

Educational model to illustrate HIV infection cycle

Product Design Specification Report

Team Members

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Problem Statement

Our client, Marge Sutinen of the UW School of Medicine and Public Health, works to educate students on the permanent effects of HIV in her Contemporary Issues in HIV/AIDS Prevention course. She has asked our team to develop a three dimensional model that captivates the attention of a class of undergraduates and visually illustrates the HIV attachment to CD4 receptors on helper T cells, the permanent effect it has on the body, as well as the differences between HIV and other viruses. This model will be used as an aid in demonstrating the irreversibility of contracting the HIV virus to persuade students to use preventative measures to protect themselves.

Client Requirements

- The model must be able to be easily transported to and from the classroom.
- The model must be clearly seen from a distance of 6 meters.
- The model must be 3 dimensional and color coordinated.
- The model should be directed towards college undergraduate students with minimal scientific knowledge.
- The number of separate pieces and need for assembly should be minimized.
- The model must be audience captivating.
- The model must show the difference between HIV and other viruses

Design Requirements

Physical and Operational Requirements

- a) *Performance Requirements* – The device will only be used for about one lecture every semester. It should be durable enough for handling and viewing in the classroom and be able to be passed around by the students. It should also be functional after being in storage for a long time between uses.
- b) *Safety* – The model should have an absence of sharp edges and an abrasive surface. There must be no parts that provide a safety hazard to our client during transportation or operation. It must be able to be handled often.
- c) *Accuracy and Reliability* – It does not need to be biologically proportional to an actual cell. It is not intended for exact structure and scientific use. It only needs to be a general representation of the structure, emphasizing the parts involved in the process. The parts should not deform once the model is disassembled and the parts should fit back together for easy assembly.

- d) *Life in Service* – The parts should not wear over time. The model will be a teaching tool for undergraduate students during its lifetime.
- e) *Shelf Life* – The model will spend the majority of its time in storage as it will only be used for about one lecture every semester. Thus the model should not be composed of any materials that will degrade while in storage.
- f) *Operating Environment* – The model will be displayed and operated by one person as a teaching tool for students. The model will be operated at room temperature and pressure.
- g) *Ergonomics* – Model must not injure or cause harm to user. Parts should be large enough to handle easily. The torque required for screwing on and off and releasing parts should be reasonable. It should run smoothly and efficiently during each run.
- h) *Size* – The model should be easily transported by one person to and from class. Approximate size no larger than 1 m x 1 m x .5 m.
- i) *Weight* – The model should be easily carried by one person. Approximate weight no more than 5 kg.
- j) *Materials* – All materials need to be non-radioactive, non-flammable, and non-corrosive.
- k) *Aesthetics* – The model should be pleasant to touch, comfortable to hold, and have soothing colors.

Product Characteristics

- a) *Quantity* – One prototype
- b) *Target Product Cost* – Must be around \$100.

Miscellaneous

- a) *Standards and Specifications* – N/A
- b) *Customer* – The model must be easy to view and be understandable by undergraduate students with minimal scientific background.
- c) *Patient-related concerns* – The model should be able to be sterilized to prevent contact transmission of viruses such as H1N1.
- d) *Competition* – There are similar items on the market but none that are marketed towards our target audience and effectively demonstrate the severity of HIV.