Lab 13: Isolation and Identification of Enterobacteriaceae and Pseudomonas, Part 2

Overview

The concept behind the case studies presented in Lab 12 used to illustrate the Enterobacteriaceae and Pseudomonas is for you and your lab partners as a group to:

1. **First come up with a valid diagnosis of the general type of infectious disease seen in your case study and then identify the bacterium causing that infection**, and

2. **Support your group’s diagnose** based on:
   a. Any relevant facts in the **patient’s history**. (A reliable on-line source will be used to support this.)
   b. The patient’s **signs and symptoms**. (A reliable on-line source will be used to support this.)
   c. **Each of the individual lab tests** given in your case study.
   d. All **microbiological lab tests you performed** as part of the project.

The due date for this report can be found on the class calendar. Remember, you are **working as a group to solve a problem**. Your grade for this lab is based on the **completeness of your report and written evidence of the critical thinking process that went into making and supporting your diagnosis**, therefore, it is critical that all members of the group participate, question any conclusions being made by the group, and contribute to the report. Remember, you are trying to convince your instructor that you understand how the diagnosis was made by supporting that diagnosis with data. Your group will work together to write the report and **submit one hard copy of that report for your group**. Part of your grade will be based on evaluation of your work by your team members.
Each member of the group must:

1. Print a copy of each of the two rubrics from the links above.
2. Print and fill out a copy of the Team Member Evaluation Form from the link above.
3. Staple them together and hand them in to me the day your Lab 12 Case Study Lab Report is due.

Be sure to handle all the bacterial cultures you are using in lab today as if they are pathogens! Be sure to wash and sanitize your hands well at the completion of today’s lab.

Also, make sure you observe several MacConkey agar plates and the Cetrimide agar plate used by others in your lab so that you can answer practical questions from Lab 12 and Lab 13. The Performance Objectives for Lab 13 tell you what you are expected to be able to do on the practical.

Case Study Lab Report for Labs 12 and 13: The Enterobacteriaceae and Pseudomonas

Each member of the group must:

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For more information on writing your Lab Report, see Course evaluation for Lab (Core labs, case studies, lab quizzes) under Course Info in the menu of the BIOL 230 website.
Case Study #1A from Lab 12

A 66 year old female with a history of recurring urinary tract infections and multiple antibiotic therapies presents with frequency and urgency of urination, dysuria, suprapubic discomfort, lower back pain, and a temperature of 99.2°F. A complete blood count (CBC) shows leukocytosis with a left shift. A urine dipstick shows a positive leukocyte esterase test, a positive nitrite test, 30mg of protein per deciliter, and red blood cells in the urine.

Case Study #1B from Lab 12

72 year old female who is diabetic and a smoker was admitted to the hospital with a leg wound that is not healing. She appears confused and anxious, has a temperature of 102°F, a heart rate of 101 beats per minute, a respiration rate of 29 breaths per minute, a blood pressure of 94/32 mm Hg, a urine output of only 110 cc for the last 8 hours, and a total white blood cell count of 2300/µL. A blood culture is taken.

Did you have Case Study 1A or 1B?______

1. Patient’s history and predisposing factors

Read the case study. Explain how any relevant parts of the patient's history contributed to your diagnosis of the type of infectious disease that is present here. You are urged to use the computers in lab to search reliable medically oriented Internet sources to support this. Reliable sources you might consider are Medscape (http://emedicine.medscape.com/infectious_diseases) and The Centers for Disease Control and Prevention (CDC) at http://www.cdc.gov/. Cite any sources you use at the end of this Patient's History section in APA style (http://www.apastyle.org/).

The patient's history should suggest a general type of infectious disease that is present, such as a urinary tract infection, a wound infection, gastroenteritis, pharyngitis, pneumonia, septicemia, etc. Do not look up the bacterium you eventually identify as the cause of this infectious disease. You don't know the causative bacterium at this point. You need to determine the general type of infection in order to determine what microbiological tests to perform to identify the bacterium causing the infection. Search at least one medically-oriented reference article from a reliable site such as Medscape and use this article to support your diagnosis of the type of infectious disease seen here. Don't forget to cite any sources you used in APA style directly under this Patient's History and Patient's Symptoms sections of this Lab Report.
2. Patient’s signs and symptoms

Read the case study. Explain how the patient’s signs and symptoms contributed to your diagnosis of the type of infectious disease that is present here. You are urged to use the computers in lab to search reliable medically oriented Internet sources to support this. Reliable sources you might consider are Medscape (http://emedicine.medscape.com/infectious_diseases) and The Centers for Disease Control and Prevention (CDC) at http://www.cdc.gov/. Cite any sources you use at the end of this Patient's Symptoms section in APA style (http://www.apastyle.org/). Also see appendix F (SIRS and Sepsis) in your lab manual for an indication of whether or not the patient has SIRS.

The patient's signs and symptoms should suggest a general type of infectious disease that is present, such as a urinary tract infection, a wound infection, gastroenteritis, pharyngitis, pneumonia, septicemia, etc. Do not look up the bacterium you eventually identify as the cause of this infectious disease. You don't know the causative bacterium at this point. You need to determine the general type of infection in order to determine what microbiological tests to perform to identify the bacterium causing the infection. Search at least one medically-oriented reference article from a reliable site such as Medscape and use this article to support your diagnosis of the type of infectious disease seen here. Don't forget to cite any sources you used in APA style directly under this Patient's History and Patient's Symptoms sections of this Lab Report.

3. Results of laboratory test given in the case study

List each lab test given and explain how the results of that test helps to contribute to your diagnosis. Refer to appendix C (Complete Blood Count), appendix D (Urinalysis), and appendix F (SIRS and Sepsis) in your lab manual.

4. Microbiological lab tests you performed in Lab 12

a. Gram stain

Give the Gram reaction (Gram-positive or Gram negative and how you reached this conclusion) and the shape and arrangement of the unknown you were given. State how these Gram stain results contributed to your decision of what microbiological test to perform next. The Gram stain is discussed in Lab 6.

b. Oxidase test

Give the results of the oxidase test (positive or negative) you performed on the unknown you were given, and how you reached this conclusion. State how the oxidase test results contributed to your decision as to what microbiological media to use next. The oxidase test is discussed in Lab 12 under C. Lab Tests Used in Today's Lab.

c. Maconkey agar (if used)

Describe the results of the MacConkey agar plate you inoculated with the unknown you were given. State how this contributed to narrowing down your identification of the bacterium causing the infectious disease. MacConkey agar is discussed in Lab 12 under C. Lab Tests Used in Today's Lab.

c. Cetrimide agar (if used)
Describe the results of the Cetrimide agar plate you inoculated with the unknown you were given. **State how this contributed to your identification of the bacterium causing the infectious disease.** Cetrimide agar is discussed in Lab 12 under C. Lab Tests Used in Today’s Lab.

d. **Enteropluri-Test.**

Using your Enteropluri-Test, identify the unknown you were given. The Enteropluri-Test and its use are described in Lab 12 under C. Lab Tests Used in Today’s Lab.

1. In the table below, **put a (+) or a (-) in the Result row for each test.**
2. **Add up the value of each positive test** in a group and put that number in the code for each group.
3. The 5 digit number is the CODICE number. **Look that number up in the Codebook and identify your unknown.**

<table>
<thead>
<tr>
<th>Test</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>2</td>
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<tr>
<td>Lysine</td>
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<tr>
<td>Ornithine</td>
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<tr>
<td>H2S</td>
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<td>Indole</td>
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<td>Adonitol</td>
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<tr>
<td>Lactose</td>
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<td>Citrate</td>
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</tbody>
</table>

**CODICE NUMBER:**

Genus and species of the bacterium: ________________________________

**Final diagnosis:**

What infectious disease does the patient have?

What is the genus and species of the bacterium causing this infectious disease?

**Case Study #2**

Each member of the group must:

1. Print a copy of each of the two rubrics from the links above.
2. Print and fill out a copy of the Team Member Evaluation Form from the link above.

3. Staple them together and hand them in to me the day your Lab 12 Case Study Lab Report is due.

After receiving a baby chicken for Easter, a 7 year old boy is taken to the emergency room with symptoms of vomiting, nausea, non-bloody diarrhea, abdominal cramps, and a temperature of 100°F. A complete blood count (CBC) shows the WBC count to be within the normal reference range.

1. Patient's history and predisposing factors

Read the case study. Explain how any relevant parts of the patient’s history contributed to your diagnosis of the type of infectious disease that is present here. You are urged to use the computers in lab to search reliable medically oriented Internet sources to support this. Reliable sources you might consider are Medscape (http://emedicine.medscape.com/infectious_diseases) and The Centers for Disease Control and Prevention (CDC) at http://www.cdc.gov. Cite any sources you use at the end of this Patient’s History section in APA style (http://www.apastyle.org/).

The patient's history and patient's symptoms should suggest a general type of infectious disease, such as a urinary tract infection, a wound infection, gastroenteritis, pharyngitis, pneumonia, septicemia, etc. You need to determine the general type of infection in order to determine what microbiological tests to perform to identify the bacterium causing the infection. Search at least one medically-oriented reference article from a reliable site such as Medscape and use this article to support your diagnosis the type of infectious disease seen here. Don't forget to cite any sources you used in APA style directly under this Patient's History and Patient's Symptoms sections of this Lab Report.

2. Patient's signs and symptoms

Read the case study. Explain how the patient’s signs and symptoms contributed to your diagnosis of the type of infectious disease that is present here. You are urged to use the computers in lab to search reliable medically oriented Internet sources to support this. Reliable sources you might consider are Medscape (http://emedicine.medscape.com/infectious_diseases) and The Centers for Disease Control and Prevention (CDC) at http://www.cdc.gov. Cite any sources you use at the end of this Patient's Symptoms section in APA style (http://www.apastyle.org/).

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3. Results of laboratory test given in the case study
List each lab test given and explain how the results of that test helps to contribute to your diagnosis. Refer to Appendix C (Complete Blood Count) in your lab manual as well as your source paper used above.

4. Microbiological lab tests you performed in Lab 12

   a. **XLD agar**
   
   Describe the results of the XLD agar plate you inoculated with the sample from the patient. **State how this contributed to your identification of the bacterium causing this infectious disease.** XLD agar is discussed in Lab 12 under C. Lab Tests Used in Today’s Lab.

   b. **EnteroPluri-Test.**

   Using the Enterotube®II inoculated with a colony from the MacConkey agar above, identify the bacterium causing the infection. The EnteroPluri-Test and its use are described in Lab 12 under C. Lab Tests Used in Today’s Lab.

   1. In the table below, **put a (+) or a (-) in the Result row for each test.**
   2. **Add up the value of each positive test** in a group and put that number in the code for each group.
   3. The 5 digit number is the CODICE number. **Look that number up in the Codebook and identify your unknown.**

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</tbody>
</table>
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**CODICE NUMBER:**

Genus of the bacterium: __________________________________

**Final diagnosis:**

What infectious disease does the patient have?

What is the genus of the bacterium causing this infectious disease?
PERFORMANCE OBJECTIVES FOR LAB 13

After completing this lab, the student will be able to perform the following objectives:

ISOLATION OF ENTEROBACTERIACEAE AND PSEUDOMONAS

1. Interpret the results of MacConkey agar and Cetrimide agar.

IDENTIFICATION OF PSEUDOMONAS

1. Interpret the results of the following tests:
   a. growth on Cetrimide agar
   b. oxidase test (Taxo N® disc)
   c. pigment production on Cetrimide agar
   d. fluorescence under ultraviolet light on Cetrimide agar
   e. odor

2. Recognize an organism as *Pseudomonas aeruginosa* and state the reasons why based on the results of the above tests.

IDENTIFICATION OF ENTEROBACTERIACEAE

1. Interpret the results of an EnteroPluri-Test.

SELF-QUIZ

Self-quiz

Answers

Contributors

- Dr. Gary Kaiser (COMMUNITY COLLEGE OF BALTIMORE COUNTY, CATONSVILLE CAMPUS)