Excellent 100% 98

Cytomegalovirus (CMV)

CMV: What Is It?

Figure 1: Cells from a lung biopsy demonstrating the classic "owl's eye" inclusion bodies. (Taylor, 2003)

- Intranuclear inclusions found in the cells of animals and humans
- The "C" in TORCH
- A member of the herpesvirus family
- Most frequent cause of congenital viral infection in humans (Schildroth, 1994)

Types

- Congenital
- Acquired
  - Primary (while pregnant)
  - Reactivation (latent infection)

Prevalence

- Found throughout the world in all geographic and socioeconomic groups
- Tends to appear more often within poverty areas and in developing countries where sanitary precautions are not well developed (Schildroth, 1994)

Prevalence in the United States

Adults

- Between 50% and 80% are infected by 40 years of age

Children

- Up to 20% of children will have contracted it before puberty
- Approximately 1 in 150 children is born with CMV
- About 40,000 children annually (CDC, 2006)

Incidence

- Acquired infections are common during adolescence, corresponding to the start of sexual activity
- Immunocompromised people are more susceptible
- Individuals employed at daycare centers are also more susceptible

Disability Statistics

- Congenital CMV causes serious disability as often as Down syndrome, fetal alcohol syndrome, and neural tube defects
- Approximately 1 in 750 children born with CMV will develop permanent disabilities
- Annually, approximately 8,000 children develop permanent disabilities caused by CMV (CDC, 2006)

Transmission: Acquired

- Bodily fluids
  - Tears
  - Saliva
  - Breast milk
  - Urine
  - Semen or vaginal fluids
- Infection from casual contact (kissing) is rare
- But getting saliva or urine on your hands, then touching your mouth or nose can transmit the virus

Transmission: Acquired

- Chief sources of infection for pregnant women are sexual contact and close interaction with infected children (Schildroth 1994)
- Also, blood transfusions
- Organ transplants (CDC, 2006; Taylor, 2003)

Transmission: Congenital

- Transmitted to the developing fetus in utero
- Primary infections result in more serious symptoms and disabilities than an infection from a reactivated virus (Schildroth, 1994)
- Rare for a second child to be infected (CDC, 2006)

Symptoms

- Silent Infection: 90% of people infected are asymptomatic
- Degree of symptoms depend on mode of transmission

  Acquired (CDC, 2006)
  - Few symptoms, if any
  - Fever
  - Sore throat
  - Fatigue
  - Swollen glands
  - Symptoms are similar to *many* types of infections

Symptoms: Congenital

- May not appear until months or years after birth
- Likely to progress in severity
- Hearing and vision loss are the most common of the late-onset symptoms (CDC, 2003)
- Approximately 29% to 40% will not survive (varies by source)

Symptoms: Congenital

Temporary Symptoms

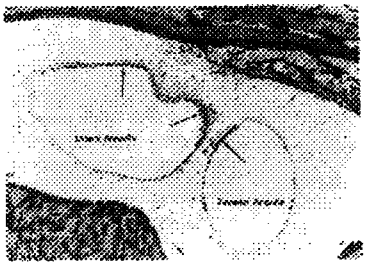
- Liver problems
- Spleen problems
- Jaundice
- Petechiae (Purple skin splotches)
- Lung problems
- Low birth rate
- Seizures

Permanent Symptoms

- Hearing loss
- Vision loss
- Mental disability
- Microcephaly
- Neuromuscular disorders
- Cerebral calcifications
- Seizures
- Death

CDC (2003); Sikkan and Silverman (1991)

CMV in the Auditory System



The intranuclear inclusion cells invade the cochlea.

Figure 2:

Full term male infant. Cytomegalic inclusions throughout the vestibular labyrinth, particularly in the utricle and cristae (arrows). (Schuknecht, 1993)

Cristae: sensory organs of dynamic equilibrium, which are located within the ampullae of the inner ear)

thanks for

CMV in the Auditory System

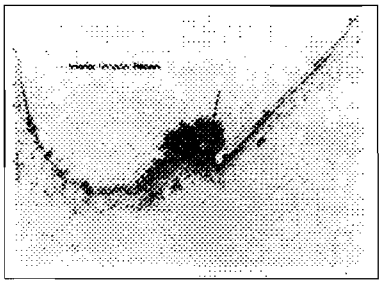


Figure 3:

Same full term male infant. The inclusion bodies are particularly numerous (arrow) on the inferior utricular crest. (Schuknecht, 1993)

Audiologic Findings

Audiometry

- Type: Sensory, unilateral or bilateral
- Configuration: Varying
- Degree: Varying, often progressive
- Word Recognition: Varies with degree, usually severely reduced

Immittance

- Tympanogram: Type A
- Reflexes: Usually absent (Jacobson and Northern, 1991)

Otologic Findings

- Best diagnostic tests are blood tests for IgM or IgG antibodies
- But, tests unable to determine if infected during a pregnancy
- Lab results often confused with other pathologies
  - Other strains of the herpes virus
  - Acute hepatitis
  - Anemia
  - About six other viral infections (Taylor, 2003)

Treatment

- Once CMV enters the body, it does not leave
- Vaccinations are in the research and development stage
  - Limited success
  - Multiple strains of CMV, even within the same individual over time
  - Strains differ between humans and animals, so animal experimentation is of little value (Schildroth, 1994)
- Current treatment involves managing the symptoms

Treatment: Hearing Loss

- Annual audiologic evaluations, especially in symptomatic patients or patients with a progressive loss
- Hearing aids and/or cochlear implants can be considered (Demmler, 1998)

Prevention

- Practice good hygiene, especially after changing diapers
- Do not kiss young children on the mouth or cheek. Instead kiss them on the top of the head or give hugs
- Do not share food, drink, or utensils with young children
- If pregnant and employed in a day care, work with children who are older than 2 ½ years (CDC, 2006)

Prevention

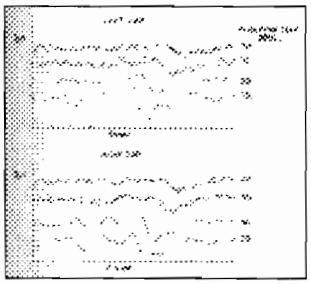
- Infected children do not need to be removed from day care because CMV is "nearly universally present" (Taylor, 2003)
- Health care workers do not need to terminate employment because "strict hand washing and education… can control the transmission" (Taylor, 2003)
- Restrictions on breast feeding are not made because "the benefits of breast milk appear to outweigh the small risk" (Taylor, 2003)

Case Study

- Male, 2 years 7 months
- At birth, small in size and weight with purple rash
- CMV was cultured from his urine
- Passed an ABR screen at 30 dB HL before discharge from hospital

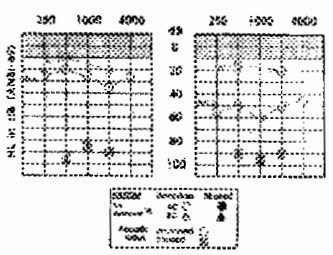
Ideal case example.

Case Study



- At twelve months
  - Follow up ABR with responses present at 30 dB HL bilaterally
  - Hearing determined to be within or near normal limits

Case Study



- At 2 years 7 months
  - Returned to clinic for evaluation of a speech and language delay
  - Test One: Estimation from ABR at 12 months
  - Test Two: Current test obtained with VRA. Mild SHL on right and moderate SHL on left. Reflexes are present.

Case Study

- Evaluation
  - All other development was normal
  - Otologic findings were normal
- Recommendations
  - Amplification for the left ear
- Follow up
  - Hearing loss remained stable in both ears for two years

References

Centers for Disease Control and Prevention (2006, February 6). Cytomegalovirus (CMV). Retrieved February 23, 2007 from http://www.cdc.gov/ncbddd/cmv/index.htm.

Dunmire, Gail (Ed.). (1998) My baby has congenital CMV disease: Infant and toddler years [Electronic version]. *CMV Updates*, 4 (2), 1-8.

Jacobson J.T. & Northern, J.L. (Eds.). (1991). *Diagnostic Audiology*. Austin, TX: ProEd.

Schildroth, A.N. (1994). Congenital Cytomegalovirus and Deafness. *AJA.*, 27-38.

Schuknecht HF. (1993). *Pathology of the Ear* (2nd Ed). Philadelphia: Lea & Febiger.

Sklaroff, S. & Silverman, C.A. (1991) Auditory Diagnostics: Principles and Applications. San Diego: Academic Press, Inc.

Taylor, Gregory (2003). Cytomegalovirus [Electronic version]. *American Family Physician*, 67 (3), 519-524.