IMMUNOLOGY VIRTUAL LAB WORKSHEET

INTRODUCTION
Go to http://www.hhmi.org/biointeractive/immunology-virtual-lab. Start the Virtual Lab and maximize the screen if you wish. Answer the following questions in the spaces provided.

DIAGNOSIS
1. Where are antibodies found?
   __________________________________________________________
   __________________________________________________________

2. How can they be used in the laboratory?
   __________________________________________________________
   __________________________________________________________

3. What does ELISA stand for?
   __________________________________________________________
   __________________________________________________________

4. What are ELISA assays used for in labs?
   __________________________________________________________
   __________________________________________________________

5. What are the three important limitations of an ELISA? Explain each.

<table>
<thead>
<tr>
<th>Limitation</th>
<th>Explanation</th>
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**BACKGROUND**

1. What test can be used to determine whether a patient has an infectious or autoimmune disease?

_____________________________________________________________________________________
_____________________________________________________________________________________

2. What does a positive result indicate?

_____________________________________________________________________________________
_____________________________________________________________________________________

3. The watery fluid of the blood is called ____________________.

4. What is allowed to react with the target antigen?

_____________________________________________________________________________________
_____________________________________________________________________________________

5. Detection is possible when ____________________________________________________________________________.

6. Once isolated, the secondary antibody can be ___________________________________________
_____________________________________________________________________________________

7. What is the signaling system?

_____________________________________________________________________________________
_____________________________________________________________________________________

8. What happens when the appropriate chemical (substrate) is added?

_____________________________________________________________________________________
_____________________________________________________________________________________

9. How is the test quantified?

_____________________________________________________________________________________
_____________________________________________________________________________________

10. What does the amount of color reflect?

_____________________________________________________________________________________
_____________________________________________________________________________________
LAB NOTEBOOK
Proceed through the entire lab simulation protocol. Be sure to read the captions below the pictures (left side) and the information in the lab notebook (right side). Be sure to "start over" to begin the lab. You CANNOT skip any steps. Answer the following questions as you proceed.

1. What is systemic lupus erythematosus (SLE)?

2. From Figure 1 (click on it), what are the four steps of an ELISA protocol?
   a. 
   b. 
   c. 
   d. 

3. In step 1, you centrifuge the samples. What does a centrifuge do?

4. What are you preparing in step 2? Why are there three different solutions?

5. In steps 3 and 4, you prepare an ELISA plate. What has the ELISA plate been pretreated with? Why?
   a. What is the positive control? (Step 4)
   b. What is a primary antibody? Please define.
c. What is the negative control? (Step 4)
_____________________________________________________________________________________
_____________________________________________________________________________________

d. Why is it necessary to have a positive and a negative control? (Step 4)
_____________________________________________________________________________________
_____________________________________________________________________________________

6. Why incubate the plate in step 5?
_____________________________________________________________________________________
_____________________________________________________________________________________

7. Next, in step 6, the plate is washed. Why wash the plate?
_____________________________________________________________________________________
_____________________________________________________________________________________

8. In step 7, a secondary antibody is added. What is a secondary antibody? Please define.
_____________________________________________________________________________________

   a. What is the attached enzyme in this assay? (Step 7)
_____________________________________________________________________________________

   b. What is the specific substrate for HRP? What color does it produce? (Step 7)
_____________________________________________________________________________________

9. How can the yellow color be quantitatively measured? At what wavelength? (Step 10, in "why")
_____________________________________________________________________________________
_____________________________________________________________________________________
10. Record your results. Indicate on this page and on the computer which boxes turned color.

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<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>+ (positive)</th>
<th>– (negative)</th>
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<tbody>
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<td>1:2</td>
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</table>

11. Did you complete the ELISA correctly? (Yes/No) __________

If yes, proceed to #12 and #14.

If no, proceed to #13 and #14.

12. What do the results indicate about:

Patient A:

_____________________________________________________________________________________

Patient B:

_____________________________________________________________________________________

Patient C:

_____________________________________________________________________________________  

13. Explain what you did wrong and what you will need to do next time. For more information, check your printable summary page. Did your incorrect procedure provide you any results? Explain what went wrong.

_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________
14. This virtual lab was testing for lupus. How is this same test used to test for the presence of HIV? If the results for an HIV test were the same as in this exercise, what would they indicate about the three patients?

_____________________________________________________________________________________
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_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

AUTHOR
Edited by Susan Dodge and Laura Bonetta, HHMI; copyedited by Linda Felaco.