Is this worth a Shot?

Considering questions & concerns about COVID vaccinations
Extras
More useful information
All top CDC/FDA leadership and scientists agree on the final safety and efficacy of vaccines.

Unfortunately, still complying with the bureaucracy of paperwork and timelines for usual full approval process.
Rumored Alternative Treatments

• Hydroxychloroquine
  • Studies revealed “no benefit for decreasing the likelihood of death or speeding recovery”, “unlikely to kill or inhibit the virus that causes COVID-19”
  • Serious side effects including heart rhythm problems, blood and lymph system disorders, kidney injuries, and liver problems and failure

• Zinc
  • No evidence to recommend use as treatment of COVID-19
  • Excessive zinc supplementation can cause hematologic defects and irreversible neurologic disorders

• Ivermectin
  • Used for treatment of parasitic worms, not an anti-viral drug
  • Extremely dangerous in high doses needed to even be possibly useful
# Vaccine Mandate Effectiveness

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>Twentieth Century Annual Morbidity</th>
<th>2000†</th>
<th>Percentage Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallpox</td>
<td>48,164</td>
<td>0</td>
<td>100</td>
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<tr>
<td>Diphtheria</td>
<td>175,885</td>
<td>4</td>
<td>99.99</td>
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<tr>
<td>Measles</td>
<td>503,282</td>
<td>81</td>
<td>99.98</td>
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<tr>
<td>Mumps</td>
<td>152,209</td>
<td>323</td>
<td>99.80</td>
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<tr>
<td>Pertussis</td>
<td>147,271</td>
<td>6755</td>
<td>95.40</td>
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<tr>
<td>Polio (paralytic)</td>
<td>16,316</td>
<td>0</td>
<td>100</td>
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<tr>
<td>Rubella</td>
<td>47,745</td>
<td>152</td>
<td>99.70</td>
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<tr>
<td>Congenital rubella syndrome</td>
<td>823</td>
<td>7</td>
<td>99.10</td>
</tr>
<tr>
<td>Tetanus</td>
<td>1314</td>
<td>26</td>
<td>98.00</td>
</tr>
<tr>
<td>Haemophilus influenzae type b</td>
<td>20,000</td>
<td>167</td>
<td>99.10</td>
</tr>
<tr>
<td>and unknown (&lt;5 years)</td>
<td></td>
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</tr>
</tbody>
</table>
Covid death rates among kids are similar to those for the seasonal flu.

Estimated share of patients who died

- **0-4 years**
  - Seasonal flu 2012-2019: ~0.01%
  - Covid: ~0.005%

- **5-17 years**
  - Seasonal flu 2012-2019: ~0.01%
  - Covid: ~0.002%

Five in 100,000 kids with Covid ages 0 to 4 have died.

Two in 100,000 kids with Covid ages 5 to 17 have died.
For adults, however, Covid-19 is far deadlier. Among people 65 and over, the disease has killed more than 2 percent of those who contracted it.

- 0.27% of adults aged 50-64 years have died from seasonal flu 2012-2019.
- 2.24% of adults aged 65+ years have died from Covid.
Vaccine Ingredients

• mRNA or inactivated adenovirus expressing spike protein
• Lipids: protect the mRNA
• Acids and stabilizers: stabilize the vaccine
• Salts: balance acidity in body
• Sugars: help withstand freezing
What is in Pfizer’s COVID-19 vaccine?
What is in Pfizer’s COVID-19 vaccine?

**Potassium chloride**
Which is also in...
- baby formulas, cereals, frozen entrees, meats, snack foods (such as chips or crisps), sports/electrolyte drinks, soups, sauces, snack/meal bars

**Monobasic potassium phosphate**
Which is also in...
- dairy products, frozen meats, fruits, vegetables, & cereals
What is in Pfizer’s COVID-19 vaccine?

- **Sodium chloride**
  - Basic table salt

- **Dibasic sodium phosphate dihydrate**
  - Which is in...
    - Various desserts, puddings, cream of wheat, & jell-o

- **Sucrose**
  - Which is **table sugar**, naturally found in fruits and vegetables, and added to almost everything sweet (chocolate, cookies, cakes...)
What is in Pfizer’s COVID-19 vaccine?

**Cholesterol**
Fat-like substance found in all animal cells (ours included).

High content found in **eggs, cheese, meat, & fish**

**1,2-Distearoyl-sn-glycero-3-phosphocholine**
Which is a phospholipid that contains both a lipid and phosphate group

Lecithin is a very common example found in **red meat, eggs, seafood, soybeans, & black beans**
What is in Pfizer’s COVID-19 vaccine?

2 [(polyethylene glycol)-2000]-N,N-ditetradecylacetamide

- Polyethylene glycol found in numerous medications and laxatives
- N,N-ditetradecylacetamide is a lipid complex for delivering nucleic acid
- Basically used as a vehicle to deliver the other dissolved components

((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)

- Hexyldecanoate used as food additive in flavorings.
- Hexane-6,1-diyl is a fatty alcohol, similar to waxy skin naturally found on fruits.
- It promotes uptake of nucleic acids.
What is in Moderna’s COVID-19 vaccine?
What is in Moderna’s COVID-19 vaccine?

**Sucrose**
Which is table sugar, naturally found in fruits and vegetables, and added to almost everything sweet (chocolate, cookies, cakes...)

**Sodium acetate**
Primary flavoring in salt and vinegar potato chips
Add to foods to prevent bacterial growth

**Acetic acid**
Souring agent used in vinegar, pickled vegetables, and sauces
What is in Moderna’s COVID-19 vaccine?

**Tromethamine hydrochloride**
- Amine compound for pH control, amines are commonly found in fermented and grilled foods
- Used in medication to maintain the pH of body fluids

**DSPC**
- 1,2-DISTEAROYL-SN-GLYCERO-3-PHOSPHOCHOLINE
- Form of glycerophospholipid, cellular membranes of all cells and organelles
- Common inactive ingredient in pharmaceuticals
- Used to form liposomes, spherical lipid for drug delivery

**Cholesterol**
- Fat-like substance found in all animal cells (ours included).
- High content found in eggs, cheese, meat, & fish.
What is in Moderna’s COVID-19 vaccine?

**SM-102**

**HEPTADECAN-9-YL 8-{(2-HYDROXYETHYL) (6-OXO-6-{UNDECYLOXY}HEXYLAMINO)OCTANOATE)**

A novel lipid delivery system developed by Moderna prior to 2018

- Heptadecane, found in **lemon balm, coconuts, and orange bell peppers**
- Hydroxyethyl, naturally occurring compound derived from **plant cellulose**
- Octanoate, a metabolite of **Saccharomyces cerevisiae** (the yeast used to make sourdough, wine, and beer)

**PEG2000-DMG**

**POLYETHYLENE GLYCOL [PEG] 2000 DIMYRISTOYL GLYCEROL [DMG]**

Prepares lipid nanoparticles, common in anticancer drugs

- PEG common food additive in **drink mixes, dressings, food coloring**
- DMG is a glycerolipid that helps form the structure of **plant and animal membranes**
What is in J&J’s COVID-19 vaccine?
What is in J&J’s COVID-19 vaccine?

**Citric acid monohydrate**
- Found in all citrus fruits
- Used in pharmaceuticals for antioxidant properties (prevents cell damage)

**Trisodium citrate dihydrate**
- Anticoagulant, used in food preservatives and flavorings in drink mixes, yogurt, ice cream
What is in J&J’s COVID-19 vaccine?

- **Ethanol**: Found in all alcoholic beverages
- **Sodium Chloride**: Basic table salt
- **Polysorbate 80**: An emulsifier that stabilizes liquid mixtures in foods such as ice cream, custard, sherbert, whipped cream
What is in J&J’s COVID-19 vaccine?

2-hydroxypropyl-β-cyclodextrin (HBCD)

A cyclic oligosaccharide (cyclodextrin), mix of simple sugars, found in food additives to stabilize flavors

Improvess solubility in liquid

Sodium hydroxide & hydrochloric acid

Used as acidity regulators, they react together to form water and harmless salts

Sodium hydroxide is an ingredient in many food preservatives (often in canned foods)

Hydrochloric acid is found in vegetable juices, canned goods, and corn syrup
Pfizer Trial

43,448 participants, age 16+
21,720 vaccine, 9 cases (.00041436)
21,728 placebo, 169 cases (.00777798)

\[ \frac{.00041436}{.00777798} = .053 \]

= 94.7% efficacy

Phases 3 July-Nov 2020
Modern Trial

28,207 participants, age 18+
14,134 vaccine, 11 cases (.00077827)
14,073 placebo, 185 cases (.01314574)

\[ \frac{0.00077827}{0.01314574} = 0.059 \]

= 94.1% efficacy

Phases 3 July-Nov 2020
38,484 participants, age 18+
19,306 vaccine, 65 cases (.00336683)
19,178 placebo, 193 cases (.01006361)

\[
\frac{0.00336683}{0.01006361} = 0.3345
\]

= 66.55% efficacy

Phases 3 Sep-Jan
How COVID-19 Vaccines Work

• All of the vaccines aim to build spike proteins, like those surrounding the coronavirus.

• Predominant vaccine types either deliver the spike protein genetic code via messenger RNA (mRNA) or DNA embedded within an inactive virus.

• This trains the bodies natural immune system to recognize the spikes and either block or destroy them.
Cells contacting the vaccine

Read the code and build spikes
Detect spike fragments and raise the alarm
B Cells

Develop and secrete antibodies that bind to spike proteins and prevent them from attaching to other cells.
Antibodies latch onto spikes to prevent infection.
Killer T Cells

Destroy cells infected with coronavirus
Greater risk of disease, hospitalization and death among unvaccinated vs. vaccinated people: National estimates

At current incidence, 35,000 symptomatic infections per week among 162 million vaccinated Americans

Data from COVID Tracker as of July 24, 2021. Average incidence 100 cases per 100,000 persons per week. Vaccine effectiveness against symptomatic illness = 88% (Lopez Bernal et al, NEJM 2021), where risk is [1 – VE] or 12%. Vaccine effectiveness hospitalization (or death) = 96% (Stowe et al, PHE preprint), where risk is [1 – VE] or 4%. Rate in unvaccinated = Community rate/((1-fully vaccinated coverage) + (1-VE)*fully vaccinated coverage). Rate in fully vaccinated=(1-VE)*Rate in unvaccinated. Fully vaccinated coverage proportions were from COVID Data Tracker as of July 24, 2021 (50% for US).
Transmission of Delta variant vs. ancestral strain and other infectious diseases

Delta variant is **more** transmissible than:
- MERS & SARS
- Ebola
- Common cold
- Seasonal flu & 1918 (“Spanish”) flu
- Smallpox

Delta variant is **as** transmissible as:
- Chicken Pox
Delta variant vaccine breakthrough cases may be as transmissible as unvaccinated cases

- Breakthrough cases reported to national passive surveillance have lower Ct values by 3 cycles (~10-fold increase in viral load) for Delta (Ct=18, n=19) compared with Alpha (Ct=21, n=207) and other lineages (Ct=21, n=251)

- Barnstable County, MA, outbreak: No difference in mean Ct values in vaccinated and unvaccinated cases [median among vaccinated (n=80): 21.9; unvaccinated (n=65): 21.5]

(CONFIDENTIAL – preliminary data, subject to change)
Pfizer 2-Dose Vaccine Effectiveness for Alpha vs. Delta

England/Scotland
- Confirmed Infection: Alpha 79, Delta 88
- Symptomatic Disease: Alpha 96
- Hospitalization: Alpha

Canada
- Symptomatic Disease: Delta 96
- Hospitalization Or Death: Delta 100

Israel
- Confirmed Infection: Alpha
- Symptomatic Disease: Delta 64
- Hospitalization Or Death: Delta 64

*Note two different time periods in Israel

References:
- Lopez Bernal et al. medRxiv preprint: https://doi.org/10.1101/2021.05.22.21257658
- Nasreen et al. medRxiv preprint: https://doi.org/10.1101/2021.06.28.21259420
Delta infections associated with higher viral load and duration of shedding: Published evidence

- India report of lower cycle threshold (Ct) values in Delta breakthrough cases in HCW (n=47, mean Ct 16.5) compared to non-Delta breakthrough cases (n=22, mean Ct 19); also larger cluster size with Delta breakthrough

- Delta infection associated with longer duration of Ct values ≤30 [median 18 days vs. 13 days for ancestral strains]

- Risk of reinfection with Delta may be higher [aOR 1.46 (CI 1.03-2.05)] compared to Alpha variant, but only if prior infection ≥180 days earlier

Micbocha et al. doi: 10.21203/rs.3.rs-637724/v1
Preliminary VE estimates assessing duration of protection for 2 doses of mRNA vaccines

- VISION (test negative design across 8 integrated healthcare systems), data through June 22, 2021
  - VE against hospitalization 88% (CI 86-90)
  - No evidence of waning immunity to 16 weeks post-2nd dose
- IVY3 (test negative design across 21 hospitals), data through June 2021
  - VE against hospitalization 87% (CI 85-97)
  - No evidence of waning immunity through 20 weeks post-2nd dose
- Healthcare personnel (test negative design across 33 sites), data to May 31, 2021
  - VE against symptomatic infection 90%
  - No evidence of waning immunity through 14 weeks post-2nd dose

(CONFIDENTIAL – preliminary data, subject to change)
Vaccine breakthrough cases may reduce public confidence in vaccines

- Vaccine **breakthrough cases are expected** and increase as a proportion of total cases as vaccine coverage increases.

- Vaccine breakthrough cases will occur more frequently in congregate settings, and in groups at risk of primary vaccine failure (i.e., immune compromised, elderly, etc.)

- Communication challenges have been associated with increasing proportions of cases vaccinated **even when vaccine effectiveness (VE) remains stable**
  - Concerns from local health departments about VE
  - Public convinced vaccines no longer work/booster doses needed
  - **Important to update communications describing breakthrough cases as “rare” or as a “small percentage” of cases**