1542L-All for One, One for All (AFOOFA)

ABSTRACT

All for One, One for All also known as AFOOFA is a pill to treat the disease Human Immunodeficiency Virus. This medication would treat HIV by lowering the symptoms of this disease, and decrease the amount of HIV infection in the bloodstream. This technology would utilize infrared rays with a sensor that would scan the bloodstream, to see if the medication is making the immune system stronger. The scan results can be sent to any device which is connected to the sensor with Bluetooth©. Once concluded that the medication works affectively, the sensor can be shut down and if the medication does not help the disease, then the sensor will Self- Destruct while, existing the body. This efficient an elaborate technology will treat HIV in a very effective method.

HIV: Human Immunodeficiency Virus. This disease is caused by being sexually active with an infected partner, receiving contaminated blood transfusions, by sharing contaminated needles, and can be transferred from a pregnant woman to an unborn baby. This virus attacks the CD_4 cells in your immune system, and forces them to quickly make copies of the virus to infect other cells, and then destroys the CD_4 cells. Once these CD_4 cells are destroyed, they cannot fight the infection, which causes the immune system to weaken and therefore the virus takes over the body. The symptoms of this active virus will begin with headaches, diarrhea, nausea and vomiting, fatigue, muscles aches, sore throat, rashes, and fever. The body is incapable of destroying the virus. In the United States every nine and a half minutes, one person is infected with HIV and currently about 1.1 million Americans live with HIV. This disease is very complicated and dangerous. As of this year, HIV is the fourth most deadly disease in the United States. HIV is a serious disease that affects many people and must be treated as quickly as possible for safety and health reasons.

Present Technology

Currently, there is not cure for HIV but there are a few technologies helping to treat HIV infected patients. An effective technology that will help test HIV-1 for present day, is a pill called Stribild. Stribild is used to treat HIV by decreasing the amount of infection in blood, to cease copies of HIV, and increases the amount of CD_4 cells in the immune system. Stribild was approved by the Food and Drug Administration in 2004 and should only be taken by patients, who have never taken any other medicine to help treat HIV. A patient, who consumes this

medicine, should take one dosage at the same time every day and it should be taken with food so the body can receive the proper amounts of medicine. One dosage of Stribild is a medication that is a mixture or a “cocktail” of four different medications which are the following; 150 mg of Elvitegravir which stops the enzyme required for HIV to make copies of itself. 200 mg of Emtricitabine has the same effect of Elvitegravir. 150 mg Cobicistat inhibits which not only blocks the enzymes to that help the reproduction of the virus but also extends the blocking of the enzymes for a lengthier time period. Lastly, Stribild contains 300 mg of Tenofovir disoproxil fumarate which has the same effect as Elvitegravir. Stribild is an advanced form of technology that helps many people treat HIV in the modern era.

Stribild has some drawbacks. Stribild has severe side effects such as: build-up of an acid in the blood, liver damage, worsening of HBV infection (Hepatitis B), kidney failure, bone issues, difference in body fat, modification in immune system, and the most common effect is nausea and diarrhea. Another negative factor of Stribild is the components that are included in the pill. If a pregnant woman consumes Stribild, these components can possibly be harmful to an unborn baby. To avoid negative effects while taking Stribild, the patient must not have ever taken another form of treatment for HIV. Prior to taking this medication, patients should consult their doctor.

An additional drawback of Stribild is its price; A 30 day supply is $2,479. However there is a solution. If eligible patients have insurance, they can qualify for 400$ off of the monthly co-

pay. The Gilead's U.S. Advancing Access Program provides financial assistance to people who do not have insurance, so they can obtain Stribild.

History

The first documented case of HIV came from an adult male living in the Congo. The virus was found in his plasma and scientists can only speculate how the disease started. All doctors know is that a similar disease was found in chimpanzees.

In 1985, the first HIV test was approved by the U.S. Public Health Service. The test consisted of drawing of blood for the lab test. This test was sent out to labs and usually took 2 weeks to come back. Testing took two visits and 10- 50% of those people did not return to get their results.

For years following the discovery of HIV, there was little progression made for HIV treatment. However in 1987, a medicine called AZT was approved by the U.S. Food and Drug Administration. The drug was originally supposed to help with cancer, but could also prevent HIV patients from getting aids. The drug used nucleoside reverse transcriptase inhibitors. AZT was the first medication to be approved by the U.S. Food and Drug Administration. The drug is made of zidovudine 5-triphosphate which attract enzymes called reverse transcriptase. These enzymes create multiples of themselves called viral single-stranded RNA into proviral double-stranded DNA. The medicine is similar to thymidine triphosphate which is a nucleic acid used in DNA. The medicine has a high level of reverse transcriptase which goes into the DNA and then terminates the recreation of HIV proviral DNA.

Even though this drug was a life savior to the first people who consumed it in 1987, it also had many side effects. The drug stops the production of certain human polymerase enzymes which can

damage muscles and tissues. This can lead to problems with the heart tissue, and maybe the heart itself. AZT also ceases some production of red blood cells and other bone marrow cells. This can lead to nausea, fatigue, and mild gastrointestinal intolerance which can lead to vomiting and fatigue.

Future Technology

The future technology we have created is All for One and One for All also known AFOOFA. All for One and One for All will come in a 30 day supply pack and the first pill provided will contain a sensor inside of it. The first part of this pill is composed of medications that treats HIV infected patients by reducing symptoms and the infection in the blood. AFOOFA would reduce symptoms of HIV such as fevers, swollen glands, fatigue, and rashes. When AFOOFA lowers the infection, the medicine assists your immune system in becoming stronger. A strong immune system leads to reduction in these severe symptoms. AFOOFA consists of many of the same things that other HIV medicines have. However, many additional people may obtain the pill; smaller dosages medications are added to the pill and for this reason, AFOOFA will be safe for children 12 and older as well as pregnant women.

AFOOFA will consist of a number of active ingredients which are the following; 200mg of Emtricitabine. This ingredient lowers the amount of HIV in the blood by blocking an HIV reverse transcript which is an HIV enzyme. It also stops HIV from replicating. Emtricitabine is taken with other anti-HIV medicines and can be used in adults, children, and even infants. The next active ingredient is 300mg of tenofovir disoproxil fumarate. This medication takes the same effect of Emitrictabine. This component must be taken with the additional anti-HIV components

in AFOOFA for the proper effect to take place and can be taken by people of two years and older. Another medication that would make up AFOOFA is 25 mg of Rilpivirine. This medication is a non-nucleoside reverse transcriptase inhibitor. It works to bind as well as block the HIV reverse transcriptase, the HIV enzyme. It too stops HIV from replicating and lowers the amount of the infection in the blood. All of these medications are approved by the U.S. Food and Drug Administration.

The second part of AFOOFA is the sensor. The first pill of the 30 day pack will contain this sensor. The sensor's purpose is to see how efficient the medications are working to help decrease the amount of HIV infection in the blood. One hour after AFOOFA is taken, the sensor will scan the bloodstream for another hour with infrared rays and the results of this scan will be sent to any device connected to the sensor which, the doctor will set up using Bluetooth connections. When AFOOFA starts to take effect on the infected cells, the infrared rays in the scan will cause the HIV cells to turn purple making it easy to recognize whether the medicine is effective in decreasing HIV.

The doctor will review the results of the scan and then there will be two options; if the medication works affectively, the doctor will tell you to shut down the sensor, in this case, the remaining pills that do not contain sensors inside of the 30 day pack, are to be continued to be taken since the medications work. To shut down the sensor, the shutdown button must be located on whichever device is connected to the sensor through Bluetooth© and be pressed. To be able to recognize that the sensor is shut down; the device should read "AFOOFA CAN NOT

BE DETECTED RIGHT NOW". Once the device says this you know that you are finished with your treatment for the day. The doctor decides if the second option is required; if the medication does not take effect in the body, the sensor must be destructed for good. To do this, the button on the device that says "SELF-DESTRUCTION" must be pressed. When the sensor in the body is in the midst of self-destructing, a tiny bag comes out of the sensor and captures the sensor and its particles and it seals immediately. Once the bag is sealed tightly it now safely travels out of the body. Once this bag is eliminated from the body through waste, the bag must be sent back to the doctor to be cautious of the germs and disease that came from the body. The consumer should take the gloves and tongs provided by the doctor and place the tiny white bag in a medicine bottle. After this process is done, the medicine bottle containing the used sensor, the tongs, as well as the gloves should be placed into a medical Ziploc bag. This bag should be sent to the doctor where the waste will properly be destroyed.

Breakthroughs

Currently, overall most affordable HIV medicines can't be used by pregnant woman or young children. Our technology will allow them to take this. Stribild and other HIV medicines have only been tested on pregnant animals. The results of this test cannot be lead to conclude anything that would allow the pill to be safe for an unborn baby. This is because of the high amount of harmful ingredients that could harm baby or young child. However, in AFOOFA we lowered these amounts. To make sure this pill would be safe, more tests and studies would half to be done.

Another discovery that needs to happen is to study whether excreting the sensor will be harmful. The study would have to experiment if small bag with the sensor in it could pass through the kidneys and be urinated. The study would show if the sensor is painful to excrete. This study will make sure the patient feels as little pain as possible and comfort while the sensor is eliminated from the body.

Design Process

There were many factors that played a role into designing this project, many of which our group members came up with as a future technology to treat our chosen disease. One idea that our group member thought of was a pill that would lower the symptoms. We rejected this pill for a number of reasons. The first reason for rejection was that this pill did not accomplish much to help with HIV. The second reason was that this was not a strong technology and we assumed that this pill if not already made, could easily be produced. Another idea that a group member thought of was a cover to put over the breast with a filter to trap HIV infection while breastfeeding to prevent the infection from being spread. We thought that this would be a good idea but when we started researching for this technology, we found that the all of the materials needed as well as all of the tests needed to approve the cover would be too costly. We also could not risk testing on breastfeeding women, and harming their baby. The final idea that our group member had in mind was a vaccination that would increase the CD4 cells in the immune system. The reason why we rejected this idea was, because there is already a vaccination discovered by doctors and scientists that couldn't the copies of HIV being made were already in existence and it was too common for a technology created in 20 years. We finally chose the

idea of a pill made of a mixture of medications that would decrease the amount of HIV in the blood and lower the symptoms of HIV. This pill would also include a sensor inside of it and take a scan of the blood after the medications have taken effect in the body. We took all of the previous ideas into great consideration, but we chose this pill with a sensor because it will take 20 years to produce and to be tested to allow patients to consume the treatment.

Consequences

AFOOFA has very little consequences that will keep patients of HIV from using this pill. Compared to Stribild, AFOOFA is a much better pill to use and is usable for a wider range of patients. AFOOFA is not yet known if it can be used by breastfeeding women. It also may cause discoloration or change in the immune system.

Breastfeeding women might be at risk of health issues for themselves and the baby if they take AFOOFA. It is not known if the pill can possibly harm the baby if it breastfeeds, and if it will cause health problems for the mother. There is only a slight chance that a baby can get HIV passed on from the mother, but suggest that you avoid AFOOFA during these times until further tests are done.

The second drawback to this pill is that people may experience discoloration in the skin. You may notice you skin becoming slightly darker, lighter, or a little yellow. This pill contains the active ingredient Emtrictabine which has a side effect of possible skin color changes. This will not put your health in jeopardy. It will only change your physical appearance.

There are also some positive consequences to AFOOFA; it decreases the amount of HIV in the blood stream making the immune system stronger, lowers the symptoms of HIV, and uses Bluetooth technology. By decreasing the amount of HIV in the blood, the immune system becomes stronger because of its ability to fight disease. AFOOFA also lowers symptoms; less HIV in the blood means there are fewer symptoms and some of the medications in AFOOFA help deal with symptoms. AFOOFA also uses Bluetooth technology which helps patients transfer their results in an advanced way.

1542L-All for One, One for All (AFOOFA)

Bibliography

Aids Info. Aids Info, n.d. Web. 24 Jan. 2014. <http://aidsinfo.nih.gov/>.

BETA. San Francisco AIDS Foundation, n.d. Web. 24 Jan. 2014. <http://betablog.org/hiv-cure-research-update/>.

Britannica Academic Edition. Encyclopædia Britannica Incorporated, n.d. Web. 24 Jan. 2014. <http://www.britannica.com/EBchecked/topic/46868/AZT>.

CDC. U.S. Department of Health and Human Services, n.d. Web. 24 Jan. 2014. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5521a4.htm>.

Gale Science in Context. Gale Cengage Learning, n.d. Web. 24 Jan. 2014. <http://ic.galegroup.com/ic/scic/ReferenceDetailsPage/ReferenceDetailsWindow?failOverType=&query=&prodId=SCIC&windowstate=normal&contentModules=&mode=view&displayGroupName=Reference&limiter=&u=balt23720&currPage=&disableHighlighting=false&displayGroups=&sortBy=&source=&search_within_results=&p=SCIC&action=e&catId=&activityType=&scanId=&documentId=GALE%7CCV2431500326>.

Healthline. Healthline Networks, Incorporaated, n.d. Web. 24 Jan. 2014. <http://www.healthline.com/health/hiv-aids/history-of-the-hiv-virus>.

Isentress. Merck Sharp and Dohme Corporation, n.d. Web. 24 Jan. 2014. <http://www.isentress.com/raltegravir/isentress/consumer/how_isentress_works/index.jsp

Luminex. Luminex, n.d. Web. 20 Jan. 2014. <http://www.luminexcorp.com/blog/luminex-multiplexing-technologies-help-identify-plasma-biomarkers-for-metabolic-abnormalities-in-hiv-infected-individuals/>.

Mayo Clinic. Mayo Foundation for Medical Education and Research., n.d. Web. 24 Jan. 2014. <http://www.mayoclinic.org/diseases-conditions/hiv-aids/basics/definition/CON-20013732>.

MNT. MNT, n.d. Web. 24 Jan. 2014. <http://www.medicalnewstoday.com/articles/249509.php>.

National Institute of Allergy and Infectious Diseases. U.S. Department of Health and Human Services National Institutes of Health, n.d. Web. 24 Jan. 2014. <http://www.niaid.nih.gov/topics/HIVAIDS/Research/vaccines/Pages/default.aspx>.

NCI. NCI, n.d. Web. 24 Jan. 2014. <http://www.ncbi.nlm.nih.gov/pubmed/21430338>.

Office of Population Affairs. U.S. Department of Health & Human Services, n.d. Web. 24 Jan. 2014. <http://www.hhs.gov/opa/reproductive-health/stis/hiv/>.

PBS. WGBH educational foundation, n.d. Web. 24 Jan. 2014. <http://www.pbs.org/wgbh/pages/frontline/aids/virus/origins.html>.

San Francsico Aids Foundation. San Francisco AIDS Foundation, n.d. Web. 24 Jan. 2014. <http://www.sfaf.org/hiv-info/basics/is-there-a-cure-for-hiv-aids.html>.

SCI. Discovery Communications, limited liability company, n.d. Web. 24 Jan. 2014. <http://www.sciencechannel.com/life-earth-science/10-deadly-diseases.htm>.

Stribild. Gilead Sciences, Incorporation, n.d. Web. 24 Jan. 2014. <http://www.stribild.com/taking-stribild>.

A Timeline of Aids. U.S. Departent of Health and Human Services, n.d. Web. 24 Jan. 2014. <http://aids.gov/hiv-aids-basics/hiv-aids-101/aids-timeline/>.

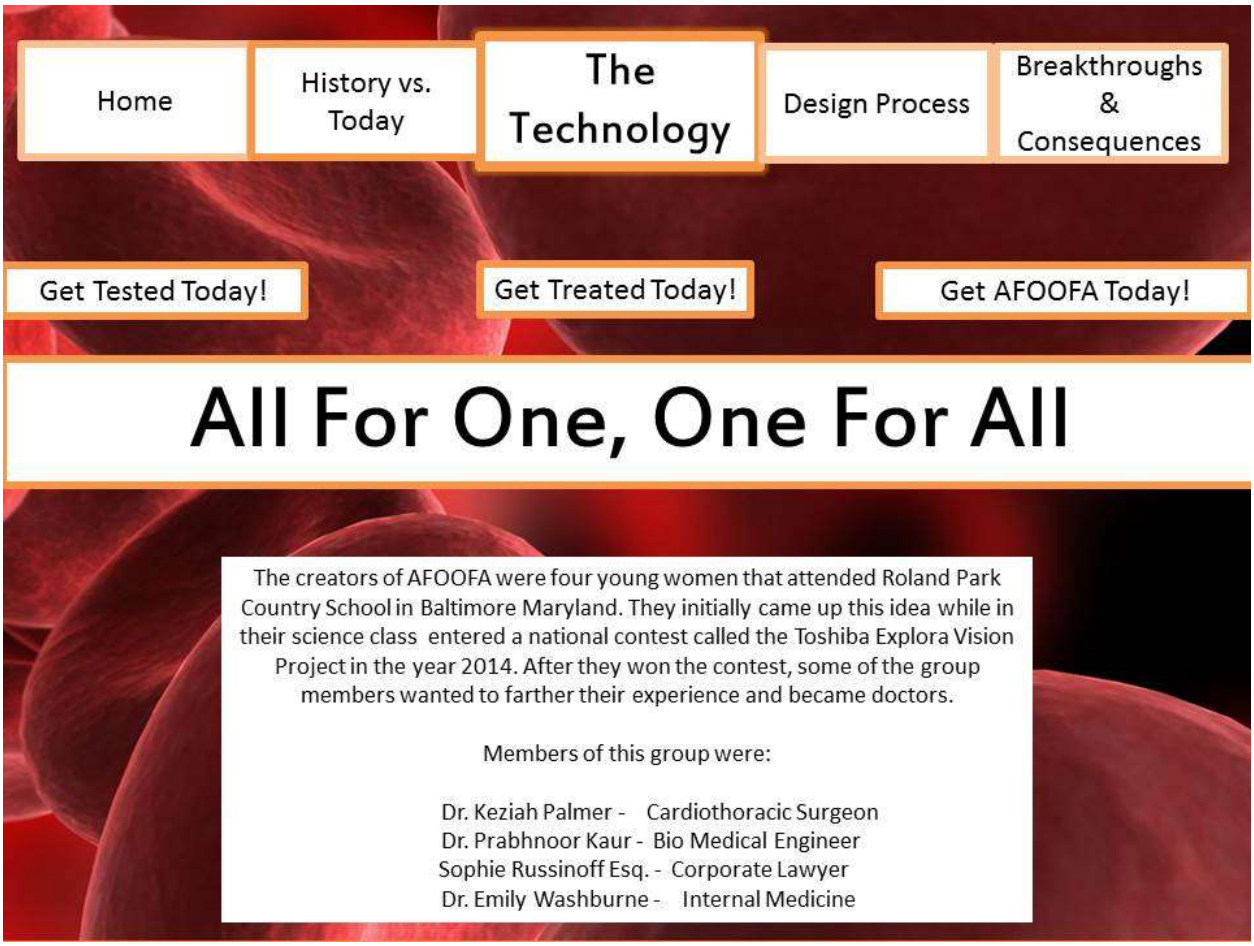
Truvada. Gilead Sciences, n.d. Web. 20 Jan. 2014. <http://start.truvada.com/individual/hiv-prevention-medicine#>.

U.S. Department of Veterns Affairs. U.S. Department of Veterans Affairs, n.d. Web. 24 Jan. 2014. <http://www.hiv.va.gov/patient/basics/what-is-HIV.asp>.

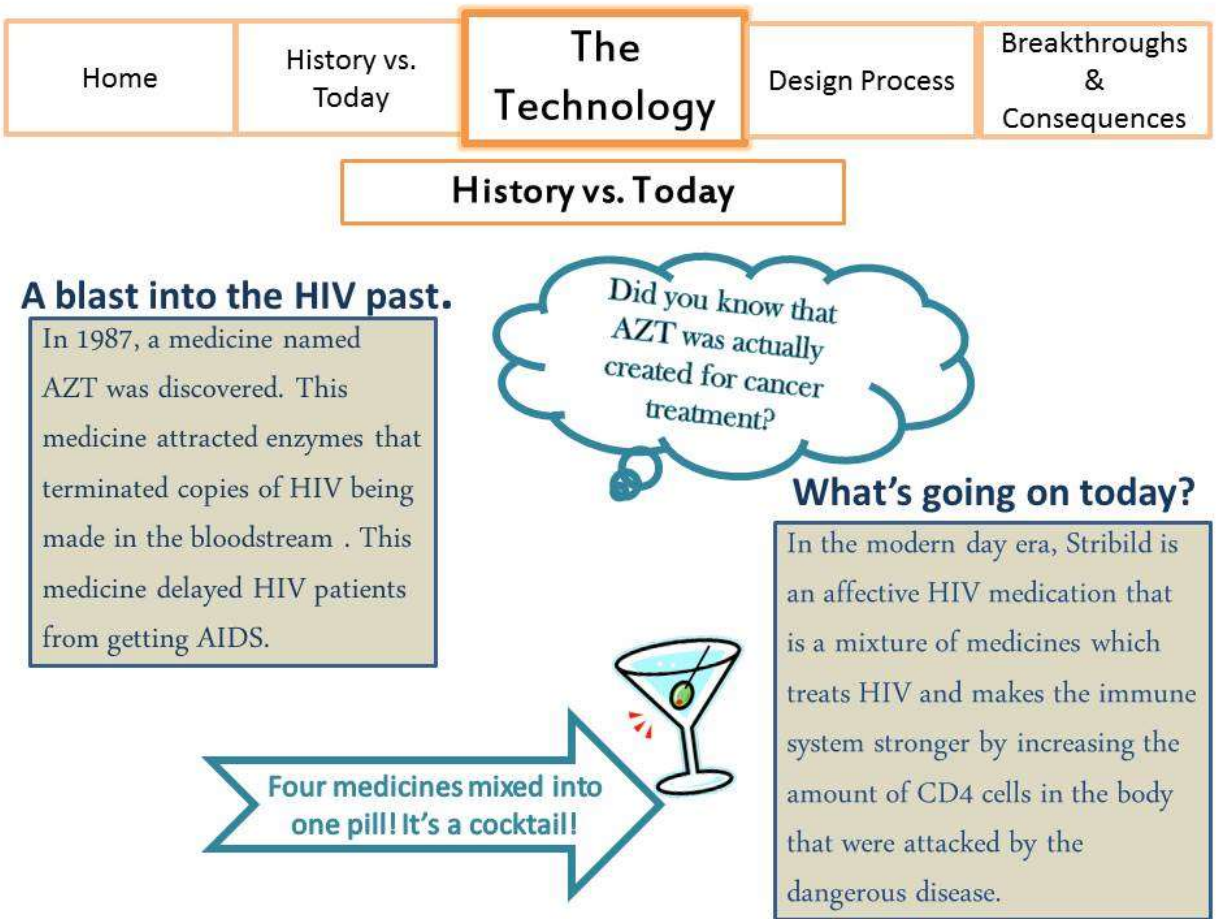
U.S. Food and Drug Administration. U.S. Food and Drug Administration, n.d. Web. 24 Jan. 2014. <http://www.fda.gov/ForConsumers/ByAudience/ForPatientAdvocates/HIVandAIDSActivities/ucm117935.htm>.

Web MD. WebMD, LLC., n.d. Web. 24 Jan. 2014. <http://www.webmd.com/hiv-aids/guide/hiv-vaccines-where-are-we-now>.

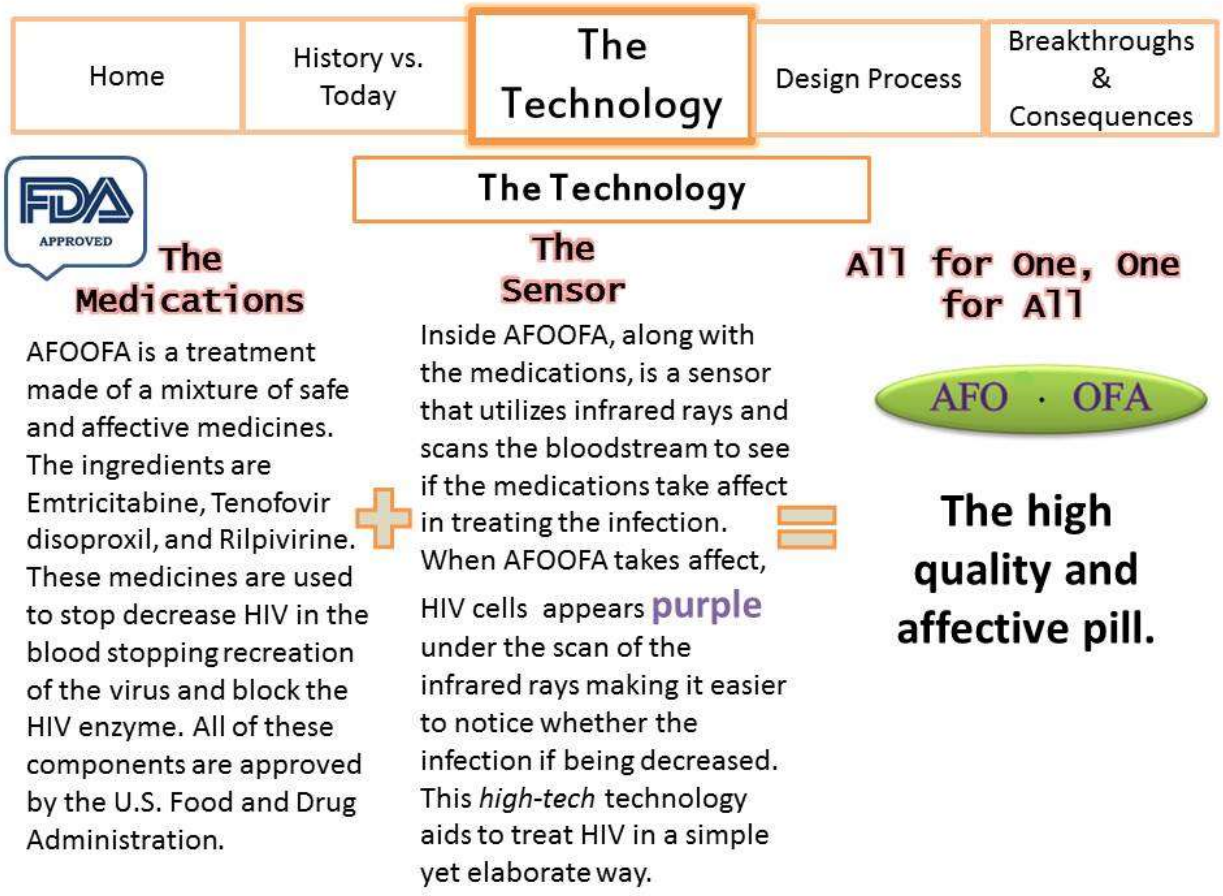
Sample Web Page 1



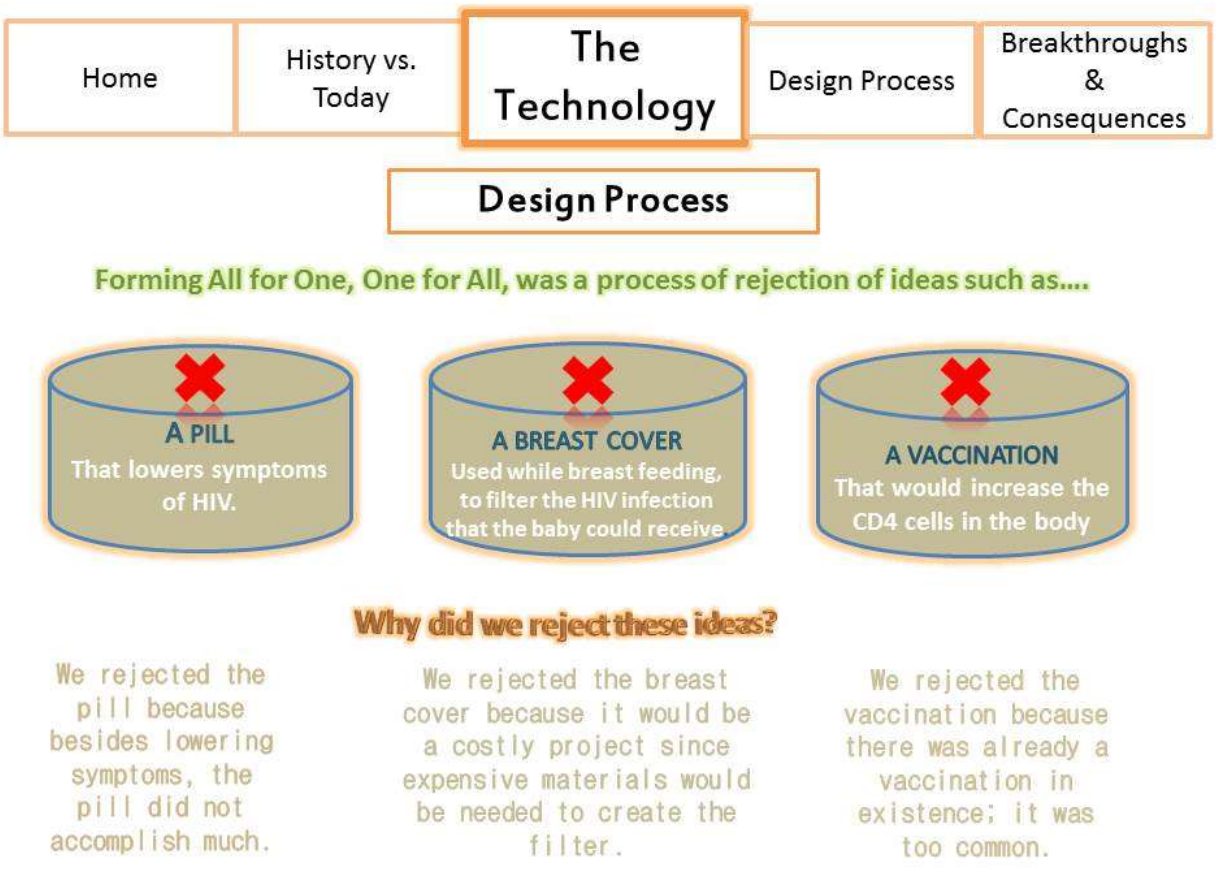
Sample Web Page 2



Sample Web Page 3



Sample Web Page 4



Sample Web Page 5

Home	History vs. Today	The Technology	Design Process	Breakthroughs & Consequences

Breakthroughs and Consequences

AFO · OFA

Breakthroughs

AFO · OFA

AFOOFA is accomplishing many things that other HIV medicines have failed to do. We have fulfilled the requests of many HIV victims by making this pill usable for teens, and pregnant women, and we have used Bluetooth technology to get results for the levels of HIV in blood. This was accomplished due to tests that confirmed the pill is safe for young or not born children. We also tested to see of it is safe and painless for the sensor to pass through your liver and be excreted into your body which we found is not painful at all.

Consequences

Like all things, there are consequences. AFOOFA has very few consequences compared to many other medicines. One consequence is that it is not known if AFOOFA is safe for breastfeeding women. The active ingredients are not known if they can harm the baby or the mother. AFOOFA may also cause discoloring in the skin and change in your immune system. If any of these things happen to you, contact a health specialist.