TITLE:

Antigens and Antibodies

PREPAREDBY:

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DCPS STANDARDS:

7.7.7

Know that antibodies produced in response to an invader can remain for long periods in the system and can fight off subsequent invaders of the same kind.

GOALS:

1. Scholars will learn the definition of antibodies and antigens.

2. Scholars will understand what allows visualization of antibody-antigen binding

OBJECTIVES:

1. Scholars will demonstrate the binding of antigens and antibodies by linking arms with their corresponding molecule

2. Scholars will predict the visualization of various antigen – antibody bindings

3. Scholars will use the punnet square to predict inheritance of blood types

PREREQUISITE KNOWLEDGE:

Blood Types: What's Your Type?

In some ways, every person's blood is the same. But, when analyzed under a microscope, distinct differences are visible. In the early 20th century, an Austrian scientist named Karl Landsteiner classified blood according to those differences. He was awarded the Nobel Prize for his achievements.

Landsteiner observed two distinct chemical molecules present on the surface of the red blood cells. He labeled one molecule "A" and the other molecule "B." If the red blood cell had only "A" molecules on it, that blood was called type A. If the red blood cell had only "B" molecules on it, that blood was called type B. If the red blood cell had a mixture of both molecules, that blood was called type AB. If the red blood cell had neither molecule, that blood was called type O.

If two different blood types are mixed together, the blood cells may begin to clump together in the blood vessels, causing a potentially fatal situation. Therefore, it is important that blood types be matched before blood transfusions take place. In an emergency, type O blood can be given because it is most likely to be accepted by all blood types. However, there is still a risk involved.

A person with type A blood can donate blood to a person with type A or type AB. A person with type B blood can donate blood to a person with type B or type AB. A person with type AB blood can donate blood to a person with type AB only. A person with type O blood can donate to anyone.

A person with type A blood can receive blood from a person with type A or type O. A person with type B blood can receive blood from a person with type B or type O. A person with type AB blood can receive blood from anyone. A person with type O blood can receive blood from a person with type O.

Because of these patterns, a person with type O blood is said to be a universal donor. A person with type AB blood is said to be a universal receiver. In general, however, it is still best to mix blood of matching types and Rh factors.

How are blood types related to the six genotypes?

A blood test is used to determine whether the A and/or B characteristics are present in a blood sample. It is not possible to determine the exact genotype from a blood test result of either type A or type B.

If someone has blood type A, they must have at least one copy of the A allele, but they could have two copies. Their genotype is either AA or AO. Similarly, someone who is blood type B could have a genotype of either BB or BO.

Blood type	Possible genotypes
A	AA AO
B	BB BO

A blood test of either type AB or type O is more informative. Someone with blood type AB must have both the A and B alleles. The genotype must be AB. Someone with blood type O has neither the A nor the

B allele. The genotype must be OO.

Blood type	Possible genotypes
AB	AB
O	OO

ESSENTIAL QUESTIONS:

1. What are blood types and how do we inherit them?

LABORATORY MATERIALS:

Index cards or paper with either A, B, O, AB, anti-A, or anti-B written on it.

ACTIVITY

After a short lecture, students will be given a piece of paper and asked to arrange themselves the way antibodies and antigens would. Those with an anti-A will find a student with either an A or an AB and will link arms. The O's should not have anyone liked to them. From this the students will see how antibodies and antigens form complexes in the body. Some students will have only one person linked to them, some will have two, some won't have any. Students will be asked to make predictions about how this helps us visualize interactions.

DIFFERENTIATING INSTRUCTION:

English Language Limited students should have no problems with this activity.

RATIONALE:

This activity is designed to demonstrate the interactions of antibodies and antigens in the body, and how we are able to visualize these interactions

EVALUATION AND ASSESMENT:

Students will be assessed on how they link up with other students. They will also be asked to predict which interactions will be visible to the naked eye.