

Methods for hiv prevention biology essay

[Science](#), [Biology](#)



HIV causes AIDS by depleting CD4+ T cells and this leads to the weakness in the immune system and there by allows opportunistic infections. We find that T cells are very essential to the immune response and so there by without them the body is not able to fight infections and kill cancerous cells. The process of CD4+ T cell depletion varies in the chronic and acute phases (Hel Z et al., June 2006). During the acute phase what accounts for CD4+ T cell depletion is killing of infected cells by cytotoxic T cells and HIV induced cell lysis, and it could be possible that apoptosis may also be a factor. During the chronic phase, there is a slow decline in CD4+ T cell numbers which is because of the gradual loss in the capacity of the immune system to produce new T cells (Arie J. Zuckerman et al., 2007). It has been found out that the symptoms of immune deficiency characteristic of AIDS does not appear for a long time after a person has been infected, bulk of CD4+ T cell loss has seen during the first week of infection, mostly in the intestinal mucosa (Mehandru S et al., Sept 2004). The majority of mucosal CD4+ T cells express the CCR5 protein which is used by HIV as a co-receptor to gain access to the cells and this is the reason why there is preferential loss of mucosal CD4+ T cells as compared to those of bloodstream CD4+ T cells among which only a small fraction of cells do so (Brenchley JM et al., Sept 2004). HIV hunts and destroys CCR5 expressing CD4+ T cells during acute infection (Julio Aliberti, 2011). A panache immune response usually controls the infection and initiates the clinical latent phase. Generalized immune activation persists throughout the chronic phase because of the continuous HIV replication (Appay V, Sauce D, January 2008). Ongoing HIV replication and several HIV

gene products cause the enhanced activation state of immune cells and release of pro-inflammatory cytokines. (Brenchley JM et al., Dec 2006).

Tests for HIV

A positive HIV test can be validated within one month of infection. Infection can be diagnosed by two ways, either by a biological test that confirms the presence of HIV antibodies or by diagnosis of an opportunistic infection that marks the presence of HIV. ELISA (enzyme-linked immunosorbent assay) is the largely used biological test in developed countries, conducted in a laboratory on a blood sample. It could take several day to get a result. Result can also be provided within 20 minutes with the help of Rapid tests and that are being used more largely as and how their costs fall. In case of developed countries where the prior probability of infection is low and resources are abundant, western blot test is recommended even after the result of first and second ELISA test comes out to be positive. Whereas in a environment where there is a high prevalence of the disease with the large previous probability and scarcity in resources, such an approach is almost not recommended and performed. Because each additional confirmatory test decreases the chances of false positive results, thereby averting the costs associated with such a result. dcp18)

Methods for HIV Prevention

Information, education, and communication: This conciliation includes education on HIV/AIDS and use of condom through brochures, pamphlets and whatever promotional materials in classroom or clinic settings or through the television, radio, or press. School-based sex education: This program is a

branch of IEC, provide information to young people and ensure healthy norms in a school setting (Peersman and Levy 1998). Voluntary counseling and testing: This intervention helps people to know their HIV status and provides counseling support to help them cope with the results. Information of serostatus may enable individuals to keep away from getting in risky behaviors (Sweat et al., 2000). Peer-based programs: This program use impactful members of a targeted community to teach specific skills or spread information. These methods have generally been found to be effective in diminishing risky behaviors. Peer based education for sex workers is likely to be more cost-effective and is about one-fifth the cost of blood safety intervention (Hutton et al., 2003). Interventions for sexual transmission: Major aspect of this intervention is Condom promotion, distribution, and social marketing, with awareness for STI (sexually transmitted infections) screening and treatment (Orroth and others 2003). Intervention for Mother-to-Child Transmission: This intervention includes avoidance of unwanted pregnancies among infected mothers and use of antiretroviral therapy with combination of other useful available strategies to the mother before the pregnancy and to the new born after the delivery, and allowing a Feeding substitution to the new born inspite of the breast feeding to avoid the chances of postnatal HIV transmission (Nduati et al., 2000). Prevention of Bloodborne Transmission: Harm reduction for injecting drug users by avoidance of sharing drug injections or needles (Mesquita et al., 2003), and implementation of blood safety practices like selection and screening of the blood donors for the necessary and appropriate blood transfusions (UNAIDS 1997).

Possible Methods of HIV CURE

Currently it has been proved in many cases that a combination of various medicine have helped to cure & in many cases stop the advancement of the virus. The following strategies are found more efficient in combination with each other (Aids media release, July 2012)Gene therapyTreatment Optimization and Intensification (eliminate all replication)Reversal of HIV latency (increase virus production)Immune-based Therapies (reverse pro-latency signaling)Therapeutic Vaccination (to enhance host-control)We have not discussed these all strategies separately here as because these all are discussed and explained many times before in the documents and books and so we will keep our focus on the feasibility of the HIV by searching out the possible advancement in the HIV cure.

HIV CURE Feasible or it's a dream!!

Many recent observations make scientists of the notion about pursuing cure research. For the first time ever there is now a hope for an effective cure. The case of Timothy Brown a " Berlin Patient", who received a stem-cell bone-marrow transplant in 2007 and is now considered to be cured of HIV, has proved that a cure is at least possible. This stem cell transplant worked because the donor was among the 1 % of Northern Europeans who lack CCR5, the protein which is used by HIV as a co-receptor to gain access to the cells. While it is supposed unrealistic to use this risky and costly therapeutic approach for most people, in spite of that it has got scientists vote to make use of gene therapy to alter a patient's own immune cells to make them resistant to HIV infection (Nature Reviews Immunology, July 2012). The molecular biology aspect of how HIV DNA becomes attached to the

chromosomes of affected people is the centre of intense research. This aspect has already led to a number of possible interventions, few of which are being tested in the clinic and for which more research and test are being carried out. Recently a test is performed on HIV+ patients from which David Margolis and colleagues found out that dose of a drug that inhibits an enzyme involved in HIV silencing leads to fast production of HIV RNA in the patient's latently infected cells. This could make such previously unreachable viral reservoirs susceptible to curative strategies. For example, in combination with treatments that increase host immune defense, unmasking latent virus might allow clearance of infection (Archin NM et al., 2012).

Scientists have also become aware of a rare group of HIV infected people who appear to have naturally "cured" their own infection. These people are called elite controllers, are HIV positive but have no readily apparent virus in the blood. Scientists are trying to get a better understanding of this group and are researching to understand them. There exists a unique group of patients in France who became HIV infected, started therapy early, and were able to successfully stop therapy without viral rebound. The study confirms the benefits of treating HIV at the very early stages of infection and shows that early detection and immediate therapy helps in along running. There is an immensely valuable store of knowledge to be gained from analyzing the immunological characteristics that made therapy redundant for these patients (Hocqueloux, L. et al., 2010). Understanding this group of people who efficiently control the virus replication and reservoirs, scientists believe, might lead to novel therapeutic interventions and may leads to a better study, cure & prevention in the near future.

Advancement to Possible HIV CURE

HIV research is undergoing a renaissance that could lead to new ways to develop vaccines against the AIDS virus and other viral diseases. In the latest development, U. S. government scientists say they have discovered three powerful antibodies, the strongest of which neutralizes 91% of HIV strains, more than any AIDS antibody yet discovered. They are now deploying the technique used to find those antibodies to identify antibodies to influenza viruses. The HIV antibodies were discovered in the cells of a 60-year-old African-American gay man, known in the scientific literature as Donor 45, whose body made the antibodies naturally. The trick for scientists now is to develop a vaccine or other methods to make anyone's body produce them as well. That effort " will require work," said Gary Nabel, director of the Vaccine Research Center at the National Institute of Allergy and Infectious Diseases, who was a leader of the research. " We're going to be at this for a while" before any benefit is seen in the clinic, he said. (Mark Schoofs).

How Cells' DNA Repair Machinery Can Destroy Viruses

A team of researchers based at Johns Hopkins has decoded a system that makes certain types of immune cells impervious to HIV infection. The system's two vital components are high levels of a molecule that becomes embedded in viral DNA like a code written in invisible ink, and an enzyme that, when it reads the code, switches from repairing the DNA to chopping it up into unusable pieces. The researchers, who report the find in the Jan. 21 early edition of the Proceedings of the National Academy of Sciences, say the

discovery points toward a new approach to eradicating HIV from the body(science daily)

Natural Antiviral Protein Stops HIV, Deadly Viruses Entering Cells

Researchers in the US have identified a natural antiviral protein that stops HIV and certain other deadly viruses like Ebola, Rift Valley Fever, and Nipah, from entering host cells. They hope the discovery will help efforts to develop broad-spectrum antivirals against many of the deadly viruses that the National Institute of Allergy and Infectious Disease lists as " priority pathogens" for national biosecurity purposes.

The team, led by principal investigator Genhong Cheng, a professor of microbiology, immunology and molecular genetics at the University of California - Los Angeles (UCLA), writes about the discovery in the January issue of the journal Immunity. The protein, called cholesterol-25-hydroxylase (CH25H), is an enzyme that converts cholesterol in the cell to an oxysterol called 25-hydroxycholesterol (25HC), which permeates the cell wall and blocks the virus from getting in(medical news today).

Scientists Successfully Develop HIV-Resistant T-cells

Scientists have created a technique to genetically engineer HIV-resistant cells, a method which if proven effective in humans, could give HIV positive patients an alternative to a lifelong medication schedule which current patients now face.

HIV is dangerous because of the virus' capability to break into and eliminate T-cells, gradually developing into AIDS causing the breakdown of the immune system. The virus is able to breach the T-cells by two genes - CXCR4 and CCR5 - that are notoriously receptive to the virus. The medications prescribed to combat HIV are aimed at both of those receptor genes. However, if the genes could be modified in a way that makes them naturally immune to HIV, the daily medication schedule would no longer be necessary (medical news today).

UNIBEN Prof announces alleged cure for HIV/AIDS

Benin - Prof. Isaiah Ibeh of the University of Benin, on Tuesday announced the development of a new drug that can possibly cure HIV and AIDS. Ibeh, who is the Dean of the School of Basic Medical Sciences of the university, told reporters in Benin that the herbal drug had undergone "series of successful tests". He said "We are at the threshold of making history, in the sense that we seem to have with us something that will permanently take care of what over time seems to have defied all solutions." "We are talking about the latest discovery of an oral drug made from plants extraction in Nigeria for the possible cure of the pandemic, HIV and AIDS virus." According to him, research on the project was started in 2010 and culminated in the

development of " Deconcotion X (DX)-Liquid or Bioclean 11 for the cure of HIV and AIDS". " The existing retroviral drugs are intervention drugs for the management of AIDS but our new discovery is a possible cure (vanguard).