Case-It: ELISA

# West Nile Virus

**Background:**  West Nile virus (WNV) was first reported in the U.S. in 1997. It is spread by mosquitoes that bite an infected animal (usually a bird), and then bite another animal, transmitting the virus. In addition to birds, the virus can be spread to humans and other mammals including dogs, cats, and horses. It can also be transmitted via blood transfusion or organ transplant from an infected person. Many humans experience no symptoms, but about 20% will contract "West Nile fever", with fever, headache, body aches, nausea, and rash that can last for weeks. In a few cases (less than1%), the illness will become more serious, leading to permanent neurological effects such as muscle weakness, vision loss, and coma. There is no specific treatment for WNV illness. Diagnosis of WNV infection is accomplished by detecting virus proteins (by ELISA). Antibodies to WNV can be detected in the patient's blood by ELISA, but these may not be detectable until later in the infection process.

Note: An ELISA test is considered positive if the color production (absorbance) for a sample is at least twice the negative control value.

**Case A.**  The annual blood drive in Mitchell, SD is usually held during September each year. However, this year there was an outbreak of West Nile infections in mid-August. No one died, but at least 30 people were diagnosed with West Nile fever, and five cases were severe enough to require hospitalization. It is likely that many more people were infected with WNV but did not have symptoms, so all of the donated blood will be screened for antibodies to WNV. Any samples testing positive for antibodies indicate that that person has or has had the disease.

To analyze this case, run an ELISA on the set of 10 donated blood samples provided, testing them for antibodies to WNV proteins (Click the Method button on the 96-well plate and choose ELISA, then select the “**coat wells with proteins, use antibodies as samples**” option).

# Steps

1. After opening Case-It, click “96 well plate” on the bottom middle of your screen
2. A tray of empty wells should appear. Below the tray, from “Select method”, click ELISA and “Coat wells with proteins, use antibodies as samples”
3. Below this menu, you should see a “Protein” button and an “Antibody” button. Click “Protein”, find the “Cases” folder, then the “Infectious Disease” folder, find the “West Nile Virus” folder, then “Case A”, open the “ELISA” folder, and select the “protein WNV”.
4. Click and drag across all the wells. They should turn pink. Click “Load” and they should turn orange.
5. Click “Antibody” and open all the antibodies in Case A (e.g. anti case A, anti sample 1, etc.)
6. In the Open and Processed window (lower left), click the first antibody and drag it across the first column of wells. Their middle should turn pink. Then click Load and they will turn orange. Do this for each antibody, with one antibody per column.
7. After all antibodies have been added and loaded, click Run. The wells should turn to a blue color
8. Click “Options”, then “Data” and then “Absorbance”
9. In the grid to the right, you should see absorbance levels (how bright the color is). The higher the number, the brighter the color, and the more positive the sample is for West Nile Virus
10. Use this to determine who has the disease. Answer the questions on the other side.

Case-It: ELISA - Questions

Name: Hour Date:

Date Assignment is due: *end of the hour*  Why late?   
 Day of Week Date If your project was late, describe why

1. From your testing, please indicate which samples have West Nile Virus (the absorbance must be at least twice the value of the negative control). Write “POSITIVE” next to the samples that tested positive.   
   * Anti neg control
   * Anti WNV pos control
   * Anti sample 1
   * Anti sample 2
   * Anti sample 3
   * Anti sample 4
   * Anti sample 5
   * Anti sample 6
   * Anti sample 7
   * Anti sample 8
   * Anti sample 9
   * Anti sample 10
2. What are we actually testing for in ELISA, the disease, or something else? (Hint: it’s something else, but what?)

1. Should the individuals who donated the blood that tested positive for WNV be notified? Explain

1. Should the blood of people who tested positive be used for blood transfusions? Explain