Med Bulletin

Education and Treatment Needed for More Progress Against the HIV/AIDS Epidemic

Med Bulletin by Joshua Ng

UNAIDS and the WHO released their annual report on HIV/AIDS, entitled AIDS Epidemic Update 2005, early last week. The findings of this report show promising progress in selected countries afflicted by AIDS. The most welcomed findings include a general decline in adult AIDS prevalence in pregnant women in Zimbabwe and Burkina Faso. The study suggested that these declines were in large part due to increased availability of treatment for the virus, and ameliorated sexual behavioural patterns, including increased condom use, fewer sexual partners, and the occurrence of a first sexual experience later in life. Increased accessibility to antiretroviral treatments for the virus is said to have saved upwards of 350 000 lives within the past year.

However, despite the encouraging news, the AIDS epidemic continues to expand with 5 million new infections occurring within the last year. 3 million deaths, including about 500 000 deaths in children, occurred during 2005. A relatively new geographical area at high risk is Central Asia, which experienced a 25% increase in cases over the calendar year. In order to strengthen the preventative measures being used by the WHO and UNAIDS, the report suggests the implementation of further educational programs, prevention of mother-to-child transmission during pregnancy, and programs fighting the spread of the virus through sex work and intravenous drug use.

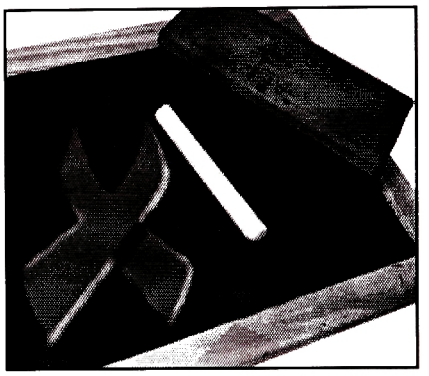

Photo by Joshua Ng

Original Summary by http://www.who.int/mediacentre/news/releases/2005/unaids_who/en/index.html

Viruses: A New Factor in Obesity

Med Bulletin by Crystal Chung

Obesity has compelled people to blame fast food industries and junk food companies for the increasing weight of the population; but could obesity be caused by something uncontrollable and unavoidable?

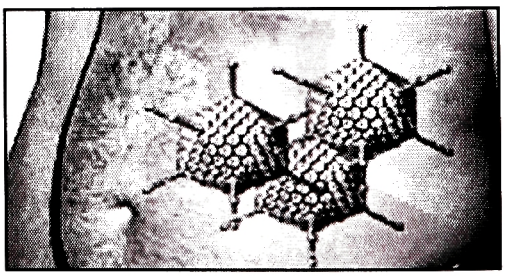

Photo by Joshua Ng

According to physiologist Leah Whigham, certain strains of adenovirus (specifically Ad-2, Ad-31, and Ad-37) can increase the amount of fat the human body stores. In other words, those with the virus may be more prone to obesity than those without it! Whigham and her team of scientists tested the human adenoviruses on young male chickens. Each chicken consumed the same amount of food and lived in the exact same conditions. After just three and a half weeks, the chickens with virus strains gained three times the amount of fat in their gut and twice as much body fat compared to chickens without the virus.

For a closer relationship to humans, Whigham's 2002 study, Human Adenovirus Ad-36 Promotes Weight Gain in Male Rhesus and Marmoset Monkeys, shows the same results: monkeys gained weight when they started to produce antibodies to the virus (indicating that the virus was present). However, it is interesting to note that the cholesterol of the infected monkeys dropped at the same time.

Although this virus is not the root cause of obesity, many questions arise. For example, can we create a vaccine to prevent obesity due to the virus? The answer is still unclear, but research is on its way to figuring out the mechanisms of the virus. Some may be concerned that it is contagious, but even that is yet to be determined.

Original Summary from Dhurandhar, N., Whigham, L., Abbott, D., Schultz-Darken, N., Israel, B., Bradley S., Kemnitz, J., Allison, D., Atkinson, R. (2002). Human Adenovirus Ad-36 Promotes Weight Gain in Male Rhesus and Marmoset Monkeys. American Society for Nutritional Sciences,~132(10),~3155-3160.

Article: Study Strengthens Link between Virus and Weight Gain, January 30, 2006 summarized from Scientific American

3-D Image of HIV Possible With Cryo-Electron Tomography

Med Bulletin by Tyler Law

A team of scientists have produced a 3-D image of HIV's viral structure. The team – consisting of members from the UK and Germany – produced the image by compositing a series of computer images of different viral specimens at different angles. They took images from 70 individual HIV viruses and used the similarities to create the 3-D structural image. This method, called cryo-electron tomography, produces an image of the virus core "with unprecedented clarity".

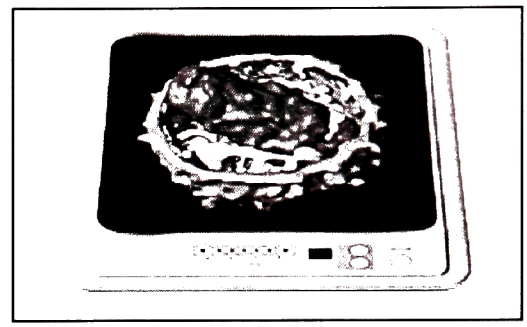

Photo by Harjot Atwal

Previously, HIV had proved difficult to image partly because of its small size. Providing a structural image of a virus can be instrumental in understanding how it causes illness. The images provided a clear look at both the viral membrane and the conical core. They show that the core growth begins at the narrow end of the cone, and grows until it reaches the opposite membrane.

The images helped answer questions regarding how the core develops within the membrane, since it allows the core to be viewed along with the membrane three dimensionally. This was previously not possible because of conventional preparation techniques. However, this imaging process provided valuable insight into the viral maturation process. Full understanding of virus structure and processes can ultimately be used to develop treatments.

Original Summary by
http://science.slashdot.org/science/06/01/24/2254227.shtml
Briggs et al. "The Mechanism of HIV-1 Core Assembly: Insights from Three-Dimensional Reconstructions of Authentic Virions." Structure (2006).
http://news.bbc.co.uk/1/hi/health/4642940.stm

Sperm Cells Speed Up

Med Bulletin by Harjot Atwal

According to research recently published in *Nature*, scientists believe they have found the reason for the rapid progress of sperm through the female reproductive system to the egg. The answer lies in a change in the motion of the sperm cell's tail. Isolated samples of sperm taken directly from males show that the tail naturally moves in a fluid, steady wave. However, upon entering female genitalia, this oscillation shifts to a much higher frequency allowing the sperm to penetrate more effectively towards the egg.

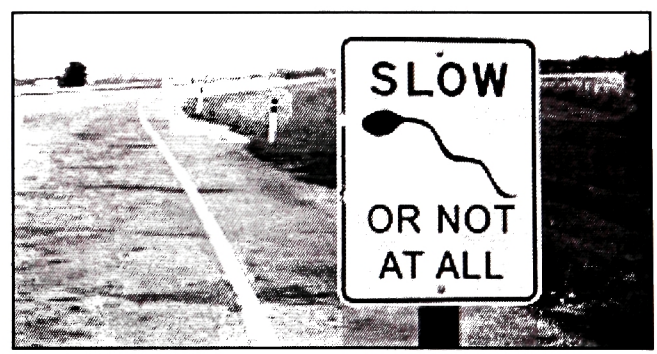

Photo by Tyler Law

This process, known as hyperactivation, is said to be caused by the alkaline environment in the female reproductive tract. Scientists applied the technique of patch clamp recording, previously unused on sperm, to determine the electrical flow found in the cells. The results showed high electrical activity and have linked a protein called CatSper1, found in the tail, as having increased the flow of calcium ions through the cell. This reaction seems to give the energy needed to reach hyperactivation.

In helping scientists to better understand how fertilization occurs, this new information could lead to the development of new methods of contraception. It is very possible that pills could be ingested by either males or females that would inhibit CatSper1 and stop hyperactivation. Alternatively, this knowledge could also help those couples that have greater problems conceiving children. The researchers believe, in many cases, the difficulty lies with a deficiency of CatSper1 in the male partner's sperm cells which could be solved with the right treatment. However, the scientists stress that although this is a great leap forward, there is still much more to be learned before many of the practical applications can be put to use.

Original Summary from http://news.bbc.co.uk/2/hi/health/4696994.stm