

Activity 1.1.2. Antibiotics & 1.1.5: ELISA Extension

Introduction

Through your study of unit 1 of Medical Interventions you have investigated the workings of the immune system and learned how *antibodies* circulate to keep us healthy. Antibodies seek out and attach themselves to invaders, flagging them for destruction by the immune system. These antigens are molecules foreign to the body and can include bacteria, viruses and fungi. Since antibodies are extremely specific to the antigens they attack, these proteins can be used in the laboratory to help identify disease agents. The ELISA assay can detect disease agents in body fluids before the body has a chance to mount an immune response and produce antibodies. An ELISA can provide *qualitative results*, indicating whether a patient is positive or negative for the presence of the antigen or antibody, or an ELISA can provide *quantitative results*, determining how much of the detected substance is present.

In this extension activity, you will use ELISA data and antibiotic data to test correctly diagnose and treat the patients in the case studies.

Equipment

- Computer with Internet access
- Laboratory journal

Procedure

1. Using the knowledge you have gained in unit 1, analyze each case study and answer the questions associated with each case in your laboratory notebook.

Case Study #1

A 21 year old college student presents at the infirmary with a severe sore throat, fatigue and slight loss of appetite. When you asked about his history he mentions that his girlfriend had a sore throat about ten days ago and that she is still feeling bad today.

1. Based on the clinical symptoms what do you think the student may have?
2. You decide to run an ELISA test on this patient. Are you testing for an antigen or antibody?
3. If you are looking for an antibody what specific antibody are you looking for (defend your answer)?
4. If you are looking for an antigen what specific antigen are you looking for?
5. Draw and label the antibody structure.

Case Study #2

A 75 year old female in a nursing home complains of tightness in her chest coughing a lot the past few days. While visiting the physician she coughs up green sputum. The sample is sent to the microbiology lab for testing. Culture results show that she has a *Klebsiella pneumoniae* infection.

1. Explain what testing you will need to perform and what antibiotic you will use to treat her infection. As part of your explanation draw a picture of the test and the antibiotics you plan on testing.

Case Study #3

A 30 year old healthcare worker was possibly exposed to HIV when she accidentally stuck herself with a needle she had just used to draw blood from this AIDS patient. She immediately went to the infection control lab to be tested. She went back six weeks later to be tested. Below are the ELISA plates showing her two test results. The first patient sample is a 1:8 serial dilution for _____ est.

1. Determine her antibody titer for her first test and what antibody would we have tested for?
2. Determine her antibody titer for her second test.
3. What antibody was tested for in the second test (defend your answer)?
4. Given these results what are you going to tell her when she arrives tomorrow for her doctor's appointment?

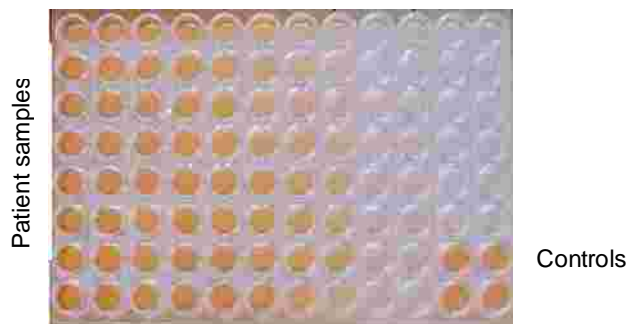
Initial test



Patient Sample row 1

Control row 6

Test 6 weeks later



Controls

Case Study #4

The nurse at Berry Academy has informed the principal that students in the physical conditioning class have developed red lesions on their hands and arms. A sample _____ clusters and the blood agar plate shows beta hemolysis. Initial treatment with penicillin shows no improvement.

1. What is your initial diagnosis?
2. How will you confirm your diagnosis?
3. What antibiotic will you use to treat them?