COVID-19 and Vaccine Q/A

Taison D. Bell, MD, MBA

About me

- Internal Medicine, Critical Care, and Infectious Disease certified physician at the University of Virginia
- Director of UVA Medical ICU
- Co-founder Owl Peal Labs
- Heavily involved in COVID-19 community education, patient care, vaccine rollout coordination
- Training background: Columbia Medical School, Mass General Hospital, Brigham and Women's Hospital, National Institutes of Health

Taison D. Bell, MD, MBA

@TaisonBell

What Keeps Me Going

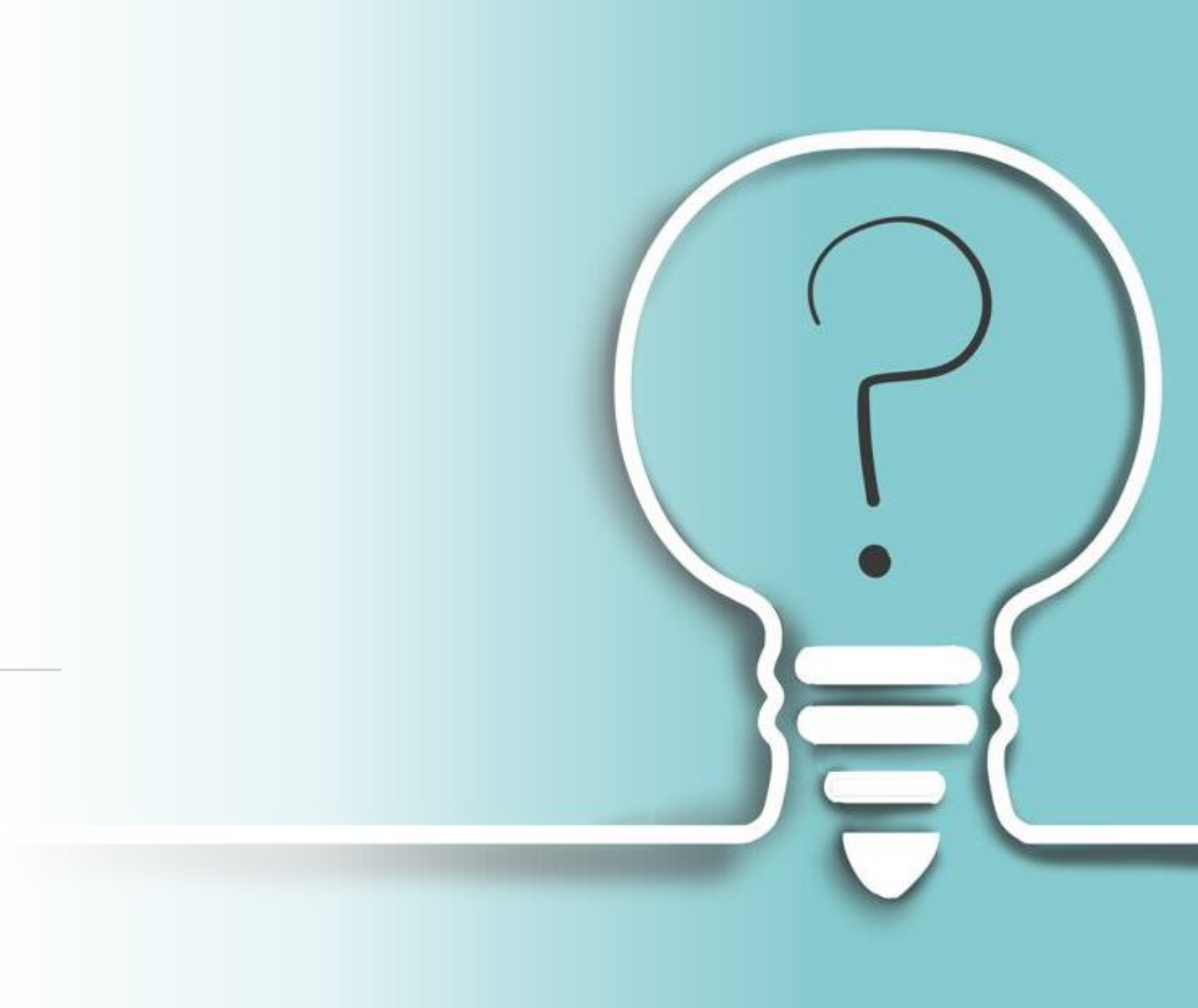
What I don’t do

- I’m not paid in any way by pharmaceutical companies
- I don’t speak for the State or Federal Government

My goal with you

- You should leave this session feeling like you understand COVID-19 and vaccination better than when you entered
- Present easily digestible information, avoid medical jargon
- Be honest. If I don't know something I'll freely admit it
- Give my personal take on the public health guidance
- I cannot give specific medical advice. But I will provide the same general advice that I have/would advise for my own friends and family

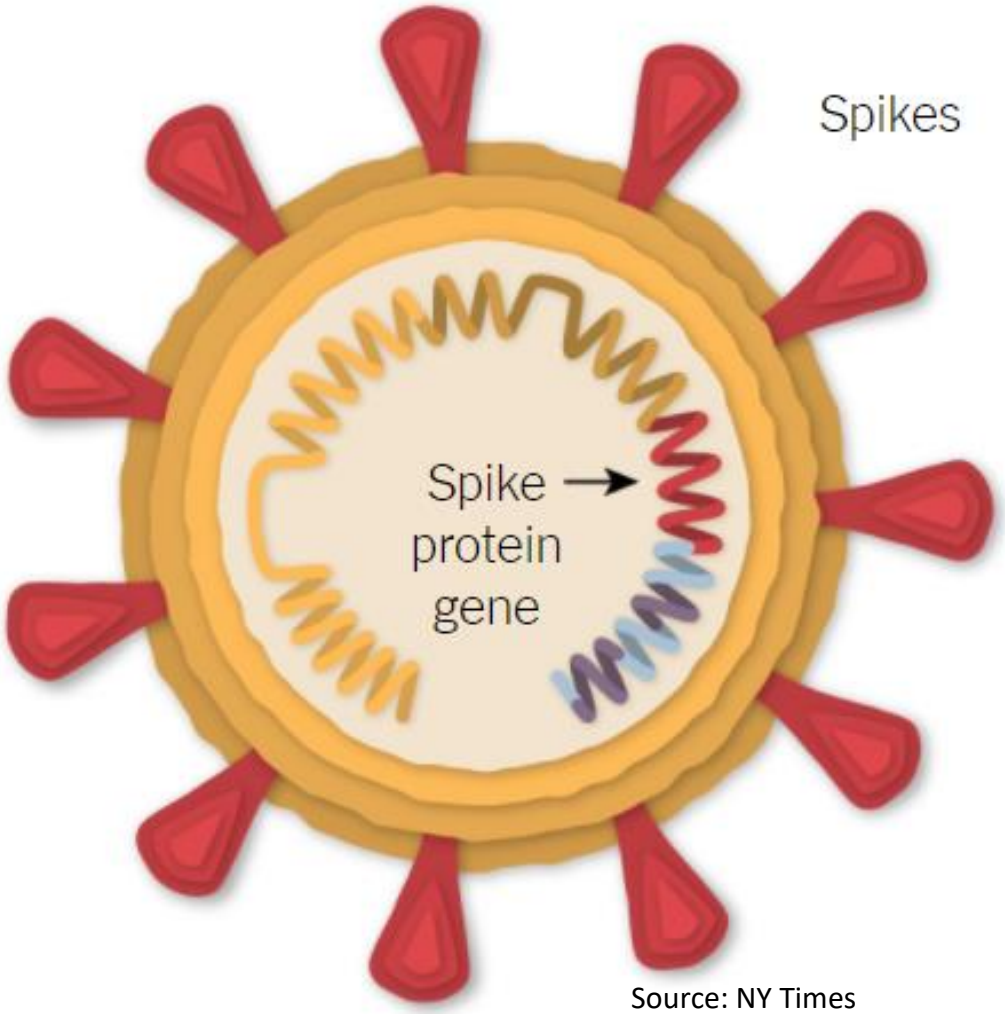
Questions



Background on the Vaccines

- What's the difference between the Pfizer, Moderna, and J&J vaccines?
- Why do the vaccines have side effects?
- How in the world were we able to get these vaccines so quickly compared to other vaccines?

The Basics: The Coronavirus



Source: NY Times

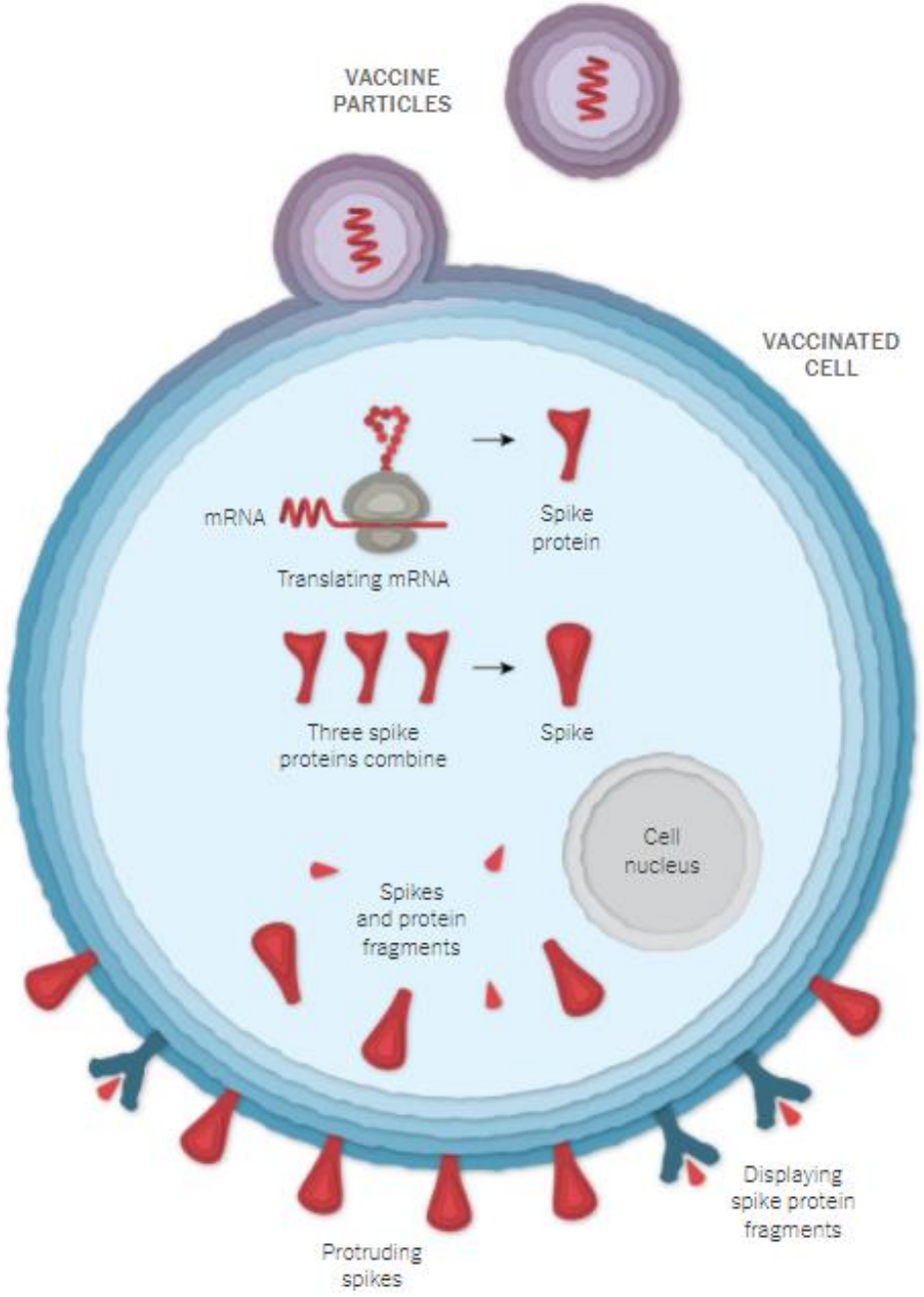
- The coronavirus has RNA genes that allow it to copy itself and reproduce
  - Sometimes mistakes are made when the copying happens. These are called "variants"
- The spike protein is what allows the coronavirus to enter our cells and cause damage
- Spike protein sticks to our cells like a lock and key

Taison D. Bell, MD, MBA

@TaisonBell

The mRNA Vaccines

- The Pfizer/Moderna vaccines contains the messenger RNA to make just the spike protein
- Not live: they do not give you COVID-19
- Your body recognizes that the spike protein is a stranger and “presents” it to your immune system



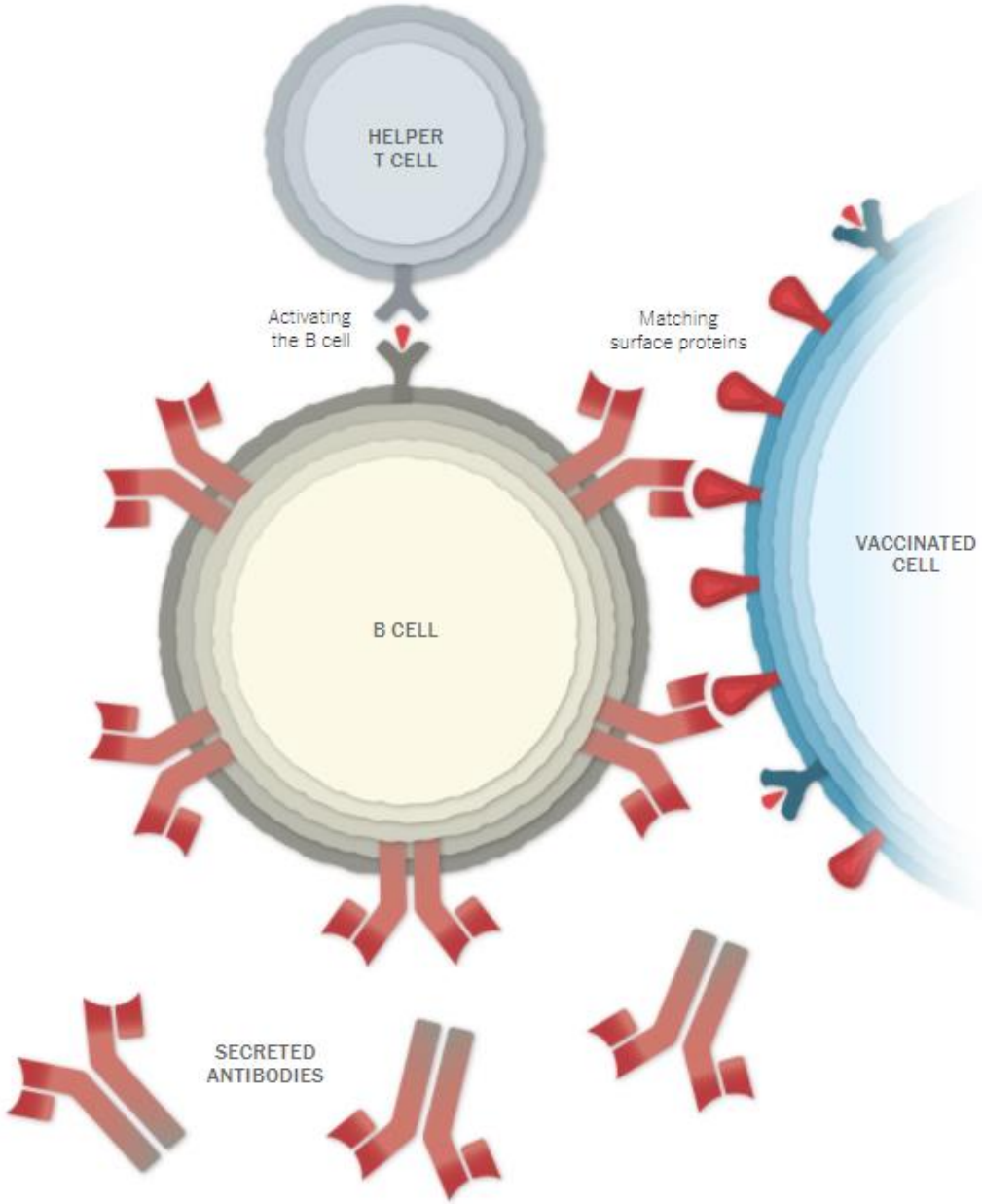
Taison D. Bell, MD, MBA

@TaisonBell

Your immune response

- Your immune system creates special proteins called antibodies that recognize the spike protein

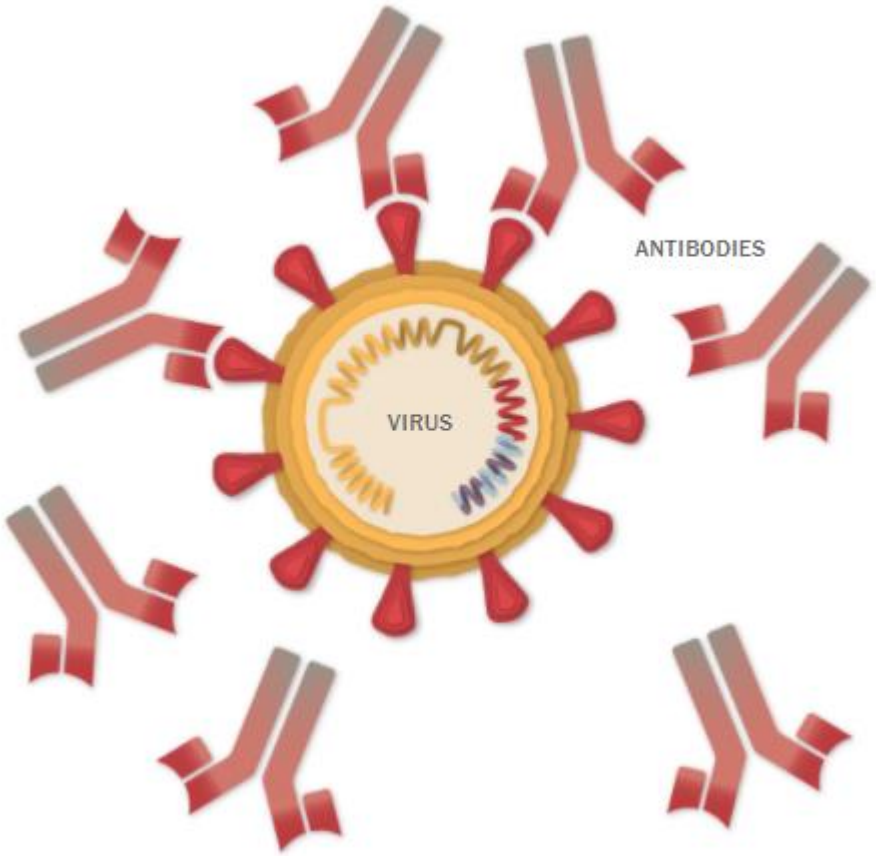
- The antibodies allow your immune system to recognize the coronavirus much quicker if you are exposed



Taison D. Bell, MD, MBA

@TaisonBell

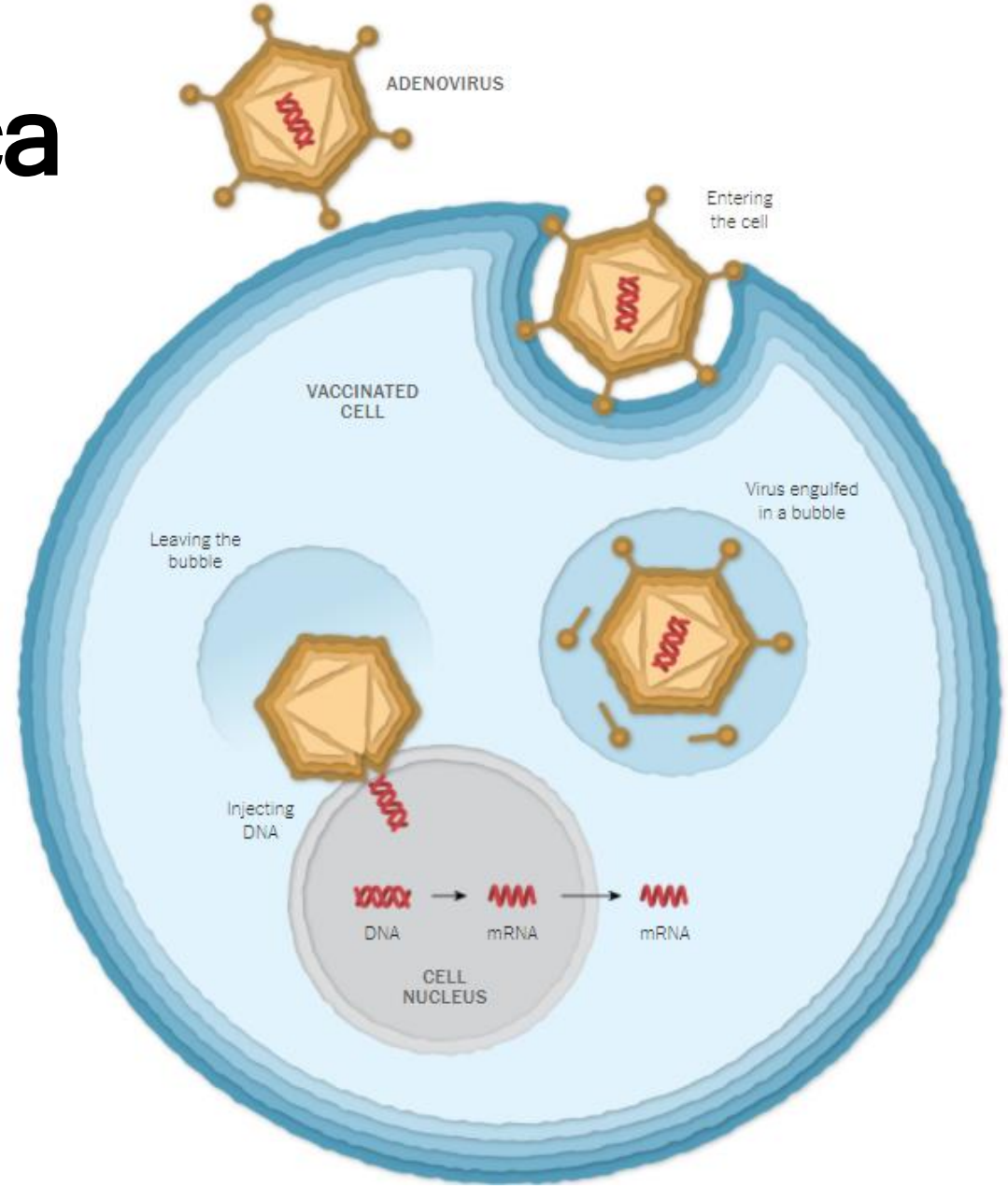
Coronavirus is stopped!



- The antibodies block the coronavirus from entering the cells
- The antibodies can also recognize infected cells much sooner
- You do not become dangerously ill

J&J and AstraZeneca

- A harmless cold virus uses a DNA message to teach your body to make the spike protein
- Not live SARS-CoV-2: They do not give you COVID-19
- DNA is changed into mRNA → spike protein
- Different vehicle, same destination



Taison D. Bell, MD, MBA

@TaisonBell

Will the vaccine change my DNA?

- The vaccine mRNA or DNA does not mix with your own DNA
- The ingredients in the vaccine get broken down very quickly after entering the body
- Less concern for long term side effects

@TaisonBell

Are there any _____ in the vaccine?

The vaccines **do not** contain:

- Coronavirus, HIV, hepatitis
- Luciferase/bioluminescent material
- Microchips or tracking technology
- Material from aborted fetuses

Taison D. Bell, MD, MBA

Which is the “best” vaccine?

94% efficacy

95% efficacy

76% efficacy

66% efficacy

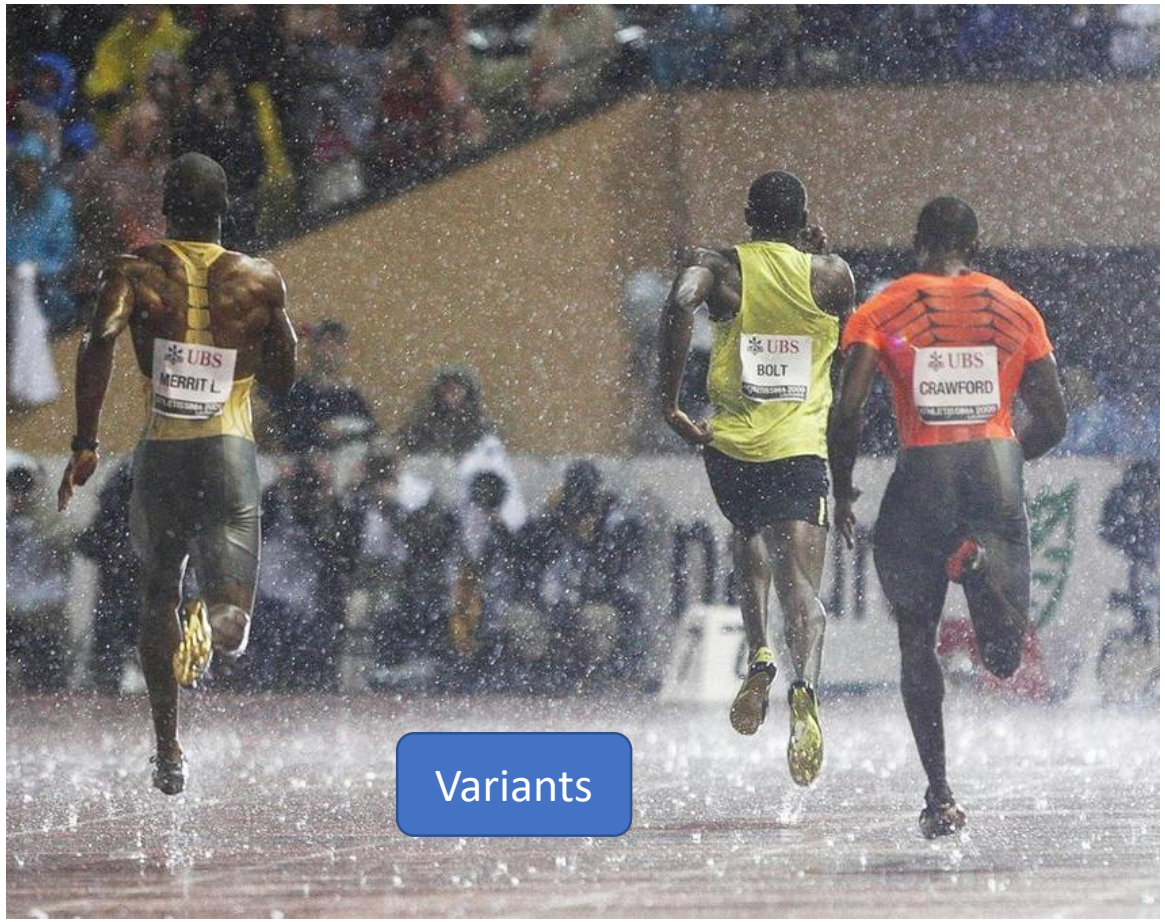
A Closer Look at J&J

- Lower efficacy of the J&J vaccine compared to Pfizer/Moderna is very misleading
  - Pfizer/Moderna trial happened before variants were an issue
  - Pfizer and Moderna have booster shots (J&J is testing a 2-shot regimen)

Efficacy of Johnson & Johnson Single-Shot Janssen COVID-19 Vaccine
Phase 3 ENSEMBLE Trial

	Moderate & Severe (28 days)	Severe (28 days)	Severe (>49 days)
US	72% ⬇️	85% ⬇️ (100% ⬇️ death)	100% ⬇️
Latin America	66% ⬇️		
South Africa (95% B.1.351 variant)	57% ⬇️		

Hard to say which vaccine is “better”



Taison D. Bell, MD, MBA

@TaisonBell

Protection from death and hospitalization

100% protection

100% protection

100% protection

100% protection

The Variants of Concern and Interest

Variants of concern

Lineage	Variant name	Status
B.1.1.7	Variant of Concern 202012/01, or 501Y.V1	Emerged in Britain in December and thought to be roughly 50 percent more infectious. Now dominant in the U.S.
B.1.351	501Y.V2	Emerged in South Africa in December. Reduces the effectiveness of some vaccines.
P.1	501Y.V3	Emerged in Brazil in late 2020. Has mutations similar to B.1.351.
B.1.427, B.1.429	CAL.20C	Common in California and thought to be about 20 percent more infectious. Carries the L452R mutation.

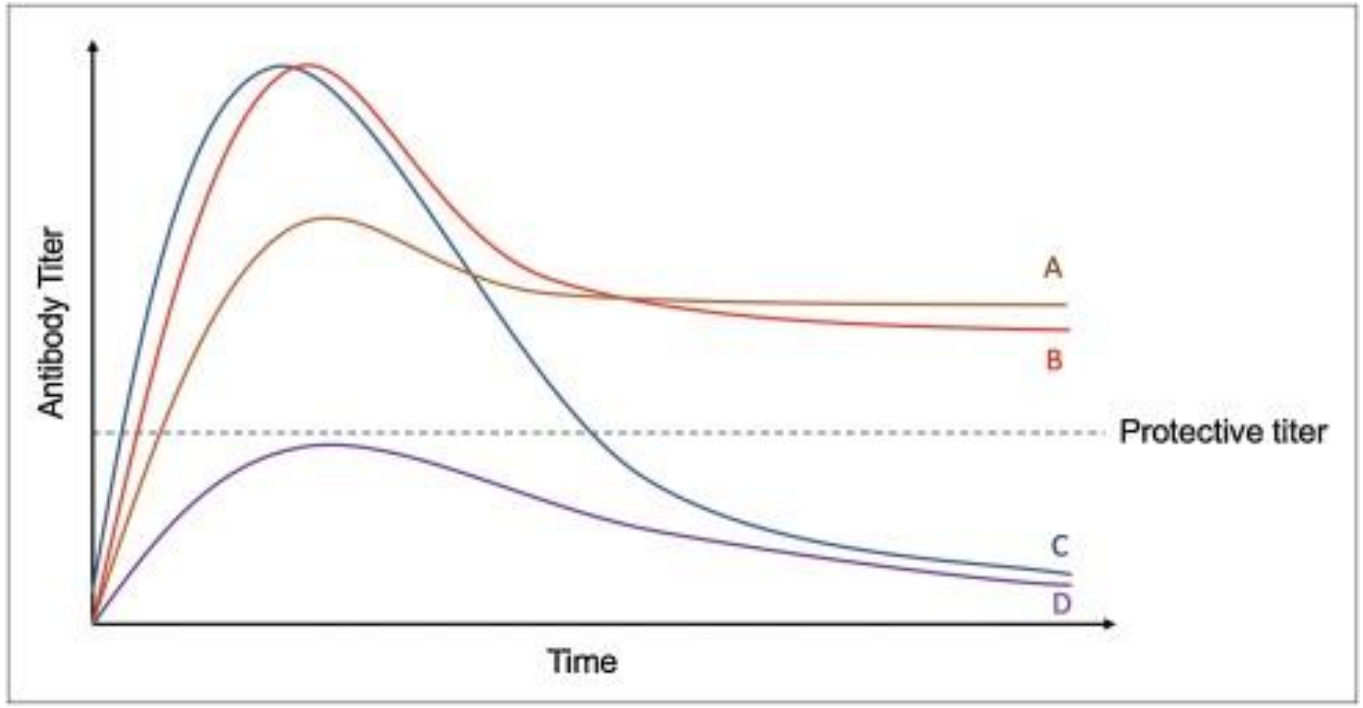
Variants of interest

Lineage	Variant name	Status
B.1.525	—	Spreading in New York. Carries some of the same mutations as B.1.1.7.
B.1.526	—	Spreading in New York. One version carries the E484K mutation, another carries S477N.
B.1.617	—	Prevalent in India. Carries the L452R spike mutation, among others.

Source: NY Times

So Far So Good

- Vaccines all show protection against hospitalization and death from the known variants
- B.1351 has shown potential to cause vaccines to be less effective (but still protective)
  - Israel pre-print showing potential “breakthrough.” I’m not convinced yet
  - 6 month Pfizer phase 3 follow up shows good protection
- NEJM Study of 417 vaccinated students and employees of Rockefeller University: only two breakthrough infections (72% isolates = variants)
- Possibility that we may need a booster or an update



Source: Seminars in Immunology Vol 50, August 2020, 101422

Taison D. Bell, MD, MBA

@TaisonBell

How do we have these vaccines so quickly?

When producing something, you get to have two of the following three things:

Good | Cheap | Fast

So if you make something that is:

Fast | Cheap | ~~Good~~

Most Vaccines

If you make something that is:

Cheap | Good | ~~Fast~~

COVID-19 Vaccines

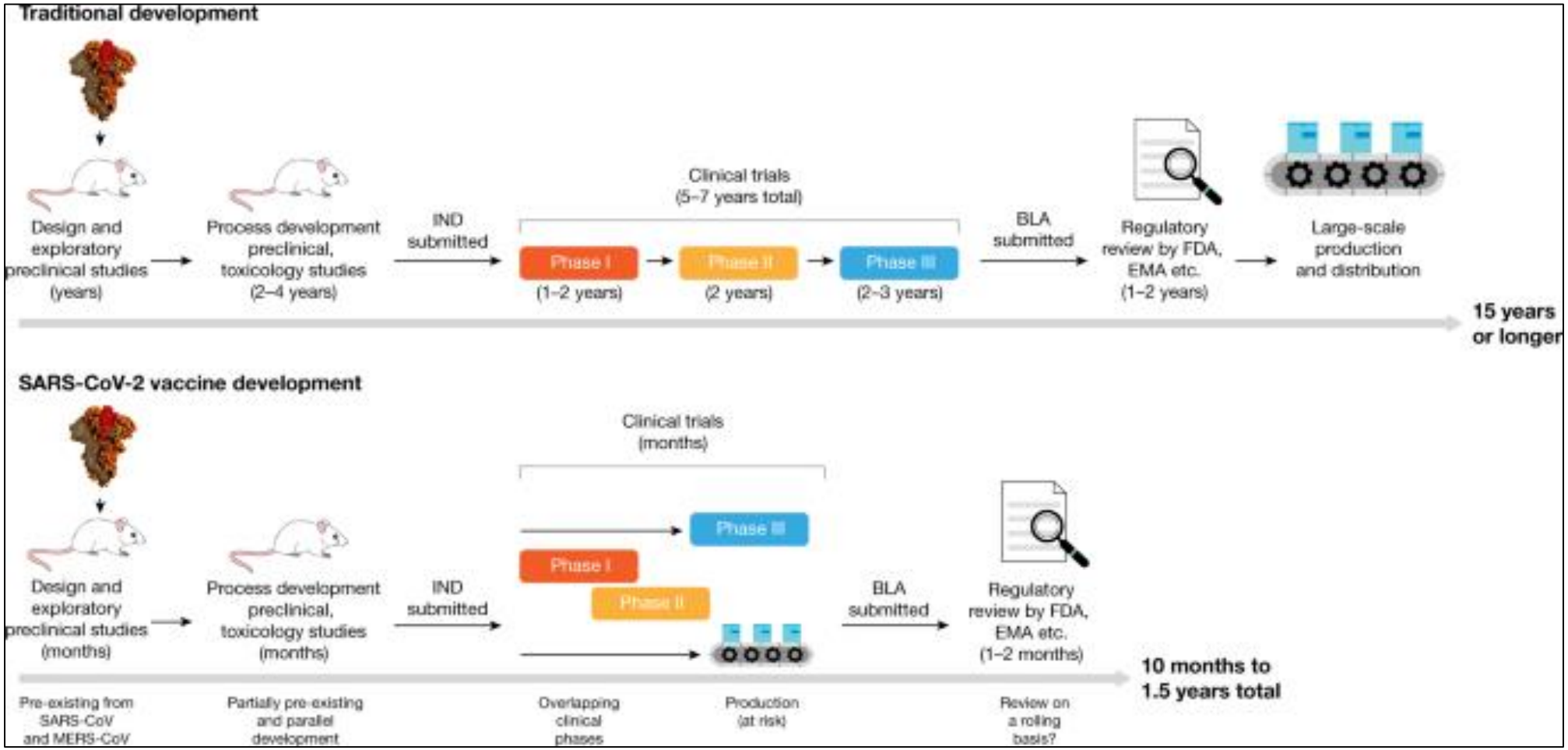
If you make something that is:

Good | Fast | ~~Cheap~~

Taison D. Bell, MD, MBA

@TaisonBell

How do we have these vaccines so quickly?



Nature volume 586, pages516–527(2020)

Taison D. Bell, MD, MBA

@TaisonBell

Comparison of side effects

Side Effect	Pfizer	Moderna	J&J
Injection site pain	84%	92%	49%
Fatigue	63%	69%	38%
Headache	55%	63%	39%
Muscle pain	38%	60%	33%
Joint pain	24%	45%	1%
Fever	14%	15%	9%
Chills	32%	43%	2%

Takeaways:

- All reactions were self limiting, resolved in 24-48h
- Reactions are a sign that the immune system is working
- J&J looks like a better tolerated vaccine. Maybe because 1 dose???
- Among my friends colleagues, their experience is similar

Side effects/special populations

- Any issues with women who want to get pregnant or pregnant mothers and the vaccine?
- What's going on with these blood clots in AZ and J&J?
- Will there be long-term side effects?

COVID-19 vaccine response in pregnant and lactating women: a cohort study

Kathryn J Gray, Evan A Bordt, Caroline Atyeo, Elizabeth Deriso, Babatunde Akinwunmi, Nicola Young, Aranxta Medina Baez, Lydia L Shook, Dana Cvrk, Kaitlyn James, Rose M De Guzman, Sara Brigida, Khady Diouf, Ilona Goldfarb, Lisa M Bebell, Lael M Yonker, Alessio Fasano, Sayed A Rabi, Michal A Elovitz, Galit Alter, Andrea G Edlow

PMID: 33758889 PMCID: PMC7987048 DOI: 10.1101/2021.03.07.21253094

- 131 women who received mRNA vaccines studied
  - 84 pregnant, 31 lactating, and 16 non-pregnant
- Vaccine-induced immune responses were the same in pregnant and lactating vs non-pregnant women
  - Titers higher than that seen in pregnant women who contracted COVID-19
- Antibody titers present in umbilical cord blood and breastmilk
- No concerning side effects seen

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Preliminary Findings of mRNA Covid-19 Vaccine Safety in Pregnant Persons

- 35,691 pregnant women studied who received mRNA vaccine
  - 84 pregnant, 31 lactating, and 16 non-pregnant
- Very reassuring safety data
  - Arm pain more frequent in pregnant women
  - Headache, fevers, chills and body aches less frequent in pregnant women
  - No neonatal deaths
  - No difference seen in rates of pre-term labor, miscarriage/pregnancy loss, or other adverse outcomes

What if I'm pregnant, considering pregnancy, or breastfeeding?

COVID-19 Vaccination leads to:

- Protection for mothers
- Protection for babies (antibody transfer)
- Peace of mind

COVID-19 leads to:

- Higher rates of miscarriage
- Higher rates of preterm labor
- Higher risk of serious illness and death for pregnant women

Taison D. Bell, MD, MBA

@TaisonBell

Quotes from the field

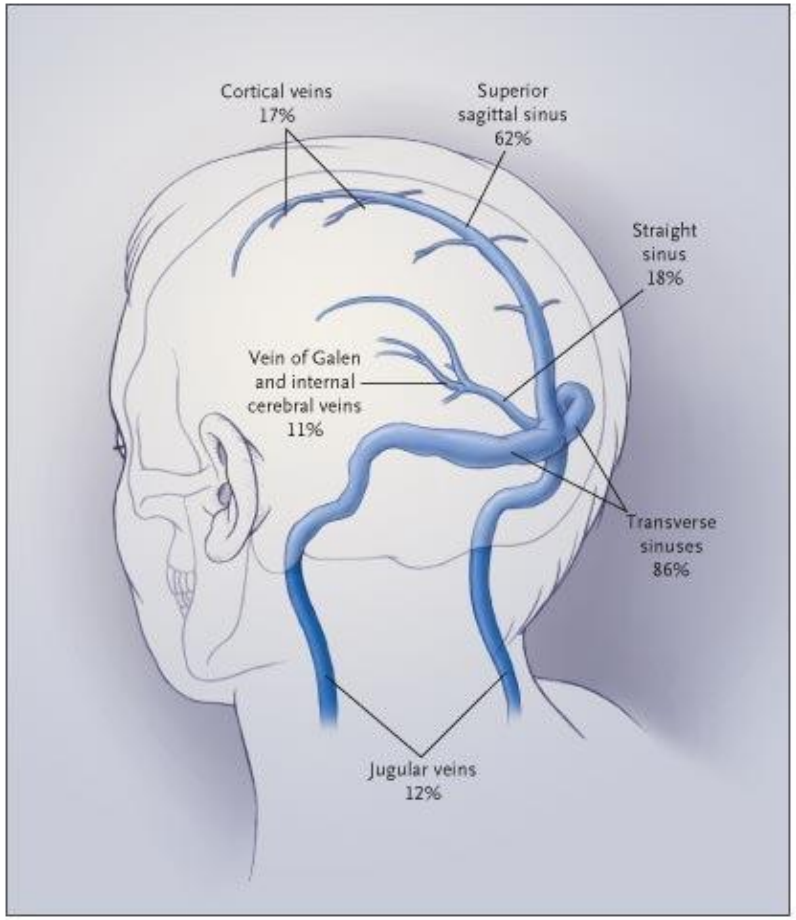
Stats from the CDC Program
- Over 94,335 pregnant women have been vaccinated - Over 700 live births now among vaccinated mothers - No difference seen in rates of miscarriage, stillbirth, pregnancy complications, and neonatal outcomes

"As a first-time mom it was scary to think about bringing a baby into the world in the middle of a pandemic. I couldn't think of a better way to protect my baby than vaccinating myself so I could pass antibodies to him."
-NP

'I was initially worried about the vaccines and fertility. But honestly, after I got vaccinated, I felt so great that my husband and I wanted to celebrate! Well, there's nowhere to go and nothing really to do so…now I'm pregnant!"
-Pharmacy tech

Cerebral Venous Sinus Thrombosis

- Reported with both AZ and J&J
  - AZ: 62 cases out of 25m vaxed
  - J&J: initial 6 cases out of 6.8m vaxed
- Mechanism is different from usual blood clots
  - CVST combined with low platelets
  - Treatment is different
- Reported more in women of child-bearing age



Taison D. Bell, MD, MBA

@TaisonBell

Results from ACIP Analysis

	Cases in Females		
Age Group	TTS Cases	Doses given	Rate
18-29 years	3	579,709	5.2/mil
30-39	7	594,215	11.8/mil
40-49	3	692,370	4.3/mil
50-64	2	1.36m	1.5/mil
65+	0	757,710	0/mil

- 15 cases seen in 4m doses administered to women
  - Most seen in women aged 18-49 years
  - Median time to symptoms onset: 8 days
  - Not strongly associated with OCPs, hypothyroid, or coagulation disorders

- ACIP recommendation: reaffirm indication for all adults.
  - Warning label added for TTS

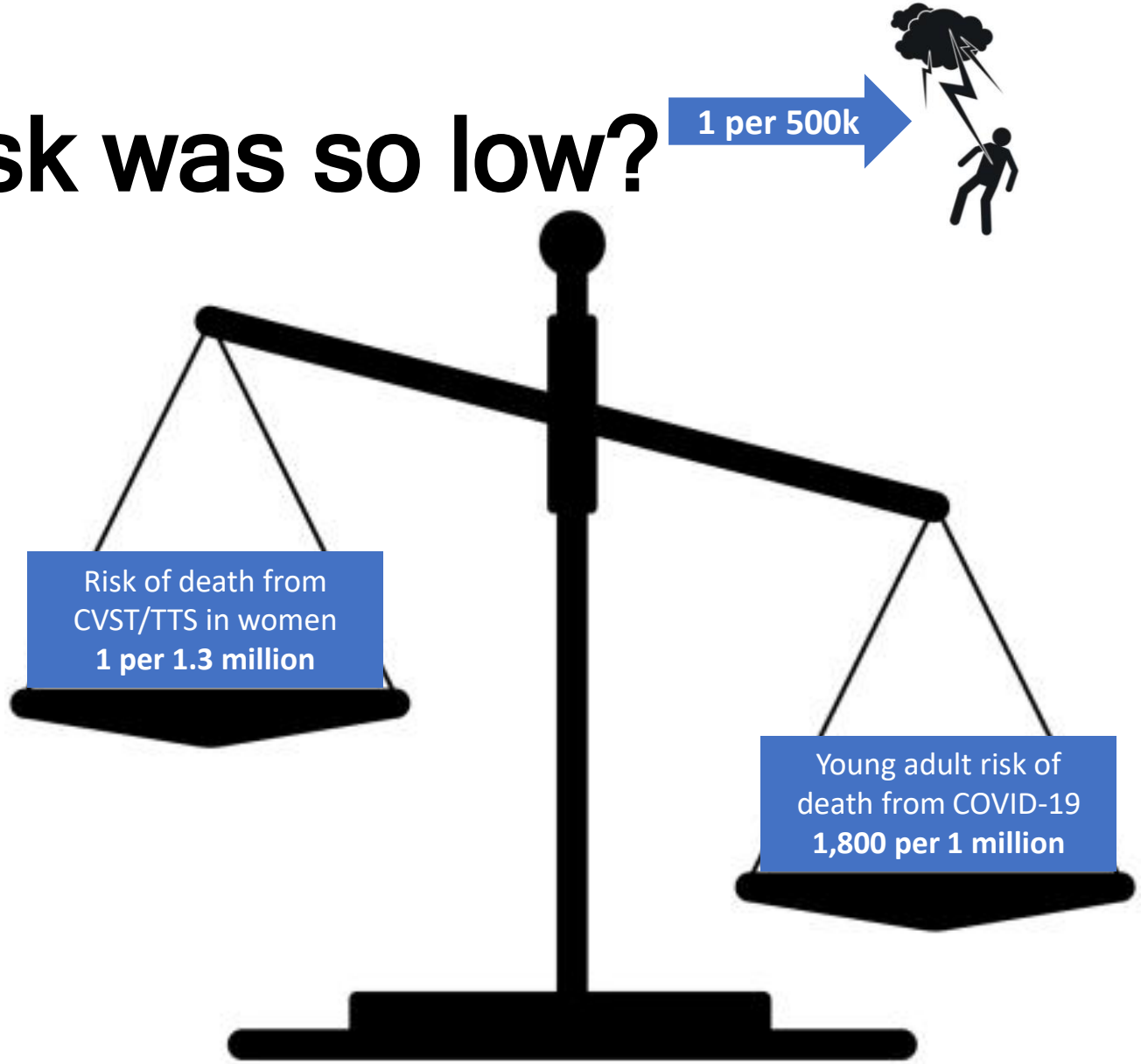
Why pause J&J if risk was so low?

Three reasons to pause:

1. Get critical information to physicians on signs and treatment

2. Collect information in a focused way

3. Prioritize safety over everything else



Taison D. Bell, MD, MBA

@TaisonBell

Vaccines and long-term side effects

- Extremely rare to see side effects that appear after 2-4 weeks
- Vaccine products are broken down by the body rapidly
- Nothing seen so far in the medium-term follow up
- Protection from COVID-19 side effects favors vaccination
  - “Long COVID”

The COVID-19 Vaccines are Like UPS

Like UPS, the vaccines:

- Go to the address (cells)
- Delivers a package (mRNA)
- Goes away (broken down)

Taison D. Bell, MD, MBA

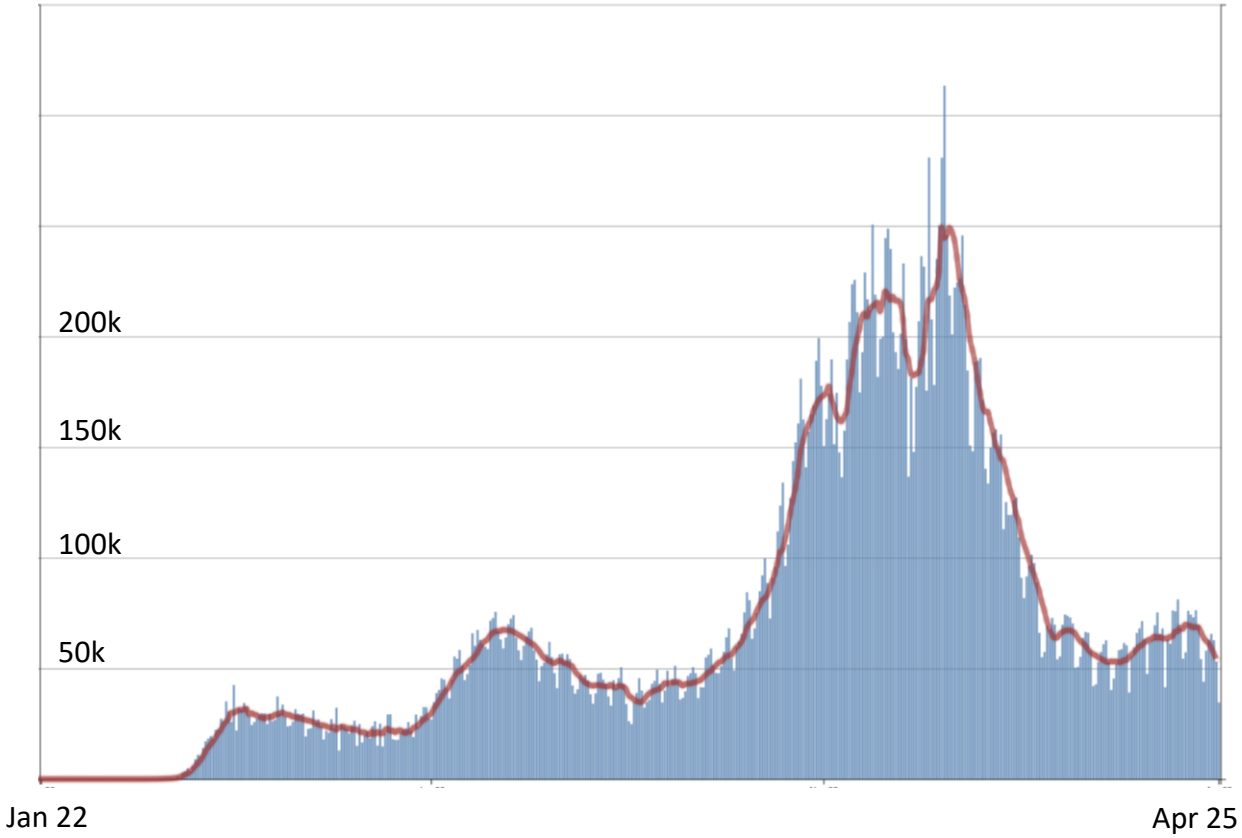
@TaisonBell

Life After Vaccination

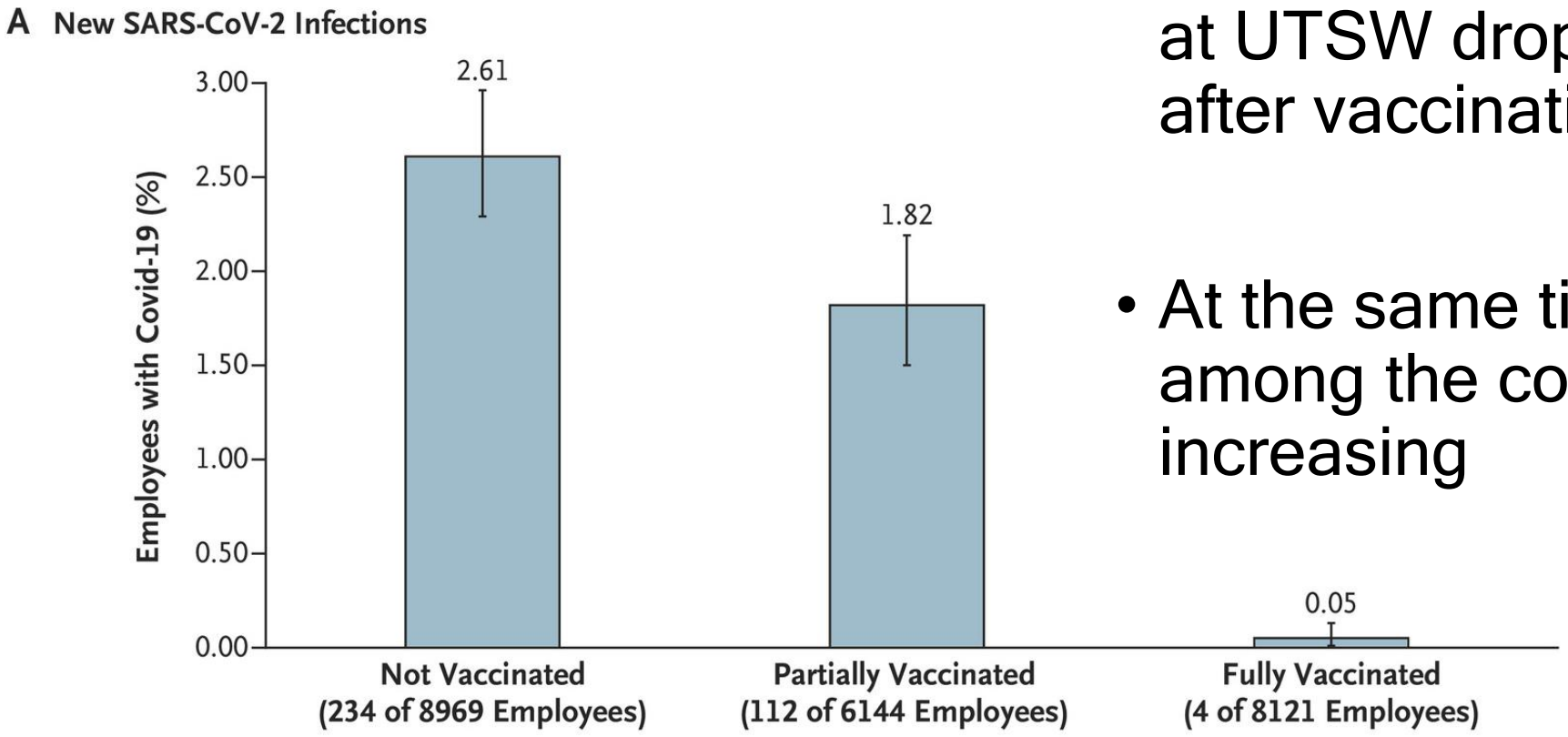
- Does vaccination protect from transmission or just from becoming ill?
- What can I/Can't I do after vaccination?
- Is mass vaccination having an impact on the global pandemic?

Is vaccination having an effect so far?

- In US, rates of cases, deaths, hospitalizations are overall down! This likely reflects:
  - Seasonal nature of coronaviruses
  - Vaccination + natural immunity
  - Ongoing public health measures
  - Plateau now at ~50k, variants? Re-opening?



The UTSW Experience

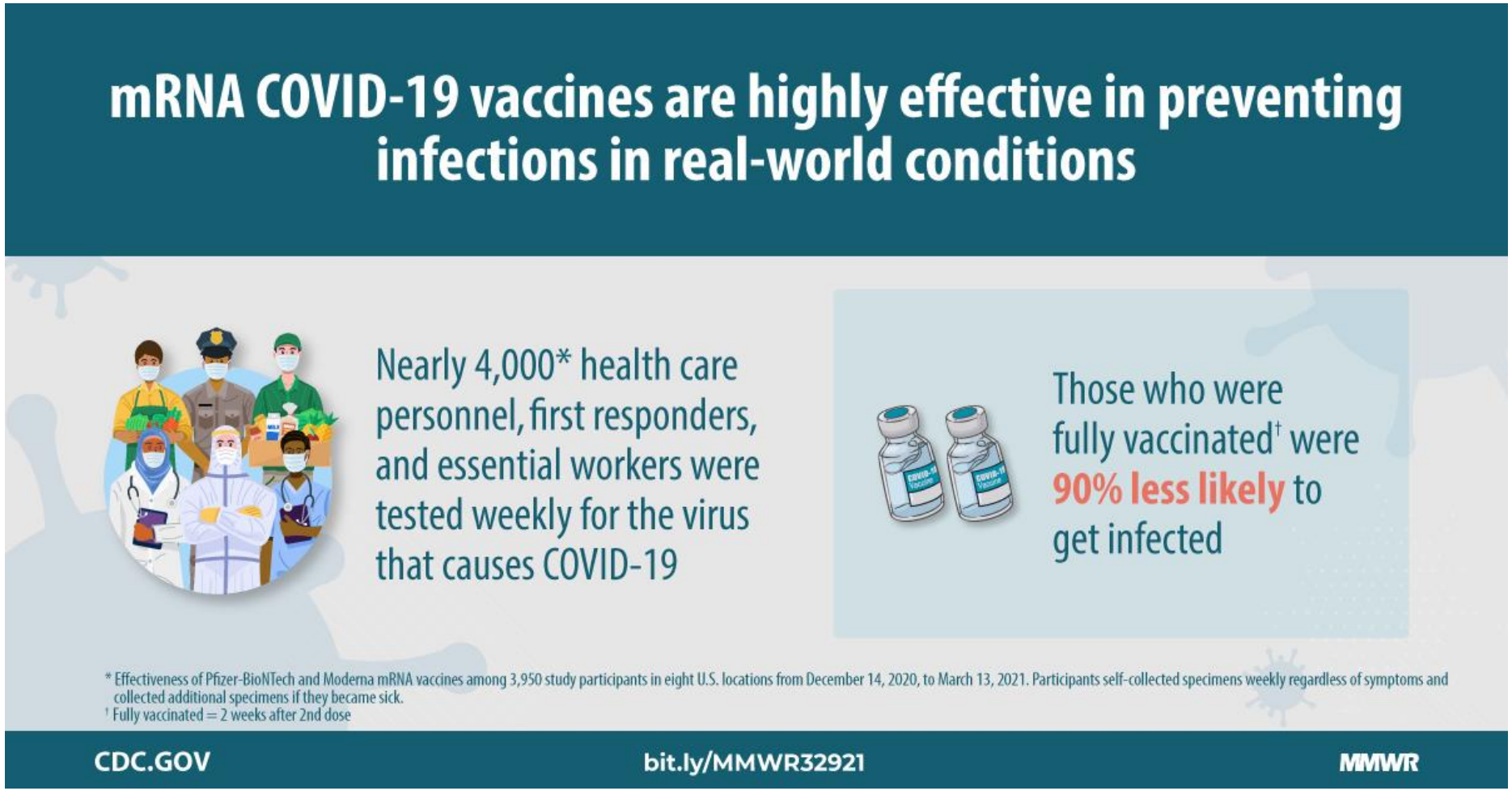


- Infections among employees at UTSW dropped by 90% after vaccination
- At the same time infections among the community were increasing

Taison D. Bell, MD, MBA

@TaisonBell

Vaccination can prevent transmission



What Can I do After Vaccination? (CDC)

Fully vaccinated people can:

- Visit with other fully vaccinated people indoors without wearing masks or physical distancing
- Visit with unvaccinated people from a single household who are at low risk for severe COVID-19 disease indoors without wearing masks or physical distancing
- Refrain from quarantine and testing following a known exposure if asymptomatic

For now, fully vaccinated people should continue to:

- Take precautions in public like wearing a well-fitted mask and physical distancing
- Wear masks, practice physical distancing, and adhere to other prevention measures when visiting with unvaccinated people who are at increased risk for severe COVID-19 disease or who have an unvaccinated household member who is at increased risk for severe COVID-19 disease
- Wear masks, maintain physical distance, and practice other prevention measures when visiting with unvaccinated people from multiple households
- Avoid medium- and large-sized in-person gatherings
- Get tested if experiencing COVID-19 symptoms
- Follow guidance issued by individual employers
- Follow CDC and health department travel requirements and recommendations

Scenarios

If you are fully vaccinated:

Friends or family from another household that are fully vaccinated

Friends or family from another household not vaccinated and low risk

- Friends or family not vaccinated and high risk
- Or multiple households regardless of vaccination

Taison D. Bell, MD, MBA

@TaisonBell

Recommendations for Work

- Wear a mask still in most settings
  - Protects from infection (vaccines are very good but not 100%)
  - There are other viral infections circulating

- Encourage family members to get vaccinated

- Get tested if you have symptoms of COVID-19

CDC Travel Recommendations

	Departure	Return
Domestic	- No test requirement - No quarantine requirement	- No test requirement unless required by local regulation - No quarantine requirement unless required by local regulation
International	- Test and quarantine requirement per destination country	- Negative test before boarding return flight - Test 3-5 days after return

General COVID-19 questions

- Children and COVID-19
- Should I get the vaccine if I have had COVID-19?
- How safe is spending time outside without masks?

Children and COVID-19

- In general, children tend to do well if they contract COVID-19
- More likely to be infected by an adult in close contact
- Less likely to spead, especially younger children
- Older children (teenagers) tend to spread like adults, but still tend to do well if infected
- Pzifer vaccine results in children 12-15 are very promising

Vaccination after COVID-19?

Yes! I had my mom and dad get vaxed after having COVID-19

Antibodies from infection

Antibodies from vaccination

Taison D. Bell, MD, MBA

@TaisonBell

The Great Outdoors

- Outdoor activities are much safer than indoor activities
- Still want to maintain distance if possible
- Mask if that isn't possible

Thank you for your time

Taison D. Bell, MD, MBA

@TaisonBell