SESSION 3 | MONDAY, AUGUST 23, 2021

Session Moderator: Dr. Whitley
Session Panelists: Drs. Kotton, Dhanireddy, Ghanem, Rose, Thomas, and Tunkel

31 | HBV REACTIVATION IN HIV | THOMAS

45-year-old HIV infected man switched to monthly cabotegravir and rilpilvirine injections. Aside from some pain in the injection sites he had no complaints. However, his routine lab testing showed ALT 568 IU/ml and AST 672 IU/L and total bilirubin of 2.3 mg/dl. Other labs weren't significantly changed from baseline. He was in a stable relationship with one male partner and did not endorse using illicit drugs.

What test is most likely to explain the hepatitis?

A. Cabotegravir metabolite level
B. Rilpilvirine level
C. HCV RNA level
D. **HBV DNA level**
E. Electron microscopy of hepatocytes mitochondria

Correct Answer: **HBV DNA level**

Since cabotegravir and rilpilvirine lack activity against HBV, there is the possibility that persons who change to this regimen will experience HBV breakthrough if they had chronic hepatitis B and were previously suppressed on a TAF- or TDF-containing regimen. Although no information regarding chronic hepatitis B is given, it is an important consideration. It is also worth remembering that there are outbreaks of acute HCV among HIV-infected MSM. Certainly, testing in this man will include HBV DNA and HCV RNA. However, given that exposure to HCV was specifically denied in the stem, the authors prefer answer D. Although cabotegravir and rilpilvirine did not cause a high incidence of hepatotoxicity in the phase 3 trials, any medication can. However, the best course of action here is to get the HBV and HCV tests first.

32 | HBV IN MED STUDENT | THOMAS

You are asked by your occupational health service about a 22-year-old incoming medical student who had never been vaccinated for HBV since he recently emigrated to the US.

At his initial visit to occupational medicine as a first-year student he reported having hepatitis B since birth which was never treated. His family immigrated to the US and his mother is the presumed source of infection.

He is otherwise well.

Occupational medicine reports that he is HBsAg positive, has an HBV DNA level of 8.2 log IU/ml, and an ALT of 22 IU/L.

What is the best advice regarding the student's participation in clinical rotations now and in the future?

A. His HBV status is not relevant to his clinical rotations or career choice regardless of whether he is treated
B. His HBV status should preclude him from an interventional career (e.g., surgery) regardless of whether he is treated
C. He should be treated and restricted from clinical rotations until his HBeAg converts to negative at which point he can resume all activities
D. **He should be treated with an approved regimen and allowed to complete clinical training once his HBV DNA < 1000 IU/L when he can resume all clinical activity**
E. He should be treated and restricted from clinical rotations until his HBV DNA < 1000 IU/L but he should never be involved in interventional procedures (e.g., surgery)

Correct Answer: **He should be treated with an approved regimen and allowed to complete clinical training once his HBV DNA < 1000 IU/L when he can resume all clinical activity**

While HBV vaccination is recommended universally in the United States for most persons (e.g., all children and adolescents under 19 years of age, adults engaging in high-risk activities, MSM, IVDUs, health care and public safety workers etc.), not everyone is vaccinated and not everyone vaccinated develops protective immunity. Presumably all health care workers or students who are not immunized are offered HBV immunization and 90-95% should seroconvert.

However, this student acquired HBV infection at birth, and it is now too late to prevent HBV infection.

This case integrates ethical and medical knowledge. HBV can be spread from health care workers to patients. However, that spread generally occurs with exposure-prone procedures and from health care workers with HBV DNA levels > 10,000 IU/L. Such persons are generally also HBeAg positive.

While patients unquestionably have the right to be protected from harm, health care workers have the right to privacy and to practice medicine if the risk of harm to patients is mitigated. Thus, while there are some differences worldwide in how those principles are applied, in the USA SHEA and CDC have recommended that the HBV DNA levels be <1000 IU/ml prior to performing exposure prone procedures. That goal can be achieved with treatment in most instances.

HBeAg is a useful proxy since HBV DNA levels are often lower when HBeAg is negative. However, guidance pivots on the HBV DNA level, not HBeAg.

33 | M. GENITALIUM URETHRITIS | GHANEM

A 35-year-old sexually active man has burning with urination and clear urethral discharge for the past two weeks.

Urine culture and urine NAAT for *Neisseria gonorrhoeae, Chlamydia trachomatis* and *Trichomonas vaginalis* are negative.

Urine PCR should be performed for which of the following?

A. *Mycoplasma pneumoniae*
B. ***Mycoplasma genitalium***
C. *Mycoplasma hominis*
D. *Treponema pallidum*
E. *Chlamydia pneumoniae*

Correct answer: ***Mycoplasma genitalium***

This patient has urethritis. Testing for *Mycoplasma genitalium* is recommended.

Mycoplasma pneumoniae and *Chlamydia pneumoniae* are not causes of urethritis and although syphilis is sexually transmitted, urine PCR would not be a standard test.

Mycoplasma hominis is more likely to be normal microbiota in urine, rather than a pathogen.

34 | CHIKUNGUNYA | WHITLEY

A 35-year-old male agricultural specialist visited Zimbabwe for 3 weeks to assess farm productivity. One day after his return to the United States, he developed fever, headache, diffuse myalgias and joint pains in his hands, elbows, shoulders, knees, and feet. He had a macular non-pruritic rash on his face and neck that faded over several days. His fingers and wrists were swollen but not erythematous. His wrists were so sore he could not use his computer or carry his briefcase.

He stayed home from work for 4 days until his fever abated without therapy, but his joint pains persist 3 weeks later, and he consults you.

He relates that he took mefloquine weekly during his stay in India but stopped it when the fever and rash began. On his exam he is not febrile and he has no rash, joint findings, or other abnormalities you can detect.

Laboratory:

- CBC and blood chemistries are normal.
- Malaria smear is pending.

The most likely cause of this man's illness was which of the following:

A. Nipah virus
B. Hepatitis A
C. **Chikungunya**
D. Mefloquine hypersensitivity
E. Dengue

Correct Answer: **Chikungunya**

Arthritis or arthralgias that persist for weeks or months after a febrile illness should make you suspect Chikungunya, O'nyong-nyong, or one of several other alphaviruses. This virus is transmitted by the Aedes mosquito (several species) and has been reported in travelers from the Caribbean, South and Central America, India, islands in the Indian Ocean (e.g., Reunion) and Sub-Saharan Africa (e.g., Zimbabwe).

Diagnosis is made by sending serum to a state lab or CDC for IgM Elisa and PCR. There is no specific therapy.

Admittedly, the distinction among dengue, chikungunya, Zika and a host of other viruses can be difficult to make clinically.

Anopheles mosquitos transmit malaria, filaria and dirofilaria, but these diseases do not fit the symptoms of this patient.

Nipah virus has been seen in Asia (including India and Malaysia) as a cause of encephalitis in individuals having close contact with pigs.

Hepatitis A is not likely in a patient who has normal liver function tests 3 weeks after the onset of symptoms, although hepatitis A or B can be associated with arthralgias.

Mefloquine can cause neuropsychiatric symptoms but not arthralgias.

Dengue is a mosquito borne illness (several species of Aedes) with headache, high fever, rash and myalgias, but persistent arthralgias or arthritis would not be typical.

You are called by a family physician about a patient, a 17-year-old whom she saw two days earlier for severe sore throat and malaise of five days duration.

The patient was well until he developed the sore throat accompanied by low grade fever and "feeling tired and sick." He doesn't know anyone else who is sick. He is sexually active with a single partner and always uses condoms.

On exam, his temperature was 100.8°F; pulse 86, BP 112/78. He had periorbital edema and bilateral anterior and posterior cervical nodes that were more prominent posteriorly. His throat was red with small exudates. The spleen tip was palpable.

A rapid strep test performed in the family physician's office was negative.

The doctor thought the young man had mononucleosis and ordered a CBC and Monospot test (heterophile antibody). The WBC count was 12,000; there were 32% lymphocytes and 12% atypical lymphocytes and the platelet count was slightly low at 120,000.

The Monospot test was negative.

Which one of the following is most likely responsible for the young man's illness?

A. Cytomegalovirus
B. HIV
C. **Epstein-Barr virus**
D. Toxoplasma
E. Human herpes virus 6

Correct answer: **Epstein-Barr virus**

This patient has a classic mononucleosis syndrome. About 90% of mononucleosis like illnesses in adolescents and young adults are due to Epstein-Barr virus, and the peak age for EBV mononucleosis in the United States is 16 to 17 years of age.

The Monospot test, a rapid agglutinin test for heterophile antibody, is highly specific but not highly sensitive

The important point is: The false negative rates are highest during the beginning of clinical symptoms (25 percent are falsely negative in the first week; 5 to 10 percent in the second week, 5 percent in the third week)

Measurement of EBV-specific antibodies is usually not necessary since the majority of patients are heterophile positive. However, testing for EBV-specific antibodies can confirm the diagnosis if the heterophile test is negative and there is a need for a definitive diagnosis. IgM and IgG antibodies

directed against viral capsid antigen (VCA) have high (>95%) sensitivity and specificity for the diagnosis of mononucleosis.

Ten percent of mononucleosis syndromes are due to other agents including HIV, CMV (sore throat less likely), toxoplasmosis (no sore throat), HHV-6 and HHV-7.

For strep pharyngitis there should be no splenomegaly and no severe fatigue.

36 | Measles Prophylaxis | Dhanireddy

A 28-year-old female emergency room nurse cares for a child with fever and rash who is later determined to have measles. Because the diagnosis was not under consideration at the time of clinical presentation, the child was not placed on airborne precautions, and the nurse did not wear an N-95 respirator when caring for the patient. The nurse is originally from Nigeria and prior MMR (measles-mumps-rubella) vaccination records are not readily obtainable.

You are asked to provide recommendations for post-exposure prophylaxis for the nurse. Which of the following would you advise?

A. Vitamin A
B. MMR vaccine and immunoglobulin (IG) within six days of exposure
C. **MMR vaccine within 72 hours of initial measles exposure, or immunoglobulin (IG) within six days of exposure**
D. Valacyclovir intravenously every 12 hours
E. Ribavirin

Correct answer: **MMR vaccine within 72 hours of initial measles exposure, or immunoglobulin (IG) within six days of exposure**

Measles, caused by *Rubeola* virus, is highly infectious, and airborne precautions (patient placed in airborne isolation room, and use of N-95 or similar respirators by health care personnel) are recommended to reduce the chance of transmission.

Evidence for immunity against measles can be demonstrated by written documentation of adequate vaccination, laboratory evidence of immunity (or laboratory confirmation of measles infection), or birth before 1957.

In this case, the nurse does not have documentation of immunity against measles; thus, she should be offered post-exposure prophylaxis.

Either MMR vaccination within 72 hours, or immune globulin within 6 days of exposure, may be used as post-exposure prophylaxis; these agents should not be used together as the immune globulin will invalidate the vaccine.

Valacyclovir and ribavirin are not used for treatment or prophylaxis against measles.

Vitamin A is thought to be helpful for adjunctive treatment of measles in children, but this is not used as post exposure prophylaxis.

37 | Otic Syphilis | Ghanem

A 27-year-old man with no significant past medical history presents complaining of a rash and "ringing" in both his ears.

He was well until one week earlier when he noticed a rash on his back and abdomen. The rash is not pruritic. Five days prior to presentation, he noted "ringing" in his right ear followed shortly thereafter by similar symptoms in his left ear. He denies any other complaints.

Physical examination reveals a macular non-blanching rash limited to his abdomen and back. Anogenital and neurological examinations are unremarkable. There is no obvious hearing loss on examination.

However, an immediate evaluation by an otolaryngologist found bilateral sensorineural hearing loss. Abnormal laboratory results include a reactive serum treponemal CIA and a reactive serum RPR with a titer of 1:512.

Which of the following is the most appropriate next step?

A. A single intramuscular dose of 2.4 MU of penicillin G benzathine
B. An intramuscular dose of 2.4 MU penicillin G benzathine weekly for 3 consecutive weeks
C. A CSF examination
D. Doxycycline 200 mg orally twice daily for two weeks
E. **Intravenous aqueous penicillin G 18-24 million units daily for 10-14 days**

Correct Answer: **Intravenous aqueous penicillin G 18-24 million units daily for 10-14 days**

The patient has secondary syphilis and evidence of otic syphilis without any other neurological signs or symptoms.

The classical symptoms of otic syphilis include hearing loss, dizziness, and/or tinnitus. In approximately 50% of patients, these symptoms will occur bilaterally. Up to 90% of patients with otic syphilis will have a normal CSF examination, so a lumbar puncture is not recommended to make a diagnosis of otic syphilis if there are no other neurological signs and symptoms to suggest concomitant neurosyphilis.

The recommended treatment regimen for otic syphilis is similar to neurosyphilis: aqueous penicillin G for 10-14 days. The benefits of steroids for this condition are unknown. The use of high dose oral doxycycline for the treatment of neurosyphilis/ocular syphilis is currently being studied and should not be recommended.

A 35 y/o male reports that he spent this past week at a shelter where he was told there were several cases of active hepatitis A. You call the shelter and they confirm that they have diagnosed 6 cases among their clients during the past week.

Your patient feels well, has no complaints and a normal examination. He reports that he never received immunizations of any sort that he can remember.

You don't have ready access to serologic testing for hepatitis A antibody, so that screening is not an option even if you thought it were useful.

In order to protect him from hepatitis A, what would you recommend:

A. Hyperimmune hepatitis A immune globulin
B. Immune serum globulin
C. **Hepatitis A vaccine**
D. Both hepatitis A vaccine and immune serum globulin
E. No post exposure prophylaxis

Correct answer: **Hepatitis A vaccine**

This patient should receive at least one dose of hepatitis A vaccine

- Immune serum globulin (ISG) would be protective but is not recommended and has only short-term benefit
- There is no hyperimmune hepatitis A immune globulin
- Dual protection with vaccine and ISG would be appropriate only for high-risk hosts such as those with chronic liver disease or immunocompromised.
- He is at enough risk from living with other possible active cases, especially where hygiene may not be optimal, and thus merits some protection.

This patient has been exposed to hepatitis A. He has no symptoms so that there is no reason to get liver function tests. One could order hepatitis A antibody, but there is some urgency to administer post- exposure prophylaxis within the two-week recommended window post exposure. If testing has a rapid laboratory turnaround and the patient is likely to be immune (i.e., was born in a country with high prevalence or is in another risk group with high infection rates (i.e., IVDU or MSM), testing might be reasonable.

Individuals who warrant post-exposure protection (i.e., hepatitis A vaccine and/or immune globulin) after exposure include unvaccinated persons in the following categories:

- Close personal contacts including household and sexual contacts and needle sharing partners

- Child Care and school contacts
- Food handlers

Post-exposure prophylaxis is not warranted in association with a single case of hepatitis A in a school, office, or hospital if the source of infection is outside the school or work setting.

Post-exposure prophylaxis with HAV vaccine or immune globulin (IG) is effective when given within 2 weeks of exposure to hepatitis A. Previously, ACIP recommended vaccine for persons 1 to 40 years of age and IG for those outside this range. The new recommendation is complicated, but intuitively reflects the additional of IG when there is a high risk that antibodies won't be formed quickly by vaccination. A summary is as follows:

- Administer HAV vaccine for all persons >12 months of age.
- When a person >40 years of age is at high risk for infection or complications (e.g., chronic liver disease or immunocompromised), the provider may consider administering IG in addition to vaccine.
- In persons >12 months of age who are immunocompromised or have chronic liver disease, administer vaccine plus IG (in different anatomic sites, i.e., separate limbs).

Immunization with single-antigen inactivated hepatitis A vaccine (HAVRIX or VAQTA) includes two doses for children and adults. Immunization with the combination inactivated vaccine, TWINRIX, consists of three doses for adults. Technically, post-exposure prophylaxis requires only one dose, but if long lasting immunity is desired, a second dose should be given, and this is usually the goal.

Serologic testing following vaccination is not necessary in immunocompetent persons since there is a high rate of vaccine response among adults. Completion of the vaccination is presumed to confer lifelong protection. HAV booster vaccination is unnecessary after completion of the primary two-dose vaccination series.

39 | Flu Vaccine | Dhanireddy

A 48-year-old with rheumatoid arthritis on TNF- alpha inhibitors presents in the Fall of 2016 for routine follow-up. He states he NEVER gets the influenza vaccine because he develops severe hives if he eats eggs and is immunosuppressed. On further questioning he states he can eat baked goods cooked with eggs and has no allergic sequelae.

What would you advise this patient about influenza vaccination:

A. He should be given the Live Attenuated Influenza Vaccine
B. **He may safely receive Inactivated trivalent or quadrivalent Influenza Vaccine**
C. He should not receive any influenza vaccine due to his egg allergy
D. The only safe option is to receive Flucelvax (ccIIV), the mammalian Cell Culture Inactivated Influenza Vaccine or Flublok (rIIV), the Recombinant Influenza Vaccine

Correct Answer: **He may safely receive Inactivated trivalent or quadrivalent Influenza Vaccine**

Incorrect. The live influenza virus vaccine is not recommended by the ACIP for 2016-17 influenza season

In those who can eat eggs but develop only hives the ACIP has deemed IIVs safe to use. He could also be given the vaccine with virus raised in cell culture or recombinant hemagglutinin protein from the three viruses grown in cell culture.

Since he is immunosuppressed it is even more important that he receive annual influenza immunization.

40 | TAKAYASU | ROSE

You are consulted to see a 31-year-old woman on the neurology service who was admitted yesterday after an apparent transient ischemic episode. She was febrile on admission and reported having had fever for more than a week along with night sweats. On review of systems, she noted a five-pound weight loss in the last week along with pain in both calf muscles after walking about a half mile. She works in a shelter for homeless people.

On exam, she has a temperature of 101.6°F; pulse 100; BP 84/66. There is no rash and no murmur. She is tender bilaterally over her carotid arteries and has diminished peripheral pulses throughout. Her neurological exam is normal. Blood cultures from admission are negative at 24 hours. Chest x-ray and routine labs are normal except for a WBC count of 12,300 with 77% polymorphonuclear neutrophils.

Which one of the following is the most likely diagnosis?

A. Culture-negative endocarditis
B. Temporal arteritis
C. Moyamoya disease
D. **Takayasu's arteritis**
E. Atrial myxoma

Correct Answer: **Takayasu's arteritis**

Takayasu's arteritis is a large vessel vasculitis of the aorta, its main branches, and pulmonary arteries. Most patients are young, otherwise healthy women who present with fever, weight loss, sweats, and myalgias along with TIAs, visual changes, strokes, asymmetrical blood pressure, carotid tenderness, extremity claudication, and diminished pulses. Diagnosis is made by arteriography and treatment is with steroids.

Temporal arteritis typically occurs in older persons and is associated with headache and visual changes. Common laboratory findings are marked elevation in inflammatory markers and anemia, which are variably present in Takayasu's arteritis.

Moyamoya disease is confined to the cerebral circulation and results in ischemic strokes. Moyamoya disease is a rare, progressive cerebrovascular disorder caused by blocked arteries in the basal ganglia. The name "moyamoya" means "puff of smoke" in Japanese and describes the look of the tangle of tiny vessels formed to compensate for the obstruction. The incidence is higher in Asian countries than in Europe or North America. The disease primarily affects children, but it can also occur in adults presenting as hemorrhagic stroke. In contrast to Takayasu's arteritis, fever is not seen with this disease. Therapy is surgical.

There is no murmur to suggest **endocarditis** here and endocarditis would not explain claudication and carotid tenderness.

Atrial myxoma can mimic endocarditis, producing fever and embolic phenomena but would not explain the diminished pulses, claudication, or carotid tenderness.

41 | BARTONELLA SBE | ROSE

A 52-year-old homeless man who often lives in shelters is hospitalized in Boston for fever, chills, loss of appetite, and weakness in the left arm and leg.

He denies intravenous drug abuse, animal exposure, and receiving any form of medical attention or medications over the past year.

Physical examination reveals a pale disheveled man with a temperature of 38.3°C, several conjunctival petechiae, a small hemorrhagic lesion in the right retina, a grade 2/6 systolic ejection murmur, and a grade 2/6 diastolic decrescendo murmur heard along the left sternal border. The spleen tip is palpable. There are no skin lesions, but a nurse found some lice in his clothing. Motor strength in the left arm and leg is diminished and the Babinski response is positive on the left.

A trans-thoracic echocardiogram reveals an oscillating mass on the non-coronary cusp of the aortic valve.

Three sets of blood cultures, each with 10 mL of blood for aerobic and anaerobic culture were drawn on the first and second hospital days and remain negative after 7 and 6 days of incubation, respectively.

The most likely cause of this patient's endocarditis is:

A. Coxiella burnetii
B. Chlamydophila (Chlamydia) psittaci
C. Abiotrophia defectiva
D. **Bartonella quintana**

E. Histoplasma capsulatum

Correct answer: **Bartonella quintana**

Bartonella quintana is the most likely cause of this man's aortic endocarditis. Bartonella species are increasingly recognized as a cause of the apparent culture-negative infective endocarditis syndrome and B. quintana has been associated with endocarditis in persons experiencing homelessness and alcohol use disorder. In one series of patients with blood culture-negative endocarditis (not due to prior administration of antibiotics), 3% of cases on careful evaluation were attributable to Bartonella species. Bartonella quintana is a fastidious, slow growing gram-negative rod. Lysis-centrifugation culture on chocolate agar is helpful in isolation from blood, though sensitivity remains low. Serology and molecular diagnostics (such as PCR of cardiac valvular tissue or blood) may be useful.

Transmission probably occurs via body lice.

The disease is characterized by relatively high fevers over 38° C, embolic phenomena (40%), and aortic lesions (88%).

Cat scratch disease, usually caused by B. henselae, is transmitted by cat bites and licks and perhaps by cat fleas.

Abiotrophia defectiva, formerly called pyridoxal-requiring streptococci, may cause endocarditis but is usually recovered in broth culture, though it may not grow on subculture using blood agar.

There is no epidemiologic history to suggest C. burnetii infection, i.e., aerosol inhalation from goats, sheep, or cattle. In some settings, however, this is a relatively common cause of "culture negative" endocarditis.

Histoplasmosis is a rare cause of endocarditis and is usually associated with other manifestations of disseminated histoplasmosis. Endocarditis due to psittacosis is extremely rare.

42 | LETERMOVIR | KOTTON

A 25-year-old female with acute myelogenous leukemia is currently in complete remission and is being scheduled for an allogeneic stem cell transplantation in the near future.

The patient's CMV IgG is positive, and her identified donor's CMV IgG is negative.

Which of the following would you recommend regarding prevention of CMV infection post-transplantation, assuming her serum CMV PCR is being monitored weekly and remains undetectable?

A. **Letermovir prophylaxis**
B. Brincidofovir prophylaxis
C. Acyclovir prophylaxis
D. Monthly IVIG prophylaxis

E. Valganciclovir prophylaxis

Correct answer: **Letermovir prophylaxis**

This patient will be a high risk (CMV Donor igG -/Recipient IgG+) for developing primary CMV infection post-transplantation.

Letermovir, a CMV-specific terminase complex inhibitor approved by the FDA in 2017 for use in allogeneic stem cell transplant recipient does not cause myelosuppression and thus is a reasonable prophylaxis approach in this patient population as long as serum CMV PCR is negative as it is currently not FDA-approved for treatment of CMV infections. Letermovir resistance arising while on treatment is well documented. Note that an agent to prevent HSV and VZV is also needed (i.e., acyclovir, famvir, valacyclovir) as letermovir does not protect against those viruses, just CMV.

Alternatively, the pre-emptive monitoring strategy (weekly serum quantitative CMV viral loads and initiation of ganciclovir/valganciclovir or in select cases, foscarnet treatment) is also a reasonable option.

As of 2020, neither letermovir prophylaxis nor the pre-emptive monitoring strategy has been proven to be superior to the other.

Brincidofovir, while an effective antiviral agent for CMV, is currently not FDA-approved and not commercially available for use, either in prophylaxis or treatment for CMV infections.

Acyclovir has activity against VZV and HSV, but not CMV.

Though valganciclovir is effective against CMV, it is potentially myelosuppressive and is thus suboptimal in the setting of recent stem cell transplantation as it can impair recovery of myeloid cells. This is not used in stem cell transplant centers.

43 | HSV Encephalitis | Tunkel

A 75-year-old man presents with a 2-day history of fever, dysphasia, and personality change.

One day prior to admission, his family noted that he was lethargic. On presentation, vital signs were temperature 101°F, pulse 110, respirations 14, and blood pressure 120/70 mmHg. He was unresponsive. Neck was supple and there were no obvious focal neurologic abnormalities.

The peripheral WBC was 9,000/mm^3.

- In the emergency room, the patient was treated empirically with vancomycin, ampicillin, ceftriaxone, and acyclovir.
- He was then sent for an emergent non-contrast CT scan of the head, which was negative. Cerebrospinal fluid (CSF) examination revealed a WBC 100/mm^3 (98% lymphs), glucose 80 mg/dL, and protein 100 mg/dL.

- CSF Gram stain was negative.

Which of the following tests will most likely identify the etiology of the patient's encephalitis?

A. CT scan of the head with contrast
B. Brain MRI
C. Serum IgG antibody
D. CSF IgG antibody
E. **CSF polymerase chain reaction**

Correct answer: **CSF polymerase chain reaction**

The patient presents with symptoms and signs of encephalitis, and his CSF analysis is consistent, demonstrating a lymphocytic pleocytosis, normal glucose and elevated protein. The most likely etiology in this patient would be herpes simplex virus (HSV) type 1, which accounts for 10-20% of encephalitis viral infections.

In patients with herpes simplex encephalitis, CT of the brain with contrast reveals abnormalities in 50-75% of patients and brain MRI reveals abnormalities in more than 90% of patients, but these findings would not establish a definitive etiology.

The detection of IgG antibodies in the serum or CSF would also not mean that his encephalitis was caused by HSV type 1.

CSF polymerase chain reaction for HSV type 1 is the diagnostic test of choice for herpes simplex encephalitis and has a sensitivity of 98%, specificity of 94%, positive predictive value of 95% and negative predictive value of 98%.

44 | POST-OP MENINGITIS | TUNKEL

A 30-year-old man is thrown from his motorcycle and suffers a depressed skull fracture with intracranial hemorrhage. He is taken to the OR where the hemorrhage is evacuated. He initially does well, but 5 days later develops fever of 39°C, worsening headache and transiently loses consciousness. A non-contrast CT of the head reveals stable appearance of the hemorrhage. Cerebrospinal fluid analysis shows a WBC count of 1500/mm^3 (95% segs), RBC count of 1000/mm^3, glucose of 40 mg/dL, and protein of 300 mg/dL. The Gram stain is negative.

Which of the following should be initiated?

A. **Vancomycin + cefepime**
B. Vancomycin + trimethoprim-sulfamethoxazole
C. Cefepime + gentamicin
D. Meropenem
E. Supportive care as this is a chemical meningitis

Correct Answer: **Vancomycin + cefepime**

This patient has meningitis after a neurosurgical procedure. Although this could certainly be a chemical meningitis as a result of the hemorrhage and/or operative procedure, the fact that he is febrile, loses consciousness, and has a CSF neutrophilic pleocytosis with a low glucose should lead to administration of empiric antimicrobial therapy while awaiting culture results. The most likely organisms in this circumstance would be staphylococci (including methicillin-resistant *Staphylococcus aureus*) and gram-negative bacilli (including *Pseudomonas aeruginosa*). The only empiric regimen listed that would cover all likely organisms is vancomycin + cefepime.

45 | STRONGYLOIDES SOT | KOTTON

A 42-year-old man from New York City developed fever, dyspnea, and increasing pulmonary infiltrates four weeks post-cadaveric single lung transplant. He had been receiving standard 3 drug immunosuppression, but has also required high dose steroids for acute organ rejection.

He received standard anti-infective prophylaxis.

On bronchoscopy, diffuse alveolar hemorrhage was noted from both lungs.

Biopsy of the transplanted lung showed no evidence of rejection. BAL stains for bacteria, fungi and mycobacteria were negative. PCR of blood for CMV was negative.

The transplant center was notified that the recipient of the other lung had developed a similar syndrome. The donor was a 20-year-old recent immigrant from Guatemala who died of a gunshot wound. His mother thought he had been healthy.

Assuming this infection was acquired from the transplanted lung, which organism appears most likely:

A. Balamuthia mandrillaris
B. Rabies
C. Cryptococcus neoformans
D. Nocardia brasiliensis
E. **Strongyloides stercoralis**

Correct answer: **Strongyloides stercoralis**

The cause of this syndrome is likely to be an infection that was asymptomatic but present in the donor lungs, taking four weeks to become manifest, and causing diffuse pulmonary hemorrhage.

Strongyloides larvae could have been migrating through the lungs of the donor, passed from the lungs to the intestinal tract of the recipient and begun the expansion of the larval population migrating through the recipient's lungs, causing the syndrome of hyperinfection in this immunosuppressed patient. Larvae migrating through the lungs can cause hemorrhage.

The BAL might have had larvae, had they been sought (wet prep of sputum or BAL for ova and parasite). There are several cases similar to this in the literature: *Strongyloides* infection should be considered in the appropriate populations of donors and recipients. Preemptive treatment with ivermectin can prevent active disease.

Histoplasma, Toxoplasma and *Cryptococcus* have been transmitted by solid organ transplantation and can cause pneumonia in the recipient, but not diffuse alveolar hemorrhage.

Balamuthia, Rabies, and *Cryptococcus* have been transmitted and caused encephalitis and/or disseminated infection in organ donor recipients, but not diffuse alveolar hemorrhage. *Nocardia* would be unlikely to cause alveolar hemorrhage.