HIV: 30 years later

The Role Played By the Cell Membrane

Nsama P. Okeowo
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How Did it all start?

I was privileged to attend the Bite of Science seminar under Enrichment Program (TEP) at George Mason University, Manassas campus earlier this year;

There were several presentations by university researchers, Lockheed Martin engineer and others that day but, the one on HIV caught my eye for various reasons;

I learned of many STEM resources to help me improve my lesson delivery and inspire my students to consider careers in scientific research;

After the seminar, I looked up the Clearinghouse and got hooked to a research center in my region. I have been inspired to keep learning and sharing.
The HIV/AIDS presentation was made by Professor Yuntao Wu

What Is HIV?

• HIV stands for Human Immunodeficiency Virus;
• A virus is a small (20-400nm) infectious particle that has nucleic acid enclosed in its protein coat;
• Viruses cannot reproduce on their own: they need a host;
• There are several groups of viruses based on their size and structure;
• The Human Immunodeficiency virus belongs to the Retrovirus group;
HIV FACTS
Looking back

Soon after “patient zero” was identified in 1981, efforts were made in locating his partners from LA to New York and several other locations in order to get a good understanding of this new disease.

But, what was happening in other parts of the World and how fast did it take for HIV to get there?

The information I will share is based on what I saw in Zambia between 1985 and 1995 and how I apply this experience to teaching middle and high school students the infection process.
I had the unfortunate opportunity of attending over 100 funerals of men, women, and children who were victims of HIV/AIDS.

Initially, because of the symptoms and ultimate miserable deaths, HIV was thought to be the work of witches and wizards in many African countries. It took almost 10 years to sensitize the people on the danger of unprotected sex, promiscuity, polygamy, etc.

The community very quickly learned how to “diagnose” this new illness and give a prognosis – death.

Obituaries never listed HIV/AIDS as the cause of death: It was usually “long illness”, pneumonia, malaria and/or cancer.
As scientists look for a cure today, it is important to look at the role the cell membrane plays in HIV infection.

To even think of a cure, one has to have an understanding of how the infection occurs. Almost all students can describe the cell membrane when asked to as “is what forms the boundary between a living thing or organ and its environment, it has layer of 2 phospholipids (head & tail each), selective permeability, etc. But, how exactly does the Human Immunodeficiency virus infect its host?
How does the HIV virus enter the Cell?

The model below is what I use to help my students visualize the relationship between the cell membrane and pathogens like HIV.

A clear understanding of lymphocytes (NK’s, B-cells, & T-cells) is key in demonstrating how the body attempts to protect itself. There are several ways that students can be made to participate in hypothesizing likely solutions to HIV infection based on their academic level.
Dr. Yuntao Wu’s research has discovered exactly how the virus infects healthy T-cells: . The healthy T-cells are tricked into producing more HIV viruses.

The cure lies in creating a protection for the T-cells. Dr. Wu is currently working on this protection called the Trojan®.
Dr. Wu’s team is developing a technique using a protein that will be able to inhibit the virus from binding on to the receptors of the T-Cells Subsequently disabling transcription of the virus.

As educators, we owe it to our students to present concepts like cell transportation in a manner that makes them (students) curious and eager to learn and enter into the research world.
Researchers will continue to study ways of preventing HIV infection and end this epidemic.

The Howard Hughes Medical Institute (HHMI) hold summer lectures to the public. Students considering careers in biosciences, medicine and general research are encouraged to participate.