

Research paper on an analysis of the functional cure for hiv

[Science](#), [Genetics](#)



\n[[toc title="Table of Contents"](#)]\n

\n \t

1. [Abstract](#) \n \t
2. [Analysis on Functional Cure for HIV](#) \n \t
3. [Review of Literature](#) \n \t
4. [Discussion](#) \n \t
5. [Conclusion](#) \n \t
6. [References:](#) \n

\n[/toc]\n \n

Abstract

Researchers have been faced with difficult moments in the past in their attempt to find a cure for HIV/AIDS. The trend that the virus takes in the human body is complicated since it stitches itself with the DNA of the host cells hence becoming part of the person. The way to eliminate or remove it from the human body without altering or killing the patient is very complex and it has not been achieved yet. However, some experiments and treatments that involve the use of therapy and stem cells transplantation have proved to be the way forward towards the eradication of the virus from the human system. In the year 2011 and 2012, scientists and researchers as well as doctors have pointed out that a functional cure for HIV has been found. This paper analyses the functional cure for HIV.

Analysis on Functional Cure for HIV

It has been noted that treatment and prevention measures taken on the fight against HIV/AIDS is not enough in curbing the epidemic. Therefore, most researchers have embarked on the process of searching for a functional cure for HIV and this is becoming more and more feasible by day. This is a goal that could have seemed ludicrous if it was initiated in more than five years ago. It is however after studying the HIV for a period of approximately more than 30 years that scientists have developed drugs that have transformed HIV/AIDS from a death sentence to a manageable chronic condition. It is through these achievements that the majority of researchers are prioritizing the search for a cure for the HIV and its complete eradication (Loury, 2012). Nonetheless, the search for a functional cure for HIV is in progress that is likely to be found than the cure that eradicates the virus completely from the body system. This has been aided by the occurrence of a number of incidences and experiments that have shown that that functional cure for HIV has been found. A functional cure for HIV would not eliminate all the virus from the human system but it is aimed at removing the entire virus from the blood stream of a patient and stop or remove all negative effects of HIV from the body. Thus, a functional cure will ensure that a patient will not develop AIDS in their lifetime or any other form or sign of HIV disease. The opportunistic diseases will not have the ability to attack the patient of HIV since the immune system will remain unaltered. This is the ultimate goal for a functional cure for HIV which researchers have pointed out to be close. The achievement of this goal will mark yet another turning point in the history of

HIV. No longer will HIV be an epidemic but rather a manageable condition (Brown and Botelho, 2012).

Review of Literature

The Sangamo Bioscience (SGMO) is one of the leading organizations that are actively participating in the research for a functional cure for HIV. There are two approaches that Sangamo is adapting, namely: (1) devising a method of transplanting HIV resistant stem cells which will allow the immune system to continue functioning and (2) use gene therapy method that will enable the patients to own immune cells that are resistant to HIV. It has been noted that an approach of this kind is likely to produce a functional cure of HIV that will enable the patients of HIV lead a normal life. This is because the effects of the virus in the body will not be felt or occur. Also, the opportunistic diseases that are caused by HIV resulting to development of AIDS will also not take place after this treatment (Seeking Alpha, 2012).

It is indicated that Sangamo is making use of its proprietary zinc finger DNA-binding protein technology to either silence genes or activate them. To silence genes, the approach of engineering ZFP nucleases that have ability to cleave specific DNA sequences and leave the gene disordered is used. In order to activate genes, it is noted that the Sangamo Company can concoct the ZFP Transcription Factors (ZFP-TF). By using the ZFP technology, the company is developing what is known as a novel treatment for HIV infection. The tests such as SB-728 are ongoing in phase 2 trials. By using this proprietary technology, the immune cells of the patients HIV are made to be resistant by permanently disrupting the DNA sequence encoding CCR5 which

is a co-receptor that is usually used by HIV to go into cells and cause an infection. It is the same approach that is being employed in pre-clinical developing to engineer HIV resilient stems cells (Seeking Alpha, 2012). It is noted that the first application that the company of Sangamo has made is an autologous ZFN-CCR5-modified T-cell invention which is being evaluated in a continuing phase 2 process. In this phase 2, there are two phase ½ as well as two phase 1 trials. These trials are conducted in subject with the HIV/AIDS. In addition, the company is also using the approach of preclinical program that will develop an SB-728 hematopoietic stem-cell product that can be used for the same purpose of developing a functional cure for HIV. Additionally, a research-stage program is also necessary to develop an SB-728 which will be used as an in vivo product. It can clearly be seen that there are more than one approach that the Sangamo Company is using in an attempt to find a functional cure of Human Immunodeficiency Virus (HIV) (Seeking Alpha, 2012).

Brown and Botelho (2012) report that there are three main approaches the researchers of HIV/AIDS in the United States are adapting in an attempt to come up with an HIV functional cure. The first strategy is the waking up of the sleeping cells in a patient that have been infected with HIV in order for the cells to be killed. The cells are woken up and killed so that they can stop harboring the virus in the body system. Another strategy requires people to be treated with HIV drugs as soon as they are infected. This approach had been tried before without giving much or significant outcome. Nonetheless, the strategy has deemed viable with the advance in technology in the medical field. The third strategy is termed as an expensive and a difficult

procedure that involves the transplant of stem cells. Stem cells transplantation is a technical procedure that will ensure that all the infected cells are replaced with resistant HIV cells. This procedure will ensure that the effects of HIV are no longer available in the body of an HIV positive patient (Brown and Botelho, 2012).

Scientists and researchers in this area hold the view that outcomes that have been described are not actual cures of the HIV virus. They are procedures that are being adapted in order to make the HIV infection manageable. In essence, the virus may persist in the body system but the body controls it. It was noted that in some of the experiments conducted, HIV remained detectable in some patients to some extent while in others it was unclear whether the virus remained after treatment or not. What was certain about the whole process is that the HIV was managed to a greater or significant degree. What must be noted in the ongoing research is that a functional cure of HIV is a significant step towards getting a cure that will eradicate or eliminate the virus from the human system (CBS News, 2012).

Curing HIV infection is deemed to be difficult because the virus stitches itself into the DNA of a person who is infected hence becoming a part of that patient. It is also noted that these cells that allow the stitching of the HIV into the DNA of the host survive for decades. This makes the matters worse since the body cannot eliminate them from the system within a short period. The longer they survive, the more destructive they are to the immune system of the body. However, the functional cure of HIV aims at awakening these cells by proper or appropriate stimulation and killing them. This strategy seems viable and less expensive to most researchers prompting various

governments and organizations to invest in such research methods (Brown and Botelho, 2012).

It must be noted that the discovery of Timothy Brown's state of HIV who was a Berlin patient was driving force that changed the face of research for HIV cure. After stem cell transplant of for leukemia, Brown recovered and it was founds that his body contained no noticeable virus. The donor of the stem cells had a rare mutation that made the cells not to be able to be infected with HIV. Another two patients are also said to have undergone the similar process that left them functionally cured of HIV infection. it is described that the two patients received a stem cell transplant for lymphoma disease which is also a cancer of the blood just like leukemia. After receiving the chemotherapy, it is indicated that some of their immune cells remained but the transplanted cells managed to kill all of them of which some were infected with HIV. The reaction under which the cells are killed is termed as graft versus host disease reaction (Brown and Botelho, 2012).

These incidences have initiated enthusiasm of a renewed energy in research to find a functional cure of HIV. There are a number of conferences that are being held across the globe by many scientists and researchers to help incorporate resources and ideas on this new development. All nations and organizations are determined to see the success of this approach of managing and controlling the HIV in the body. This is because the process of finding a functional cure seems to be closer to conclusion than that of finding a cure that will eliminate the virus from the body (Medical Health News, 2011).

Another development that has been published is the use of ' shock and kill'

strategy. This strategy is aimed at awakening the sleeping cells making it possible for the detection of HIV. After the HIV has been detected, appropriate methods can be used to kill the cells. One of the experiments that have been successful in using this method is administration of the cancer drug known as vorinostat. It was noted that the HIV from the sleeping cells in cancer patients with the virus could be detected within a period of six hours after the administration (CBS News, 2011).

In another experiment in France, 14 HIV patients were given antiretroviral drugs soon after they discovered that they were infected. For all the 14 patients who are generally referred to as Visconti cohort, it was an early detection of HIV infection. They remained on drugs for a period not less than three years before they stopped. It is indicated that the Visconti cohort patients have been observed to live well without increase on the viral load as is always expected without drug suppressions. It has been more than seven years since they stopped taking the antiretroviral drugs. This experimentation has proved that early treatment of the HIV may help cure or suppress the duplication of the virus in the body. It is such experiments that have given researchers hope that the functional cure of HIV can be found soon. Researchers are therefore investing in studying the causes of such incidences through which a conclusion can be drawn in developing a functional cure of HIV (Boseley, 2012).

This is a clear indication that people should be given or be put on antiretroviral medication as soon as possible when they find out that they have been infected by the HIV. Not only does the medication help in keeping a patient health but also suppresses the virus and makes it remain in low

levels. The low levels of the virus in the human body do not result in occurrence of diseases even after stopping the medication. It is termed as a major breakthrough that has given hope to the researchers and the world in general in the fight against the HIV/AIDS epidemic. The achievement that has been realized in this process is very encouraging and promising. It is an indication that in actuality, doctors and researchers have found a functional cure for HIV and all that they are doing is to solidify their ideas for implementation. This is achieved through carrying out experiments on how different people respond to such treatments (The Economist, 2012).

According to Petchey (2011) eleven patients were treated with gene therapy and they were able to stop using antiretroviral drugs. This gene therapy inhibits the virus from entering the white blood cells which it normally attacks. This treatment entails the isolation of the T-cells of the white blood cells from patients which are then genetically modified by a particularly designed enzyme whose work is to inactivate the CCR5 gene. It is this gene that encryptions with a receptor that is needed for HIV to enter the cell and infect the T-cells. This procedure makes them to be HIV resistant and they can safely be transfused back into the body. It is stated that, there are two copies of the CCR5 gene that are inherited coming from each parent. It is through gene mutation that this process has been able to show positivity in the fight against the epidemic. This is regarded by researchers as the turning point for the process of searching for a cure of HIV. It is a functional cure for HIV that has produced results that are beyond the expectations of many since one of the eleven patients had no trace of the virus in the body (Petchey, 2011)

Discussion

The search for a cure of HIV had proved to almost impossibility in the early 1990s when doctors realized that however much the drugs were administered to patients of HIV the viral load did not reduce. It is indicated that most researchers had given up on the struggle against the HIV due to the fact that the cure seemed far than they could imagine of. However, the cure of Timothy Brown who is the first man to be clinically cured of HIV/AIDS has made many researchers get a new momentum of searching for a cure. It was until that time when Brown was transplanted with stem cells for leukemia that his blood tested negative of the HIV which he was also suffering from. Though the cure that eliminates the virus from the body system completely has not been reached, doctors say that a functional cure has been found. This means that HIV/AIDS is no longer a death sentence as it has been branded but a chronic disease that can be manageable (DeNoon, 2012).

The new technology of stem cell transplant is the most promising procedure among others that have worked with a few cases throughout the world. This procedure is said to be the most reliable functional cure for HIV since it reduces the virus from the DNA of the cells. This ensures that there is no multiplication of the HIV which makes it to rapidly eliminate the functionality of the immune system. The HIV is suppressed by the transplanted stem cells which multiply in the body system of the host. The HIV is unable to multiply hence the effects that are caused by the virus at chronic stages do not occur. In this manner, a person or patient suffering from HIV infection may not necessarily use the antiretroviral drugs for survival but can live a healthy

life without opportunistic diseases (Brown & Botelho, 2012).

For the success of these approaches that researchers have ventured into, there must be a mechanism that will govern this new process. The mechanism will incorporate all states and governments as well as the necessary resources to work together for the common goal. The governments and organizations ought to fund researchers and all those with the like mindedness in order for them to work together successfully. Each new idea that will eliminate the few barriers that are hindering the implementation of the functional cure for HIV should be embraced and tried. The world is in dire need for the cure of HIV since it has claimed millions of lives and it still goes on. It was declared the world's greatest killer disease before the advent of antiretroviral therapy. The use of antiretroviral therapy has helped the patients of HIV live longer lives but with continual medication. Nevertheless, the new discoveries are showing some light at the end of the tunnel (Glazov, 2012).

It is also in proper tone to note that basic scientists ought to work hand in hand with clinicians in order to translate as fast as possible the things learned in the laboratory into human studies as well as those learned in the human studies into the laboratories. They should also find the best animal models for the tests of their findings and also get the community support by making sure that there is enough information circulating on the members of public on the benefits and the risks involved with cure research (CBS News, 2011).

Conclusion

In summary, there has been made significant steps towards the development of the functional cure for HIV around the world in the recent past. Use of a method of transplanting HIV resistant stem cells which will allow the immune system to continue functioning seems to be the best approach but it is a very expensive procedure that many may not afford. Use of gene therapy method that will enable the patients to own immune cells that are resistant to HIV is also another method that is seen to be viable in developing a functional cure for HIV. There are a few cases across the globe that has been reported to have worked and this has given more hope both to the researchers and the general population as well. This means that there is hope for a functional cure for HIV to be found or developed soon enough.

References:

- Boseley, S. (2012). French Research Gives Scientists Hope Of 'Functional Cure' For HIV. Retrieved from <http://www.guardian.co.uk/society/2012/jul/26/french-study-scientists-hiv>
- Brown, D. & Botelho, A. A. (2012). AIDS Research Renews Hope for A ' Functional Cure. Retrieved from http://articles.washingtonpost.com/2012-07-26/national/35487593_1_cell-transplant-hiv-infection-functional-cure
- CBS News. (2011). Doctors Claim To Have " Functional Cure" For HIV. Retrieved from http://www.cbsnews.com/8301-18563_162-20069146.html
- CBS News. (2012). Doctors Claim to have " Functional Cure" for HIV – CBS News. Retrieved from <http://www.vindianz.com/lifestyle/doctors-claim-to-have-functional-cure-for-hiv-cbs-news-044108.html>

DeNoon, D. J. (2012). AIDS Cure Possible, Top Scientists Say. Retrieved from <http://www.webmd.com/hiv-aids/news/20120720/aids-cure-possible-top-scientists-say>

Glazov, J. (2012). 19th International AIDS Conference Convenes in Washington. Retrieved from <http://frontpagemag.com/2012/frontpagemag.com/in-praise-of-lindsey-graham-for-confronting-the-true-benghazi-culprit/19th-international-aids-conference-convenes-in-washington/>

Loury, E. (2012). Scientists Make Curing HIV A Priority. Retrieved from <http://articles.latimes.com/2012/jul/23/science/la-sci-hiv-cure-20120724>

Medical Health News. (2011). " Functional Cure" For HIV/AIDS Glimpsed In Small Trial. Retrieved from <http://www.medicalnewstoday.com/articles/234615.php>

Petchey, L. (2011). Gene Therapy to Treat HIV Shows Promise. Retrieved from http://www.bionews.org.uk/page_107109.asp

Seeking Alpha. (2012). Sangamo Biosciences: Could It Have A Cure For Hiv? Retrieved from <http://seekingalpha.com/article/756671-sangamo-biosciences-could-it-have-a-cure-for-hiv>

The Economist. (2012). The 19th International AIDS Conference: Looking Into The Future. Retrieved from <http://www.economist.com/node/21559594>