Question #1

- 2 days before delivering a term infant, the 20-year old mother develops chicken pox
- Of the following, the most appropriate plan of action is to:

Answers Q#1

- A. Separate the mother and baby for 21 days after delivery
- B. Administer VariZIG or IVIG to the mother
- C. Administer VariZIG or IVIG to the infant at birth
- D. Administer VariZIG or IVIG to both the mother and the infant at birth
- E. Administer VariZIG or IVIG to the baby only if the infant develops varicella
VARICELLA: POST-EXPOSURE PROPHYLAXIS

- VariZIG or IVIG (if VariZIG not available)
  - Investigational product (IND protocol)
  - Use IVIG if VariZIG not available
  - Used to prevent or modify varicella in those susceptible
  - Indicated for persons at risk for having severe varicella infections
  - Need to administer ASAP but within 96 hours of exposure

Varicella: Post-Exposure Prophylaxis

- Persons at risk for having severe varicella infections
  - Neonates born to moms who have varicella 5 days before to 2 days after delivery
  - Acquire virus transplacentally without benefit of protective maternal antibody
  - Immunocompromised individuals; hospitalized premies
  - Pregnant women

VARICELLA: POST-EXPOSURE PROPHYLAXIS

- Acyclovir
  - Used to treat varicella in immunocompromised and occasionally normal children
  - Prophylaxis—controversial
    - Generally not recommended for immunocompetent individuals
    - For susceptible immunocompromised children
      - Can consider when VariZIG or IVIG not available
      - Can consider when >96 hours have passed since exposure
VARICELLA: POST-EXPOSURE PROPHYLAXIS

- Varicella vaccine
  - May prevent or modify disease course if given within 72 hours of exposure
  - Consider if there are no contraindications

Question #2

An 8-yr old boy who has had no previous immunizations sustains a puncture wound to the foot. Of the following, the best tetanus post-exposure prophylactic regimen for this child is:

- A. DTaP vaccine
- B. Tdap vaccine
- C. Tdap vaccine and Tetanus Immune Globulin
- D. Td vaccine and Tetanus Immune Globulin
- E. Tetanus Immune Globulin

TETANUS PROPHYLAXIS IN WOUND MANAGEMENT

<table>
<thead>
<tr>
<th>History of previous tetanus toxoid (doses)</th>
<th>Clean, minor wounds</th>
<th>All other wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown or &lt;3</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>≥3</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

1-yes, if more than 10 yrs since last dose
2-yes, if more than 5 yrs since last dose
TETANUS VACCINE

- Composition: toxoid
- Vaccination with primary series and booster every 10 years nearly 100% effective
- Natural disease does not confer immunity
- DT if pertussis vaccine is contraindicated and patient < 7 years of age
- Tdap for ≥ 7 yrs of age if has not already had one Tdap
- Contraindication: immediate severe or life-threatening allergic reaction to previous dose

Question #3

Hepatitis A vaccine is indicated for each of the following patients, EXCEPT:

- A. A 4-month old boy with biliary atresia
- B. A 3 year-old girl traveling with her family to Central America
- C. A 2 year-old girl with chronic hepatitis B infection
- D. An adolescent engaging in high-risk behavior
- E. A healthy 12-month old boy

INDICATIONS FOR HEPATITIS A VACCINATION

- Travelers to areas where Hep A is endemic
  - May also need Immune globulin if travel is within 2 weeks of vaccination or those <1y
  - Excludes travelers to Canada, W. Europe, NZ, Australia, Japan
INDICATIONS FOR HEPATITIS A VACCINATIONS

- All children should receive vaccine at one year of age (i.e. 12-23m)
- Children not immunized by 2 years of age can be vaccinated at subsequent visits
- States with immunization programs for all children 2-18y should maintain these and expand to include children 1-2 years of age

INDICATIONS FOR HEPATITIS A VACCINATION

- Patients with chronic liver disease
  - Including those awaiting and who have had liver transplantation
- Homosexual and bisexual men
- Users of injection and illicit drugs
- Those at occupational risk of exposure
  - Laboratory workers working with HAV
- Those with clotting factor disorders
- Outbreak Situations

Risk of HAV Infections in Various Groups

- Child care center staff and attendees
  - Consider vaccination in areas with ongoing or recurrent outbreaks
- Hospital personnel
  - Nosocomial transmission rare
  - No increase prevalence compared to controls
- Food handlers
  - Rates of hepatitis A infection similar to general population
Question #4

A 5 year-old boy presents with sudden onset of fever, sore throat and drooling. Radiograph of the neck is shown. Of the following, the most likely diagnosis is:

- A. Laryngotracheitis
- B. Epiglottitis
- C. Retropharyngeal abscess
- D. Peritonsillar abscess
- E. Bacterial tracheitis

**POLYSACCHARIDE VS CONJUGATE VACCINES**

<table>
<thead>
<tr>
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<th>Polysaccharide</th>
<th>Conjugate</th>
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</thead>
<tbody>
<tr>
<td>T-cell dependent</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Immune response</td>
<td>Weak and variable</td>
<td>Strong B-cell response</td>
</tr>
<tr>
<td>Memory response?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Booster response?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>IgG response</td>
<td>Restricted IgG 2,4</td>
<td>IgG1 and IgG3</td>
</tr>
<tr>
<td>Immunogenic &lt;2y ?</td>
<td>No</td>
<td>yes</td>
</tr>
</tbody>
</table>
Question #5

Which is a true statement regarding the currently available meningococcal vaccines?

A. They are protective against all serotypes of meningococcal disease that cause human infection in the US

B. They are live attenuated vaccines

C. They can be administered to asplenic children at 2y of age

D. The vaccines can replace postexposure chemoprophylaxis with rifampin

E. Polysaccharide vaccines are preferred over conjugate vaccines

MENINGOCOCCAL VACCINES

Three vaccines available

Capsular polysaccharide vaccine against serogroups A,C,Y, and W-135 (MPSV4)

2 Polysaccharide-protein conjugated vaccines (MenACWY-D-Menactra and MenACWY-CRM-Menveo)

Conjugate preferred over polysaccharide vaccines

Contain serogroups A, C, Y, W135

NOT effective against serogroup B, the most common serotype causing disease in infants

Meningococcal Polysaccharide Vaccine (MPSV4)

Menomune (Sanofi Pasteur)

Quadrivalent (serogroups A, C, Y, W-135)

Approved for persons 2 years of age and older

Administered by subcutaneous injection
Meningococcal Conjugate Vaccine (MCV4)

- Menactra (Sanofi Pasteur)
- Quadrivalent (serogroups A, C, Y, W-135) conjugated to diphtheria toxoid
- Administered by intramuscular injection
- Approved for persons 9 months through 55 years of age

Meningococcal Conjugate Vaccine (MCV4)

- Menveo (Novartis)
- Lyophilized serogroup A vaccine reconstituted with liquid containing serogroups C, Y, and W-135
- Administered by intramuscular injection
- Approved for persons 2 through 55 years of age

MCV4 Recommendations

- 1st dose at age 11 or 12 years
- Routine booster dose at 16 years of age
- Persons vaccinated at 13 through 15 years should receive a one-time booster dose at 16 through 18 years of age
**MCV4 Recommendations**

- A booster dose is not recommended for healthy persons if the first dose is administered at 16 through 21 years of age
- A booster dose is not recommended for healthy persons 22 years of age or older
  - Diminished risk of disease

**Meningococcal Vaccine for High-Risk Groups**

- Persistent complement component deficiency
- Functional or anatomic asplenia
- Travelers to and U.S. citizens residing in countries in which *N. meningitidis* is hyperendemic or epidemic
- Certain research and laboratory personnel

**Meningococcal Vaccine Recommendations**

- High-risk children 9 through 23 months of age
  - 2-dose series of Menactra
  - 3-month interval between doses
  - administer at 9 and 12 months of age
Meningococcal Vaccine Recommendations

- ACIP defines high-risk children age 9 through 23 months as:
  - those with persistent complement component deficiency
  - those in a community or institution where a meningococcal disease outbreak is occurring, or
  - those traveling to an area of the world where meningococcal disease is epidemic

- Asplenia and Sickle Cell Disease
  - Minimum age is 2 years
  - Also at high risk for invasive pneumococcal disease
  - Vaccinating at 2 years avoids interference with immunologic response to infant series of PCV vaccine
  - If have not received PCV after age 2y, can give PCV doses separated from MCV4 by 4 weeks

Meningococcal Vaccine Revaccination

- Children who remain at increased risk
- If received primary vaccination at:
  - Age 6 years or younger
    - additional dose of MCV4 3 years after primary vaccination
  - Age 7y or older
    - additional dose of MCV4 5 years after primary vaccination
  - Booster dose every 5 years as long as they remain at increased risk
Questions #6
Matching

6. 13-year old who develops a confluent rash during inadvertent treatment with ampicillin
   - A. Parvovirus B19
   - B. Measles
   - C. Epstein-Barr virus
   - D. Rubella
   - E. HHV 6

Questions #7
Matching

7. School-age child with lacy, reticular rash on the extremities
   - A. Parvovirus B19
   - B. Measles
   - C. Epstein-Barr virus
   - D. Rubella
   - E. HHV 6
Questions 8 Matching

- 8. Adolescent with postauricular and occipital adenopathy, and discrete MP rash beginning on the face
  - A. Parvovirus B19
  - B. Measles
  - C. Epstein-Barr virus
  - D. Rubella
  - E. HHV 6
  - F. CMV

Questions 9 Matching

- 9. An infant with a maculopapular rash following 3-5 days of high fever
  - A. Parvovirus B19
  - B. Measles
  - C. Epstein-Barr virus
  - D. Rubella
  - E. HHV 6

Questions 10 Matching

- 10. Croup-like cough, high fever, confluent maculopapular rash
  - A. Parvovirus B19
  - B. Measles
  - C. Epstein-Barr virus
  - D. Rubella
  - E. HHV 6
Question #11

A previously healthy 6 year old boy has had a 2-week history of cough, mild sore throat and low-grade fever. On PE he is non-toxic appearing, has a normal respiratory rate and normal oxygen saturation. He has diffuse rhonchi bilaterally on auscultation of his lungs. His CBC reveals a WBC 6.8 with 40% neutrophils and 50% lymphocytes. CXR reveals bibasilar diffuse infiltrates.

Question #11

Of the following, the most likely agent responsible for these findings is
A. *Streptococcus pneumoniae*
B. *Streptococcus pyogenes*
C. Epstein-Barr virus
D. *Pneumocystis jirovecii*
E. *Mycoplasma pneumoniae*

Manifestations of *Mycoplasma pneumoniae* Infection

- Atypical pneumonia
  - Most common cause of pneumonia in school-aged children
- Pharyngitis
  - Often in conjunction with pneumonia
- Croup
- Erythema multiforme
- Bullos myringitis and otitis media
- Hemolytic anemia
- Neurologic
  - Aseptic meningitis; encephalitis
  - Guillain-Barre; transverse myelitis
A 5-week old infant presents with a 5-day history of tachypnea and dry cough. The mother notes that the infant had drainage from both eyes 2 weeks prior to presentation. PE reveals an afebrile non-toxic appearing infant who is mildly tachypneic and has rales bilaterally. CXR reveals hyperexpanded lungs with bilateral interstitial infiltrates.

Of the following, the most likely etiologic agent is:

- A. Group B streptococci
- B. *Chlamydia trachomatis*
- C. *Staphylococcus aureus*
- D. *Streptococcus pneumoniae*
- E. *Chlamydophila pneumoniae*

CHLAMYDIA TRACHOMATIS PNEUMONIA

- Develops in 10-20% of infants born to women with chlamydial infection
- 30-50% have history of conjunctivitis
- Present at 3wks-12 wks; insidious onset
- Persistent cough, tachypnea, rales
  - NO FEVER, no wheezing
- Peripheral eosinophilia common
- CXR: hyperinflation and interstitial infiltrates
- Treatment: oral erythromycin 2 weeks
QUESTION #13

A 1-year old healthy male presents with a 6 day history of fever and swelling on the right side of the neck. PE reveals an erythematous, tender, 4x4 cm fluctuant lymph node at the angle of the mandible. The rest of the PE is normal. Of the following the most likely organism causing this infection is:

• A. Streptococcus pyogenes (Group A streptococcus)
• B. Mycobacterium avium complex
• C. Bartonella henselae
• D. Staphylococcus aureus
• E. Mycobacterium tuberculosis

PYOGENIC CERVICAL ADENITIS

• Majority caused by S. aureus and GAS
  • Acute and unilateral in most cases
  • S. aureus more indolent than GAS and more likely to suppurate
• 80% occur in children 1-4 years of age
• History of preceding URI common
• 25-40% become fluctuant and need surgical drainage
QUESTION #14

A 9 year old child presents with a 4-week history of an enlarged submandibular lymph node. On PE, he is afebrile, nontoxic, and has a 4x4 mildly tender submandibular lymph node. Of the following, the best next step in this child’s care would be:

• A. Incision and drainage of lymph node
• B. Placing a double strength (250 tuberculin units) tuberculin skin test on the child
• C. Removal of the lymph node
• D. Obtaining a CBC and chest radiograph
• E. Treatment with azithromycin and rifampin

QUESTION #15

Further history reveals that the family recently obtained a kitten, with whom the child has had close exposure. There is no history of exposure to TB and an intermediate strength PPD is negative. On closer PE, you note that the child has a papule on the face, medial to the enlarged lymph node. Of the following, the most appropriate management at this point would include:

• A. Incision and drainage of the lymph node
• B. Complete surgical excision of the lymph node
• C. Therapeutic trial with azithromycin
• D. No active intervention

DIFFERENTIAL DIAGNOSIS OF SUBACUTE AND CHRONIC LYMPHADENOPATHY

• Cat Scratch Disease
• Mycobacteria tuberculosis
• Nontuberculous Mycobacteria
• Actinomycosis
• Nocardiosis
• Brucellosis
• Syphilis
CAT SCRATCH DISEASE

- 90% of patients report exposure to cats and 75% have history of scratch or bite
- Etiology
  - *Bartonella henselae* definitive organism through isolation and serology
  - commercially available serologic test
- Pathology: necrotizing granulomas with microabscesses
- Clinical
  - chronic tender regional lymphadenopathy: axilla and face
  - inoculation site found in 60%: macule or papule
  - Fever and nonspecific symptoms found in less than 1/3

CAT SCRATCH DISEASE

- Atypical clinical manifestations
  - Parinaud oculoglandular syndrome-2-17% of cases
    - conjunctival granuloma and preauricular adenopathy
  - CNS-encephalitis, encephalopathy, neuroretinitis
  - Hepatosplenic disease-granuloma/abscesses in liver and spleen
  - FUO
- Diagnosis
  - History and PE findings; lymph node biopsy; culture of organism; serologic testing
CAT SCRATCH DISEASE

- Management
  - Typical course is benign and self limited – lasts 2-4 months
  - Needle aspiration for relief of symptoms
  - I&D not recommended
  - Removal of the node generally unnecessary
  - Antibiotics (azithromycin) may shorten duration in acutely or severely ill patients
  - Antibiotics used for atypical disease and immunocompromised patients—no controlled trials
    - Azithromycin, Gentamicin

Needle aspiration for relief of symptoms
I&D not recommended
Removal of the node generally unnecessary
Antibiotics (azithromycin) may shorten duration in acutely or severely ill patients
Antibiotics used for atypical disease and immunocompromised patients—no controlled trials
Azithromycin, Gentamicin
MYCOBACTERIAL ADENITIS

- **M. tuberculosis**
  - All ages
  - Exposure to TB
  - Abnormal CXR usual
  - Urban residence
  - PPD > 15mm
  - Bilateral involvement not uncommon
  - Anti-tuberculous therapy effective

- **Nontuberculous Mycobacteria**
  - 1-4 years mostly
  - No exposure to TB
  - CXR normal
  - Rural residence
  - PPD < 15mm
  - Unilateral involvement mostly
  - Removal of node effective

Question #16:
Which of the following is a true statement regarding the treatment of acute otitis media in infants and children?

- A. Amoxicillin has the best activity of any oral beta-lactam in treating nonsusceptible strains of *S. pneumoniae*.
- B. Clindamycin is an appropriate choice for initial empiric therapy.
- C. High dosages of amoxicillin are recommended to overcome resistance caused by beta-lactamase-producing organisms.
- D. The advantage of amoxicillin-clavulanate over amoxicillin is improved activity against nonsusceptible strains of *S. pneumoniae*.
- E. Macrolide antibiotics are considered first-line agents.

Microbiology of AOM

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>H. influenzae</em></td>
<td>35-50%</td>
</tr>
<tr>
<td><em>S. pneumoniae</em></td>
<td>25-40%</td>
</tr>
<tr>
<td><em>M. catarrhalis</em></td>
<td>3-10%</td>
</tr>
<tr>
<td>Viruses</td>
<td>5-20%</td>
</tr>
<tr>
<td>No bacterial or viral agent</td>
<td>16-25%</td>
</tr>
</tbody>
</table>
Change in Microbiology of AOM

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S. pneumoniae</td>
<td>48%</td>
<td>31%</td>
</tr>
<tr>
<td>H. influenzae</td>
<td>38%</td>
<td>57%</td>
</tr>
<tr>
<td>M. catarrhalis</td>
<td>4%</td>
<td>1%</td>
</tr>
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</table>

Pediatr Infect Dis J 2004;23:824-828

Incidence of Resistance Based on Organism

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<thead>
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<th>Organism</th>
<th>% Resistant</th>
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<tbody>
<tr>
<td>S. pneumoniae</td>
<td>30%</td>
</tr>
<tr>
<td>Highly resistant</td>
<td>15%</td>
</tr>
<tr>
<td>Intermediately resistant</td>
<td>15%</td>
</tr>
<tr>
<td>H. influenzae</td>
<td>50%</td>
</tr>
<tr>
<td>M. catarrhalis</td>
<td>100%</td>
</tr>
</tbody>
</table>

*-alteration of penicillin binding proteins
#:beta-lactamase

Penicillin-Resistant Pneumococcus

- Only those highly resistant (MIC > 2.0 ug/ml) may not respond to high dose amoxicillin
  - overcomes most resistance
- Risk factors
  - child care attendance
  - recent antimicrobial therapy
  - age younger than 2y
Rationale for Amoxicillin as first line agent

- Effective against susceptible and most resistant pneumococci (at high doses)
- Safety
- Low cost
- Acceptable taste
- Narrow microbiologic spectrum

Bacterial Cure Rates Without Antimicrobial Therapy Based on Organism

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>CURE RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. pneumoniae</td>
<td>19%</td>
</tr>
<tr>
<td>H. influenzae</td>
<td>48%</td>
</tr>
<tr>
<td>M. catarrhalis</td>
<td>75%</td>
</tr>
</tbody>
</table>

Question #17

- A 1 month old female presents with a 1-week history of URI symptoms, severe cough, recurrent episodes of gagging, and post-tussive emesis. On further questioning the mother informs you that the infant often turns blue during the coughing and gagging episodes. PE is normal except for conjunctival hemorrhage. CBC show a WBC of 38,000/mm3 with 85% small lymphocytes, and a platelet count of 670K.
Question 17 (Cont)

Of the following, the most likely additional feature to be present in this infant is
- A. Fever
- B. Eosinophilia
- C. Pneumonia
- D. Seizures
- E. Hyponatremia

PERTUSSIS: CLINICAL MANIFESTATIONS
- Incubation period 3-20 days
- 3 classic stages of illness
  - catarrhal
  - paroxysmal
  - convalescent
- Presence and duration of distinct stages highly variable
  - immunization status
  - age

CATARRHAL STAGE
- 1-2 week duration typical
- Non-specific URI symptoms
  - rhinorrhea
  - lacrimation
  - mild cough
  - conjunctival injection
- May be unrecognized in infants < 3 months
PAROXYSMAL STAGE

- 2-4 week duration typically
- Dry, intermittent, hacking cough
- Repetitive series of forceful coughs within a single expiration
- Sudden massive respiratory effort through partially closed glottis (Whoop)
- Expulsion of thick plug of inspissated tracheal secretions, denuded cilia, and necrotic epithelium

PAROXYSMAL STAGE

- Bulging eyes, protrusion of tongue, lacrimation
- Choking, gagging, cyanosis, apnea very common in infants < 3 mos. and may be presenting features (absent whoop)
- Posttussive emesis is very common at all ages
- Posttussive exhaustion is universal
- Between attacks, patient comfortable and non-toxic

CONVALESCENT STAGE

- 2-6 week duration typical
- Severity and duration of episodes diminish
- Paroxysmal coughing may recur for months
  - exacerbated by subsequent respiratory illness
PHYSICAL EXAMINATION

- Unremarkable between paroxysms
- Conjunctival hemorrhage and petechiae on upper body common

LABORATORY FINDINGS

- Leukocytosis with absolute lymphocytosis
  - WBC 15,000-100,000/ul
  - degree parallels severity of disease
  - late catarrhal and paroxysmal stages
  - small T and B lymphocytes (not atypical lymphs)
  - not present in adults
- Thrombocytosis
- Eosinophilia NOT common
- Absolute increase in neutrophils suggest secondary bacterial process

DIFFERENTIAL DIAGNOSIS

- Adenovirus
- *Bordetella parapertussis*
- *Bordetella bronchiseptica*
- Viral bronchiolitis
- Cystic fibrosis
- Bacterial pneumonia
# MORBIDITY AND MORTALITY RATES

<table>
<thead>
<tr>
<th>Age</th>
<th>Hospitalization</th>
<th>Pneumonia</th>
<th>Seizures</th>
<th>Death</th>
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<tbody>
<tr>
<td>&lt; 2m</td>
<td>82%</td>
<td>25%</td>
<td>4%</td>
<td>1%</td>
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<tr>
<td>2-6m</td>
<td>70%</td>
<td>16%</td>
<td>2%</td>
<td>0.4%</td>
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<td>6-11m</td>
<td>45%</td>
<td>14%</td>
<td>2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>1-4y</td>
<td>24%</td>
<td>11%</td>
<td>2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>5-9y</td>
<td>12%</td>
<td>6%</td>
<td>1%</td>
<td>0.1%</td>
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</table>

## NEONATAL PERTUSSIS

- Placentally transferred antibodies to *B. pertussis* NOT protective
  - Low titer due to waning immunity in mother
  - Cell mediated and local mucosal immunity likely important
- Transmission can occur immediately after birth
- Most hospitalized between 2-3 weeks of age

## NEONATAL PERTUSSIS

- Feeding difficulties, tachypnea early
- Absent or brief catarrhal phase
- Cough-may not be paroxysmal
- Recurrent episodes gagging, apnea, bradycardia, cyanosis
- Apnea
  - After paroxysmal episode
  - Spontaneous-?secondary to vagal stimulation
Question #18

• A 12-year old male presents with a 2 week history of fever, sore throat, anterior and posterior cervical lymphadenopathy, and splenomegaly. You suspect infectious mononucleosis. Which of the following statement is true regarding infectious mononucleosis?

• A. The presence of atypical lymphocytes is specific for EBV
• B. Heterophile-positive mononucleosis occurs with EBV infection but not with CMV infection
• C. Older children and adolescents are more often asymptomatic than younger children
• D. The presence of antibodies against EBV nuclear antigens (EBNA) is indicative of acute infection

Monocucleosis syndromes

• Heterophil antibodies are produced by EBV but not other causes of infectious mononucleosis syndrome:
  • CMV
  • Toxo
  • HIV
• Younger children more likely to be asymptomatic and to have non-classic signs and symptoms
Diagnosis of Infectious Mononucleosis

- Monospot slide test
  - Younger children (<5y) do not develop heterophilic response
  - High sensitivity and specificity in older children
  - May be negative in first week of the illness and subsequently become +
  - Positive test may persist for weeks after acute infection

Diagnosis of Infectious Mononucleosis

- Viral-specific Serology
  - IgM-VCA produced at time of acute infection and last for weeks to months
  - IgG-VCA produced at time of acute infection and last for life
  - Anti-EBNA produced about 4 weeks after acute infection and last for life
  - Anti-EA produced acutely, disappear, and can reappear spontaneously

VARIous Antibodies in EBV Primary Infection
Question #19

Which of the following is TRUE regarding the complications of infectious mononucleosis?

- A. Severe thrombocytopenia occurs in about 50% of patients
- B. Cranial nerve palsies and encephalitis are the most common neurologic complications
- C. Corticosteroids are indicated for patients with neurologic or hematologic complications
- D. A clinically apparent hepatitis is evident in most patients

Complications of EBV Infection

- Hematologic
  - Mild thrombocytopenia in up to 50%
  - Mild autoimmune hemolytic anemia
  - Mild granulocytopenia
- Neurologic
  - Cranial nerve palsies, encephalitis most common
- Hepatic
  - Subclinical hepatitis common; liver failure extremely rare (X-linked lymphoproliferative disorder)
- Airway obstruction
  - Tonsillar hypertrophy
  - Corticosteroids may be indicated

Question #20: Photo

The organism responsible for this infection is most likely to be recovered from (in this patient):

- A. Nasopharynx
- B. Blood
- C. Urine
- D. Skin lesion
- E. Cerebrospinal fluid
STAPHYLOCOCCAL SCALDED SKIN SYNDROME

- Infants and children under age 5 years
- Malaise, fever, tender skin→diffuse erythema, wrinkled appearance, circumoral erythema, flaccid blisters. NO strawberry tongue
- Nikolsky sign: areas of epidermis separate with gentle shear force
- Desquamation 2-5 days after onset of erythema

SSSS(cont)

- Generally well appearing, except for skin tenderness
- Phage group 2 S. aureus--
  - nasopharynx most common foci of infection (umbilicus, conjunctivae, also)
- Toxin mediated (blood and skin lesions usually negative for bacteria)
- Anti-staphylococcal therapy systemically
A 12-year old child is brought to the ED with a 6-hour history of a fever and rash. The rash has spread over the past 4 hours, according to the mother. There is no history of travel. On exam, he is febrile to 39.0ºC. and has this non-blanching rash on both extremities.
Question # 21: Photo

Of the following, the most appropriate initial antibiotic regimen for this boy is:

- A. Nafcillin
- B. Clindamycin
- C. Doxycycline
- D. Cefotaxime
- E. No antibiotics-likely viral etiology

FEVER AND PETECHIAL RASH

- Enteroviruses-most common
- Other viral infections
- Meningococcemia-9%
- Other bacterial-\textit{H.influenzae}; pneumococcus; GNB
- Malignancy-leukemia
- RMSF
- Atypical measles

MENINGOCOCCEMIA: POOR PROGNOSTIC FACTORS

- Hypotension
- WBC < 10,000/mm³
- Petechiae within 12 h of presentation
- Absence of meningitis
Question # 22: Photo

Of the following, the most likely agent associated with this rash is:

- A. *Mycoplasma pneumoniae*
- B. Measles
- C. EBV infection
- D. *Chlamydia pneumoniae*
- E. *Streptococcus pneumoniae*
ERYTHEMA MULTIFORME

- Target lesions, hive-like rash
- EM major=Stevens Johnson Syndrome
  - At least one mucous membrane involved
- Etiology
  - Drug induced
  - Idiopathic
  - Infectious
    - *Mycoplasma pneumoniae*
    - *Herpes simplex virus*
Question # 23: Photo

Of the following, the most likely organism complicating this infection is:

- A. S. pyogenes (Group A Streptococcus)
- B. H. influenzae type b
- C. S. pneumoniae
- D. Staphylococcus epidermidis
- E. Pseudomonas aeruginosa

COMPLICATIONS OF VARICELLA

- Bacterial superinfection-most common
  - Group A Streptococci and S. aureus most common
- Pneumonia
- Encephalitis/cerebellar ataxia
- Hepatitis
- Myocarditis
- Arthritis
Question # 24: Photo

Most likely etiology:

- A. Coxsackie virus
- B. Adenovirus
- C. Herpes simplex virus
- D. Cytomegalovirus

Question #25

Which of the following statements about measles is true?

- A. Fever is low grade and disappears before onset of the rash
- B. Koplik spots appear simultaneously with the rash
- C. Rash begins on extremities
- D. Patients are generally ill appearing
- E. Lack of conjunctivitis in measles distinguishes this from Kawasaki disease
QUESTION #26: Photo

The most likely etiology:

- A. Staphylococcus Scalded Skin Syndrome
- B. Streptococcal Scarlet Fever
- C. Bullous Impetigo
- D. Necrotizing Fasciitis
- E. Staphylococcal toxic shock syndrome

Bullous Impetigo

- Localized skin infection in infants and children
- Perianal area most common in neonates and infants; extremities in older children
- Nikolsky sign typically absent
- S. aureus cause; recovered from the lesions-unlike SSSS
- Systemic therapy usually required
Questions 27-30
Matching

• 27. Associated with Reye syndrome
• 28. Important cause of spontaneous peritonitis
• 29. Important cause of brain abscess in neonates
• 30. Glomerulonephritis

• A. S. pneumoniae
• B. Influenza
• C. Group A streptococci
• D. Citrobacter koseri (diversus)

Question #31

• Of the following, the animal who is most likely to harbor rabies is
  • A. bat
  • B. squirrel
  • C. dog
  • D. rat
  • E. guinea pig

RABIES

• Regard as rabid unless geographic area known to be free of rabies
  • skunks, raccoons, bats, foxes, woodchucks, carnivores
  • Almost never rabid
    • squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, other rodents, rabbits, hares
  • Possibly rabid-check with local health department
    • If healthy and available for 10-day observation: prophylaxis only if develop signs of Rabies
    • Dogs, cats, ferrets
RABIES: CARE OF THE EXPOSED INDIVIDUAL

- Local care
  - Prompt and thorough local treatment
  - Tetanus prophylaxis
  - Don’t suture wound
- Active immunization
  - HDCV or RVA, IM days 0, 3, 7, 14
- Passive immunization
  - RIG concomitantly with first dose of vaccine (unless previously immunized)
  - As much as can be given locally; remainder IM

Questions 32-34

Matching

- 32. Migratory arthritis, erythema marginatum, and chorea
- 33. Toxin-mediated response to GAS infection
- 34. Strawberry tongue, sandpaper rash, Pastia lines

A. Scarlet fever
B. Rheumatic fever
C. Both
D. Neither

Scarlet Fever

- Caused by one of several erythrogenic toxins of Group A Streptococci
- Secondary to:
  - Pharyngitis
  - Impetigo
  - GAS wound infection
- Appears 12-48 hours of the acute GAS infection
- Other features of GAS common (tonsillitis, strawberry tongue, palatal petechiae, nodes)
Scarlet Fever

- Rarely seen in children less than 3 years of age
- Confluent sandpaper-like rash that blanches
- Begins on face-generalizes in 24 hours
- Circumoral pallor common
- Accentuation of erythema around skin creases
  - *Pastia lines*
  - *common in antecubital fossae*
- Desquamation common within 1 week

Jones Criteria for Rheumatic Fever

- Major criteria
  - Carditis
  - Polyarthritis, migratory
  - Erythema marginatum
  - Chorea
  - Subcutaneous nodule
  - Evidence of preceding GAS infection
- Minor criteria
  - Fever
  - Arthralgia
  - Elevated acute-phase reaction (ESR, CRP)
  - Prolonged P-R interval on ECG

Evidence of preceding GAS infection
A new rapid screening test for GAS pharyngitis is being tested. The test was administered to 1000 children with the following results:

- True positives: 50
- False positives: 300
- True negatives: 600
- False Negatives: 50

Q #35: The sensitivity of this screening test is most approximately:

- A. 33.3%
- B. 50%
- C. 66.7%
- D. 95%

Q #36: The specificity of this screening test is most approximately:

- A. 33.3%
- B. 50%
- C. 66.7%
- D. 95%
### BOX

<table>
<thead>
<tr>
<th></th>
<th>Disease Present</th>
<th>Disease Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Positive</strong></td>
<td>A True Positives</td>
<td>B False Positives</td>
</tr>
<tr>
<td><strong>Test Negative</strong></td>
<td>C False Negatives</td>
<td>D True Negatives</td>
</tr>
</tbody>
</table>

### Questions 35 and 36

- Sensitivity = \( \frac{50}{50+50} \) ==> 50%
- Specificity = \( \frac{600}{300+600} \) ==> 66.7%

### Statistical Definitions

- **Sensitivity**
  - Likelihood that a test will be positive in the presence of disease
  - \( \frac{A}{A+C} \)
  - Screening test
- **Specificity**
  - Likelihood that a test will be negative in individuals who do not have the disease
  - \( \frac{D}{B+D} \)
  - Confirmatory test
SENSITIVITY AND SPECIFICITY

- Sensitivity
  - Proportion of “diseased” persons who have a positive test
  - True positives/True positives + False Negatives
  - Screening test

- Specificity
  - Proportion of “disease free” persons with a negative test
  - True Negatives/True Negatives + False Positives
  - Confirmatory test

PREDICTIVE VALUE

- Positive Predictive Value
  - Proportion of persons with a positive test who have the “disease”
  - True Positives/True Positives + False Positives

- Negative Predictive Value
  - Proportion of persons with a negative test who are “disease free”
  - True Negatives/True Negatives + False Negatives

PREVALENCE AND INCIDENCE

- Prevalence
  - Number with disorder/total number in population at one time
  - Cross section

- Incidence
  - Number who develop disorder/number who could have developed characteristic over a period of time
Statistical Definitions

- **Type 1 error**
  - occurs when after testing, it is assumed that a difference from normal exists in a given condition when, in actuality, there is no difference

- **Type II error**
  - when it is assumed that there is no difference in a condition from normal, when in reality, a difference actually is present

- **Power of a test**
  - the ability of a test to detect a difference between groups when such a difference really exists

Answers to Questions

1. C
2. C
3. A
4. B
5. C
6. C
7. A
8. D
9. E
10. B
11. E
12. B
13. D
14. D
15. D
16. A
17. C
18. B
19. B
20. A
21. D
22. A
23. A
24. A
25. D
26. C
27. B
28. A
29. D
30. C
31. A
32. B
33. A
34. A
35. B
36. C