutionarily related harmless bacteria. That is our starting point," says Baumbach. The computer simulations will allow scientists to locate the switches for dangerous genes much faster than with expensive testing in biomedical laboratories.

Knowledge of around 80 to 90 per cent about interactions in normal enteric bacteria can be transferred to the EHEC pathogen by utilizing the computer simulations. This knowledge about harmless bacteria has been gathered by biologists and medical scientists over the last twenty years. "We cannot
afford spending so much time with the EHEC bacteria, but we can take a short cut and use the available information about harmless bacteria and transfer knowledge about their genetic regulation to EHEC. It will save us time-consuming, expensive and even dangerous work in the laboratory," says Baumbach. Comparing the data on the computer is much faster. In this way, scientists hope to be able to find out which switches to flip in the genome in order to reduce EHEC's virulence.

Still, the scientist cautions against becoming too euphoric: "It may take years before a drug is actually approved for the market. However, it is possible that we will soon be able to pinpoint promising targets in experiments." The Saarbrücken-based scientists are therefore offering free access to their EhecRegNet web platform, in order to involve all biomedical scientists and pharmacists around the world in the search for drugs against the EHEC pathogen. "We envision a new generation of drugs which, in contrast to antibiotics, will not kill whole populations of bacteria. We want to use the genetic pathways in the bacteria to switch specific genes on and off," says Baumbach.

This could render the bacteria harmless or susceptible to the defence mechanisms of the immune system. "Perhaps this way we will be able to combat pathogens using their own genetic program in the future," Baumbach suggests. Less aggressive bacteria are often flushed out of the intestine with diarrhea. The EHEC pathogens circumvent this natural mechanism with their strong adhesion to the intestinal wall.

Jan Baumbach's research group at the Saarbrücken Cluster of Excellence "Multimodal Computing and Interaction" at Saarland University has already constructed similar web platforms for corynebacteria which, among other things, trigger diphtheria, and for tuberculosis. With the help of complex computational methods, bioinformatics scientists use these platforms to compare harmless laboratory strains of bacteria with disease-causing bacteria. "Our computer simulations drastically reduce the number of necessary trials in animals and experiments in test tubes. This, in turn, cuts the time until medical scientists and pharmacists can develop drugs based on the genetic switches," Jan Baumbach adds.

The new database and analysis platform for E. coli and EHEC gene Regulatory Networks can be found at: www.ehecregnet.de

For more information, visit: http://csb.mpi-inf.mpg.de

Calls to lift ban on gay men giving blood
Ministers are dragging their heels to end the restriction despite advice from medical experts
By Emily Dugan
Sunday, 12 June 2011

Experts have advised the Government to lift a controversial blanket ban on homosexual men giving blood, amid fears of blood shortages as younger donors fail to come forward.

But despite a clear recommendation to lift the ban more than a month ago, ministers are dragging their feet – and experts on the advisory committee on the safety of blood, tissues and organs (Sabto) say they have been warned not to talk about the "politically sensitive" situation.

Figures released for Britain's first National Blood Week, ahead of World Blood Donor day on Tuesday, are expected to show that the pool of donors is at risk of depleting. At present there are 1.7 million people on the UK donor list and the NHS will be pushing for more people to sign up.

A panel of medical experts recommended last month that the ban should be relaxed so that gay men who have not had sex within a 12-month period can donate blood. But ministers have so far declined to endorse the experts' decision.

The new recommendation brings the UK in line with many other countries that already permit homosexuals to make blood donations. Health safety experts advised that the ban on men who have had sex with men was no longer medically justified to protect the blood pool from HIV.

One source on Sabto, who had to remain anonymous as the board was "told to keep quiet until ministers had looked at the recommendations", said its decision to relax the rules came thanks to medical advances. Another expert adviser said: "A lot of things have changed and the technology to monitor blood is now automated and much safer, so the likelihood of HIV getting through is highly unlikely."

For bone marrow transplantation, where the same risks apply, the law on gay and bisexual men has already been relaxed to a case-by-case basis. Sometimes it can take several months for HIV antibodies to show in tests, which is why experts want the extra precaution of a year without sex.

Campaigners say the current guidelines are draconian, unnecessary and breach equality law. However, the Department of Health review of them has been held up as a result of ministerial prevarication.
When initially asked last week, the department insisted it had not yet been given any findings, but later conceded: "The findings of the review will be considered by the relevant health ministers and further information on any resulting changes to current blood donation policies will be made available in due course."

The human rights campaigner Peter Tatchell, who plans to take legal action under equality law if the total ban is not lifted, said: "Blood shortages would be far fewer if more non-risk gay and bisexual men could donate. One year is an improvement on the current lifetime ban but it is still a needlessly long exclusion period. I can only assume the delays are due to serious conflict and disagreement."

Jane Firth, 39, from Staffordshire, was given 18 pints of blood after haemorrhaging during childbirth. "I wouldn't have survived if I hadn't had the blood. My liver and kidneys stopped working. It'd be a good thing if they changed the law. As long as you're fit and healthy, it shouldn't matter if you're gay or straight."

**Monday, 13 June 2011**

**Belgium: First criminal conviction under poisoning law, advocates caught unawares**

Last week saw the first successful prosecution for criminal HIV transmission in Belgium. The case surprised the main HIV support organisation, Sensoa, who were only informed of the case by the media because neither complainant nor defendant (both of whom were African migrants) had contacted them for support or legal advice.

Details of the case are relatively sketchy and only available in Dutch-language news reports, available [here](http://www.destandaard.be/article.aspx?id=6373395) and [here](http://www.destandaard.be/article.aspx?id=6373395). A more detailed news story appeared following the man's conviction in De Standaard, but I am unable to translate it. They have been supplemented via a colleague working on the issue at Sensoa.

**The facts in brief**

A 54-year-old man, originally from Angola, was found guilty of 'knowingly infecting' his former wife (originally from Congo, and thought to be significantly younger) with HIV via the existing criminal law of poisoning and sentenced to three years in prison, two of which are suspended.

The couple met and married in 2004 and the woman discovered she was HIV-positive during pre-natal testing in 2005. Court evidence showed that her husband was diagnosed in 1994, whilst married to his first wife, but that he was in deep denial of the diagnosis because, according to his defence lawyer, Rafael Pascual: My client is very religious. He prayed for healing. His first wife and the children he had with her never became infected. Therefore he assumed that his prayers were answered. Without ever taking drugs.

Pascual also unsuccessfully argued that the complainant could have been infected by someone else, and that scientific evidence of his responsibility for infection was inconclusive.

The prosecutor had asked for five years in prison, two suspended, but the court gave a more lenient sentence.

Sensoa's position – and difficulty in reaching marginalised populations – was highlighted in this article in De Standaard (English translation via Google) published last Thursday, the day of the verdict.

Sensoa, the Flemish service and expertise in sexual health, is concerned about the matter in Huy. "We are not asking for criminal prosecutions," said spokesman Boris Cruyssaert. "In neighboring countries, we see that it is counterproductive. It just makes the taboo, because nobody dares to know if they are infected."

"That does not mean that HIV patients should not share responsibility [for HIV prevention]," says Cruyssaert. "Only in the case of intentional transmission [should the criminal law be used]. The cultural aspect [of HIV] is often deeply rooted faith. Of course prayer does not eliminate HIV, but the Angolan man is very religious. He was really convinced that his prayers were answered."

Sensoa tries to reach other cultures, with accessible information [about HIV] but that is not easy. Since 2009, in an opinion by the National Council of the Order of Physicians, a doctor can, in exceptional cases, inform the partner of an HIV patient [if there is a belief of exceptional risk of harm].

The case highlights three important issues.

First, the general law can always be applied even when it appears that a country has so far been spared prosecutions.

Second, people with HIV who have no connection with HIV support services may feel that the criminal law is their only recourse to justice, when appropriate counselling may have mitigated the sense of betrayal felt by the complainant.
Third, cultural issues (including faith-inspired denial) can have a major impact not only on disclosure, but also access to treatment, care and support.

Prior to this case, only two individuals had approached Sensoa for legal assistance, and these were civil cases, involving custody issues. In both cases the HIV-positive status of the father was used in court in an attempt to take away the father's rights.

Two previous attempts at using the criminal courts for HIV exposure or transmission in Belgium were unsuccessful. One involved an HIV-positive man prosecuted for not disclosing to his girlfriend who subsequently tested HIV-positive, and a 2007 case involved an HIV-positive man from Ostend who was prosecuted for attempted murder for not disclosing to his boyfriend, who remained HIV-negative.

**Treatment Refusal = Criminal?**

By Sean Strub on June 12, 2011 9:59 AM | 3 Comments

I was pleased to have the chance to speak at the Global AIDS Treatment rally at Dag Hammarskjold Plaza, in front of the United Nations, last Wednesday, June 8, in New York City. The rally was organized by Health Gap, Housing Works and other organizations fighting for treatment choice and access for every person with HIV, an effort I fully support.

Here is an extended version of my comments (I only was able to deliver about half of this at the rally).

A continuing disregard and trampling of the human rights of people with HIV drives this epidemic and until we recognize and address this fact, we will not defeat AIDS. This is no more clearly evident than in the fact that HIV-related stigma is today increasing, not decreasing.

In 1983, the revolutionary Denver Principles manifesto began with a defiant statement that reverberated powerfully throughout the intervening plague years: "We condemn attempts to label us as 'victims,' a term that implies defeat, and we are only occasionally 'patients,' a term that implies passivity, helplessness, and dependence upon the care of others. We are 'People With AIDS.'

What those early activists did not articulate, and probably could not have imagined, was that the label we would need to fight against three decades later is that of criminal.

Sadly, the US is a global leader in HIV criminalization, exporting intolerance, ignorance and legal retribution around the world. Criminalization creates a viral underclass in the law, which treats people with HIV differently for behavior that, for those who do not have HIV, is unremarkable.

In Texas a man is serving 35 years for spitting at a cop; In Iowa a young man was sentenced to 25 years in prison for having sex with a condom, while his viral load was undetectable.

A woman in Georgia got 8 years for failing to disclose her status, despite the fact that it had been published on the front page of her local paper and two witnesses claimed she had disclosed.

There are hundreds of these cases and it continues to get worse. Just two weeks ago, the Nebraska legislature passed a bill that makes it a felony for people with HIV to sneeze or vomit in the vicinity of a public safety officer.

There is no more extreme manifestation of stigma than when government incorporates discrimination into the law, like with Jim Crow laws, or apartheid, or criminalizing people with HIV.

These laws are driven by a political and public policy leadership, abetted by the media, that increasingly, insultingly and irrationally defines people with HIV principally as viral vectors or potential infectors, as a dangerous population, a threat to society that must be regulated and controlled.

This is not just in criminal prosecutions but it is also seen in HIV prevention and treatment policy-making that is veering towards the coercive, abandoning respect for individual autonomy and opening the door to tyranny, paternalistic or otherwise.

It is vital for all of us to understand how anti-retroviral treatment can reduce one’s infectiousness, or provide some protection against infection for those who are negative.

That fact, for many is reason enough to start treatment, including some who do not medically need treatment for themselves, like those with high CD4 counts.

But it is wrong for anyone to assume everyone who has HIV "should" be on treatment in order to reduce infectiousness.

To encourage healthier HIV positive people—those with high CD4 counts for whom it has not yet been proven will receive a net benefit from anti-retroviral treatment—to commence treatment while downplaying or disregarding the risks of serious long-term side effects is unethical and dangerous.

So while we advocate for treatment to be made available to all who need it, including the millions who will die in the next few years if they do not get it, we must also make sure that ethical challenges inherent
in so-called "test and treat"—promoting treatment for a public health objective, at the potential expense of the individual person with HIV—are addressed.

The Associate Director of the CDC, Harold Jaffe, says it is not clear that "test and treat " "benefits the infected people themselves and indeed it may be harmful". He notes that test and treat "falls foul of the normal ethical standards of clinical medicine, which is to act in the best interests of patients."

Writing about test and treat, the Economist noted "people do not like taking medicine, particularly if they have no symptoms."

For test and treat to achieve the desired societal benefit, they write, "all those people, or, at least, the vast majority of them, would have to be persuaded to take (anti-retroviral drugs). That is difficult enough when someone is ill. The latest report from UNAIDS suggests that almost one in five of those put on the drugs stops taking them within a year. It will be even harder to persuade the asymptomatic to pop a daily pill or two for the public good."

An avalanche of funding has provided an army of strategists and publicists to work with public health and community organizations to promote treatment to those for whom there is no scientific justification for such treatment. That is appalling, especially when only 1/3 of those in immediate medical need of treatment are able to get it.

We must never forget harms that have been perpetrated in the name of a supposed public good and we must not, even inadvertently, contribute to those harms.

If we respect individual autonomy, we must provide objective information about both the potential rewards and risks of treatment without creating a false sense of urgency or need. To do otherwise is profoundly unethical.

Pioneering AIDS doctor Joseph Sonnabend, wrote last week that "Respect for the autonomy of the individual may be the most important of the principles that form the foundation of medical ethics."

John Christman described an attribute of personal autonomy as: "the capacity to be one's own person, to live one's life according to reasons and motives that are taken as one's own and not the product of manipulative or distorting external forces."

The Economist noted test and treat will require a very high level of participation in order for it to work. What if too few agree to participate for it to be effective?

Do those of us with HIV present enough of a public health danger to trigger the use of legal mechanisms to intervene and force us to take treatment against our will?

There are times when we, as a society, impose medical treatment on some citizens, even against their will. We do that with criminals.

Might those who refuse treatment for the "common good" ultimately be considered criminals? Will they be seen as socially irresponsible, labeled enemies of society, selfish or unconcerned about spreading HIV? Have we begun to stigmatize those who, for whatever reason, have chosen not to take treatment?

NAM's newsletter asked the question bluntly: "How long will it be before legislators—or judges—conclude that failing to take available treatment should be considered as contributory negligence in cases of HIV transmission or exposure?"

Defining those of us with HIV as a threat to society and manipulating or coercing us into treatment, rather than empowering us to access healthcare and make well-informed treatment decisions for ourselves, is a dangerous threat to our rights.

Moreover, it will continue to fuel the epidemic, further disenfranchise the most at-risk populations and erode trust in the healthcare system, making people at risk less likely to get tested and, for those who need or want it, less likely to access treatment.

We are not criminals and we do not consent to coercion.

Another important section of the Denver Principles reads that people with HIV have the right "To full explanation of all medical procedures and risks (and) to choose or refuse their treatment modalities."

We must be vigilant against a creeping criminalization of our existence, be vigilant against those will sacrifice our human rights at the altar of a perceived public good, and to be vigilant against the "arrogance of the well" that operates from an unstated but clear belief that we—those of us living with HIV—are "less than"; are inferior beings with inferior rights to their arrogant supremacy.

3 Comments
Mark S. King | June 11, 2011 8:16 AM | Reply
Thank you, Sean, for continuing to ring this bell. It was especially interesting, and scary actually, to hear how two hot topics—making criminals out of HIV+ people who dare to have sex or who might sneeze somewhere near you, AND the new prevention theory “test and treat”—might intersect, and what the potential consequences could be.
What you're saying, if I have this right, is, if the law is going to treat those with HIV as criminals anyway (as all these prosecutions and new laws demonstrate), then it's a short trip on the Big Brother train before people with HIV are forced to undergo treatment, just as criminals are. That got my attention.

Rising stigma toward people with HIV and a widening paternalistic streak among well-meaning prevention advocates is a creepy combination. I hope we're all watching this debate very, very closely.

Mark S. King
MyFabulousDisease.com

Premature aging seen as issue for AIDS survivors
By LISA LEFF, Associated Press – 2 days ago
SAN FRANCISCO (AP) — Having survived the first and worst years of the AIDS epidemic, when he was losing three friends to the disease in a day and undergoing every primitive, toxic treatment that then existed, Peter Greene is grateful to be alive.

But a quarter-century after his own diagnosis, the former Mr. Gay Colorado, now 56, wrestles with "I survived all the big things, but now there is a new host of things. Liver problems. Kidney disease. It's like you are a 50-year-old in an 80-year-old body," Greene, a San Francisco travel agent, said. "I'm just afraid that this is not, regardless of what my non-HIV positive friends say, the typical aging process."

Even when AIDS still was almost always fatal, researchers predicted that people infected with HIV would be more prone to the cancers, neurological disorders and heart conditions that typically afflict the elderly. Thirty years after the first diagnoses, doctors are seeing these and other unanticipated signs of premature or "accelerated" aging in some long-term survivors.

Government-funded scientists are working to tease apart whether the memory loss, arthritis, renal failure and high blood pressure showing up in patients in their 40s and 50s are consequences of HIV, the drugs used to treat it or a cruel combination of both. With people over 50 expected to make up a majority of U.S. residents infected with the virus by 2015, there's some urgency to unraveling the "complex treatment challenges" HIV poses to older Americans, according to the National Institutes of Health.

"In those with long-term HIV infection, the persistent activation of immune cells by the virus likely increases the susceptibility of these individuals to inflammation-induced diseases and diminishes their capacity to fight certain diseases," the federal health agency's chiefs of infectious diseases, aging and AIDS research wrote, summing up the current state of knowledge on last September's National HIV/AIDS and Aging Awareness Day. "Coupled with the aging process, the extended exposure of these adults to both HIV and antiretroviral drugs appears to increase their risk of illness and death from cardiovascular, bone, kidney, liver and lung disease, as well as many cancers not associated directly with HIV infection."

In San Francisco, where already more than half of the 9,734 AIDS cases are in people 50 and over, University of California, San Francisco AIDS specialists are collaborating with geriatricians, pharmacists and nutritionists to develop treatment guidelines designed to help veterans of the disease cope with getting frail a decade or two ahead of schedule and to remain independent for as long as possible.

"Wouldn't it be helpful to be able to say, are you at high risk, low risk or moderate risk for progressing to dependency in the next five, the next 10 years, being less mobile, less able to be functional in the workplace. Are you going to be safe in your home, are you going to remember to take all those
medications? How are they going to interact?” explained Dr. Malcolm John, who directs UCSF’s HIV clinic. “All those questions need to be brought into the HIV field at a younger age.”

Research so far suggests that HIV is not directly causing conditions that mimic old age, but hastens patients toward ailments to which they may have been genetically or environmentally predisposed. Plus, their immune systems are being weakened over time even when they are being successfully treated for AIDS, John said.

“That’s probably true for a lot of these things. We aren’t saying HIV’s starting the problem, but it’s added fuel on top,” he said.

Stokes, a patient of John’s who goes by only his last name, is a prime example. At 53, HIV-positive since 1985 and in substance abuse recovery for the last 11 years, he says he is happier than he ever has been. Yet the number of ailments for which he is being treated would be more commonly found in someone 30 years his senior: a condition called Ramsay Hunt syndrome that causes facial paralysis, a rare cartilage disorder for which he has undergone four ear surgeries, bone death in the hip and shoulder, deterioration of his heart muscle, osteoporosis and memory loss.

A specialist recently diagnosed a Kaposi’s sarcoma spot on Stokes’ ankle. Although the cancer is not life-threatening, the sight of young men disfigured by KS lesions was a harbinger of the early AIDS crisis, and its presence on his own body is unsettling.

At his therapy group for men with HIV, aging “comes up frequently,” he said. “I say, ‘Just think what we have come through to have a life today.’” At the same time, he acknowledges sometimes feeling self-conscious about his physical appearance and worries if “people are not attracted to me and unwilling to go the length of what it means to be with me, no matter how brilliant my mind or my zest for life.”

Loneliness, financial worries and concerns about who will care for them and where can weigh on long-term AIDS survivors in the same way as all adults living in a society that values youth, Charles Emlet, a social work professor at the University of Washington, Tacoma, said.

As they get older and sicker, many feel “doubly stigmatized,” he said. Some people who have lived with the virus for a long time have been getting by on private disability benefits that will run out when they turn 65, forcing them to move to less expensive locations or to consider turning to estranged family members. Like soldiers from a distant war, many lost partners and their closest friends to AIDS.

Such emotional side effects, combined with the physical toll of managing chronic health problems, put older AIDS patients at risk for depression. At the same time, Emlet has uncovered evidence that a majority of long-term survivors also share another trait that typically comes with advanced age: that is, the ability to draw strength from their difficult experiences.

“The older adults I’ve interviewed, many of them talk about how much it means to them to give back, to do something positive with the years they never expected to have,” he said.

Peter Greene can relate to that. At times, like the days he is so exhausted he can’t get out of bed or the pain from his multiple maladies is too intense, he asks himself “the Carrie Bradshaw question — are we really lucky to still be alive?”

As frightening and uncertain as this phase of AIDS is, he thinks he knows the answer.

“T’ve tried to make the time I have count, and really, now that I have the body of an 80-year-old, I probably have the wisdom of an 80-year-old as well, which counts for a lot,” Greene said. “Everything becomes clear at the end of your life and in some ways, thinking you’ve been dying all these years, you get moments of clarity that I don’t think everyone gets.”

**How HIV Shapes Everyday Life**

*Post-Standard (Syracuse)*, (06.05.2011) James T. Mulder

In the three decades since the first reported AIDS cases, the disease has brought about many changes in communities in New York and across the nation.

Condom use had declined since the 1960s introduction of the birth control pill. Then in 1987, US Surgeon General C. Everett Koop deemed condoms the best prevention against AIDS for people who “will not practice abstinence or monogamy.” That same year, condom sales spiked 33 percent.

“The onset of the AIDS crisis in the 1980s changed perceptions on condoms and use rates climbed by double digit percentages for the first time in history,” said Bruce Weiss, a marketing vice president for Trojan Brand condoms.

Bernard Alex, director of the Syracuse-based FACES, an HIV/AIDS outreach program, said the epidemic forced parents to engage their children in conversations about sex much earlier than previous generations did.
The epidemic also bred patient empowerment—and not just among those with HIV/AIDS. “That patient advocacy spread,” said Rick Bartell of Planned Parenthood. “Now all kinds of patients are taking charge of their medical lives.”

Among other areas where the impact of AIDS is seen:
- Dental workers began using protective gear.
- Devices and protocols were introduced to minimize the danger of needlesticks for health care workers.
- HIV testing of all blood donations began in 1985, and blood banks instituted stricter donor selection procedures.
- HIV testing of newborns in New York became mandatory in 1997 so those infected could receive specialized care.
- Health care providers in New York are now required to offer every patient between 13 and 64 a voluntary HIV test.
- In 1991, athletic associations and schools adopted protocols for handling open wounds and spilled blood. CDC reports there have been no documented cases of HIV transmission linked to participation in sports.

Discussion of Sexual Risk Behavior in HIV Care Is Infrequent and Appears Ineffectual: A Mixed Methods Study
*AIDS and Behavior Vol. 15; No. 4: P. 812-822, (05..2011)*  M. Barton Laws; Ylisabyth S. Bradshaw; Steven A. Safren; Mary Catherine Beach; Yoojin Lee; William Rogers; Ira B. Wilson

According to consensus guidelines, clinicians should provide a brief sexual risk behavioral intervention in each visit as part of HIV care. Studies based on participant reports suggest this is occurring infrequently; however, studies based on direct observation of clinical encounters are lacking.

In the current research, the team conducted a mixed method study based on audio recordings of 116 routine outpatient visits by 58 different HIV patients in five practice sites. After coding, the visit transcripts were analyzed using a quantitative system. A qualitative analysis was conducted for the dialogue segments in which sexual risk behaviors were discussed.

Ten visits included communication about sexual risk behavior; these discussions were “generally quite brief,” the authors reported. In two visits, “substantial counseling” regarding sexual risk reduction occurred, while two others included substantial discussion that “was not evidently directed at the patient’s changing behavior.” In seven additional visits, physicians did not follow up on cues that suggested “a need or opportunity for such discussion.”

“Interactions about sexual risk had less patient engagement than interactions about other health behaviors,” the authors concluded. “Physicians seldom provide sexual risk reduction counseling in HIV care, even where specific indications are present.”

Dengue Vaccine Could Be Available In Four Years

A vaccine against the mosquito-borne infection dengue, the first to reach the final stage of clinical testing, "has seen 'very promising' results in Thailand, a specialist involved in the tests said on Friday," Reuters reports (Petty/Mahlch, 6/10). The vaccine, which is being developed by the French pharmaceutical group Sanofi, could be launched in four years, according to Agence France-Presse. Dengue, for which there is no treatment or cure, causes severe flu-like symptoms and infects about 50 million people worldwide annually, killing thousands, primarily in developing countries (6/10).

Heavy Rains Increasing Number Of Cholera Cases In Haiti

Heavy rains in Haiti have increased the number of cholera cases in the country, the Associated Press/Seattle Times reports.

"Alain Legarne, mission chief for the French aid group Doctors of the World, said Friday that a clinic in the southwestern town of Jeremie treated 77 people for cholera in recent days. That's a fivefold increase from last week and was most likely caused by rising river levels, he said," the news service reports. "In Port-au-Prince, what we're seeing is the outbreak is ongoing and spreading," Sylvain Groulx, Doctors Without Borders' chief of mission in Haiti, said. "Whenever there's a rainy season ... it often has consequences on these epidemics" (Daniel, 6/10).
This issue of The Scientist focuses on novel approaches to vaccines. Vaccines are “miracles” that have saved millions of human lives—more than any other medical intervention—by activating the body’s natural defenses to prevent infection. Likewise, veterinary vaccines protect our livestock and pets. Vaccines were originally produced to prevent infectious diseases, and this goal continues to be important. Today, however, there are also interesting developments in the use of vaccines to control noninfectious conditions, such as some types of cancer and Alzheimer’s disease, or, as discussed in this issue, cocaine addiction.

We still do not have sufficient insight into the reasons why certain vaccines work poorly or not at all. Humankind has benefited from more than 200 years of successful vaccine use. (See timeline.) One hundred years ago, parents worried most about their children contracting diphtheria, and 50 years ago they worried about polio; today, the most serious childhood infections have largely disappeared from the developed world. Moreover, the World Health Organization officially declared the global eradication of smallpox in 1980. In addition, vaccines are now available to combat adult diseases such as cervical cancer and shingles. Yet there are three major 21st century scourges that still cry out for efficacious vaccines: HIV/AIDS, tuberculosis, and malaria.

**Prevention is better than cure**

Since ancient times, people have realized that you could only catch certain diseases once. If you recovered, you became immune for the rest of your life. In the 17th century, variolation—scratching a small amount of a patient’s smallpox scab into the skin of uninfected individuals, inducing a mild form of the disease followed by protective immunity—was introduced to Europe from China by way of Turkey. Although around 1–2 percent of variolated people contracted the disease and died, the odds were still favorable during a raging epidemic. In 1796, Edward Jenner took note of the folk observation that milkmaids had smooth complexions: they did not get smallpox. (In the nursery rhyme that begins “Where are you going, my pretty maid?/I’m going a-milking, sir, she said,” the girl claimed that “My face is my fortune” because it was free of pockmarks.) Jenner successfully used the relatively harmless cowpox as a vaccine (from the Latin vacca, “cow”) in place of smallpox.

Although we understand the immune system better today, we still do not have sufficient insight into the reasons why certain vaccines work poorly or not at all, or why some of the most successful ones (e.g., the vaccine against yellow fever) protect for a lifetime. Rather than targeting the pathogen itself, some vaccines protect against the byproducts of infection, such as the toxins produced by diphtheria and tetanus bacteria. In the 90 years since the Bacillus Calmette-Guérin (BCG) vaccine—made from bovine TB—was developed to fight the *Mycobacterium* that causes human tuberculosis, there has unfortunately been little progress in developing a new vaccine. But promising results are beginning to emerge for a vaccine that may offer partial protection against the malaria parasite. HIV has managed to evade researchers’ best efforts towards an efficacious vaccine: the virus rapidly changes its outer coat, and protects itself with a “glycan shield” or sugary carapace. Moreover, HIV invades and subverts the immune system itself. Gene Shearer and Adriano Basso resurrect an approach to HIV immunization based on using human antigens in addition to viral antigens. But a pathogen’s immune-evasion strategy is not always the biggest barrier to vaccine development. As Brad Spellberg discusses, investment in the development of fungal vaccines has been hindered by the lack of demand in the developed world and by a perceived lack of profitability.

**Therapeutic vaccines**

Although vaccines were originally designed as a method of preventing disease, we now realize that stimulating the immune system after diseases have taken hold may also help patients. Therapeutic (rather than prophylactic) vaccines have been designed to make cancer cells look more foreign so that immune
cells will destroy them. But because cancer cells originate from our own cells, there is danger that such an approach could backfire, with the body rejecting its own tissues in an autoimmune reaction. Paradoxically, the very immune reaction responsible for transplant and graft rejection may help to spawn a new kind of vaccine, as Shearer and Basso explain in their article. Therapeutic vaccines are also being attempted for conditions like addiction. Although molecules of nicotine and cocaine are too small to elicit immune reactions by themselves, Thomas Kosten writes about the development of a vaccine against cocaine that couples an immune-stimulating protein to the small addictive molecule.

**The future of vaccines**

Despite the enormous number of lives saved by immunization, a vocal minority holds the view that these measures are harmful. Parents who withhold vaccination from their children usually see no ill effect, because they benefit from the vast majority of vaccinated children providing “herd immunity,” making the disease agents much rarer. Sadly, though, because of the unjustified scare about a vaccine-autism link—a claim which is not evidence-based and which has been rejected by public-health authorities—we have witnessed a rise in measles infections, which can have debilitating complications. One of the greatest challenges of the modern era is to convince parents in Western countries of the essential benefits of vaccines. With the exception of a few brave individuals, the scientific community as a whole has not risen to this challenge.

If only this vocal minority could appreciate the enormous impact vaccines have had in the past and their untapped potential for the future. For example, there is the challenge of developing an efficacious multivalent influenza vaccine that would avert pandemic influenza. Rino Rappuoli outlines the extraordinary challenges inherent in developing “universal” vaccines, protective against all strains of rapidly replicating viruses such as influenza and HIV. These viruses mutate key proteins at a furious rate, reconfigure their shapes, and recombine with each other, constantly evolving to make it harder for the immune system and vaccinologists to find a highly conserved Achilles’ heel. Further problems concern the huge cost of manufacturing, the growing complexity of vaccine design, the fear of liability on the part of pharmaceutical companies, and the funding and logistics of rollout in countries where vaccines are most needed. Yet given determination, these challenges can be surmounted.

Robin A. Weiss is a professor of viral oncology at University College London. Peter Hale is the founder of the Foundation for Vaccine Research, Washington, DC.

**The ghost of personalized medicine**

Drug therapies tailored to the DNA profiles of individual patients could change the face of medicine, but such treatments aren’t commonly used in the clinic

By Bob Grant  |  June 14, 2011

The US Food and Drug Administration recommends that doctors genotype patients before prescribing more than 70 commonly-used medications for specific genetic biomarkers. These tests, the agency suggests, can help physicians identify those in which the drug is less efficacious, poorly metabolized, or dangerous. But medicine is still far from a day when drugs and treatment regimes are fitted precisely to a patient’s genomic profile.

According to a 2008 survey conducted by the American Medical Association (AMA) and Medco Research Institute, even though 98 percent of physicians agreed that the genetic profiles of their patients may influence drug therapy, only 10 percent believed they were adequately informed about how to test their patients for biomarkers that may predict the safety and/or efficacy of a particular drug.

“Less than 1 percent of all opportunities are being realized with respect to genetic testing,” said Felix Freuh, president and head of genomics initiatives at Medco. “There’s a long way until this new technology is going to see the translation.”

Indeed, while new biomarkers are identified everyday, and researchers are continuing to collect more and more information about genetic variants that confer some amount of disease risk or predict a specific response to a treatment, that information has yet to be widely implemented in the clinic. The AMA states on its website that physicians today can use more than 1,200 genetic tests for more than 1,000 different
diseases to help diagnose and treat their patients, but only 13 percent of the 10,000 doctors who responded to the survey had ordered a genetic test for a patient in the preceding 6 months.

But while physicians by large have been slow to adopt the practice of screening patients to search for genetic information of relevance to drug treatments, known as pharmacogenomics, neither research nor regulation has stalled, as evidenced by the FDA's relabeling of dozens of approved drugs with biomarkers that affect their safety or efficacy in specific patient populations. “Pharmacogenomics is probably an area where personalized medicine is really able to deliver,” Freuh said, “and it is able to do so because those are tests that can be clearly associated with a particular therapy.”

In some cases, testing patients for the labeled pharmacogenomic markers has become critical. For example, the FDA strongly recommends that doctors prescribing the HIV drug abacavir test their patients for HLA-B*5701 allele. Individuals carrying that allele who take abacavir could become hypersensitive to the drug, which can lead to a systemic, potentially fatal flu-like illness. A 2008 study in the New England Journal of Medicine found that testing for the presence of HLA-B*5701 in HIV patients taking abacavir eliminated hypersensitivity reactions. “Abacavir is a black and white example,” Freuh said. “You know that if you don’t do genetic testing, you’re omitting something that’s clearly a standard of care today.”

“But,” he added, “we have to be careful that we’re not overstating what’s possible.” Other pharmacogenomic biomarkers, while helpful, aren’t as cut-and-dried. Studies have yielded mixed results, for example, about whether genetic testing for different CYP2C19 alleles in patients taking the anticoagulant drug Plavix can indicate proper dosing schedules to improve how the drug is metabolized. Similarly, identifying single nucleotide polymorphisms in two genes, CYP2C9 and VKORC1, in patients taking another blood thinner, warfarin, can help guide optimum dosing to prevent over anticoagulation, but the markers’ predictive ability varies widely across races, according to a 2008 Pharmacogenomics study.

Still, recent results suggest that genotyping patients who are receiving warfarin can improve health outcomes. A 2010 nationwide study that compared the effectiveness of warfarin among different patient populations, conducted by MedCo and the Mayo Clinic of Rochester, Minnesota, found that patients receiving the drug who had been genotyped to determine their CYP2C9 and VKORC1 status were hospitalized about 30 percent less than patients whose genotypes were unknown. Remarkably, Freuh noted, only a handful of physicians out of the thousands contacted for the study were even aware that a genetic test existed that could potentially improve warfarin dosing in patients.

According to Vance Vanier, CEO of personal genetic analysis company Navigenics, this lack of implementation is one reason why personalized medicine is not yet a widespread clinical reality—a barrier that Vanier calls the “adoption gap” between advances in the lab and benefits in the clinic. “The world is awash in biomarker content,” Vanier said. “The key question is, ‘What is the most effective mechanism to drive awareness among the primary care physician base?’”

Part of the problem, he suggested, is that physicians underestimate the predictive power of genetic risk factors for certain diseases or treatment outcomes. For example, he said that when he asks physicians in training to state the relative risks of classical predictors of heart disease, such as cigarette smoking or diabetes, he consistently hears figures like “10 to 15 percent.” In fact, Vanier said, most of those predictors only have relative risks of around 1.8 to 2 percent, similar to some of the more robustly linked genetic markers of disease or drug effectiveness. If doctors are made aware of the fact that certain genetic biomarkers can be just as powerful as traditional predictors, they may be more inclined to use them to help personalize treatment regimes.

Freuh agreed that there’s a problem with clinical uptake of new genomic tools and biomarkers, adding that researchers also need to do a better job of demonstrating the clinical utility of such advances. “There is a paucity of data that we can point to and talk to physicians and practitioners about the clinical effectiveness of these tools,” he said. “That has something to do with the lack of uptake as well.”

Furthermore, with the sheer volume of new genomic information coming out of labs across the globe, it’s difficult for physicians to stay abreast of the latest advances that could improve the way they treat their patients, Freuh said. “The ‘build it and they will come’ approach to personalized medicine is not going to work,” he said. “If you’re not actively reaching out to the people who are practicing, nobody is going to come.”
SA, US to test new HIV gel

The Deputy Minister of Science and Technology, Derek Hanekom, and US Ambassador Donald Gips on Tuesday announced a follow-on trial to test the safety and effectiveness of 1% tenofovir gel.

South Africa is leading the charge to provide the world with the first safe and effective microbicide to protect women against HIV.

Led by Professor Helen Rees, the Director of the Wits Reproductive Health and HIV Institute (WRHI), the Follow-on African Consortium for Tenofovir Studies (FACTS) would conduct the Phase III trial to be known as FACTS 001.

"FACTS 001 follows the positive results of the CAPRISA 004 trial last year, which tested the safety and effectiveness of 1% tenofovir gel among nearly 900 women at two sites in South Africa.

"The research found that using the gel before and after sex provided moderate protection against sexually transmitted HIV and Herpes Simplex Virus 2 (HSV-2). However, CAPRISA 004 was a relatively small trial (Phase IIb trial) and was not designed for licensure purposes."

FACTS 001 is a critical study being funded by the Department of Science and Technology, the Department of Health and the United States government through the US Agency for International Development (USAID).

CONRAD, a leading reproductive health research organisation based in the US, is providing the gel for the study and the Technology Innovation Agency (TIA), a South African government agency focusing on supporting technological innovation, funds the technical support and monitoring carried out by the African Clinical Research Organisation (ACRO).

At a media briefing earlier on Tuesday, Hanekom said the South African government was very proud of the collaboration between the governments of South Africa and the United States of America.

"We are very pleased to be associated with the FACTS 001 study and hope that the results of this study will confirm the positive CAPRISA 004 results, making it possible to provide a technology that can help protect women against HIV and Aids."

"We are very proud of the South African researchers that constantly prove that they are world-class and we would also like to honour the women that are an integral part of these studies—they are the unsung heroes."

Ambassador Gips said the United States, through the President's Emergency Plan for AIDS Relief and President Obama’s Global Health Initiative, was working hand-in-hand with the South African government to turn the tide of this disease.

"We are committed to empowering women and girls to protect themselves by finding new HIV prevention options. Confirming tenofovir gel's effectiveness is a fundamental and essential step in that direction," Gips added.

Rees agreed that the establishment of the FACTS consortium to confirm the effectiveness of the first potential vaginal microbicide gel for women and enable licensure was extremely exciting for South African researchers.

"The South African government's support for FACTS demonstrates a new era of collaboration between researchers and government with the common vision of preventing HIV infections in women," she said.

FACTS 001 was urgently needed to provide sufficient evidence to license a new drug. The phase III study was a multi-centre, placebo-controlled, randomised trial designed to assess the safety and effectiveness of tenofovir gel used before and after sex to provide protection from sexually transmitted HIV and HSV-2 infection, Rees added.

FACTS 001 planned to enrol 2,200 women aged 18 to 30 years old at seven trial sites across South Africa. This confirmatory trial was an essential step on the path to the licensing of the first potential vaginal microbicide product that would help women protect themselves from HIV and HSV-2 infection.

HIV Patient Timothy Brown Is the Boy Who Lived

Los Angeles Times, (06.05.2011) Melissa Healy

Timothy Brown did not set out to become a beacon of hope for an end to AIDS, but that is what has happened.

Brown learned he was HIV-positive in 1995. Then in 2006, he was diagnosed with acute myeloid leukemia. He underwent a stem-cell transplant at University Hospital in Berlin, performed by oncologist Gero Huetter and colleagues. Of the 230 possible donor matches for Brown, Huetter deliberately picked one who carried genetic resistance to HIV, with the goal of tackling both Brown's HIV and leukemia.
Brown, known in medical circles as the “Berlin Patient,” was the focus of a case study in the New England Journal of Medicine in February 2009. Twenty months after Brown’s immune system was destroyed by radiation and rebuilt with donated bone marrow, Huetter’s team reported they could not detect HIV in his body.

In the 30 years since AIDS was first reported, talk of a cure has been downplayed, even viewed as a distraction from the critical tasks of prevention and treatment. But in a June 7 Annals of Internal Medicine report, Drs. Anthony Fauci and Carl W. Dieffenbach of the National Institute of Allergy and Infectious Diseases abandoned their reluctance to discuss cures, noting that Brown’s case offers proof of concept that the fight against HIV/AIDS can advance beyond daily drug cocktails.

Recently, Brown spoke in San Francisco at an American Foundation for AIDS Research (amfAR) event entitled “Cure—Still a Four-Letter Word?” “It’s an incredible feeling—like a miracle,” Brown said. “I had two lethal diseases and was able to get rid of both of them.”

Do HIV+ People Have Higher Stroke Risk?

SUMMARY
A Danish study finds HIV positive people have a higher risk for stroke, increasing with injection drug use and lower CD4 cell count but not antiretroviral therapy overall.

By Liz Highleyman
Several observational studies over the course of the epidemic have found that people with HIV/AIDS have an elevated risk for cardiovascular events including heart attacks and strokes, but data on rates and risk factors have been highly variable and sometimes conflicting.

As described in the June 3, 2011, advance online edition of AIDS, Line Rasmussen from Odense University Hospital and colleagues conducted a study to assess the risk of cerebrovascular events, or strokes, in HIV positive individuals and to evaluate the influence of proven and potential risk factors.

The analysis included all HIV positive people in Denmark, which has a centralized health system that enables comprehensive monitoring. The study also looked at a general population comparison cohort and at parents of both the HIV positive and general population groups. None of the participants had pre-existing brain disease.

The researchers calculated incidence rate ratios (IRR) for cerebrovascular events overall and for events with and without proven risk factors. The analysis was stratified according to history of injection drug use, which has been shown to be a risk factor for strokes among HIV positive and negative people in prior studies.

Most HIV positive participants were on highly active antiretroviral therapy (HAART). The study authors looked at the influence of HIV drugs including protease inhibitors as a class, indinavir (Crixivan), didanosine (ddI, Videx), abacavir (Ziagen, also in the Trizivir and Epzicom coformulation), and tenofovir (Viread, also in the Truvada and Atripla coformulations). Some prior research has linked abacavir to heart attacks and other cardiovascular events, but others have found no such association.

Results

- HIV positive people had an increased risk of cerebrovascular events compared with the general population cohort, a difference that was magnified for injection drugs users (IDUs):
  - Non-IDU: adjusted IRR 1.60 for HIV positive vs HIV negative individuals, or 60% higher risk;
  - IDUs: adjusted IRR 3.94 for HIV positive vs HIV negative, or nearly 4 times higher risk.
Stroke risk was higher both among HIV positive people with and those without proven risk factors.

Significant predictors of increased stroke risk, in addition to injection drug use, included:

- CD4 count < 200 cells/mm³ before starting combination ART (adjusted IRR 2.26);
- Exposure to abacavir (adjusted IRR 1.66).

However, use of protease inhibitors as a class, indinavir, didanosine, tenofovir, and HAART overall had no significant association with stroke risk.

Parents of HIV positive IDUs had a higher rate of strokes, but this was not the case for the non-IDU group.

Based on these findings, the researchers concluded, "HIV-infected individuals have an increased risk of [cerebrovascular events] with and without proven risk factors."

"The risk is associated with [injection drug use], low CD4 count, and exposure to abacavir, but not with HAART," they continued. "An association with family-related risk factors seems vague except for parents of IDUs." 6/14/11

Reference

**Proving Darwin Right: New Study Supports Hypothesis That Competition Is Stronger Between More Closely Related Species**

ScienceDaily (June 14, 2011) — A new study provides support for Darwin's hypothesis that the struggle for existence is stronger between more closely related species than those distantly related. While ecologists generally accept the premise, this new study contains the strongest direct experimental evidence yet to support its validity.

"We found that species extinction occurred more frequently and more rapidly between species of microorganisms that were more closely related, providing strong support for Darwin's theory, which we call the phylogenetic limiting similarity hypothesis," said Lin Jiang, an assistant professor in the School of Biology at Georgia Tech.

The study was published online on June 14, 2011 in the journal *Ecology Letters*. The work was supported by the National Science Foundation.

Jiang and his team—Cyrille Violle, formerly a postdoctoral fellow at Georgia Tech currently at the Centre d’Ecologie Fonctionnelle et Evolutive in Montpellier, France, and Georgia Tech biology graduate student Zhichao Pu—conducted experiments with 10 common ciliated protist species in artificial, simplified ecosystems called microcosms. Diana Nemergut, an assistant professor in the Institute of Arctic and Alpine Research and the Environmental Studies Program at the University of Colorado at Boulder, helped the team generate a family tree of the 10 microorganisms to determine how closely related the species were.

"We selected bacterivorous ciliated protist microorganisms for this study because they rapidly reproduce, allowing us to examine species co-existence over multiple generations in a closed system during a period of a few weeks, which wouldn’t be possible if we were testing the hypothesis with plants or animals," said Jiang.

The researchers set up 165 microcosms that contained either an individual protist species or a pairing of two species, along with three types of bacteria for the organisms to eat. They collected weekly samples from each microcosm and examined them under a microscope, recording the presence or absence of species. After 10 weeks, the researchers estimated the density of the protist species in each microcosm.

The study results showed that all species survived until the end of the experiment when alone in a microcosm. However, in more than half of the experiments in which protists were paired together, one of the two species dominated, leading to the extinction of the other species.

The researchers found that the frequency and speed of this extinction process—called competitive exclusion—was significantly greater between species that were more closely related. In addition, in microcosms where both competitors coexisted for the duration of the experiment, the abundance of the
inferior competitor was reduced more as the phylogenetic relatedness between the two competitors increased.

The study also showed that the frequency of competitive exclusion was significantly greater between species that had similar mouth sizes.

"We documented the mouth size of each species because there is some evidence that this morphological trait affects the selectivity and uptake rate of prey particles, and we thought that similarity in mouth size might translate into the exploitation of similar bacterial resources and result in competitive exclusion," said Jiang.

While they found that phylogenetic relatedness predicted the likelihood of coexistence better than mouth size, the results suggest that other traits involved in resource uptake may also be important predictors of the outcomes of competitive interactions in ecological communities.

"This study is one step toward a better understanding of how phylogenetic relatedness influences species interactions," said Jiang. "We hope our experimental validation of the phylogenetic limiting similarity hypothesis in microorganisms will encourage other ecologists to conduct additional studies with other types of organisms to further validate Darwin's hypothesis."

The phylogenetic limiting similarity hypothesis is just one of the many ideas Darwin published in his 1859 book called "The Origin of Species." In this book, Darwin introduced his scientific theory that populations evolve over the course of generations through a process of natural selection. The book presented a body of evidence that the diversity of life arose by common descent through a branching pattern of evolution.

Journal Reference:

New Cell Type Offers Immunology Hope
ScienceDaily (June 14, 2011) — Scientists in Australia have discovered a new type of cell in the immune system. The new cell type, a kind of white blood cell, belongs to a family of T-cells that play a critical role in protection against infectious disease. Their findings could ultimately lead to the development of novel drugs that strengthen the immune response against particular types of infectious organisms.

It is also potentially significant for many other important diseases including allergies, cancer and coronary artery disease.

The research team includes Dr Adam Uldrich and Professor Dale Godfrey from the University of Melbourne, Dr Onisha Patel and Professor Jamie Rossjohn from Monash University and Professor Mark Smyth from the Peter MacCallum Cancer Institute.

The discovery, published in the journal Nature Immunology, is a fundamental advance in understanding the different components of the immune system and how this system casts a net wide enough to catch all kinds of different infectious organisms.

Typically, when the body is threatened with bacterial or viral infection, molecules called T-cell receptors interact with protein fragments (called peptides) from the bacterium or virus, triggering the immune response. This process has been widely studied and leads to the killing of microbes and protection against severe infection.

While the immune system is known to focus on proteins from viruses and bacteria, some T-cells in the immune system (known as NKT cells) can recognise lipid-based, or fatty, molecules. As such, there is great enthusiasm for the potential of these lipid-sensing T-cells in the development of novel vaccines. This team have identified a new type of NKT cell that can specifically target lipids found in the cell walls of bacteria, including Mycobacteria.

Professor Dale Godfrey from the University of Melbourne said the discovery is significant and opens the door to a new avenue of investigation into immunity.

"The identification of a new cell type paves the way for many new studies into the unique function of these cells and how they might be harnessed for the development of new types of vaccines," he said.

Using the Australian Synchrotron, the team produced a molecular image of precisely how the new cell type’s T-cell receptor recognises lipid-based molecules.

"The use of the Australian synchrotron was essential for us to undertake our study," Dr Onisha Patel from Monash University said.

Journal Reference:
antigen receptor defines a population of natural killer T cells with distinct glycolipid antigen–recognition properties. Nature Immunology, 2011; DOI: 10.1038/ni.2051

Gates Foundation’s global vaccinations scheme too friendly to drug industry, critics say
June 13, 2011 | 6:27 AM | By Tom Paulson

Vaccines are “miracles,” Bill Gates likes to say, because of their power to prevent death and disease so simply and at such a low cost.

Today, at a meeting in London held to increase funding for one of global health’s biggest success stories, the Global Alliance for Vaccines and Immunization, governments and international donors agreed to boost funding for the vaccine initiative by $4.3 billion — exceeding GAVI’s request of $3.7 billion.

The new money — most of which came from the British government, the Norwegian government and the Gates Foundation — will allow the vaccine alliance to vaccinate 250 million more children worldwide and prevent at least 4 million child deaths over the next five years.

The funding allows expanding the initiative’s portfolio to include two new vaccines against two big killers, pneumonia and diarrhea.

“For the first time in history, children in developing countries will receive the same vaccines against diarrhea and pneumonia as children in rich countries,” said Bill Gates, co-chair of the Bill & Melinda Gates Foundation. “Together we must do more to ensure that all children – no matter where they live – have equal access to life-saving vaccines.”

In this time of economic recession, when governments and donors are reluctant to even maintain, let alone increase, foreign aid, GAVI’s success at fund-raising is extraordinary.

There’s little question GAVI is making a big difference in terms of global health, having so far prevented something like 5 million deaths. I’ve written several posts recently emphasizing this point, and to some extent perhaps sounding a bit like an advocate for GAVI.

It’s hard not to be when you look at what this project has accomplished in terms of lives saved. But there are some questioning whether GAVI is, in fact, saving the most lives possible by getting the biggest bang for the buck. This question was raised today, at the London meeting and at the press conference.

So let’s ask a few of the tough questions now that the fund-raising goal’s been met.

Vaccines are made by drug companies, which tend to want (well, are required) to make money. Yet the goal of GAVI is not supposed to be about helping drug companies make money. The goal is to vaccinate children in poor countries. And poor countries don’t have a lot of money to spare.

The first question:
Does GAVI strike the hardest bargain with drug companies, getting the needed vaccines at the lowest cost? Put another way, is the organization too willing to accept what the drug companies want?

The Wall Street Journal today cites a number of organizations who think GAVI has not done enough to reduce prices, is too “cozy” with drug companies and want to see pharmaceutical industry representatives removed from the governing board. Nina Schwalbe, a GAVI official, responded that the alliance has done the best it could to get the industry to reduce vaccine prices and that they need to collaborate with the drug industry.

The vaccine that has drawn the most ire from critics is for preventing pneumococcal disease, which causes pneumonia and meningitis, for which GAVI agreed to pay $7 per vaccine (children need three shots). The higher price (which will go down to $3.50 later) was agreed upon to help drug firms GlaxoSmithKline and Pfizer build manufacturing plants.

Schwalbe said changes in the vaccine market over time are expected to continue to drive down prices but “GAVI in the meantime can’t afford to let kids die.”

One former staffer at GAVI who now works for UNICEF, Craig Burgess, recently wrote an open letter in How Matters to new GAVI CEO Seth Berkley in which he made five recommendations. One of them was to suggest that GAVI needs to become less beholden to the drug industry, stop allowing it to set prices and use the organization for marketing purposes. Burgess writes:

Some would argue that the GAVI Alliance is one of the best marketing machines ever devised by industry and partners, stimulating demand and shaping pricing mechanisms.... Challenging the industry publicly or privately seems off limits for discussion, adding to the ‘smoke and mirrors’ perceived relationship that GAVI has with pharma.
James Love, of Knowledge Ecology International, specializes in examining the relationship between the drug industry and global health organizations like GAVI and the World Health Organization. Here’s a statement his organization, along with Oxfam, Médecins Sans Frontières and others, made recently expressing concern regarding growing conflict-of-interests due to industry participation in the governance structures of many global health initiatives:

We are concerned that proposals in the current debate over WHO reform, particularly in the report on ‘The future of financing for WHO, World Health Organization: reforms for a healthy future’, do not adequately address the management of conflicts of interest, and present an unrealistic and empirically unsupported assumption that all stakeholders will collaborate to advance the public interest.

The statement specifically calls for opposition to, among other things, the governance of a new organization called the Decade of Vaccines Collaboration. This organization was created to carry out the vision described in the declaration — which includes a promise of $10 billion over 10 years — made by Bill and Melinda Gates last year at the World Economic Forum meeting in Davos.

Love and members of other health advocacy organizations are concerned these initiatives are heavily weighted toward the interests of those on the supply side of the vaccine equation — industry, researchers, NGOs — with inadequate representation by the intended beneficiaries — poor people in poor or middle-income countries.

The Commission on Smart Global Health Policy recently issued a report on GAVI’s Future. In the opening statement, the commissioners write:

Now and into the future, GAVI will need to convince donors and recipient governments alike that in the midst of a global recession and constrained national budgets and donor resources, immunizations and GAVI’s leadership in delivering vaccines to the poor are a “best buy” in global health.

Finding the “best buy” leads to the second question:
Why isn’t more being done to get the vaccines made in poor and middle-income countries rather than relying largely on Big Pharma?

That’s the question Yojana Sharma of SciDev.Net raises in Make Vaccines for Africa in Africa. The vaccines used by GAVI are almost entirely made in Europe, the U.S. and to some extent in Latin America and Asia, Sharma notes, and a number of organizations are calling on GAVI to support vaccine manufacturing in poor countries:

Julia Hill, vaccines policy advisor at MSF, said: "We believe GAVI could be stronger in including low cost producers rather than paying companies who have developed vaccines originally for use in richer countries. [The vaccines] need to be better suited to the countries they are used in."

Daniel Berman, also with Médecins Sans Frontières (MSF, aka Doctors Without Borders), makes the same argument but with more force in “GAVI money welcome but could it be more wisely spent?” Berman contends that GAVI’s approach to vaccine purchases with Big Pharma amounts to “corporate welfare” and that much more could be accomplished if more vaccines were purchased from “emerging country suppliers” such as in India.

Last week, a number of drug companies jointly announced plans to reduce the price of select vaccines for GAVI. This was widely hailed as evidence the global vaccines initiative is making progress toward its goal of “market shaping” — driving down costs by guaranteeing drug firms large purchases for their vaccines and creating market demand for vaccines that otherwise would be of little interest to industry.

Obviously, the announcement by industry was timed to precede the London meeting. Some saw this as less due to “market shaping” than pre-emptive marketing. One vaccine expert suggested to me the drug firms likely were faced with either showing good faith on price reductions or getting lambasted at the summit.

But even with the price drops, many of the newer vaccines remain fairly expensive for poor countries. What happens if/when donors stop funding the vaccines? Will poor countries be able to continue vaccinating?

The Smart Global Health Policy gang says in its report:

There is a pressing need to achieve continued and steeper vaccine price reductions, create incentives for late-stage research and development (R&D), and promote manufacturing of new vaccines, while respecting the need to maintain a healthy competitive market among manufacturers.

So, last question:
Is there a healthy competitive market to maintain among manufacturers of vaccines?

I’m no economist, and so I won’t try to answer that. My concern is if this question is even phrased accurately. Vaccines are basically a public good. They need to be cheap to be useful. Drug companies can’t
be expected to take a loss in producing them. But what constitutes a healthy competitive market for vaccines?

Right now, vaccines are made by a relatively few drug companies. And the nature of any large corporation is to compete, sometimes to the point of creating an unhealthy market — in which one or two industries exert too much control over both sides of the supply and the demand equation.

What is happening right now with regard to Big Pharma’s assault on the generic drug industry in the developing world is worrisome, indicating that “healthy competition” is not necessarily a top priority for drug companies. Most AIDS drugs, for example, are only affordable in many countries because they are generic drugs. Yet Big Pharma appears to be pushing for regulations that would greatly restrict global marketing of these drugs.

As the Guardian reports: According to Michelle Childs, director of policy and advocacy with Médecins Sans Frontières’ campaign for access to essential medicines, the US, the European Union and Japan are trying to make laws “even stricter and narrow the opportunities for generic producers to make [and] to export those drugs.”

Clearly, the drug industry does a good job protecting its own interests. The question for GAVI is how best to strike the right balance between collaborating with the drug industry while also pressuring it to serve the interests of the poor.

**MenAfriVac More Effective, Less Expensive Than Older Meningitis Vaccines, Studies Say**
The meningococcal vaccine MenAfriVac, which is made by the Indian generic drug company Serum Institute, is "dramatically better" at producing a protective effect among African children in three countries than "older so-called meningococcal polysaccharide vaccines, including Mencevax from GlaxoSmithKline," according to a paper describing two studies published in the New England Journal of Medicine, Reuters reports.

MenAfriVac, which costs about 50 cents per dose, is specifically designed to protect against meningitis A, which causes regular epidemics in Africa, whereas older vaccines, including Mencevax and Menomune from Sanofi Pasteur, protect against four meningitis strains, making them "more expensive and less targeted to Africa’s needs," according to Reuters (Kelland, 6/16). MenAfriVac "could prevent about 150,000 deaths by 2020, lead author Marie-Pierre Preziosi said in a telephone interview," Bloomberg reports (Narayan, 6/16).

IRIN reports on the MenAfriVac vaccine, writing, "The roll-out of a revolutionary meningitis vaccination in Burkina Faso, Mali and Niger has dramatically cut transmission rates, according to the World Health Organization (WHO), and if each country can find sufficient funds to co-finance the campaign, it will be extended to all 25 countries in the Africa meningitis belt by 2016, says the Global Alliance for Vaccines and Immunization (GAVI)” (6/15).

**Sugar-Binding Protein May Play a Role in HIV Infection**
ScienceDaily (June 14, 2011) — Researchers report that a sugar-binding protein called galectin-9 traps PDI on T-cells' surface, making them more susceptible to HIV infection.

Specific types of "helper" T cells that are crucial to maintaining functioning immune systems contain an enzyme called PDI (protein disulfide isomerase). This enzyme affects how proteins fold into specific shapes, which in turn influences how the T cells behave. PDI also plays a role in HIV infection by helping to change the shape of the surface envelope protein of the virus, enabling the virus to interact optimally with receptors on the T cells, such as the CD4 molecule.

Though it is known that PDI inhibitors can prevent HIV infection, just how this happens has remained a mystery. And though it has been known that PDI, which normally lives inside the cell, can become entrapped on the cell's surface, it has not been understood how this happens. Now, in a new study, UCLA researchers report that a sugar-binding protein called galectin-9 traps PDI on T-cells' surface, making them more susceptible to HIV infection.

**IMPACT:** The findings could lead researchers to a potential new target for anti-HIV therapeutics, such as therapies to inhibit PDI or galectin-9.

**Journal Reference:**
S. Bi, P. W. Hong, B. Lee, L. G. Baum. **Galectin-9 binding to cell surface protein disulfide isomerase regulates the redox environment to enhance T-cell migration and HIV entry.** Proceedings of the National Academy of Sciences, 2011; DOI: 10.1073/pnas.1017954108
Parents should begin talking about sexual health matters with their children from an early age, especially when they ask questions, experts say.

About 49 percent of 12th-graders are sexually active, according to the National Campaign to Prevent Teen and Unplanned Pregnancy (NCPTUP), citing the 2009 Youth Risk Behavior Survey. However, the 2002 National Survey of Family Growth found 33 percent of female teens received no instruction about contraception before they first had sex.

“Parents should disabuse themselves of this notion that it is a one-time talk,” said Bill Albert, chief program officer for NCPTUP. “It is and should be an 18-year conversation.”

The conversations should be tailored to the child’s age, graduating from discussions about anatomy to middle-school topics about acting respectfully toward peers, said Leslie Montgomery, director of education at Planned Parenthood of Indiana.

“If your child does come to you and asks a question, the most important thing at that point is to avoid having that shocked expression on your face, and answer in a matter-of-fact tone,” Montgomery said.

Parents’ influence over children’s decisions about sex is greater than that of the youths’ peers, Albert said. Children can accept, “Please delay having sex; but if you do have sex, use contraception,” he said.

Parents who believe teens should save sex for marriage should share and foster those values early, noting that contraception reduces—not eliminates—risks, said Valerie Huber, executive director of the National Abstinence Education Association.

“What they need to do is give their young person enough tools to be safe,” said Dr. J. Dennis Fortenberry, pediatrics professor at Indiana University School of Medicine and an adolescent-medicine specialist.

“We need to treat sex as something different than drugs, alcohol, and other risk behaviors,” said Dr. Margaret Blythe, adolescent-medicine specialist at Riley Hospital for Children in Indiana. “It is a part of our lives, and it should be a healthy part.”

On Tuesday, South African and US officials announced a bilateral initiative to support a Phase III trial of a microbicide that contains the AIDS drug tenofovir.

The Technology Innovation Agency, which is licensing the African rights to the microbicide from the US research group CONRAD, plans to manufacture and distribute the product, if proved effective, with the local firm Cipla Medpro.

The confirmatory Phase III trial seeks to build on the results of a study of 900 women from two sites in KwaZulu-Natal province. That trial showed that a gel containing 1 percent tenofovir, used before and after sex, reduced HIV transmission risk by 39 percent. In addition, the microbicide halved the risk of acquiring herpes, an STD that increases vulnerability to HIV.

However, those results had a wide margin of error, and HIV protection efficacy was estimated to range from 6 percent to 60 percent, said professor Helen Rees, protocol chair of the Follow-on African Consortium for Tenofovir Studies (FACTS), which hopes to build on last year’s study and satisfy regulators of the microbicide’s safety and efficacy.

FACTS is being funded by $18 million from the US Agency for International Development and 70 million rand (US $10.2 million) from the South African Department of Science and Technology.

Pharmaceutical imports are the fifth-largest contributor to South Africa’s trade deficit, so the government is eager to see more of these goods produced domestically.

A new meta-analysis of prenatal syphilis screening and treatment studies suggests that more than 50 percent of the world’s syphilis-related stillbirths and perinatal deaths each year could be prevented. About 2.1 million pregnant women have active syphilis annually, but many are not given a simple blood test costing $1 to $1.50 to detect it.

Without screening and treatment, 69 percent of these women will experience an adverse outcome of pregnancy, noted Sarah Hawkes, of University College London, and colleagues. The worst outcomes could
be prevented if syphilis were detected and treated before about 28 weeks. An estimated 1 million babies
die from congenital syphilis each year, experts say.

Hawkes and colleagues analyzed 10 studies, nine of which involved decentralized screening and
treatment. Two were randomized trials, and two aimed to encourage women to seek earlier prenatal care.
The trials, which involved more than 41,000 women, showed same-day syphilis testing and treatment
could cut perinatal deaths by 54 percent and stillbirths by 58 percent.

“What this review shows is that screening is extremely effective at bringing down death rates and
illness rates, but unfortunately the majority of pregnant women in the world are still not screened for
syphilis,” Hawkes said. “It’s incredibly cheap, you can do it with a simple blood test, and women often
have blood tests during antenatal care anyway. But we need to get all women who are pregnant to come to
antenatal care early enough to be able to make a difference.”

The study, “Effectiveness of Interventions to Improve Screening for Syphilis in Pregnancy: A Systematic Review and Meta-Analysis,”
was published online ahead of the print edition of Lancet Infectious Diseases (2011; doi:10.1016/S1473-3099(11)70104-9).

AIDS-Hit Swaziland Sees Reason for Hope
Associated Press (06.15.2011)
Swaziland’s HIV prevalence rate is the world’s highest, more than one-quarter of residents ages 15 to 49
are believed to carry the virus, but an activist there sees some rays of hope. Sipho Dlamini, programs
director for the Swaziland National Network of People Living with HIV and AIDS, on Wednesday pointed
to signs of progress in the government’s latest population projections. Government statisticians estimate
that the nation’s life expectancy will rise to 47 years by 2030, up from 45 in 2007. The rate of infant
mortality is expected to decline from 100 deaths for every 1,000 live births in 2007 to about 92 per 1,000
in 2030.

NIH Scientists Attenuate B-Cell Exhaustion in Chronic HIV

“Healthy B cells have a balanced mix of surface proteins that the immune system can use, like the gas
pedal and brake of a car, either to activate the cell or to damp down its activity. However, in people with
long-term HIV infection who have not begun antiretroviral therapy, their B cells—responsible for
producing anti-HIV antibodies—display a surplus of inhibitory receptors, the surface proteins used to
apply the brakes on a B cell. Scientists from the NIAID Laboratory of Immunoregulation led by Lela
Kardava, Ph.D., Susan Moir, Ph.D., and Anthony S. Fauci, M.D., NIAID Director and Chief of the
labratory, wanted to know if this phenomenon can help explain why B cells become ‘exhausted’ and
essentially shut down in people who are HIV-infected but treatment-naive.

“To test their hypothesis, the scientists used molecules called small interfering RNAs (siRNAs), which
acted at the genetic level to prevent exhausted B cells from replenishing inhibitory receptors. After
treatment with siRNAs, the exhausted cells responded more normally to conditions that typically would
spur a B cell into action … demonstrating that the excess of inhibitory receptors may explain why
exhausted B cells are so unresponsive.

“Because B cells generally are difficult to manipulate, the new siRNA-based approach may hold
promise for scientists seeking to develop therapies to improve the human antibody response against HIV
and other pathogens by altering the expression of specific B-cell genes.”

Study Examines Impact of Baseline HIV Tropism on Viral Response in HIV-Infected People Receiving First-Line Antiretroviral Therapy

“Viral tropism influences the natural history of human immunodeficiency type 1 (HIV-1) disease: X4
viruses are associated with faster decreases in CD4 cell count. There is scarce information about the
influence of viral tropism on treatment outcomes. … Baseline plasma samples from patients recruited to
the ArTEN (Atazanavir/[ritonavir]) vs. Nevirapine on a background of Tenofovir and Emtricitabine) trial
were retrospectively tested for HIV-1 tropism … ArTEN compared nevirapine with atazanavir-ritonavir,
both along with tenofovir-emtricitabine, in drug-naive patients. … Of 569 ArTEN patients, 428 completed
48 weeks of therapy; 282 of these received nevirapine and 146 of these received atazanavir-ritonavir.
Overall, non-B subtypes of HIV-1 were recognized in 96 patients (22%) and X4 viruses were detected in 55
patients (14%). At baseline, patients with X4 viruses had higher plasma HIV RNA levels (5.4 vs 5.2 log
copies/mL, respectively; P = .044) and lower CD4 cell counts (145 vs 188 cells/μL, respectively; P < .001)
than those with R5 strains. At week 48, virologic responses were lower in patients with X4 viruses than in
patients with R5 viruses (77% vs 92%, respectively; P = .009). Multivariate analysis confirmed HIV-1
tropism as an independent predictor of virologic response at week 24 (P = .012). This association was extended to week 48 (P = .007) in clade B viruses. Conversely, CD4 cell count recovery was not influenced by baseline HIV-1 tropism. ... HIV-1 tropism is an independent predictor of virologic response to first-line antiretroviral therapy. In contrast, it does not seem to influence CD4 cell count recovery."

**vineri, 17 iunie 2011**

**Knowingly transmitting HIV is a criminal offence in Romania**

Recently two senators—Mr. Ruset Ion and Urban Iulian—PDL senators, decided to complete the Penal Code with an aggravating punishment between 15-25 years for AIDS patients who infect other people, if this leads to the victim's death. Although apparently the proposal seems good, the way things are done is disappointing.

Their reason was to cover a gap in the current Penal Code, I would say a non-existent gap as shown below. Government urged caution shortening the sentence between 7-15 years to match the new Penal Code adopted and published in the Official Gazette which shall enter into force on 1 October 2011.

None of the two initiators and not even the other senators have wondered what is the difference between HIV and AIDS or how do you establish if the newly infected person did or did not know about the partner's condition.

Remains a mystery how Romanian lawmakers imagine the offender have said before contact that has HIV or AIDS. In writing? Filming their statement?

Although criminal prosecutions of individuals with HIV are relatively rare, concerns about the use of confidential healthcare or public health information in such prosecutions are by no means hypothetical. All a prosecutor would need, is evidence that on that date, the defendant knew he or she was infected with HIV and knew that his or her behavior posed a risk of transmission.

Current law is vague, unclear and allows interpretations and the new paragraph adopted by the Senate is equally vague, almost meaningless in the context of the new Criminal Code that will come into effect in several months.

Furthermore, although the culpability extends to all forms of infection and not just sex, new Criminal Code is a disaster in most respects. The biggest issue is that it criminalizes those who transmit HIV without knowing they are infected.

In conclusion, we mention explicitly that we are against deliberate infection with HIV and we agree that is an aggravating circumstance in the punishment of perpetrators, but you can not punish somebody if he or she did not know that has HIV / AIDS and unintentionally transmitted the virus.

The logical deduction is that a HIV / AIDS information program should be done first in Parliament, because they make many mistakes and confusion (in ignorance or not) between HIV and AIDS in the very motivation of their initiative. So the law should do better distinguish and clarify exactly when it comes to HIV infection and when it comes to an AIDS. Currently the law speaks of disease transmission when in fact is transmitted the virus that can trigger the disease only after years of infection!

The bill initiated by the two senators:

"Transmission of a venereal disease by sexual intercourse, by sex between same-sex persons or acts of sexual perversion by a person who knows to suffer from such disease shall be punished with imprisonment from one to five years. Acquired immunodeficiency syndrome transmission—AIDS—by a person known to suffer from this disease is punished with imprisonment from five to 15 years. If the offense resulted in death of the victim, the punishment is imprisonment from 15 to 25 years"

The final draft, adopted by the Senat:

"Transmission of a venereal disease by sexual intercourse, by sex between same-sex persons or acts of sexual perversion by a person who knows to suffer from such disease shall be punished with imprisonment for 1-5 years. Acquired immunodeficiency syndrome transmission—AIDS—by a person suffering from this disease know that is punishable by imprisonment for 5-15 years. If the offense resulted in death of the victim, the punishment is imprisonment from 7 to 15 years"

**Fewer Girls Develop Cervical Abnormalities After HPV Vaccine**

*Reuters*, (06.16.2011) Tan Ee Lyn

A new study suggests a recent decrease in the incidence of high-grade cervical abnormalities (HGA) in young females in Victoria may be linked to the roll-out of Australia’s human papillomavirus vaccine program. In 2007, Australia began subsidizing Gardasil HPV vaccine for all females ages 12-26. Within
three years, the number of young females developing cervical abnormalities declined by as much as 50 percent, the study found.

The study compared low-grade cytological abnormality (LGA) and HGA incidence data in five age groups from before and after the vaccination program began. Post-launch, proportionately fewer vaccinated girls (0.42) screened had HGAs than unvaccinated girls (0.8 percent). Incidence of HGAs decreased by 0.38 percent (95 percent confidence interval 0.61–0.16) in girls younger than 18 years, a decline that was progressive and different to linear trends seen before the program’s introduction (incident rate ratio 1.14, 1.00–1.30, p=0.05). Similar declines were not observed for LGAs in older age groups, noted Julia Brotherton, an epidemiologist with the Victorian Cytology Service Registries, and colleagues.

The study “shows a reduction in the number of very young women with [HGAs] diagnosed since the vaccine program started,” Brotherton said. “In conjunction with the data from our colleagues in the sexual health field, who have already demonstrated a significant reduction in the occurrence of genital warts since the vaccine program started, we are optimistic that this is an indication that the vaccine program is already beginning to have an impact.”

“Linkage between vaccination and screening registers is needed to confirm that this ecological observation is attributable to vaccination and to monitor participation in screening among vaccinated women,” Brotherton and colleagues wrote. The effects were seen in a group that is younger than that typically screened, Karen Canfell, an epidemiologist with the Cancer Council of New South Wales, also noted.


International team works out secrets of one of world’s most successful patient safety programs

How dramatic reduction in infection at 100 intensive care units was achieved is revealed

A team of social scientists and medical and nursing researchers in the United States and the United Kingdom has pinpointed how a programme, which ran in more than 100 hospital intensive care units in Michigan, dramatically reduced the rates of potentially deadly central line bloodstream infections to become one of the world’s most successful patient safety programmes.

Funded in part by the Health Foundation in the UK, the collaboration between researchers at the Johns Hopkins University, the University of Leicester and the University of Pennsylvania, has led to a deeper understanding of how patient safety initiatives like the Michigan programme can succeed.

"Explaining Michigan: developing an ex post theory of a quality improvement programme” by Mary Dixon-Woods and Emma-Louise Aveling of the University of Leicester; Charles Bosk of the University of Pennsylvania and Christine Goeschel and Peter Pronovost of Johns Hopkins University, is published in the June 2011 edition of Milbank Quarterly.

"We knew this programme worked. It not only helped to eliminate infections, it also reduced patient deaths," said programme leader Peter Pronovost of the Johns Hopkins University School of Medicine, who was named as one of Time Magazine's 100 most influential people in 2008 and was the recipient of a MacArthur Fellowship, or 'genius grant,' from the John D. and Catherine T. MacArthur Foundation. "The challenge was to figure out how it worked”.

The researchers found that one of the Michigan programme's most important features is that it explicitly outlined what hospitals had to do to improve patient safety, while leaving specific requirements up to the hospital personnel. A critical aspect of the programme was convincing participants that there was a problem capable of being solved together.

"It was achieved by a combination of story-telling about real-life tragedies of patients who came to unnecessary harm in hospital, and using hard data about infection rates," said co-author Charles Bosk, a professor of sociology in Penn’s School of Arts and Sciences and a senior fellow in the Center for Bioethics at Penn.

Infection rates were continuously monitored at hospitals participating in the programme, making it easier for hospital workers to track how well they were doing and where they needed to improve.

The authors conclude that that there are important lessons for others attempting patient safety improvements. Checklists were an essential component, but not necessarily the most important element of the Michigan programme.

"The programme was much more than a checklist," said lead author Mary Dixon-Woods, professor of medical sociology at the University of Leicester, "It involved a community of people who over time created
supportive relationships that enabled doctors and nurses in many hospitals to learn together, share good practice, and exert positive pressure on each other to achieve the best outcomes for patients."

"What we have learned is that it is the local teams that deliver the results", said Dr Bosk. "But they need to be well supported by a core project team, who have to focus on enabling hospital workers to get things right. That means providing them with scientific expertise to justify the changes they are being asked to make, and standardising measures so they are all collecting the same data. It also means trying to figure out why simple changes that make life better are so difficult for health care delivery systems to do. Getting the whole programme to work, rather than compliance with a single one component, is the key to making health care safer for patients."

"No one discipline has the answer to patient safety problems. We have to bring together contributions from clinical medicine and the social sciences to make real progress in this area" added Dr Provonost. This month, Dr. Pronovost was named director of Johns Hopkins' newly formed Armstrong Institute for Patient Safety and Quality and senior vice president for patient safety and quality.

**Scientists Develop a Fatty 'Kryptonite' to Defeat Multidrug-Resistant 'Super Bugs'**

ScienceDaily (June 17, 2011) — "Super bugs," which can cause wide-spread disease and may be resistant to most, if not all, conventional antibiotics, still have their weaknesses. A team of Canadian scientists discovered that specific mixtures of antimicrobial agents presented in lipid (fatty) mixtures can significantly boost the effectiveness of those agents to kill the resistant bacteria.

This discovery was published online in *The FASEB Journal*.

According to a researcher involved in the study, Richard Epand, Ph.D. from the Department of Biochemistry and Biomedical Science at McMaster University in Hamilton, Ontario, Canada, "This study may contribute to overcoming the lethal effects of drug resistant bacteria that is becoming an increasing clinical problem, particularly in hospitals."

To make their discovery, Epand and colleagues conducted experiments using groups of mice infected with lethal doses of multidrug-resistant *Escherichia coli* (*E. coli*). Researchers then treated the mice with conventional drug combinations or drug combinations encapsulated in lipid mixtures. They found that certain lipid mixtures caused the drugs to act together in a synergistic manner. In this form, the drugs were much more effective in increasing the survival rate of the mice because they overcame the cellular mechanisms used by these bacteria to defeat therapeutic agents.

This study also demonstrated a novel use of a new family of antimicrobial agents called oligo-acyl-lysyls, which have the potential to be combined with other drugs and lipid mixtures with similar properties to yield a platform for other specific applications.

"As we’ve seen in the recent *E. coli* outbreak in Germany, bacteria can mutate to become super bugs that resist antibiotics," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*. "Thanks to this new, lipid-based antibiotic therapy, multidrug-resistant bacteria may begin to look more like Jimmy Olsen and a lot less like Superman."

**Journal Reference:**

How the Immune System Fights Back Against Anthrax Infections

ScienceDaily (June 17, 2011) — Scientists at the University of California, San Diego School of Medicine and Skaggs School of Pharmacy and Pharmaceutical Sciences have uncovered how the body’s immune system launches its survival response to the notorious and deadly bacterium anthrax. The findings, reported online June 16 and published in the June 22 issue of the journal Immunity, describe key emergency signals the body sends out when challenged by a life-threatening infection.

Exposure to anthrax often proves deadly. The anthrax bacterium can invade immune cells called macrophages and release potent toxins that paralyze key biochemical pathways, causing rapid cell death. Unchecked, the process may completely collapse the body’s immune defenses, allowing the bacteria to proliferate, and ultimately lead to septic shock and high mortality.

The researchers discovered that the fight against invading anthrax bacteria begins with the first infected cell. They found that initially impacted macrophages immediately communicate with other immune cells to sound the alarm and develop a survival strategy. Remarkably, the key signaling molecule involved in the survival response is adenosine triphosphate or ATP, a basic currency of energy transfer used by all organisms.

"The warning alarm sounded during anthrax infection is elegant, complex and can be effective in slowing spread of the pathogen," said Michael Karin, PhD, distinguished professor of pharmacology and senior author of the study.

Karin explained that ATP is released from macrophages infected and poisoned with anthrax toxins through a special channel in the cell membrane. This ATP is then sensed by a receptor on a second macrophage, which assembles and activates a complex of molecules known as the inflammasome. The inflammasome then releases into the bloodstream an immune-activating molecule known as interleukin-1beta (IL-1beta), which alerts macrophages throughout the body to mobilize and increase their resistance to anthrax-induced cell death.

Researchers confirmed the importance of this complex signal transduction pathway in fighting anthrax in a series of experiments using genetically altered mice or inhibitor drugs. Whenever the researchers interfered with the ATP channel, the ATP receptor, inflammasome proteins or the IL-1beta molecule, they found that the macrophages could not survive, anthrax bacteria grew unchecked or the infected mouse died rapidly. They also noted that the immune response pathway responded only to the most dangerous bacterial pathogens. Infections using a mutant anthrax bacterium lacking the deadly toxins did not set off the alarm system in test animals.

"We hope these findings can be exploited for the design of new treatments to help the body combat serious bacterial pathogens," said Victor Nizet, MD, professor of pediatrics and pharmacy, whose infectious disease research laboratory contributed to the study. "Supporting the survival of macrophages and preserving their immune function may buy patients precious time until antibiotic therapy is brought on board to clear the infection."

Journal Reference:

Lyme Disease Bacteria Take Cover in Lymph Nodes

ScienceDaily (June 16, 2011) — The bacteria that cause Lyme disease, one of the most important emerging diseases in the United States, appear to hide out in the lymph nodes, triggering a significant immune
response, but one that is not strong enough to rout the infection, report researchers at the University of California, Davis.

Results from this groundbreaking study involving mice may explain why some people experience repeated infections of Lyme disease. The study appears online in the journal Public Library of Science Pathogens.

"Our findings suggest for the first time that Borrelia burgdorferi, the bacteria that cause Lyme disease in people, dogs and wildlife, have developed a novel strategy for subverting the immune response of the animals they infect," said Professor Nicole Baumgarth, an authority on immune responses at the UC Davis Center for Comparative Medicine.

"At first it seems counter intuitive that an infectious organism would choose to migrate to the lymph nodes where it would automatically trigger an immune response in the host animal," Baumgarth said. "But B. burgdorferi have apparently struck an intricate balance that allows the bacteria to both provoke and elude the animal’s immune response."

**About Lyme disease**

Lyme disease, the most important tick-borne disease in the United States is caused by *Borrelia burgdorferi*, corkscrew-shaped bacteria also known as spirochetes. The disease is transmitted to humans and animals through bites from infected deer ticks.

The disease occurs mainly in the Northeastern and Great Lakes states, and is present to a lesser extent in Northern California. However, the western black-legged tick, the main carrier of Lyme disease in the western United States, has been found in 56 of California’s 58 counties, according to the California Department of Public Health.

Symptoms of Lyme disease are quite variable and may include fever, headache, fatigue and a skin rash. If the infection is not treated, it can spread to the joints, heart and nervous system.

Usually, Lyme disease can be successfully treated with about four weeks of antibiotics; treatment is most successful during the early stages of infection.

**The UC Davis study**

Swollen lymph nodes, or lymphadenopathy, is one of the hallmarks of Lyme disease, although it has been unclear why this occurs or how it affects the course of the disease. The UC Davis research team set out to explore in mice the mechanisms that cause the enlarged lymph nodes and to determine the nature of the resulting immune response.

They found that when mice were infected with *B. burgdorferi*, these live spirochetes accumulated in the animals’ lymph nodes. The lymph nodes responded with a strong, rapid accumulation of B cells, white blood cells that produce antibodies to fight infections. Also, the presence of *B. burgdorferi* caused the destruction of the distinct architecture of the lymph node that usually helps it to function normally.

While B cells accumulated in large numbers and made some specific antibodies against *B. burgdorferi*, they did not form "germinal centers," structures that are needed for the generation of highly functional and long-lived antibody responses.

"Overall, these findings suggest that *B. burgdorferi* hinder the immune system from generating a response that is fully functional and that can persist and protect after repeat infections," Baumgarth said. "Thus, the study might explain why people living in endemic areas can be repeatedly infected with these disease-causing spirochetes."

**Journal Reference:**


**A Shot in the Arm**

Decades of vaccine research have expanded our understanding of the immune system and are yielding novel disease-fighting tactics.

**By Edyta Zielinska | May 28, 2011**

Imagine having the ability to eliminate a disease—not just to alleviate its symptoms, but to erase it completely, as if it had never existed. This is the promise of vaccines.

It was this idea that lured me, as an undergraduate, into the field of immunology. A few years after my grandmother had died of melanoma, I was browsing in the library stacks when I came across a research article discussing a vaccine-based therapy for the cancer. The concept gave me pause. I had only known vaccines in the context of the dreaded childhood shots. Yet here, the authors presented the idea of
tweaking vaccination so that the immune system might reject cancer in much the same way that it clears an infection.

Feisty as it is, the immune system remains an unconquered landscape still harboring many secrets. Cancer vaccines still remain more a goal than a current therapy, but the design of successful vaccines offers firsthand evidence that the human immune system can be tricked and manipulated to behave as we would like.

This issue of The Scientist celebrates vaccines. It catalogs how a fuller understanding of the intricacies of generating immunity is informing vaccine design. The articles herein focus on diseases that present unique challenges to vaccine development.

While our ever-adapting immune system is nimble, some pathogens, such as the HIV and influenza viruses, are even more nimble in their evolution and immune evasion. For this reason, Gene Shearer and Adriano Boasso have resurrected the idea of designing a vaccine to target a human protein displayed on the envelope of the HIV virion, a protein over which the virus has no control. They explain how such a vaccine could stop viral spread by eliciting the kind of fierce immune response seen in organ-transplant rejection. Vaccinologist Rino Rappuoli reviews current efforts to make “universal” vaccines that could circumvent pathogens’ incessant self-modification.

Another major challenge to the production of new vaccines is the cost associated with their development and their distribution. Like other pharmaceutical products, vaccines are estimated to cost as much as a billion dollars each to bring to the clinic, while the income they generate is usually limited to a three-time application per susceptible person. Brad Spellberg discusses the underexplored market for vaccines against fungal infections that kill many patients who acquire them in hospital settings.

In a Critic at Large article, Michael Gusmano makes the point that vaccines must be viewed as complementary solutions to the problem of malaria in areas of the world where millions of people still suffer and die from the disease—true resolution needs to include the implementation of effective local and national public-health systems.

The principles underlying vaccination have inspired applications beyond infectious disease. Thomas Kosten discusses developing vaccines that might help users of addictive drugs break the habit. Blocking the drug’s access to the brain via antibody binding of cocaine deprives users of the pleasure—though not the craving—associated with the drug. However, the vaccine, coupled with behavior-modification therapy, could help patients struggling to maintain sobriety.

Vaccines activate one of our most versatile biological systems—one so adept at preventing microbes from taking over our bodies that it can guess the molecular signature of pathogens it has never encountered. Feisty as it is, the immune system remains an unconquered landscape still harboring many secrets. As the list of immune-related diseases grows, from rheumatoid arthritis, to diabetes and Alzheimer’s, and of course, cancer, one can only hope that we can do for these what vaccination has done for many infectious diseases.

**Newly blacklisted pathogens**

The US government presents a new list of 11 microorganisms that pose the highest risk in biomedical research

By Cristina Luiggi | June 16, 2011

Earlier this week, a yearlong federal investigation ended with the classification of 11 pathogens in a new category of microorganisms that require the most stringent security standards in research. Known as Tier 1 select agents, the list includes organisms that cause deadly diseases such as anthrax, smallpox, plague, and Ebola hemorrhagic fever. While the new ruling is meant to tighten security surrounding the listed pathogens, such as requiring rigorous criminal background checks and periodic monitoring, it also removes some of the red tape imposed on researchers working with other potentially dangerous microorganisms that did not make the list, ScienceInsider reports. Here’s a full list of the newly blacklisted agents:

- Bacillus anthracis (Anthrax disease)
- Burkholderia mallei (Glanders)
- Burkholderia pseudomallei (Melioidosis or Whitmore’s disease)
- Ebola virus
- Foot-and-mouth disease virus
- Francisella tularensis (Tularemia)
- Marburg virus

---

Newly blacklisted pathogens

The US government presents a new list of 11 microorganisms that pose the highest risk in biomedical research

By Cristina Luiggi | June 16, 2011

Earlier this week, a yearlong federal investigation ended with the classification of 11 pathogens in a new category of microorganisms that require the most stringent security standards in research. Known as Tier 1 select agents, the list includes organisms that cause deadly diseases such as anthrax, smallpox, plague, and Ebola hemorrhagic fever. While the new ruling is meant to tighten security surrounding the listed pathogens, such as requiring rigorous criminal background checks and periodic monitoring, it also removes some of the red tape imposed on researchers working with other potentially dangerous microorganisms that did not make the list, ScienceInsider reports. Here’s a full list of the newly blacklisted agents:

- Bacillus anthracis (Anthrax disease)
- Burkholderia mallei (Glanders)
- Burkholderia pseudomallei (Melioidosis or Whitmore’s disease)
- Ebola virus
- Foot-and-mouth disease virus
- Francisella tularensis (Tularemia)
- Marburg virus
Intensive and targeted PEP counselling leads to less risky sex afterwards, fewer HIV infections

Roger Pebody
Published: 21 June 2011

People at higher risk of HIV infection who take post-exposure prophylaxis benefit from an intensive programme of risk reduction counselling, American researchers report in the 1 July issue of Clinical Infectious Diseases. Participants made durable changes to their sexual behaviour and were less likely to have acquired HIV infection one year later.

The PEP counselling was based on detailed discussion of the sexual risks participants were taking. However other new research indicates that in the setting of routine clinical care for people with HIV in the UK, some clinicians are barely scratching the surface when it comes to asking about their patients' sexual health and sexual risks.

Counselling for people taking PEP

Researchers in San Francisco wished to measure the impact of providing risk reduction counselling to people taking post-exposure prophylaxis (PEP) to prevent HIV infection. They measured changes in sexual behaviour one year later.

They randomised 457 people receiving PEP to either receive two sessions of standard counselling, or an enhanced programme of five counselling sessions. The standard counselling intervention consisted of two sessions of 20 to 30 minutes each, individually tailored on the basis of social cognitive theory, motivational interviewing, and coping effectiveness training. In the first session, the counsellor and participant explored the details and context of the risk exposure and developed a written risk reduction plan. At the second session a week later, the baseline HIV test result was given. The participant was asked about risk behaviour in the past week and the effectiveness of the risk reduction plan, which was adjusted if necessary.

People receiving the enhanced intervention received the same two sessions, as well as three further sessions, during which difficulties in implementing the plan were explored, contextual factors (such as particular places or emotions) that led to high or low risk behaviour were identified and an increasingly personal risk reduction plan was developed. (A detailed protocol for the five sessions is freely available on the journal’s website).

Adherence counselling was also separately provided on three occasions.

Almost all participants were men, and PEP had commonly been prescribed after unprotected anal sex (80.1%), unprotected vaginal sex (7.5%) or oral sex to ejaculation (5.9%) in the previous 72 hours. Four out of ten people receiving PEP knew that their partner was HIV-positive.

To assess the impact of the two styles of counselling, the behaviour of participants was assessed at the time of taking PEP and one year later.

When the data for all participants were analysed together, the extra intervention appeared to provide a modest benefit, but perhaps one that could not justify the cost of its provision.

The study’s primary outcome was change in the number of unprotected anal or vaginal sex acts. In the six months before taking PEP, participants had had unprotected sex an average of 5.5 times. In people who received two counselling sessions, this dropped by a mean of 1.8, while those getting the extra sessions had 2.3 fewer unprotected sex acts.

The results are more interesting if we only look at those individuals who were taking more sexual risks to begin with. A fifth of the participants had had unprotected sex four or more times in the six months before taking PEP, and the extra counselling had much more impact in this group.

In terms of the primary outcome, those with higher risk receiving the standard two sessions had a reduction in 7.0 unprotected sexual acts, whereas in those getting the extra sessions the average reduction was 13.2 acts.

Whereas 31.5% of higher-risk individuals receiving the standard intervention felt the need to come back for a second course of PEP within a year, this was case in 17.1% of those receiving five sessions.

And most importantly, fewer people were HIV-positive one year later. Among those with higher risk who received two sessions, 12.3% seroconverted. In those who received five sessions, 2.4% did so. (These
infections are likely to be due to risk behaviour in the months after taking PEP, not the failure of PEP to prevent infection).

The researchers say that while, overall, two session counselling is non-inferior, this is not the case for those who have taken greater sexual risks. “For riskier individuals the three additional sessions may be necessary for risk behaviours to decrease,” they say.

Clinicians providing PEP need to take a sexual history in order to target additional counselling at those who would benefit from it.

While PEP can provide a benefit to individuals, the authors say that PEP will only make a public health impact “if it is targeted, used as a tool to leverage additional interventions, and the lessons learned from this study are adopted.”

**Do clinicians discuss sexual behaviour with patients?**

Meanwhile, an audit from the HIV clinic at Guy’s and St Thomas’ in London has found that only a minority of HIV-positive patients seen for follow up had recently had their sexual history reviewed by their HIV clinician. This is despite British HIV Association guidelines recommending that a sexual history should be taken every six months (and a full sexual health screen offered every twelve months).

Researchers audited the medical records of 60 newly diagnosed people and 90 patients attending for routine HIV care. Whereas a sexual history was recorded for 88% of newly diagnosed people, this was only the case for 37% of people attending for follow-up.

Different questions were asked of gay men and heterosexual people. Gay men were more likely to be asked about the number of sexual partners, the type of sex act and about sexual health check-ups, but tended not to be asked about having regular partners, the HIV status of regular partners and disclosing HIV status to regular partners. (These differences were all statistically significant).

None of the heterosexuals were asked about anal sex.

The researchers suggest that HIV clinicians should do more to assess their patients’ onward transmission risk and to provide behavioural interventions.

**References**


**Invitation to test for HIV ups test rate among male partners of pregnant women in South Africa**

Carole Leach-Lemens

Published: 21 June 2011

Providing pregnant women with a written invitation to test for HIV for their male sexual partners significantly increased the numbers of males attending HIV voluntary counselling and testing at antenatal clinics (ANC) compared to those invited for pregnancy information sessions (PIS) in Khayelitsha, a township with a high HIV prevalence, in Cape Town, South Africa according to Boshishi K. F. Mohlala and colleagues in a randomised controlled trial published in the advance online edition of *AIDS*.

Community sensitisation activities encouraging male participation were conducted and antiretroviral therapy was available.

As in a Kenyan study the proportion of self-reported intimate partner violence was small and did not differ between the two groups; for women: 4% (7) in the male sexual partner voluntary counselling and testing arm (MSP VCT) compared to 7% (10) in the male sexual partner pregnancy information session (MSP PIS), p=0.207; for men: 0.5% (1) and 3% (4) for the MSP VCT and MSP PIS, respectively, p=0.167. The authors suggest these numbers may be due to under-reporting.

An estimated 2.1 million children under the age of 15 are living with HIV; the majority of whom were infected perinatally.

Preventing the sexual and perinatal transmission of HIV during pregnancy needs communication and cooperation between partners, note the authors.

In many prevention of mother-to-child transmission (PMTCT) programmes men and their role, they add, is ignored.

Yet, in many sub-Saharan communities men are the primary decision-makers regarding health care. For expectant couples this can include the mode of delivery as well as infant feeding.
Couples counselling is considered an effective strategy to improve the uptake of PMTCT interventions and minimise adverse outcomes associated with disclosure. However, few studies have evaluated the effectiveness of engaging male partners in PMTCT programmes in areas of high prevalence.

So in a randomised controlled trial the authors chose to compare a pregnant woman’s acceptance of a written invitation for VCT or PIS for their male sexual partners and the consequent effect on the uptake of VCT.

From November 2006 to December 2007 pregnant women attending the Site B Midwife and Obstetrician Unit in Khayelitsha for their ANC booking visit were consecutively screened for the study. The clinic was chosen because it had facilities for interviewing men and provided ART.

Criteria for enrolment included being less than 30 weeks pregnant and being willing and able to give informed consent.

At the booking visit women were offered antenatal care, HIV group education and individual VCT. Half were randomly assigned to the MSP VCT arm and the other half to the MSP PIS.

Each woman in the MSP VCT and MSP PIS arms was given a written invitation to give to her sexual partner inviting him the following week to attend ANC and VCT or ANC and PIS with her, respectively. The couples were interviewed at weeks one and twelve of the two study visits.

Men in the VCT and PIS arms were offered VCT or PIS, respectively. Men in the PIS arm whose partners tested positive were offered VCT at the first couple visit. VCT was available to all who requested it throughout the study.

All 1000 women in the study accepted the letter and agreed to invite their partner. No male partner attended the booking visit.

35% (175/500) of women given VCT invites were accompanied by their male sexual partners to ANC compared to 26% (129/500) given PIS invites (RR: 1.36, 95% CI: 1.12-1.64, p=0.002).

92% (161/175) of male sexual partners who attended ANC because of the VCT invite had HIV couples testing compared to 44% (57/129) of those who attended PIS.

In the Kenyan study only 38% of male partners who went to ANC had couples testing. Neither community sensitisation nor ART were available in this setting prompting the authors to suggest these can play a role in increasing couples testing.

In a multivariate analysis the VCT invite and a woman’s HIV positive status were positive predictors of a male sexual partner’s attendance.

Knowing their positive status, the authors suggest, may have motivated the women to encourage their partners to attend. Conversely ART availability may have motivated the men to take the opportunity to know their HIV status.

The authors highlight the importance of their findings: increasing the number of male sexual partners attending ANC and VCT by inviting them may encourage safer behaviours; may reduce the number of males having multiple partners; and help support HIV positive pregnant women to benefit from PMTCT interventions.

Additional benefits include earlier diagnosis and treatment leading to viral load suppression so reducing transmission.

The authors suggest further studies look at whether ANC and VCT can be sustained in future pregnancies and whether their results can be generalised.

Reference

Researchers Take Another Step Closer to HIV Prevention Product for Use During Pregnancy

Safety of Tenofovir Gel Also Being Evaluated for First Time in Breastfeeding Moms

PITTSBURGH, June 20, 2011 — Determining whether a promising HIV prevention gel is safe for women to use while they are pregnant or breastfeeding is the aim of a new clinical trial being conducted by the U.S. National Institutes of Health–funded Microbicide Trials Network (MTN). Researchers are hopeful that the study—the first clinical trial of the vaginal microbicide tenofovir gel in breastfeeding women and only the second in pregnant women—will bring them a step closer to developing a safe and effective HIV prevention product women can use throughout their lives.

The Phase I trial is underway at two U.S. sites—Magee-Womens Hospital of the University of Pittsburgh Medical Center and the University of Alabama, Birmingham (UAB)—but has implications for women throughout the globe. Indeed, nearly 16 million women are living with HIV worldwide, with most...
acquiring infection through unprotected vaginal sex. **Microbicides**, such as tenofovir gel, are products being developed to prevent HIV infection when used in the vagina or rectum. Researchers anticipate tenofovir gel may be the first vaginal microbicide approved for preventing HIV infection in women.

“Tenofovir gel and other vaginal microbicides under development are intended to be used by sexually active women – the very women most likely to get pregnant – yet we have very little information about whether these products are safe for them to use,” said Richard Beigi, M.D., M.Sc., assistant professor of obstetrics, gynecology and reproductive sciences at the University of Pittsburgh School of Medicine, who is leading the study.

“In fact, HIV prevention may be most critical during pregnancy due to heightened immune responses or hormonal changes that appear to make pregnant women twice as likely to be infected by sexual partners. Most women also continue to be sexually active and use medication while they are pregnant and breastfeeding, so we need to know if products like tenofovir gel are safe for women and their babies before they become widely available,” he added.

Promising results from an earlier clinical study of tenofovir gel called CAPRISA 004 found 39 percent fewer infections among HIV-negative women who used it before and after vaginal sex compared to women who used a placebo gel. A major large-scale study being conducted by the MTN called **VOICE** – Vaginal and Oral Interventions to Control the Epidemic, is currently testing whether daily use of the gel, or an antiretroviral (ARV) tablet, can reduce risk for HIV among 5,000 women in southern Africa. The U.S. Food and Drug Administration (FDA) has indicated it will consider approving tenofovir gel as an HIV prevention method for women based primarily on its review of the results of CAPRISA 004 and **VOICE**, which are expected in 2013.

The new study, **MTN-008**, will provide critical information about the safety of using tenofovir gel during pregnancy and lactation, which the FDA also considers essential to its decision whether to approve the gel. The study is part of a comprehensive research program at the MTN designed to take incremental steps toward determining whether tenofovir gel can safely and effectively protect women against HIV infection when they are pregnant or breastfeeding.

Tenofovir gel contains the same ARV drug that in oral tablet form is a mainstay of one of the most widely used regimens for treating HIV. Oral tenofovir is increasingly being used, along with other ARVs, to safely treat both pregnant and breastfeeding women who are HIV-positive. Research also has shown that HIV-positive pregnant women who are treated with oral tenofovir pass very little drug to their newborn infants.

MTN-008 is a follow-up study to **MTN-002**, which found that a single dose of tenofovir gel given to pregnant women hours before scheduled Cesarean delivery was safe and well-tolerated by both mother and infant, resulting in only trace amounts of active drug in the mother’s bloodstream, and in the amniotic fluid and umbilical cord blood. The drug levels measured in umbilical cord blood were 40 times lower than drug levels in studies of HIV-infected women who took the tablet form of tenofovir while they were pregnant. Building on these results, MTN-008 will test daily use of tenofovir gel by pregnant women for one week during third trimester pregnancy, and daily use of the gel for one week by breastfeeding mothers four to 26 weeks after they have given birth.

“By taking a cautious, step-wise approach to this research, we are ensuring the safety of both mothers and their infants,” said Dr. Beigi. “Our overall goal is to find a product that women can safely use to protect against HIV during all stages of pregnancy and motherhood.”

Researchers will enroll approximately 105 HIV-negative mother-infant pairs. For the pregnancy group, researchers will initially enroll 45 women between 37 and 39 weeks gestation and randomize them to receive tenofovir gel or a placebo gel. The women will apply one dose of their assigned study product (tenofovir gel or placebo gel) for seven consecutive days and undergo evaluation for side effects. Provided there are no safety concerns, researchers will then enroll a second group of 45 pregnant women who will follow the same seven-day regimen. The second group of women will enter the study earlier in their third trimester – between 34 and 36 weeks gestation. For the group of breastfeeding women, all 15 participants who are enrolled will use tenofovir gel daily for seven days.

The researchers plan to evaluate the safety of the drug and assess how much active drug is absorbed during pregnancy and subsequently transferred to the fetus. In breastfeeding mothers, the researchers will also measure drug levels in breast milk and assess whether the drug is transferred to the baby. Depending on results of the study, which are expected in late 2012, the researchers will likely embark on a larger international trial involving a greater number of pregnant women, including those at earlier gestational ages.
New Math in HIV Fight
Statistical Method Evolves From Physics to Wall Street to Battle Against AIDS
By MARK SCHOOFS
Scientists using a powerful mathematical tool previously applied to the stock market have identified an Achilles heel in HIV that could be a prime target for AIDS vaccines or drugs. The research adds weight to a provocative hypothesis—that an HIV vaccine should avoid a broadside attack and instead home in on a few targets. Indeed, there is a rare group of patients who naturally control HIV without medication, and these "elite controllers" most often assail the virus at precisely this vulnerable area.

Scientists have identified an Achilles’ heel in HIV, the virus that causes AIDS, with a powerful mathematical method previously applied to the stock market, and think the spot could be a prime target for vaccines or drugs. Mark Schoofs explains.

"This is a wonderful piece of science, and it helps us understand why the elite controllers keep HIV under control," said Nobel laureate David Baltimore. Bette Korber, an expert on HIV mutation at the Los Alamos National Laboratory, said the study added "an elegant analytical strategy" to HIV vaccine research.

"What would be very cool is if they could apply it to hepatitis C or other viruses that are huge pathogens—Ebola virus, Marburg virus," said Mark Yeager, chair of the physiology department at the University of Virginia School of Medicine. "The hope would be there would be predictive power in this approach." Drs. Baltimore, Korber and Yeager weren’t involved in the new research.

One of the most vexing problems in HIV research is the virus’s extreme mutability. But the researchers found that there are some HIV sectors, or groups of amino acids, that rarely make multiple mutations. Scientists generally believe that the virus needs to keep such regions intact. Targeting such sectors could trap HIV: If it mutated, it would disrupt its own internal machinery and sputter out. If it didn’t mutate, it would lie defenseless against a drug or vaccine attack.

The study was conducted at the Ragon Institute, a joint enterprise of Massachusetts General Hospital, the Massachusetts Institute of Technology and Harvard University. The institute was founded in 2009 to convene diverse groups of scientists to work on HIV/AIDS and other diseases.

Targeting HIV
Read more about the science behind the study

Two of the study’s lead authors aren’t biologists. Arup Chakraborty is a professor of chemistry and chemical engineering at MIT, though he has worked on immunology, and Vincent Dahirel is an assistant professor of chemistry at the Université Pierre et Marie Curie in Paris. They collaborated with Bruce Walker, a longtime HIV researcher who directs the Ragon Institute. Their work was published Monday in the Proceedings of the National Academy of Sciences.

To find the vulnerable sectors in HIV, Drs. Chakraborty and Dahirel reached back to a statistical method called random matrix theory, which has also been used to analyze the behavior of stocks. While stock market sectors are already well defined, the Ragon researchers didn’t necessarily know what viral sectors they were looking for. Moreover, they wanted to take a fresh look at the virus.

So they defined the sectors purely mathematically, using random matrix theory to sift through most of HIV’s genetic code for correlated mutations, without reference to previously known functions or structures of HIV. The segment that could tolerate the fewest multiple mutations was dubbed sector 3 on an HIV protein known as Gag.

In an interview with WSJ’s Mark Schoofs, NIAID director Dr. Anthony Fauci reflects on his thirty years spent fighting AIDS, and how he believes science is at a turning point where it has the potential to dramatically shrink the size of the AIDS epidemic across the globe.

Previous research by Dr. Yeager and others had shown that the capsid, or internal shell, of the virus has a honeycomb structure. Part of sector 3, it turns out, helps form the edges of the honeycomb. If the honeycomb suffered too many mutations, it wouldn’t interlock, and the capsid would collapse.

For years, Dr. Walker had studied rare patients, about one in 300, who control HIV without taking drugs. He went back to see what part of the virus these "elite controllers" were attacking with their main immune-system assault. The most common target was sector 3.

Dr. Walker’s team found that even immune systems that fail to control HIV often attack sector 3, but they tend to devote only a fraction of their resources against it, while wasting their main assault on parts of the virus that easily mutate to evade the attack. That suggested what the study’s authors consider the
paper's most important hypothesis: A vaccine shouldn't elicit a scattershot attack, but surgical strikes against sector 3 and similarly low-mutating regions of HIV.

"The hypothesis remains to be tested," said Dan Barouch, a Harvard professor of medicine and a colleague at the Ragon institute. He is planning to do just that, with monkeys. Others, such as Oxford professor Sir Andrew McMichael, are also testing it.

The Ragon team's research focused on one arm of the immune system—the so-called killer T-cells that attack other cells HIV has already infected. Many scientists believe a successful HIV vaccine will also require antibodies that attack a free-floating virus. Dr. Chakraborty is teaming up with Dennis Burton, an HIV antibody expert at the Scripps Research Institute in La Jolla, Calif., to apply random matrix theory to central problems in antibody-based vaccines.

**NCDs Responsible For Majority Of Deaths Worldwide And Cost Trillions, Report Says**
Nearly two-thirds of deaths worldwide are caused by non-communicable diseases (NCDs) such as heart and lung disease, cancer, and diabetes, which are increasingly prevalent and cost the global economy trillions of dollars, according to a U.N. report and preliminary results from a new study announced Monday at a press conference to preview the September U.N. High Level Meeting on NCDs, the Associated Press/MSNBC.com reports.

A report from U.N. Secretary-General Ban Ki-moon, originally released in May and circulated on Monday, said that "36 million people died from non-communicable diseases in 2008, representing 63 percent of the 57 million global deaths that year. Nearly 80 percent of deaths from these diseases were in the developing world, and 9 million deaths were of men and women under the age of 60, it said," the news service writes.

David Bloom of the Harvard School of Public Health, who is leading a project examining the global economic burden of NCDs, "said preliminary results indicate that the substantial economic burden caused by these diseases today 'will evolve into a staggering economic burden over the next two decades' that could have a huge impact on economic development and fighting poverty," according to the Associated Press/MSNBC.com (Lederer, 6/20).

"Bloom said treating newly diagnosed cancer cases cost $300 billion globally in 2010" and that the "global decline in productivity due to illness and deaths from non-communicable diseases will reach $35 trillion by 2030 ... an amount seven times larger than the current level of global health spending."

Bloomberg writes (Reniick, 6/20).

**Results Of African Malaria Vaccine Trial Expected Later This Year**
The final phase of testing for GlaxoSmithKline Biologicals' malaria vaccine, RTS,S, is underway in seven sub-Saharan African countries, and "[i]f the results, due to be released later this year confirm the vaccine's efficacy in preventing malaria, it could be made available as early as 2015," IRIN reports. "A malaria vaccine would not only save lives, it would also alleviate the great burden of the disease on health systems in economically stretched developing countries," IRIN writes (6/20). Christian Loucq, director of the PATH Malaria Vaccine Initiative, which is helping to fund the trials, "says the new vaccine ... will be a major step toward getting rid of malaria. But for that to happen, he says, greater investment in research will be essential," VOA News notes (Sinha, 6/20).

**Ghana's Vice President Discusses Country's Efforts To Fight HIV/AIDS**
John Dramani Mahama, vice president of the Republic of Ghana, recently spoke with NPR's "Tell Me More" about how Ghana has made significant gains against HIV/AIDS, bringing the prevalence rate down to 1.5 percent from nearly 4 percent. Mahama said the government is working with community organizations to educate the public, reduce stigma surrounding HIV/AIDS and eliminate mother-to-child transmission (Martin, 6/20).

**Poor Governance Is No Excuse For Withholding Aid**
Recent improvements in health indicators in the Democratic Republic of Congo, "[i]n no small part, ... are connected to the rollout of basic health services," even at a time when the country's economy is shrinking and its population is growing, Charles Kenny, a senior fellow at the Center for Global Development, writes in his Foreign Policy column.

"Health and education together accounted for around $9 per year per person – less than 0.3 percent of what the U.S. government spends per citizen on health care alone. That meager expenditure,
augmented by aid and the limited private resources available to individual citizens, was enough to provide a level of health and schooling considerably better than would be expected by far richer countries only a few years ago,” he writes, concluding that Congo's success “is a refutation of the idea that we should wait to improve lives, or focus on sustainable development, until bureaucracies function with clockwork efficiency and the rule of law is universally applied” (6/20).

Annual HIV Testing for MSM May Not Be Enough

MedPage Today, (06.02.2011) Michael Smith

Sexually active men who have sex with men may benefit from HIV testing more than once a year, perhaps every three to six months, a new CDC report suggests.

CDC recommends HIV testing at least annually for sexually active MSM. Current guidelines use risk behaviors to identify MSM who should be tested more frequently. However, self-reported risk behavior may not be helpful in determining who needs the more frequent testing, the new study found. In it, MSM reporting high-risk behaviors were no more likely to be newly HIV-infected than those without these reported risks.

Researchers in 2008 collected cross-sectional behavioral risk data and conducted HIV testing among a venue-based sample of MSM in 21 US cities with high AIDS prevalence. Overall, 7,271 eligible MSM were included in the analysis (44 percent white; 25 percent Hispanic; 23 percent black; mean age 34 (range: 18-85)). Of the 7,271 participants, 4,453 (61 percent) had tested HIV-negative during the past 12 months. Among these 4,453, 7 percent (15 percent of blacks; 7 percent of Hispanics; 3 percent of whites) nonetheless were found to be HIV-infected when tested by CDC.

Of 3,672 high-risk MSM who tested HIV-negative in the past 12 months, 7 percent were HIV-infected when tested by CDC, compared with 8 percent of those not reporting high-risk factors. After adjusting for time since the most recent test, HIV prevalence remained similar for the two groups, the study noted.

A possible under-reporting of previous positive HIV test results or over-reporting of recent testing could potentially have skewed the proportion of new MSM infections higher, the researchers observed. They further advised that, given venue-based sampling and the high-risk cities surveyed, the data may not represent all MSM generally.


Significant Rise in HPV-Related Throat Cancer in Men

ABCNews.go.com, (06.01.2011) Lara Salahi

The increasing incidence of oropharyngeal cancers in the United States since 1984 is associated with human papillomavirus, according to research presented recently at the 2011 American Society of Clinical Oncology Annual Meeting in Chicago.

HPV prevalence in 271 oropharyngeal cancer cases, documented in population-based registries, grew significantly during the study period (1984-2004), the researchers found. Compared to HPV-negative cases, median survival was greater for HPV-positive cases and grew significantly over time. This was not true for HPV-negative cases, however.

Population-level incidence of HPV-positive oropharyngeal cancers grew 225 percent during 1988-2004 (0.8/100,000 to 2.6/100,000). If the trend were to continue, HPV-positive cases would double from 4,000-4,500 in 2004 to 8,500 by 2020, researchers reported, with the increase occurring mainly in men.

“You don’t want them waking up in 20 or 30 years and finding out they have stage 4 throat cancer. That’s where I am now,” said Philip Keane, referring to his diagnosis, which prompted the decision to have his 12-year-old son vaccinated against HPV. While the vaccine Gardasil has not been approved to protect against oral HPV cancers, many experts say it likely confers some protection since it targets some of the same HPV strains implicated in these cancers.

As for adults, the growing numbers of HPV-related throat cancers “emphasize the need for head and neck screening even in patients without traditional risk factors of tobacco and alcohol use,” said Dr. Chris Sullivan, assistant professor of otolaryngology at Wake Forest Baptist Medical Center. Sullivan was not affiliated with the report.

The study, “Human Papillomavirus (HPV) and Rising Oropharyngeal Cancer Incidence and Survival in the United States,” was published in Journal of Clinical Oncology (2011;15:abstract 5529).
The Hepatitis C Epidemic Among HIV-Positive MSM: Incidence Estimates from 1990 to 2007

*AIDS*, (05.15.2011) Jannie Ja van der Helm and others; on behalf of the CASCADE Collaboration

In the current study, the authors estimated hepatitis C virus incidence among HIV-infected men who have sex with men, 1990-2007, using data from 12 cohorts from the Concerted Action on Seroconversion to AIDS and Death in Europe Collaboration. Estimates were based on standard incidence methods and methods for interval-censored data, taking into account that routine HCV data collection began in different calendar years in the cohorts.

Of 4,724 MSM with an HCV test included, 124 (4 percent) had only positive test results, 2,798 (93 percent) had only negative and 92 (3 percent) had both. HCV incidence in 1990 ranged from 0.9 to 2.2 per 1,000 person-years, depending on the analysis strategy. Incidence increased through 1995, when it ranged from an estimated 5.5 and 8.1 per 1,000 person-years. Substantial increases occurred from 2002 on, with incidence ranging between 16.8 and 30.0 per 1,000 person-years in 2005 and between 23.4 and 51.1 per 1,000 person-years in 2007.

“Our data support phylodynamic findings that HCV incidence had already increased among HIV-infected MSM from the mid-1990s,” the authors concluded. “However, the main expansion of the HCV epidemic started after 2002. Incidence estimates obtained from cohort studies may help identify changes in the spread of important infections earlier and should guide routine testing policies to minimize further disease burden.”

Sugar-Binding Protein Facilitates HIV Cell Entry

**SUMMARY**

A sugar-binding protein known as galectin-9 traps protein disulfide isomerase (PDI) on the surface of CD4 T-cells, making them more susceptible to HIV infection.

Interaction of glycoproteins (sugar-protein complexes) with other cell surface compounds known as lectins controls formation and maintenance of cell membranes and regulation of various cell functions.

Below is an edited excerpt from a press release issued by University of California at Los Angeles Health Sciences describing how one such protein, galectin-9, may influence susceptibility of T-cells to HIV entry.

**Sugar-Binding Protein May Play a Role in HIV Infection**

Specific types of "helper" T cells that are crucial to maintaining functioning immune systems contain an enzyme called PDI (protein disulfide isomerase). This enzyme affects how proteins fold into specific shapes, which in turn influences how the T cells behave. PDI also plays a role in HIV infection by helping to change the shape of the surface envelope protein of the virus, enabling the virus to interact optimally with receptors on the T cells, such as the CD4 molecule.

Though it is known that PDI inhibitors can prevent HIV infection, just how this happens has remained a mystery. And though it has been known that PDI, which normally lives inside the cell, can become entrapped on the cell's surface, it has not been understood how this happens.

Now, in a new study, UCLA researchers report that a sugar-binding protein called galectin-9 traps PDI on T-cells' surface, making them more susceptible to HIV infection.

The findings could lead researchers to a potential new target for anti-HIV therapeutics, such as therapies to inhibit PDI or galectin-9. 6/21/11

**Reference**

How dense is a cell?
Combining an ancient principle with new technology, MIT researchers have devised a way to answer that question.
Anne Trafton, MIT News Office June 21, 2011
More than 2,000 years after Archimedes found a way to determine the density of a king’s crown by measuring its mass in two different fluids, MIT scientists have used the same principle to solve an equally vexing puzzle — how to measure the density of a single cell.

“Density is such a fundamental, basic property of everything,” says William Grover, a research associate in MIT’s Department of Biological Engineering. “Every cell in your body has a density, and if you can measure it accurately enough, it opens a whole new window on the biology of that cell.”

The new method, described in the Proceedings of the National Academy of Sciences the week of June 20, involves measuring the buoyant mass of each cell in two fluids of different densities. Just as measuring the crown’s density helped Archimedes determine whether it was made of pure gold, measuring cell density could allow researchers to gain biophysical insight into fundamental cellular processes such as adaptations for survival, and might also be useful for identifying diseased cells, according to the authors.

Grover and recent MIT PhD recipient Andrea Bryan are lead authors of the paper. Both work in the lab of Scott Manalis, a professor of biological engineering, member of the David H. Koch Institute for Integrative Cancer Research and senior author of the paper.

Going with the flow
Measuring the density of living cells is tricky because it requires a tool that can weigh cells in their native fluid environment, to keep them alive, and a method to measure each cell in two different fluids.

How the lab can determine the weight and density of individual cells
In 2007, Manalis and his students developed the first technique to measure the buoyant mass of single living cells. Their device, known as a suspended microchannel resonator, pumps cells, in fluid, through a microchannel that runs across a tiny silicon cantilever, or diving-board structure. That cantilever vibrates within a vacuum; when a cell flows through the channel, the frequency of the cantilever’s vibration changes. The cell’s buoyant mass can be calculated from the change in frequency.

To adapt the system to measure density, the researchers needed to flow each cell through the channel twice, each time in a different fluid. A cell’s buoyant mass (its mass as it floats in fluid) depends on its absolute mass and volume, so by measuring two different buoyant masses for a cell, its mass, volume and density can be calculated.

The new device rapidly exchanges the fluids in the channel without harming the cell, and the entire measurement process for one cell takes as little as five seconds.

David Weitz, professor of physics at Harvard University, says the new technique is a clever way of measuring cell density, and opens up many new avenues of research. “The very interesting thing they show is that density seems to have a more sensitive change than some of the more standard measurements. Why is that? I don’t know. But the fact that I don’t know means it’s interesting,” he says.

Changes in density
The researchers tested their system with several types of cells, including red blood cells and leukemia cells. In the leukemia study, the researchers treated the cells with an antibiotic called staurosporine, then measured their density less than an hour later. Even in that short time, a change in density was already apparent. (The cells grew denser as they started to die.) The treated leukemia cells increased their density by only about 1 percent, a change that would be difficult to detect without a highly sensitive device such as this one. Because of that rapid response and sensitivity, this method could become a good way to screen potential cancer drugs.

“It was really easy, by the density measurement, to identify cells that had responded to the drug. If we had looked at mass alone, or volume alone, we never would have seen that effect,” Bryan says.

The researchers also demonstrated that malaria-infected red blood cells lose density as their infection progresses. This density loss was already known, but this is the first time it has been observed in single cells.
Being able to detect changes in red-blood-cell density could also offer a new way to test athletes who try to cheat by “doping” their blood — that is, by removing their own blood and storing it until just before their competition, when it is transfused back into the bloodstream. This boosts the number of red blood cells, potentially enhancing athletic performance.

Storing blood can alter the blood’s physical characteristics, and if those include changes in density, this technique may be able to detect blood doping, Grover says.

Researchers in Manalis’ lab are now investigating the densities of other types of cells, and are starting to work on measuring single cells as they grow over time — specifically cancer cells, which are characterized by uncontrolled growth.

“Understanding how density of individual cancer cells relates to malignant progression could provide fundamental insights into the underlying cellular processes, as well as lead to clinical strategies for treating patients in situations where molecular markers don’t yet exist or are difficult to measure due to limited sample volumes,” Manalis says.

**Scientists reveal HIV weakness**

Vaccines that target newly identified viral protein sequences could be more effective than previous efforts.

Anne Trafton, MIT News Office

June 21, 2011

Ever since HIV was revealed as the infectious agent behind the AIDS epidemic, scientists have been striving to develop a vaccine against the disease. However, the task has proven difficult, because HIV mutates so rapidly.

In a new finding that may allow vaccine designers to sidestep part of that obstacle, researchers at the Ragon Institute of Massachusetts General Hospital, MIT and Harvard University have identified sections of an HIV protein where mutations would actually undermine the virus’ fitness — its ability to survive and reproduce.

Vaccines that prime immune cells to specifically target those vulnerable regions could prove much more effective than previously tested vaccines, says Arup Chakraborty, the Robert T. Haslam (1911) Professor at MIT and senior author of a paper on the work appearing in the *Proceedings of the National Academy of Sciences* the week of June 20.

Though global HIV infection rates have dropped since 2000, there are still more than 33 million people living with AIDS. The vast majority of those people live in developing countries, where there is limited access to antiretroviral drugs that can control the infection.

“Even though we have treatments, the number of people in need globally is outpacing our ability to provide these drugs,” says Harvard Medical School Professor Bruce Walker, director of the Ragon Institute and a senior author of the new paper. “The only real solution is development of an effective vaccine.”

Lead authors of the paper are Vincent Dahirel, a former postdoc in Chakraborty’s lab who is now a professor of chemistry at the Université Marie et Pierre Curie in Paris; and Karthik Shekhar, a chemical engineering PhD student at MIT.
**Co-evolution**
Viral vaccines usually consist of killed or weakened versions of a virus that prime the body’s immune system to respond when it later encounters the real thing. Most experimental HIV vaccines include some proteins found in the virus’s genetic material.

Vaccines provoke the recipient’s immune system to generate two types of responses: antibodies that can battle viruses in blood or outside cells, and memory T cells, which attack cells that display viral proteins on their surfaces—a sign of infection. However, HIV can escape these responses when its viral proteins evolve to new forms that the vaccine-induced antibodies and T cells no longer recognize. Most researchers believe that an effective HIV vaccine will have to include both an antibody and a T-cell component.

In recent years, designers of the T-cell arm of a vaccine have looked to target single amino acids (the building blocks of proteins) that seem unable to evolve to a different form, with the goal of inducing mutations that incapacitate the virus. So far, this strategy has had limited success, because mutations elsewhere in the viral protein can help restore the loss of fitness.

The Ragon Institute researchers took a broader approach, looking not just at single mutations, but trying to determine if there might be groups of amino acids within viral proteins that evolve together in a coordinated way. After identifying some such groups, they determined whether multiple mutations in those groups tended to be beneficial or harmful to the virus’s survival. A group in which multiple mutations are most harmful could be a good vaccine target, because the virus may undermine its own survival if it tries to mutate those sites, and escape pathways would be limited.

The Ragon team analyzed available HIV protein sequences obtained from infected patients using a mathematical approach, including a method called random matrix theory, which was developed by Eugene Wigner in the 1950s to study high-energy physics. Since then, it has been used in many other areas of physics, but has also been applied in other fields, including economics (to study stock market fluctuations) and biology (to analyze sequences of an enzyme family).

For example, Boston University physicist Eugene Stanley has used random matrix theory to find inherent correlations among the stock prices of companies whose economic activities are coupled. He was able to identify groups of companies whose prices fluctuate collectively, but independently of the fluctuations of other groups of companies. (For example, he found that oil and gas company stock prices fluctuate together, but essentially independently of stock prices in the financial sector.)

**Multiple mutations**
The Ragon team focused on an HIV polyprotein called Gag, which gives the virus much of its structure, and identified five co-evolving groups of amino acids within the protein. The researchers looked at each pair of sites within the groups, calculating whether a double mutation was beneficial or detrimental to the virus’s survival. (They also analyzed triplets and larger groups.) They discovered that one of the groups, which they term sector 3, had the highest proportion of detrimental multiple mutations.

Structural analysis revealed that amino acids in sector 3 are located at interfaces between proteins that form the viral capsid surrounding the virus’s genetic material. If you make multiple mutations to these amino acids, Chakraborty says, it is difficult for the virus to assemble the capsid.

The Ragon team then tested its findings against human clinical data, discovering that T cells in patients who control HIV without medication do in fact disproportionately target sector-3 amino acids at multiple points, and HIV strains with multiple mutations in this sector are rare, indicating that those strains are less likely to survive.

This finding strengthens the argument that these protein sequences would make good vaccine targets, notes Gregory Petsko, professor of biochemistry and chemistry at Brandeis University. “Tying it to the patient population is what sets this apart, in my mind, from a traditional computational study,” Petsko says.

The Ragon researchers suggest designs for test vaccines based on the vulnerabilities they found in the Gag protein, and are now looking for vulnerable targets in other HIV proteins.

Rafi Ahmed, professor of immunology at the Emory University Vaccine Center, says the paper offers an exciting new approach to designing HIV vaccines. “It breaks new ground in terms of vaccine design and potential insights into why elite controllers are more effective at controlling HIV infection, and it provides additional protein regions to examine,” Ahmed says.
Non-coding RNA has role in inherited neurological disorder—and maybe other brain diseases too

A team of scientists, led by researchers at the University of California, San Diego School of Medicine, have uncovered a novel mechanism regulating gene expression and transcription linked to Spinocerebellar ataxia 7, an inherited neurological disorder. The discovery promises to have broad ramifications, suggesting that abundant non-coding transcripts of ribonucleic acid (RNA) may be key players in neurological development and function, and could be powerful targets for future clinical therapies.

The research, headed by Albert La Spada, MD, PhD, chief of the division of genetics in the UCSD department of pediatrics, and professor of cellular and molecular medicine, neurosciences and biological sciences, is published in the June 22 issue of the journal Neuron.

"Our paper highlights a number of important emerging themes in our understanding of gene regulation in the brain," said La Spada, who is also associate director of the UCSD Institute for Genomic Medicine.

"With the advent of new technologies, science has learned that the vast majority of our transcripts are non-coding," said La Spada. "The challenge going forward is to determine what they do do, and if they have specific functions. It now seems increasingly likely that a multitude of these non-coding RNAs help finely tune transcription regulation in the brain, and perturbation of their work is linked to disease. If we can figure out exactly how, we should be able to gain new insights into how the brain is so precisely regulated—knowledge that may help us better understand how the brain works."

Spinocerebellar ataxia 7 is one of several types of spinocerebellar ataxia (SCA), genetic degenerative disorders characterized by atrophy in the cerebellum of the brain, progressive loss of physical coordination—and in the case of type 7—retinal degeneration that can result in blindness. There is currently no known cure.

Many SCAs are classified as polyglutamine diseases, caused when a protein associated with the disease contains too many repeats of the amino acid glutamine. Polyglutamine diseases are also known as "CAG Triplet Repeat Disorders" because CAG is the sequence of nucleic acids that codes for glutamine.

La Spada and colleagues have long studied SCA. In 2001, they were the first to demonstrate that SCA7 retinal degeneration was the result of transcription dysregulation of ataxin-7, the protein associated with SCA7. Following up, they decided to learn how the gene that expresses ataxin-7 is itself regulated.

The researchers found not one, but two, regulators. The first is called CTCF, a highly conserved protein that regulates a variety of transcriptional processes, most notable establishing insulator domains and controlling genomic imprinting. But they also discovered an adjacent, alternative promoter dubbed intron 2 promoter (P2A) and a transcribed antisense, non-coding RNA, which they labeled SpinoCerebellarAtaxia-AntisenseNoncodingTranscript1 or SCAANT1.

Antisense RNA is single-stranded ribonucleic acid whose primary function appears to be as an inhibitor or suppressor of a gene, though sometimes it can promote gene expression instead. Most antisense RNAs are non-coding, meaning that their sequences do not provide information for making proteins. Even though non-coding RNAs do not provide instructions for the production of vital proteins, they comprise the bulk of the human genome. A major challenge for biomedical research in the 21st century is to figure what they do, and how they do it.

In their Neuron paper, La Spada and colleagues highlight one function, at least for SCAANT1. When they investigated how CTCF regulated ataxin-7 gene expression in transgenic mice, they discovered that CTCF promotes the production of SCAANT1 which in turn represses the newly discovered ataxin-7 sense promoter P2A. In mice lacking SCAANT1, sense promoter P2A is de-repressed, allowing a mutant ataxin-7 gene to be expressed, resulting in mice with a version of SCA7. The scientists found a similar lack of antisense SCAANT1 in the fibroblasts and white blood cells taken from human patients with SCA7, implicating deregulation of this pathway in the disease process.
As many inherited neurological disorders are now known to exhibit such overlapping "bidirectional" transcription, the findings in SCA7 could shed light on similar abnormalities with non-coding RNA function in a number of brain diseases.

**Mimivirus Isolated, Genome Amputated**

ScienceDaily (June 19, 2011) — In the absence of competition with other microorganisms, Mimivirus, the largest known DNA virus, loses 17% of its genome. This has recently been demonstrated by a French-American collaboration including researchers from CNRS, the Université de la Méditerranée and the Université de Provence[1]. The results are published online this week in the journal *Proceedings of the National Academy of Sciences*.

With 900 genes of their own, Mimiviruses, discovered in 2003 by two teams headed by Professor Didier Raoult, represent the largest known group of DNA viruses. They have been discovered in amoebas, unicellular beings that can be found in the water-cooling circuits of air conditioning systems. The originality of this virus stems from its size and its vulnerability to infection by small viruses: virophages.

In a natural environment, in other words within amoebas, Mimiviruses live in a "community." They share their amoebic space with other organisms such as viruses and bacteria. Constant exchanges of genes within these organisms with intra-amoebal life, not just between each other but also with their protozoan host, have allowed this evolution towards a "community" life.

The researchers cultivated the Mimivirus in the laboratory, alone in an amoeba and without contact with other organisms. Through accelerated evolution (only 150 passages[2]), they observed a 17% reduction in the size of its genome. This genomic loss mainly occurs in the form of deletions[3] of both ends of its genome. In the absence of other microorganisms and thus competition within the amoeba, the Mimivirus then eliminates part of its genome by deleting in particular the genes involved in the formation of the long fibers that surround its capsid[4]. The Mimivirus therefore becomes "bald." The researchers also observed that it becomes resistant to virophages.

This work shows that a change of ecosystem may be associated with a major and rapid modification of the genome of microorganisms.

**Journal Reference:**


**Size Matters—In Virulent Fungal Spores—And Suggests Ways to Stop a Killer**

ScienceDaily (June 17, 2011) — Scientists at Duke University Medical Center have found that larger fungal spores can be more lethal. Their findings about two different spore sizes of the fungus *Mucor circinelloides*, a pathogen that kills half or more of its victims, could help to develop new treatments and fight other types of fungal infections.

*Mucor infection is in the news as an environmental fungus contracted by people who had trauma in the wake of tornadoes in Joplin, Mo. Three out of eight patients had died by June 11. This group of fungi can be common in the environment but only particular hosts with high risks become infected. In Joplin, some people got the fungal infection through traumatic skin wounds. The study showed a new way to categorize fungi. Scientists traditionally describe a fungus through its growth pattern: either fingerlike hyphal growth, like bread mold, or round and symmetric isotropic growth, like an expanding balloon.*
Now the researchers say there is another way to categorize a fungus, by whether it produces larger or smaller spores.

"This kind of dimorphism is something new," said co-senior author Soo Chan Lee, Ph.D. The larger spores can be over than 20 microns, while the tiny spores are only 4-5 microns, the perfect size for penetrating into the recesses of the lungs. The mycologists found that the larger spores caused worse infections in laboratory animals and more readily evaded immune cells.

The work was published in *PLoS Pathogens* online on June 16.

When the scientists performed an experiment that made the smaller spores grow into larger spores, "We found in that case, the smaller spore that became large acted like the larger spores," Lee said. "We believe that this spore bypassed the natural growth stage of isotropic growth and that was how it becomes more virulent."

"This means we might be able to find a way to arrest them in the smaller stage before they grow into more virulent, larger spores," he said.

Interestingly, other scientists have recently published related findings about the dual cell sizes in another virulent fungal pathogen, *Cryptococcus neoformans*, in which gigantic cells form in the lungs of infected animals and patients.

Normally immune cells called macrophages engulf and destroy dangerous fungal spores. Small spores can be contained by macrophages, but the larger spores switch too quickly to hyphal growth and thereby can destroy the macrophage. When the macrophages, a first-line defense, split open, they undergo cell death and are unable to protect an infected human or other host animal.

"This finding shows another example of adaptation through fungal cell gigantism, which lets pathogenic fungi establish infection in the hosts, particularly those that are immune compromised," said Joseph Heitman, M.D., Ph.D., co-senior author and chair of the Duke Department of Molecular Genetics and Microbiology. "We used a diabetic model of mice, which is also an immunocompromised type of animal. We found the fungal subspecies that we studied is highly virulent in mice, which correlates well with this subspecies' frequent occurrence in clinical human specimens."

Heitman said the hope is to find a way to arrest the isotropic growth stage. "Clinically, these mucor infections are reasonably common in diabetic patients, transplant patients, and lung-cancer chemotherapy patients," he said. "Having a high blood-glucose level is immunosuppressive, and predisposes diabetic patients to difficult-to-manage fungal infections."

The collaboration for this study grew from pioneering work done by co-authors Rosa M. Ruiz-Vazquez and Santiago R. Torres-Martinez who chose to work at Duke during a sabbatical from the Department of Genetics and Microbiology at the Universidad de Murcia in Murcia, Spain. There they pioneered genetic and genomic approaches to study Mucor. They began by studying the fungus' sensitivity to light, and then took up its pathogenic properties.

The next steps in this research will be to investigate the minus and plus sex determinants of the fungi, which are related to sexual reproduction and spore size, Lee said.

**Journal Reference:**


**Gatekeepers: How Microbes Make It Past Tight Spaces Between Cells**

ScienceDaily (June 17, 2011) — There are ten microbial cells for every one human cell in the body, and microbiology dogma holds that there is a tight barrier protecting the inside of the body from outside invaders, in this case bacteria. Bacterial pathogens can break this barrier to cause infection and senior author Jeffrey Weiser, MD, professor of Microbiology and Pediatrics from the Perelman School of Medicine at the University of Pennsylvania, and first author Thomas Clarke, PhD, a postdoctoral fellow in the Weiser lab, wondered how microbes get inside the host and circulate in the first place. Weiser and Clarke tested to see if microbes somehow weaken host cell defenses to enter tissues.

In this *Cell Host & Microbe* study, the investigators found that microbes open and get through the initial cellular barrier—epithelial cells that line the airway—in a programmed and efficient way. They surmise this could be a normal physiological event and the epithelial lining may not be as effective at keeping microbes out as once thought. Microbes that survive once past the epithelial lining tend to be pathogenic, such as *Streptococcus pneumoniae* and *Haemophilus influenzae*, two major human pathogens causing invasive infections. Their data support a general mechanism for epithelial opening exploited by invasive pathogens to facilitate movement into tissue to initiate disease.
Using microarray and PCR analysis of the epithelial cells’ response to invasion by *S. pneumoniae* and *H. influenzae*, the researchers found a downregulation of genes called claudins that encode proteins key to keeping the spaces between epithelial cells tight. All animals recognize molecules in microbial cell walls. It was detection of these microbial molecules by host molecules called Toll-like receptors that caused the proteins responsible for keeping the cellular barrier tight to fall down on the job.

When modeled in a cell assay, claudin downregulation was preceded by upregulation of another protein called SNAIL1 that suppresses claudins, the cellular components that keep the junctions tight. What's more, inhibiting claudin expression in a cell assay or stimulating the Toll-like receptors in an animal model loosened the junctions between cells and promoted bacterial movement across the epithelium.

"This study provides an understanding of how microbes gain access into their host to affect its physiology," concludes Weiser.

**How the Immune System Responds to Hepatitis A Virus**

ScienceDaily (June 21, 2011) — A surprising finding in a study comparing hepatitis C virus (HCV) with hepatitis A virus (HAV) infections in chimpanzees by a team that includes scientists from the Texas Biomedical Research Institute sheds new light on the nature of the body's immune response to these viruses.

Understanding how hepatitis C becomes chronic is very important because some 200 million people worldwide and 3.2 million people in the U.S. are chronically infected with HCV and are at risk for progression to cirrhosis and liver cancer. Hepatitis C associated liver disease is the most common indication for liver transplantation, while liver cancer due to HCV infection is now the most rapidly increasing cause of cancer death in the U.S.

"Remarkably, we found that HAV was more adept at evading the innate immune response than HCV, the virus that ultimately causes chronic infections," said Robert E. Lanford, Ph.D., a Texas Biomed virologist. The novel findings demonstrate that HAV is the stealthier virus when it comes to evading the innate immune response, despite the lack of persistent infections.

Hepatitis C infections are characterized by a failure of the immune system to combat and eliminate the virus. "We suspect this failure of the immune system shares attributes with other persistent viruses such as HIV and hepatitis B virus," said Lanford. By comparing two similar viruses that infect the liver, one that is always cleared by the immune system, HAV, and one that frequently evades the immune response, HCV, the team hoped to unravel the mystery of how HCV causes lifelong persistent infections.

The new study points out the critical need for more information about how the immune system reacts to HCV. It also reinforces the importance of chimpanzee research in this effort. The chimpanzee, the only animal model susceptible to HCV infection, was critical for probing the molecular differences in gene expression in the liver related to infection by the two viruses.

Examination of the adaptive immune system by co-author Christopher M. Walker, Ph.D., of Nationwide Children's Hospital in Columbus, Ohio, found that the T cell response to HAV was unique as well. "We expected the immune response to kill all HAV infected cells in a short time frame, and yet we could detect the genome of the virus in the liver for up to one year, long after symptoms of the disease were resolved," Lanford explained.

"Hepatitis viruses have co-evolved with humans over a very long period of time and they are good at evading the immune system, but nobody understands how hepatitis C becomes a chronic infection," said co-author Stanley M. Lemon, M.D., of UNC.

"The surprising and exciting results of this research program further highlight the critical value of the chimpanzee model in research on hepatitis," said John L. VandeBerg, Ph.D., Texas Biomed's chief scientific officer and SNPRC director.

Others on the study included Deborah Chavez, M.S., and Bernadette Guerra, B.S., of Texas Biomed;

**Journal Reference:**
HIV/AIDS: Anal sex HIV risk misunderstood among heterosexuals
Silence surrounding anal sex
DURBAN, 21 June 2011 (PlusNews) – Vaginal sex, thigh sex, even armpit sex – people have sex in lots of ways, but in heterosexual anal sex, HIV prevention programming is silent about the high risk of infection that goes with it, and people may have mistaken this silence for safety.

The risk of contracting HIV through unprotected receptive anal sex is almost 20 times greater than the HIV risk associated with vaginal intercourse.

While this fact is often a focus in HIV prevention programming aimed at men-who-have-sex-with-men (MSM), it has been largely left out of programmes for heterosexuals, according to Zoe Duby of the University of Cape Town, South Africa, and the Desmond Tutu HIV Foundation.

Duby presented the findings of her study, which interviewed almost 400 people in Tanzania, Uganda and Kenya, at the 1st HIV Social Sciences and Humanities Conference held recently in Durban, South Africa.

“Safer sex programming has, in my opinion, failed to take into account varying definitions of sex. The omission of anal sex in safe sex messaging has been interpreted as meaning that anal sex is safe,” she told IRIN/PlusNews.

“What people preach out there, it’s just vaginal sex – not information on anal [sex],” said a young woman from Salgaa, Kenya, who was quoted in the research. “So somebody thinks, ‘if I do [sex] this other way, then I will not get HIV.’”

Even more worrying was that research showed healthcare workers often held similar views, and some incorrectly believed HIV was only present in vaginal fluid. The virus is, in fact, also present in male sperm and blood.

“Me, I do not want to practice vaginal sex because that is the highest [risk] sex that transmits HIV, so it is a belief… that non-vaginal sex does not transmit HIV,” one Kenyan healthcare worker reported.

A nurse in Malaba, Uganda, said: “As you go and have sex vaginally you can get HIV, but these other methods, they do not expose you [to HIV].”

Virginity, pregnancy and pleasure
East African respondents said anal sex was also practiced as a way to prevent pregnancy, increase sexual pleasure, or preserve a woman’s virginity, which was only associated with vaginal sex.

“A lady got married a real virgin… and then she started showing symptoms of HIV. When she was questioned… she started crying, saying that she was advised to only have anal sex so that she would still maintain her virginity and respect during marriage,” a Kenyan truck driver said during an interview.

“Youth today are searching for these things that don’t make them lose their virginity but allow them to still sort of engage in sexual activity,” according to another young woman. Anal sex is seen as a cultural “loophole”.

“My religious friends who are trying to hold onto some sanctity of waiting until they’re married to have sex, they feel that oral and anal sex are sex that they can have that’s still not full sex,” a female respondent told Duby.

She said research about the use of anal sex to preserve virginity has noted similar views among young South African women, especially in communities that practice virginity testing.

Safe sex messaging
Duby cautioned that her results – part of a Family Health International evaluation of an HIV programme for mobile populations – should not be generalized, but did show that anal sex must be included HIV prevention programming.

“Sex has largely been defined as penile-vaginal penetrative sex… We hear this word ‘sex’ bandied about all the time but… we’re not really looking at… how [people] are defining it in order to tailor safe sex messaging,” she told IRIN/PlusNews.

“Due to the assumptions that sex refers to penile-vaginal penetration only, people put themselves at a greater risk of contracting HIV in an attempt to practice safe sex,” Duby added. “Unprotected anal sex can no longer be ignored as a significant contributing factor in the global HIV epidemic.”

Erection-boosting condom gets EU backing
LONDON | Mon Jun 20, 2011 3:30pm BST
(Reuters Life!) – A British medical company has had its erection-enhancing condom recommended for European approval.
Futura Medical said its CSD500 condom—licensed to pharmaceutical firm Reckitt Benckiser for sale under its Durex brand has gel in its tip that dilates the arteries and increases blood flow to the penis, resulting in a firmer and bigger erection.

Futura said on Monday products usually took about a month to receive CE mark certification after recommendation. The mark would enable the condom to be sold in 29 European territories and a number of other non-European countries.

Futura said on its website that the CSD500 will be a condom used by healthy men to help maintain a firmer erection during intercourse whilst wearing a condom.

In a double blind clinical study comparing CSD500 against a standard condom co-sponsored by Futura, of those who expressed a preference, a significant proportion of both men and women reported improvements in the firmness of the man’s erection during intercourse when using CSD500, compared against a standard condom, the company said.

Furthermore, of those who expressed a preference, a significant proportion of both men and women also felt that CSD500 increased the penis size and a significant proportion of women reported a longer lasting sexual experience.

Study: Doctors Overtesting for Cervical Cancer Virus

Many doctors report using human papillomavirus DNA testing in scenarios for which it is not recommended, according to a new study. Routine use in younger women and testing for low-risk HPV types were commonly reported, wrote CDC's Dr. Mona Saraiya, who led the study, and colleagues.

The overuse of HPV testing can lead to unnecessary expenditures and follow-up care, including invasive testing that can leave the cervix less able to carry a pregnancy later in life, said Saraiya.

Researchers analyzed responses to a cross-sectional survey of a nationally representative sample of Pap test providers, encompassing 376 office-based health care providers and 216 outpatient clinics.

Combination Pap and HPV testing is recommended for women age 30 and above, and if both tests are negative, the patient can wait three years before the next screening. Sixty percent of respondents, however, said they routinely administer both tests to women too young for the combination to be indicated. HPV is common in younger women, but they are usually infected with low-risk strains that the body eventually eliminates. HPV testing for younger women is indicated when a Pap smear signals a possible problem.

Twenty-eight percent of respondents ordered DNA testing for both cancer-causing and genital wart-causing HPV types, regardless of patient age. The test for genital warts has been on the market longer than the test that detects cancer-causing HPV strains. It may be that some doctors are not aware of the difference, or that testing order forms do not specify which product to use, Saraiya said. This would also result in a bill for two HPV tests rather than one, she noted.

CDC has developed a brochure to help women better understand the screening process; to access it, visit http://tinyurl.com/6g8de6v.


June 22, 2011

Unusual Traits Blended in Germany E. Coli Strain

By GINA KOLATA

The E. coli bacteria that killed dozens of people in Germany over the past month have a highly unusual combination of two traits and that may be what made the outbreak among the deadliest in recent history, scientists there are reporting.

One trait was a toxin, called Shiga, that causes severe illness, including bloody diarrhea and, in some patients, kidney failure. The other is the ability of this strain to gather on the surface of an intestinal wall in a dense pattern that looks like a stack of bricks, possibly enhancing the bacteria’s ability to pump the toxin into the body.

The thought is that the bacteria started out being able to aggregate with the brick pattern and then were infected with a bacterial virus that gave them the Shiga toxin, said Dr. Matthew K. Waldor, an infectious-disease expert at Harvard Medical School who was not connected with the new research.

With the two traits combined in one strain of E. coli bacteria, “now they are highly virulent,” Dr. Waldor said. The new findings, by a team led by Dr. Helge Karch of the University of Münster, were
published Wednesday in the journal *Lancet Infectious Diseases*. They result from two days of fevered work to characterize the bacteria causing the illness that raced through Germany in May.

Experts in the United States praised the German scientists’ work. The work and the entire outbreak are “a real game-changer,” said Dr. Philip I. Tarr, a professor of pediatrics and an expert in gut infections at the Washington University School of Medicine in St. Louis. Dr. John Mekalanos of Harvard called the paper “extremely important.”

Other Shiga-producing bacteria adhere to the lining of the gut much less avidly, in diffuse clumps, not bricklike walls, Dr. Tarr said. And other strains of E. coli that do attach tightly to the gut do not make Shiga toxins. The combination of the two traits in one E. coli strain may be what makes this one so lethal.

Microbiologists knew, of course, that E. coli can be deadly; outbreaks in the United States involving tainted hamburger or vegetables have led to kidney failure in 5 to 10 percent of victims. And they knew that the most vulnerable were the very young and the very old.

But the recent outbreak, which has been traced to contaminated bean sprouts grown on a German farm, was different. As of June 20, it had sickened 2,684 people with diarrhea and 810 with kidney failure. Thirty-nine people died. The proportion with kidney failure — 25 percent — was “extraordinary,” Dr. Waldor said.

Moreover, the victims tended to be young and middle-aged women.

Still, Dr. Michael T. Osterholm, an epidemiologist at the University of Minnesota who has investigated food-borne disease outbreaks in the United States, said that while there was no doubt that the German outbreak was horrendous, he questioned whether as many as 25 percent had kidney failure. The percentage depends on the denominator — the total number of people infected. And many, especially at the beginning of the outbreak when the numbers were highest, were not tested, Dr. Osterholm said. Labs had to look for Shiga toxin in stool, he said, and that “is hardly ever done.”

But whether it was 25 percent of the infected or something less, the number of victims was sobering. The hospital in Münster was only mildly affected, compared with others in northern Germany. Yet Dr. Karch said that even there, “within a few weeks, 20 patients had to be dialyzed.” Now, he added, although the epidemic is dying out, at least 100 people will need kidney transplants or will have to undergo dialysis for the rest of their lives.

Dr. Karch, an expert in E. coli, infections, got the first stool samples on May 23. Over the next few days, more and more samples flooded his lab, 50 to 100 a day. “You can’t imagine,” he said.

He isolated the strain that was causing the illness and analyzed it to determine that it was strain O104:H4. Then he began investigating the bacteria’s DNA. First he determined what kind of Shiga toxin it made. Then he did adherence tests and found that the bacteria stuck to surfaces in the bricklike pattern. It is an unmistakable phenomenon: “Once you see it you will never forget it,” Dr. Karch said.

He posted the results and provided detailed information so most labs that had a suspicious stool sample could analyze it immediately and see if the stool contained O104:H4 bacteria. Until he posted that information, most labs would be at a loss. The strain is so rare that there are no standard tests to find it.

Dr. Karch also realized that the O104:H4 strain had been seen before in bloody diarrhea and kidney failure, but only on rare occasions — first in Germany in 2001, then sporadically in a few other countries. And in each outbreak, at most a few people were ill.

Why, then, was the German outbreak so widespread, and where did the bacteria go between outbreaks?

Many experts assumed the bacteria lived in animals, probably cattle. That is where the strain that usually causes severe illness, E. coli O157:H7, is found. And that is why it has spread all over the world as animals, and their meat, transmit it to humans. In fact, Dr. Karch said, E. coli O157:H7 is thought to have traveled to Europe from America in 1610, spread by cattle.

But the strain that caused the German outbreak does not seem to live in animals.

“I think it is human-specific,” Dr. Karch said. And that increases the mystery of where it goes between outbreaks.

Dr. Karch thinks it smoldered in human populations, causing mild illnesses in most and occasionally causing severe disease. Then, somehow, it was passed to the bean sprouts by someone who harbored the bacteria. And since sprouts are eaten raw, they were highly infectious.

The strain is so rare, Dr. Karch said, that those infected had no immunity. An epidemic caught fire.

Women may have been the primary victims, Dr. Karch speculates, because they are more likely to eat sprouts.

He himself does not like sprouts, he said, though his wife does. Aware that sprouts have always been “a high-risk food” for bacterial illnesses, he will not touch them unless they have been cooked.
STDs are on the rise among older Americans, prompting an increased emphasis on treatment and prevention for this population.

An Orlando Sentinel analysis of data provided by CDC found that reports of syphilis and chlamydia among those age 55 and older increased by 43 percent from 2005 to 2009. The spike in the two STDs during these years was even more pronounced in communities with large numbers of retirees: 87 percent in Maricopa and Pima counties in Arizona; 60 percent in South Florida.

Experts cite multiple factors for the rise, including healthier seniors living longer lives and socializing more; medications like Viagra and hormone-replacement therapy, which facilitate sex; and the fact that most older people missed out on the safe-sex messages directed at the young. A study by Indiana University researchers found that US men age 50 and older reported the lowest levels of condom use.

Joanne Williams, director of the Baltimore County Department of Aging, oversees 20 senior centers and takes a proactive approach to STD prevention. Her agency receives health education funding from the state, and she dedicates a portion of the money to promoting safe sex and STD testing.

Anna Fowlkes works to get the word out, too. Five years ago, the 64-year-old Baltimore widow and grandmother tested positive for HIV. Today, she shares her experiences with groups of seniors and shows a brief video she produced, entitled “Senior Dating: Older, Wiser, Safer.”

Experts say physicians need to move beyond their assumptions about their older patients’ sex lives. “Removing age-based profiling with respect to STD screenings is a good idea,” said Dr. Stacey Lindau, a University of Chicago OB-GYN and the author of a New England Journal of Medicine study on sex and senior citizens.

Seroadaptation refers to sexual behavior to reduce the risk of acquiring or transmitting HIV, based on knowing one’s own serostatus as well as that of one’s partners. In the current study, the team measured the prevalence of seroadaptive behaviors among MSM recruited through time-location sampling across three perspectives: by individuals (n=1,207 MSM), among sexual dyads (n=3,746 partnerships), and for sexual episodes (n=63,789 episodes) in the preceding six months.

When considering the consistent behavioral pattern of individuals, seroadaptation was more common than 100 percent condom use (adopted by 39.1 percent vs. 25.0 percent of men, respectively). Among sexual dyads, 100 percent condom use was more common than seroadaptation (33.1 percent vs. 26.4 percent, respectively).

“Considering episodes of sex, not having anal intercourse (65.0 percent) and condom use (16.0 percent) were the most common risk reduction behaviors,” the authors reported. “Sex of highest acquisition and transmission risks (unprotected anal intercourse with a HIV serodiscordant or unknown status partner in the riskier position) occurred in only 1.6 percent of sexual episodes.”

The authors concluded, “In aggregate, MSM achieve a high level of sexual harm reduction through multiple strategies. Detailed measures of seroadaptive behaviors are needed to effectively target HIV risk and gauge the potential of serosorting and related sexual harm reduction strategies on the HIV epidemic.”

Three cases of cholera have been confirmed in the Democratic Republic of Congo capital of Kinshasa, "home to at least 9 million people, many of whom live in cramped, unsanitary conditions," Reuters reports.

A cholera outbreak in Bandundu province has already sickened more than 680 and killed 32 people. Traders traveling down the Congo River have carried the disease to the capital, leading health officials “to step up surveillance at Kinshasa’s river ports and identify hospitals that could take patients” (Hogg, 6/22).

After four teenage girls involved in a clinical trial in India testing vaccines for human papillomavirus (HPV) died last year, the study "threatens to have a dual legacy: inflaming unfounded fears about a
lifesaving vaccine and raising new questions about the management of medical research in the country," Nature News reports.

"A committee of three scientists from the All India Institute of Medical Sciences (AIIMS) in New Delhi, commissioned by the government to look into the trial, confirmed that the deaths were not linked to the vaccines—two of the girls died of poisoning, one of drowning and the fourth of a fever. But its report, leaked to India's media last month, said that the study involved several serious ethical violations," including misclassifying the study as observational rather than clinical, the news service writes.

The study was run by PATH, an international health organization, and the Indian Council of Medical Research (ICMR), Nature News notes. "Vivien Tsu, director of PATH's HPV vaccines project, says that the procedures criticized in the report had all been approved by state ethics boards in India and an independent review board in the United States," according to Nature News, which adds that "Rani Kumar, dean of the AIIMS, who assisted the investigating committee, declined to speak to Nature."

"Still, the verdict could pose a setback to the country's ambitions to become a hub for international clinical trials, luring drug developers with its large patient population and low costs," according to the news service (Shetty, 6/22).

2011-06-24

**Chemist solves riddle of killer diseases**

**Bacterial poison**

Anthrax, septicemia and meningitis are some of the planet's most deadly infections. In part because doctors lack basic insights to prevent and cure diseases caused by so called Gram-positive bacteria. Now, a chemist from the University of Copenhagen has revealed the mechanism behind these deadly infections. By creating a synthetic version of a Gram-bacterial endotoxin, Danish synthetic chemist Christian Marcus Pedersen has made a contribution that'll compel immune biologists to revise their textbooks. More importantly, he has paved the first steps of the way towards new and effective types of antibiotics.

The research results were attained in collaboration with Prof. Richard R. Schmidt of the University of Konstanz and biologists at the Leibniz-Zentrum für Medizin und Biowissenschaften in Borstel, Germany. Ulrich Zähringer, leader of the Centre in Borstel, is thrilled with Pedersen's achievement.

"Because Pedersen can supply us with substances that are entirely pure, and have a known structure and composition, we are able to get a more precise answer as to why we show symptoms when these bacteria enter our body."

"No one knew what substance Gram-positive bacteria released to make us sick. But because Pedersen can supply us with substances that are entirely pure, and have a known structure and composition, we are able to get a more precise answer as to why we show symptoms when these bacteria enter our body," explains Professor Zähringer.

**Synthesis succeeds where biologists gave up**

Lipoteichoic acid, is a substance created and present in the cell wall of Gram positive bacteria. It appears to be the culprit of stimulating immune response symptoms such as fever, inflammation and organ failure. Indeed, when exploring illness, it is critical to investigate the substances that bind themselves to healthy human cells and thus, the cell wall becomes an important place to look. But if the substance breaks down as soon as it comes under the microscope, the chances of studying its binding abilities are not very great. Therefore, it was a major breakthrough when Pedersen was able to fabricate the molecule from scratch.

"Biologists have been trying to isolate this poison from living organisms for years. But the substance has a number of active groups. That is to say, the spiked parts of the molecule which enable the entire molecule to bind to cells. This makes it extremely difficult to purify. And dirty molecules are not conducive to viable research. Therefore, it's a great advantage to fabricate the substance synthetically, because we can 'build' a molecule in which everything is included... Or where we ourselves decide which part of the structure to leave out," says Christian Marcus Pedersen.

**Tiresome task but outstanding results**

Lipoteichoic acid consists of 335 atoms combined in tangle, the complexity of which has made it difficult to collect. To create pure and intact molecules, Pedersen needed to complete 88 so-called synthesis steps. That is to say that 88 distinct "recipes", all of which needed to function, were required in order to reach the final result. These synthetic biomolecules are a fantastic tool for biologists in the investigation of Gram-positive bacteria’s attack mechanisms.
"When it comes to these bacteria, there is still no one who knows precisely what on the bacteria activates the immune system. But we can build the precise parts of the structure that we want to. And biologists can examine how what we have built reacts with the immune system," says Pedersen.

The results, presented in a series of articles in the esteemed journal Organic & Biomolecular Chemistry, can be used in the development of antibiotics to kill some of the multi-resistant bacterial strains which cause headaches for hospitals worldwide. Christian Marcus Pedersen is currently seeking funding to broaden the scope of his work.

**Study of phytoremediation benefits of 86 indoor plants published**

**Japanese royal fern tops list for formaldehyde removal effectiveness**

SUWON, KOREA—Formaldehyde is a major contaminant of indoor air, originating from particle board, carpet, window coverings, paper products, tobacco smoke, and other sources. Indoor volatile organic compounds (VOCs) such as formaldehyde can contribute to allergies, asthma, headaches, and a condition known as "sick building syndrome". The concern is widespread; a 2002 report from the World Health Organization estimated that undesirable indoor volatiles represent a serious health problem that is responsible for more than 1.6 million deaths per year and 2.7% of the global burden of disease.

Scientists have long known the benefits of using plants to absorb and metabolize gaseous formaldehyde. Phytoremediation—the use of green plants to remove pollutants or render them harmless—is seen as a potentially viable and environmentally significant means of improving the indoor air quality in homes and offices. A team of scientists from Korean's Rural Development Administration and the Department of Horticulture at the University of Georgia tested the efficiency of volatile formaldehyde removal in 86 species of plants representing five general classes (ferns, woody foliage plants, herbaceous foliage plants, Korean native plants, and herbs). The results of the extensive research were published in *HortScience*.

Phytoremediation potential was assessed by exposing the plants to gaseous formaldehyde in airtight chambers constructed of inert materials and measuring the rate of removal. *Osmunda japonica* (Japanese royal fern), *Selaginella tamariscina* (Spikemoss), *Davallia mariesii* (Hare's-foot fern), *Polypodium formosanum*, *Psidium guajava* (Guava), *Lavandula* (Sweet Lavender), *Pteris dispers*, *Pteris multifida* (Spider fern), and *Pelargonium* (Geranium) were the most effective species tested. Ferns had the highest formaldehyde removal efficiency of the five classes of plants tested, with *Osmunda japonica* determined to be most effective of all 86 species, coming in at 50 times more effective than the least (*D. deremensis*) efficient species.

"Based on the wide range of formaldehyde removal efficiency among the plants tested, we separated the species into three general groups: excellent, intermediate, and poor", said corresponding author Kwang Jin Kim. "The species classified as excellent are considered desirable for use in homes and offices where the formaldehyde concentration in the air is a concern. It is evident from our results that certain species have the potential to improve interior environments and, in so doing, the health and well-being of the inhabitants".

The complete study and abstract are available on the ASHS *HortScience* electronic journal web site: [http://hortsci.ashspublications.org/cgi/content/abstract/45/10/1489](http://hortsci.ashspublications.org/cgi/content/abstract/45/10/1489)

**United States: opt-out HIV testing in clinical settings boosts HIV diagnoses among hard-to-reach groups**

Keith Alcorn
Published: 24 June 2011

Expanded HIV testing in the United States in clinical settings identified over 18,000 new HIV infections between October 2007 and September 2010, the US Centers for Disease Control and Prevention has reported. The new diagnoses were the result of targeting health care settings in areas with a large number of AIDS diagnoses in African-Americans.

In 2006 the CDC recommended opt-out HIV testing for patients aged 13 to 64 in health care settings where the local prevalence of HIV infection is greater than 0.1%, and in 2007 launched the Expanded HIV Testing Initiative to target districts with high rates of late HIV diagnosis among African-Americans.

African-Americans are disproportionately affected by HIV in the United States, and rates of late diagnosis remain high in this population.

The Expanded HIV Testing Initiative targeted 25 districts in which more than 140 AIDS diagnoses had been reported in African-Americans in 2005, as a marker of high rates of undiagnosed HIV infection.
$111 million was made available to the 25 districts, 80% of which was spent on promoting opt-out HIV testing in clinical settings; the remainder could be spent on promoting innovative methods of increasing HIV testing uptake among high-risk populations such as men who have sex with men.

2,786,739 tests were conducted between October 2007 and September 2010, resulting in 18,432 new HIV diagnoses. Ninety-one per cent of all tests took place in clinical settings, yielding 81% of all new HIV diagnoses.

Emergency departments accounted for 8% of testing venues but 30% of all tests and 32% of all HIV diagnoses. 0.8% of all tests performed in emergency departments were positive.

Sexually transmitted disease clinics accounted for 21% of testing venues, 21% of all tests and 20% of new HIV diagnoses.

Although substance abuse clinics made up 9% of testing venues, they accounted for only 0.9% of HIV tests and new HIV diagnoses.

Testing conducted by community-based organisations yielded a disproportionate number of new diagnoses. Although comprising only 7% of testing venues and carrying out 6% of tests, community-based organisations accounted for 11% of new diagnoses, indicating the importance of supporting community-based organisations to improve rates of HIV diagnosis.

The Expanded HIV Testing Initiative was also successful in offering testing to groups who are less likely to have regular contact with health care providers in the United States. Fifty-five per cent of the tests were carried out on men, who accounted for 72% of new HIV diagnoses. Men were twice as likely to test positive as women.

Sixty per cent of tests were carried out in African-Americans, who were 60% more likely to test positive (0.8% HIV prevalence, compared to 0.5% prevalence in whites and Hispanics).

But despite the large number of new diagnoses, the survey also showed that problems remain in linkage to care.

Nine per cent of people who tested positive did not receive their results and 25% of people who tested positive failed to be linked to care. Rates of result notification and linkage to care were lower outside clinical settings. The US National HIV/AIDS Strategy has set a target of improving the proportion of people who are linked to care within three months of diagnosis from 65% to 85%.

The report notes that the Expanded HIV Testing Initiative addressed only two stages in the spectrum of care, and that to achieve a reduction in new infections as a result of earlier diagnosis and treatment, linkage to care must be followed by retention in care, initiation of treatment, adherence, sustained viral suppression, and access to ongoing prevention and support services. US researchers have previously estimated that only 19% of the HIV-infected population in the United States has achieved viral load suppression.

Reference

**Iran giving out condoms for criminals to rape us, say jailed activists**

Smuggled letters allege authorities are using mass rape as a weapon inside Iran’s most notorious prisons.

Prison guards in Iran are giving condoms to criminals and encouraging them to systematically rape young opposition activists locked up with them, according to accounts from inside the country’s jail system.

A series of dramatic letters written by prisoners and families of imprisoned activists allege that authorities are intentionally facilitating mass rape and using it as a form of punishment.

Mehdi Mahmoudian, an outspoken member of Iran’s Participation Front, a reformist political party, is among those prisoners who have succeeded in smuggling out letters revealing the extent of rape inside some of the most notorious prisons.

Mahmoudian was arrested in the aftermath of Iran’s 2009 disputed presidential election for speaking to the press about the regime’s suppression of the movement and is currently in Rajaee Shahr prison in Karaj, a city 12 miles (20km) to the west of the capital, Tehran.

"In various cells inside the prison, rape has become a common act and acceptable," he wrote in a letter published on Kaleme.com, the official website of opposition leader Mir Hossein Mousavi.

According to Mahmoudian and letters published on various opposition websites, political prisoners are locked up with some of the most dangerous criminals – murderers and ex-members of armed gangs.
Meanwhile, 26 prominent political activists who have been in jail since the 2009 election have written to an official prison monitoring body accusing the government’s intelligence ministry and the revolutionary guards of harassing inmates with unlawful tactics that included sexual assaults.

Mohsen Aminzadeh, a senior deputy foreign minister, Mohsen Mirdamadi, a leader of a reformist party and Behzad Nabavi, a veteran activist are among those who put their signatures on the letter.

Speaking to Jaras, a website run by opposition activists, families of political prisoners have alleged that prison guards are failing to protect them from rape or sexual assault.

"During exercise periods, the strong ask for sex without any consideration. Criminals are repeatedly seen with condoms in hand, hunting for their victims," an unnamed family member told Jaras.

"If the inmate is not powerful enough or guards would not take care of him, he will be certainly raped. Prison guards ignore those who are seen with condoms simply because they were given out to them by the guards at first place," the family member said.

The family members say prison guards are turning a blind eye to the systematic rape and have ignored complaints made by rape victims.

Amnesty International, which has documented rape inside Iran’s prisons and interviewed victims for a 2010 report, called on Iran to launch an investigation into the recent allegations.

Kristyan Benedict, Amnesty International UK’s Middle East campaign manager, told the Guardian: "Rape is a terrible crime and these allegations [mentioned in the letters] should be thoroughly investigated. Amnesty International has also documented the rape of male and female detainees by security officials. Many of those detained for taking part in post-election protests were tortured and did not receive fair trials. The Iranian authorities still continue to punish and persecute those who peacefully speak up against them."

According to Mahmoudian, who has been transferred to a solitary confinement after his letter attracted attention, one young prisoner was raped seven times in a single night.

"In [Rajaeeshahr] prison, those who have pretty faces and are unable to defend themselves or cannot afford to bribe others are forcibly taken to different cells each night [to be raped]," he writes.

"The situation is such that those exposed to rape even have an owner and that owner makes money by renting him out to others and after a while selling him to someone else."

Rape victims in Iran usually stay quiet in order to protect the honour of their family but at the time when journalists based in the country are facing strict restrictions, these letters have become one of the only sources of information about the situation of hundreds of imprisoned activists.

Iranian officials have ignored the allegations and have previously denied any claims of rape inside jail.

**AIDS group to appeal court ruling on HIV transmission among porn actors**

June 23, 2011 | 6:10 pm

A local AIDS group said it would appeal to the California Supreme Court a ruling rejecting its bid to order county authorities to take more aggressive action to prevent the spread of HIV on adult-film sets.

The California Court of Appeal last week affirmed a lower court’s decision defending a county health officer’s discretion in protecting public health. The AIDS group wants the county to, among other things, inspect film sets to ensure that actors are being protected from sexually transmitted diseases.

Adult film companies widely flout state rules that require performers to wear condoms on set, the group alleges.

The three judges on the appeal panel unanimously agreed that, "a court ... cannot substitute its discretion for that of legislative or executive bodies in matters committed to the discretion of those branches."

The AIDS Healthcare Foundation had asked a judge in 2009 to compel local public health officials "to combat an acknowledged epidemic of sexually transmitted diseases stemming from production of hardcore pornography in Los Angeles County." The case was filed after a porn performer contracted HIV in 2009.

Michael Weinstein, president of the AIDS Healthcare Foundation, said the number of STD cases among adult-film performers is "an epidemic virtually ignored by the county Department of Public Health."

"County officials and porn producers should know we will not stop our efforts to protect the public health and will continue to fight the STD epidemic in the adult-film industry," Weinstein said in a statement.
Los Angeles County public health officials praised the court’s decision. The agency released a statement that said: "The court recognized that the Department of Public Health acted in accordance with California law."

Dr. Jonathan Fielding, who heads the department, has ruled out more aggressive action, such as sending health officials to perform on-set inspections of porn productions.

23 June 2011

Type 2 diabetes in newly diagnosed 'can be reversed'

An extreme eight-week diet of 600 calories a day can reverse Type 2 diabetes in people newly diagnosed with the disease, says a Diabetologia study.

Newcastle University researchers found the low-calorie diet reduced fat levels in the pancreas and liver, which helped insulin production return to normal.

Seven out of 11 people studied were free of diabetes three months later, say findings published in the journal.

More research is needed to see whether the reversal is permanent, say experts.

Type 2 diabetes affects 2.5m people in the UK. It develops when not enough insulin is produced in the body or the insulin that is made by the body doesn’t work properly.

When this happens, glucose—a type of sugar—builds up in the blood instead of being broken down into energy or fuel which the body needs.

The 11 participants in the study were all diagnosed with Type 2 diabetes within the previous four years.

They cut their food intake drastically for two months, eating only liquid diet drinks and non-starchy vegetables.

Fat loss

After one week of the diet, researchers found that the pre-breakfast blood sugar levels of all participants had returned to normal.

MRI scans of their pancreases also revealed that the fat levels in the organ had decreased from around 8%—an elevated level—to a more normal 6%.

Three months after the end of the diet, when participants had returned to eating normally and received advice on healthy eating and portion size, most no longer suffered from the condition.

"This diet was only used to test the hypothesis that if people lose substantial weight they will lose their diabetes.

"Although this study involved people diagnosed with diabetes within the last four years, there is potential for people with longer-standing diabetes to turn things around too."

Susceptibility question

Dr Ee Lin Lim, also from Newcastle University's research team, said that although dietary factors were already known to have an impact on Type 2 diabetes, the research showed that the disease did not have to be a life sentence.

"It's easy to take a pill, but harder to change lifestyle for good. Asking people to shift weight does actually work," she said.

However, not everyone in the study managed to stay free of diabetes.

"It all depends on how much individuals are susceptible to diabetes. We need to find out why some people are more susceptible than others, then target these obese people. We can't know the reasons for that in this study," Dr Lim said.

Professor Edwin Gale, a diabetes expert from the University of Bristol, said the study did not reveal anything new.

"We have known that starvation is a good cure for diabetes. If we introduced rationing tomorrow, then we could get rid of diabetes in this country.

"If you can catch people with diabetes in the early stages while beta cells are still functioning, then you can delay its onset for years, but you will get it sooner or later because it's in the system."

But Keith Frayn, professor of human metabolism at the University of Oxford, said the Newcastle study was important.

"People who lose large amounts of weight following surgery to alter their stomach size or the plumbing of their intestines often lose their diabetes and no longer need treatment."
“This study shows that a period of marked weight loss can produce the same reversal of Type 2 diabetes.

“It offers great hope for many people with diabetes, although it must be said that not everyone will find it possible to stick to the extremely low-calorie diet used in this study.”

Dr Iain Frame, director of research at Diabetes UK, which funded the study, said the diet was not an easy fix.

“Such a drastic diet should only be undertaken under medical supervision. Despite being a very small trial, we look forward to future results particularly to see whether the reversal would remain in the long term.”

HIV Testing Project Discovers 18,000 New Cases


A CDC initiative to expand HIV testing and link those infected to care resulted in more than 18,000 new diagnoses, the agency reported Thursday. Launched in 2007, the three-year, $111 million Expanded HIV Testing Initiative operated in 25 jurisdictions with high HIV prevalence. Health departments chosen as EHTI partners were required to target at least 80 percent of efforts on opt-out HIV screening in high-morbidity clinical settings; they had the option of directing up to 20 percent of efforts toward innovative testing programs for high-risk populations, such as a social networking approaches for men who have sex with men (MSM).

In the program, 2.8 million HIV tests were conducted, and 29,503 (1.1 percent) were positive, including 18,432 previously undiagnosed cases. Blacks were a particular focus of EHTI, representing about 60 percent of those tested and 70 percent of the new diagnoses. Nearly three-quarters of those newly diagnosed were men. In the screening, men were more than twice as likely as women to test HIV-positive.

Clinical settings comprised at least 75 percent of testing venues and 90 percent of all tests. About 30 percent were emergency departments, 21 percent STD clinics, and 17 percent community health centers. Community-based organizations conducted about 10 percent of tests, and their rate of positivity was about twice that found in medical settings.

Of those testing positive: 93 percent received their results; 78 percent were linked to medical care; and 83 percent were referred to partner notification services.

EHTI is now expanding to include 30 states and cities with about $50 million in annual support for targeted testing, said Dr. Jonathan Mermin, director of CDC’s Division of HIV/AIDS Prevention. EHTI will focus on African Americans, Hispanics, injection drug users, and MSM.

“It is the job of the health care system to make HIV testing as routine as cholesterol screening,” Mermin said.


One Session of Transtheoretical Model-Tailored Condom Use Feedback: a Pilot Study Among At-Risk Women in the Bronx

AIDS Care Vol. 23; No. 1: P. 10-15, (01..2011) Colleen A. Redding; Pamela Brown-Peterside; Seth M. Noar; Joseph S. Rossi; Beryl A. Koblin

The authors introduced their research by noting the “urgent need” to enact interventions to curb the spread of STDs, particularly HIV. “Consistent condom use is an effective preventive strategy, yet especially among those at highest risk, condom use remains too low,” they wrote.

This study describes changes in condom use and stages of condom use during a two- to three-month period following a single session with an interactive multimedia computer-delivered Transtheoretical Model (TTM)-tailored expert system, which was originally designed for at-risk adolescents. The intervention gave immediate TTM-tailored feedback to diverse urban women based on their stage of condom use and other TTM variables.

Previous work had found the system acceptable. In the current study, 89 percent of women returned for a second session two to three months later, further demonstrating the system’s utility.

“After just one feedback session, 21 percent of women not using condoms at baseline started using condoms consistently at follow-up, with a trend for a relationship to baseline stage of condom use,” the authors concluded. “These results support further randomized controlled research on the reach and efficacy of computer-based TTM-tailored and individual condom use interventions.”
Man Contends Illinois Jail Denied Him HIV Drugs

Associated Press, (06.23.2011) Carla K. Johnson

This week, the state Department of Corrections began investigating allegations that a man was denied his prescribed HIV drugs while held in jail for a week in Bureau County.

On Sept. 29, Arick Buckles, a Chicago HIV/AIDS outreach worker, was booked into the Bureau County Jail in Princeton on an outstanding warrant for passing bad checks. During the week he was held, Buckles said he asked repeatedly for his HIV drugs, as did friends and a minister who contacted BCJ on his behalf. He said he was told he could not have his own pills brought to him because they were stored in a day-by-day organizer and not in their original containers. Buckles said he experienced diarrhea, fatigue, and light-headedness without the three-pill combination.

Bureau County uses a private firm, Peoria-based Advanced Correctional Healthcare, to provide jail medical services. Under its contract, the county is responsible for the cost of inmates’ HIV drugs.

A nurse’s notes mention notifying the state’s attorney of the cost of Buckles’ medicines, more than $2,000 a month. After one week in jail, Buckles said a sheriff’s deputy came to tell him he was being released because the county could not afford his treatment. Bureau County Sheriff John Thompson did not respond to repeated AP requests for comment.

Illinois requires that jails provide medical care, including prescription drugs. BCJ violated Buckles’ right to medical treatment, says a letter from the American Civil Liberties Union. Poor HIV treatment is a common problem in jails, particularly because of the high cost, said ACLU attorney John Knight, who is awaiting BCJ’s response and has not ruled out a lawsuit.

Buckles said he wants to ensure future inmates receive better care. “I’m interested in them correcting what they did wrong,” Buckles said.

Hybrid Leishmania Parasites On the Loose

ScienceDaily (June 23, 2011) — What we anxiously fear in the influenza virus—a cross between two strains, resulting in a new variant we have no resistance against—has occurred in another pathogen, the Leishmania parasite. This was uncovered by researchers of the Institute of Tropical Medicine (ITG). The new hybrid species might not be more dangerous than their parents, but it’s too early to know. Kenian scientist Samwel Odiwuor receives for his discovery a PhD at ITG and Antwerp University.

After malaria, leishmaniasis is the most deadly parasitic disease in developing countries. It is caused by unicellular organisms, Leishmania, transmitted by small mosquitoes (sand flies) while bloodsucking. Yearly the parasite hits two million people worldwide, of which four thousand in Southern Europe. Most victims are poor. Which means not much research is put into it: developing medicines or diagnostics costs more than it ever could bring in.

Biologically spoken, Leishmania is a remarkable organism. It is one of a few disease-causing organisms to adapt in millions of years of evolution to quite diverse environments, without making use of the normal motor of genetic innovation, sex.

During an innovative genetic analysis of Leishmania parasites from Africa and South America, Samwel Odiwuor discovered vestiges of sex between different species of Leishmania, resulting in new, hybrid varieties of the organism. It still has to be sorted out if the newcomers are ‘better’ at causing disease, as often is the case with hybrids.

If we want to understand how these parasites operate, how they can hide in animals, what they do to a human, which techniques and strategies they use to keep up against our immune system and our medicines (and it looks like they have a few tricks never before seen in biology)—then we will have to understand how they themselves are built and how they work. This research is a considerable step on that long road.

Who Goes There? Novel Complex Senses Viral Infection

ScienceDaily (June 23, 2011) — Double-stranded (ds) RNA viruses are a diverse group of viruses that include rotaviruses, a common cause of gastroenteritis. The ability of the immune system to detect and destroy viruses is critical for human health and survival. Now, a study published by Cell Press in the June 23rd issue of the journal Immunity identifies a novel sensor that is necessary to activate the immune response to viral infection. The research enhances our understanding of the complex and overlapping mechanisms our immune cells use to thwart infection.
Viruses are infectious agents composed of nucleic acid (DNA or RNA) and a protective protein coating. Viruses infect all types of organisms and can hijack host cell machinery to replicate (make many copies of themselves). The innate immune system is the body's first line of defense against viruses and detects infection by sensing viral nucleic acids. Detection of a virus leads to activation of the type 1 interferon (IFN) response, a powerful weapon that is named for its ability to "interfere" with viral replication.

"During the past decade, major efforts using genetic approaches have identified three major classes of innate immune receptors for sensing microbial nucleic acids," says senior study author, Dr. Yong-Jun Liu from the University of Texas MD Anderson Cancer Center. "However, there is a major gap in our understanding of how these receptors bind nucleic acids and whether additional receptors or coreceptors exist. For example, Toll-like receptor 3 (TLR3) has been known as the only TLR that sense dsRNA and use adaptor molecule TRIF to trigger antiviral immune responses. Intriguingly, macrophages and dendritic cells from TLR3-deficient mice but not from TRIF-deficient mice could still make significant antiviral IFN responses to dsRNA, suggesting the presence of additional TRIF-dependent dsRNA sensors" Dr. Liu and colleagues investigated this issue by isolating and characterizing proteins that bound to a synthetic form of double-stranded viral RNA called poly I:C. Looking inside myeloid dendritic cells that are known to play a key role in pathogen detection, the researchers found two known dsRNA sensors as well as a previously unknown viral sensor complex that consists of three RNA helicases, DDX1, DDX21 and DHX36, and the adaptor molecule TRIF. This multi-helicase-TRIF complex bound directly to poly I:C and triggered an immune response. Dr. Liu's team went on to show that DDX1 directly bound to poly I:C while DDX21 and DHX36 served as bridges to TRIF and that each of the four components was essential for the appropriate immune response. Importantly, interference with the complex impaired the immune response to influenza A and a type of rotavirus.

"Our study suggests that the DDX1-DDX21-DHX36 complex represents the missing poly I:C sensor and may represent an early sensor of poly I:C that triggers initial IFN production," concludes Dr. Liu. "This initial IFN production may help to activate other known dsRNA sensors which will serve to further amplify the IFN response. This may explain the overlapping functions of the known dsRNA sensors." A better understanding of the complex mechanisms our immune system uses to detect viruses will contribute to the future design of more effective antiviral therapeutics.


No Two Strands Are Alike: New Mechanism for Elongation of Viral Genome Termini

ScienceDaily (June 24, 2011) — Like bacteria, viruses have their own genome. The ends or termini of a viral RNA are especially interesting for virologists because they play an important role in reproduction and in the reaction of the innate immune system to the virus. The genetic information is reproduced when a strand of the genome is transcribed into a complementary strand of the so-called antigenome. This strand then serves as the model or template for the synthesis of a new genome.

As a result of this simple copying mechanism, the two strands are normally exact copies of each another. However, this is not the case with the Borna disease virus (BDV), which belongs to the group of negative-strand RNA viruses. When one compares the genome and the antigenome of the BDV, one finds that the two strands possess four additional nucleotides each as components of the RNA at their 3' termini. There is no template on the complementary strand for this elongation, and the process thus cannot be explained with the standard model of reproduction.

In a new study, a Freiburg research group led by Dr. Urs Schneider (now Québec, Canada) at the Institute of Microbiology and Hygiene, Department of Virology, was able to demonstrate that the
additional nucleotides are not transcribed from the complementary strand but from a template located within the newly synthesized viral strand.

The study describes the use of internal templates for RNA synthesis for the first time and presents a previously unknown possibility for modifying viral genome termini. The significance of genome elongation for the reproduction and pathogenesis of the BDV is not yet completely clear. However, there are indications that this mechanism serves the dual function of preserving the integrity of the genome termini and making them unidentifiable for the innate immune system. Further experimentation will be necessary to clarify the significance of the "realignment and elongation" mechanism described in the study.

In some animals (e.g., horses), the BDV establishes a terminal infection that can lead to a severe neurological illness, ending in death.

Journal Reference:

Premature aging caused by some HIV drugs, study shows
A class of anti-retroviral drugs commonly used to treat HIV, particularly in Africa and low income countries, can cause premature ageing, according to research published today in the journal Nature Genetics. The study shows that the drugs damage DNA in the patient's mitochondria – the 'batteries' which power their cells.

The findings may explain why HIV-infected people treated with antiretroviral drugs sometimes show advanced signs of frailty and age-associated diseases such as cardiovascular disease and dementia at an early age.

Nucleoside analogue reverse-transcriptase inhibitors (NRTIs) – of which the most well known is Zidovudine, also known as AZT – were the first class of drug developed to treat HIV. They were a major breakthrough in the treatment of the disease, greatly extending lifespan and leading the condition to be seen as a chronic, rather than terminal, condition.

In high income countries, such as Europe and North America, the older NRTIs are used less commonly now due to concerns over toxicity and side-effects when taken over a long period of time. However, as they are now off-licence and hence relatively cheap, the drugs have proved to be an important lifeline for people infected with HIV in Africa and low income countries.

Professor Patrick Chinnery, a Wellcome Senior Fellow in Clinical Science from the Institute of Genetic Medicine at Newcastle University, says: "HIV clinics were seeing patients who had otherwise been successfully treated but who showed signs of being much older than their years. This was a real mystery. But colleagues recognised many similarities with patients affected by mitochondrial diseases – conditions that affect energy production in our cells – and referred them to our clinic."

Mitochondria are the 'batteries' in our cells which provide them with the energy to carry out their functions. During natural human ageing, these mitochondria acquire mutations, though it is unclear whether these mutations are a cause of ageing or a consequence.

In an attempt to understand what was happening at a cellular level, Professor Chinnery and colleagues studied muscle cells from HIV-infected adults, some of whom had previously been given NRTIs.

The researchers found that patients who had been treated with NRTIs – even as long ago as a decade previously – had damaged mitochondria which resembled that of a healthy aged person.

"The DNA in our mitochondria gets copied throughout our lifetimes and, as we age, naturally accumulates errors," explains Professor Chinnery. "We believe that these HIV drugs accelerate the rate at which these errors build up. So over the space of, say, ten years, a person's mitochondrial DNA may have accumulated the same amount of errors as a person who has naturally aged twenty or thirty years. What is surprising, though, is that patients who came off the medication many years ago may still be vulnerable to these changes."

Co-author and HIV specialist, Dr Brendan Payne, a Medical Research Council fellow from the Department of Infection and Tropical Medicine at the Royal Victoria Infirmary, Newcastle, believes that despite the side effects caused by NRTIs, they are still important drugs and the risks are relative.

"These drugs may not be perfect, but we must remember that when they were introduced they gave people an extra ten or twenty years when they would otherwise have died," he says. "In Africa, where the
HIV epidemic has hit hardest and where more expensive medications are not an option, they are an absolute necessity."

**Rogue blood cells may contribute to post-surgery organ damage**

A study from scientists at Queen Mary, University of London, sheds new light on why people who experience serious trauma or go through major surgery, can suffer organ damage in parts of the body which are seemingly unconnected to the injury.

The study, published today in *Nature Immunology*, examines the way certain white blood cells, called neutrophils move out of blood vessels to defend damaged organs against injury or infection.

This is normally a one-way journey but researchers were surprised to find that, in some cases, this process can go into reverse, with rogue super-activated neutrophils, re-entering the blood stream and causing damage to other parts of the body.

The researchers used a cutting edge imaging technique which allowed them to watch the movement of neutrophils, in three dimensions and in real time in mice. As they expected the neutrophils moved out of blood vessels and into tissues to tackle injury or infection and they showed that his process was being controlled by a protein on the surface of the blood vessels called JAM-C.

However, when they temporarily blocked the blood vessels, mimicking the trauma experienced by patients undergoing major surgery, JAM-C was lost from the blood vessels. When this happened the neutrophils seemed to loose their way. Cells that had already exited blood vessels returned to the blood stream and damaged other parts of the body. In particular, the researchers found that these confused but highly activated neutrophils lodged into blood vessels in the lungs where they appeared to cause inflammation and damage to lungs.

Further research on the JAM-C molecule and the properties of these rogue neutrophils could lead to the development of drugs aimed at reducing life threatening complications following major surgeries such as inflammation of the lungs.

Professor Sussan Nourshargh who led the study said: "This is a really exciting piece of research as we have been able to watch how white blood cells move out of blood vessels to enter parts of the body that need their help. But with the advanced imaging technique that we have developed we could also for the first time see neutrophils move back into blood vessels following trauma. The neutrophils that behave this way are very different from normal blood neutrophils in that they are highly activated and fully capable of causing damage to other organs."

"Neutrophils are usually our first line of defence against infection but they have the ability to cause many diseases. As we learn more about the complex processes that protect us against infections we also find ways of tackling inflammatory diseases where white blood cells are inappropriately switched on."

‘The junctional adhesion molecule JAM-C regulates the polarized transendothelial migration of neutrophils in vivo’, Woodfin, et al.

**Kivexa and Truvada-based combinations associated with long-term gains in limb fat, not fat loss**

Michael Carter

Published: 27 June 2011

Modern antiretroviral regimens based on Kivexa and Truvada are associated with long-term gains in limb fat, US investigators report in the July 15th edition of *Clinical Infectious Diseases*.

After 96 weeks of therapy limb fat levels had increased by approximately 25% in patients treated with Kivexa (abacavir and 3TC) and by 21% in patients taking Truvada (tenofovir and FTC).

These results provide reassurance that the nucleoside/nucleotide backbones used in modern HIV therapy do not cause the fat loss, or lipoatrophy associated with the older drugs, d4T (stavudine, Zerit) and AZT (zidovudine, Retrovir).

Visceral fat gain – accumulation of fat around the organs – was somewhat more likely to occur with atazanavir (Reyataz) rather than efavirenz (Sustiva, also in the combination pill Atripla), and was associated with baseline obesity.

The study involved 269 HIV-positive patients enrolled in the ACTG A5242s study. All were starting HIV therapy for the first time. They were treated with open-label ritonavir-boosted atazanavir or efavirenz, which was used in combination with blinded Kivexa or Truvada.

Both DEXA and CT scans were used to assess changes in limb and visceral fat.

Recruitment to the study took place between 2005 and 2007, and 96-week follow-up data were published by the investigators.
Most of the patients (85%) were male and 47% were white. The median age at baseline was 38 years, and median body mass index at this time was 24.9 kg/m$^2$. Median limb fat was 7.4 kg, median trunk fat was 9.4 kg, and median visceral adipose tissue was 84.1 cm$^2$.

At the time HIV therapy was started, the patients had a median CD4 cell count of 233 cells/mm$^3$ and median viral load was 4.6 log$_{10}$ copies/ml.

Lipoatrophy was defined as fat loss of at least 10% after 96 weeks. It was diagnosed in 18% of patients treated with *Kivexa* and 15% of patients taking *Truvada*.

Fat loss of 20% of greater from the limbs occurred in approximately 5% of patients.

The investigators note that this prevalence of fat loss was significantly lower than the 50%-70% seen among patients treated with d4T or AZT.

Moreover, DEXA scans showed that overall limb fat had increased by 1.66 kg or 25% in patients taking *Kivexa*, and by 1.11 kg or 21% among *Truvada*-treated patients.

Limb fat changes were significantly greater for patients taking ritonavir-boosted atazanavir than for those treated with efavirenz.

The estimated overall increased in trunk fat at week 96 was 1.83 kg or 28%, with similar gains seen in the *Kivexa*- and *Truvada*-treated patients.

Greater gains in trunk fat were however seen in patients taking atazanavir-ritonavir than in those treated with efavirenz (2.42 kg, 37% vs. 1.33 kg, 21%).

Neither *Kivexa* nor *Truvada* were associated with gains in visceral fat. However, slightly larger increases in visceral fat were seen in patients taking atazanavir than among individuals treated with efavirenz (30% vs. 15%).

Therapy with atazanavir-ritonavir was associated with greater increases in BMI than treatment with efavirenz (p = 0.022).

A higher baseline viral load was associated with significantly greater increases in limb fat (p < 0.001). The investigators suggest that this is consistent with limb-fat gains being “mediated by the return-to-health phenomenon.” Older age was associated with significantly greater losses in limb fat. (p = 0.02).

Higher baseline BMI was associated with increases in visceral fat. The investigators suggest “this could be linked to the enhanced inflammation associated with obesity.”

The authors conclude “very few subjects in any study arm met [the] criterion for lipoatrophy.” They suggest “studies aimed at better understanding and preventing lipohypertrophy after ART initiation are needed.”

Reference

**SIV-resistant monkeys close the gates to viral infection**

Sooty mangabeys, a type of African monkey, have intrigued scientists for years because they can survive infection by SIV, a relative of HIV, and not succumb to AIDS.

Researchers have identified a way some of sooty mangabeys’ immune cells resist infection: they close the gates that SIV and HIV use to get into the cell. The findings may lead to strategies to help HIV-infected individuals cope better with infection.

The results are published online in the journal *Nature Medicine*.

"We have shown sooty mangabeys can prevent SIV from infecting a very important part of the immune system," says first author Mirko Paiardini, PhD, senior research scientist at Yerkes National Primate Research Center, Emory University. "This protection from infection comes from reducing the levels on the cell surface of a molecule that SIV uses to enter the cell."

Co-first author is postdoctoral fellow Barbara Cervasi. The senior author is Guido Silvestri, MD, chief of microbiology and immunology at Yerkes National Primate Research Center, Emory University. Collaborators included investigators from NIH, University of Pennsylvania, University of Pittsburgh and University Hospital Ulm.

To infect a cell, HIV and SIV need to find two molecules on the cell’s surface. Scientists call these molecules co-receptors, and they can be thought of as gates. One of the co-receptors is CD4, which appears on immune cells called T cells. The other is called CCR5. Stimulating a T cell usually increases the level of CCR5, facilitating infection.

Paiardini, Cervasi and their colleagues found that in sooty mangabeys, a type of T cell called a central memory T cell doesn’t turn on CCR5. This means that even when a sooty mangabey is infected with SIV, some T cells can mostly avoid being killed by the virus.
Memory T cells help the immune system respond to an infection faster and stronger the second time around. Central memory T cells are long-lived and found in lymph nodes, in contrast to effector memory T cells, which have shorter life spans and are found mostly in tissues, such as the intestines, Paiardini says.

"Not all T cells are created equal," he says. "Some appear to be more important than others for keeping the immune system up and running. This is why having central memory T cells resistant to infection is so valuable. By protecting central memory T cells, sooty mangabeys avoid the loss of T cells and the chronic immune activation that are the hallmarks of AIDS in humans."

Scientists have identified several differences in the pattern of infection between sooty mangabeys and both humans and rhesus macaques, a monkey that is susceptible to SIV infection.

"For several years, we and others thought lack of chronic immune activation was the main factor protecting sooty mangabeys from AIDS," Paiardini says. "This study changes this working model and proposes that lack of immune activation in sooty mangabey is secondary, deriving from their ability to protect and maintain their central memory T cells."

Paiardini continues, "We would have not been able to perform such complex comparative studies without the presence of the large colony of sooty mangabeys at the Yerkes National Primate Research Center."

**Factors Associated with Refusal of Rapid HIV Testing in an Emergency Department**

* AIDS and Behavior Vol. 15; No. 4: P. 734-742, (05..2011) Mary L. Pisculli; William M. Reichmann; Elena Losina; Laurel A. Donnell-Fink; Christian Arbelaez; Jeffrey N. Katz; Rochelle P. Walensky

HIV testing studies in the emergency department have found rates of testing refusal of 40 percent to 67 percent, noted authors of the current study. Walensky and colleagues examined factors associated with refusal to undergo routine rapid HIV testing in an academic ED in Boston.

Of the 1,959 subjects offered HIV testing by an HIV counselor, 577 (29 percent) refused. Data from a self-administered survey were used to determine independent correlates of refusal.

Participants more likely to refuse testing included women, those with annual household incomes of $50,000 or greater, those reporting no HIV risk behaviors, those previously tested, those who did not perceive a need for testing, and participants enrolled during the morning hours.

Adjusting for other factors, a history of prior HIV testing was associated with a 20 percent increase in testing refusal. Perceived risk for HIV may be tied to refusal. Perception of risk may be influenced by nonclinical factors, as the proportion who perceived a need for testing was low (16 percent), and nearly 15 percent who perceived a need nonetheless refused testing. Low self-perceived need for testing was the strongest independent correlate for test refusal, with more than a two-fold increased risk.

As the trial was conducted at one site, it may not be generalizable to other EDs, the authors cautioned. However, "our findings demonstrate that routine HIV screening programs may not fully or equally engage all groups, including women, patients with higher incomes, and participants who did not perceive a need for HIV testing," they concluded. "Increased educational efforts to convey the rationale and benefits of universal screening may improve testing uptake among these groups. In addition, the modification of routine HIV screening programs to offer testing during hours of lower test refusal may increase testing rates."

**Meta-analysis reveals patterns of bacteria-virus infection networks**

Bacteria are common sources of infection, but these microorganisms can themselves be infected by even smaller agents: viruses. A new analysis of the interactions between bacteria and viruses has revealed patterns that could help scientists working to understand which viruses infect which bacteria in the microbial world.

A meta-analysis of the interactions shows that the infection patterns exhibit a nested structure, with hard-to-infect bacteria infected by generalist viruses and easy-to-infect bacteria attacked by both generalist and specialist viruses.

"Although it is well known that individual viruses do not infect all bacteria, this study provides an understanding of possibly universal patterns or principles governing the set of viruses able to infect a given bacteria and the set of bacteria that a given virus can infect," said Joshua Weitz, an assistant professor in the School of Biology at the Georgia Institute of Technology.

Discovering this general pattern of nested bacteria-virus infection could improve predictions of microbial population dynamics and community assembly, which affect human health and global
ecosystem function. Knowing the patterns of which bacteria are susceptible to which viruses could also provide insights into strategies for viral-based antimicrobial therapies.

The results of the meta-analysis were published June 27, 2011 in the early edition of the journal *Proceedings of the National Academy of Sciences*. The work was sponsored by the James S. McDonnell Foundation, the Defense Advanced Projects Research Agency and the Burroughs Wellcome Fund.

Georgia Tech physics graduate student Cesar Flores, Michigan State University zoology graduate student Justin Meyer, Georgia Tech biology undergraduate student Lauren Farr, and postdoctoral researcher Sergi Valverde from the University Pompeu Fabra in Barcelona, Spain also contributed to this study.

The research team compiled 38 laboratory studies of interactions between bacteria and phages, the viruses that infect them. The studies represented approximately 12,000 distinct experimental infection assays across a broad spectrum of diversity, habitat and mode of selection. The studies covered a 20-year period and included hundreds of different host and phage strains.

bacterial types, columns containing phage strains, and cells with zeros or ones to indicate whether a given pair yielded an infection. Then they applied a rigorous network theory approach to examine whether the interaction networks exhibited a nonrandom structure, conformed to a characteristic shape, or behaved idiosyncratically—making them hard to predict.

Of the 38 studies, the researchers found 27 that showed significant nestedness. Nestedness was measured by the extent to which phages that infected the most hosts tended to infect bacteria that were infected by the fewest phages. The researchers used statistical tests to rule out forms of bias. However, because the majority of the data consisted of closely related species, the researchers anticipate that more complex patterns of infection may form with species with more genetic diversity.

"Considering the large range of taxa, habitats and sampling techniques used to construct the matrices, the repeated sampling of a nested pattern of host-phage infections is salient, but the process driving the nestedness is not obvious. The pattern suggests a common mechanism or convergent set of mechanisms underlying microbial co-evolution and community assembly,” explained Weitz.

The researchers examined three hypotheses to explain the nestedness pattern based on biochemical, ecological and evolutionary principles, but found that additional experiments will be required to determine why this pattern occurs so often.

This meta-analysis demonstrated the utility of network methods as a means for discovering novel interaction patterns. According to the researchers, viewing host-phage interaction networks through this type of unifying lens more often will likely unveil other hidden commonalities of microbial and viral communities that transcend species identity.

**Living Antibiotic Effective Against Salmonella, Study Suggests**

*ScienceDaily* (June 27, 2011) — Scientists have tested a predatory bacterium—*Bdellovibrio*—against *Salmonella* in the guts of live chickens. They found that it significantly reduced the numbers of *Salmonella* bacteria and, importantly, showed that *Bdellovibrio* are safe when ingested.

The research was funded by the Biotechnology and Biological Sciences Research Council, carried out by Professor Liz Sackett’s team at The University of Nottingham, with Dr Robert Atterbury and Professor Paul Barrow at the University of Nottingham Vet School; and published in the journal *Applied and Environmental Microbiology*.

Researcher Dr Laura Hobley said "*Bdellovibrio* has the potential to be used as a living antibiotic against some major human and animal pathogens, such as E. coli and other so-called Gram-negative bacteria."

Previous studies have shown that *Bdellovibrio* is very effective at invading and killing other bacterial cells in a test tube. It looks likely to provide an alternative to antibiotic medicines at a time when bacterial resistance is a significant problem to human and animal health.
Dr Hobley continued "We think that Bdellovibrio could be particularly useful as a topical treatment for wounds or foot rots but we wanted to know what might happen if it is ingested—either deliberately as a treatment, or by accident."

Salmonella likes to grow in the guts of poultry and other animals and can cause food poisoning in humans. In lab experiments Bdellovibrio can kill Salmonella by breaking into the cells and destroying them from the inside. This research shows that it also works inside the gut of a bird and is safe, not harming them or changing their behaviour.

Bdellovibrio reduced the numbers of Salmonella by 90% and the birds remained healthy, grew well, and were generally in good condition.

"We concluded that Bdellovibrio aren’t long lived in the bird guts—they had a strong effect for about 48 hours, which dropped off after this time. If we were to use this method to completely rid the birds of Salmonella, we might have to test a program of multiple dosing. But the point of this study was really to ensure that Bdellovibrio is safe and effective when ingested," said Dr Hobley.

Professor Douglas Kell, Chief Executive, BBSRC said "Once we have understood the fundamental nature of an extraordinary organism such as Bdellovibrio, it makes sense that we should look at potential uses for it. The impact of bacterial infections on human and animal health is significant and since antibiotic resistance is a major issue, alternatives from nature may become increasingly important."

Journal Reference:

New study finds rise in global malaria R&D funds leads to largest ever pipeline of new products

But report finds derailment possible if donors do not maintain funding

LONDON (28 JUNE 2011)—A new analysis of progress in the global fight against malaria finds a four-fold increase in annual funding for malaria research and development (R&D) in just 16 years—increasing from US$121 million in 1993 to US$612 million in 2009, with a particularly rapid increase since 2004. The funding has generated the strongest pipeline of malaria control and prevention products in history.

The report warns, however, that even a small decline in annual funding could jeopardize this pipeline, derail development of needed products, and paradoxically also increase development costs later. The report’s authors assessed progress to date against the R&D funding goals in the 2008 Global Malaria Action Plan and what will be needed in the coming decade to deliver the suite of products needed to manage, eliminate and—ultimately—eradicate malaria from the world. The answer is sustained, relatively modest increases that will boost total annual funding to US$690 million by 2015, followed by a larger jump in 2016 to US$785 million.

The report, "Staying the Course? Malaria Research and Development in a Time of Economic Uncertainty," was authored by Policy Cures, an independent nonprofit research group, with input and funding from several product development partnerships working on new malaria interventions. It was published by the global health nonprofit PATH and the Roll Back Malaria Partnership, which is the global framework for coordinated action against malaria.

The malaria product pipeline today includes more than four dozen drug projects, an almost 17-fold increase since 2001, a vaccine candidate in late-stage testing and dozens of others in various stages of development, an unprecedented number of new insecticide active ingredients for mosquito control, and a new generation of simple, rapid, and highly sensitive diagnostic tests.

"In the coming years, the fruits of this unprecedented investment in malaria research and development could save hundreds of thousands, if not millions, of lives," said Professor Awa Marie Coll-Seck, Executive Director of the Roll Back Malaria Partnership and a former Minister of Health for Senegal. "This robust product pipeline gives us hope that eradication of malaria is possible. Backpedaling on R&D funding now, when so many innovations are in the pipeline, would be a foolish waste of a historic opportunity."

The report offers six key recommendations, among them a plea for better coordination among a greater number of funders from the public, philanthropic, and private sectors, and greater flexibility of public sector funding in particular. Without sufficient coordination, the authors warn, future product development costs will be even higher than currently projected.

The increasing availability of new approaches to detecting, treating, and preventing the disease—including long-lasting insecticide treated bednets and the first high-quality malaria medicine developed...
specifically for children—have contributed to a significant decrease in malaria deaths worldwide in only
ten years: According to the World Health Organization, 11 African countries have achieved a 50 percent
reduction in either confirmed malaria cases or malaria-related hospital admissions and deaths in recent
years. Nonetheless, malaria still kills about 780,000 people annually, mostly young children in Africa.

The report highlights the importance of maintaining the momentum of the last two decades and
keeping the world on a path toward further reductions in malaria deaths. On the R&D front, annual
investments would need to increase from the 2009 level of US$612 million to US$690 million. There
would then need to be a 15 percent increase around 2016 to US$785 million to pay for the high—cost of
advancing products through the final stages of clinical testing. The analysis finds that making adequate
investments now should allow overall malaria R&D funding to decline after that by about 5 percent per
year until 2020, the last year covered by the report, as the fruits of earlier investments become available.

"This report tells us that the malaria control community is in a position to achieve unprecedented
reductions in malaria deaths if investors stay the course," said Dr. Mary Moran, Director of Policy Cures.

"I'm delighted that the donor community has stepped up to the plate and recognized the important
role of research and development in combating malaria," said Jeremy Lefroy, MP, Chair of the United
Kingdom's All-Party Parliamentary Group on Malaria and Neglected Tropical Diseases. "We are saving
lives today due to tools developed a decade ago, and we will save lives tomorrow with the tools being
developed today."

**Targeted, strategic investments needed**
Sustained and gradually increasing investments in R&D over the next few years will advance the
development of new diagnostic tests, new mosquito—killing compounds that can be used in bednets and
indoor spraying, and new and next—generation drugs and vaccines, according to the report.

Funding for R&D related to diagnostic tests should quadruple immediately—to make up for years of
underfunding—from US$11.9 million in 2009 to US$50 million per year for about four years—to develop
rapid diagnostic tests (RDTs) and other field detection tools. Funds are needed to ensure the quality of
existing RDTs, develop tests for multiple forms of malaria, ensure safe and targeted use of new anti-
malarial drugs, and create more sensitive screening measures that can quickly detect a potential
resurgence of the disease in areas where the burden of malaria is dropping.

Current approaches to controlling the mosquitoes that carry the malaria parasite (vector control) rely
predominantly on a single class of insecticides called pyrethroids. The emergence and spread of resistance
to these insecticides amongst mosquitoes puts this strategy at great risk. Annual funding needs to nearly
triple over the next five or six years to a peak of around US$90 million in 2016 to add new compounds to
the vector—control arsenal, according to the report.

The analysis warns against any further declines in funding for drug development, noting the need for
stable funding to ensure that drug development doesn't slow. New products are needed to address
Plasmodium vivax malaria and to deal with the emerging problem of resistance to artemisinin—a key
compound in the most effective treatment drugs used today.

Funding levels for vaccines are viewed as adequate for the moment, but efforts to develop a second
generation of more effective vaccines, a vaccine against P. vivax malaria, and transmission—blocking
vaccines will require a boost in investments from 2016 onward.

"The global malaria community does not need a blank check, rather it needs targeted and strategic
investments that continue to take us toward the goal of eradicating malaria," added Dr. Moran. "Funding
is needed to enable the development of new medicines to counter resistance, block transmission of
malaria, and address the P. vivax form of malaria."

**Donor diversification and coordination needed**
The report notes that malaria R&D funding is highly concentrated and calls for additional donors and
investors to enter the field. Funding from fewer than a dozen governments accounted for nearly half of
total malaria R&D funding in 2009 and industry for nearly one—fifth. The Bill & Melinda Gates
Foundation was responsible for one—quarter of total funding that year and was also the largest single
donor (US$184 million), followed closely by the US government (US$165 million). The United Kingdom,
European Commission, and the Wellcome Trust each invested more than $25 million in 2009.

A further challenge is posed by the need for coordination among the private, philanthropic, and
government sectors. The estimates of resource needs contained in the report are based on the assumption
that investors will work together to develop a balanced portfolio and determine when certain areas require
increased funding and when reductions are justified elsewhere. The report recommends a strategic ebb
and flow over the next several years, during which spending increases in certain areas are made possible
by the ability to reduce spending elsewhere as projects move to completion. In the absence of such
coordination among funders, achieving product development goals will be more costly and many may not be reached at all.

"We have come together as a global community to put an end to this vicious disease once and for all. But we must remember that if we are to defeat malaria, we must fully deploy the tools we have today and continue to invest strategically in the development of superior tools for tomorrow," said Professor Coll-Seck.

**Zimbabwe MP accused of infecting journo with HIV**

*June 24 2011 at 09:00am*

**Peta Thornycroft**

A ZimbabweAN MP was arrested this week, accused of infecting a state journalist with HIV.

Movement for Democratic Change MP Siyabonga Malandu Ncube turned himself in on Tuesday at the Bulawayo Central police station accompanied by his lawyer, Mlweli Ndlovu.

Media in Zimbabwe had reported that a journalist working for the pro-Zanu-PF Chronicle newspaper in Bulawayo told police that she had been infected with HIV by Ncube, a member of the MDC faction led by Welshman Ncube.

Under Zimbabwean law, prosecutors would have to prove that the MP knew he had the disease before having sex with her, if indeed he does have it.

If convicted, Ncube could face 20 years in jail.

Several lawyers in Zimbabwe said they could not recall any similar previous criminal case arising from an allegedly infected person charging another with transmitting the virus.

Zimbabwe's private health sector first recorded HIV/Aids in 1986 and, at the time, the Zanu-PF government led by President Robert Mugabe blamed the disease on a white, Western conspiracy.

Many prominent Zimbabweans, including politicians, well-known musicians and famous sporting personalities died of complications from the virus in the early years. In those days the government harassed HIV-Aids activists who tried to campaign for action from the health ministry. The private medical doctor who first noticed the virus in blood samples in Harare had to flee the country.

The Joint UN Programme on HIV/Aids said this week that more than 168 000 Zimbabweans aged between 15 and 24 are living with the virus. – Independent Foreign Service

**CDC Reports Extended HIV/AIDS Surveillance Data**

<table>
<thead>
<tr>
<th>SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 1.1 million people in the U.S. were living with HIV at the end of 2008, with 20% not knowing their status. But the burden is unevenly distributed, with 50% of cases among gay men and higher incidence among African-Americans.</td>
</tr>
</tbody>
</table>

**By Liz Highleyman**

The first report of what would come to be known as AIDS was published in the Center for Disease Control and Prevention's *Morbidity and Mortality Weekly Report on June 5, 1981.*


CDC investigators analyzed data collected through the end of 2010 by the National HIV Surveillance System. AIDS cases have been reported by name since the early years of the epidemic. Due to concerns about confidentiality and discrimination, some states reported HIV infections anonymously or confidentially for many years, but now all states report new HIV diagnoses by name.

During the first 14 years after the epidemic became apparent, "sharp increases" were reported in the number of new AIDS diagnoses among people age 13 and older, rising from 318 in 1981 to a high of 75,457 in 1992. Deaths among people with AIDS rose from 451 in 1981 to 50,628 in 1995.

After the advent of highly active antiretroviral therapy (HAART) in the mid-1990s, AIDS diagnoses and deaths "declined substantially" from 1995 through 1998. AIDS diagnoses fell 45% between 1993 and 1998, while AIDS deaths decreased by more than 60% from 1995 to 1998. Rates then remained roughly stable from 1999 through 2008, with an average of approximately 38,000 new AIDS diagnoses and 17,500 deaths per year.

Yet despite the decline in AIDS cases and deaths over the course of the epidemic, an estimated 1,178,350 people were living with HIV at the end of 2008. Of these, it is estimated that 20%—or about 236,400 individuals—remain undiagnosed and potentially unaware of their status.
This report emphasizes the disparity of the HIV/AIDS burden in the U.S.: while the HIV prevalence was 238 per 100,000 people among whites and 593 per 100,000 among Hispanics/Latinos, it rose to 1819 per 100,000 among blacks/African-Americans. Nearly 50% of people living with HIV were men who have sex with men.

"These findings underscore the importance of the National HIV/AIDS Strategy focus on reducing HIV risk behaviors, increasing opportunities for routine testing, and enhancing use of care," the report authors concluded.  

6/28/11

**Reference**

### HIV Coreceptor Tropism Affects Treatment Outcomes

**SUMMARY**
HIV strains that use the CXCR4 co-receptor are associated with higher risk of virological failure on antiretroviral therapy than those using CCR5, according to a recent Spanish study.

By Liz Highleyman

HIV uses 1 of 2 co-receptors—CCR5 or CXCR4—along with the CD4 receptor to enter cells. Prior research has shown that virus using CXCR4 (known as CXCR4-tropic) is associated with more advanced disease progression among untreated people, but the effect of tropism on response to antiretroviral therapy (ART) is not well understood.

![Tropism is the co-receptor HIV uses to get into your cells](image)

As described in the *July 2011 Journal of Infectious Diseases*, Eduardo Seclén from Hospital Carlos III in Madrid and colleagues compared viral suppression according to co-receptor tropism in HIV positive people starting ART for the first time.

The analysis included 569 participants in the ArTEN trial, which compared first-line boosted atazanavir (Reyataz) versus nevirapine (Viramune), both in combination with tenofovir/emtricitabine (the drugs in Truvada). A total of 428 patients completed 48 weeks of therapy, 146 in the atazanavir arm and 282 in the nevirapine group.

The researchers retrospectively tested baseline plasma samples collected prior to treatment initiation, using the "geno2pheno FPR=5.75%" genotypic tool to determine tropism.

**Results**
- 96 people (22%) had HIV-1 non-B subtypes, which are prevalent outside Europe and the U.S.
- 55 patients (14%) had CXCR4-tropic virus prior to starting treatment.
- People with CXCR4-tropic HIV had higher baseline plasma viral load than those with CCR5-tropic virus (5.4 vs 5.2 log copies/mL, respectively, a difference that just reached statistical significance).
- People with CXCR4-tropic HIV also had significantly lower CD4 cell counts at baseline (145 vs 188 cells/?L, respectively).
- At week 48 of treatment, the virological response rate was significantly lower in people with CXCR4-tropic compared with CCR5-tropic virus (77% vs 92%, respectively).
- In a multivariate analysis, HIV tropism was an independent predictor of virological
response overall at week 24.

-Tropism was also predictor of virological response at week 48 in people with clade B virus subtypes.

-Baseline co-receptor tropism was not, however, significantly associated with immunological response, or CD4 cell count recovery.

Based on these findings, the study authors concluded, "HIV-1 tropism is an independent predictor of virologic response to first-line antiretroviral therapy. In contrast, it does not seem to influence CD4 cell count recovery."

"[T]his observation may have important clinical implications for the monitoring of antiretroviral therapy and interpretation of comparative trials," they suggested.

**Reference**

**Drug-Resistant Scarlet Fever Outbreak Has Infected Nearly 550 People In Hong Kong**
An outbreak of drug-resistant and particularly virulent strains of scarlet fever has infected nearly 550 people and killed two children in Hong Kong so far this year, about double the Chinese city's average annual total, the Associated Press reports.

"Local media also are reporting some 9,000 cases detected in mainland China, also about twice the normal rate there, but it's unclear if it's becoming a regional problem because many countries do not track the common childhood illness, according to the World Health Organization," the news service notes (Mason, 6/27).

According to ScienceInsider, "University of Hong Kong microbiologist Kwok-Yung Yuen says an analysis of a draft sequence of the genome suggests that the strain acquired greater virulence and drug resistance by picking up one or more genes from bacteria normally found in the human oral and urogenital tracts. He believes that the overuse of antibiotics is driving the emergence of drug resistance in these bacteria" (Normile, 6/27).

**South African Circumcision Program Moving Forward With Support From Zulu King**
NPR's Morning Edition on Monday examined how a circumcision program in South Africa's Kwa-Zulu Natal, run by the Society for Family Health at the Boom Street Community Health Clinic, "is gaining momentum" because of a decree issued last year by King Goodwill Zwelithini kaBhekuzulu about the importance of circumcision in helping to reduce the risk of HIV infection.

"Four years ago, the World Health Organization determined that medical circumcision reduces a man's likelihood of contracting HIV by 60 percent. Since then, large-scale circumcision programs have been growing slowly in sub-Saharan Africa – two-thirds of the world's HIV-positive people live there," according to the show. Cynthia Nhlapo, a project manager for Society for Family Health, "says getting the support of cultural leaders is proving equally important in other parts of the continent," NPR notes (Kelto, 6/27).
HIV disrupts blood-brain barrier
Cellular study suggests way virus may cause neurological deficits

Washington, DC — HIV weakens the blood-brain barrier — a network of blood vessels that keeps potentially harmful chemicals and toxins out of the brain — by overtaking a small group of supporting brain cells, according to a new study in the June 29 issue of The Journal of Neuroscience. The findings may help explain why some people living with HIV experience neurological complications, despite the benefits of modern drug regimens that keep them living longer.

Standard antiretroviral treatments successfully suppress the replication of HIV and slow the progression of the disease. Yet recent studies show 40 to 60 percent of patients on such therapy continue to experience mild to moderate neurological deficits — including memory loss and learning challenges.

In the new study, Eliseo Eugenin, PhD, of Albert Einstein College of Medicine, found that HIV infection in a small number of supporting brain cells called astrocytes breaks down the blood-brain barrier, despite low to undetectable viral production. Under normal conditions astrocytes help bolster the blood vessels comprising the barrier.

To test if HIV interfered with this support system, Eugenin and his colleagues built a model of the blood-brain barrier using human cells in the laboratory. In a previous study, the researchers found HIV infects around 5 percent of astrocytes. In the current study, the researchers found the presence of HIV in a similar percentage of astrocytes led to the death of nearby uninfected cells and made the barrier more permeable.

As the neighboring cells died, however, HIV-infected astrocytes survived. Astrocytes exchange chemical signals through specialized molecules called gap junctions. When they were blocked in the model, it prevented the changes to the blood-brain barrier and nearby cells, suggesting the infected astrocytes relay toxic signals to neighboring cells through the gap junctions.

"Our results suggest HIV infection of astrocytes may be important in the onset of cognitive impairment in people living with the disease," Eugenin said. "New therapies are needed that not only target the virus, but also to stop the virus from spreading damage to other uninfected brain cells."

Eugenin's group also analyzed the brain tissue of macaque monkeys infected with the simian form of HIV. Similar to what they saw in the human blood-brain barrier model, the researchers found uninfected cells in contact with HIV-infected astrocytes died, while infected astrocytes remained alive as the disease progressed.

"Researchers have been stymied to explain why HIV-associated neurological complications persist, despite potent combination antiviral therapies that have dramatically improved health and survival," said Igor Grant, an expert who studies HIV-associated neurocognitive impairment at the University of California, San Diego. "This study provides a possible explanation indicating that minute numbers of infected astrocytes can trigger a cascade of signals that could open the brain to various toxic influences."

The findings open up the possibility of developing new therapeutic approaches that block or modify the transmission of signals from the HIV-infected astrocytes, added Grant, who was not affiliated with the study.

Tiny Cell Patterns Reveal the Progression of Development and Disease

Scientists have long known that, to form tissue structures and organs, stem cells migrate and differentiate in response to the other cells, matrix, and signals in their environment. But not much is known about these developmental processes nor how to distinguish between normal and pathological behaviors. A team of researchers at Columbia Engineering School has developed a new technique to evaluate human stem cells using cell micropatterning—a simple but powerful in vitro tool that will enable scientists to study the initiation of left-right asymmetry during tissue formation, to diagnose disease, and to study factors that could lead to certain birth defects.
The study, led by Gordana Vunjak-Novakovic, Professor of Biomedical Engineering at Columbia University’s Fu Foundation School of Engineering and Applied Science, will be published in the online Early Edition of the Proceedings of the National Academy of Sciences the week of June 27, 2011.

Vunjak-Novakovic and her team have long been interested in developing technologies to investigate developmental processes of cells. In 2008 Leo Wan, a postdoctoral scientist from her lab, printed human cells onto microscopically small patterns to investigate the shape-force control of cell function; this study helped them learn more about the connections between mechanical tension generated inside the cell and the decisions that cells make.

As they looked into the numerous videos they made to document and analyze the shapes of cells on micropatterns over time in culture, they noticed that the cell populations on micropatterns had a life of their own. These small communities of cells would undergo directional motion and form chiral alignment after a day or two of culture, with all cells moving in the same direction within the boundaries. Vunjak-Novakovic said “It was really the consistency of this motion pattern—the same cell type would always take the same direction with extremely high statistical power—that was intriguing and made us do hundreds of experiments.”

They found that the direction of motion depended on cell type—that normal cells and cancer cells of the same type show opposite direction of motion, and that the mechanism by which the directional motion is established involves the actin stress fibers inside the cell. "What’s really interesting about this work is that it shows that cells can establish a consistently biased asymmetry without the help of large-scale embryonic structures," said Vunjak-Novakovic. "Our study clearly demonstrated that mammalian cells could establish and organize consistent asymmetry without cilia or node, a finding of great interest to those of us in cell and both developmental biology and stem cell bioengineering. The use of cell patterning techniques for studying cell asymmetry, or chirality, is entirely novel, and it enables obtaining a lot of biological and medical information by analyzing cell motion on tiny patterns."

Vunjak-Novakovic and her team plan to extend their research in several directions, by working:

- with developmental biologists to get deeper insights into the establishment of left-right asymmetry
- with cancer biologists to evaluate the capacity of this technology to diagnose disease
- in cardiac tissue engineering to pattern signal propagation in cell populations.

"We are very excited about developing this technology that gives us insights into the small world of the cells, in a way that is predictive of their behavior in the whole organism," added Vunjak-Novakovic. "But what’s also really striking are the images of cells on micropatterns—these are the most beautiful hybrids of art and science I have ever seen!"

Columbia has filed a patent application covering potential commercial applications of the discovery and, through its technology transfer office, Columbia Technology Ventures, is seeking partners to develop these applications.

**Study Examines Lipodystrophy in Treatment-Naive HIV-Infected People**

“A5224s was a substudy of A5202, a trial of human immunodeficiency virus type 1 (HIV-1)-infected, treatment-naive subjects randomized to blinded abacavir-lamivudine (ABC-3TC) or tenofovir DF-emtricitabine (TDF-FTC) with open-label efavirenz (EFV) or atazanavir-ritonavir (ATV-r). The primary endpoint was the presence of lipoatrophy (≥10% loss of limb fat) at week 96 by intent-to-treat (ITT) analysis. Secondary endpoints included changes in limb and visceral fat. ... At week 96, estimated prevalence of lipoatrophy (upper 95% confidence interval [CI]) was 18% (25%) for ABC-3TC and 15% (22%) for TDF-FTC (P = .70); this was not significantly less than the hypothesized 15% for both (P ≥ .55 for both). The secondary as-treated (AT) analysis showed similar results. At week 96, the estimated mean percentage change from baseline in VAT [visceral adipose tissue] was higher for the ATV-r group than for the EFV group (26.6% vs 12.4%; P = .090 in ITT analysis and 30.0% vs 14.5%; P = .10 in AT analysis); however, the percentage change in VAT:TAT [total adipose tissue] was similar by ITT and AT analysis (P ≥ .60 for both). Results were similar for absolute changes in VAT and VAT:TAT. ... ABC-3TC- and TDF-FTC-based regimens increased limb and visceral fat at week 96, with a similar prevalence of lipoatrophy.

Compared to the EFV group, subjects assigned to ATV-r had a trend towards higher mean percentage increase in VAT.”
**Genome Digest**  
Meet the species whose DNA has recently been sequenced.  
By Megan Scudellari | June 28, 2011

---

**Deadly *E. coli***  
Species: Rare hemorrhage-causing strain of *E. coli*, O104:H4  
Genome size: 5.2 million base pairs  
Interesting fact: This strain of *E. coli*, which caused the recent deadly outbreak in Germany, is a new serotype not involved in any previous *E. coli* outbreaks. It has acquired several antibiotic resistance genes and specific genetic sequences involved in aggregation ability and virulence.  

---

**Tasmanian devil**  
Species: Tasmanian devil, *Sarcophilus harrisii*  
Genome size: 3.2 billion base pairs  
Interesting fact: Tasmaniandevils, which live in the wild only on the island of Tasmania in Australia, have low genetic diversity within their population. This low diversity, however, preceded the Devil Facial Tumor Disease outbreak that has spread rapidly since it was first observed 15 years ago and now threatens the species with extinction.  

---

**Yeast colonies**  
Species:  
Genome size:  
Interesting fact:  

---

*E. coli* Wikimedia Commons, Mattosaurus  
*Tasmanian devil* Wikimedia Commons, KeresH, Endangered devil  
*Yeast colonies* Wikimedia Commons, M. Lilly, A yeast trio
Species: Three yeasts—Saccharomycyes bayanus, S. kudriavzevii and S. mikatae
Genome size: 11 million base pairs each
Interesting fact: The five most commonly studied Saccharomycyes yeast species share 5,261 protein-coding orthologs, making them a prime model organism to study the tempo and mechanisms of yeast gene evolution.


Septoria leaf spot disease, caused by M. graminicola
omafra.gov.on.ca, Stealthy fungus
Species: Wheat plant fungus, Mycosphaerella graminicola
Genome size: 39.7 million base pairs
Interesting fact: M. graminicola stealthily infects wheat plants, slowly killing large swatches of leaf cells and leaving behind large, brown spots, all under the radar of the plants’ immune defenses.


If you’re HIV positive, safe sex isn’t just about condoms
With advances in HIV drug therapy, the option of ‘treatment as prevention’ is a real possibility – though it’s not right for everyone

As the HIV epidemic has evolved over three decades, the “just use a condom” message has remained the cornerstone of prevention. But stubbornly high levels of new HIV infections in the UK show we’ve struggled to always translate this simple message into real life.

Most monogamous couples will decide to stop using condoms at some point, but what if one half of the couple is HIV positive? Until recently, it has been assumed there is no safe option other than condoms for life. But new research into the preventive benefits of HIV treatment (antiretroviral therapy) is set to change this, and could potentially revolutionise the way we think about HIV prevention and safer sex advice.

HIV treatment works by reducing the level of HIV in the body (the viral load) to such an extent that a person’s infectiousness is almost zero (clinically referred to as "undetectable"). A big effect of this – in addition to keeping the person healthy – is that the risk of transmitting HIV to another person is dramatically reduced.

Last month we heard the conclusive results of the first global study into HIV "treatment as prevention" – a 96% reduction in transmission risk when the HIV-positive partner received treatment and responded effectively. When put into practice, this means people living with HIV who are on treatment can, like everyone else, consider giving up condoms when their relationship is committed and monogamous.

But before we get carried away, it is not time to throw away our condoms altogether. They are still the best protection against other sexually transmitted infections, so any couple wanting to rely on treatment rather than condoms to prevent HIV transmission must be confident they are both STI free and monogamous. Other STIs in the body can make HIV levels spike upwards, which seriously compromises the effects of treatment as prevention and significantly increases risk of transmission.

The notion of ditching the condoms when one half of a couple is HIV positive also throws up other practical challenges in a relationship. A condom is visible, its use is mutual, and if it fails this is usually evident. By contrast, the level of HIV in a person’s body is invisible has been measured at some point in the past (up to four months, usually) and that information has been given to only one of the sexual
partners. Very different issues of trust are involved and to rely on this method means relying in both partners’ faithfulness, or on their courage to come clean if they have sex with anyone else.

Last year, at the National AIDS Trust's seminar on HIV treatment as prevention, we heard stories from couples who were in this situation and trying to navigate their safer sex options in a way that suited them both.

Some couples were happy to rely on treatment as prevention, but for others it was a lot more complex. In some instances the negative partner was happy to rely on treatment but the positive partner was too worried about the risk (however small) of passing HIV on to the one they love. For others it was the opposite, with the HIV-negative partner anxious about risk of infection despite the HIV positive partner's desire to no longer use condoms.

What is clear from people’s experiences is that HIV treatment as prevention is not some "quick fix". There remain complex issues of love and trust to negotiate, as well as unlearning the internalised stigma and fear around HIV, which people have lived with for years.

This is not to say that treatment as prevention will only have benefits for those who are in long-term, monogamous relationships. Being on treatment will still reduce infectiousness even if you have more than one partner, but you could not rely on it to prevent transmission in the same way that an exclusive couple might.

Additionally, one of the biggest barriers to HIV treatment as prevention is the fact that at least a quarter of people living with HIV in the UK have not been diagnosed – and therefore are not on treatment.

So with the exception of those in completely monogamous (and honest) relationships, the message is still "use condoms". But the fact remains that people will always make their own decisions based on the level of risk they're prepared to live with.

What we need is clear guidance on how individuals should be advised on using "treatment as prevention" as a safer sex option and this should be combined with renewed efforts to encourage condom use. Crucially, this will require appropriate, accessible support for those people who find using condoms or negotiating their use difficult – a much larger number of people than is usually acknowledged.

Thirty years into the epidemic, an HIV prevention revolution could be upon us. But the basic need for well-resourced, appropriate HIV and sexual health support services remains the same. And while we aren't ready to lay condoms to rest just yet, the "just use a condom" message can now be combined with a new source of encouragement for those diagnosed with HIV that if they commence and stick to their treatment, when the timing is right in their lives there will be another option available to them for safer sex.

**New rapid test tells difference between bacterial and viral infections**

Scientists are reporting development and successful testing of a rapid and accurate test to tell the difference between bacterial and viral infections. Those common affictions often have similar symptoms but vastly different treatments — antibiotics work for bacterial infections but not for viruses. The report appears in ACS' journal *Analytical Chemistry*.

Robert Marks, Daria Prilutsky, and colleagues cite the importance of determining the source of an infection in order to quickly start the right treatment. If left untreated until results of a throat culture, for instance, are in, bacterial infections can get worse. But needlessly giving antibiotics to patients with a viral infection could contribute to the growing problem of antibiotic-resistant bacteria. Since current diagnostic methods to sort out the two kinds of infection are time-consuming and may not be completely accurate, the researchers sought to develop a new test that would enable doctors to rapidly make the right diagnosis.

They found that the immune systems of patients with bacterial infections behaved differently than the immune systems of patients with viral infections, and developed a test based on those differences. "The method is time-saving, easy to perform and can be commercially available, thus, having predictive diagnostic value and could be implemented in various medical institutions as an adjunct to clinical decision making," say the researchers.
Deadly Bovine Disease Ousted
United Nation officials declare rinderpest the first animal disease to be fully eradicated.
By Cristina Luiggi | June 30, 2011
This past Tuesday (June 28), zoologists, veterinarians, and public health officials from around the world celebrated the second time in history that a disease has been wiped out from the face of the Earth. Rinderpest, a deadly viral disease that has plagued cattle and other cloven-hoofed animals since antiquity, now joins the ranks of smallpox, which was officially eradicated in 1979.

With the last documented case of rinderpest appearing nearly a decade ago in a wild buffalo in Kenya, the official declaration this week brings to a triumphant end an eradication campaign begun in 1945 with the creation of the Food and Agriculture Organization (FAO), the New York Times reports. It was during the FAO’s annual conference in Rome this week that the announcement was made. In his keynote speech, Nobel Laureate Peter C. Doherty expressed his optimism for the eradication of other common scourges, in particular, rinderpest’s closest genetic kin, the measles virus. “As a one-host pathogen of humans, it should also be possible to eliminate measles from the planet,” he said, adding that standing in the way are “the anti-vaccination movements in the advanced countries.”

The Anal Dialogues
by Trenton Straube
Rectal microbicides-topical gels, ointments and lubricants laced with drugs to block HIV—could help stop the spread of the virus. So why is it taking so long to develop them? For one thing, an unwillingness to talk about sex—especially anal sex. Given the potential of microbicides’ protective power, it’s time we loosen our tongues in order to start saving lives.

Click here to read a digital edition of this article.

In 1992, at a meeting of the Delaware Valley Women and AIDS Network, Anna Forbes first heard about experimental compounds called vaginal microbicides. It sparked an “A-ha!” moment for the longtime advocate for women’s health. Forbes saw right away how a microbicide—a gel, cream, lubricant or other topical agent that could be applied to the vagina to inhibit sexual transmission of HIV—would offer a much-needed method of protection to women, especially those who couldn’t get their partners to use condoms. And as an advocate for gay men’s health, Forbes also imagined how a rectal microbicide could offer a valuable prevention tool for anal sex for both men and women.

Women and gay men share the common concern of having their health needs respected and addressed, Forbes says. “A receptive partner is a receptive partner.” Effective microbicides would arm both male and female receptive partners with prevention tools that could save their lives.

But when she started talking about the notion of vaginal and rectal microbicides, Forbes found that even people on the cutting edge of women’s and gay men’s health advocacy were uncomfortable talking so specifically about sex, especially anal sex. It showed, according to Forbes, “this weird way that homophobia and sexism intersected.” And it pointed out “the well-kept secret that women have anal sex too.”

Undaunted by the reluctance of many of her peers, and inspired by the potential lifesaving power of microbicides, Forbes set out to convince the world to think similarly, working for a decade at the Global Campaign for Microbicides (she recently moved into consulting). The topic continued to be a hard sell. “The trouble with microbicides in comparison to pills and injections,” Forbes says, “is that they are applied ‘down there.’ You can’t talk about microbicides without talking about sex.”

Thanks in part to the unflagging efforts of Forbes and other visionary leaders (along with increasingly promising research data), the scientific and advocacy communities began rallying around vaginal microbicide research. Yet, very few people supported the notion of a rectal version. Forbes recalls the first time she saw the topic discussed in the print media, in a 1999 POZ article, “Beyond Condoms: Life After Latex,” in which journalist Michael Scarce presciently wrote: “The astonishing thing is, gay men raise no
voice to advocate for a form of HIV prevention that maximizes pleasure and safety.” In Colorado the next year, at the second LGBTI Health Summit (the initials embrace lesbian, gay, bisexual, trans and intersex people), Forbes gave a presentation on the need for rectal microbicides. Only about five people showed up. Clearly, interest in the subject was lacking—even among the most likely benefactors, gay men.

Then, another A-ha! moment: The messenger, Forbes realized, needed to double as the message. A straight woman couldn’t draw the same attention in the gay community as a gay man could. “We needed a gay male face, somebody with a track record in the [prevention] field,” she says. She envisioned an organized group led by a gay man working to promote rectal microbicides and in the process tackling the taboos associated with anal sex. In 2005, Forbes approached some likely advocates: Marc-André LeBlanc from the Canadian AIDS Society, Julie Davids from CHAMP (Community HIV/AIDS Mobilization Project) and Jim Pickett of the AIDS Foundation of Chicago. Although all were overextended, they agreed on the need to fight for a new form of prevention. Thus, the International Rectal Microbicide Advocates (IRMA) group was formed.

IRMA began modestly. “We had a listserv, and our goal was to get people to share information [about rectal microbicides],” says Pickett, IRMA’s chair (its out, gay face). He recalls begging people at the 2005 National HIV Prevention Conference to join the email group. Many resisted, arguing that rectal microbicides were too futuristic and that advocating for them would deflect resources from the priority concern at the moment: condoms. “People would almost groan when Jim would get on stage,” says Ian McGowan, MD, a leading microbicide researcher.

People’s reluctance to talk about butts (male and female), similarly muzzled scientists. As recently as a few years ago, many researchers scoffed at the very idea of a rectal microbicide, claiming human anatomy made it impossible. Unlike the vagina, which is essentially an enclosed container, the five-foot-long colon, Pickett says, is “like the Holland Tunnel.” There was the question of how far ejaculate could travel up the colon. Would the colon’s entire surface have to be protected? How much gel would be required—and how much could a body take? Scientists didn’t know. That is, until Craig Hendrix, MD, at Johns Hopkins University, conducted experiments involving some brave volunteers, faux microbicides and a hollow dildo that squirted an “ejaculate” traceable by MRI scans. (Read one volunteer’s hilarious account, “Putting My Ass on the Line,” on the IRMA blog at irma-rectalmicrobicides.blogspot.com.)

Experiments proved that the faux microbicide traveled well with the ejaculate and that to be effective, a microbicide would likely need to coat only the lowest 4 to 6 inches of the rectum and anal canal. Furthermore, researchers determined that humans could tolerate up to 30 milliliters (ml) of gel administered anally. However, the gel currently being studied requires only 4 ml, less than a teaspoon.

If these details make you squirm, you wouldn’t want Pickett’s job. The gregarious advocate constantly finds himself discussing anal sex and all its details—often in front of crowds. He does so as easily as most guys rattle off sports stats, employing honesty and humor that prove disarming. Equally important, he and IRMA back up their cause with something scientists recognize: cold, hard data.

Perhaps IRMA’s most visible work is three game-changing reports it published in conjunction with the biennial International Microbicides Conference. The first, Rectal Microbicides: Investments & Advocacy in 2006, compiled what research was being done and where—a tricky task. “A lot of researchers were concerned that if ‘anal’ or ‘rectal’ appeared in research proposals or reports, they wouldn’t get funded, so they’d scrub their papers so those words wouldn’t show up,” LeBlanc says. “Instead, they would refer to ‘topical use of products’ or other language.” And because of the dangers surrounding the subject—male-to-male sex is illegal in many countries, including 31 in sub-Saharan Africa—IRMA first had to gain researchers’ trust, proving they were not raging advocates who would alienate and antagonize. Their professionalism paid off, and the report was a hit. “It showed we were serious,” Pickett says, “and we got hundreds of new members.”

The next two reports, Less Silence, More Science in 2008 and From Promise to Product: Advancing Rectal Microbicide Research and Advocacy in 2010 (all the reports are available at rectalmicrobicides.org), addressed the reality that anal sex is more common than believed. The reports showed that among women anal sex remains an overlooked driver of the AIDS epidemic. (Because there are more women in the world than gay men, the overall number of women having receptive anal sex is higher than that of gay men.) By amassing data and research from across the globe, the reports argue effectively for developing rectal microbicides. A sampling from the 2010 report:

- It is estimated that unprotected anal intercourse transmits HIV 10 to 20 times more effectively than unprotected vaginal intercourse.
Gay men in the developing world are 19 times more likely to be positive compared with the general population.

In the United States, men who have sex with men (MSM) represent 53 percent of new HIV infections.

Depending on the study, 20 to 75 percent of women report having engaged in receptive anal sex.

Globally, up to seven times more women than men have receptive anal sex.

To confront homophobia and varying cultural and religious belief systems that complicate HIV prevention (for example, the tendency in Africa to focus solely on vaginal transmission), IRMA launched Project ARM (Africa for Rectal Microbicides) and IRMA-ALC (IRMA-America Latina y el Caribe).

Beyond advocacy and education about anal sex, IRMA helps shape a unified research agenda, coordinating studies among disparate, often unconnected researchers across the globe. ("We herd the cats," Pickett says.) It directs funds to needed areas (though it doesn't directly fund research). It digests complex research into talking points for mainstream media, translates reports into other languages, asks important questions and pursues answers.

Along the way, microbicide research has produced some immediate benefits. At a 2006 Cape Town AIDS conference, biomedical scientists with the Population Council presented data on the possible link between anal lubes and HIV risk. (The same team, lead by David Phillips, PhD, reported in 2000 that the spermicide nonoxynol-9 damaged linings of the rectum and vagina, thus increasing the risk for HIV and herpes—findings that resulted in N-9 being removed from most condoms.) The lube presentation, Pickett says, sparked his own revelatory moment. "We were like, The lubes we have are not tested for safety? We have to get research on this. Yes, we want rectal microbicides, but people are using lubes today!"

At the time, little was known about the popularity, use and safety of anal lubes—in the United States, lubes must be tested for vaginal irritation (in rabbits) but not for rectal use. To build a research database, IRMA conducted a survey. "We thought we'd get a few dozen answers," LeBlanc says, "but we had nearly 9,000 people respond from nearly 100 countries." The survey was translated into six languages. "As far as we know, it's the largest survey on anal sex in the world." (IRMA is following up with a survey on douches and enemas, which might affect HIV/STI risk and offer a mode of microbicide delivery.)

The survey results have been pivotal to researchers such as Charlene Dezzutti, PhD, a lab director at the Microbicide Trials Network, who is examining the lube qualities that might affect HIV risk and be of use in microbicides. (For more on lube safety and her findings, see "Slippery Slopes," on the following page.)

IRMA's hard work is paying off elsewhere too. The energetic listserv now includes more than 1,000 members. Pickett manages its daily conversation from his office at the AIDS Foundation of Chicago (AFC), where he is director of advocacy (IRMA is a project of AFC). "I think the overarching thing that has made us successful is that we bring together scientists and advocates," Pickett says. "There is no other forum like this. An advocate in Thailand can post an opinion, and a researcher in Peru or London or Pittsburgh can comment all in the same hour—people find it really useful."

Discussions range across prevention topics including study results, female condoms and Uganda's Anti-Homosexuality Bill. One round of emails discussed a British safe-sex musical video with the problematic lyrics, "Something to remember as a rule of thumb, one up the bum and there's no harm done...one up the bum and you won't be a mum." (Listserv members contacted the video's creators to argue against promoting anal intercourse as a risk-free way to avoid getting pregnant.)

"[IRMA is] doing all the right stuff," says Forbes, speaking like a proud momma. "They're recognizing the importance of geographic and constituency diversities, and they're promoting everybody having the discussion in whatever way makes sense in their own communities and encouraging people to share ownership—exactly what we need."

This year, IRMA had good news to trumpet. A Microbicide Trials Network study, MTN-006, found that people who used a rectal gel containing 1 percent tenofovir, an HIV drug, had high concentrations of the med in rectal tissue and lower concentrations in the blood stream, which could mean fewer side effects. The downside: A single dose before sex probably won't be effective.

Today, people no longer groan when Pickett takes the stage. "People came up to me after the CAPRISA results [a large South African microbicide study] and said, 'For all these years, I thought you were crazy, but you've proven me wrong. Now I understand why you had such a belief in this.'"

Perhaps IRMA's biggest success is simply getting people to confront the realities of anal sex and HIV. Because without honest dialogue about sex—whether at an international science conference, a sex
education class or an intimate chat between lovers—we are never going to stop this epidemic. And that's something we all need to speak up for.

**Slippery Slopes**

Can lubes increase the risk of HIV during anal sex?

A slew of recent studies suggest that using lubes for unprotected anal sex may increase the risk of HIV, and that some lubes may harm the rectum’s thin protective layer of cells (the epithelium). It’s premature to know which brands to avoid, says Marc-André LeBlanc, a lube advocate with the International Rectal Microbicide Advocates (IRMA). Most research has been done in laboratories, and it isn’t certain whether the findings translate to humans—or whether the products’ lubricating benefits outweigh their potential harm. But one fact is certain: “The best way to prevent acquiring HIV and STIs [sexually transmitted infections] during anal sex is still using male or female condoms,” LeBlanc says. “And we know that using lubes with condoms decreases the risk of the condom slipping or breaking—a big bonus.”

In the meantime, here’s a highlight of what scientists are investigating and how lube qualities might affect the success of microbicides:

- **Polyquaterniums**, a class of chemicals common in cosmetics, seem to increase HIV replication by almost four times in lab tests. A Population Council study found this ingredient in three of four HIV-enhancing Astroglide brand lubes: Astroglide Liquid, Astroglide Warming Liquid, Astroglide Glycerin & Paraben Free liquid and Astroglide Silken Secret.

- **Osmolality** refers to the concentration of salts, sugars and other substances (solutes) present in a lube. Hypo-osmolar lubes have a lower concentration of solutes than human cells and cause the cells to swell with water and burst. Hyperosmolar lubes cause cells to shrink and become brittle. Iso-osmolar lubes don’t affect cells because their concentrations are identical. Most water-based lubes are hyperosmolar and damaging.

- **pH balance** is acidic in the vagina and neutral in the rectum. Many lubes are designed for the vagina—does the difference in pH mean they affect the rectum differently?

- **Viscosity** is the slippery quality that gives lube its feel and texture. Glycerin, in water-based lubes, adds to viscosity. It also makes lubes hyperosmolar—and destructive to epithelium. When a rectal microbicide now in trials proved harmful to the epithelium, researchers solved the problem by lowering the glycerin content.

Charlene Dezzutti, PhD, with the Microbicide Trials Network and the University of Pittsburgh, looked at these qualities in six popular lubes. Some findings: Pré and Wet Platinum appear safest. Pré is the only water-based lube that is iso-osmolar and doesn’t damage the epithelium. KY Jelly wiped out entire colonies of good bacteria. Astroglide is the most hyperosmolar and most toxic to cells and tissue (Elbow Grease, ID Glide and KY Jelly have similar toxicity profiles). But Dezzutti also warns that more studies are needed before any official warning or suggestions can be issued.

**Starting to Gel**

Microbicides: Where they are now and where they are going

**VAGINAL GEL:** After two decades of disappointing results, a breakthrough arrived last summer with results of the CAPRISA 004 trial: Women using a gel containing 1 percent tenofovir (an HIV med found in Atripla, Viread and Truvada) had 39 percent fewer infections than those using a placebo. Women with 80 percent adherence to the two necessary applications per sex act (12 hours before, then immediately after) had even fewer infections. The gel also offered protection against herpes.

What’s Next: Studies are under-way to confirm CAPRISA 004 results and determine the most effective concentrations and doses, but the global economic crisis has depleted funding, slowing progress. On the bright side, the drug from the vaginal gel is showing up in rectal tissue, so one product might offer women protection in both areas.

**RECTAL GEL:** Microbicide Trials Network study MTN-006 looked at using the vaginal tenofovir gel rectally, with promising results announced in February. Although the vaginal formulation harmed the rectal lining and caused gastrointestinal distress, Charlene Dezzutti’s team developed a better version with less glycerin. And, says Ian McGowan, PhD, a co-principal study investigator, “We found that when you give the drug topically, you get very high concentrations in the rectal tissue—a hundred times the amount from a single Viread tablet.” A few caveats: Tenofovir works not by directly attacking and disarming HIV, but by accumulating in the tissue and CD4 cells HIV will attack, preventing HIV from
replicating once it invades the cell. Unfortunately, this accumulation demands repeated doses. “I think MTN-006 suggests,” McGowan says, “that if you just take one dose, orally or rectally, half an hour before exposure, I would doubt you’d be protected.”

What’s Next: A Phase I study (MTN-007) on the safety and acceptability of the rectal tenofovir gel; and Project Gel, investigating the use of rectal microbicides among African-American and Latino men who have sex with men (MSM). “It’s critical,” McGowan says, “because these are the people who are getting infected and need the product.”

FUTURE IDEAS AND EXPERIMENTS:
Other HIV meds or combos—or completely new compounds—may offer better protection than tenofovir as microbicides (hint: HIV drugs that are too toxic as pills may work as topical solutions).

Different modes of delivery: How about a slowly dissolving ring instead of a vaginal gel? Or combining a microbicide with a vaccine, to help prepare the immune system for an encounter with HIV? And vaginal probiotics—living microbicides—could be created by genetically altering bacterial cultures such as the common lactobacilli.

Research is showing that HIV might lower the electrical barrier of epithelial cells, enabling infection even without surface damage. Such new knowledge could produce future strategies and modes of protection.

AIDS Drug Supplies Dwindling in Swaziland
Associated Press, (06.28.2011) Phathizwe-Chief Zulu
Government hospitals have only a two-month supply of antiretroviral drugs in stock, Swaziland’s health minister recently told Parliament. According to state-controlled media reports, Benedict Xaba blamed budget problems caused by the global recession and a decline in customs revenue. News of the scant supplies concerned AIDS activists.

More than 60,000 Swazis depend on free ARVs distributed by state hospitals. It is estimated that more than a quarter of people ages 15-49 have HIV in Swaziland.

The country is seeking international loans to help ease the current budget crisis, so people with HIV/AIDS should not lose hope, Xaba said June 27.

Without ARVs, “we shall die,” said Patrick Mngometulu, a patient who has been on government-provided ARVs since 2003. Mngometulu said he especially worries about any disruption to programs that help prevent mother-to-child HIV infections. “We lose hope, and the situation will decrease productivity of the infected,” he added.

The number of people receiving ARVs in Swaziland has grown from just 15,000 in 2005 to 60,000 today, noted Thembi Nkambule, director of the Swaziland National Network of People Living with HIV and AIDS. Now, however, she fears “Swazis will die in numbers. Hope will be lost.”

Africa’s last absolute monarchy has seen a pro-democracy movement gain support since the government’s announcement in March that it plans to freeze civil-service salaries and sell state-owned enterprises. Activists there criticize King Mswati III of living in opulence amid poverty, and of harassing and jailing pro-democracy activists.

Chlamydia Trachomatis Infection Among Women Reporting Sexual Activity with Women Screened in Family Planning Clinics in the Pacific Northwest, 1997 to 2005
American Journal of Public Health Vol. 101; No. 7; P. 1284-1290, (07..2011) Devika Singh, MD, MPH; David N. Fine, PhD; Jeanne M. Marrazzo, MD, MPH
The authors sought to define positivity for Chlamydia trachomatis (CT) among women who have sex with women, “a population for which sparse data on this infection are available and for whom health disparities, including challenged access to comprehensive sexual and reproductive health services, have been reported.”

The team analyzed data from 9,358 visits to family planning clinics that included CT testing among women ages 15 to 24 whose reported sexual activities in the past year had been exclusively with women (WSW) or with men and women (WSMW) in the Region X Infertility Prevention Project. The characteristics of these patients were compared with women who reported sex with men only (WSM).

Among both WSW and WSMW, CT positivity was 7.1 percent, compared to 5.3 percent among WSM. Compared to WSM, WSW and WSMW more commonly reported behavioral risks. Risks for CT positivity were comparable across groups; these included younger age, nonwhite race, behavioral risks, and clinical signs.
“Higher [CT] positivity among women reporting same-sex sexual behavior supports investigation into potential explanatory factors, including sexual behaviors, biological susceptibility, routine [CT] screening disparities, sexual identity disclosure, and sexual network assessment,” the authors concluded.

'Exact Correlation' Between Peacekeeper Arrival And Cholera Outbreak In Haiti, Study Says
"Evidence 'strongly suggests' that a United Nations peacekeeping mission brought a cholera strain to Haiti that has killed thousands of people," according to a study conducted by a team of epidemiologists and physicians and published in the July issue of the CDC journal Emerging Infectious Diseases, the Associated Press reports. The Haitian government has recorded more than 363,000 cases of cholera more than 5,500 deaths since the outbreak began in October.

"The article says there is 'an exact correlation' in time and place between the arrival of a Nepalese battalion from an area of its South Asian homeland that was experiencing a cholera outbreak and the appearance of the first cases in the Meille river a few days later," the news service writes.

U.N. mission spokesperson Sylvie Van Den Wildenberg, in an email to the AP, "didn't comment on the findings" of the most recent study but referred to a U.N.-commissioned report published in May that "attributed the outbreak to a 'confluence of circumstances,' including a lack of water infrastructure in Haiti and Haitians' dependence on the river system" and "refrained from blaming any single group for the outbreak," according to the news service (Daniel/Katz, 6/29).

In an accompanying editorial, two public health experts from CDC said the fact that cholera was introduced to Haiti by a traveler from abroad "raises important public health considerations." They write, "These travelers and their service organizations should take appropriate precautions (such as vaccination and chemoprophylaxis) to protect themselves and to forestall introducing such pathogens to local populations" (Dowell/Braden, July 2011).

Multinational Drug Companies' Scam
In an Al Jazeera opinion piece, the first in a two-part series, Khadija Sharife, a journalist and visiting scholar at the Center for Civil Society, examines how multinational drug companies control markets.

"Drug multinationals claim that U.S. consumers are forced to fund the necessary research and development in order to keep global innovation going. In Australia, Europe, as well as Canada – the source of much prescription drug 're-importing' by US citizens, where drugs sometimes sell for half the going U.S. price – governments ensure pricing structures render patented drugs affordable," Sharife writes.

"While drug multinationals generate considerable profits from these countries, about 50 percent of global drug industry profits are generated in the U.S. ... But the real deception is less the Machiavellian tactics used by Big Pharma to Botox the bottom line than the terrible myth behind the 'true' price of innovation: the $1bn pill," according to Sharife, who notes, "The '$1bn cost' is derived from a 2003 study [PDF] published in the Journal of Health Economics by Joe DiMasi et al from the Tufts Center for the Study of Drug Development. The authors and their organisation claimed that the study was unbiased, despite the fact that the Tufts Center is itself some 65 per cent financed by drug companies. Though the findings have been normalised as factual by the media, the facts have long since been debunked by independent specialists."

Sharife goes on to break down the $1 billion pill claim, discussing "[T]ax secrecy" and profits made from antiretroviral drugs (6/29).

'Goat plague' threat to global food security and economy must be tackled, experts warn
Review: Peste des petits ruminants: A suitable candidate for eradication?
"Goat plague," or peste des petits ruminants (PPR), is threatening global food security and poverty alleviation in the developing world, say leading veterinarians and animal health experts in this week's Veterinary Record.

They call on the UN Food and Agricultural Organisation (FAO) and the World Organisation for Animal Health (OIE) to turn their attention now to ridding the world of the PPR virus, which carries a very high risk of death among infected animals.

The call follows the formal announcement this week by the FAO that a related virus, rinderpest, better known as "cattle plague," has now been eradicated around the globe.
In an editorial, senior vets, all of whom were variously involved in the global rinderpest eradication campaign, say that getting rid of that virus has had far reaching effects.

"What is not generally appreciated is that the eradication of rinderpest has yielded benefits that surpass virtually every other development programme in agriculture, and will continue to do so in future," they write.

They cite the case of Chad, where between 1963 and 2002, every dollar spent on rinderpest eradication made a return of at least $US16.

Now the world must focus on achieving the same for PPR, which is endemic in most of sub Saharan Africa "as well as a swathe of countries from Turkey through the Middle East to south Asia," they say. The virus has also recently been reported in North Africa, central Asia, and China.

It's important to control the infection because it spreads quickly through goat herds and sheep flocks, decimating their numbers, and taking a terrible financial toll on the farmers and families who depend on these animals for their livelihoods, say the authors.

And it has also spread to wildlife species, many of which are endangered or threatened.

"Because poorer people are more likely to keep small ruminants than cattle, women and children tend to have more access and control over them, PPR control and eradication would be both pro-poor and pro-women and children. It fits many development objectives for nutrition, food security and poverty alleviation," they write.

"We believe that a global programme for the total eradication of PPR should be established as an international undertaking without delay," they declare.

"Given support from governments, international organisations, and funding agencies, we believe that another great success could be achieved within a 10 year time frame with concerted international effort," they suggest.

In a review published in the same issue, senior international vets, including from the Institute for Animal Health in Pirbright, Surrey, document the history of the infection and explain the scientific basis for eradication of the virus.

"Although PPR has not yet been seen in the UK, and is currently absent from most European countries, it is without doubt the fastest growing and potentially the most economically important disease of sheep and goats anywhere in the developing world," they write.

They go on to say that there has been a reluctance to tackle the issue because sheep and goats are considered to be of lesser economic value than cattle, and their shorter working lives mean that it would cost more to eradicate PPR.

But they warn: "The ever advancing spread of PPR has made the economic impact of the disease, and consequently the benefits of its eradication, much greater. The imperative for coordinated action is therefore much stronger."