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# **CMV 101: What is Congenital Cytomegalovirus**

**Kathleen M. Muldoon, Ph.D.**

College of Graduate Studies  
Arizona College of Osteopathic Medicine  
Midwestern University

Stop CMV AZ/ ALTO CMV AZ, Co-founder  
National CMV Foundation, Scientific Advisory Committee  
[kmuldo@midwestern.edu](mailto:kmuldo@midwestern.edu)



[www.stopcmvaz.org](http://www.stopcmvaz.org)



# Kathleen Muldoon, PhD

Kathleen M. Muldoon, Ph.D. is an anthropologist and Professor of Anatomy at Midwestern University, Glendale. She is the course developer and director of Humanity in Medicine and the facilitator training course Medical Improv. Through her experiences with disability, she became interested in science communication, and the effectiveness of professional education on public health knowledge, empathy, and humanity in medicine. She has given more than 100 research seminars and outreach workshops nationally and internationally. Her work has been featured on National Public Radio, USA Today, and several podcasts. Dr. Muldoon has served or led the Arizona College of Osteopathic Medicine Curriculum Taskforce on Diversity, as well as a member of several academic and state committees relating to diversity advocacy and disability services. She is a consultant for Moderna and the University of Arizona College of Medicine, Phoenix, and the Chair of the Scientific Advisory Committee at the National CMV Foundation.



# What is CMV?

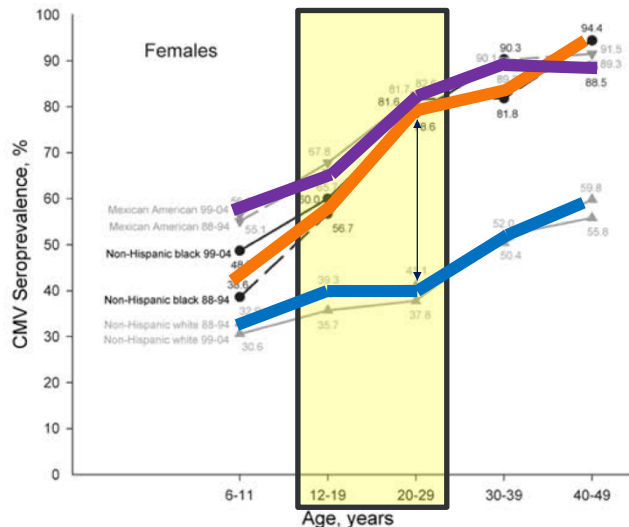
Cytomegalovirus  
(sy·toe·MEG·a·low·vy·rus)

- Common virus that is usually harmless to healthy kids and adults but can cause cold-like symptoms (sore throat, fever, fatigue and swollen glands)
- Most adults have been infected with CMV by the time they are 40 years old
- **Common in children ages 1-3 years old**, especially if they attend day care
- Herpesvirus: Once you are infected, CMV stays in your body in an inactive (latent) state that reactivates (lytic state) throughout your life.

You or your child can have a **hidden infection** with no **signs or symptoms** (*asymptomatic*)

# How common is CMV among women?

- CMV seroprevalence in a population varies by age, ethnicity, and other factors associated with low SES
- disproportionately high risk of primary maternal CMV acquisition & congenital CMV infection in socially disadvantaged communities (Lantos et al 2015, 2017)



Force of Infection / Incidence rate  
(risk per time unit for susceptible  
individuals to acquire a disease)

- general seronegative population = 1.8%/year
- non-Hispanic white = 1.4%/year
- non-Hispanic black = 5.7%/year
- Mexican American = 5.1%/year

Infection rates for seronegative women  
who work in childcare are between  
10-20%/year

# How is CMV transmitted?

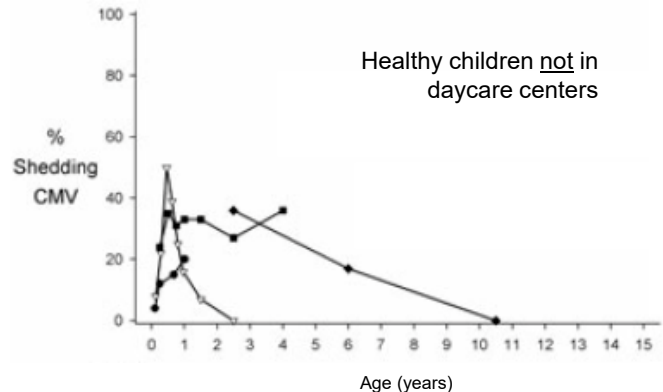
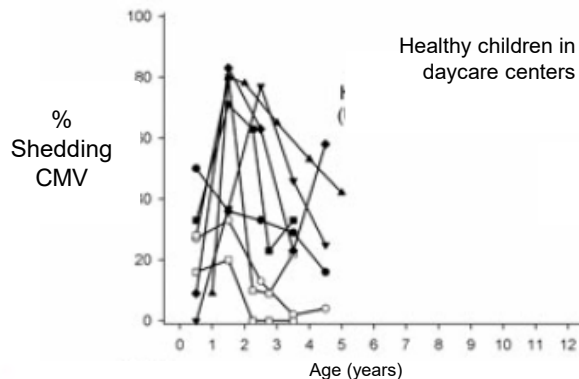
- CMV is spread by **direct close personal contact** with saliva, urine, mucous, tears, blood, and other bodily fluids

examples: kissing on mouth or face

Stowell et al  
(2012, 2014)

- CMV can spread by **indirect contact with virus** on hands and common surfaces

examples: CMV persists on hands and plastics for at least 15 minutes, and food for at least 5 minutes (long enough for transfer to a mucosal surface)



# When does CMV become a concern?

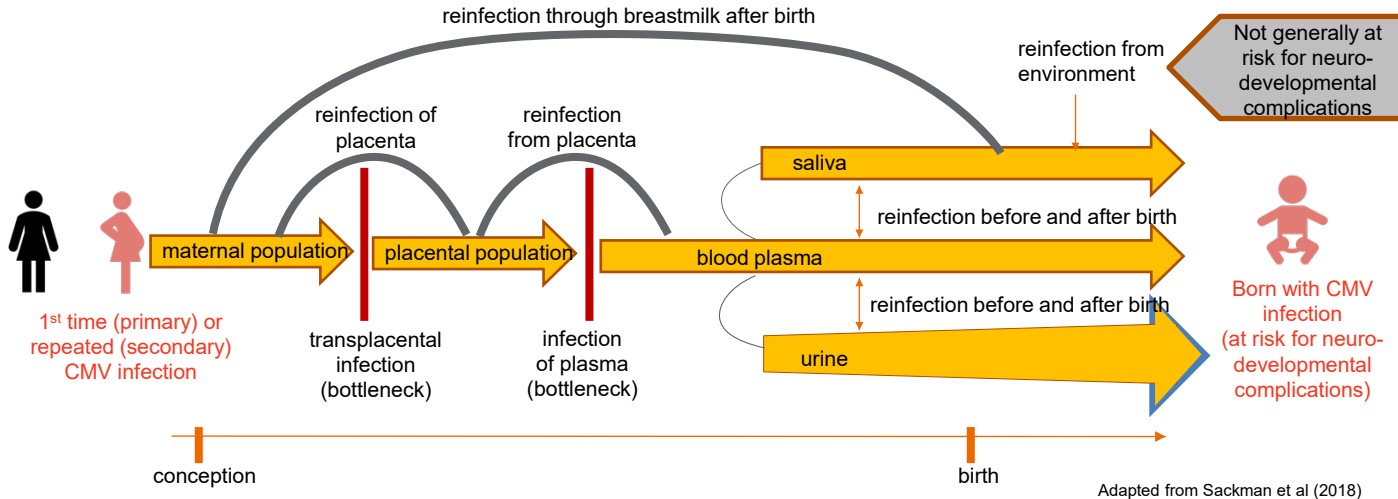
Congenital CMV (cCMV) is when a baby catches CMV before birth

- contact with the **saliva** or **urine** of a young child is a common cause CMV infection in pregnant women
- CMV can **survive on objects** long enough to be transmitted between people by touching surfaces



**CMV is preventable by following universal precautions (especially during pregnancy)  
(wash hands & clean surfaces often, kiss on top of head, use only your own utensils/cups)**

# What is congenital CMV?



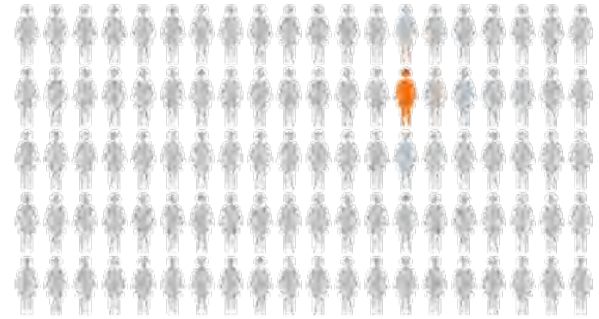
Ways to test for congenital CMV

- CMV antibody testing
  - maternal (blood, urine), before or after conception
- Virus isolation (PCR)
  - fetal (amniotic fluid)
  - newborn (urine, saliva), high sensitivity, **must be done within first 3 weeks of life**
  - after 3 weeks of life (dried blood spot [DBS]), lower sensitivity



CMV is the most common virus that can harm a developing baby during pregnancy

# Congenital CMV is common



**1 out of 200** babies are infected with cCMV every year

**30,000-40,000 babies** in the US, and **400-600 babies** in AZ are infected with cCMV every year.

# Congenital CMV is serious

**1 in 5**  
babies infected with cCMV  
will have  
**lifelong disabilities**



even if they have  
**NO signs**  
of infection at birth.

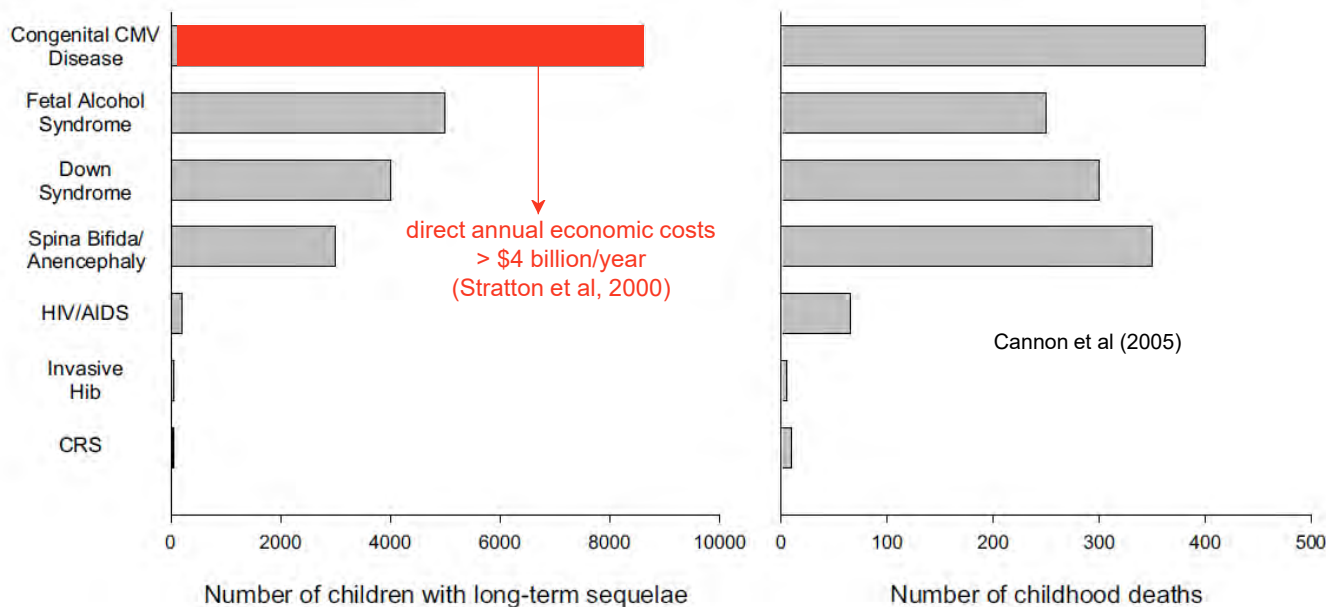


**6,000-8,000 babies** in the US  
and  
**120 babies** in AZ

per year

will have CMV-related, serious, life-  
long health conditions.

# Congenital CMV is serious



# Babies born with cCMV may have lifelong disabilities

Born with symptoms of being sick  
(10% of babies born infected with  
cCMV)

Born with NO symptoms of being sick  
(90% of babies born infected with cCMV;  
of these 10-15% will develop long-term  
disability)

## Death

Miscarriage,  
Stillbirth,  
Infant or  
child loss

## Medically Complex

Cerebral palsy,  
Seizures,  
Failure to thrive,  
Hearing  
differences,  
differences,  
Vision difference

## Multiple disabilities

Cerebral palsy,  
Hearing  
differences,  
Vision  
differences

## Developmental Delays

Cognitive delays,  
Learning  
difficulties,  
Feeding/sleeping  
issues,  
Vision differences,  
Hearing differences

## Deaf

Hearing  
differences,  
Communication  
and learning  
differences,  
Vision  
differences

## None

No apparent  
developmental  
differences or  
disabilities

Severe

Moderate

Mild

## cCMV is a leading cause of deafness

even in babies  
born WITHOUT  
symptoms.



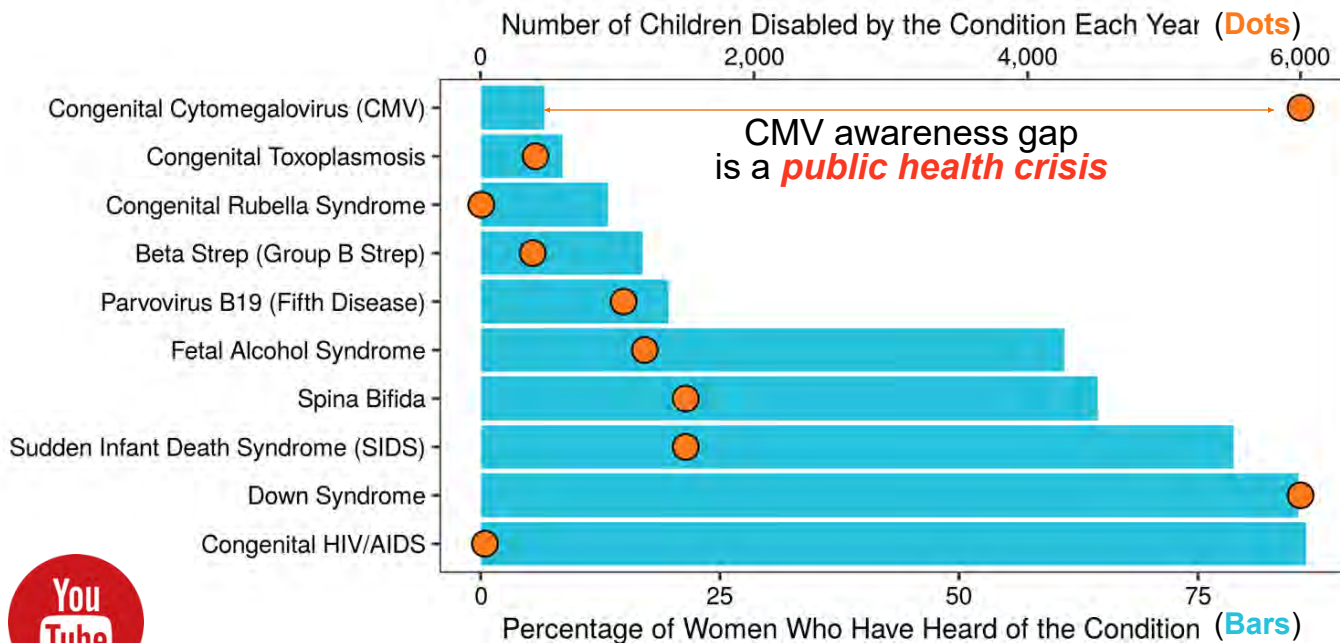
**Hearing differences** (deafness) can be present at birth and hearing thresholds can change later in childhood.

Babies with cCMV may have hearing differences in one ear (unilaterally deaf or hard of hearing [D/HH] ) and may later develop hearing differences in the other ear (bilateral).

Children born with cCMV  
(with or without a demonstrated hearing difference)  
benefit from services and monitoring  
by a **health care team**.



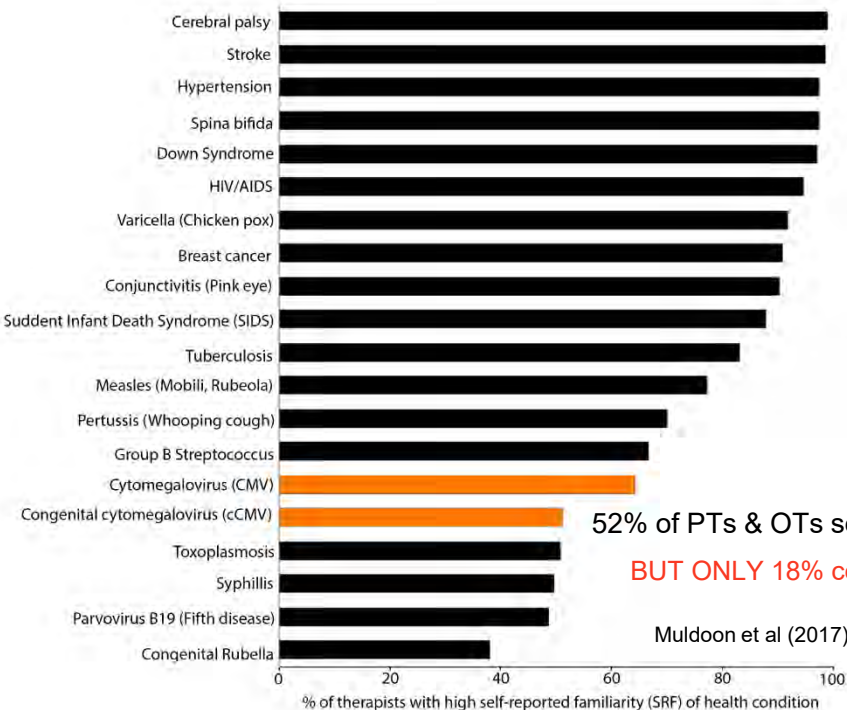
## Awareness vs Incidence of Congenital Conditions



CMV Awareness Gap

Based on US data from Doutré SM *et al.* (2016) Losing Ground: Awareness of Congenital Cytomegalovirus in the United States. *Journal of Early Hearing Detection and Intervention* 1:39-48. Chart by Artful Analytics, LLC (@\_sethdobson). For more information, visit [nationalcmv.org](http://nationalcmv.org).

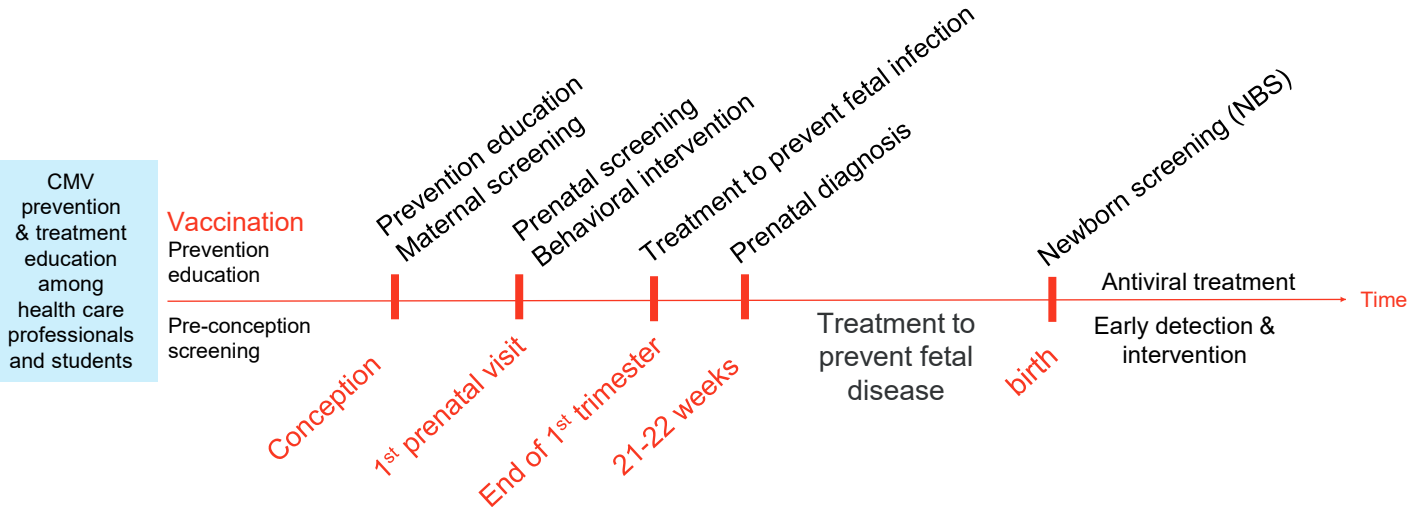
# CMV Awareness Gap in health care professionals



Jeon et al (2006)  
 Pereboom et al (2013)  
 Muldoon & Dobson (2018)  
 Muldoon & Pesch (2022)  
 Muldoon et al (in press)  
 etc etc



## Clinical treatment and public health interventions for cCMV



**Currently, none of these interventions are routine in the US**

In 1999, the government ranked a congenital CMV vaccine as a top priority for research and industry.

# Status of a CMV vaccine

moderna

Clinical trial now recruiting

- ☐ CMV vaccine in healthy women 16-40 years of age several states, including Phoenix, Tempe, Peoria AZ
- ☐ 30 months, compensated

Moderna TX ID

mRNA-1647-P301

Clinicaltrials.gov ID

NCT05085366

EudraCT ID

2020-006051-17



<https://cmvictory.com/>



**Nix, M. (2023). *Remedies for sorrow: An extraordinary child, a secret kept from pregnant women, and a mother's pursuit of the truth.* Doubleday.**

# Congenital CMV is preventable.

CMV can **survive on objects**,

such as hands, faces, toys, pacifiers, teething rings, food, plates, cups, straws, forks, spoons, and knives

long enough to be **transmitted between people by touching surfaces**.

**Taking these actions while pregnant will protect your baby from ALL germs:**



**Wash hands often**  
with soap & water,  
especially after changing  
diapers, wiping faces,  
or touching objects  
that have been drooled on.



**Give hugs  
& kisses on the  
forehead or  
top of head to  
avoid drool.**



**Clean and disinfect  
surfaces  
& objects,  
such as toys,  
often.**



**Eat only your  
own  
food & drink.**



**Use only your  
own  
cup, plate,  
straws, forks,  
spoons & knives.**



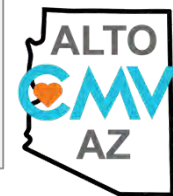
**Use only your  
own  
toothbrush.**



**YOU** can **prevent cCMV** from affecting someone you love by practicing healthy pregnancy tips to **avoid ALL GERMS**



**Kathleen M. Muldoon**  
[kmuldo@midwestern.edu](mailto:kmuldo@midwestern.edu)  
[stopcmvaz.org](http://stopcmvaz.org)  
[altocmvaz.org](http://altocmvaz.org)



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