



Influenza

STEM Sims

Lesson 1: Attaching Proteins

Influenza, also known as the flu, is a disease caused by viruses that have RNA as their genetic material. The RNA inside the virus encodes for specific proteins that aid in the spread of the virus. Hemagglutinin (HA) is a large protein whose purpose is to bind the virus to cells that are being infected. Neuraminidase (NA) is another large protein whose purpose is to break apart the infected cell and the virus so that it can then infect more cells. The RNA inside the virus codes for which HA and NA proteins attach to the virus walls, called capsids. Can you build the receptor binding proteins?

Doing the Science

1. Start the Influenza Simulation by clicking on the “Sim” tab.
2. The RNA inside the influenza virus will code for the NA and HA proteins on the outside of the capsid.
3. Click and drag one of the NA proteins icons onto the outer surface of the influenza virus capsid.
4. Click and drag one of the HA proteins icons onto the outer surface of the influenza virus capsid.
5. Click on “Check Your Build” to see if the correct proteins are attached.
6. If the build was incorrect, repeat steps 3-5 with a different combination of NA and HA proteins.
7. Record the colors of the NA and HA proteins in Table 1 below.
8. If the build was correct, click on “New Virus” to try different RNA combinations.
9. Repeat steps 3-8 for a total of five trials.

Table 1.

Trial	NA Protein	HA Protein
1		
2		
3		
4		
5		

Do You Understand?

1. What would happen if a part of RNA was damaged? Explain.

2. How many different possible combinations of the virus cell can there be if there are four different NA proteins and seven different HA proteins?