# Congenital Cytomegalovirus Infection (cCMV): Natural History, Diagnostic Testing & Available Treatments


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**Washington State Board of Health**
**NBS Technical Advisory Committee Meeting**
**September 21, 2022**

WILLIS-KNIGHTON HEALTH SYSTEM

# Disclosures

- Advisory Panel – Pfizer, Avalere
- Advisory Council – Moderna, Valneva
- Site PI, multicenter clinical trials – Regeneron, Pfizer, GSK
- Site Sub-I, multicenter clinical trials – Novavax

# Congenital and Perinatal Infections

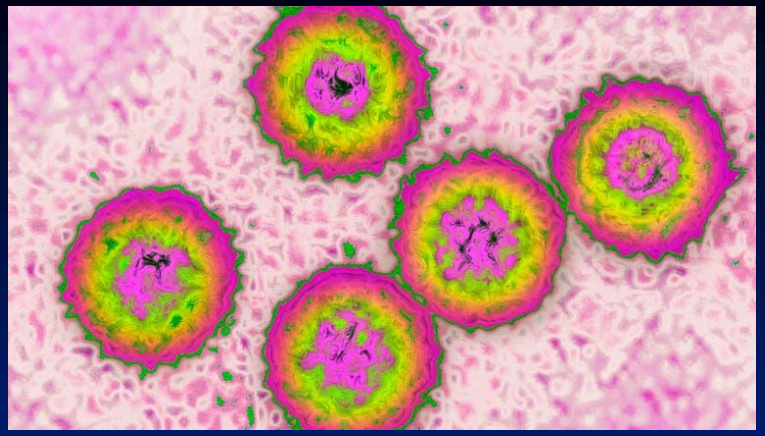
| | |
|---|---|
| T | *Toxoplasma gondii* |
| O | Other: varicella, parvovirus, Zika |
| R | Rubella |
| C | Cytomegalovirus |
| H | Herpes simplex, hepatitis B, hepatitis C, HIV |
| S | Syphilis |

# Congenital CMV

- Most common congenital infection
  - 0.5%-0.7% of live births in US
    - 1 in 150-200 live-births
    - 20,000-31,500 newborns annually
  - Asymptomatic ~ 90%
  - Symptomatic ~ 10%

- A leading cause of sensorineural hearing loss (SNHL) and neurodevelopmental delay

# Cytomegalovirus



- Herpesvirus family
  - Capacity to infect multiple types of cells
  - Life-long persistent infection
    - Latency
    - Periods of active replication
      - Intermittent shedding from infected cells
        - Urine, saliva, cervicovaginal secretions, semen, breast milk, tears, blood products, transplanted organs
        - CMV can survive on hands and contaminated surfaces

# CMV: Transmission

- Horizontal
  - Children in childcare and childcare workers – saliva
  - Adolescents and young adults – young children and sexual
  - Transfusion and Transplantation – infected blood product or organ
- Vertical
  - Congenital – transplacental
  - Perinatal – during birth, breast milk

# Young Children are an Important Source of CMV for Young Adults and Pregnant Women

- NHANES
  - Prevalence of CMV IgG antibody
    - 2011-12
    - 2017-18
  - Higher seroprevalence: ethnic/racial minority groups, exposure to breast milk and/or other children
- Shedding is highest in 1-2 y/o
  - Day care centers

*Clinical Infectious Diseases*

BRIEF REPORT

## Changes in Cytomegalovirus Seroprevalence Among U.S. Children Aged 1–5 Years: The National Health and Nutrition Examination Surveys

**Molly R. Petersen,[1,a] Eshan U. Patel,[1,2,a] Alison G. Abraham,[2,3] Thomas C. Quinn,[4,5] and Aaron A.R. Tobian[1]**

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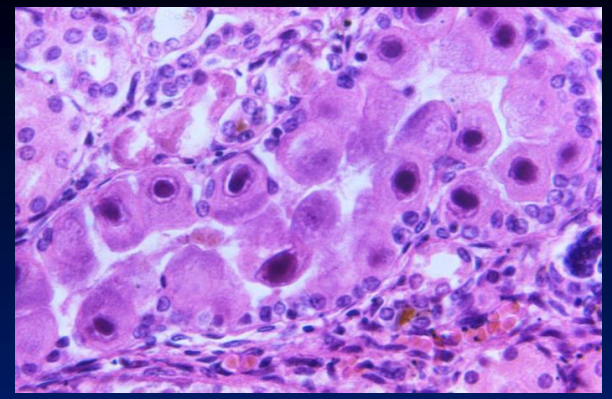
| Characteristic | 2011–2012[a] Prevalence, % (95% CI) | 2017–2018[a] Prevalence, % (95% CI) |
|---|---|---|
| Overall | 20.7 (14.0, 29.0) | 28.2 (23.1, 34.0) |
| Age, y | | |
| 1 | 12.3 (6.4, 20.6) | 23.3 (16.4, 31.5) |
| 2–3 | 20.0 (11.7, 30.7) | 24.5 (16.2, 34.4) |
| 4–5 | 24.2 (16.6, 33.2) | 33.9 (24.0, 44.9) |

*Clin Inf Dis* 2021;72(9):e408–11

# Cytomegalovirus



- Over 50% of US population infected by age 40 yrs
- 1-4% of women will become infected with CMV during a pregnancy
- 50-75% of cCMV occurs in infants born to mothers infected before they became pregnant
  - cCMV prevalence increases with increasing maternal seroprevalence

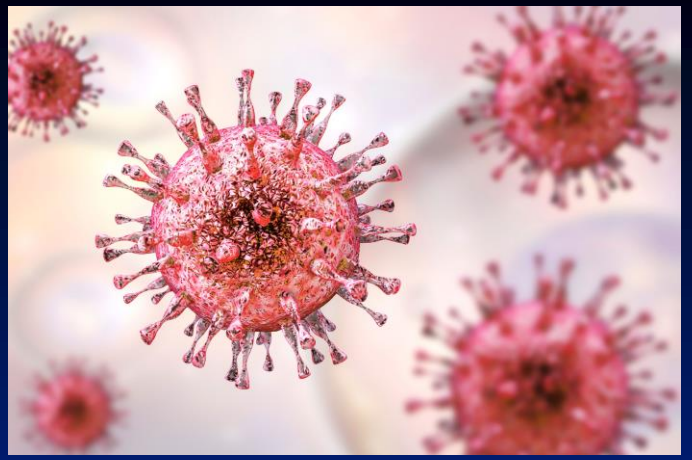
# *In utero* CMV Transmission from Mother to Fetus

- **Primary infection**
  - **30% transmission rate**
  - **Approximately equal rate regardless of trimester infection occurs**
  - **More severe outcomes with infection in 1st trimester**

# *In utero* CMV Transmission from Mother to Fetus

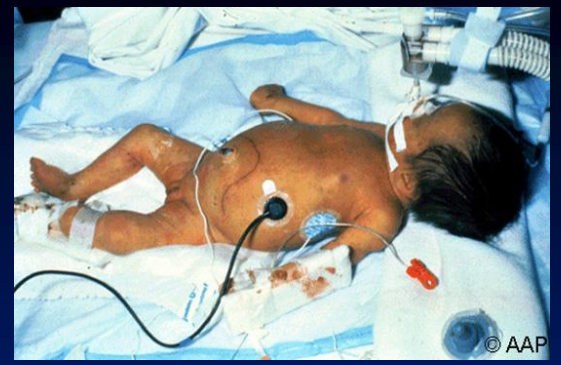
- Non-primary infection
  - Reactivation
    - Lower transmission rate, but increasing percentage of cases based on CMV prevalence
    - Infant less likely to be symptomatic
  - Reinfection
    - Immunity not complete
    - New serotype
    - Risk of cCMV may be as high as primary infection

# Cytomegalovirus

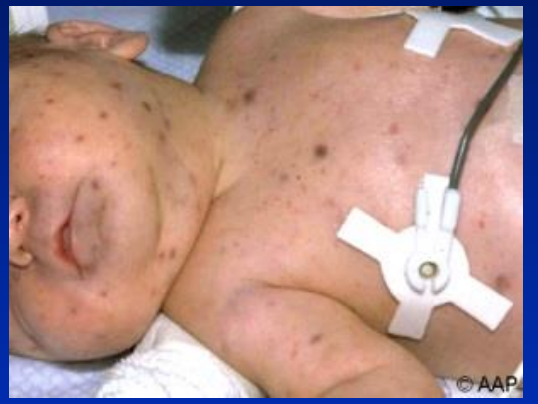


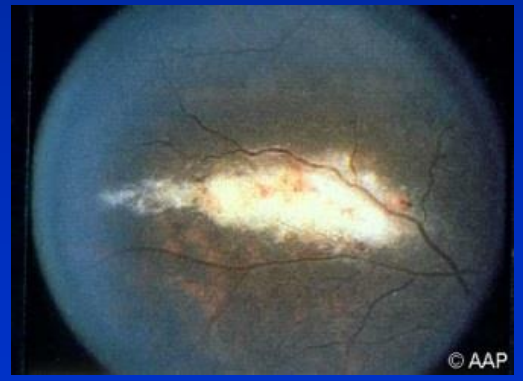
- Healthy persons – minimal manifestations
  - Pregnant women,  > 90% of primary infections are asymptomatic
- Serious disease
  - Congenital infection
  - Immunosuppressed persons
    - Solid organ or bone marrow transplants, AIDS

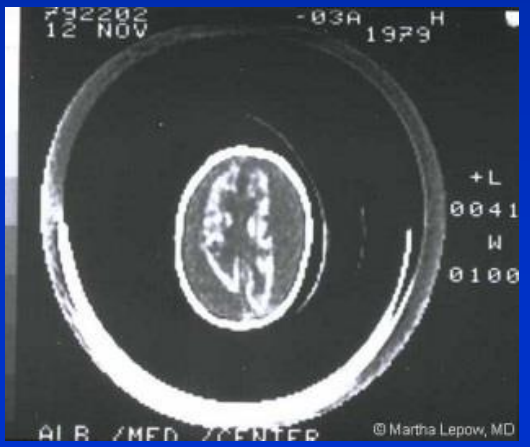
# Symptomatic congenital CMV: Manifestations




- Intrauterine growth restriction (IUGR)
- Thrombocytopenia, purpura
- Hepatitis, pneumonitis
- Jaundice
- Hepatosplenomegaly
- Microcephaly
- Intracerebral calcifications
- Retinitis
- Mortality: ~ 4%



ORIGINAL ARTICLES

www.jpeds.com • THE JOURNAL OF PEDIATRICS

# Racial and Ethnic Differences in the Prevalence of Congenital Cytomegalovirus Infection

Karen B. Fowler, DrPH[1,2], Shannon A. Ross, MD[1], Masako Shimamura, MD[1], Amina Ahmed, MD[4], April L. Palmer, MD[5], Marian G. Michaels, MD[6], David I. Bernstein, MD[7], Pablo J. Sánchez, MD[8], Kristina N. Feja, MD[9], Audra Stewart, DO[8], and Suresh Boppana, MD[1,3]

- 2007-2012
- 100,322 infants from 7 medical centers
- Prevalence (per 1000 live births)
  - Overall 4.5
  - Black 9.5
  - Multiracial 7.8
  - Hispanic 3.0
  - Non-Hispanic white 2.7
  - Asian 1
- Symptomatic (9.6%) and SNHL (7.8%) same across groups

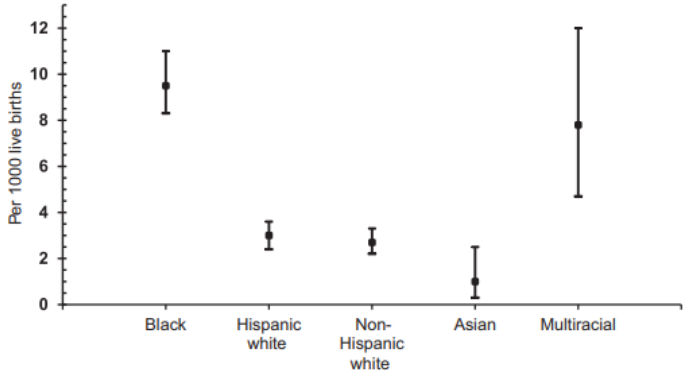



**Figure 1.** Prevalence per 1000 live births of congenital CMV infection and 95% CIs by race and ethnicity.

**Table III. Unadjusted and aPORs for cCMV infection by race and ethnicity**

| | POR (95% CI) | aPOR (95% CI)* |
|---|---|---|
| Infant race and ethnicity | | |
| Black, non-Hispanic | 3.5 (2.8-4.5) | 1.9 (1.4-2.5) |
| Multiracial | 2.9 (1.8-4.8) | 1.9 (1.1-3.0) |
| White, Hispanic | 1.1 (0.8-1.5) | 0.7 (0.5-1.0) |
| Asian | 0.4 (0.1-1.0) | 0.6 (0.2-1.2) |
| White, non-Hispanic | 1.0 | 1.0 |

*aPOR*, Adjusted prevalence OR.
*Model included race and ethnicity, insurance status, and maternal age.

*J Pediatr* 2018;200:196-201

# Congenital CMV: Outcomes

- **Symptomatic infection**
  - **40-60% develop permanent sequelae**
    - **Sensorineural hearing loss**
    - **Vestibular dysfunction**
    - **Cognitive impairment**
    - **Developmental delays**
    - **Retinitis**
- **Asymptomatic infection**
    - **Sensorineural hearing loss**
    - **Vestibular dysfunction**

# SNHL with cCMV

- Most common sequelae
- Loss is variable
  - Mild unilateral to profound bilateral
  - Fluctuate
  - Delayed-onset
- Pathogenesis: may be a combination of viral-mediated damage and host inflammatory response

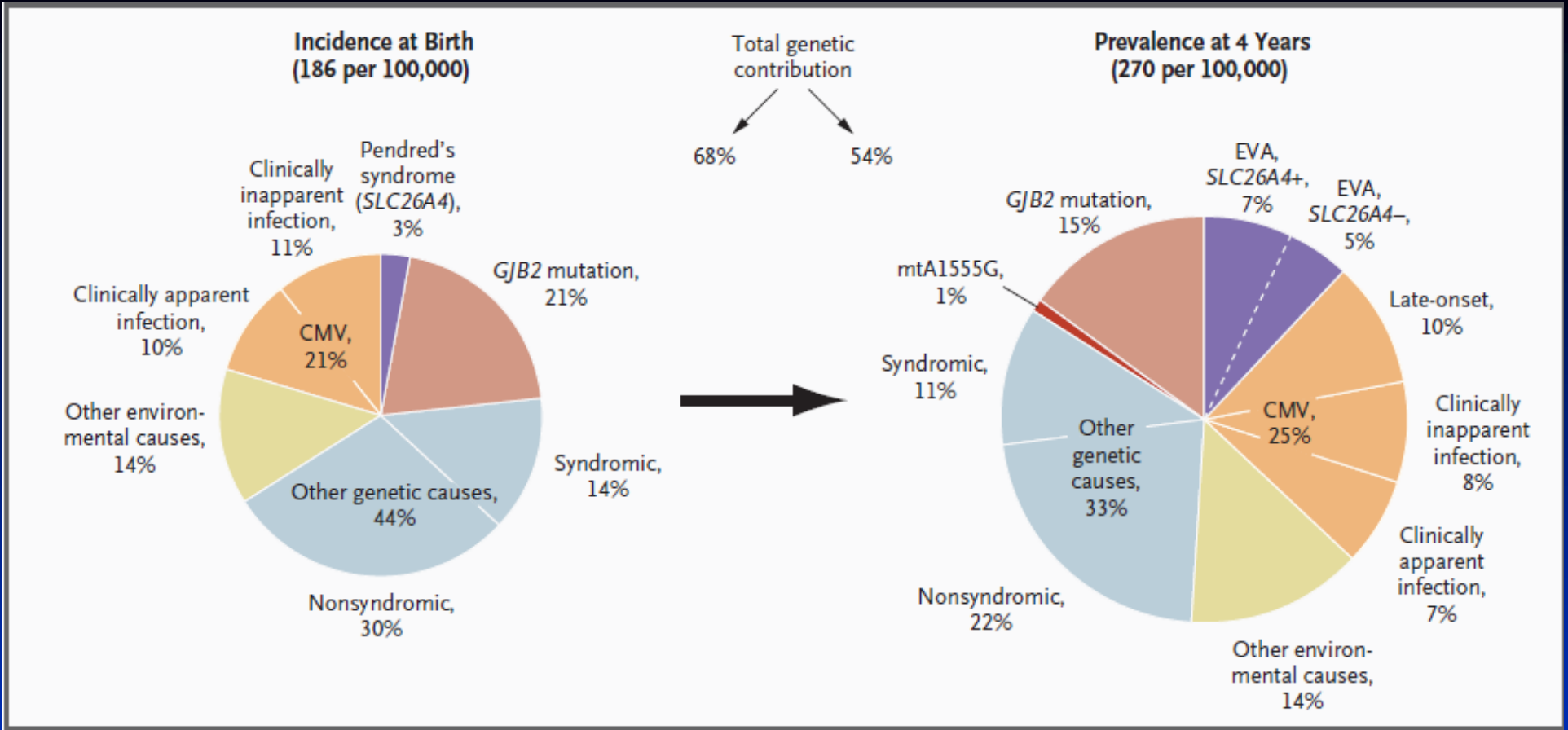



**Figure 1. Estimates of Causes of Deafness at Birth and at Four Years in the United States.**

The incidence of deafness at birth in the United States, and its prevalence at four years of age, were obtained by adjusting estimates from the United Kingdom[11,12] (where, in contrast with the United States, follow-up is nearly complete) to include unilateral hearing loss. The overall proportion of genetic cases at four years of age was estimated by sentinel phenotype analysis.[13] Estimates for specific causes were obtained from previously published data (as documented in the Supplementary Appendix, available with the full text of this article at www.nejm.org). No studies were available in which universal newborn testing was performed for more than one specific cause of deafness in the same population sample. CMV denotes cytomegalovirus, mtA1555G the mitochondrial A1555G mutation, and EVA enlargement of the vestibular aqueduct.

*N Engl J Med* 2006;354:2151-64

# Natural History of Hearing Loss in cCMV

| Hearing Loss | Symptomatic | Asymptomatic |
|---|---|---|
| Total | 33-40% | 7-10% |
| Characteristics of Loss | | |
| Bilateral | 67-71% | 43-48% |
| Delayed onset | 18-27% | 9-38% |
| Median age (and range of delayed onset) | 33 mos (6-197 mos) | 44 mos (24-182 mos) |
| Progressive | 18-54% | 20-54% |
| Fluctuating | 21-22% | 24-48% |
| Severe-profound loss | 75% | 78% |

Summary from 4 studies. *Antiviral Res* 2021;191:1-5

# Cumulative Percentage of Sensorineural Hearing Loss by Age

| Age | Symptomatic | Asymptomatic |
|---|---|---|
| Birth – 1 month | 43.5% | 25.5% |
| 3 months | 55.3% | 31.4% |
| 6 months | 67.2% | 43.1% |
| 2 years | 82.4% | 47.1% |
| 3 years | 88.2% | 58.8% |
| 4 years | 89.4% | 72.5% |
| 6 years | 95.3% | 86.6% |
| 7 – 15 years | 100% | 100% |

*J Am Acad Audiol* 2000;11(5):283-90

# Vestibular, Gaze, and Balance Disorders in Asymptomatic Congenital Cytomegalovirus Infection

Swetha Pinninti, MD,[a] Jennifer Christy, PT, PhD,[b] Anwar Almutairi, PT, PhD,[b] Graham Cochrane, BA,[b] Karen B. Fowler, PhD,[a,c] Suresh Boppana, MD[a,d]

- **Comprehensive vestibular, gaze, and balance assessments**
- **40 children with asymptomatic cCMV**
  - **17.5% with SNHL (2 each with mild, moderate-severe and profound) vs 33 Controls**
- **RESULTS: Vestibular disorders in 45% of cohort**
  - **46% had difficulties maintaining gaze during head movement**
  - **1/3 – 1/2 with difficulties maintaining balance**

*Pediatrics* 2021;147(2):e20193945

# Cognitive Impairment and Cerebral Palsy in Symptomatic cCMV

| Outcome | Percentage |
|---|---|
| IQ < 70 | 40% |
| Motor deficits | 20% |
| Seizures | 19% |

*J Pediatr* 2014;164:855-859 *Pediatr Infect Dis J* 2016;35:924-926 *Antiviral Res* 2021;191:1-5

# Effect on Brain Development Based on Trimester of Infection

- 1st trimester
  - Neural stem cells which differentiate into neurons and glia are infected
  - Interruption of organogenesis, abnormal neuronal migration

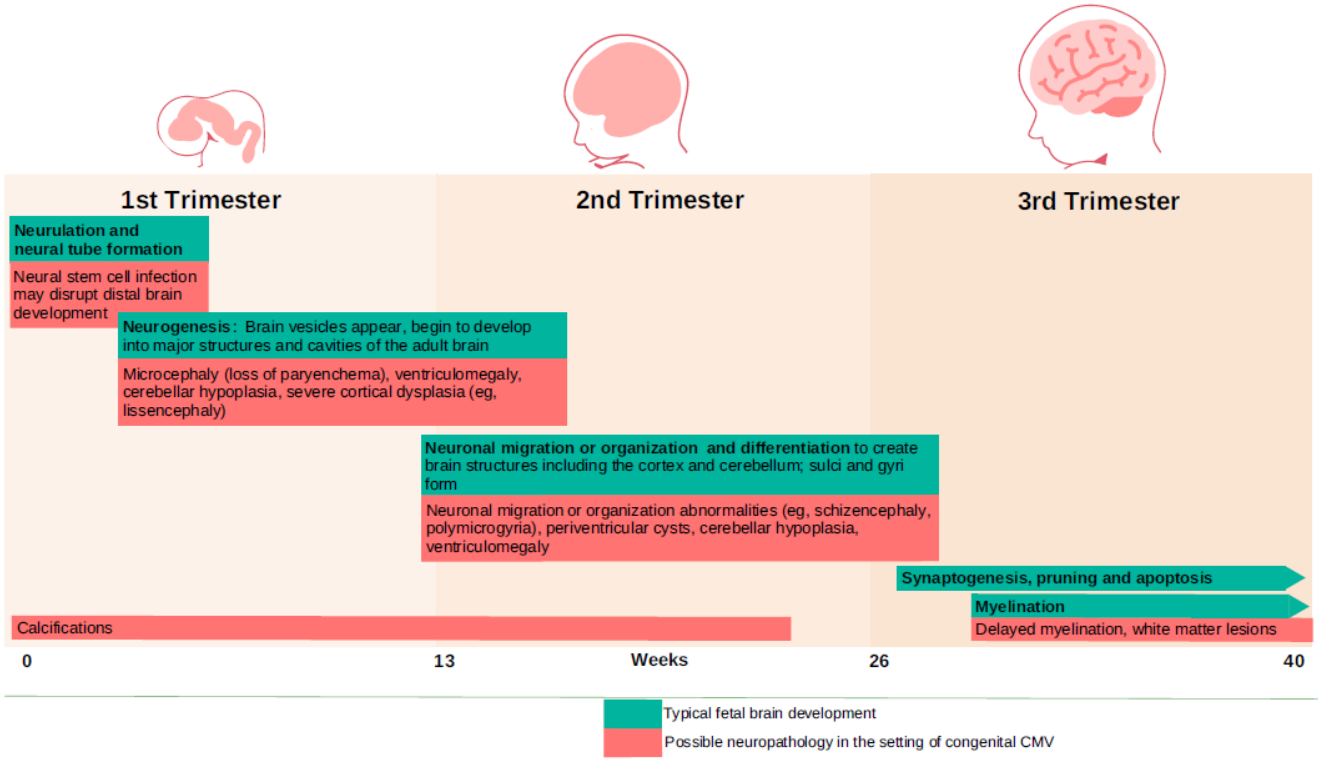



**FIGURE 2**
Typical fetal brain development and resultant congenital cytomegalovirus-associated neuropathology by timing of maternal infection and vertical transmission. Processes of fetal neurodevelopment distal to timing of fetal infection may be affected by CMV-associated placental injury, inflammatory response, and fetal central nervous system infection.[91,113,114]

*Pediatrics* 2022;150(2):e2021055896

# Intelligence and Academic Achievement With Asymptomatic Congenital Cytomegalovirus Infection

Adriana S. Lopez, MHS,[a] Tatiana M. Lanzieri, MD, MPH,[a] Angelika H. Claussen, PhD,[b] Sherry S. Vinson, MD,[c,d] Marie R. Turcich, MA,[c,d] Isabella R. Iovino, PhD,[c,d] Robert G. Voigt, MD,[c,d] A. Chantal Caviness, MD, MPH,[c] Jerry A. Miller, MS, PhD,[c,e] W. Daniel Williamson, MD,[c] Craig M. Hales, MD, MPH,[a] Stephanie R. Bialek, MD, MPH,[a] Gail Demmler-Harrison, MD,[c,d] on behalf of the Congenital Cytomegalovirus Longitudinal Study Group

- Longitudinal study of infants identified by newborn screening vs controls through childhood and adolescence (92) vs unmatched controls (42) born within 6 days of infant
- 20 patients (11 by age 2 yrs, 9 moderate to profound) and 3 controls (9-15 yrs) developed SNHL

- Results:
  - No differences in IQ, vocabulary or academic achievement scores in subjects with normal hearing at age 2 yrs
  - Subjects with SNHL
    - full-scale intelligence score 7.0 points lower
    - Receptive vocabulary scores 13.1 points lower

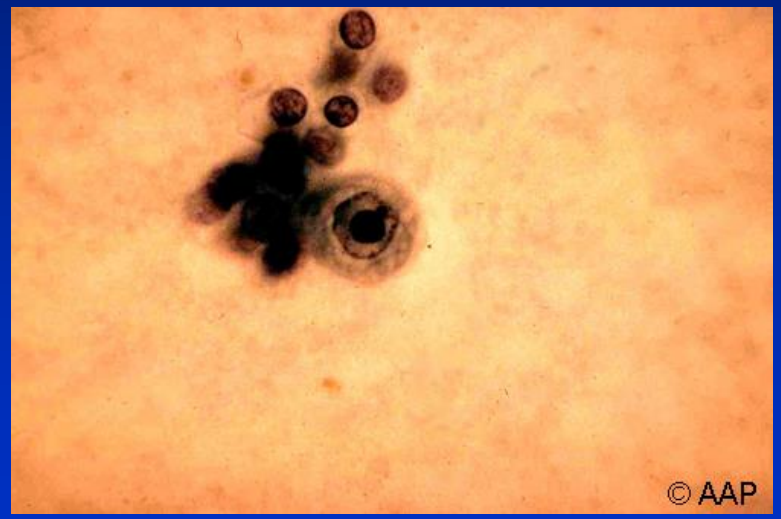
Congenital Cytomegalovirus Longitudinal Study Group. *Pediatrics* 2017;140(4):e20171517

# Maternal-infant transmission of CMV

- Transplacental (Congenital)
- Intrapartum (Perinatal) – incubation period: 3-4 weeks
  - Cervical secretions
    - CMV positive: 5% - 24%, transmission rate: 26% - 56%
- Postpartum (Postnatal) – incubation period: 3-4 weeks
  - Human milk
    - CMV positive: 13% - 32%, transmission rate: 29% - 59%
- No sequalae of perinatal or postnatal infection

# Diagnosis of Congenital CMV

- Virologic detection within 3 weeks of birth is necessary to differentiate cCMV from perinatal or postnatal infection transmission
- CMV DNA PCR has replaced culture
  - Urine or saliva – sensitivity 97-100%
    - Saliva – wait 1 hour after breast feeding
      - False positive rate 0.03-0.14%[1]
    - Saliva positive; confirm with urine
  - Respiratory tract, blood, CSF, amniotic fluid
- Serologic diagnosis
  - IgG – no value, maternal transfer
  - IgM – false positives common




AAP 2021 Red Book, pg 297

[1] *J Infect Dis* 2018;217:1612-1615

# cCMV Treatment

- Randomized, placebo-controlled trial
  - 6 wks vs 6 mos; 96 participants
- End points
  - Primary: change in better ear at 6 months
  - Secondary: total ear hearing and developmental outcomes at 12, 24 mos
- Outcome:
  - No improvement in short term (P=0.24 at 6 mos)
  - Modest improvement in hearing and developmental outcomes in longer term

ORIGINAL ARTICLE

## Valganciclovir for Symptomatic Congenital Cytomegalovirus Disease

D.W. Kimberlin, P.M. Jester, P.J. Sánchez, A. Ahmed, R. Arav-Boger, M.G. Michaels, N. Ashouri, J.A. Englund, B. Estrada, R.F. Jacobs, J.R. Romero, S.K. Sood, M.S. Whitworth, M.J. Abzug, M.T. Caserta, S. Fowler, J. Lujan-Zilbermann, G.A. Storch, R.L. DeBiasi, J.-Y. Han, A. Palmer, L.B. Weiner, J.A. Bocchini, P.H. Dennehy, A. Finn, P.D. Griffiths, S. Luck, K. Gutierrez, N. Halasa, J. Homans, A.L. Shane, M. Sharland, K. Simonsen, J.A. Vanchiere, C.R. Woods, D.L. Sabo, I. Aban, H. Kuo, S.H. James, M.N. Prichard, J. Griffin, D. Giles, E.P. Acosta, and R.J. Whitley, for the National Institute of Allergy and Infectious Diseases Collaborative Antiviral Study Group

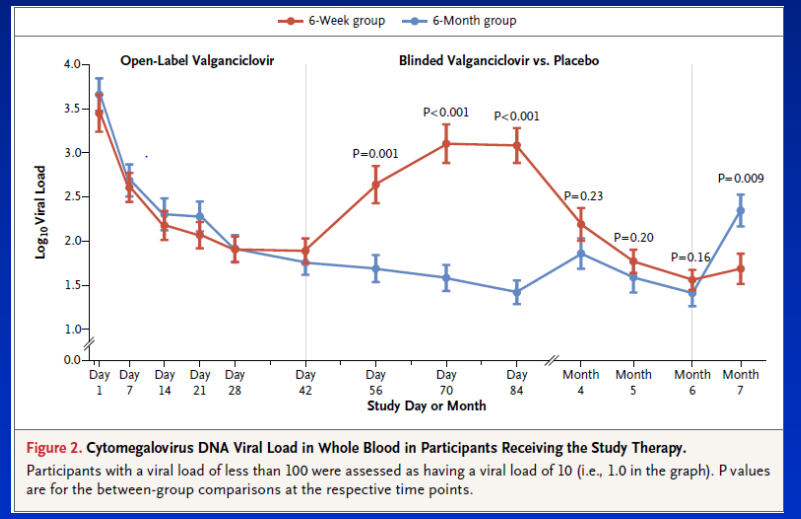
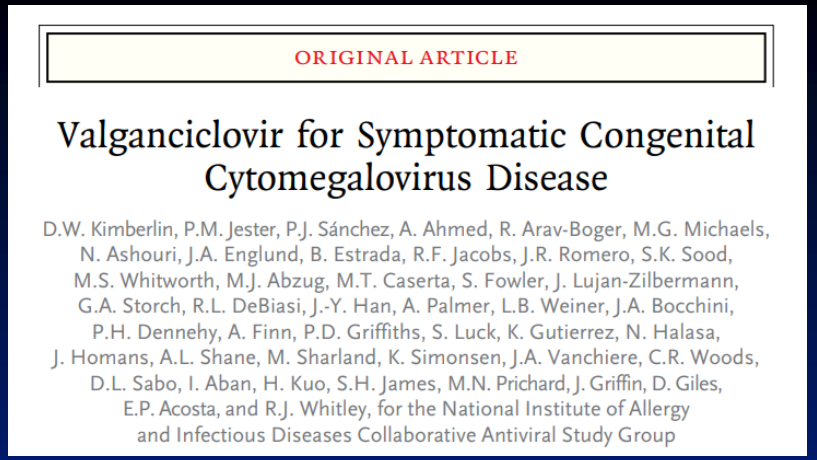



**Figure 2. Cytomegalovirus DNA Viral Load in Whole Blood in Participants Receiving the Study Therapy.**
Participants with a viral load of less than 100 were assessed as having a viral load of 10 (i.e., 1.0 in the graph). P values are for the between-group comparisons at the respective time points.

*N Engl J Med* 2015;372:933-43

# cCMV Treatment



ORIGINAL ARTICLE

Valganciclovir for Symptomatic Congenital Cytomegalovirus Disease

D.W. Kimberlin, P.M. Jester, P.J. Sánchez, A. Ahmed, R. Arav-Boger, M.G. Michaels, N. Ashouri, J.A. Englund, B. Estrada, R.F. Jacobs, J.R. Romero, S.K. Sood, M.S. Whitworth, M.J. Abzug, M.T. Caserta, S. Fowler, J. Lujan-Zilbermann, G.A. Storch, R.L. DeBiasi, J.-Y. Han, A. Palmer, L.B. Weiner, J.A. Bocchini, P.H. Dennehy, A. Finn, P.D. Griffiths, S. Luck, K. Gutierrez, N. Halasa, J. Homans, A.L. Shane, M. Sharland, K. Simonsen, J.A. Vanchiere, C.R. Woods, D.L. Sabo, I. Aban, H. Kuo, S.H. James, M.N. Prichard, J. Griffin, D. Giles, E.P. Acosta, and R.J. Whitley, for the National Institute of Allergy and Infectious Diseases Collaborative Antiviral Study Group

- Total-ear hearing improved or remained normal
  - 12 mos (73% vs 57%. P=0.001) [OR = 3.04, 95% CI 1.26 to 7.35]
  - 24 mos (77% vs 64%, P=0.04) [OR = 2.61, 95% CI 1.05 to 6.31]
- Bayley III Components at 24 mos
  - Cognitive composite (P=0.02)
  - Language composite (P=0.004)
  - Receptive-communication (P=0.003)
  - Expressive-communication (P=0.02)
  - Gross motor (P=0.02)

*N Engl J Med* 2015;372:933-43

# Standardizing manifestations to improve analysis of treatment outcomes

- **Mildly symptomatic**
  - Presence of 1-2 isolated manifestations, often transient
- **Moderately to severely symptomatic**
  - Presence of multiple attributable manifestations or central nervous system manifestations or both
- **Asymptomatic**
  - Normal or isolated SNHL in newborn period

Informal International Consensus Recommendations Group. *Lancet Infect Dis* 2017;17(6):e177-e188

# Current Recommendations for Antiviral Therapy of Infants with cCMV

- Moderate to severe symptomatic disease
  - Valganciclovir (16mg/kg/dose, PO, BID for 6 months)
    - Begin treatment <1 month of age
    - Side-effects: neutropenia (~20%), elevated LFT's
  - Can use ganciclovir IV if PO not indicated
- Mild disease or isolated SNHL should not receive antiviral treatment

AAP 2021 Red Book, pg 298

**TABLE 1** On-Going and Recently Completed Studies of Congenital Cytomegalovirus Related Therapeutics, Prevention, and Vaccines

| Clinical Trial Number, Principal Investigator, Institution or Sponsor | Phase | Intervention | Primary Objective | Population |
|---|---|---|---|---|
| Antiviral medication for infants with cCMV | | | | |
| NCT03301415 National Institute of Allergy and Infectious Diseases[115] | Phase 2 | Valganciclovir, 16 mg/kg per dose provided orally twice daily for 4 mo | To evaluate valganciclovir as a treatment to prevent development of SNHL in infants with asymptomatic cCMV infection | 229 newborns with asymptomatic cCMV without baseline SNHL |
| NCT03107871 Albert Park, University of Utah, National Institute of Deafness and Other Communication Disorders, Genentech, Inc.[116] | Phase 2 | Valganciclovir, 16 mg/kg per dose or placebo provided orally twice daily for 6 mo | To determine if valganciclovir treatment reduces the mean slope of total hearing thresholds over the 20 mo after randomization compared with placebo in cCMV-infected asymptomatic infants with isolated hearing loss | 52 infants with asymptomatic cCMV and isolated SNHL |
| NCT02005822 Ann C.T.M. Vossen, Leiden University Medical Center, Netherlands[117] | Phase 3 | Valganciclovir, 16 mg/kg per dose provided orally twice daily for 6 wk | To investigate whether early treatment with oral valganciclovir of infants with both congenital cytomegalovirus infection and sensorineural hearing loss can prevent progression of hearing loss | 37 infants with cCMV and SNHL |

| | | | | |
|---|---|---|---|---|
| Maternal immunoglobulin to prevent vertical transmission | | | | |
| NCT05170269 Biotest AG | Phase 3 | Cytotect CP Biotest (BT097), 200 U/kg IV weekly every 2 wk until at least GW 17 | To demonstrate efficacy and safety of Cytotect CP Biotest in preventing maternal-fetal transmission of CMV | 80 pregnant women with primary CMV infection |
| Maternal behavioral intervention to prevent CMV infection | | | | |
| NCT04615715 Karen Fowler, University of Alabama at Birmingham[49] | NA | Prenatal clinic-based CMV risk-reduction behavioral intervention versus control | To evaluate whether a brief prenatal clinic-based CMV risk-reduction behavioral intervention will prevent maternal CMV infections during pregnancy in women | 840 pregnant women |
| Antiviral medication for congenitally infected fetuses | | | | |
| NCT04732260 Yves Ville, Assistance Publique - Hôpitaux de Paris, France[118] | NA | 1 tablet of Letermovir (240 mg or 480 mg /d) for 3 d | To measure the Letermovir transplacental transfer in the second trimester and its accumulation in the amniotic fluid and the placenta in the second trimester | 10 pregnant women undergoing termination of pregnancy for fetal abnormality |

| | | | | |
|---|---|---|---|---|
| CMV vaccine trials | | | | |
| NCT03486834 Merk Sharp and Dohme Corp.[119] | Phase 2 | Vaccine V160 vs placebo | To evaluate the safety, tolerability, and efficacy of the CMV vaccine (V160) and whether administration of a 3-dose regimen reduce the incidence of primary CMV infection compared with placebo | 2200 healthy seronegative women aged 16 to 35 y with direct exposure to young children |
| NCT05089630 GlaxoSmithKline[120] | Phases 1 and 2 | Recombinant protein subunit vaccine | To assess the safety, reactogenicity, and immunogenicity of the candidate CMV recombinant protein subunit, regardless of baseline CMV sero-status | 320 healthy adults 18 to 50 y of age |
| NCT05085366 ModernaTX, Inc.[121] | Phase 3 | mRNA-1647 vaccine versus placebo | To evaluate the efficacy of mRNA 1647 vaccine in CMV-seronegative female participants and to evaluate the safety and reactogenicity of mRNA-1647 vaccine in all participants | 6900 healthy seronegative participants aged ≥20 y old with direct exposure to at least 1 child ≤ 5 y old |

# Use of Valacyclovir During Pregnancy

- 100 women with preconceptionally or 1st trimester primary CMV infection
- Oral valaciclovir vs placebo, amniocentesis at 21-22 weeks.
- cCMV: Valaciclovir – 11% Placebo – 30% (p=0.027)

Valaciclovir to prevent vertical transmission of cytomegalovirus after maternal primary infection during pregnancy: a randomised, double-blind, placebo-controlled trial

Keren Shahar-Nissan*, Joseph Pardo*, Orit Peled, Irit Krause, Efraim Bilavsky, Arnon Wiznitzer, Eran Hadar†, Jacob Amir†

*Lancet* 2020;396(10253):779-785

- Symptomatic fetuses, treated in utero from diagnosis (median 25.9 wks' gestation) until delivery or termination, severe CNS disease not included
- 43 treated, 34 asymptomatic at birth (82%, vs literature – 43%), all asymptomatic at 12 months

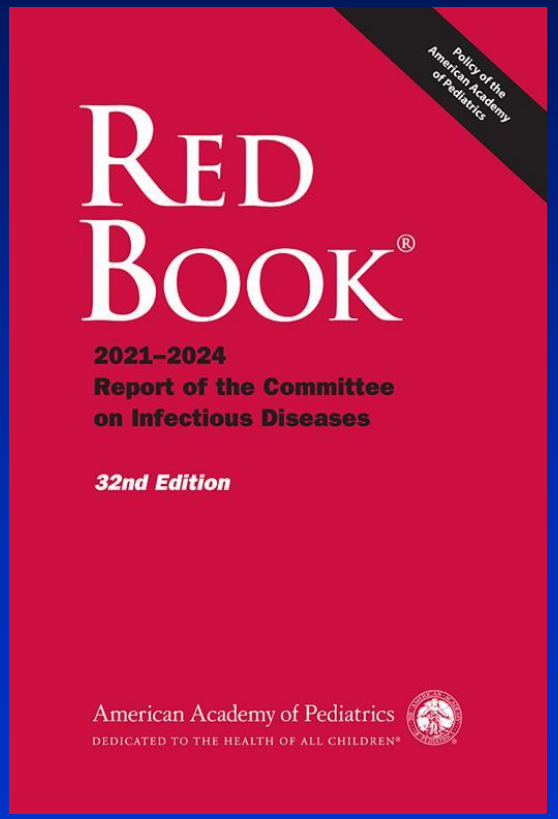
In utero treatment of congenital cytomegalovirus infection with valacyclovir in a multicenter, open-label, phase II study

Marianne Leruez-Ville, MD, PhD; Idir Ghout, MSc; Laurence Bussières, PhD; Julien Stirnemann, MD, PhD; Jean-François Magny, MD; Sophie Couderc, MD; Laurent J. Salomon, MD, PhD; Tiffany Guilleminot, BA; Philippe Aegerter, MD, PhD; Guillaume Benoist, MD, PhD; Norbert Winer, MD; Olivier Picone, MD, PhD; François Jacquemard, MD; Yves Ville, MD, FRCOG

*Am J Obstet Gynecol* 2016;215(4):462.e461-462.e410

# American Academy of Pediatrics Committee on Infectious Disease Recommendations for Infants with cCMV

- **Asymptomatic or Symptomatic Disease**
  - Hearing testing at 4, 6, 9, 12, 15, 18, 24, 36 mos
  - Standard hearing assessments at 4, 5, 6, 8, 10 yrs

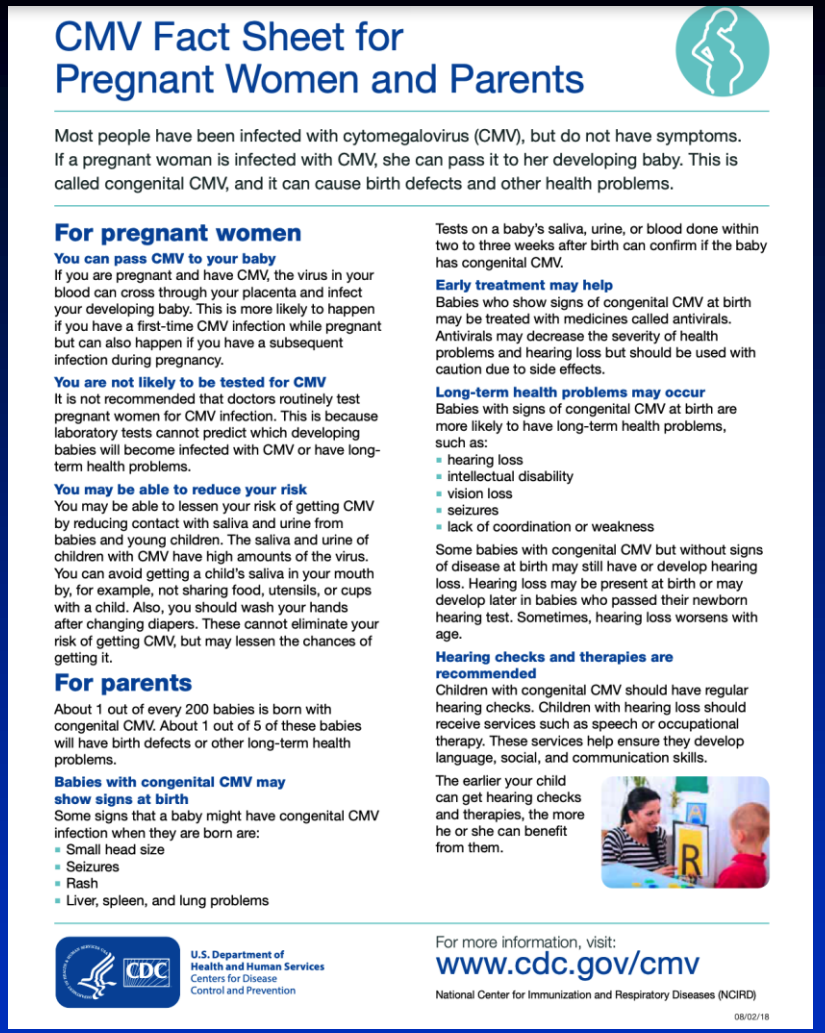



AAP 2021 Red Book, pg 298

# Prevention

- Increasing awareness
- Education
  - Hygiene prevention measures


https://www.nationalcmv.org



## CMV Fact Sheet for Pregnant Women and Parents

Most people have been infected with cytomegalovirus (CMV), but do not have symptoms. If a pregnant woman is infected with CMV, she can pass it to her developing baby. This is called congenital CMV, and it can cause birth defects and other health problems.

### For pregnant women

**You can pass CMV to your baby**
If you are pregnant and have CMV, the virus in your blood can cross through your placenta and infect your developing baby. This is more likely to happen if you have a first-time CMV infection while pregnant but can also happen if you have a subsequent infection during pregnancy.

**You are not likely to be tested for CMV**
It is not recommended that doctors routinely test pregnant women for CMV infection. This is because laboratory tests cannot predict which developing babies will become infected with CMV or have long-term health problems.

**You may be able to reduce your risk**
You may be able to lessen your risk of getting CMV by reducing contact with saliva and urine from babies and young children. The saliva and urine of children with CMV have high amounts of the virus. You can avoid getting a child's saliva in your mouth by, for example, not sharing food, utensils, or cups with a child. Also, you should wash your hands after changing diapers. These cannot eliminate your risk of getting CMV, but may lessen the chances of getting it.

### For parents

About 1 out of every 200 babies is born with congenital CMV. About 1 out of 5 of these babies will have birth defects or other long-term health problems.

**Babies with congenital CMV may show signs at birth**
Some signs that a baby might have congenital CMV infection when they are born are:
- Small head size
- Seizures
- Rash
- Liver, spleen, and lung problems

Tests on a baby's saliva, urine, or blood done within two to three weeks after birth can confirm if the baby has congenital CMV.

**Early treatment may help**
Babies who show signs of congenital CMV at birth may be treated with medicines called antivirals. Antivirals may decrease the severity of health problems and hearing loss but should be used with caution due to side effects.

**Long-term health problems may occur**
Babies with signs of congenital CMV at birth are more likely to have long-term health problems, such as:
- hearing loss
- intellectual disability
- vision loss
- seizures
- lack of coordination or weakness

Some babies with congenital CMV but without signs of disease at birth may still have or develop hearing loss. Hearing loss may be present at birth or may develop later in babies who passed their newborn hearing test. Sometimes, hearing loss worsens with age.

**Hearing checks and therapies are recommended**
Children with congenital CMV should have regular hearing checks. Children with hearing loss should receive services such as speech or occupational therapy. These services help ensure they develop language, social, and communication skills.

The earlier your child can get hearing checks and therapies, the more he or she can benefit from them.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

For more information, visit:
www.cdc.gov/cmv

National Center for Immunization and Respiratory Diseases (NCIRD)

08/02/18

https://www.cdc.gov/cmv/fact-sheets/parents-pregnant-women.html