

Case Discussions



Student Manual – 2008

Guidelines for Leading Microbiology Small Groups

You have all been assigned to lead your microbiology small group on a particular date, usually with one or two other students. Note this date because the small group presentation is a requirement of the microbiology course. Also, note who your fellow presenters are so that you can divide up some of the work and discuss the cases together in advance. Regardless of how you divide up the work, all presenters should have an in depth understanding for all of the cases for that day.

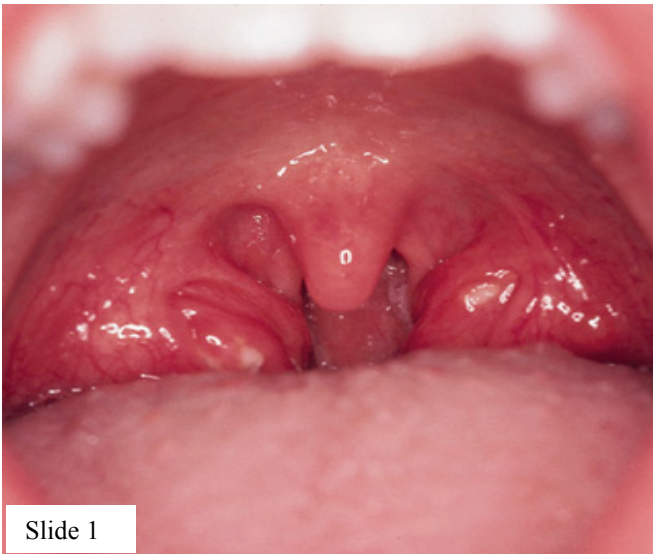
Small group sessions are designed to help you to start thinking clinically and we hope you find them enjoyable and fun. Exam questions will also come from material covered in small group. Small group sessions can last up to 1.5 hours. Here are some guidelines for your presentation day.

- 1) The student presenters, not faculty, are expected to lead the class discussion. Faculty will offer assistance when needed, but should not lead the session.
- 2) The session will be informal—Power Point slides are not required; however, you might want to come prepared with some notes.
- 3) Presenters are expected to go through the case together in advance and should be up to date on the lecture material covered before their small group. Many cases in small group are taken from the lecture material.
- 4) Presenters will also need to do additional preparation (reading) before leading their session. For example, if the case asks you to provide a differential diagnosis, you need to cover a list of possibilities for what may be occurring and this list may extend beyond what has been covered in lecture (i.e. to other infectious processes or even non-infectious processes). The **differential diagnosis** is generated by reviewing the patient's history, physical findings and laboratory studies. The pertinent positives (and negatives) are then grouped together and an effort is made to determine which diagnoses best fit the pattern. For example a patient with fever, cough, abnormal chest x-ray and an elevated white blood cell count might have a bacterial pneumonia but might also have endocarditis, a pulmonary embolus or a malignancy. Students should be prepared to justify why a particular disease was either included or excluded from the differential.
- 5) The case should be read aloud either by the presenters or by other members of the small group.
- 6) In the cases, several questions are asked. Do not just answer the questions yourselves. Ask or call on your classmates to get their opinions. We hope the questions can serve as jumping boards to informative discussions. Sometimes your classmates will not know the answers—as presenters you are expected to come prepared with your answers. If you are incorrect about something, don't worry, the faculty will help you out.
- 7) Feel free to ask your classmates about points in the case you find interesting or applicable to your class lectures. You don't just have to cover the questions already written into the cases.
- 8) Don't be discouraged if your faculty-leader chimes in occasionally. There may be certain points they've been asked to cover or clarify.
- 9) You are not being graded on your performance (only your participation as a group leader is required). There are also not always clear-cut answers to all the questions—that's one reason why the discussion format is used.

Session 1: Bacteria I

1) Joey's sore throat

Joey G., a sullen 14-year old boy, is dragged to your office by his mother in February. Joey is complaining about a sore throat and fever. His symptoms began two days ago and have gotten progressively worse to the point where he finally agreed to come to your office. His mother tells you that his five-year old sister had similar symptoms last week but didn't get this sick. On further questioning Joey states that he has had chills, headaches and throat pain when he swallows food.



On physical examination he appears ill, has a temperature of 101°. He has enlarged, anterior cervical lymph nodes. His throat is red and injected and he has white pustules on his tonsils (slide #1). The remainder of his exam is unremarkable with no rash, clear lungs, a normal cardiac exam and no evidence of an enlarged spleen.

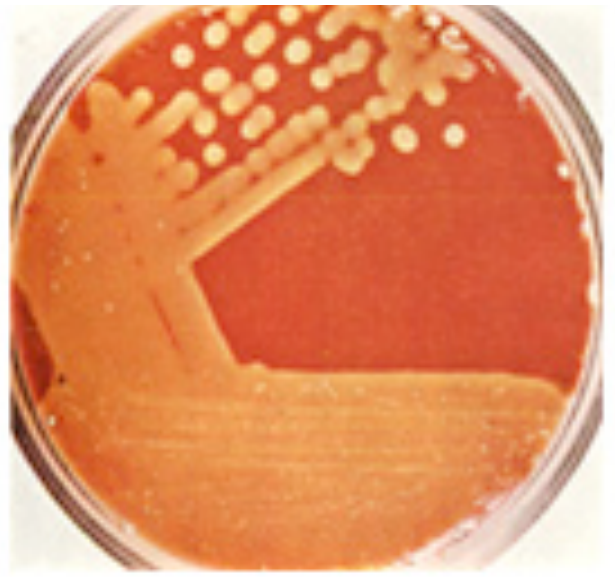
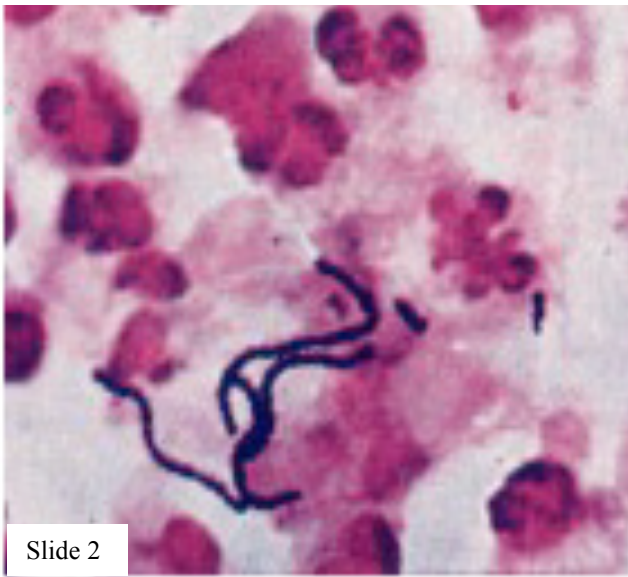
- 2 -

1. What is your differential diagnosis?
2. How would you proceed from here? What are your options for confirming the diagnosis?

Slide #2 shows the results of Joey's throat culture. (The Gram stain on the left will help you in your identification of the organism)

3. What is the rationale for treating this infection?
4. How is this infection spread?
5. What bacterial determinants are involved in the pathogenesis of these infections?

Two weeks after you institute therapy for his infection, Joey returns with his mother with new complaints. He has now developed recurrent fever, joint aches and pains and he has also noticed some swelling of his joints. When you examine him you notice that he now has a soft systolic heart murmur heard best at the apex (suggesting mitral insufficiency). His left knee and right wrist are warm, swollen and tender. His mother mentions parenthetically that she's had the devil of a time getting Joey to take his medication and he probably took only a third of his pills.



6. What's going on? Why?
7. How will you diagnose this new process?
8. Do you have any recommendations for the future for Joey's management?

2) **George W. the construction worker looks awfully sick!**

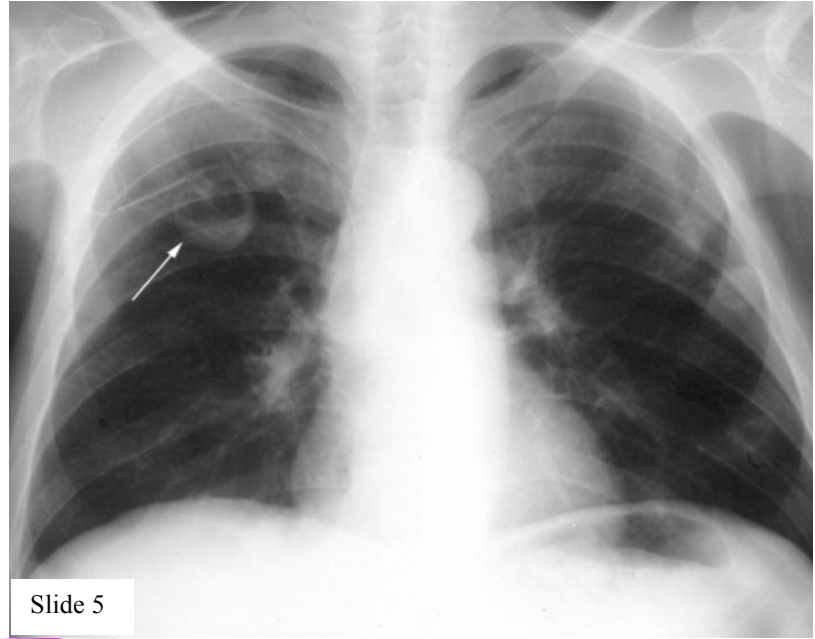
A 33-year old construction worker, George W., has a history of intermittent injection drug use. He last injected heroin intravenously 2-3 days ago. He presents to the Columbia emergency room appearing acutely ill. He is complaining of a cough productive of bloody sputum, pain with deep breathing, and severe lower back pain. Until this presentation he has been in good health. Despite his frequent drug use he has had no drug related complications (until now).



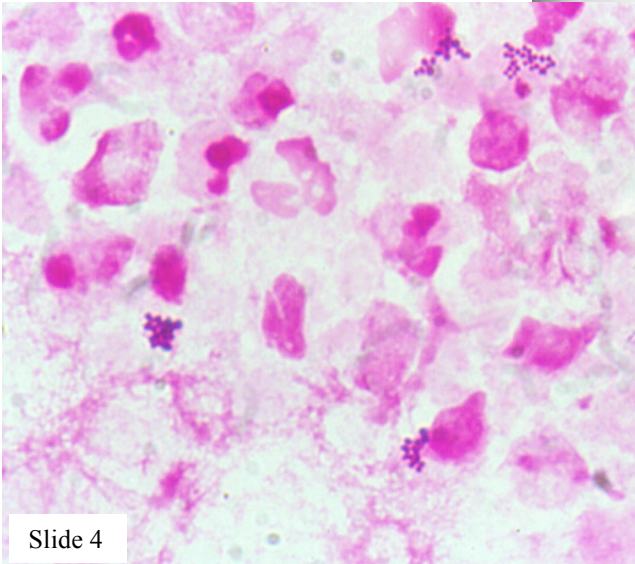
On physical examination his temperature is 103° and his pulse is 124. He is an ill appearing male. He has petechiae (a hemorrhagic rash indicative of low platelets or overwhelming infection, see slide #3) on his arms and legs and some brown macular (flat) lesions on his left palm. His left forearm has a small abscess at the site of his last drug injection that has a small amount of purulent drainage (pus). His lungs are clear. His cardiac exam

is notable for a new murmur consistent with tricuspid insufficiency. His liver and spleen are not enlarged.

You order some lab tests and learn the following: White blood cell (WBC) count 21,000 (high) with a marked left shift (suggestive of an infection). His erythrocyte sedimentation rate (ESR) is 95 (an indication of nonspecific inflammation). His urine contains numerous red blood cells. Blood cultures are pending. A sputum Gram stain and chest x-ray are shown in slides #4 and 5, respectively.



Slide 5



Slide 4

1. What is your differential diagnosis ('Sepsis' is not specific enough—specify potential infectious/non-infectious processes)? Be prepared to provide a rationale for your choices.
2. What are the likely pathogens responsible for this infection?
3. Blood cultures grow Gram positive cocci in clusters. What is the likely pathogen?
4. How does the pathogenesis of the likely diagnosis correlate with the clinical findings?
5. How would you proceed from here? What criteria can you use to establish a diagnosis? Review these criteria.
6. Are there additional studies that you feel are indicated? Why?

The patient slowly begins to improve on the antibiotics that you have selected as a part of his therapy. However he is still complaining of pain in his back. On closer examination you note that he appears to have developed a left foot drop (a dragging foot indicative of nerve damage).

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7. What do you think is going on and how would you proceed?



Slide 6

8. The diagnostic test shown in slide #6 is performed. Discuss the pathogenesis of this process.

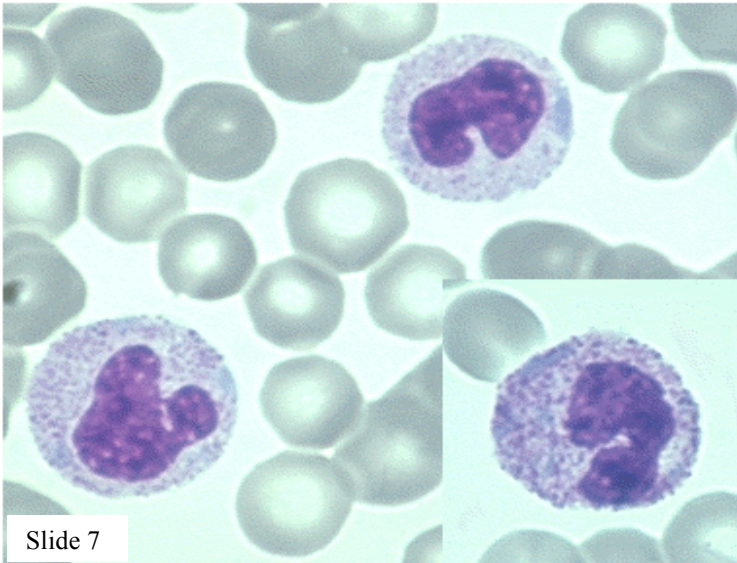
The patient recovers after several weeks of therapy.

9. Are there other routine medical measures that you should have performed while he was hospitalized?

Session 2: Bacteria II

1) Sharon B. – an unhappy 10 year old

Sharon B., a ten-year old girl, is brought to the emergency room by her mother. Sharon has been in excellent health with no prior hospitalizations. She began complaining of crampy, lower abdominal pain about three days ago. Her appetite decreased and she had some nausea. Over the next two days the pain worsened and was associated with increased nausea and vomiting. She describes the pain as around her belly button and in the last day in the lower right part of her belly. In the past 24 hours her mother has noticed that Sharon has had a fever and chills. Sharon states that she has had four or five watery stools in the past two days.



On physical examination you note an uncomfortable child with a temperature of 103°, rapid respiration, pulse of 120, and BP of 80/40. She appears acutely ill and, on examination of her abdomen, you find right lower quadrant tenderness with some rebound (pain when you release your hand usually indicative of peritonitis). Her bowel sounds are diminished and she also has some involuntary guarding

(muscular contraction protecting a painful area).

Laboratory studies are of note for the following: WBC count 15,000 (high) with a marked left shift and toxic granulations observed on peripheral smear (slide #7) -- these findings are quite suggestive of infection.

1. What is the differential diagnosis for this presentation? What do her vital signs indicate about her condition?
2. Are there additional studies that you would consider ordering?
3. What is the pathogenesis of this infection?

Based on the results of the additional studies that you decided to order (slide #8 shows abdominal CT scan results), the patient is promptly taken to the operating room and undergoes an exploratory laparotomy. At surgery a perforated appendix is found with an abscess. The appendix is excised and the abscess drained and debrided. Following surgery the patient rapidly defervesces (becomes afebrile) and clinically improves.



4. What are the likely pathogens and what unique virulence determinants are responsible for their ability to cause abscesses?

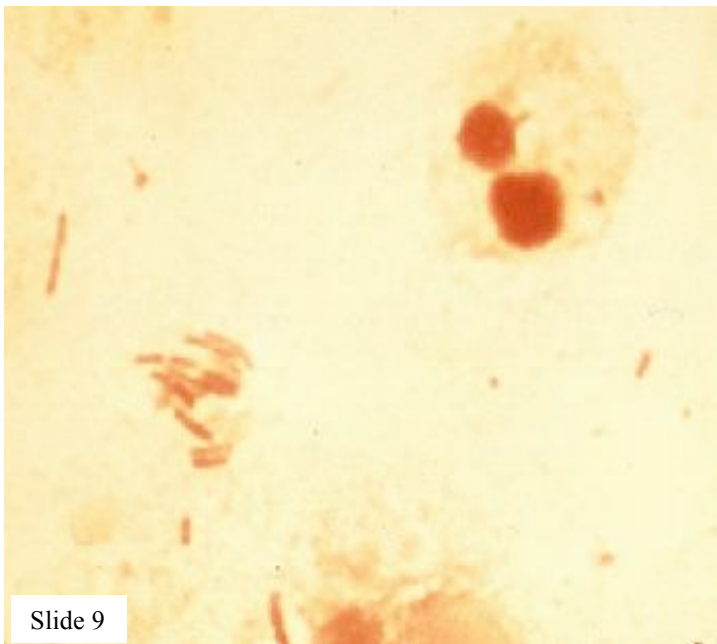
2) Sally C. and her recurrent urinary tract infections

Sally C., a 28-year old female with insulin-dependent diabetes who is new to your practice, presents with a 3-day history of dysuria and increased urinary frequency. She denies fever, chills, abdominal pain, back pain, or vaginal discharge. She is sexually active and reports that she always uses condoms. She reports that she has recurrent urinary tract infections – approximately 4/year – and this feels just like the rest of them. In fact she simply tells you she needs Bactrim (trimethoprim/sulfamethoxazole). On examination, she is afebrile and has no costovertebral angle tenderness. Microscopic examination of the sediment of a centrifuged urine sample reveals 10-15 white blood cells per high power field and numerous bacteria. You send a urine culture and prescribe a 3-day course of Bactrim.

1. Why does Sally get so many UTIs?
2. What are the likely organisms responsible for her recurrent infections?

Unlike her previous episodes Sally calls from home several days later to tell you that her symptoms have not improved and she now has fever, nausea and back pain. She has generalized myalgias (muscle pains) but her back pain is especially bothersome. When she comes into your office she looks acutely ill, her temperature is 104°, she has diffuse abdominal pain and also has marked right costovertebral angle tenderness (pain right over the kidney).

3. What has happened? Why (*i.e.*, the responsible pathogenetic mechanisms)?
4. What tests would you order?



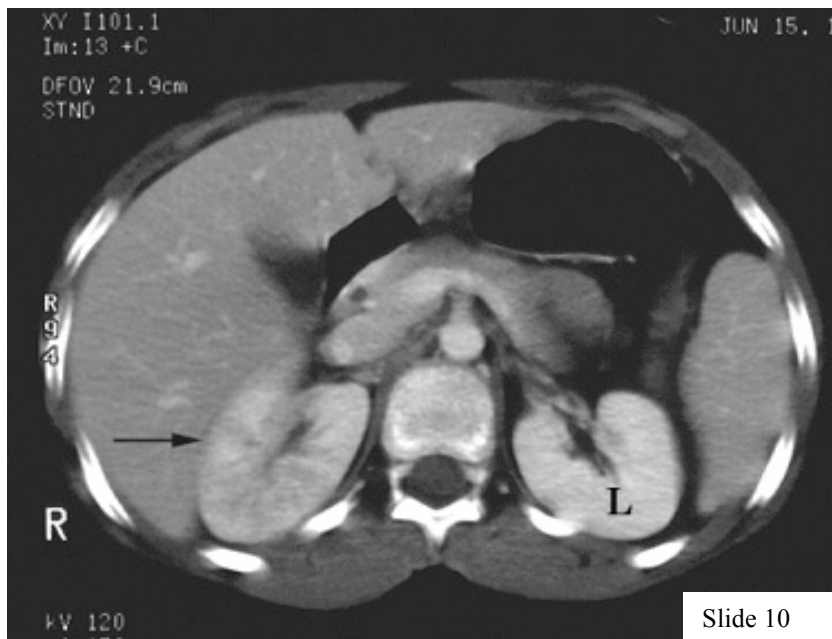
Slide 9

You hospitalize Sally and treat her with antibiotics. Her blood and urine cultures are both growing the same organism (*E. coli*) that you cultured out initially. Slide #9 shows the urine gram stain. After 72 hours of treatment she remains febrile, and you order a CT scan (slide #10).

5. What are you looking for on the CT scan?

By the next day she is feeling better, and her fever has

resolved. The following day she is sent home to complete a 2-week course of antibiotics.



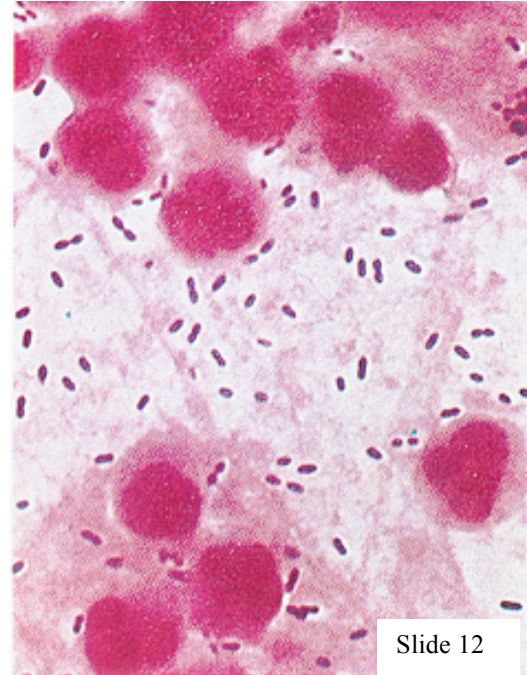
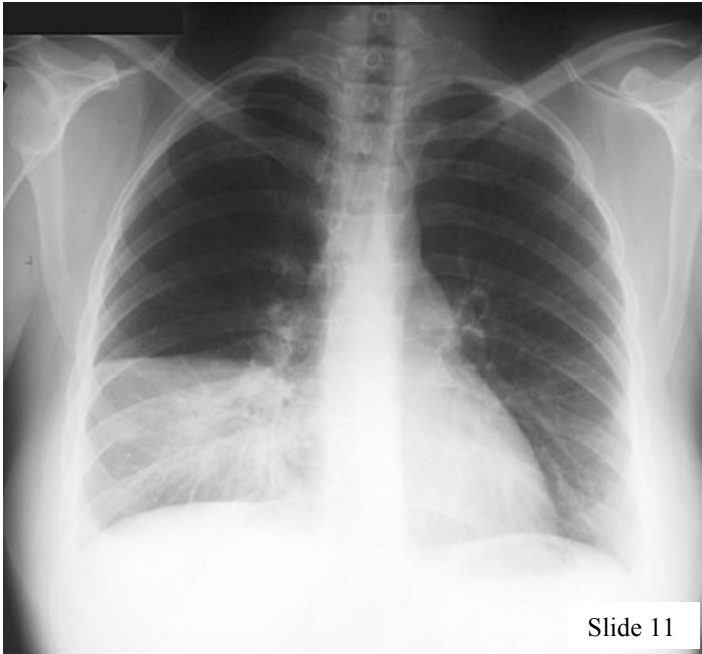
Slide 10

3) S.H. develops a nasty cough

S.H., a 60-year old woman who smokes half a pack of cigarettes daily but has no other past medical history and takes no medications, develops malaise and a mild cough in mid-January. Within 24 hours, she notes the onset of severe right-sided pleuritic (pain when taking a deep breath) chest pain, a fever of 103 degrees and a teeth rattling chill. Her cough worsens and becomes productive of greenish and rusty colored sputum. She immediately calls her physician and is seen in the office that afternoon.

Physical examination reveals a blood pressure of 120/70, pulse of 96, respirations of 24 and an oral temperature of 101 degrees. There is no rash, the head and neck examinations are normal as is the cardiac exam. On lung exam, there is dullness to percussion and bronchial breath sounds over the right lower chest. The remainder of the examination is normal.

Laboratory data reveal a white blood cell count of 18,000 (high) with 80% PMNs, 10% bands (immature PMNs indicative of bacterial infection) and 10% lymphocytes. The electrolytes, blood urea nitrogen, creatinine and liver enzymes are normal. The chest x-ray (slide #11) shows a consolidation in the right middle lobe. Her sputum Gram stain is revealing: see slide #12.



1. Are there any clues in the history as to the nature of the pulmonary infection in this patient?
2. Why is the sputum rusty colored?
3. Would you characterize this as a “typical” or “atypical” pneumonitic process? Why? and how does this correlate with the pathogenesis of this process?
4. What additional tests would you order to secure the diagnosis?
5. What do you predict is the pathogen in this case? What does the Gram stain show and is it useful?
6. Could this illness have been prevented?

Session 3: Aspirin Anyone?

1) Mr. Seagram has a fit

Mr. Seagram, a 68 year old male, is perched precariously on his usual stool at Coogan's pub when he has a seizure, falls off his stool and is brought to the CPMC emergency room by several helpful medical students (we're not sure what they were doing there in the first place). The denizens of the pub assumed it was just another of Mr. Seagram's "rum fits." However, when he is assessed in the emergency room he is noted to have a temperature of 104° and appears toxic (acutely ill). His blood pressure is reduced, his pulse is 120 and his respirations are rapid and shallow. He remains obtunded (minimally responsive) after the seizure and is unable to answer questions. His neurological exam reveals no focal abnormalities.

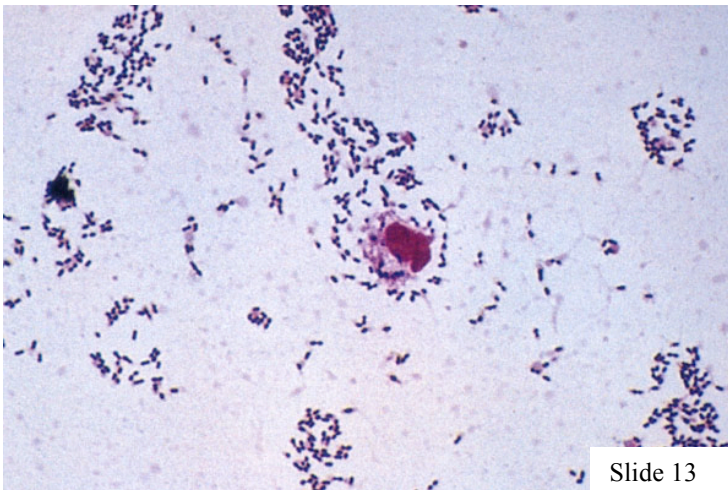
His old chart does indeed reveal a history of alcohol withdrawal related seizures in the past. There is also a history of head trauma on several occasions related to his drinking.

1. What diagnoses should be considered?
2. How would you proceed from here?

A CT scan is normal. A lumbar puncture is performed next and reveals the following:

Opening pressure – increased; CSF appearance – turbid (normal- clear). The CSF is sent to the lab for analysis.

3. What pathogens should be considered if this is meningitis? Which is the most likely pathogen?



WBC- 2,300 (normal 0-5); 95% polymorphonuclear leukocytes (PMNs) (indicative of bacterial infection); Red blood cells – 100; protein 178 (elevated); glucose 18 (very low). Gram stain is shown in slide #13.

Slide 13

4. How do these results influence your differential diagnosis?
5. What is the likely pathogenesis of this infection? Are there any particular risk factors that contribute to Mr. Seagram's illness?
6. What potential complications or future sequelae should be anticipated?
7. Could this illness have been prevented?

Mr. Seagram's symptoms resolve with appropriate treatment, and he is discharged home.

2) **Junior has a rash**

Junior, an 18 year-old college freshman, has, with some difficulty, made it through the first semester of college. He returns for the second semester rejoining his five fraternity suite mates. One week into the second semester he starts to feel ill. His symptoms start with a mild cough and some myalgias. He thought that this might have been due to a late night drinking and smoking (we're not sure what he smoked) binge with his buddies in the local pub. On the day of his admission he develops a low-grade fever and headache. He goes to lie down and is found several hours later by one of his roommates delirious, with shaking chills and a rash covering much of his body. He is rushed to the hospital where he is examined in the emergency room and found to have the following: Temperature 103°; BP - 80/palpable (reduced); Respirations 28 (increased), and Pulse 124. He is minimally responsive to questions and is shaking in bed. His entire body is covered with a petechial rash (pinpoint hemorrhagic lesions) with some areas where the skin rash has become confluent (slide #14).

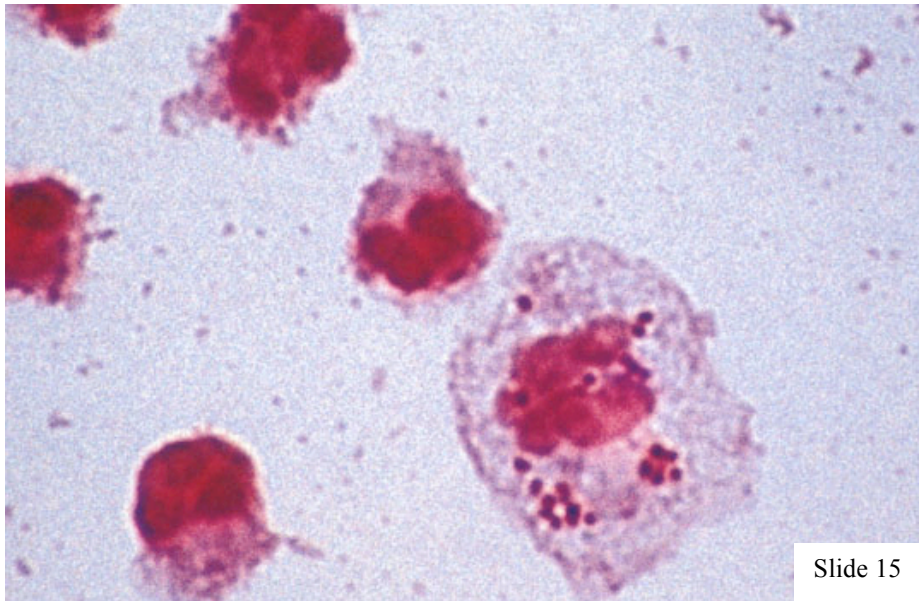


Laboratory studies reveal: White blood cell count: 19,000 (high) with a marked left shift. Platelet count 70,000 (reduced).

Lumbar puncture: Opening pressure increased; WBC 9,500 (normal 0-5); PMNs - 98% (high- suggestive of bacterial process); Gram stain pending; Protein – 130 (high); glucose – 5 (very low).

1. What are the likely causes of this process?
2. What is the pathogenesis of this process?

The Gram stain comes back and is shown in slide#15. Junior is admitted and promptly treated with appropriate antibiotics. His suitemates come to the emergency room because they have heard that Junior's infection is contagious and they want to know if they should take anything.



3. Should they? Why?
4. Would it have been possible to prevent this infection?

Session 4: Sexually Transmitted Diseases

The format of this session will differ from the other sessions. It will use a team-based learning approach. Further information will be provided prior to the session.

Session 5: Antibiotic Case Discussion

Introduction

Discuss the following questions in class at some point during the session:

- A. Why do most bacterial infections respond to bacteriostatic antibiotics? Why do some infections require bactericidal compounds?
- B. When the microbiology laboratory indicates that an organism is "susceptible" or "resistant" to an antibiotic, what does that mean?
- C. What is meant by synergistic interaction between antimicrobials? Discuss several mechanisms of synergy.
- D. Discuss the potential advantages and disadvantages of using more than one antibiotic in the treatment of infections.

The Case

Charles D. Gold, a 72 year-old lawyer, begins to wake up three to six times per night to urinate. After a month of these symptoms he consults a urologist, who makes a diagnosis of benign prostatic hyperplasia and schedules him for a transurethral resection of the prostate (TURP).

Mr. Gold's preoperative evaluation notes that he is in good health and takes no routine medications. His medical history is notable for rheumatic fever at age 12, with no serious sequelae. On physical exam, his temperature, pulse rate, blood pressure and respiratory rate are normal. His exam is unremarkable except for a soft, pansystolic heart murmur (suggestive of mitral regurgitation) and a symmetrically enlarged prostate. Routine laboratory results are normal. A urinalysis shows 30- 40 white cells per high power field and occasional bacteria. A urine culture is sent to the laboratory.

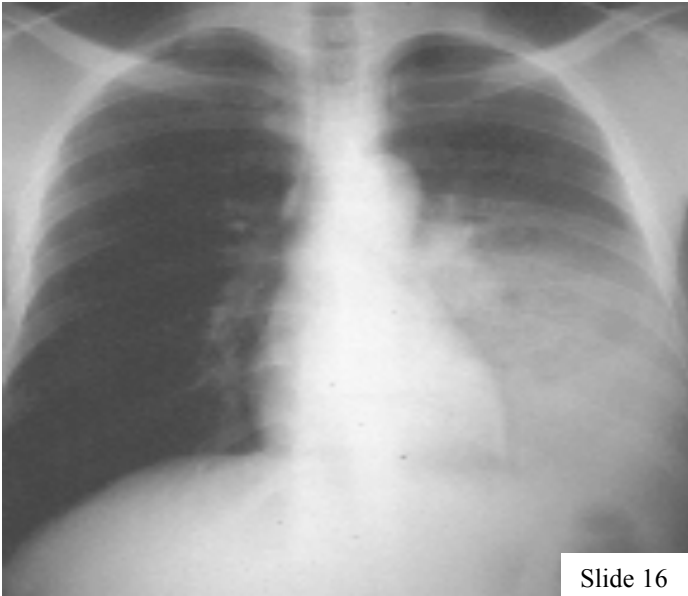
The next day the TURP is performed uneventfully. Mr. Gold's symptoms are much improved. Ten days later, however, he begins to feel weak and unwell. He develops fevers, sweats, chills, then a cough and shortness of breath when he walks.

On evaluation, Mr. Gold now has a temperature of 101° and a respiratory rate of 22. There are a few petechiae on his conjunctivae. His chest exam is notable for rales in both lung fields, and his heart murmur is much louder than it was previously. Routine labs show a fall in his hematocrit and a high erythrocyte sedimentation rate. His chest X-ray shows signs of heart failure. His urinalysis shows red cells, white cells and bacteria. Both his urine and his blood cultures grow *Enterococcus faecalis*.

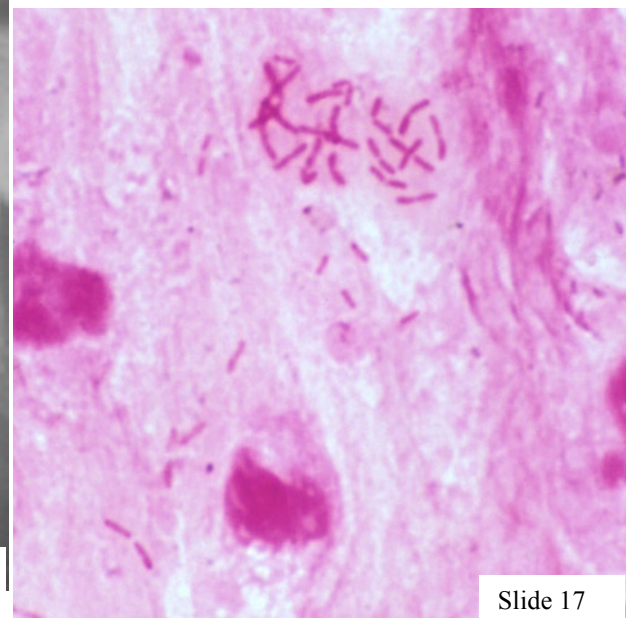
1. What is the differential diagnosis for Mr. Gold's illness? Justify your differential.
2. Which antibiotics will you choose to treat his infection? How will you administer them? About how long should he be treated?
3. Mrs. Gold calls you from Mr. Gold's hospital room just as the nurse is preparing to give him his first dose of antibiotics. She thinks you should know that he got a rash the last time he was given penicillin. What else do you want to know? Will this change your choice of antibiotics?
4. How do you plan to monitor Mr. Gold's response to antibiotic treatment?

Mr. Gold begins on the course of antibiotics you have selected. Within a week he has become afebrile, and subsequent blood cultures are negative. However, he continues to have difficulty breathing and his heart failure appears to be worsening. He is transferred to the medical intensive care unit where he is endotracheally intubated and placed on a mechanical ventilator. The next day a mitral valve replacement is performed.

After the operation Mr. Gold's cardiac and respiratory status stabilize. Two days later, however, he develops a fever of 104°. On chest X-ray he has a new left lower lobe infiltrate (slide #16). Sputum suctioned from his endotracheal tube is purulent, and on Gram stain many white blood cells and bacteria are seen (slide#17).



Slide 16



Slide 17

5. What infection does Mr. Gold have now? What organisms are likely to be involved?
6. What antibiotics can be used to treat this condition? Which would you select for Mr. Gold? How would you administer them?

After a lengthy discussion, you elect to empirically treat Mr. Gold with a third generation cephalosporin plus an aminoglycoside. Several days after the antibiotics you have chosen are begun, Mr. Gold becomes afebrile. His sputum culture is eventually reported positive for *Enterobacter cloacae*, sensitive to the antibiotics you have chosen. Mr. Gold then does well for several days. Although he remains in the intensive care unit, he can finally be removed from the ventilator. However the next morning, he once again develops a fever of 104°. His sputum, which had become scanty, is once again copious and purulent. His chest X-ray shows an enlarging infiltrate. A sputum culture again grows enterobacter, but now the organism is resistant to the antibiotics Mr. Gold is receiving. The susceptibility report reveals the following:

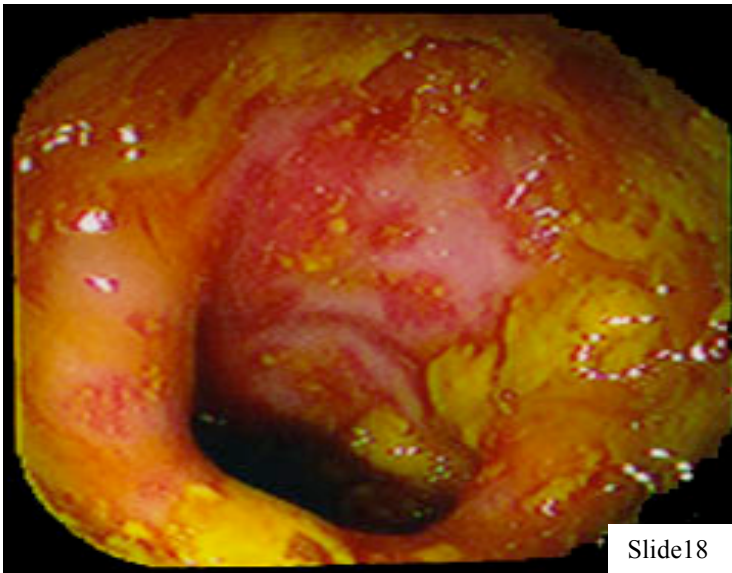
Resistant: ceftriaxone, piperacillin, ceftazidime

Sensitive: imipenem, ciprofloxacin.

7. Why has this organism become resistant? Is there any way you might have prevented resistance from developing?

8. Is this finding of clinical significance? Should you change Mr. Gold's antibiotics? To what?

Mr. Gold begins to do well on the antibiotics you have chosen. He leaves the intensive care unit. He begins to take short walks around the ward and is looking forward to going home. Suddenly, however, on the day before his discharge, he develops excruciating crampy abdominal pain, profuse diarrhea and a fever of 101°.



Mr. Gold undergoes colonoscopy (shown in slide #18).

9. What is the differential diagnosis for Mr. Gold's new illness?

10. What is the likely pathophysiology?

11. Which antibiotics can be used to treat this condition? Which would you select for Mr. Gold? How would you administer them?

Mr. Gold does well on the antibiotics you have selected and finally leaves the hospital, eight weeks after his admission, feeling well and thanking you for all your efforts. As he heads for the elevator he mentions that one of his molars has been bothering him for weeks. He is planning to go see his dentist in the morning.

12. Do you have any parting advice for Mr. Gold? Is there any way this long hospitalization of his might have been prevented?

Session 6: Outbreak and More



1) The Medical School Picnic

At the completion of the second year of medical school, 100 medical students attended a celebratory picnic. The food consisted of spinach salad, hamburgers, fried chicken, cole slaw, and homemade ice cream (by Dr. Garrett). Unfortunately, 2 days after the picnic 2 medical students got sick. And within a week of the picnic, an additional 18 medical students fell ill. All of the sick medical students attended the picnic.

Most of the 20 affected students experienced malaise, fever, abdominal cramping, and diarrhea consisting of frequent small loose stools. In some cases blood and mucus were seen. One student was treated in the ER for dehydration and two students were seen in the ER for symptoms mimicking appendicitis. Symptoms lasted from 1-7 days.

As a future epidemiologist you are enlisted to identify the source of the outbreak and its cause.

1) Using the following data, construct an epidemic curve:

Days after the picnic	# who fell ill
2	2
3	10
4	6
5	1
6	0
7	1

2) What appears to be the median incubation time for this illness?

3) Do you think this was a point source outbreak or was there person to person spread (or both)? Why?

4) What is your differential diagnosis?

5) Using the following data, calculate attack 'rates' (risk of being exposed and ill/total exposed) for consuming a particular food at the picnic. Next, calculate attack rates (risk of being unexposed and ill/total unexposed). The ratio of the attack rate in the exposed/attack rate in the unexposed is the attack ratio. Construct attack ratios to determine the food responsible for the outbreak.

Food Item Consumed	Ill students N=21	Well students N=80	Total N=100
Spinach Salad	15	60	75
Hamburger	5	70	75
Fried Chicken	18	30	48
Cole Slaw	18	70	88
Ice Cream	10	50	60

2) **Fever and sweats in T.J., a homeless man**

T.J., a 35 year old homeless man appears in the CPMC ER looking wasted and ill. He reports that he has been having daily fevers and drenching night sweats for a month. He has had no appetite and has lost 25 pounds. In addition, he has had a worsening cough productive of yellowish sputum that is occasionally blood streaked. He denies any other symptoms.

He was born in the Dominican Republic and moved to the New York area 10 years ago. He does not recall whether he drank unpasteurized milk as a child. He has no other travel history. He has worked intermittently as a handyman and has spent a good part of the past three years in shelters in Manhattan. He is heterosexual and has had approximately 6 partners in the past 2 years. He smokes 1 pack of cigarettes per day and drinks approximately 2-3 bottles of Wild Turkey per day.

Physical examination reveals a chronically ill appearing man with a blood pressure of 130/70, an elevated pulse and respiratory rate and a temperature of 101.4 degrees orally. There is temporal muscle wasting, no oral thrush (yeast infection of the mouth), poor dentition, no significant lymphadenopathy (enlarged lymph nodes), occasional rhonchi (a whistling sound indicative of some airway compromise) on lung exam, no heart murmur, a firm liver edge palpable 2 cm below the right costal margin with a span of 12 cm (indicating mild hepatic enlargement) and a palpable spleen tip (indicating a possibly enlarged spleen).



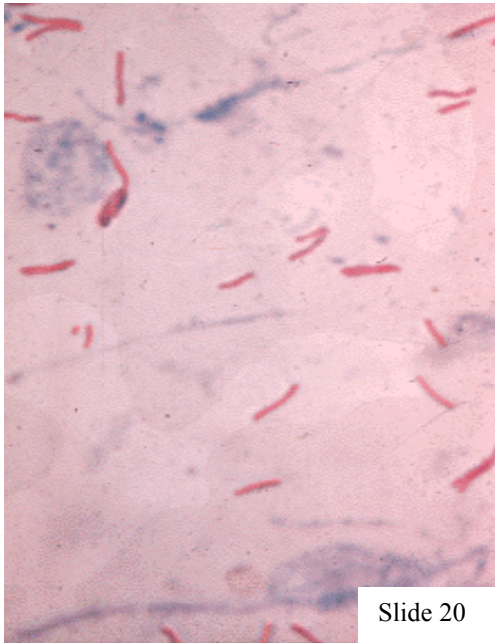
Laboratory studies show a Hgb of 10 gm/dL (low), a white blood cell count of 8,000 (normal) with 70% PMNs (slightly elevated), and 4% bands (slightly elevated). The liver function studies are mildly elevated. Electrolytes, blood urea nitrogen, creatinine and blood sugar are normal. The chest x-ray is shown in slide #19.

1. Do any of the epidemiologic clues help you in your thinking of the differential diagnosis?
2. Do the cough, hemoptysis, night sweats, weight loss and chest x-ray suggest one pathogen as most

likely?

3. When this patient is admitted to the hospital, would you take any infection control precautions? If so, what?
4. What are the possible causes of the elevated liver enzymes?
5. What additional laboratory tests would you request?

Results of a sputum evaluation are shown in slide #20.



6. What is the approach to treatment of the most likely pathogen?

3) **Jane feels lousy**

Jane H., a 75-year-old woman, wakes up on New Year's Day feeling lousy, with total body aches, a splitting headache, and a fever to 102. Over the next two days she develops a sore throat and dry cough. On the fourth day of her illness, she starts to feel a bit better but her husband persuades her to visit her doctor, you. Jane has no chronic medical problems except osteoarthritis, and she takes no medications. Her physical examination reveals a temperature of 100.8 degrees, blood pressure 126/84, pulse 102, respiratory rate 12, palatal erythema but no exudate, and mildly enlarged cervical lymph nodes bilaterally. Her heart and lung exams are within normal limits.

1) What is the differential diagnosis of Jane's illness?

You suspect influenza, but Jane says that could not be possible because she received the flu shot 2 years ago. She has not received it since, because she was convinced she got the flu last time she received the vaccination. You confirm your suspicion with a rapid test for influenza on a nasopharyngeal swab. Because the illness has been going on for four days, you decide not to treat Jane with antivirals, but prescribe acetaminophen and plenty of rest.

- 2) What is the pathogenesis of Jane's illness?
- 3) Why did Jane get the flu even though she received the flu shot 2 years ago?
- 4) Why did you choose not to treat her with antivirals?
- 5) What recommendations, if any, should you make for Jane's 78-year-old husband with rheumatic heart disease and mitral stenosis?
- 6) What should you tell Jane about influenza immunization?

Jane returns three days later feeling worse, with high fevers again, chills, a cough productive of greenish sputum, and shortness of breath.

- 7) What do you think has happened, and what are the most likely pathogens? What should you do now?

Session 7: HIV Infections

1) Janet J. has a rash and swollen glands

Janet J., a 20 year old college junior, returns from a summer vacation in San Diego and two weeks later develops fever, malaise, headache, mild neck stiffness, sore throat, “swollen glands” and a non-pruritic (not itchy) rash. She went camping and also had unprotected sex with a new male partner during the trip. Her previous health was excellent and she takes no medications.

Physical examination in her physician’s office reveals a temperature of 101°F, a maculopapular rash on the torso, oral ulcers (see slide #25), mild neck stiffness, and enlarged cervical lymph nodes.

Hemoglobin 13.5 gm/dL, WBC 3,100 (mildly low) with 66% PMNs, 35% lymphocytes, and 9% atypical lymphocytes. The AST and ALT, measures of liver enzyme function, are both mildly elevated. Electrolytes, blood urea nitrogen, creatinine, blood glucose and urinalysis are normal. A lumbar puncture is performed and reveals the following: 30 WBC’s (99% lymphocytes) (too many cells), protein 50 mg/dL (mildly elevated), glucose normal. A Gram stain of the cerebrospinal fluid (CSF) is negative.

1. What is your differential diagnosis?
2. Does the presence of the neck stiffness and the CSF profile help you? What do these abnormalities indicate?
3. How would you approach trying to pin down the diagnosis?

A diagnosis of acute HIV infection is made. (Specific test results will be provided.)

4. Why is it important, in terms of personal benefit and public health, to make this diagnosis?

2) Fever and cough in a woman from the Dominican Republic

Gloria R., a previously healthy 28-year old woman who emigrated from the Dominican Republic three years ago, appears in her local physician’s office with low grade fevers and a mild dry cough of one week’s duration. The physician hears some “noise in her chest” and prescribes a five day course of azithromycin. She initially feels somewhat better but the symptoms never entirely resolve. Over the next two weeks, she develops recurrent fevers to 101-102 degrees, fatigue, anorexia, worsening dry cough and shortness of breath with exertion. She feels like she “can’t take a deep breath”. She reports a mild headache when her temperature is up but she denies photophobia or neck stiffness. She has had no nausea or vomiting but has had some modest diarrhea. On questioning she reveals that she has lost 15 pounds in the past six months and hasn’t “been feeling herself”.

She has been married for 8 years and has been monogamous. There are two children at home who have been well.

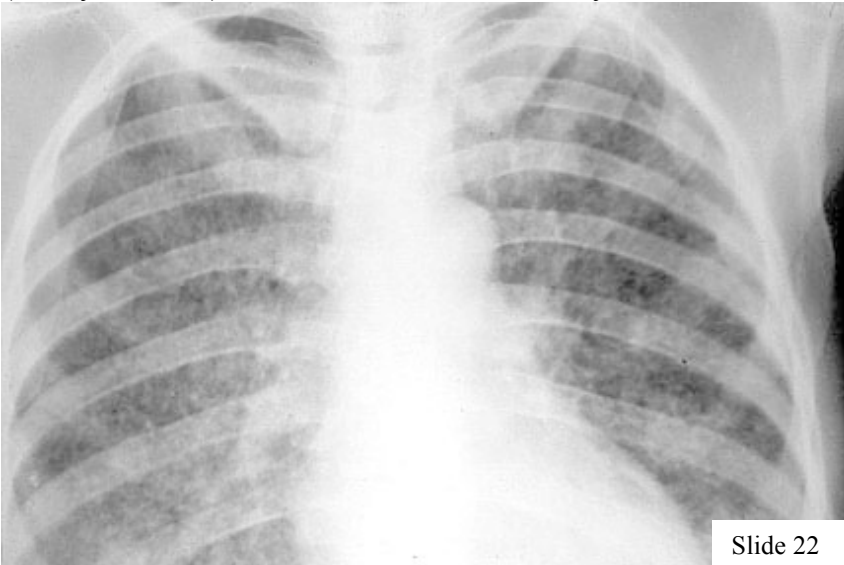


Slide 21

Physical examination reveals a fatigued appearing woman who gets short of breath with mild exertion. Blood pressure 100/60, pulse 110, respirations 30, temperature 101.5°F degrees orally. The pharynx reveals whitish plaques on the tongue and buccal mucosa (slide #21) and linear, vertical, white streaks on the sides of the tongue. Cervical, axillary and inguinal lymph nodes are palpable but mostly <1 cm in diameter. The neck is supple. Lungs are clear to auscultation and

percussion. Cardiac, abdominal, extremity and neurologic exams are normal. She has a 1.5 cm painful ulcer in the vaginal introitus.

Initial laboratory studies reveal a Hgb of 11.5 gm/dL, a white blood cell count of 3,000 with 80% polys, 3% bands, 7% monocytes and 10% lymphocytes. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are 45 and 50, respectively (mildly elevated). Renal function and electrolytes are normal. Oxygen saturation is 91%

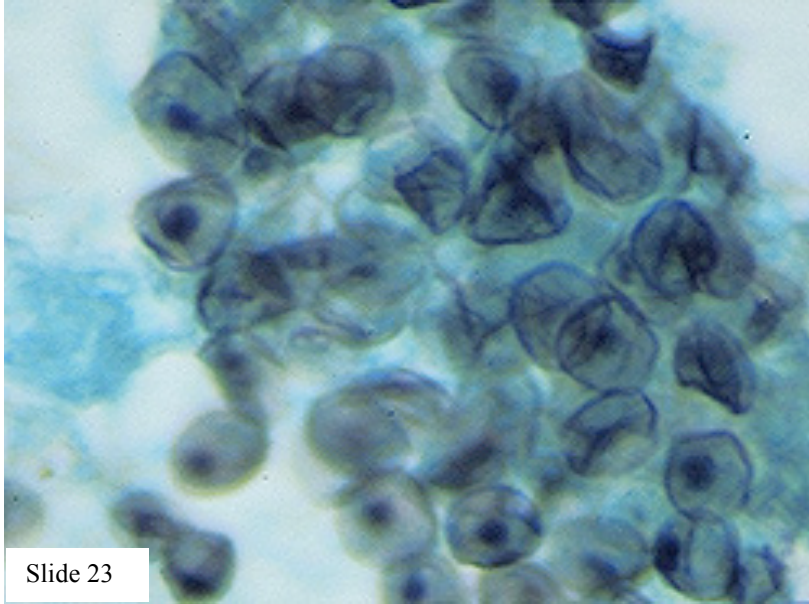


Slide 22

on room air, dropping to 85% after walking up and down the hall (abnormal). An arterial blood gas reveals a pO₂ of 65 on room air (quite low). Electrocardiogram shows sinus tachycardia. Chest x-ray shows bilateral, interstitial infiltrates (slide #22).

The patient is admitted to CPMC for evaluation and treatment. A bronchoscopy is performed and reveals *Pneumocystis jiroveci* organisms (slide#23). An HIV antibody test, drawn on admission, turns out to be positive.

1. Now that you know the patient is HIV antibody positive, what other tests would you do to characterize her stage of disease?



Slide 23

2. The patient is found to have pneumocystis pneumonia (PCP), which is known as an opportunistic infection. What is meant by the term opportunistic infection? What is the usual presentation of PCP in a patient with AIDS? She is treated with both trimethoprim-sulfamethoxazole and methylprednisone. Why was a steroid used in this case?

3. Her CD4 cell count is found to be $30/\text{mm}^3$, and the HIV RNA level is 350,000 copies/ml. Are you suspicious that any other processes are going on in this patient? If so, what might some of them be?

The patient responds to treatment. On the 7th hospital day, a phlebotomist suffers a needle stick after drawing blood from the patient.

4. What is the risk of HIV transmission from a needle stick from a known HIV positive source?
5. What are the factors that contribute to a higher risk of transmission?
6. What other viruses besides HIV would you be worried about being transmitted by needle stick?
7. What should the phlebotomist do?
8. If Gloria decides to have another child what can be done to decrease the risk of transmission of HIV to her baby?

Session 8: Unknowns

1) Seeing Spots

A 17 year-old boy presents to the ER in May complaining of shaking chills, fever, and a generalized skin rash for 2 days duration. Previously he was feeling well, though he notes that he developed an unusual skin lesion on his arm about 6 days ago—it started out



as a bump, but became a small black crater. He denies knowledge of any tick bites. Two months ago he visited his uncle who works in Biodefense at the CDC. He denies other travel outside of NYC, but notes he went to Kew Gardens, Queens a week ago as a volunteer to clean up rodent-infested housing. No known sick contacts. He cannot recall his childhood illnesses nor his vaccinations.

On physical exam he looks fairly well. His temperature is 104 F, pulse is 120, RR 23, BP is 110/72, and SpO₂ is 100% on room air. His conjunctivae



are injected and there are no mucosal lesions. No neck stiffness. Lungs sound normal. Heart is tachycardic and abdomen is benign. There is a 1 cm eschar on the left forearm (slide #24) with a tender mobile lymph node in the left axilla. Skin exam also reveals up to 20 vesicles and papulovesicles scattered over his body—see slide #25.

Lab results are unremarkable and include a normal white count, platelets, liver enzymes, and kidney function. CXR appears normal.

1) What is your differential diagnosis?

You call dermatology to come help confirm what you think is the most likely diagnosis.

3) What diagnostic tests would you like to perform?

The group's preceptor will provide you with your test results. A diagnosis should be made.

3) How is this illness acquired?

4) How is this illness treated?

2) Maddy S. Acts Abnormally

Maddy S., a 45 year old previously healthy housewife, awakens at 3 in the morning in the dead of winter, makes the bed, showers, puts on a bathing suit and goes to the kitchen to make breakfast. At six in the morning, her husband awakens and is surprised to find that his wife has gone through her usual routine daily activities at such an odd hour (and is in a bathing suit). He asks her why she behaved like this but she doesn't think anything is abnormal. She describes "hearing something" when she woke in the middle of the night but can't remember the details. She states she feels "OK" except for a left sided headache. The husband notes that his wife appears to be having trouble finding words and is somewhat halting in her speech pattern. He is concerned and wishes to take his wife to the doctor but she doesn't want to go. Twelve hours later, however, his wife is witnessed to have a seizure which initially involves the right upper extremity but evolves into a generalized tonic-clonic seizure with depressed consciousness. The husband calls 911 and his wife is brought to the Columbia Presbyterian Emergency Room.

In the ER, the wife is noted to have a temperature of 102°F, a blood pressure of 140/90, a pulse of 90 and a respiratory rate of 22. She is arousable but lethargic, and appears to be speaking unintelligibly in response to questions. There is no rash. The neck has some



mild resistance to passive motion but not impressively so. There is no lymphadenopathy and the heart, lung, abdomen and extremity exams are normal. The neurologic exam reveals the mental status as noted, intact cranial nerves, and symmetric deep tendon reflexes. She cannot cooperate with detailed motor, sensory and cerebellar exams but she appears to withdraw her extremities symmetrically to noxious stimuli.

Initial laboratory data in the ER reveal a white blood cell count of 7,000 with a normal differential, normal platelet count, normal electrolytes and blood sugar, and normal kidney and liver function. Blood and urine cultures are sent. An astute

medical resident immediately starts a medication intravenously and sends the patient for an emergency head CT scan (with contrast). The result is negative but an MRI is obtained (slide #26) and reveals increased signal in the left frontal and anteromedial temporal region (consistent with edema). No mass effect is seen so a lumbar puncture is performed. This reveals an opening pressure of 140 mm of water, a white cell count of 55 with 60% lymphocytes, 40% PMNs, a red cell count of 430, a protein of 70 mg/dL and a normal sugar. Gram stain does not show any bacteria.

1. What is your differential diagnosis?
2. Is there any other history that you would like to obtain from the patient or her husband?
3. What are the important clues in her available history, initial ER examination and laboratory data?
4. How would you characterize the pathogenic process that is likely occurring in this patient?
5. What additional diagnostic tests might you order?

3) Occam's Razor?

You are working in the AIDS clinic and are asked to see a patient who has come in without an appointment because he is not feeling well.



He is a 47-year old man who was diagnosed with HIV five years ago, after an episode of pneumonia. His CD4 cell count at that time was 5/mm³ and his viral load was >750,000. He is presumed to have acquired his infection in the 1990s through intravenous drug use.

Since his diagnosis he has been seen very intermittently at the clinic, most recently 9 months ago. Antiretroviral drugs were prescribed a few times several years ago, but the patient never kept follow-up appointments and admitted that he never took the meds. He has, however, stated that he is careful always to take trimethoprim-sulfa 1 DS tab a day.

Despite participating in a methadone program he has continued to use heroin and cocaine heavily. His CD 4 cell count is always in the single digits. His liver and kidney function have been good. He is infected with Hepatitis C. He is homeless and will not go to shelters; instead he sleeps on sidewalks or in abandoned buildings.

Today the patient complains of feeling terrible. He has had a dry cough for a few weeks, and a skin rash. His vital signs: T 103.6 BP 96/60 P 120. He is cachectic and looks ill. Physical exam is notable for:

skin: a few dozen small umbilicated papules over his face and neck. (slide #27)

nodes: small nontender freely mobile cervical and axillary nodes

pharynx: white patches over the upper palate and gums

chest: clear

cor: tachycardia without a murmur

abdomen: no organomegaly or masses

neurologic exam: intact

Labs: WBC 2.1 (low)

Hct 30/Hgb 10

plts 121 k (slightly low)

electrolytes are consistent with slight dehydration

liver enzymes: ast/alt 80/80 (slightly elevated)

alk phos 780 (markedly elevated)

bilirubin normal

chest x-ray: diffuse interstitial infiltrates

1. What is the differential diagnosis? Be specific and complete. What in the patient's history or physical exam makes you worry about each possibility?
2. Given your differential diagnosis, how will you manage this patient? Where will you send him? What tests will you order? What medications will you suggest? Request diagnostic test results from your preceptor.
3. What test now?
4. What is his diagnosis? Why is the CSF not more abnormal? How will you manage the patient? What tests will you use to guide his therapy? What complications will you watch for? What are your long-term goals for the patient? What is his prognosis?

2008 MID Pathophysiology Preceptor Group Assignments

<u>Group 1 – HHSC 304</u>	<u>Group 2 – HHSC 306</u>	<u>Group 3 – HHSC 308</u>	<u>Group 4 – HHSC 310</u>
1 Andersen, Kristen Brady, Paula Close, Ryan	1 Arnold, Danielle Castle, Robyn Colacchio, Nicholas	1 Atalay, Alev Cerda, Natalie Conniff, James	1 Atkinson, Richard Chan, Joseph Critchfield, Adam
2 Douglass, Nathan Fulham, Sarah Graif, Theresa	2 Dukes, Jason Gancarczyk, Stephanie Gray, Tyler	2 Duncan, Ellen Gapinski, Jennifer Green, Daniel	2 Duvall, Michelle George, Erin Griffin, Judith
3 Hawson, Alexander Huang, Kai Katzman, Rebecca	3 Hayes, Gabriela Imus, Philip Kazadi, David	3 He, Xining Inkellis, Elizabeth Kerner, Bethany	3 Hingula, Lee Iweala, Uzodinma Kirby, E. Wilson
5 Langer, Nathaniel Li, Darrick Manuelli, Victoria	5 Lawton, Christopher Lin, Christine Marhoffer, Elizabeth	5 Lee, Eliza Linker, Debra Marulanda, Erika	5 Lee, Valerie Linkov, Gary Mayer, Joseph
6 Mogen, Jonathan Pagano, Matthew Piazza, Matthew	6 Montoya-Fontalvo, Diana Parameswaran, Janaki Pitman, Max	6 Nees, Shannon Parisot, Nelly Pizzarello, Benjamin	6 Mitsumoto, Jun Paul, Tracy Polland, Allison
7 Ravin, Reid Rodman, Arielle Sonti, Rajiv	7 Reyfman, Paul Russo, Marco Spencer, Kevin	7 Ricci, Angela Sarnelli, Crissaris Stater, Brian	7 Richardson, Safiya See, Craig Stein, Gregory
8 Vogel, Laura Wong, Alvin	8 Vora, Amar Xu, Lu Na	8 Wang, Shang-Jui Yagoda, Nicholas	8 Ware, Jeffrey Young, Tiffany
<u>Group 5 – HHSC 316</u>	<u>Group 6 – HHSC 320</u>	<u>Group 7 – HHSC 322**</u>	<u>Group 8 – HHSC 324**</u>
1 Ballantine, Brooke Chang, Catherine Cruz, Christina	1 Barsa, Jonathan Cheesman, Khadeen Cyrille, Nicole	1 Baur, Laura Chiang, Austin Dabela, Ellen	Bazargan-Lari, 1 Ardalan Cho, Christina DeCuir, Jennifer
2 Eudailey, Kyle George, Michael Gutierrez, Nicholas	2 Everett, Benjamin Gerken, Adrienne Hall, Daniel	2 Fernandez, Cristina Goettsche, Katherine Harper, Oliver	2 Friedlander, Robin Gover, Mary Hartley, Rochelle
3 Hipkens, Sarah Jackson, William Kleinert, Kelly	3 Hitti, Frederick Jessiman, Megan Ko, Darae	3 Hopkins, Sarah Kane, Austin Koeckert, Michael	3 Hsieh, Christine Karl, John Kushner, Jared
5 LeGall, John Liu, Tin Yan McColgan, Bryan	5 Levine, Joshua Lukac, Paul Mendez, Andres	5 Levy, David Lyashchenko, Alexander Mendoza, Natalia	5 Lewsey, Sabra Mantri, Sneha Millan, Ramon
6 Newhouse, Amy Paz, Yehuda Pugliese, Angela	6 Ng, Elise Penn, Brandon Rajfer, Rebecca	6 Nightingale, Andrew Perretta, Laura Ramirez, Alejandro	6 O'Brien, Connor Perrino, Michael Rampersaud, Ryan
7 Ridley-Lane, Megan Sherman, Evan Ursem, Carling	7 Riesgo, Aldo Slocum, Chloe Stella, Peter	7 Ringler, Doron Smalls-Mantey, Adjoa	7 Robinson, Kimberly Solis, Daniel
8 Wasserlauf, Jeremiah Youngerman, Brett	8 Watling, Jonathan Yuan, Xiaoning	8 Straw, Erin Williams, Brendan	8 Svoronos, Alexandra Wittenberg, Alan Charlie ¹

****ROOM EXCEPTION DATES for Groups 7 & 8**

Mon. 10/13:

Group 7 - use PH17-309
Group 8 - use PH17-311

Thurs. 11/20:

Group 7 - use HSC 412¹