

Aids disease in humans and hiv management biology essay

[Design](#)



Acquired Immunodeficiency Syndrome (AIDS) is a disease foremost appears in the 1980s and now it is one of the major causes of decease of the human population in the Earth. AIDS is caused by HIV-1 and HIV-2. The find and isolation of the virus which causes AIDS happened by the usage of tissue from patients with AIDS. The clinical probes showed that the HIV virus disable and kills the CD4+ T lymphocytes cells which are playing a chief function in the immune responses of the human being. The violent death of these cells do non let the being to observe and response to any other infective beings doing the being vulnerable. (Brigid M.

K. 2008)HIV virus in order to derive entree to the inside of the cell binds to the CD4 receptors which are found on the surface of the T-cells. HIV binds to the CD4 receptors by the aid of the gp120, at the same clip HIV must adhere to a co-receptor in order to derive entry to the CD4+ T cell. There are two receptors (CCR5 and CXCR4) which are of import for the entry of the HIV into the cell. At first, HIV was unwieldy but nowadays the utilizations of drugs help to pull off the virus but non bring arounding it.

First antimicrobial drugs where used in order to handle other infections which were able to infect the human being because of its low immune response. These drugs help a batch because they were able to let the being to be free of infection by bugs and other infective beings, hence increasing the life-time of the AIDS-patients. Subsequently on, in the late 90s and the beginning of the twenty-first century after clinical tests and more research in the topic of HIV scientists realise that the usage of a combination of three drugs had astonishing consequences against AIDS comparison to the usage of one drug

merely. HIV is a retrovirus, it has ribonucleic acid as a familial stuff. RNA of the virus undergoes a tract in order to change over RNA into DNA.

On the other manus beings like mammals and workss have their Deoxyribonucleic acid converted into RNA. Therefore this procedure which happen in HIV is a rearward tract (RNA into DNA) . Furthermore the drugs used against retroviruses are called antiretroviral. These drugs can move in different parts of the life rhythm of HIV, but until now there is no remedy for the HIV/AIDS. During the HIV life rhythm some proteins are require for the reproduction of the virus. These proteins are: rearward RNA polymerase, integrase and peptidase. They are really of import for the reproduction of the virus and continued infection of the cells. Therefore the drugs against HIV are design to suppress (strike hard out) these enzymes in order to do HIV less aggressive.

Anti-HIV drugs were design to suppress the parts of the life rhythm of HIV. These parts are: rearward RNA polymerase (RNA is converted into DNA) , integrating (helps viral DNA to be inserted into the Deoxyribonucleic acid of the cell) . And besides to the polyprotein processing (peptidase is taking the big proteins of the virus and do them smaller) . Therefore the suppression of the above enzymes will upset the HIV reproduction and infection of cells and better the immune system of the host.

However the betterment in the immune system will non better anymore and will get down to fall. This is because the HIV is developing opposition to the drugs which are used. Probably HIV will develop opposition to the drugs

which are traveling to be discovered in the hereafter. Furthermore the antiretroviral therapy must be followed for a life-time.

If the intervention is stopped by the patient, HIV will come back ; activated and the CD4+ T-cells will drop quickly to unsafe degrees which will set the life of the patient in danger. Therefore the choice of drugs must be the best suited one to the patient, with less inauspicious effects (toxicity -i? taking to decease because of drugs) . Thus design of anti-HIV drugs need a batch of survey and tests in order to acquire drugs with less inauspicious effects.

Presents there are four categories of anti-HIV drugs in usage: Rearward RNA polymerase inhibitors- i? Nucleotide contrary RNA polymerase inhibitors- i? Non-Nucleoside contrary RNA polymerase inhibitorsProtease InhibitorsIntegrase inhibitorsEntry InhibitorsThe contrary RNA polymerase inhibitors are divided into two subgroups. The nucleotide contrary RNA polymerase inhibitors and non-nucleoside inhibitors.

The rearward RNA polymerase inhibitors were the first drugs introduced for the intervention of HIV as they target the contrary RNA polymerase enzyme of which is critical for the virus being. The inhibitors are impacting the rearward RNA polymerase of the virus but they do non make a batch of harm if they are used in doses safe for worlds. Therefore the RT inhibitors were non making the work which the scientists were anticipating to make.

(disable the RT wholly) . In higher doses likely they will work but they will do decease to the host because of their high toxicity. The rearward written text in HIV life rhythm could be terminated but toxicity of the drugs used will kill the HIV-free host cells which are following their cell division as good.

Furthermore the contrary RNA polymerase enzyme it does not copy ever the RNA sequence into DNA precisely as it should, hence HIV has a high mutant rate and a high diverseness around the universe. The first and major drugs used against HIV are rearward RNA polymerase inhibitors. There are 19 drugs which are approved for the intervention of HIV. Eleven of them inhibit the contrary RNA polymerase. Seven out of 11s are nucleoside rearward RNA polymerase inhibitors (NRTIs) . Some NRTIs are Zidovudine (AZT, ZDV) , Didanosine (dideoxyinosine) , Zalcitabine (dideoxycytosine) , Stavudine (d4T) .

Furthermore the non-nucleoside contrary RNA polymerase inhibitors (NNRTIs) are nevirapine, efavirenz and Rescriptor. There is besides another one drug which is called PMPA-tenofovir. Some of the above drugs can be combined together for better consequences. In add-on more rearward RNA polymerase are under tests and design. Some of them are the etravine (TMC125) and rilpivirine (R278474) which show a high success against the HIV in clinical tests. NRTIs are really of import because they miss a hydroxyl group at the 3' & A ; acirc ; ^™ terminal of the ribose ring. This help the drug to suit to the Deoxyribonucleic acid of the virus and act as a eradicator.

Therefore while RT starts the rearward written text of the RNA into DNA, it takes nucleosides but when it takes nucleosides from the drug alternatively of the 1s from the host cell change by reversal written text Michigans. During this procedure the drug is phosphorylated and it triphosphate signifier it is used by the RT enzyme of HIV. Furthermore the NRTIs are similar to the nucleosides found in every cell, therefore they can adhere to the

Deoxyribonucleic acid of the cell and likely do decrease because of they are toxic. On the other hand drugs from the NNRTIs subgroup bind to the Reverse RNA polymerase enzyme active site. They are non toxic for the host cells because they merely bind the RT enzyme of HIV. Another one feature of NNRTIs is the non competitive suppression compared to the NRTIs. Furthermore the utilization of two to three drugs from different categories together have a major function against the progression of HIV.

The full block HIV will diminish any opportunity of drug resistance. However the development of drug resistance derive from the fluctuation and recreation of the HIV. Therefore there are instances where the drugs do not hold any benefit because that specific type of HIV is immune.

This high fluctuation of HIV is caused by the high reproduction rate and by the mistakes made by the RT of HIV and the polymerase of the host. One of the first drugs found was the AZT (azidothymidine) , also called Retrovir (ZDV) . It was used foremost in the late 80s and it was permitted to be used because it was found to diminish the number of deaths from AIDS. It was taken twice a twenty-four hours. For a time of old ages it was the lone drug used against HIV until the design of new RT inhibitors and so it was used in a combination with other anti-HIV drugs. It acts on the RT enzyme and it takes portion during the reverse transcription and acts as a terminator. All the NRTIs undergo phosphorylation and so they act as terminators. A different class of anti-HIV drugs are the inhibitors of HIV protease enzyme.

Protease inhibitors are moving on the HIV peptidase enzyme. They bind to the active site of the Protease enzyme and they disable it, doing the procedure of polyprotein processing to halt. HIV peptidase is found in every HIV atom and it is responsible for the creative activity of little protein by the dislocation of big non active proteins. This procedure is really critical for the HIV life rhythm. When the procedure terminals and smaller proteins are created, the viral atoms can acquire out of the cell and infect the nearby cells.

If the virus do non hold the little proteins the virus is in an immature status therefore it is non possible to acquire out of the cell and infect the other HIV-free host cells. The creative activity of this type of drugs put the criterions in a higher degree. They help a batch in the intervention against HIV and this can be seen by a batch of surveies demoing that the usage of HIV peptidase inhibitors decrease the figure of people deceasing from AIDS and besides increase the life span of AIDS patients. Furthermore a manner to better the PR inhibitors is the usage of a 2nd PR inhibitor. The 2nd PR is used in a lower dose. Normally the 2nd inhibitor used is ritonavir. The function of Norvir is to populate the cytochrome P450 enzymes. Which are found in every homo cell and chiefly in the liver and bowels.

Their map is to breakdown drugs. The suppression of CYP3A4 enzyme (chiefly) by Norvir causes the chief PR inhibitor to stay for more clip in the being without interrupting down. Therefore the chief PR stay longer in the host and inhibit HIV. Until now 10 peptidase inhibitors are approved by FDA

for the intervention of HIV. Some of them can be used in a combination with the ritonavir drug.

The first peptidase inhibitor was saquinavir. It was approved in 1995. The design of peptidase inhibitors was really of import because the drugs were staying in the organic structure for longer clip and it was decelerating donw the reproduction rate of HIV.

However some side effects can be observed. Diarrhoea and concern can be happening. Another category of anti-HIV drugs were design. These drugs will move on the integrase enzyme of HIV. The map of this enzyme is to incorporate the viral DNA into the Deoxyribonucleic acid of the host cell. This map is really indispensable for the HIV life rhythm.

Integrase is an enzyme which appears merely in the virus and it does non be in the host cells, so the suppression of this enzyme will happen merely in the HIV. Integrase has a cardinal nucleus which is the topographic point where the active site is situated. The integrase inhibitors bind to the active site and do non let so enzyme to incorporate the viral DNA and the Deoxyribonucleic acid of the host. This fuction is really of import for the being of HIV and if it was traveling to be stopped so the drugs will make a batch of harm to the HIV life rhythm.

However integrase inhibitors are still in clinical test phase. None was approved until now. There are three drugs waiting for blessing from the FDA. These drugs are raltergravir, eltagravir and 364735. The blessing of these drugs will be a great forward measure in the intervention of HIV. (Lin S.

S. , Xu F. , Liao P.-H. , Yang C.-C. 2008)Another category of drugs is the viral entry inhibitors.

These drugs are divided into two subgroups. The attachment inhibitors and the merger inhibitors. Attachment inhibitors are adhering to the CD4 receptor or the other two co-receptors CCR5 and CXCR4 and they result in the suppression of viral replication. The drugs approved until now are two: maraviroc and enfuvirtide. Maraviroc is an attachment inhibitor. It inhibits the binding of HIV to CCR5 receptors. The drug is chiefly used by people which their HIV is adhering to the CCR5 receptors.

This drug can not be used by people which their HIV is adhering to CD4 receptor or to both CCR5 and CXCR4. Enfuvirtide is a merger inhibitor. It is taken by injections and it is used by patients which are not able to take any other ant-HIV drug. It binds to the gp41 and it does not let the gp41 to change its construction in order to blend with the host cell.