

# A Nanocure for AIDS

A short play describing an innovative nanotechnology-based solution for the prevention and cure of AIDS.

## Cast:

CD4 Lymphocyte1

CD4 Lymphocyte2

HIV1

HIV2

Trappa-Lappa1

Trappa-Lappa2

HIV Extinguisher

## Costumes:

CD4 Lymphocytes wear white T-shirts marked 'CD4 Lymphocyte.' HIVs wear black T-shirts marked 'HIV.' Trappa-Lappas wear red T-shirts marked 'Trappa-Lappa' decorated with neon slinky rings and rainbow hair wigs. HIV Extinguisher wears a box outfit to represent the LASER box.

## Props:

Trappa-Lappa's carry models of functionalized buckeyballs made from Zome Tool construction kits. HIV Extinguisher carries a plastic StarWars light saber representing the LASER beam.

## Script:

[All cast on stage in a single row toward back of stage area. Row left to right is CD4 Lymphocyte1, HIV1, HIV2, Trappa-Lappa1, Trappa-Lappa2, HIV Extinguisher, and CD4 Lymphocyte2.]

CD4 Lymphocyte1:

There have been several nanotech breakthroughs in the medical field including, biomedical solutions for disease, targeted drug delivery, and visualization of biological processes in the human body.

HIV1:

The Lab-On-A-Chip concept where an entire lab is miniaturized into a microchip using microfluidics, could be helpful in sampling, testing and diagnosing diseases and toxins in the human body.

HIV2:

Implanting a sensor in the body could aide doctors in evaluating a patient at all times, not just when they come to the office or lab. The sensor could remotely signal the doctor when necessary.

Trappa-Lappa1:

Growing and replacing tissue, possibly even whole organs is another area in which nanotech materials are being investigated. This could greatly reduce the waiting time and risk of rejection.

Trappa-Lappa2:

Nanoshell-Assisted Tumor ablation is being used to seek and destroy tumor or cancer cells. The nanoshell is functionalized to attach to the targeted cells.

HIV Extinguisher:

Once attached, the nanoshell is heated with a laser for that specific wavelength of light, the nanoshells heat and kill the cellular material which it is attached to and leave the neighboring healthy cells alone.

CD4 Lymphocyte2:

We believe that nanotechnology will bring the cure for AIDS. Here's how it will work:

[CD4 Lymphocytes step forward.]

CD4 Lymphocyte1 & CD4 Lymphocyte2:

Hi, We are white blood cells.

CD4 Lymphocyte1:

White blood cells or leukocytes are cells that fight invading viruses in the body. Leukocytes are a vital part of the body's immune system. There are anywhere from 7,000 to 25,000 white blood cells in a drop of blood. We are special type, of white blood cell called a helper T cell or a CD4 lymphocyte.

CD4 Lymphocyte2:

We secrete small proteins to help the 'killer' T cells destroy viruses. We are manufactured in the thymus.

[HIVs step forward.]

HIVs Together:

We are the HIV virus.

HIV2:

HIV is a virus that duplicates by entering a healthy white blood cell. It attacks the receptor and breaks in. HIV'Stops your immune system and prevents you from being able to fight off other diseases. People think that humans got AIDS from monkeys. Currently there is no cure for AIDS but there are many medications that help people live longer and with fewer symptoms.

#### HIV1:

The first case of AIDS in the US was reported in 1981 but it was probably around for many years before then. By the end of 1987, there were 71,000 confirmed cases of AIDS and 40,000 deaths in the US alone. 40% of the people in sub-Saharan Africa are still infected with HIV. In 2005 more than 40 million people had AIDS.

#### HIV2:

Like most viruses, HIV is strands of genetic code wrapped in protein. There are spikes outside your immune system called T-cells which let the virus in. You can't get AIDS from insects, food, and places like public pools. HIV cannot live outside the body. That is why touching someone with AIDS cannot hurt you. HIV can only travel by body fluids.

[CD4 Lymphocytes and HIVs begin moving slowly around each other in a small circle and continue walking as Trappa-Lappa's step forward.]

#### Trappa-Lappas Together:

We are the Honey-pot trappa-lappa super duper trappers. Also known as the Trappa-lappas.

#### Trappa-Lappa2:

The trappa-lappa is a vaccination for Acquired Immune Deficiency Syndrome or AIDS. It is sent into the body by injection. Millions of Trappa-lappas are sent into the body with the vaccine. Unlike Leukocytes, Trappa-lappas are on the Nano scale. A person would need a booster shot about every five years to replace the Trappa-lappas that are filtered out of the blood stream by the kidneys. Our solution is similar to the nanoshell-assisted tumor ablation. First, nanotubes are wrapped in DNA strands. This fabrication attracts the HIV which wants to use DNA to replicate.

#### Trappa-Lappa1:

We functionalize the nanotube-DNA structures to be more attractive to HIV than natural DNA used for replication in cells. This is our 'honey-pot trap' for the HIV. Once trapped, the HIV can no longer replicate. The nanotubes are also functionalized with nanoshells that absorb infrared light.

[Trappa-Lappas start moving in the circles with the CD4 Lymphocytes and the HIVs. After some mingling, each Trappa-Lappa 'captures' an HIV by touching with the functionalized buckyball. HIV Extinguisher steps forward.]

#### HIV Extinguisher:

I am the HIV Extinguisher, a nanorobot this is injected into the body along with the Trappa-Lappas. After the HIV are trapped by the trappa-lappas, the region is heated with a LASER. The nanoshell heats up, destroying the materials which become waste products eliminated by the body.

[The HIV Extinguisher goes up to each Trappa-Lappa-connected-to-HIV and sticks LASER beam in the buckey ball. The HIVs 'die' dramatically falling to the floor.]

CD4 Lymphocyte1:

We believe that advances in nanotechnology can bring about the end of diseases such as AIDS, cancer, TB. However, there are concerns about whether these drugs would be available to the poor who are suffering from these diseases. Since AIDS is such a serious problem in Africa, it would be important to find a way to make this technology available to people there in all parts of the world regardless of their ability to pay.

CD4 Lymphocyte2:

Thank you. Do you have any questions?