**FINAL LAB PROJECT**

**Your name:**

**Your unknown number:**

**Your case study letter:**

**Your lab section:**

**Case Studies**

**Case Study A**

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, unilateral costovertebral angle (CVA) tenderness, fever and chills, and nausea. She currently has a temperature of 103°F. A complete blood count (CBC) shows leukocytosis with a left shift. A urine dipstick shows a positive leukocyte esterase test, a negative nitrite test. Microscopic examination of centrifuged urine shows 30 white blood cells, as well as 7 red blood cells and 18 bacteria per high-power field.

Assume that your unknown is from the urine of this patient.

**Case Study B**

A 61-year-old male who has type 2 diabetes, a history of alcoholism, and is a heavy smoker was admitted to the hospital with a leg wound that is not healing - for which he was previously treated for two weeks ago but was subsequently released against medical advice. He was brought to the ER by a brother who noticed he was febrile and appeared confused, disoriented, and anxious. He exhibits flushing and peripheral vasodilatation. He has a temperature of 102° F, a heart rate of 130 beats per minute, a respiration rate of 42 breaths per minute, a blood pressure of 90/40 mm Hg, a urine output of only 110 cc for the last 8 hours, and a total white blood cell count of 2500/µL with a marked left shift. Lactic acid levels measure 3.5 mmol/L.

Assume your unknown is from a blood sample.

**Case Study C**

A 78-year-old female who for several days had a severe productive cough and chest pain when breathing deeply, is admitted to the hospital by her sister with whom she lives. Symptoms include confusion and agitation, difficulty in breathing, peripheral edema, and shaking and chills. She has a temperature of 96.1° F, a heart rate of 112 beats per minute, a respiration rate of 45 breaths per minute, a blood pressure of 105/60 mm Hg, and a total white blood cell count of 13,000/µL. chest X-ray reveals a right lower lobe infiltrate.

Assume your unknown is from a blood sample.

**FINAL PROJECT** **LAB REPORT**

**Procedure and Results**

**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 as to the type of infectious disease seen here. **The patient's history refers to anything given in the case study prior to that patient seeking medical attention for the current medical condition.**

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 do not know the causative bacterium at this point. **You need to determine the general type of infection 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 seen here. **Signs refer to anything being measured by a medical professional during a physical exam such as blood pressure, respiration rate, heart rate, oxygen saturation, and temperature. Symptoms refer to symptoms being reported by the patient.**

You are urged to use the computers in lab to search reliable 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/>). **Also refer to** [**appendix F (SIRS and Sepsis)**](http://faculty.ccbcmd.edu/courses/bio141/labmanua/finalproject/appendix%20F_SIRS.html) **in your lab manual for an indication as to 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, strep throat, pneumonia, septicemia, etc. **Do not look up the bacterium you eventually identify** as the cause of this infectious disease. You do not know the causative bacterium at this point. **You need to determine the general type of infectious disease present 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 under this Patient's History and Patient's Symptoms sections** of this Lab Report.

**3. Vocabulary list for medical terms used in the case study under signs and symptoms**

List and define any medical terms used in your case study that describe the patient’s signs and symptoms that the average person not in the medical profession might not know.

**4. Results of laboratory test given in the case study**

List each **lab test given in the case study that would be done in a lab, such as a total white blood cell count, differential white blood cell count, urinalysis, and X-ray**, and explain how the result of that test helps to contribute to your diagnosis. **The CBC and urinalysis tests are described in** [Appendix C](appendixC_CBC.html) and [Appendix D](appendix%20D_Urinalysis.html) of this lab manual.

**5. Gram stain and Catalase test if needed**

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. **Remember that Staphylococci and Enterococci look similar in a Gram stain when coming off a plate culture.** **If the result of the arrangement is inconclusive after seeing Gram-positive cocci, try doing the** **catalase test** described in **Lab 8** andstate **specifically** how the results of the catalase test helped to confirm the arrangement.

**State how this contributed to your decision as to which microbiological tests and/or media to use next**. The Gram stain is discussed in **Lab 6**.

**Make sure you check your Gram stain results with your instructor before determining which microbiological lab tests you will perform.**

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**6. Based on the results of your Gram stain, determine which of the following isolation media you will inoculate and why. Refer to Labs 12, 14, and 15 to help determine your selection.**

a. MacConkey agar (Lab 12)
b. Blood agar with NB disc (Lab 15)
c. Bile Esculin Azide agar (Lab 14)

Also **inoculate a tube of Trypticase soy broth (TSB)** with your unknown to be **used next time for antibiotic susceptibility testing**.

Inoculate each medium you chose, making sure to **streak all petri plates for isolation**. Incubate the plates upside down and stacked in the petri plate holder on the shelf of the **37°C** incubator corresponding to your lab section. Incubate the TSB and Bile esculin agar tubes in your test tube rack on the shelf of the **37°C** incubator corresponding to your lab section.

**Isolation Results**

Explain why you chose to **use or not use** each of the isolation media.

**a. MacConkey agar** (Lab 12)

Why did you choose to use or not use this medium?

If you used this medium, describe the results of the MacConkey agar plate you inoculated with the sample from the patient. **State specifically how this contributed to your decision as to what bacterium is causing the infection**.

**b. Blood agar with NB disc** (Lab 15)

Why did you choose to use or not use this medium and disc?

If you used this medium, describe the results of the Blood agar plate you inoculated with the sample from the patient. **State specifically how this contributed to your decision as to what bacterium is causing the infection**.

**c. Bile Esculin Azide agar** (Lab 14)

Why did you choose to use or not use this medium?

If you used this medium, describe the results of the Bile Esculin Azide agar you inoculated with the sample from the patient. **State how this contributed to your decision as to what bacterium is causing the infection**.

**7. Based on the results of your isolation media used in step 5 above, determine which of the following media you will inoculate or tests you will perform and why. Refer to Labs 12, 14, and 15 to help determine your selection of media/tests and how to correctly perform the lab procedures.**

a. Oxidase Test (Lab 12)
b. Cetrimide agar (Lab 12)
c**.** EnteroPluri-*Test* (Lab 12)
d. Mannitol Salt agar (Lab 15)
e. Coagulase test (Lab 15)
f. Bauer-Kirby antibiotic susceptibility testing on Mueller-Hinton agar (Lab 18)

Incubate the plates upside down and stacked in the petri plate holder on the shelf of the **37°C** incubator corresponding to your lab section. Incubate the tubes in your test tube rack on the shelf of the **37°C** incubator corresponding to your lab section.

**Results of Additional Lab Media or Lab Tests Performed**

Explain why you chose to **use or not use** each of the following tests or media.

**a. Oxidase test** (Lab 12)

Why did you choose to use or not use this test?

If you used this test, describe the results of the oxidase test and **state specifically how this contributed to your decision of media to use**.

**b. Cetrimide agar** (Lab 12)

Why did you choose to use or not use this medium?

If you used this medium, describe the results of the Cetrimide agar **and state specifically how this contributed to your decision as to what bacterium is causing the infection**.

**c. EnteroPluri-*Test*** (Lab 12)

Why did you choose to use or not use this test?

Using your EnteroPluri-*Test*, identify the unknown you were given.

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.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Group 1** | **Group 2** | **Group 3** | **Group 4** | **Group 5** |
| **Test** | **Glucose** | **Gas** | **Lysine** | **Ornithine** | **H2S** | **Indole** | **Adonitol** | **Lactose** | **Arabinose** | **Sorbitol** | **VP** | **Dulcitol** | **PA** | **Urea** | **Citrate** |
| **Value** | **4** | **2** | **1** | **4** | **2** | **1** | **4** | **2** | **1** | **4** | **2** | **1** | **4** | **2** | **1** |
| **Result** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Code** |  |  |  |  |  |
| **CODICE NUMBER: Identification:** |

**Genus and species from the EnteroPluri-*Test*:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**d. Mannitol Salt agar** (Lab 15)

Why did you choose to use or not use this medium?

If you used this medium, describe the results of the Mannitol salt agar plate you inoculated with the sample from the patient**. State how this contributed to your decision as to what bacterium is causing the infection**.

**e. Coagulase test** (Lab 15)

Why did you choose to use or not use this test?

If you used this test, describe the results of Coagulase test and **state specifically how this contributed to your decision as to what bacterium is causing the infection**.

**f. Bauer-Kirby antibiotic susceptibility testing on Mueller-Hinton agar** (Lab 18)

#### Gram-Positive Unknown

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disc****code** | **Antimicrobial****agent** | **Zone in****mm** | **R** | **I** | **MS** | **S** |
| AMC-30 | Amoxicillin/Clavulanic Acid |  |  |  |  |  |
| CTX-30 | Cefotaxime |  |  |  |  |  |
| FOX-30 | Cefoxitin |  |  |  |  |  |
| CIP-5 | Ciprofloxacin |  |  |  |  |  |
| DA-2 | Clindamycin |  |  |  |  |  |
| E-15 | Erythromycin |  |  |  |  |  |
| K-30 | Kanamycin |  |  |  |  |  |
| OX-1 | Oxacillin |  |  |  |  |  |
| SXT-75 | Sulfamethoxazole+ Trimethoprim |  |  |  |  |  |
| TE-30 | Tetracycline |  |  |  |  |  |
| TZP-110 | Piperacillin/Tazobactum |  |  |  |  |  |
| VA-30 | Vancomycin |  |  |  |  |  |

**R = Resistant**

**I = Intermediate**

**MS = Moderately Susceptible**

S = Susceptible

#### Gram-Negative Unknown

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disc****code** | **Antimicrobial****agent** | **Zone in****mm** | **R** | **I** | **MS** | **S** |
| AK-30 | Amikacin |  |  |  |  |  |
| AMC-30 | Amoxicillin/Clavulanic Acid |  |  |  |  |  |
| AMP-10 | Ampicillin |  |  |  |  |  |
| MEZ-75 | Mezlocillin |  |  |  |  |  |
| CIP-5 | Ciprofloxacin |  |  |  |  |  |
| CTX-30 | Cefotaxime |  |  |  |  |  |
| FOX-30 | Cefoxitin |  |  |  |  |  |
| CN-10 | Gentamicin |  |  |  |  |  |
| K-30 | Kanamycin |  |  |  |  |  |
| SXT-75 | Sulfamethoxazole+ Trimethoprim |  |  |  |  |  |
| TE-30 | Tetracycline |  |  |  |  |  |
| TZP-110 | Piperacillin/Tazobactum |  |  |  |  |  |

**R = Resistant**

**I = Intermediate**

**MS = Moderately Susceptible**

**S = Susceptible**

**Final diagnosis:**

What infectious disease does the patient have?

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

Based on your Bauer-Kirby results, what antibiotics might be effective against this bacterium?