Outbreak at Kenwood Academy

Skin infections are a common problem among athletes at all levels of competition. Recently, many students at Kenwood have experienced enlarged lymph nodes, fever, sore throat, headaches and blisters. However, not all students are experiencing all of the same symptoms.

Jonesy has persistent headaches. Jonesy is on the football team and doesn’t often drink a lot of water. Pete and Jonesy are best friends but haven’t been able to hang out lately. Pete went to a concert last night and yelled a lot, and he thinks his sore throat is because of that. Pete is on the wrestling team. Pete also has fluid-filled blisters on his neck. Beaver is also on the wrestling team and he has really bad headaches and recently told coach that he has a painful rash on his legs. Douglas plays basketball a lot with Jonesy and he has noticed blisters on his arms. Douglas also recently burned himself during a firework accident.

1. Create a concept map that explains the outbreak on campus.

2. What are two medical interventions you would implement? Why?

3. An epidemiologist would like you to identify the pathogen causing the infection using DNA identification. What are the six major steps in DNA species identification? Overall what is the point of each step and how do you do each step?

4. Several researchers have been called to perform the sequencing prep and sequence the DNA of the pathogen. You determined, or were told, the following information: Left primer: GGGA. Right primer: TGGAC. What is your target gene? Create the resulting DNA gel, horizontal chromatogram, and vertical chromatogram.

5. Enter the following sequence into BLAST to determine the identity of the pathogen.

6. Diagram the steps of a negative result for an antigen detection ELISA test. Who do you suspect would have a negative ELISA result?

7. Explain the results of the following ELISA.

<table>
<thead>
<tr>
<th>Elisa Concentration Standard</th>
<th>Elisa Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>20,000 ng/ul</td>
<td></td>
</tr>
<tr>
<td>2,000 ng/ul</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>0 ng/ul</td>
<td></td>
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</tbody>
</table>

   a. Which well is the stock solution?
   b. What fold dilution was performed?
   c. Calculate the tube dilution and final dilution for each well.
   d. Who is infected? How do you know? What is the concentration of the antigen in their samples?

8. When treating this outbreak. A pharmacist is asked to fill a prescription for antiviral medication. The stock solution of the antiviral is 0.2 g/mL, and it needs to be used at a working concentration of 6.25 x 10⁻³ g/mL.

   a. What does it mean to perform a serial dilution?
   b. How many 2-fold serial dilutions will need to be performed to reach the working concentration?
   c. The working concentration of the antiviral is how many orders of magnitude less than the stock concentration?

*DO NOT WRITE ON ME*