

The Cure for Cancer Lies in the HIV Virus?

Roberta Dume

Department of Chemistry, Lake Forest College

Imagine that you have been suffering from an aggressive form of cancer. All possible forms of treatment have done little to stop the spread of the tumor. You think that all hope is lost until your doctor suggests a breakthrough treatment that is still in its trial stages. You think, "What more do I have to lose?" and decide to try it. A couple weeks later, your cancer is completely gone.

No, this isn't a fictitious story. This is exactly what happened to William Ludwig, a patient suffering from leukemia at the University of Pennsylvania a year ago. The innovative treatment used on William Ludwig is actually quite simple. What is perhaps the controversy around this treatment is the use of modified HIV viruses.

The HIV virus is in simplest terms a vector. By taking out all the viral RNA inside, the HIV virus becomes harmless. Doctors then inserted a mixture of human, mouse, and cow DNA back into the virus. Ludwig's T-cells (a white blood cell that is programmed to fight viruses and tumors) were then removed from his body and exposed to the modified HIV virus. These "infected" T-cells were injected back into the body. Keep in mind that HIV usually attacks the immune system. In this case, the HIV infected T-cells attack the cancerous B-cells (lymphocytes that are responsible for making antigens in the body) and healthy B-cells as well. The T-cells multiplied and created a memory in the body to kill any future B-cells, preventing any type of leukemic cancer to form. Because the patient doesn't have any more B-cells present in the body, the patient would have to be injected with infusions of immune globulin to help protect himself against immunodeficiency.

This seems to be foolproof on paper. However, the side effects that the body faces after injection of modified T-cells are torturous if not dangerous to a suffering cancer patient. After ten days of administering the treatment, Ludwig experienced such shaking chills and high fevers that he was moved to the intensive care unit for what seemed to be deadly flu-like symptoms. A few weeks later, the symptoms passed, as did the cancer. A CT scan showed no bulging cancerous lymph nodes. After one year, Mr. Ludwig is still in remission and has returned to a seemingly normal life, though his doctors clearly state that Mr. Ludwig is not cured, for it is too soon to tell.

So what's the catch? This treatment was tested on two other patients with chronic lymphocytic leukemia when a bone marrow transplant wasn't an option for treatment. One patient had partial remission where the second had full remission. Doctors say that this is not something that is available for all patients as a form of treatment now; it is still in its experimental stage. They aren't even sure which component of the treatment is the key to killing the cancer: the use of the HIV virus to carry new genes or the particular pieces of DNA selected to go back into the HIV virus. These must be kept in mind when deciding how effective this treatment is at this stage.

So what do you think? Pete Jansen '11, an English and politics double-major at Lake Forest College said, "Although this experimental treatment miraculously cured two people, I can't help but wonder how many unsuccessful experimental treatments there have been that aren't celebrated in the media. Of course, this study is highly encouraging and deserves close scrutiny. However, I refuse to get my hopes up until this procedure has been tested on a sample size larger than three people." I asked Kristen Braun '11, a biology major at Lake Forest College, what her

thoughts were as a scientist reading about this novel research. She said, "I think that this treatment is really interesting, and I know that they are experimenting with the same type of methods when treating AIDS patients. As far as being practiced in the near future, I feel like it is far from becoming the "norm" of cancer treatments. These types of procedures are not only risky but expensive. As prevalent as cancer is and with the current state of our health care system, I don't see this becoming something readily available to the public in the next few years. Overall, though I think it is a remarkable advance and defiantly a step closer to a "cure" for cancer."

Kristen is also a cancer survivor herself. I asked her as a patient if she thought that this research is giving other cancer patients false hope or if it can be used as a positive sign to help keep patients fighting. Her response: "Cancer is a broad term. It can mean anything from an abnormal mole to stage-three lymphoma. I feel that the people this new treatment will help most are those with terminal cancers. At a point when the outlook is that bleak, I feel like hope is something that a person has to look to other sources for besides medical treatments. It is a long ways away from being offered to your average cancer patient, and I feel like everyone is aware of new drugs and treatments happening all of the time. For this reason, I do not feel like this is giving patients false hope; they expect a treatment to work, and if they are getting hope from faith in modern medicine, this one new treatment won't be the only medical miracle patients hope for."

It seems that both a layperson and scientist feels that this novel treatment is far from being used as a treatment option at hospitals around the country. However, both can agree that these findings show promise in the near future. For now, Mr. Ludwig is a living example of what is possible in the future for millions of other cancer patients.

Citation:

Grady, D. (September 12, 2011). An Immune System Trained to Kill Cancer. *The New York Times*, Retrieved from http://www.nytimes.com/2011/09/13/health/13gene.html?_r=1&pageant=anted=all



Dr. Carl June observing re-engineered T-cells

Photo taken from:

http://www.nytimes.com/2011/09/13/health/13gene.html?_r=2&pageant=anted=all

Note: Eukaryon is published by students at Lake Forest College, who are solely responsible for its content. The views expressed in Eukaryon do not necessarily reflect those of the College. Articles published within Eukaryon should not be cited in bibliographies. Material contained herein should be treated as personal communication and should be cited as such only with the consent of the author.

