Comparing COVID Vaccines: Pfizer vs. Moderna vs. AstraZeneca/Oxford

By Alex Berezow, PhD — November 23, 2020

Pfizer and Moderna are producing fewer but more effective (and pricier) vaccines, while AstraZeneca is making a greater number of less effective (and cheaper) vaccines.

Over the past several days, the world has received monumentally good news: Vaccines exist against the coronavirus, and they are effective. Even better, vaccines are being developed by multiple companies.

Among the many questions that will follow is, "Which vaccine is best?" The answer is tricky because several factors go into describing a "good" vaccine. For example, which vaccine is better: One that causes no side effects and is 80% effective or one that causes rare but lethal side effects and is 99.9% effective? The answer isn't immediately obvious.

In an attempt to clarify this, we have compiled information from multiple news sources to create a chart that compares what is currently known about the three major vaccines that have made global headlines.
Explaining the Chart

**Technology.** Both Pfizer and Moderna are using experimental technology that employs mRNA [2]. There is currently no vaccine on the market that uses mRNA, so these vaccines are a world-first. The AstraZeneca vaccine is based on time-tested technology that employs a harmless cold virus (called adenovirus) that has been genetically modified to stimulate an immune response against the coronavirus.

**Efficacy.** Much to everyone’s surprise, the experimental mRNA vaccines are most effective (95%), while the time-tested adenoviral vector vaccine shows only 62% to 90% efficacy.

**Storage temperature.** Pfizer's vaccine poses a logistical problem. It has to be stored at -94° F, which is an obscenely cold temperature that requires specialized freezers. Moderna’s vaccine can be stored in a normal freezer, while AstraZeneca’s can be stored in a regular refrigerator.

**Shelf-life.** Once again, Pfizer's vaccine poses a unique challenge. Once it’s out of the deep freeze, it’s only good for 5 days. Moderna’s does better at 30 days, while AstraZeneca’s can last 6 months.

**Price per dose.** As shown, both Pfizer and Moderna plan to profit from the vaccine. (There’s nothing wrong with that.) AstraZeneca does not (yet), which is why its vaccine is so cheap. However, the company says that it will seek profits after the pandemic ends.

**Doses by end of 2020.** Here, there’s no contest. AstraZeneca can deliver the most doses the fastest. (Note that all three vaccines require two doses.)

**So, Which Vaccine Is Best?**

As shown, it’s hard to answer this question. A 95% effective vaccine is better than a 62% to 90% effective vaccine, but 200 million doses is better than 20 million to 50 million doses. In short, Pfizer and Moderna are producing fewer but more effective (and pricier) vaccines, while AstraZeneca is making a greater number of less effective (and cheaper) vaccines.

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