COVID-19 and Pneumococcal Vaccine Developments 2022

Marvin J. Bittner MD

Infectious Diseases Spring Symposium 4/23/22

Creighton University School of Medicine

Disclosures

- No relevant conflicts of interest
- Views are not necessarily those of any organization with which I am affiliated
- Many of the COVID-19 vaccine recommendations involve use authorized by the FDA for emergency use, i.e., off-label

Objectives

- Describe current recommendations for pneumococcal vaccination in older adults
- Describe current recommendations for pneumococcal vaccination in younger adults
- List principal benefits and harms of COVID-19 vaccines currently used in the U.S.

Invasive Pneumococcal Disease

- "Isolation of *S. pneumoniae* from a normally sterile site or pathogen-specific nucleic acid in a specimen obtained from a normally sterile body site using a validated molecular test."
- Examples
  - Bacteremia
  - Meningitis
- *Not* invasive: pneumonia without bacteremia or meningitis

Pneumococcal vaccines

- PCV or Pneumococcal Conjugate Vaccine
  - Example: PCV13 (Prevnar 13)
  - Older: PCV7
  - FDA-approved 2021: PCV15, PCV20
- PPSV or Pneumococcal Polysaccharide Vaccine
  - Example: PPSV23 (Pneumovax 23)

Evidence for preventing disease

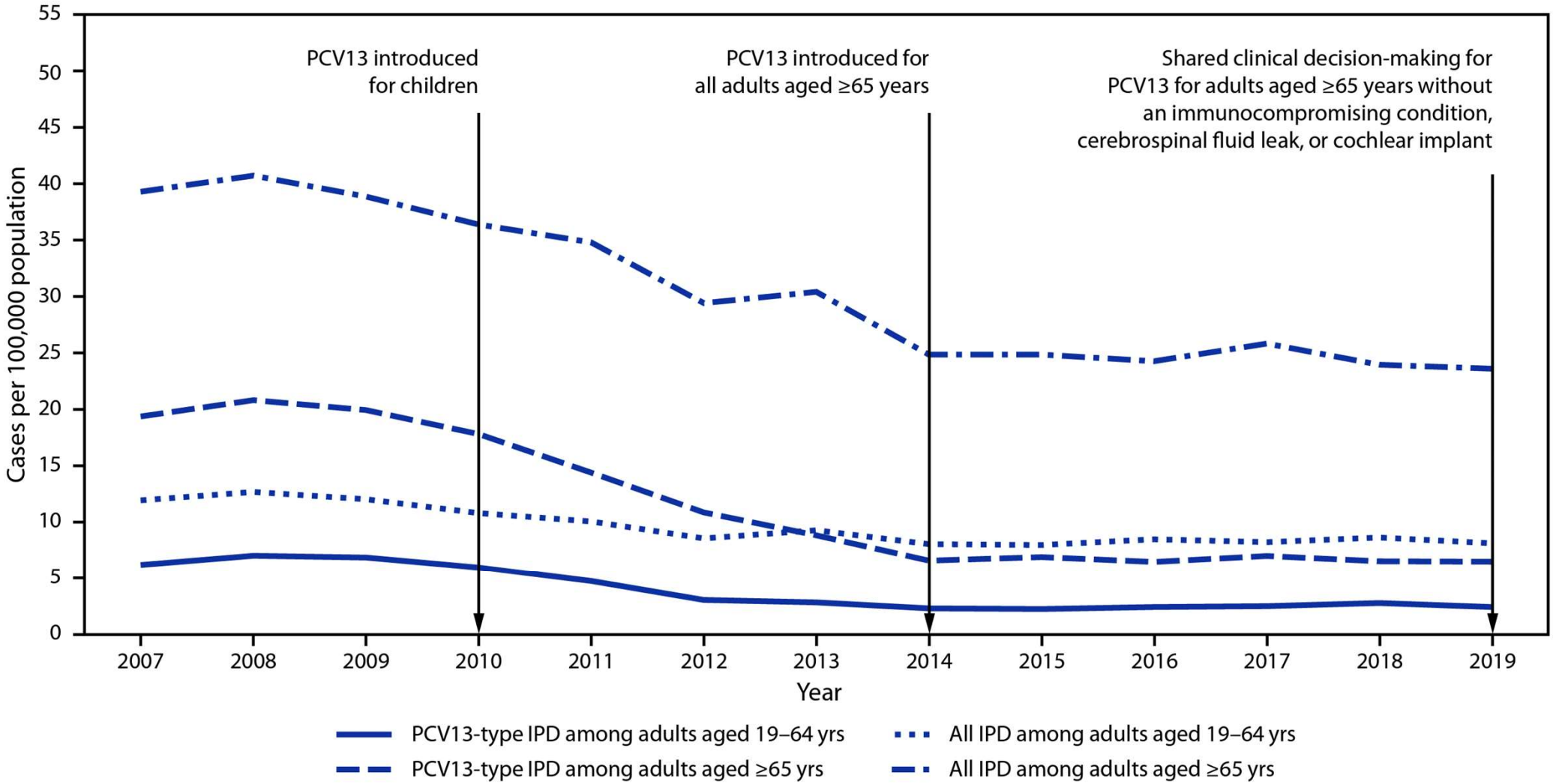
- PCV13 or Pneumococcal Conjugate Vaccine 13
  - Invasive pneumococcal disease
  - Pneumococcal pneumonia
- PPSV23 or Pneumococcal Polysaccharide Vaccine 23
  - Invasive pneumococcal disease
  - Inconsistent: pneumococcal pneumonia

Conjugate	Polysaccharide
(modified diphtheria toxin)	
-T cell	-T cell independent
-Boostable, durable	-Not

Prefer to give conjugate, then polysaccharide (not the other way around)

Complicated recommendations

FIGURE. Incidence of all invasive pneumococcal disease and 13-valent pneumococcal conjugate vaccine-type* invasive pneumococcal disease among adults aged ≥19 years, by invasive pneumococcal disease type and age group — United States, 2007–2019†



Special risk for invasive pneumococcal disease

- Cochlear implant or CSF leak
- Immunocompromising conditions
    - Chronic renal failure, nephrotic syndrome
    - Congenital or acquired immune deficiencies
    - Generalized malignancy, Hodgkins disease
    - HIV
    - Leukemia, lymphoma, multiple myeloma
    - Immunosuppression, solid organ transplant

Also at increased risk of invasive pneumococcal disease

- Heart disease, CHF, cardiomyopathies
- COPD, emphysema, asthma, cigarette smoking
- Alcoholism, chronic liver disease
- Diabetes mellitus
- Asplenia, sickle cell disease, other hemoglobinopathy

Age 19-64 with risk for pneumococcal disease

- No previous pneumococcal vaccine (or history unknown). EITHER:
    - PCV20 OR
    - PCV15, wait 8 weeks (cochlear implant, CSF leak, immune compromising condition) to a year, then PPSV23
- History of PPSV23 at least a year ago. EITHER:
    - PCV20 OR
    - PCV15
- History of PCV13. Give PPSV23
- History of PCV13 and PPSV23. No further vaccine

MMWR 2022;71:109

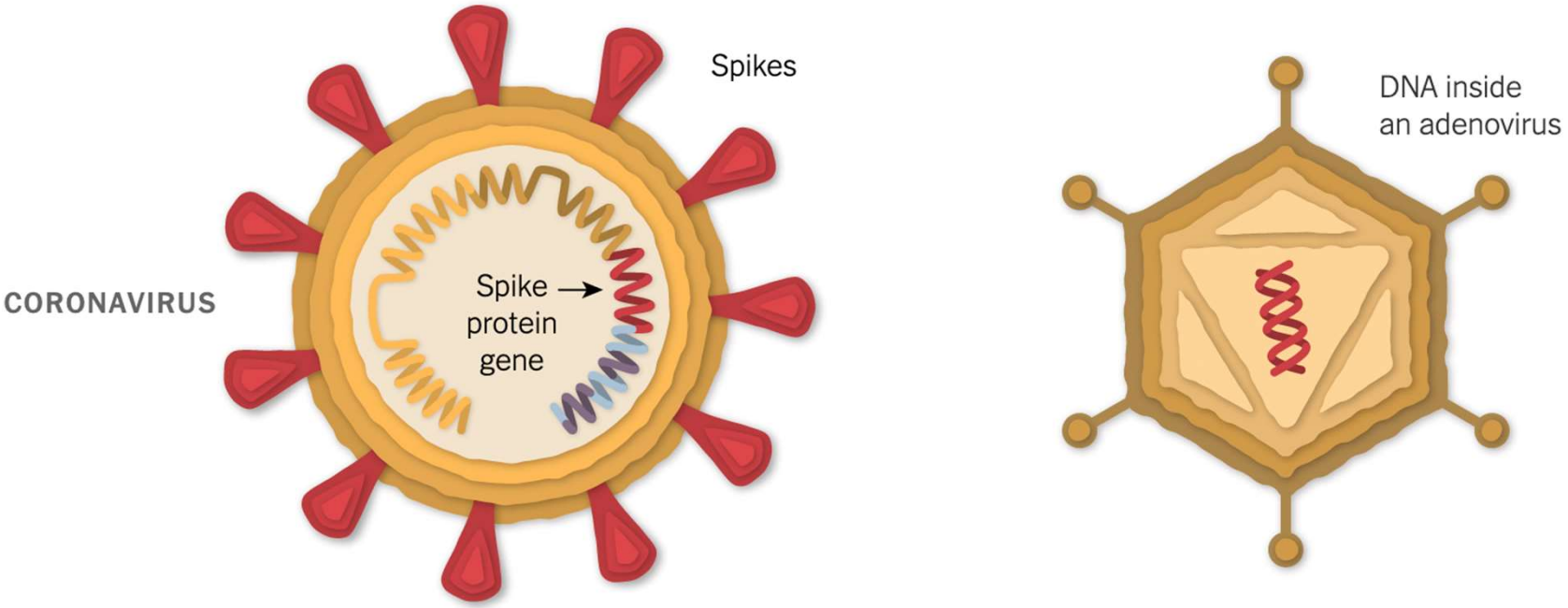
Age ≥ 65 regardless of risk for pneumococcal disease

- No previous pneumococcal vaccine (or history unknown). EITHER:
    - PCV20 OR
    - PCV15, wait 8 weeks (cochlear implant, CSF leak, immune compromising condition) to a year, then PPSV23
- History of PPSV23 at least a year ago. EITHER:
    - PCV20 OR
    - PCV15
- History of PCV13. Give PPSV23
- History of PCV13 and PPSV23. No further vaccine

MMWR 2022;71:109

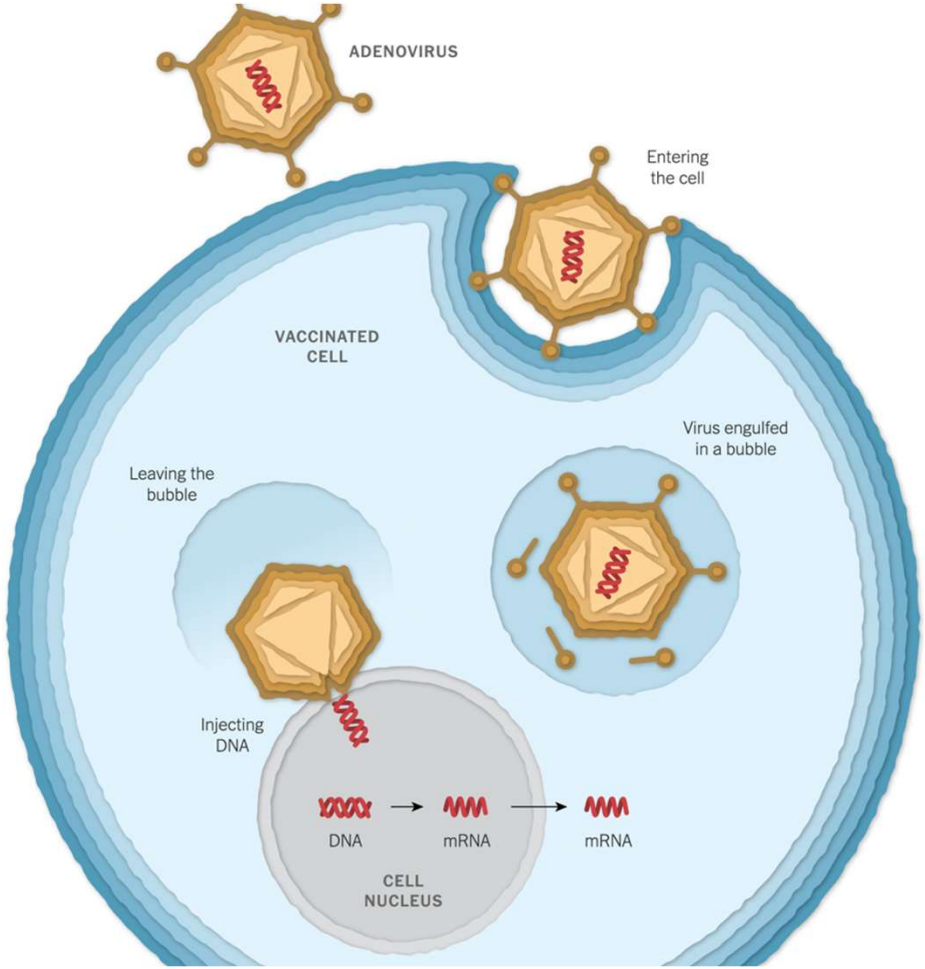

Hotel California

Johnson & Johnson Adenovirus Vector



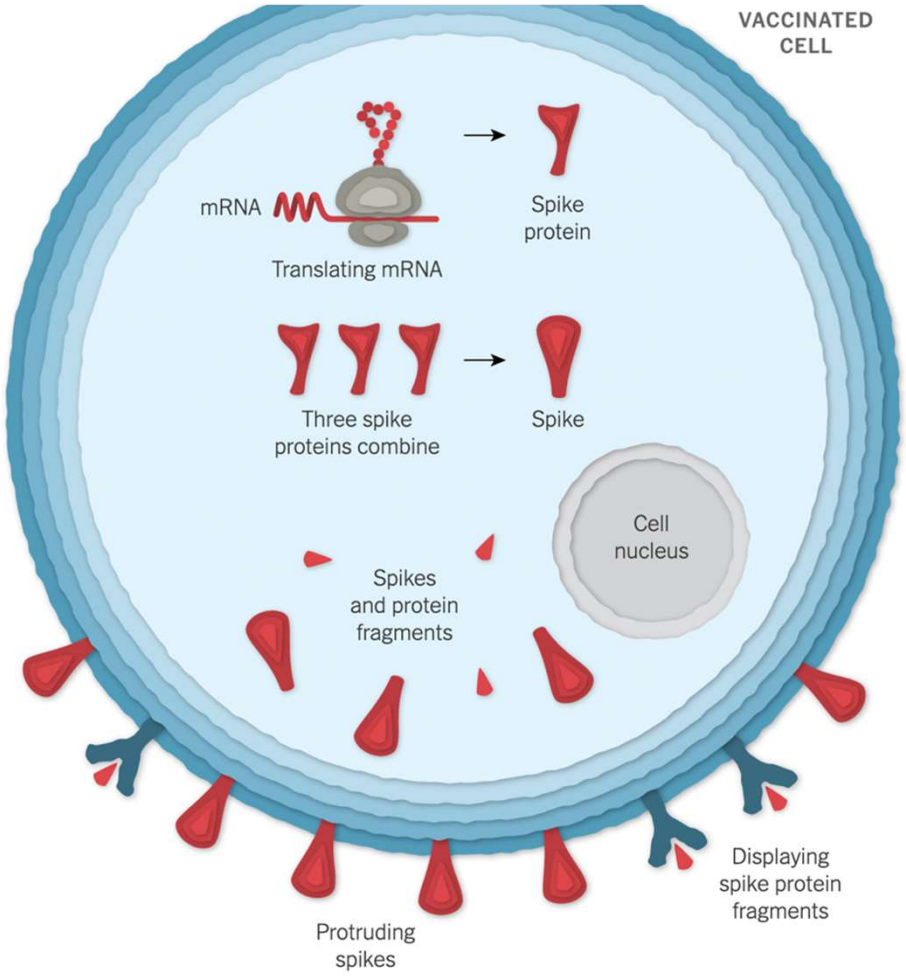
https://www.nytimes.com/interactive/2020/health/johnson-johnson-covid-19-vaccine.html

Johnson & Johnson Adenovirus Vector



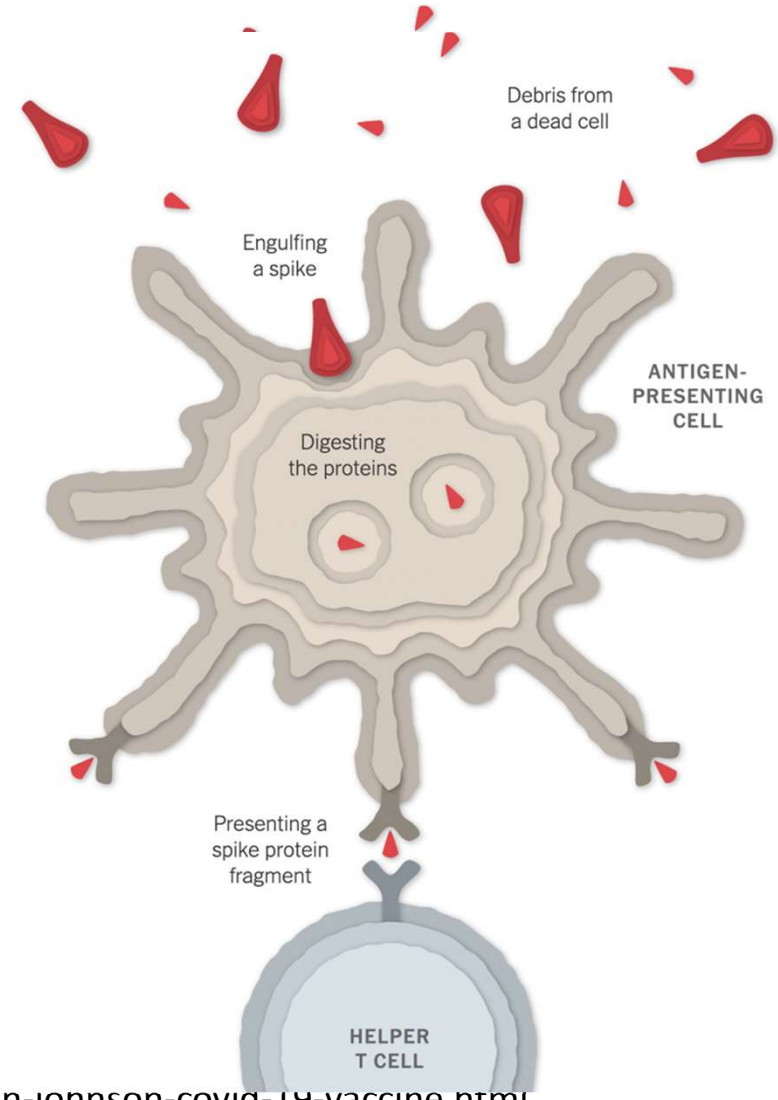
https://www.nytimes.com/interactive/2020/health/johnson-johnson-covid-19-vaccine.html

Johnson & Johnson Adenovirus Vector



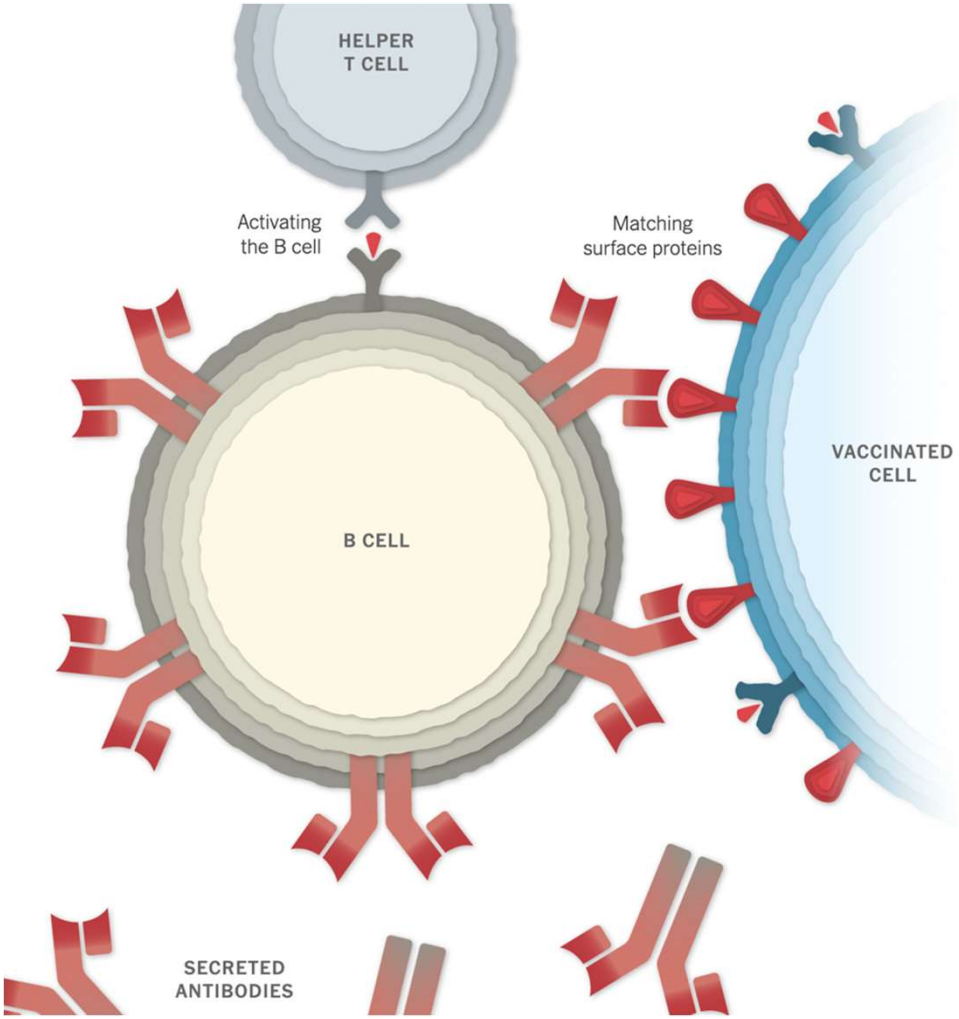
https://www.nytimes.com/interactive/2020/health/johnson-johnson-covid-19-vaccine.html

Johnson & Johnson Adenovirus Vector



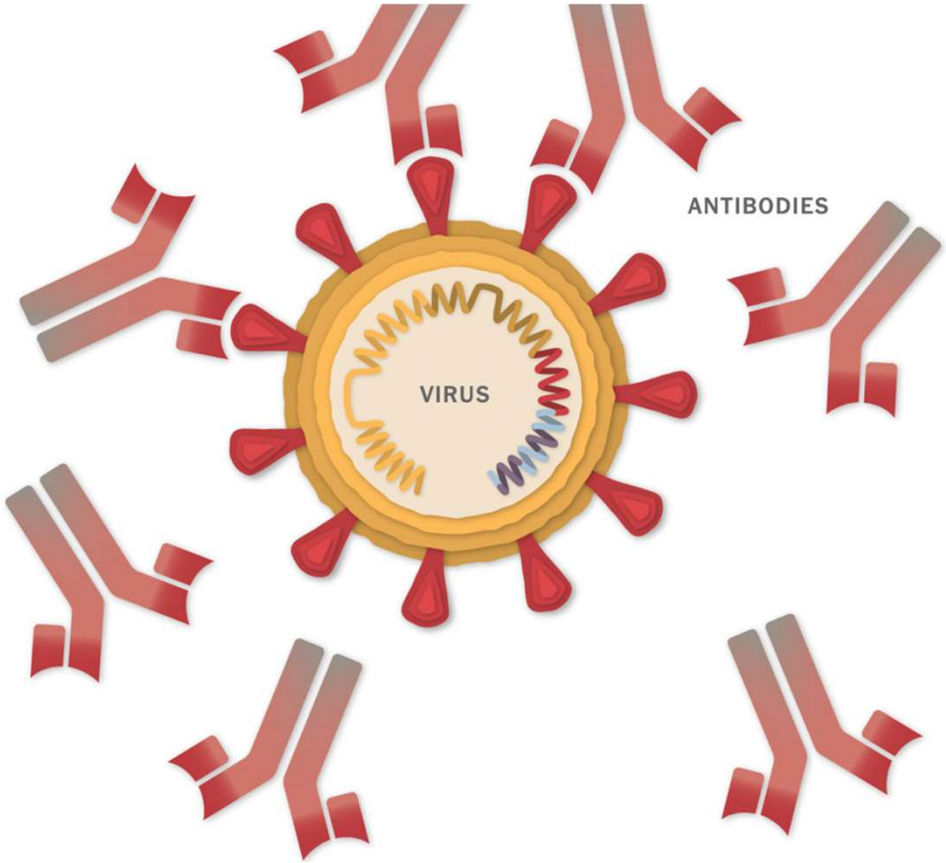
https://www.nytimes.com/interactive/2020/health/johnson-johnson-covid-19-vaccine.html

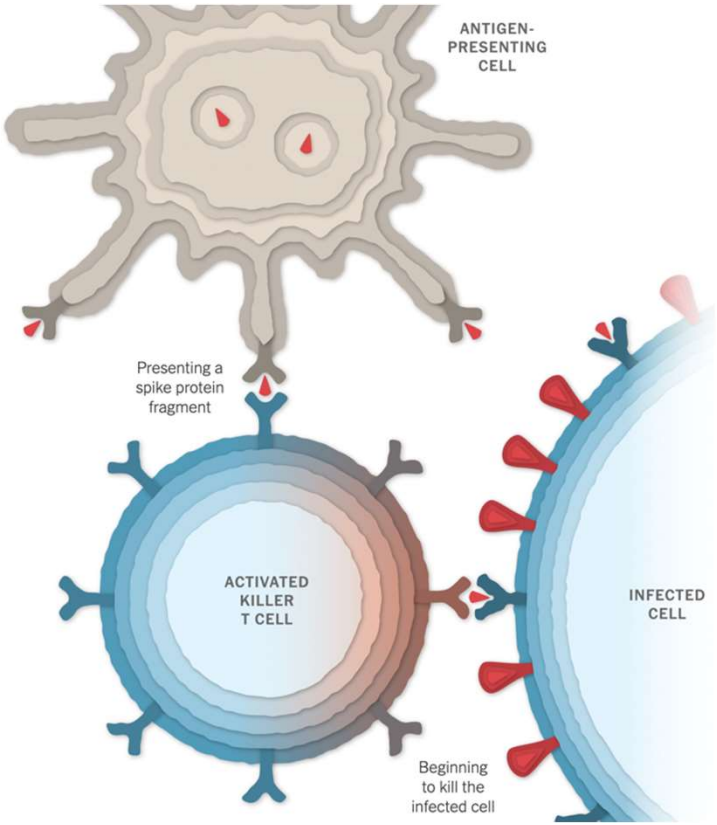
Johnson & Johnson Adenovirus Vector



https://www.nytimes.com/interactive/2020/health/johnson-johnson-covid-19-vaccine.html

Johnson & Johnson Adenovirus Vector





https://www.nytimes.com/interactive/2020/health/johnson-johnson-covid-19-vaccine.html

Johnson & Johnson Vaccine

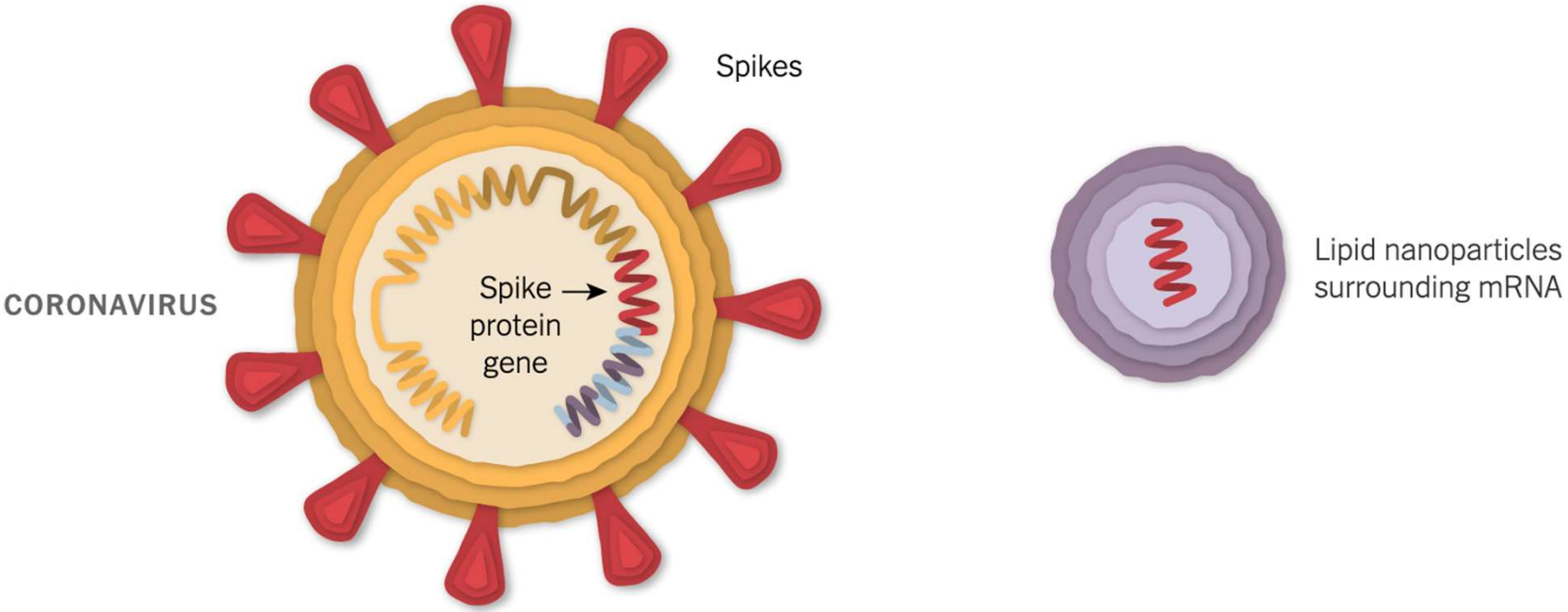
- One dose
- Refrigerated for months
- Durable protection

- Thrombosis
  - 30-39 ~~11~~/million
  - Overall 4/million
- Guillain-Barré

CDC 12/21: mRNA vaccines preferred

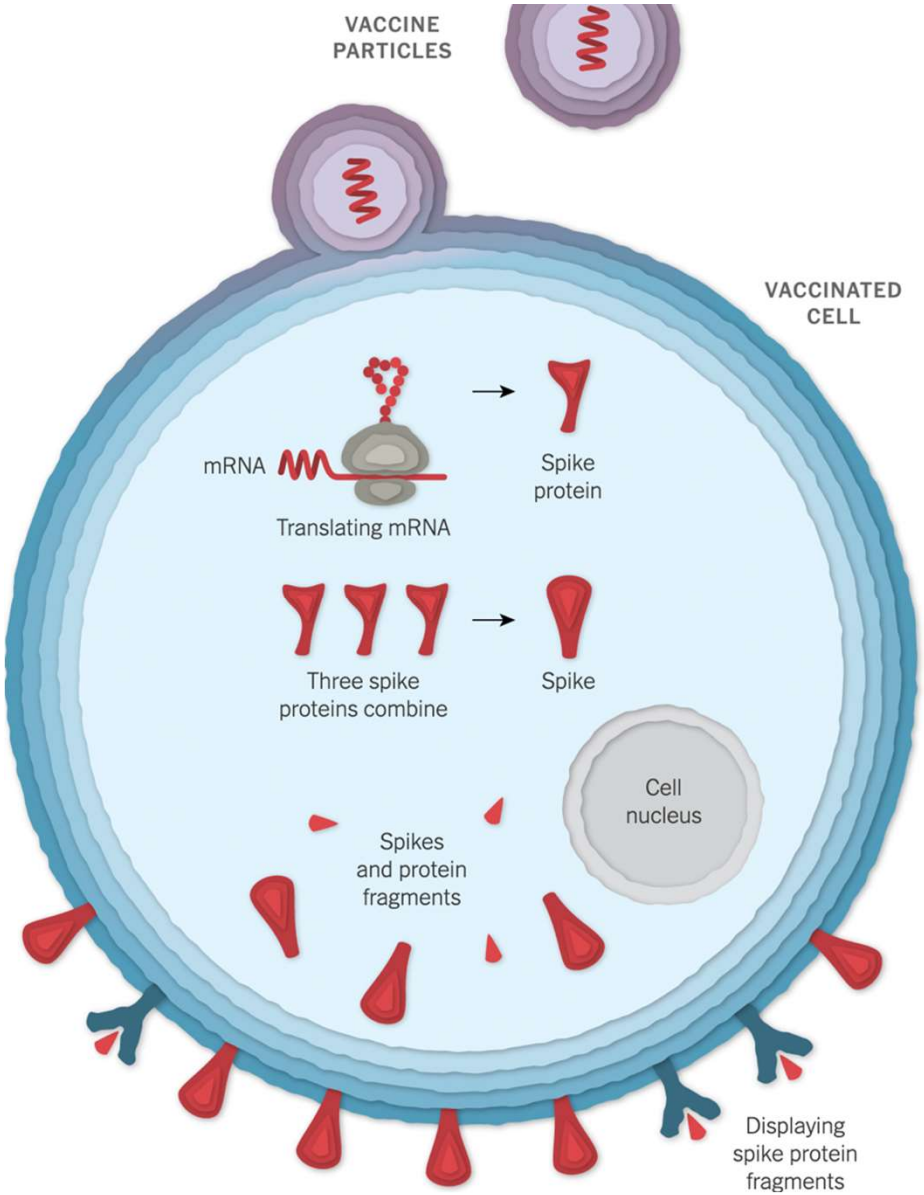
Oliver SE, Wallace M, See I, et al. Use of the Janssen (Johnson & Johnson) COVID-19 Vaccine: Updated Interim Recommendations from the Advisory Committee on Immunization Practices — United States, December 2021. MMWR Morb Mortal Wkly Rep 2022;71:90–95.
DOI: http://dx.doi.org/10.15585/mmwr.mm7103a4

Pfizer mRNA BNT162b2 (Comirnaty)
Moderna mRNA (Spikevax)



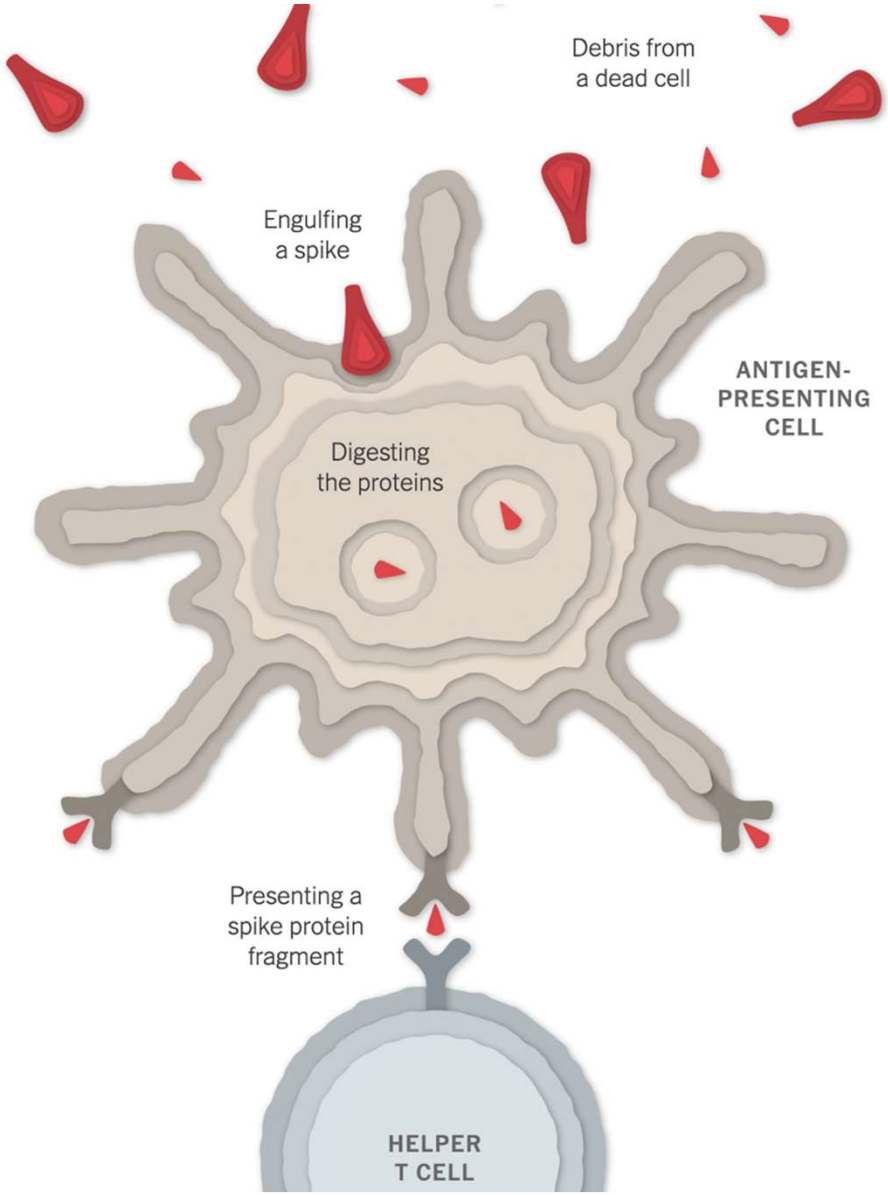
https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html
https://www.nytimes.com/interactive/2020/health/moderna-covid-19-vaccine.html

Pfizer mRNA BNT162b2 (Comirnaty) Moderna mRNA (Spikevax)



https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html
https://www.nytimes.com/interactive/2020/health/moderna-covid-19-vaccine.html

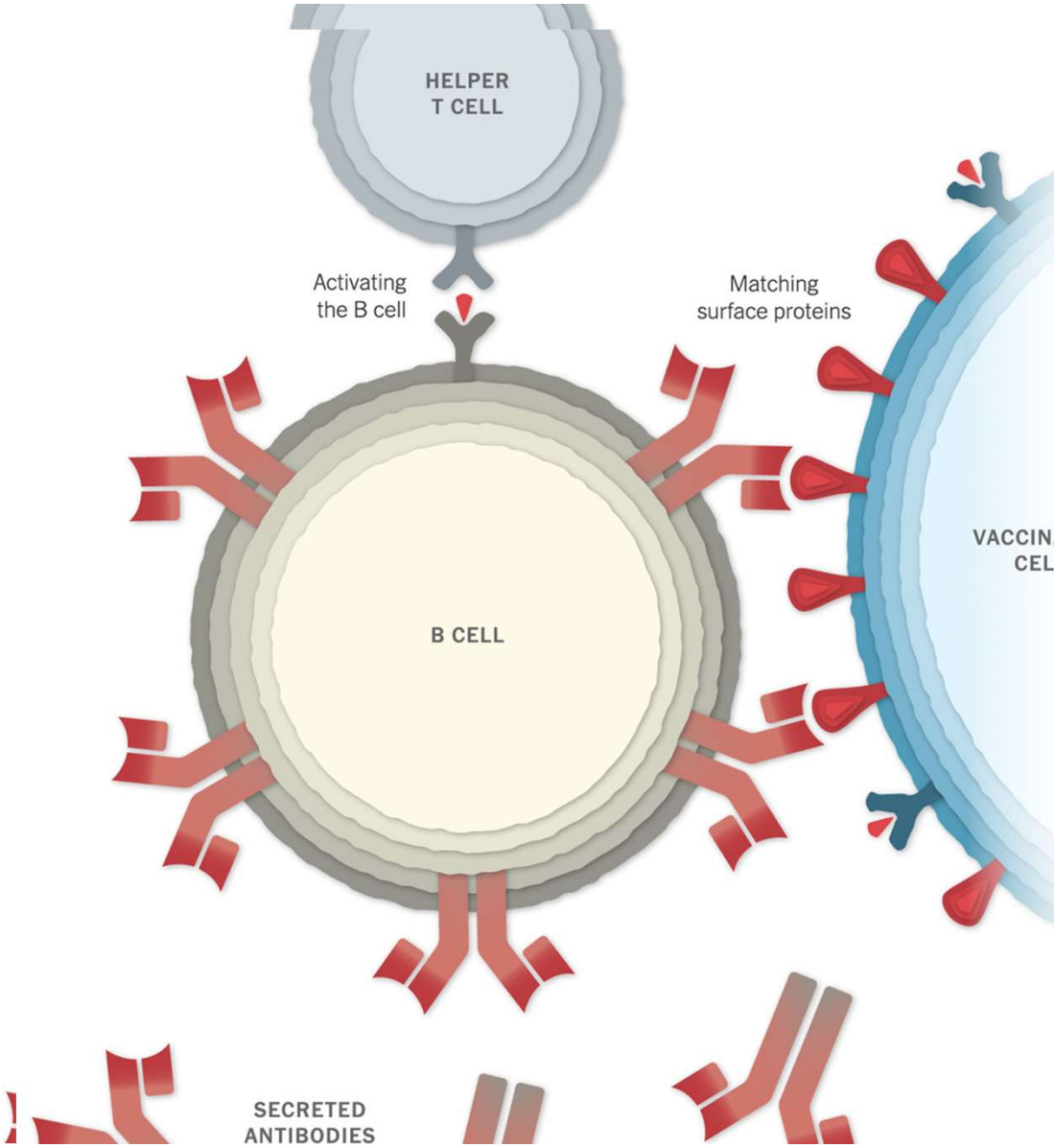
Pfizer mRNA BNT162b2 (Comirnaty) Moderna mRNA (Spikevax)



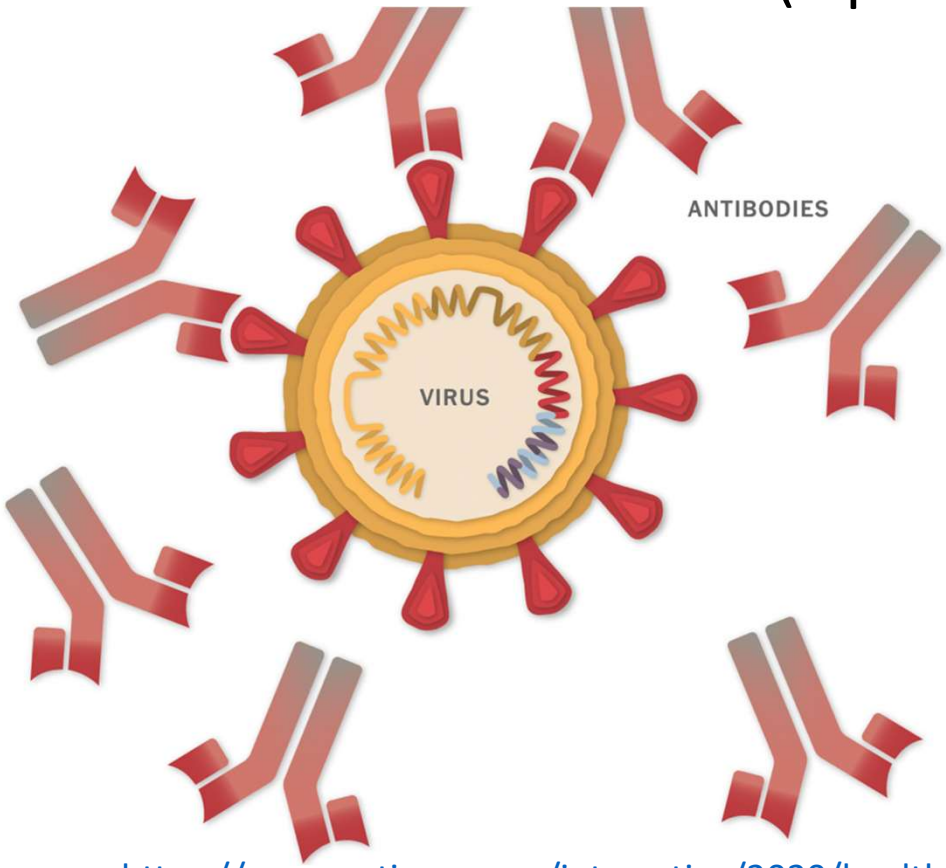
https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html
https://www.nytimes.com/interactive/2020/health/moderna-covid-19-vaccine.html

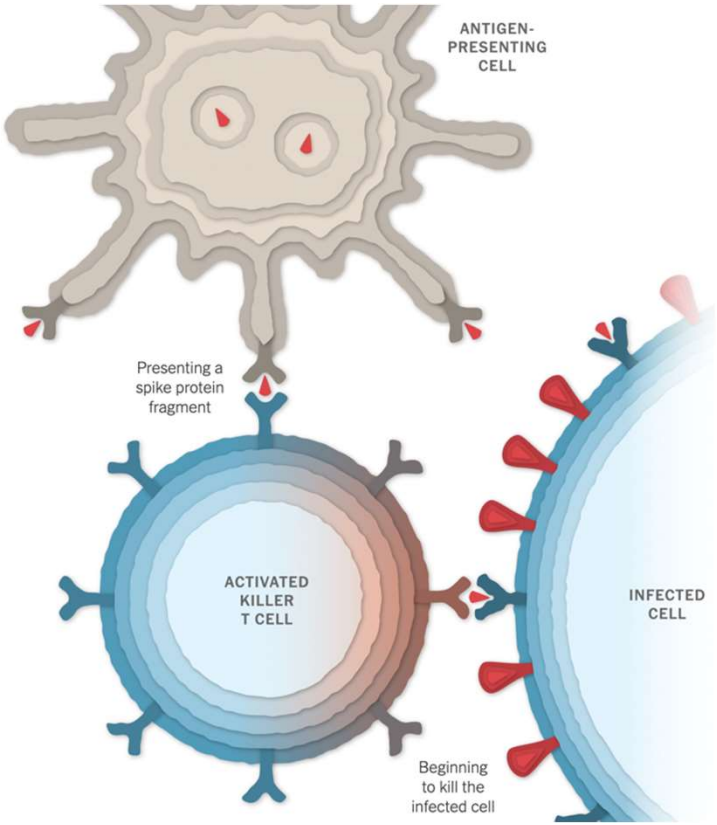
Pfizer mRNA BNT162b2 (Comirnaty) Moderna mRNA (Spikevax)

https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html



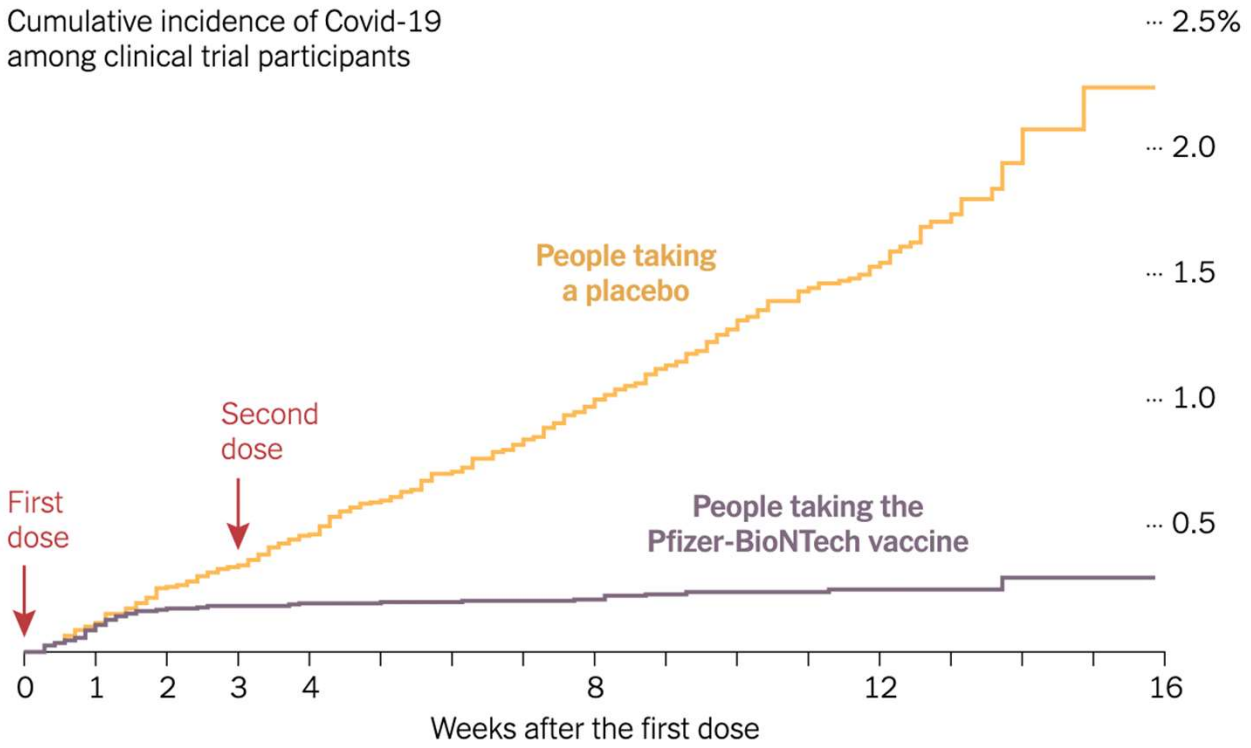
Pfizer mRNA BNT162b2 (Comirnaty)
Moderna mRNA (Spikevax)





https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html
https://www.nytimes.com/interactive/2020/health/moderna-covid-19-vaccine.html

Pfizer mRNA BNT162b2 (Comirnaty)



https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html

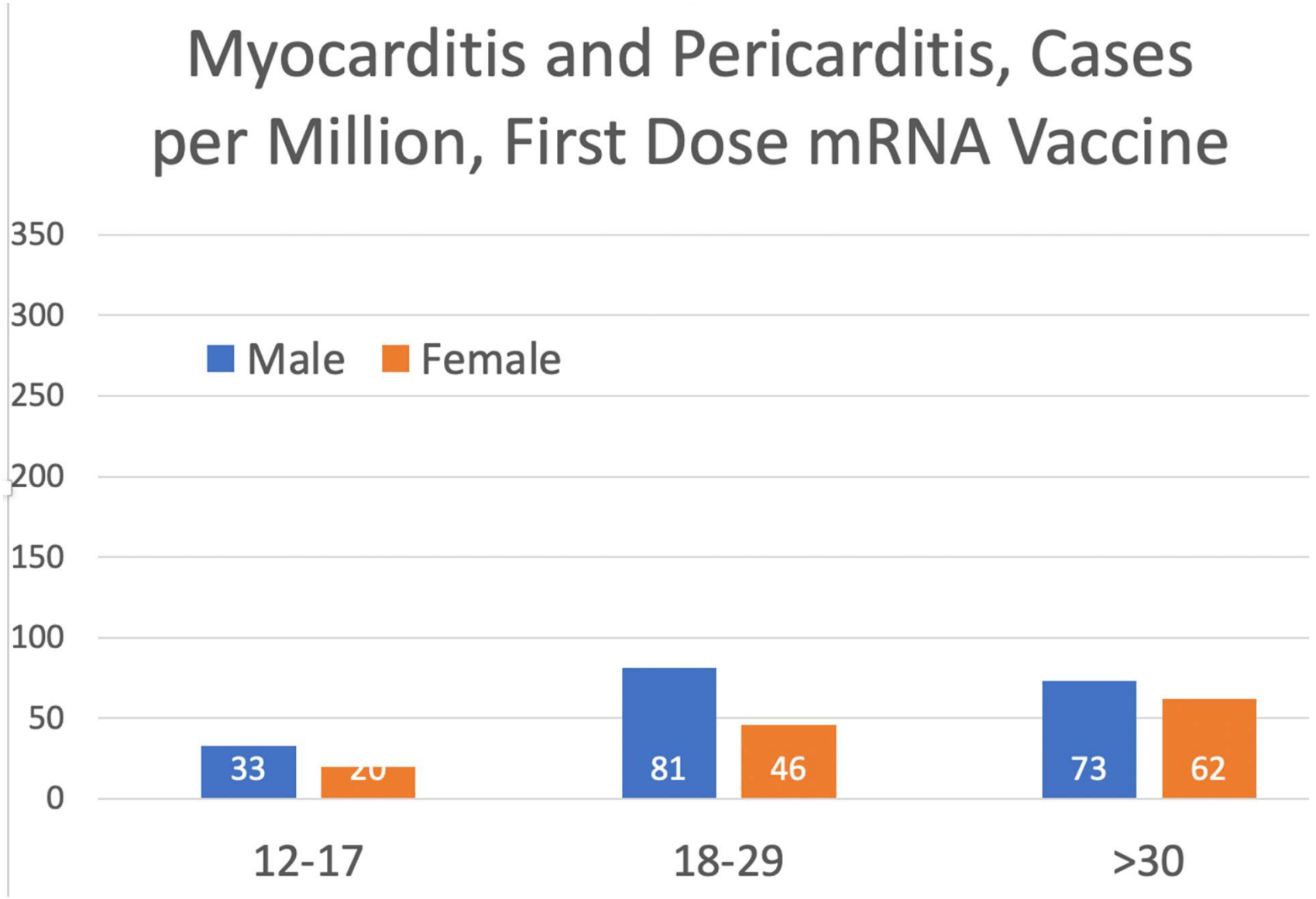
mRNA vaccines

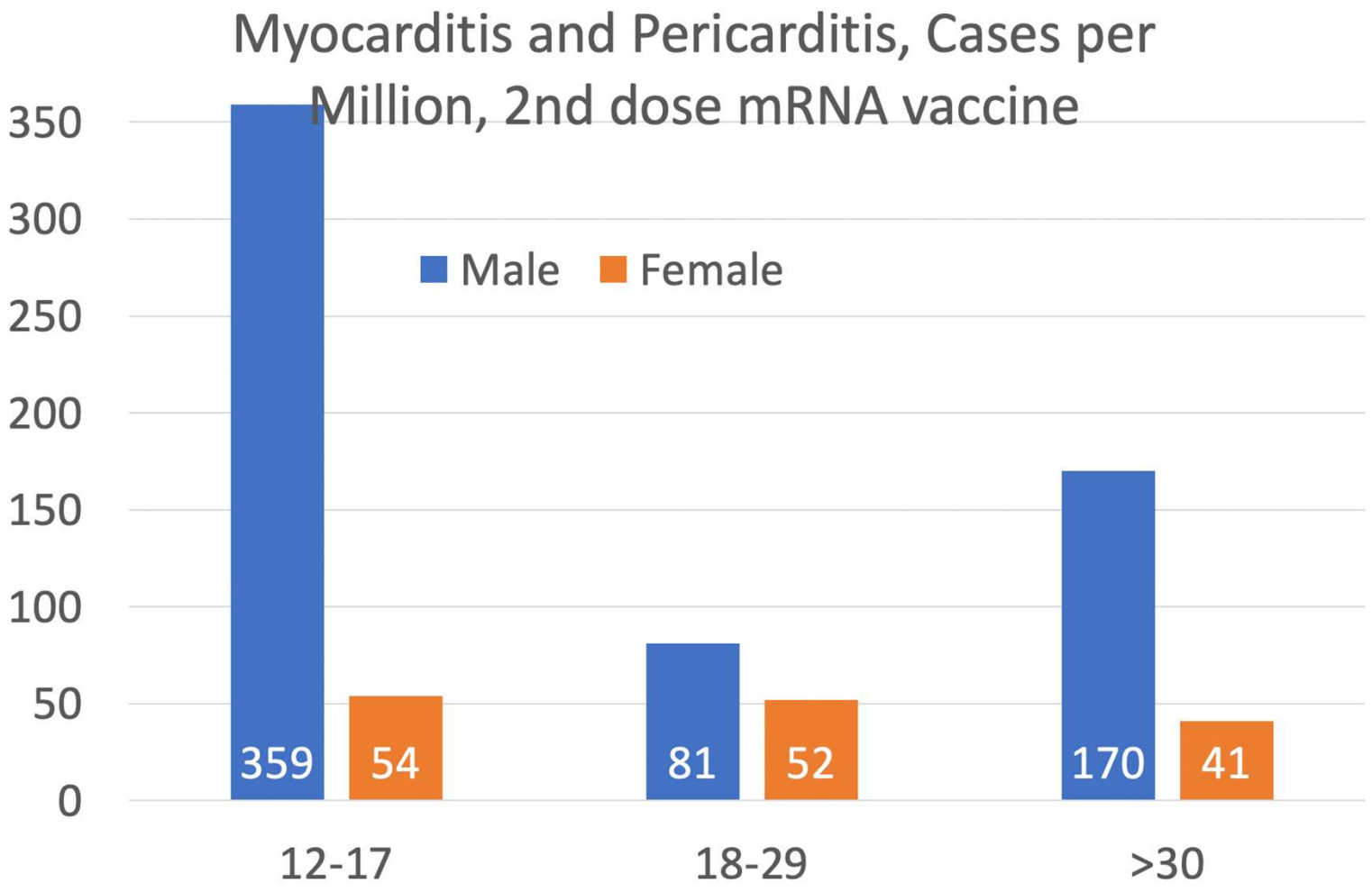
Moderna

- Age ≥ 18 (EUA ≥ 5)
- 0.5 ml 1 mo apart
- Refrigerator 30 days
- Pain, swell, redness
- T, fatigue, headache, chills, myalgia

Pfizer

- Age ≥ 16 (EUA ≥ 5)
- 0.3 ml 3 wk apart
- Refrigerator 30 days
- Pain, swell, redness
- T, fatigue, headache, chills, myalgia


Myocarditis and Pericarditis, Cases per Million, First Dose mRNA Vaccine
350
300
250
200
150
100
50
0
Male
Female
33
81
46
73
62
12-17
18-29
>30


Myocarditis and Pericarditis, Cases per Million, 2nd dose mRNA vaccine
350
300
250
200
150
100
50
0
Male
Female
359
54
81
52
170
41
12-17
18-29
>30

- Prevent infection?
- Prevent serious infection, hospitalization, death?
- Prevent long COVID, complications?
- Prevent transmission?

- Generally, ”primary” + “booster” after 4 months
- Age 50, other risk factor: additional “booster”
- Risk of cardiac complications after COVID-19 much higher than after vaccine
- Immune compromise: passive antibody
  - EVUSHELD™ (tixagevimab co-packaged with cilgavimab)
  - Emergency Use Authorization: 4 x 1.5 ml injections

Key points

- Pneumococcal risk groups
  - Cochlear implant, CSF leak, immune compromising
  - Other medical
  - Age 65
- No or unknown pneumococcal vaccine history
  - PCV20 OR
  - PCV15, then PPSV23
- mRNA COVID-19 vaccines current recommended in US generally for adults
  - 2 doses 3-4 wk apart, booster 4 mo later
  - Additional booster if 50 or at risk
  - Risk of heart disease higher with COVID-19 than vaccine