

# *Just the Facts-* COVID-19 and Maternal & Infant Health

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# SARS-CoV-2

- Coronaviruses are single stranded non-segmented RNA viruses
- Causes severe respiratory illness along with other complications including cardiac, hematological, and neurological complications



# Physiology

- Pregnant women are more susceptible to microbial infections
- Down regulation of pro-inflammatory cells alter the physiological milieu
  - Shift in the inflammatory cell cascade contributes to overall infectious morbidity
- Jamieson et al.2006; Haake et al.1990; Harris 1919; Jamieson et. al. 2009, Rasmussen et al. 2012; Silasi et al 2015



MMWR: June 26, 2020

## Hospitalized pregnant vs. non-pregnant

- 5.4 x more likely to be hospitalized
- 1.5 x more likely to be admitted to ICU
- 1.7 x more likely to receive ventilation
- Black or Hispanic disproportionately affected by SARS-CoV-2



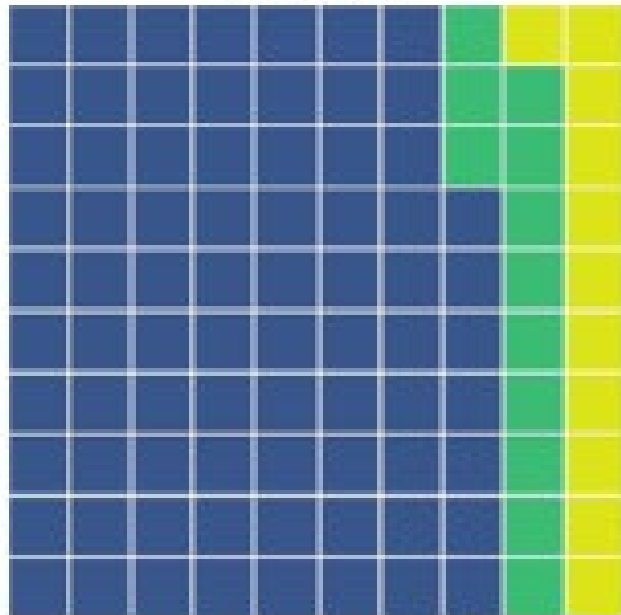


OPEN

# SARS-CoV-2 infection and COVID-19 vaccination rates in pregnant women in Scotland

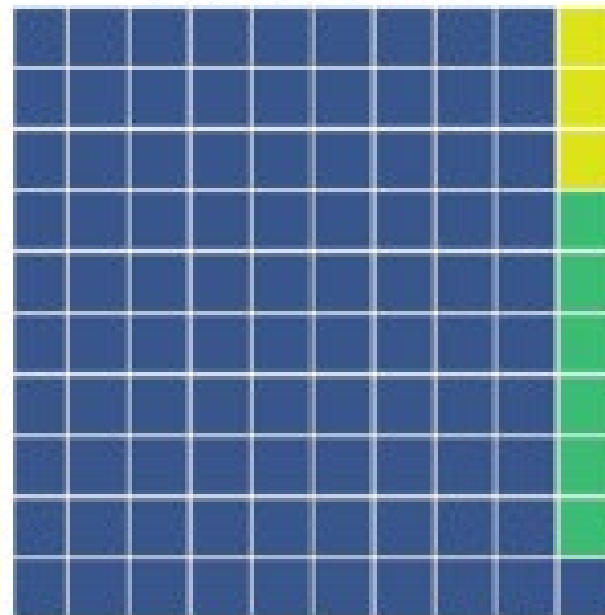
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Percentage SARS-CoV-2  
infections



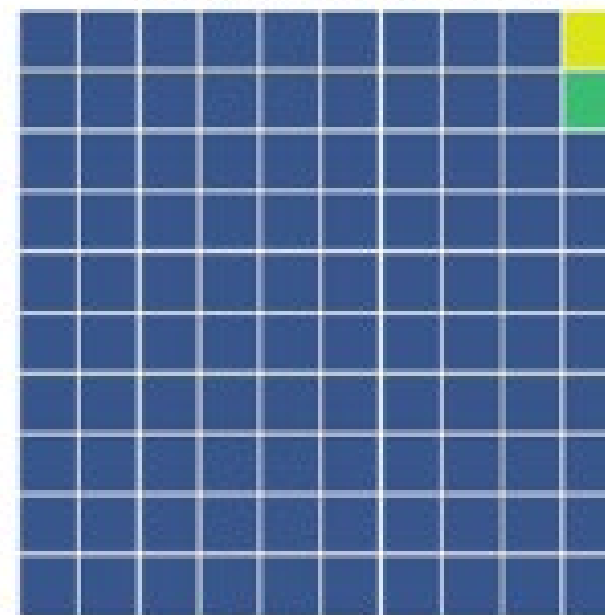
$n = 4,950$  infections

Percentage SARS-CoV-2  
infections with  
hospital admission



$n = 823$  admissions

Percentage SARS-CoV-2  
infections with  
critical care admission



$n = 103$  admissions

■ Unvaccinated  
■ Partially vaccinated  
■ Fully vaccinated

Data on the association between  
COVID-19 in pregnancy and  
stillbirth are emerging



# Hospitalized pregnant women with COVID-19 can have severe illness

About half of hospitalized pregnant women with COVID-19 had symptoms



Some hospitalized pregnant women who had symptoms had severe outcomes, including

ICU admission

Mechanical ventilation

Death

Slow the spread and protect yourself from COVID-19 during pregnancy



**Wear a mask when out in public**



**Stay 6 feet apart**



**Wash hands**



**Continue receiving prenatal care**

COVID-19-Associated Hospitalization Surveillance Network (COVID-NET) among 13 states  
Vaccine Safety Datalink (VSD) surveillance of COVID-19 hospitalizations among eight healthcare centers

**CDC.GOV**

**MMWR**

# Underlying Conditions

## COVID-19 ASSOCIATED HOSPITALIZATION RELATED TO UNDERLYING MEDICAL CONDITIONS

### FACTORS THAT INCREASE COMMUNITY SPREAD AND INDIVIDUAL RISK



CROWDED  
SITUATIONS



CLOSE / PHYSICAL  
CONTACT

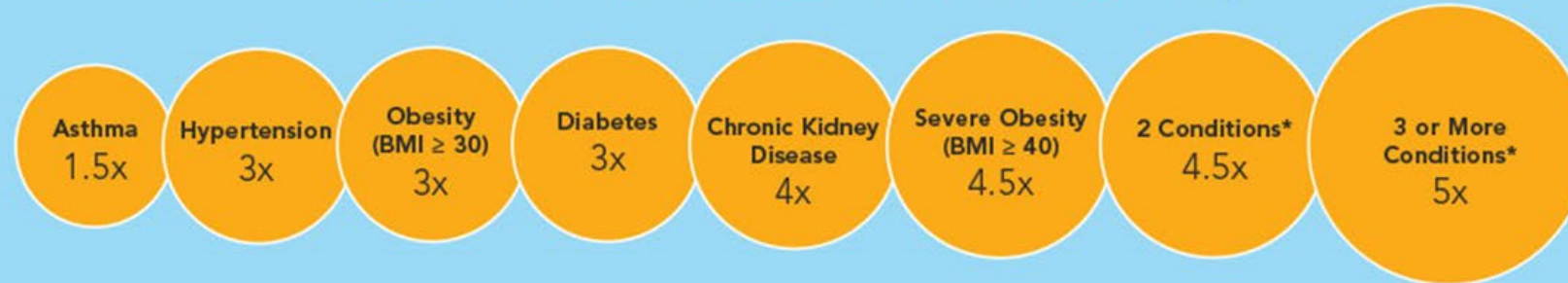


ENCLOSED SPACE



DURATION  
OF EXPOSURE

RISK FOR HOSPITALIZATION IF YOU HAVE ANY OF THESE CONDITIONS AND  
GET COVID-19 COMPARED TO PEOPLE WITHOUT THE CONDITION(S).



Data has shown that racial and ethnic minority groups with the referenced conditions are at even higher risk for severe COVID-19 illness. Race and ethnicity are risk markers for other underlying conditions that impact health — including socioeconomic status, access to health care, and increased exposure to the virus due to occupation (e.g., frontline, essential, and critical infrastructure workers).

\*Conditions include asthma, obesity, diabetes, chronic kidney disease, severe obesity, coronary artery disease, history of stroke and COPD.

### ACTIONS TO REDUCE RISK OF COVID-19



WEARING A MASK



SOCIAL DISTANCING  
(6 FT GOAL)



HAND HYGIENE



CLEANING AND  
DISINFECTION



ALTHOUGH RISK GENERALLY INCREASES WITH AGE, ALL INDIVIDUALS SHOULD ROUTINELY TAKE ACTIONS TO REDUCE RISK OF INFECTION AND AVOID ACTIVITIES THAT INCREASE COMMUNITY SPREAD.

[cdc.gov/coronavirus](https://cdc.gov/coronavirus)

Source: Ko JY, Danielson ML, Town M et al. 2020.

# Underlying Conditions

## Increased risk severe COVID illness

- Cancer
- Chronic kidney disease
- Chronic obstructive pulmonary disease
- Down Syndrome
- Heart conditions, such as heart failure, coronary artery disease, or cardiomyopathies
- Immunocompromised state (weakened immune system) from solid organ transplant
- Obesity BMI  $\geq 30$  kg/m<sup>2</sup>
- Pregnancy
- Sickle cell disease
- Smoking
- Type 2 diabetes mellitus

## Possibly increased risk

- Asthma (moderate-to-severe)
- Cerebrovascular disease
- Cystic fibrosis
- Hypertension or high blood pressure
- Neurologic conditions, such as dementia
- Liver disease
- Overweight (BMI  $> 25$  kg/m<sup>2</sup>)
- Pulmonary fibrosis (having damaged or scarred lung tissues)
- Thalassemia (a type of blood disorder)
- Type 1 diabetes mellitus



# Risk of Stillbirth Among Women With and Without COVID-19 at Delivery

## March 2020-September 2021

- The adjusted risk for stillbirth was higher in deliveries with COVID-19 compared with deliveries without COVID-19
  - COVID-19 documented at delivery was associated with increased risk for stillbirth, with a stronger association during the period of Delta variant predominance
- MMWR/Nov 26,2021



# COVID-19 Vaccine during Pregnancy: Preterm, or SGA (Dec15-2020-July 2021)

- CDC recommends vaccination for women who are pregnant, recently pregnant and lactating, who are trying to get pregnant now, or who might become pregnant in the future
- COVID-19 vaccination during pregnancy was not associated with preterm birth or small for gestational age at birth (SGA)

- MMWR/January 7,2022

# Women Societies agree with CDC

- COVID-19 vaccines strongly recommended for pregnant and lactating individuals
- They do not increase risk of infertility, 1<sup>st</sup> or 2<sup>nd</sup> tri miscarriage, stillbirth or congenital anomalies



# Education: How do Vaccines Work?

S. Jain, A. Venkataraman, M.E. Wechsler et al.

Advanced Drug Delivery Reviews 179 (2021) 114000

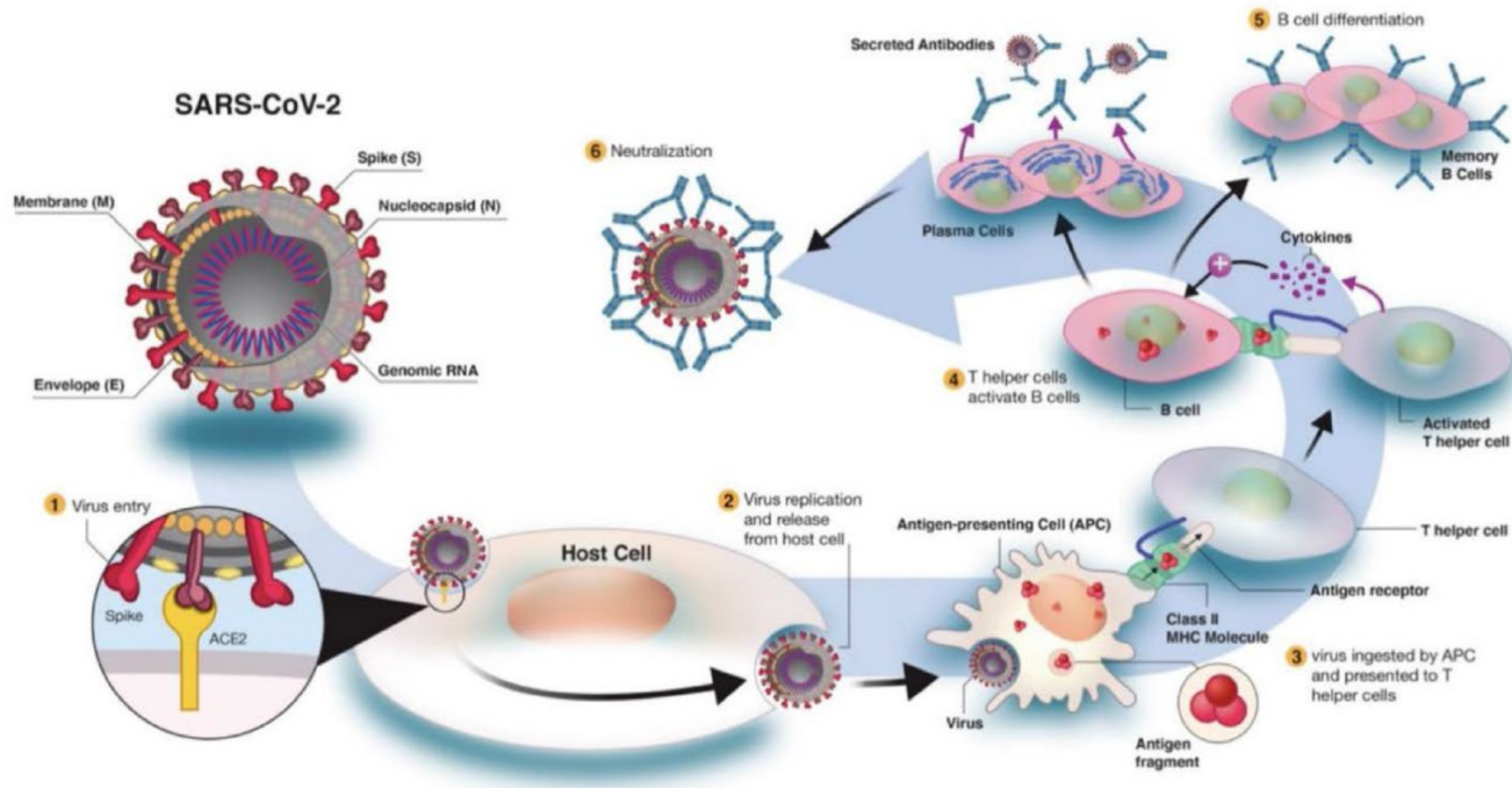


Fig. 4. Cellular mechanism of immune activation. Reproduced from Ghaffari et al., 2020. [57] (1) The SARS-CoV-2 virus enters the host cell via interaction between viral spike proteins and host cell surface receptor, angiotensin-converting enzyme 2 (ACE2) receptor. (2-3) Following replication and release from the host cell, the virus will be engulfed and digested

mRNA vaccine is not a live vaccine but **teaches** our cells to make harmless piece of a “spike protein” which is found on the surface of the “RNA virus”

This is how the body is protected and this protection wanes over time

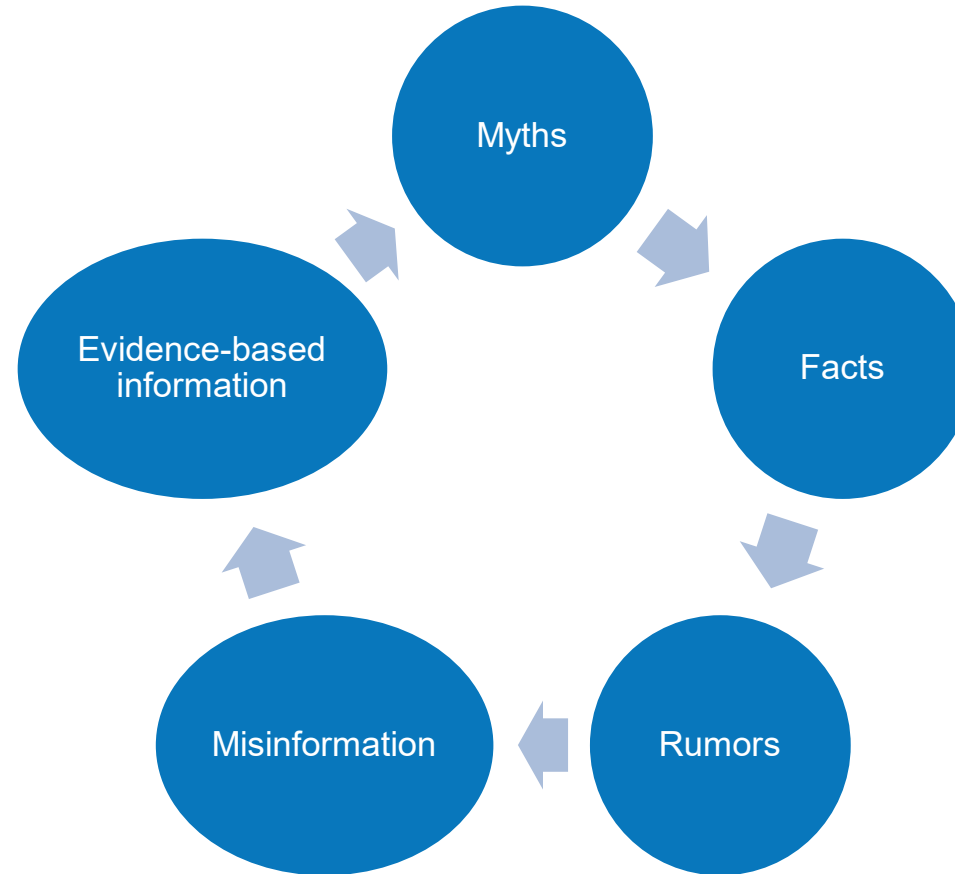
After making the protein, our cells display it on their surface, **our immune system** then recognize that it does not belong there and respond to get rid of it

This is what is seen in vaccine & natural immunity when the real virus “spike protein” is seen by our immune system. Remember, not everyone’s immune system is strong. some have underlying condition or weakened immunity

When our immune system responds, antibodies are produced

# Vaccines

- Myths
- Facts
- Rumors
- Misinformation



# How mRNA vaccines work

## Researchers Publish Encouraging Early Data on COVID-19 Vaccine

Posted on July 16th, 2020 by Dr. Francis Collins

Carry genetic information to manufacture the spike protein of SARS-COV-2 (protein on virus surface)

Injected into muscle

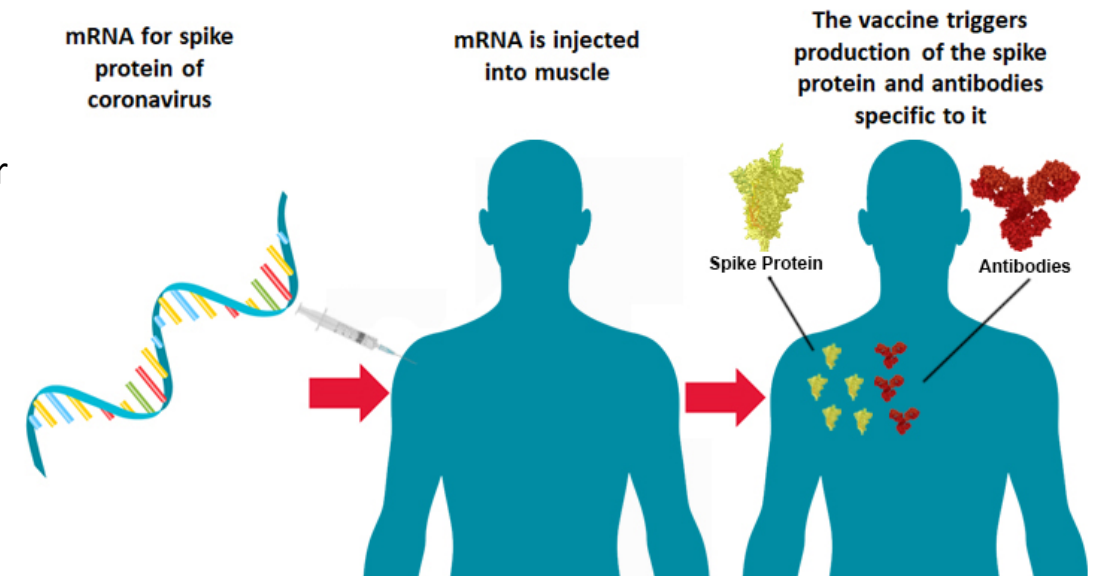
Cells manufacture spike protein

Spike protein recognized by immune system

mRNA rapid degraded (within days), removed by lymphatic system and never enters nucleus or integrated into cell DNA

Given how mRNA vaccines act locally (at the site of injection) and are rapidly degraded and removed by lymphatic system, it is unlikely that the vaccine would reach and cross the placenta

Buzzword  
spike protein



Credit: NIH

# Side effects of vaccines

Table 1. Mild Side Effects Among All Study Participants\*

	Injection Site Reactions	Fatigue	Chills	Muscle Pain	Joint Pain	Headaches
Moderna	91.6%	68.5%	43.4%	59.6%	44.8%	63%
Pfizer-BioNTech	84.10%	62.90%	31.90%	38.30%	23.60%	55.10%
Janssen Biotech Inc.	48.6%	38.2%	N/A	33.2%	N/A	38.9%

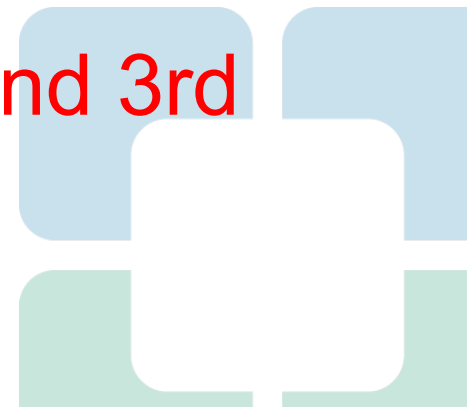
*\*Fever was the least common side effect reported; see text above for data on frequency of fever*

<https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2020/12/vaccinating-pregnant-and-lactating-patients-against-covid-19>



# Fertility: Myth vs. Facts

- Does not affect fertility in men or women
  - Multiple studies have looked at semen parameters in IVF clinics in men who received the mRNA vaccine and found no difference
  - Multiple studies have shown no increase in miscarriage, Low birth weight, PTB or poor obstetric history with vaccination
    - Although majority were vaccinated in 2nd and 3rd tri. Best time for vaccine is NOW!



# Transfer of immunity via placenta and breastmilk

PROTECT YOUR BABY



# Maternal-neonatal transfer of SARS-CoV-2 immunoglobulin G antibodies among parturient women treated with BNT162b2 messenger RNA vaccine during pregnancy

## Placental Transfer

Cord and neonatal blood spot levels of antibodies were significantly higher in infants of vaccinated women than in those of women recovered from COVID-19

TABLE 2

Serology for COVID-19—specific antibodies

Samples	BNT162b2 mRNA vaccinated women (n=64)	COVID-19 recovered women (n=11)	P value
Maternal serum IgG	26.1 (22.0–39.7)	2.6 (0.9–3.5)	<.0001
Neonatal cord blood	20.2 (12.7–29.0)	3.27 (0.5–4.6)	<.0001
DBS <sup>a</sup>	11.0 (7.2–12.8)	N/A	
Breastmilk IgG <sup>b</sup>	4.9 (3.8–6.0)	N/A	

Data are presented as median (interquartile range).

DBS, dried blood spot; IgG, immunoglobulin G; mRNA, messenger RNA; N/A, not applicable.

<sup>a</sup> Neonatal DBS samples (n=55); <sup>b</sup> Breastmilk samples (n=30).

Nir. Maternal-neonatal SARS-CoV-2 immunoglobulin G antibodies transfer following vaccination of pregnant women. *Am J Obstet Gynecol MFM* 2021.

# Benefits to Newborn

- Pregnant and lactating women elicited comparable vaccine induced humoral immune responses to non-pregnant controls, and generated higher antibody titers than those observed following SARS-CoV-2 infection in pregnancy.
- Vaccine-generated antibodies were present in umbilical cord blood and breastmilk after maternal vaccination



# Benefits to Newborn

- COVID-19 vaccination confers a robust humoral response in pregnant and lactating women and immune transfer to neonates via placenta and breastmilk.



# Menstruation: Myth Vs Facts

- Women receiving one dose of a COVID-19 vaccine during a single menstrual cycle had an increase in cycle length of nearly one day, compared to unvaccinated women.
- The increase in cycle length- a longer time between bleeding-was not associated with any change in the number of days of menses (days of bleeding).
  - According to the authors, the increase they saw was well within the range of normal variability. They added that additional research is needed to
- Edelman, A. et al. Determining the impact of COVID-19 vaccination on the menstrual cycle: a U.S. cohort. Obstetrics & Gynecology. DOI:10.1097 (2022)



# Boosters

- Observation of up to 6 months in the vaccinated with mRNA vaccine showed a decline in efficacy estimated at a rate of approx. 6% every 2 months, with 84% efficacy 4-6 months after the 2<sup>nd</sup> dose.
  - Administration of booster dose effectively recalls specific immune response of SARS-CoV-2 and increases serum antibody levels

# Boosters

- This response likely restores the initial and considerable levels of protection against infection, **even for the more highly transmissible variants**

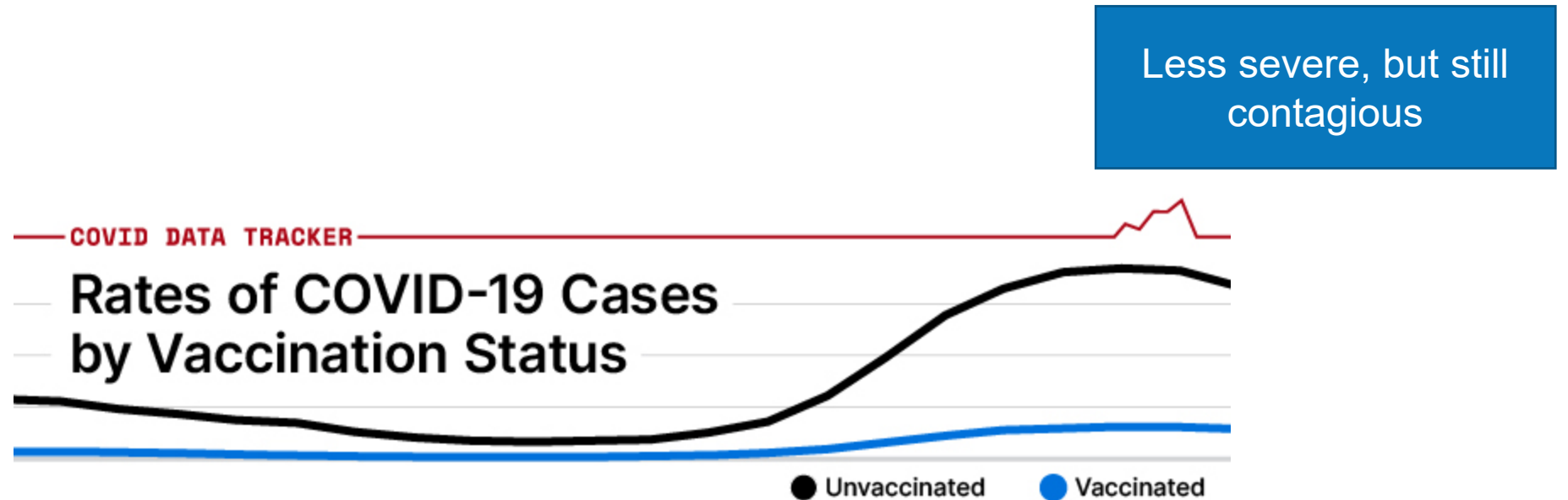


# Boosters

- Even among the un-boosted vaccinated group, protection against severe disease after initial vaccination regimen remain high
  - Preferred Boosters are mRNA vaccines
  - You can Mix and Match



# Vaccine Breakthrough Infections



# Bust the Myths

- Natural immunity is better
  - Vaccine is safer and more dependable. One study showed that people who recovered from COVID-19 and did not get vaccinated are more than 2 times more likely to get COVID again than those who recovered and got fully vaccinated
  - Natural immunity depends on age, severity of illness, how remote the last infection





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