# Cytomegalovirus Newborn Screening

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**What is CMV?**
Human cytomegalovirus (CMV) is a ubiquitous DNA virus belonging to the Herpesviridae family that infects more than 80% of the world's population [13]. It distinguishes itself as the leading global nongenetic cause of sensorineural hearing loss (SNHL), and a major contributor to neurodevelopmental disabilities in children.

**Transmission**
- Vertical
- Breast milk
- Transfusion
- Vaginal secretions

**Acquired vs Congenital?**
In immune-competent individuals, acquired CMV produces common cold or mild flu-like symptoms. However, in its congenital, intrauterine form, CMV can cause devastating outcomes in a newborn infant.

**Why Focus on Congenital?**
Acquired is less toxic to infants compared to prenatal congenital infections as there is a risk of severe complications prior to 30 weeks conceptual age.

*5-7 per 1000 live births each year in the United States, Canada, Western Europe, and Australia* [7, 8, 9, 10]

Stehel et al. (2008) described a five-year study that included 79,047 born at Parkland Memorial Hospital in Dallas, Texas. Of that total number, 572 failed the initial hearing screenings of which 483 were also screened for CMV. Twenty-four of the 483 children had confirmed cCMV. Consequently, the prevalence estimate was slightly more than 0.3 per 1000 (24/79047). In comparison, children born in Latin America, Africa, and several Asian countries show rates of cCMV infections that are as high as 10-30 per 1000 live births [3, 15, 18, 19].

**High Incidence of Acquired CMV in Women of Childbearing Age**
The prevalence of seropositive women of child-bearing age in the US and Western Europe is estimated between 40-60%.

If a pregnant woman has a primary infection during the pregnancy, there is a significant risk of intrauterine transmission to the fetus.
- Thirty to 40% in the first and second trimester
- Forty to 70% in the third trimester [2, 17].

**Today's Relevance**
In the United States presently 10 states have implemented targeted newborn cCMV screening programs. Failure of a newborn hearing screening will trigger cCMV screening.

**Screening**
*Congenital CMV (cCMV) is often undetected due to the absence of screening programs and up to 90% of infected infants may not present with symptoms at birth [6].*

**Detection**
- Saliva
- Urine
- Blood

**Benefits of Early Screening**
- Scope of Impact
  - Vision
  - Hearing
  - Cognitive
  - Learning
  - Motor
  - Internal Organs
- Timely intervention
  - Special Education
  - Speech-Language
  - Development
  - Cost

**Limitations**
- Cost/test
- $189 for CMV PCR → $12.09 for 90 tests in-house
- Lack of Awareness/Education
- Time
- Must be completed by 21st day of life
- False Positives
- Not added to Recommended Uniform Screening Panel (RUSP)
- Asymptomatic prevalence
  - ***85-90% of infants with congenital infection are asymptomatic***
  - 0-23.5% ~ 15% will show symptoms later in life [5]
    - 67.6% hearing loss


**Knowledge Gaps in CMV**
*CMV has relatively modest research completed on it despite its expansive impact. Health care professionals and childbearing individuals lack key elements of cCMV knowledge.*

Recent surveys reveal gaps in education and knowledge for diagnosing and treating cCMV among health professionals [4]:
- Otolaryngologists
  - 63% knew that screening must be performed by the 21st day of life.
  - Most reported that they do not screen for cCMV or refer diagnosed children for antiviral therapy.
- Speech-Language Pathologists
  - Only 26% had any working knowledge of cCMV.
- Medical students [1]
  - Most have trouble in discussing the finer details of CMV.

Among Parents:
- Only 22% of childbearing-women reported having some knowledge of CMV and even fewer knew of preventive measures to decrease vertical transmission [6, 12].
- Barely 7% of men have heard of cCMV [21].