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BRIEF TITLE: Preventing the spread of HIV After Exposure

BRIEF DESCRIPTION: A biological breakdown and explanation of what could be done to stop the spread of HIV in the body.

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Acquired immune deficiency syndrome, also known as AIDS, on a scientific and emotional level continues to impose the worse and most debilitating consequence onto its victim. AIDS debilitates the host's immune system until the host's systems succumbs to the disease or is maintained by antiretroviral treatments. According to Avert, an International HIV and AIDS charity, in sub-Saharan Africa, AIDS was responsible for an estimated 1.4 million adults and children, 15 million Africans since the start of the epidemic. Centers for Disease Control and (CDC) reports that AIDS diagnoses increased from almost 170,000 in 1993 to about 470,000 in 2007. The crisis of this disease is a dominating basis for intensifying efforts to find a cure or a vaccine.

In the United States alone half a million people have died because of AIDS and one million people currently carry the disease with a fifth unknowingly carrying and transmitting the disease. African Americans are currently the highest race plagued by the disease. Centers for Disease Control and Prevention or the CDC recently released a report that claims that 1 in 22 African Americans have AIDS. These numbers for an already underprivileged and thriving race can completely debilitate an entire race of people.
A budget for the prevention of HIV is at the bottom of the HIV/AIDS objections totem pole. Antiretroviral treatment is currently available for those with insurance and stable medical access in the United States. However with ongoing health care reform and millions of people without access to medical assistance and insurance one issue is the fact that many, especially the disadvantaged do not have access to this type of treatment and therapy. Even in a developed nation such as the United States certain persons cannot

maintain their health, especially those with compromised immune systems because of HIV/AIDS.

Going beyond the scope of what currently is maintenance of Human immunodeficiency virus (HIV), what would be ideal is to prevent the onset or spread of HIV once the body has been exposed. With millions of current and new cases in the world today, it is important for researchers to find a cure for this disease that has proven to plague people all over the world. Currently budgets are strained for medical treatments, therapy, diagnosis, prevention, education and other issues that monetarily strain. The cost for treatment and maintenance of HIV is an overwhelming burden for those in developing nations. In Malawi and in most African nations, a diagnosis of HIV is a death sentence. The average annual income of the people of Malawi is less than U.S. $500 with the cost of HIV medication at an estimated U.S. $1000 per month. (Kiesbye, 2008)**.** In most African nations the emotions behind the stigma associated with the diagnosis of HIV/AIDS is a huge burden within itself. Many cases go undiagnosed and even if persons within developing nations such as in Africa are diagnosed cannot face the discriminatory aspects of the culture and purposely neglect to inform family members, sexual partners, are untreated, and the plague of the disease continues to take its destructive course.

Finding a cure for HIV/AIDS will perhaps allow for the same methods to be applied in finding cures for venereal diseases and other autoimmune ailments such as polio and rheumatoid arthritis. Discovering a breakthrough to such a scientifically challenging dilemma will not only stop the plague of the disease but will assist with a better understanding of the body at a biological level and what could be done to

manipulate the body into a healthy position and prepare the body's immune system for other potential attacks and sustainability

When attempting to cure this disease, it is important to identify what is occurring on a biological level. The human immunodeficiency virus (HIV) that proceeds AIDS as it is the virus that essentially attacks the immune system, particularly the white blood cells that are responsible for fighting disease. The HIV virus latches onto it host cell and takes over the DNA of the cell and can reproduce infected cells that eventually weaken the body's immune system and may or .ay not turn into full blown AIDS.

HIV belongs to a virus class called retroviruses. Within HIV, HIV's genetic material consists of two identical strands of RNA or Ribonucleic Acid. RNA's structure is similar to DNA. HIV must replicate inside a human cell in order make new copies of its self. When the body is exposed to the HIV virus, a virus particle makes a connection with a white blood cell called a T cell that carries a co-receptor, a special protein and a primary receptor called CD4. Spikes on the virus stick to the CD4 receptor and allows the envelope of the virus to bond or fuse with the T cell's membrane. The contents of the virus are released into the white blood cell.

Inside the cell, the HIV enzyme, reverse transcriptase, changes the HIV virus' RNA into DNA. This new DNA is brought into the host's cell nucleus. Currently antiviral drugs focus on disrupting reverse transcriptase's ability to copy its genetic material and create new viruses hindering the growth of the HIV virus in the body. HIV can become dormant even once the host cells have been infiltrated, however, once a cell becomes activated, the HIV genes are equal to human genes. Using the host cell's enzymes, the genes can be turned into messenger RNA via transcription. The messenger

RNA then can be transported outside the cell, just as in ordinary translation, and is the template for new HIV proteins and enzymes. The messenger RNA is a complete copy of the HIV virus and can now make new viral proteins that can be released from the cell. Another HIV enzyme, protease, assists with breaking up strands of newly made protein into smaller pieces that will now make a new viral core or nucleus. Once replication is over the new HIV particles can now be released to infect another T cell body, quickly, thus spreading the HIV virus all over the body.

What is proposed here is to attempt to handle the HIV virus once a person has been exposed to the virus and the virus is in the body system. Scientists have found a way to suppress the HIV with antiretroviral drugs, which cannot clear the virus from the body. This is the currently the main treatment for HIV. Scientists currently cure attempt include freeing dormant immune cells which will eventually be attacked by the virus, exposing the virus and flushing it out with antiretroviral treatment. Another group of scientists have pinpointed that when HIV enters the white blood cell and changes the DNA, the DNA must turn into RNA and leave the cell. Scientists learn that the new viral RNA hijacks the pathways out of the cell thus going into the cytoplasm and synthesizing proteins for a new HIV virus.

The key is to attack the virus before it enters the victim right before it gains entry via the CD4 receptor. A special enzyme that can suppress or deactivate the CD4 receptor as it prepares to allow the virus entry into the T-cell. By rending the receptor inactive, the virus cannot sustain itself as it attempts to enter different white blood cells. Find an enzyme that can operate in a similar manner to the antiviral drugs that prevent reverse transcriptase ability to perform. If more research is completed this same manipulation of

a co-receptor, in this case, CD4, on a host cell can be completed. Scientists have proven that they can alter the effects of an enzyme on a virus that is fairly new to the science world. Scientists can certainly find a way to modify effects on a human blood cell receptor.

Scientists have recently learned that HIV not only replicates but it "hijacks" a cell in order to leave the cell nucleus to a particular point on the plasma membrane. This is an important step because of the HIV virus is not taken to this particular point it will not be infectious and rendered inactive. Scientists have determined this information extremely critical as more research will allow more strategies that can prevent this vital process that eventually allows the release of the new viral RNA and eventual spread.

Both ideas focus on blocking pathways into and out of the cell. The reality that the body will be exposed to the HIV virus is noted, so it is important to focus on manipulating the virus at biological level, enabling the white blood cell to fight the disease. It is feasible to manipulate the HIV virus itself with the use of antiviral drugs.

More research can perhaps open up new ideas as to how to block the virus all together, especially learning how to enable the white blood cell to go beyond its role of defense but as a defense super power. The human body will be exposed to more and higher level of pathogens. It is vital to find better methods that will suppress certain viruses and disease that can debilitate the body. Scientists must find better methods that will enhance the body's ability not just at the cellular level but must approach holistically. The body's immune system cannot rely on white blood cells alone but other body systems in order to build up the highest guard against fatal and communicable diseases with inevitable exposure.

Although ambitious, finding a cure and better strategies for handling HIV/AIDS, is a critical scientific dilemma that must be addressed. It is a disease that has proven to destroy the body's immune systems and eventually obliterates the body as a whole in a rapid and devastating process. The introduction of antiviral drugs has not only positively impacted millions of lives but has demonstrated that the scientific world is on the verge of developing breakthroughs in the fight against HIV/AIDS. The emotional and financial toll it has taken on developed and underdeveloped nations alike is evidence enough to take significant steps towards ensuring that this pathological course is brought to an end.

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