



**High School Science Virtual Learning**

**Forensic Science**

**ELISA**

**May 4, 2020**



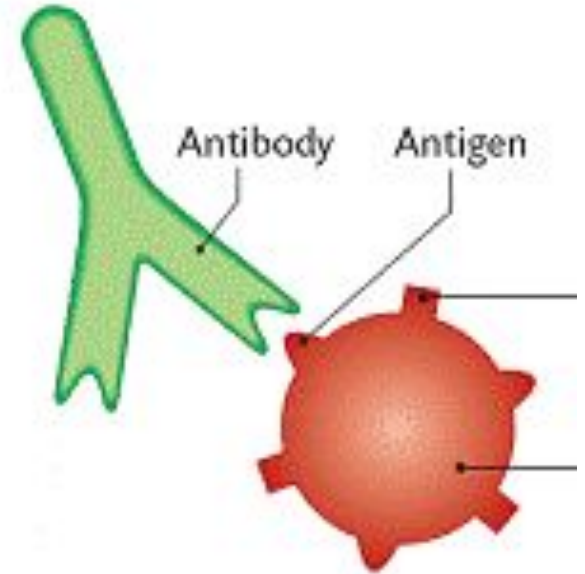
## High School Forensic Science Lesson: May 4, 2020

### **Objective/Learning Target:**

Students will learn what an ELISA test is used for. Students will then discover how it works and what biochemistry is crucial for an accurate test.

Consider the image shown to the right.

1. What is the purpose of antibodies inside a living thing?
2. What is the purpose of antigens on the surface of our cells?



1. Antibodies “combine” with other proteins and chemical structures in the body. By attaching, they are signaling the immune system that there is something foreign to the body present (bacteria, virus, etc.)
2. Antigens act as cell identifiers. Antigens on the surface of your cells allow your immune system to recognize those cells as your own, so it only will attack foreign cells.



# Lesson Activity:

**Directions:** Use this [Healthline article](#) to learn about how ELISA tests are used in the medical field. Answer the questions on the following slides.



# Practice

You will use the information from the activity on slide 5 to answer the following questions.



# Practice Questions

1. What does ELISA stand for?
2. What molecules does an ELISA test detect?
3. Write 3 examples of diseases that an ELISA test can detect.
4. What type of sample is needed to perform the test?
5. What does a lab technician do with the sample in the lab?
6. How would the lab technician know if you have antibodies present in your sample?



# Practice Questions ANSWER KEY

1. What does ELISA stand for? **enzyme-linked immunosorbent assay**
2. What molecules does an ELISA test detect? **ELISA detects the presence of antibodies related to certain infectious conditions.**
3. Write 3 examples of diseases that an ELISA test can detect. **HIV, Lyme disease, Rocky Mountain spotted fever, Zika virus**
4. What type of sample is needed to perform the test? **ELISA is usually performed with a blood sample.**
5. What does a lab technician do with the sample in the lab? **The lab tech will add your sample to antigens to see if they bind together.**
6. How would the lab technician know if you have antibodies present in your sample? **If antibodies are present, they will bind to specific antigens in the test. Special enzymes are used to show how much binding happens. This will give an estimate of how much antibodies are present in your blood for a specific antigen.**





# More Practice

Watch this [informational video](#) describing how an ELISA test works. Answer the questions associated with the video on the following slide.



## More Practice Questions

1. What is in the sample tubes? What is he trying to figure out through this test?
2. What is special about an antibody?
3. What do the proteins do when they are placed in the well plate?
4. Which color protein does the detection antibody stick to in the video?
5. What is a direct ELISA?
6. What additional component does an indirect ELISA use? Why is this beneficial?
7. What does the blocking agent do?



## More Practice Questions **Answer Key**

1. What is in the sample tubes? What is he trying to figure out through this test? **How much of a particular protein is in the mixture of protein (the original sample)**
2. What is special about an antibody? **They only bind/attach to a specific protein**
3. What do the proteins do when they are placed in the well plate? **Stick to the walls of the well plate**
4. Which color protein does the detection antibody stick to in the video? **The protein of interest in the video is the 'green' protein**
5. What is a direct ELISA? **ELISA method where the antibody with the color changing enzyme directly attaches to the protein of interest**
6. What additional component does an indirect ELISA use? Why is this beneficial? **Indirect ELISA uses a second antibody. This allows for much more specific targeting of proteins if necessary.**
7. What does the blocking agent do? **Prevents anything else from sticking to the side of the well plate.**



# Additional Information

[Using ELISA to learn about COVID-19](#)

[Pros and Cons of ELISA methods](#)