CYTOMEGALOVIRUS

Cmv, Human Cytomegalovirus, Hcmv, Herpesvirus-5, Hhv-5

The most common congenital viral infection, causing hearing, visual and psychomotor impairment.

⚠️ Risk factor ♂ Male & Female

About Cytomegalovirus

Cytomegalovirus (CMV) is a type of herpes virus that causes severe disease in patients with immature or impaired immune systems. It is the most common congenital viral infection in humans and an important cause of morbidity and mortality in immunocompromised (with deficiency in immune system) hosts. During active infection, CMV modulates host immunity, and CMV-infected patients often develop signs of immune dysfunction, such as immunosuppression and autoimmune phenomena. Furthermore, active viral infection has been observed in several autoimmune diseases, and case reports have linked primary CMV infection and the onset of autoimmune disorders. The mechanisms by which CMV could induce inhibition of host defense, inflammation, and autoimmunity are discussed, as is the treatment of virus-induced immunopathology with antivirals (medication treating viral infection).

CMV is found throughout all geographic locations and socioeconomic groups, and infects 40% worldwide as indicated by the presence of antibodies in much of the general population and infects people of all ages. Major areas of risk of infection include prenatal or postnatal infants and immunocompromised individuals, such as organ transplant recipients, persons with leukemia, or those infected with human immunodeficiency virus (HIV).

CMV (Pic. 1), like all herpesviruses, can stay latent for long durations of time. The initial introduction of CMV generally gives way to an extended period of infection during which there is no detectable clinical illness. Severe impairment of the body’s immune system reactivates the virus from this dormant state. CMV persists in the host because the viral genome encodes multiple proteins that can confuse immune system. In AIDS (a spectrum of conditions caused by HIV infection) patients, CMV can cause loss of vision (cotton wool spots), pneumonia, and hepatitis. Transplant patients with CMV are also susceptible to pneumonia and hepatitis.

Transmission

Humans are the only source of CMV. The risk of getting CMV through casual contact is very small. The virus is generally passed from infected people to others through direct contact with body fluids that carry the virus, such as blood, urine, saliva, feces, vaginal secretions, tears, semen and breast milk.

CMV infections are frequently associated with the salivary glands and it can be shed in saliva and urine on and off for many months, sometimes years. Infection is also possible via blood transfusion or organ transplantation. Adults are usually infectious for less time than babies.

People with weakened immune systems may experience a recurrence of CMV or may be infected with a new strain of the virus. The virus could be detected by blood test that indicates antibodies against CMV. The virus could be detected also by polymerase chain reaction or by culture from blood sample, sample from other body fluid or tissue biopsy.

CMV screening is important in pregnant women. If woman has antibodies against CMV, there is very small chance of infecting their unborn baby. Another issue is when new infection is detected during pregnancy. A sample of amniotic fluid could be obtained and examined whether the fetus is infected. If there is a risk that
baby may be born with CMV (congenital CMV), the baby must be tested within the first three weeks of birth. Later tests won’t be conclusive for congenital CMV, because there is the possibility that the baby could have contracted the infection by nursing or by exposure to siblings or others who may be shedding the virus.

The immune response against CMV is complex and not fully understood. There is no cure for CMV and it is unable to eliminate the virus completely, allowing it to persist in a latent state.

Treatment for mild CMV infections is not usually required apart from bed rest and drinking plenty of fluids. The kind of treatment depends on the symptoms and it may also be needed for complications such as pneumonia. For more serious CMV illness where the symptoms are present, treatment is most often in the form of antiviral drugs. These drugs can’t cure the infection but slow the virus reproduction.

A vaccine against (CMV) is currently under investigation. Because CMV can cause congenital infection, considerable effort has been made towards the development of a vaccine, with particular emphasis on protection for pregnant women.

Symptoms

Cytomegalovirus infection in healthy people often causes no symptoms at all. A small number of people will experience a sore throat, tiredness, loss of appetite, generalized aches and pains and sore glands. These symptoms may last for two to three weeks.

People with weakened immune systems can develop a more severe illness which may include infections of the blood, central nervous system (encephalitis), bowel (diarrhea), liver (hepatitis), kidneys, lungs or eyes (visual impairment and blindness). Other symptoms may include fever, ulcers in the digestive tract (possible causing bleeding), behavioral changes, seizures and coma.

The most serious disease is seen in a small percentage of babies infected before birth, who can experience small birth weights, lethargy, fitting, yellowing of the skin (jaundice), rash and problems with brain, liver and spleen. This can result in lasting problems such as hearing loss, vision loss, small head size, cerebral palsy, developmental delay or intellectual disability.

Associated diseases

- pneumonia, pneumonitis – lung tissue inflammation
- hepatitis - liver and renal impairment
- CMV colitis, toxic megacolon
- meningitis/encephalitis
- Guillain-Barre syndrome - a rapid-onset muscle weakness caused by the immune system deficiency
- adrenal insufficiency
- thrombotic thrombocytopenic purpura
- AIDS, in AIDS patients also retinitis
- diarrhea
- bone marrow failure

Complications

Infertility in CMV positive men is associated with inflammatory diseases of urinary tract, which significantly reduces number of sperm in semen. In women, infection is highly associated with congenital transmission of infection to their unborn baby.

Congenital CMV infections are a leading cause of hearing loss, eye abnormalities, small head, seizures, permanent mental disability in infants. In rare cases infection in babies may be fatal.

Risk factors

- transplantation
- advanced AIDS
- steroid use
- mechanical ventilation
- bacterial pneumonia and sepsis
- red cell transfusion (via immunomodulation not transmission)
- burns

Transmission can occur:
- from contact with the body fluids of a person who is shedding the virus in their body fluid, the virus needs to come into contact with another person’s mucous membranes such as the mouth, nose or eyes
- from mother to her unborn child - the highest risk to an unborn baby is when a woman acquires CMV for the first time during her pregnancy and when infection occurs during the first half of the pregnancy
- during delivery of a child
- through breast milk of an infected woman who is breast feeding
- during sexual contact
- following an organ or bone marrow transplant
- following transfusion with infected blood

Prevention

- CMV does not spread easily, and transmission can be prevented by simple hygiene methods:
  - Wash your hands with warm soapy water before and after preparing food, after feeding a young child, after handling children's toys, after going to the toilet or after changing a child's nappy.
  - Wash toys, and other surfaces that come into contact with urine or saliva, with detergent and warm water.
  - Children who are unwell should stay home from childcare or school.

Pregnant women particularly, should observe strict hygiene practices to avoid contact with infectious fluids - especially around young children.

- Do not place a child’s dummy/pacifier into your mouth.
- Do not share a toothbrush with a young child.
- Do not share food or drinks or eating utensils with a young child.
- Avoid contact with saliva when kissing a young child.

How it can affect fertility

CMV infection affects fertility through several mechanisms. The inflammatory process may affect fertilization process by changes in the composition of genital secretions, which subsequently affects interaction of sperm and cervical mucus, thereby influence on sperm passage through female reproductive tract. Other mechanism may be induction of production of antisperm antibodies by female immune system that attack sperm and results in immunologic infertility of those parents.

The infection has direct influence also on spermatogenesis (sperm production) which causes defective sperm function. The negative effect is a result of endocrine dysbalance due to CMV influence on Leydig cells and/or hypothalamus, pituitary gland, adrenal gland and/or gonadal glands.

Prognosis

As cytomegalovirus is very common, it is likely that many people will be infected with the virus at some time in their life. The most severe form of the illness occurs in infants infected via placenta (congenital infection), however most babies born with CMV infection grow up with normal health.

By adulthood, 40% or more of the adult population have been infected. Most of these infections will have been acquired in childhood and many of the children would have had no symptoms. Because most infections with CMV are not apparent, people may be infected or acquire the infection and not realize it. As the infection is never eliminated from the body, the symptoms from the virus can show years later if the person’s immune system is weakened, such as those with some cancers, those undergoing cancer treatment, or people with AIDS.

In healthy people, CMV infection doesn’t affect their fertility, but it is important to screen pregnant women because of high risk of congenital infection for unborn babies whom mother is infected during pregnancy for the first time. Symptoms of congenital infection have about 10-15% of newborn. Over 90% of infected babies don’t have any symptoms after birth, but 10% of them can develop problems later in their lives. If woman is CMV negative before pregnancy, infection prevention is recommended. For women who are CMV positive before conception, risk of congenital infection is very low. Additionally, in CMV negative woman using CMV positive donor sperm, risk of congenital infection is very low.

Although CMV can be shed in breast milk, infections that occur from breastfeeding usually do not cause symptoms or disease in the infant and there are no recommendations against breast feeding. However, mothers
of very premature or low birth weight infants should consult their healthcare provider about breastfeeding, as CMV infection after birth may cause illness in these babies.

**Gallery**

**Pic**
Basophilic nuclear inclusions with peri-nuclear halo and granular basophilic cytoplasmic inclusions.

**Sources**

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