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BRIEF19

A daily review of covid-19 research and policy.

RESEARCH BRIEFING

Comparing current vaccine candidates.

Johnson & Johnson released a study protocol last week, describing a plan to enroll 60,000 patients across the United States for its phase III trial designed to assess the safety and effectiveness of its candidate for a SARS-CoV-2 vaccine. In this brief we compare the Johnson & Johnson, AstraZeneca and Moderna vaccines. All three companies have candidate vaccines in Phase III trials that target the S protein.

These vaccines share a common strategy of prompting the body to generate antibodies that recognize SARS-CoV-2 virus particles, surround the particles and mark them for destruction. Johnson & Johnson and AstraZeneca have used a more traditional approach. These two are created by splicing DNA for the S-protein of SARS-CoV-2 into the genome of a carrier virus. This carrier virus can infect human cells but it cannot replicate. Johnson & Johnson uses Ad26, an adenovirus, while AstraZeneca uses ChAdOx1, a chimpanzee adenovirus. The Moderna vaccine uses nanoparticles to deliver RNA encoding the S-protein. The table below summarizes the three vaccines.

	Target	Stage	Participants	Frozen	Doses	How it works
J&J	Spike Protein	Phase III	60,000	No	1	Contains S-protein DNA, recipient makes antibodies against S, which SARS-CoV-2 needs to enter cell
AstraZeneca			30,000	Yes	2	
Moderna			30,000	Yes	2	Contains RNA that instructs recipients cells to make S protein

The high-level view is that targeting the S-protein is likely to provide immunity against this version of SARS-CoV-2. New vaccines may be required each year and the vaccine may be more effective in some years than others. Furthermore, some vaccine approaches may be more effective in certain groups. For example, the Moderna vaccine may be safer in patients with autoimmune conditions, because it does not use a functioning virus. One barrier that each of these candidates carry a logistical component to their success, as they all require some degree of refrigeration, which will complicate delivery and storage to areas with less infrastructure.

—Michael Chary, MD PhD

[1] The Spike or S protein studs the coronavirus shell. Coronaviruses are named as such because the pattern of S protein studding resembles a crown (*corona* in Latin) under the microscope. SARS-CoV-2 uses the S protein to bind to cells that line the respiratory tract.

[2] Adenoviruses cause mild upper respiratory infections, and were first isolated from the adenoids, as the name indicates. Scientists have created versions of adenoviruses that can infect cells but not replicate, allowing them to shuttle material into the cell, somewhat like a “drug mule”.

[3] An RNA vaccine contains RNA, rather than protein or DNA. One role of RNA is to serve as an intermediary template for the synthesis of proteins. Moderna’s vaccine contains RNA that directs the cell to make the S protein, which, in theory will then prompt the body to generate antibodies against the S-protein.

POLICY BRIEFING

New authorization for point-of-care testing

The United States Food and Drug Administration (FDA) has issued an Emergency Use Authorization (EUA) for the first antibody point-of-care (POC) covid-19 test. POC tests generally refer to tests that generate results on-the-spot without the need to send the sample to a laboratory for analysis or processing. Home pregnancy tests are a common example of a POC test.

Initially authorized for use by certain labs in July, the EUA has since been expanded to authorize POC use on fingerstick samples (note: fingerstick samples refer to small amounts of blood drawn from a pinprick needle applied to the tip of a finger; blood glucose levels are often obtained in this way). This EUA will allow the covid-19 antibody test to be deployed in any setting, unlike the original agreement, which required shipment to a central lab for analysis. The FDA has granted over 50 serology (i.e. blood tests) EUAs, most recently an inexpensive self-contained test in September, as well as novel salivary tests. But this latest authorization marks the first POC test with such simple collection and processing.

While the expanded amount of data this test will provide may be beneficial in contact tracing and exposure, it is not yet known what degree of immunity, if any, the presence of antibodies gives to patients, nor how long such proteins and the immunity they provide may last after exposure. For a more complete list of FDA EUAs related to the pandemic, please visit the FDA's dedicated portal. *The Food and Drug Administration.*

—Joshua Lesko, MD