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Understanding the front runner COVID-19 vaccines

South Africa has overcome the second wave of COVID-19 infection. However, as experts warn, a third wave of infection could be upon us soon.

It's important that we all understand how the various COVID-19 vaccines being developed globally work.

This article looks at various global front-runner vaccines in detail. We summarise what you need to know, from how the vaccine works to efficacy, storage, side-effects, dose and more.

Now, let's take a look at each of the various global front-runner vaccines in detail.

Johnson & Johnson vaccine (USA)

- **Efficacy:** 64% efficacy against moderate to severe disease
 - 82% against severe disease against South African 501Y.V2 variant
- **Storage:** For 3 months when refrigerated at 2 to 8 degrees C. And, for 2 years when frozen at -20 degrees C.
- **Side-effects:** Initial safety information released for the vaccine shows that the most common reactions after the vaccine was administered included injection site pain, fatigue, headache and muscle aches.
- **Age groups that the vaccine has been authorized for:** ages 18 and up
- **Number of vaccine doses needed:** One dose

Pfizer-BioNTech vaccine (USA/Germany)

- **Efficacy:** 95% after the second dose.
 - Efficacy against variants unknown at time of writing, [however testing was underway](#)
- **Storage:** 5 days under normal refrigeration at 2 to 8 degrees C. Beyond 5 days, this vaccine must be stored at -70 degrees C
- **Side-effects:** Side effects (such as fever, chills, tiredness, and headache throughout the body) were more common after the second dose of the vaccine. Most side effects were mild to moderate. Allergic reaction could occur within 4 hours of getting vaccinated, including symptoms such as hives, swelling, or wheezing (respiratory distress). This includes allergic reactions to polyethylene glycol (PEG) and polysorbate.
- **Age groups that the vaccine has been authorized for:** ages 18 and up
- **Number of vaccine doses needed:** 2 doses, 21 days apart

Moderna vaccine (USA)

- **Efficacy:** 94.5%
 - Efficacy against variants unknown at time of writing, however [testing was underway](#)
- **Storage:** for 30 days under normal refrigeration at 2 to 8 degrees, and for 6 months at -20 degrees C
- **Side-effects:** Side effects such as fever, chills, tiredness, and headache throughout the body were more common after the second dose of the vaccine. Most side effects were mild to moderate. Allergic reaction could occur within 4 hours of getting vaccinated, including symptoms such as hives, swelling, or wheezing (respiratory distress). This includes allergic reactions to polyethylene glycol (PEG) and polysorbate.
- **Age groups that the vaccine has been authorized for:** ages 18 and up
- **Number of vaccine doses needed:** 2 doses, 28 days apart.

Oxford/AstraZeneca vaccine (UK/USA)

- **Efficacy:** 70% against the COVID-19 virus variant dominant in the first global wave of COVID-19 infections. In clinical trials, when the vaccine was given as a half dose followed by a full dose a month later, efficacy was reported at 90%. When two full doses were given, a month later, efficacy was reported at 62%.
 - On 7 February 2021, preliminary data showed that this vaccine offers minimal protection (only a 22% efficacy) against illness caused by South Africa's now dominant 501Y.V2 COVID-19 virus variant (responsible for roughly 90% of COVID-19 infections in the country's second wave of infection)
- **Storage:** Refrigerate at a temperature of between 2 and 8 degrees C for up to 6 months.
- **Side-effects:** Mild to moderate in severity and usually resolve within a few days of vaccination or injection site tenderness or pain, headache, fatigue; muscle pain, feeling unwell; fever, chills, joint pain and/ or nausea.
- **Age groups that the vaccine has been authorized for:** ages 18 and up
- **Number of vaccine doses needed:** 2 doses, 4 -12 weeks apart

Novavax vaccine (UK)

- **Efficacy:** 89.3% in the case of infection with the strain of COVID-19 dominant in 2020.
 - 85% effective against the COVID-19 variant identified in the United Kingdom
 - 60% effective against the variant identified in South Africa. Novavax is [working on a new vaccine](#) that will target the new variant and expects to start testing it in a few months.
- **Storage:** Refrigerate at a temperature of between 2 and 8 degrees C (temperatures attainable in most common fridges)
- **Side-effects:** pain at the injection site, headaches, muscle pain and fatigue.
- **Age groups that the vaccine has been authorized for:** ages 18 and up
- **Number of vaccine doses needed:** 2 doses, 3 weeks apart

(Gamelya) Sputnik V vaccine (Russia)

- **Efficacy:** 91.4%
 - Efficacy against variants unknown at time of writing, with research underway
- **Storage:** Refrigerate at a temperature of between 2 and 8 degrees C
- **Side-effects:** Flu-like symptoms which may include fever, fatigue, weakness and headaches
- **Age groups that the vaccine has been authorized for:** ages 18 and up
- **Number of vaccine doses needed:** 2 doses, 2 weeks apart

Sinovac (CoronaVac) vaccine (China)

- **Efficacy:** Vaccine efficacies of 50%, 65%, 78% and 91% from various trial results from participating countries have been reported.
 - Efficacy against variants unknown at time of writing
- **Storage:** Refrigerate at a temperature of between 2 and 8 degrees C for five months
- **Side-effects:** Fatigue and fever and low-grade muscle pain
- **Age groups that the vaccine has been authorized for:** Ages 65 and over
- **Number of vaccine doses needed:** 2 doses 3 to 4 weeks apart

Sinopharm vaccine (China)

- **Efficacy:** 79.34%
 - Efficacy against variants unknown at time of writing
- **Storage:** Refrigerate at a temperature of between 2 and 8 degrees C for 24 months
- **Side-effects:** Headaches, muscle aches and fever
- **Age groups that the vaccine has been authorized for:** Aged 18 to 59
- **Number of vaccine doses needed:** 2 doses 3 to 4 weeks apart

CanSino Biologics vaccine (China)

- **Efficacy:** Interim analysis of data showed 65.7% effective in preventing symptomatic cases and 95.47% effective in preventing severe disease 14 days after vaccination. This fell to an efficacy rate of 65.28% at preventing symptomatic cases and 90.07% at preventing severe disease 28 days after a single dose. Late-stage clinical trials with the vaccine are still ongoing, and ultimate efficacy is not yet known. The vaccine has gained emergency use authorisation in Pakistan and Mexico and in China, been administered to military personnel since June 2020. However no detailed study results are publicly available yet.
 - Efficacy against variants unknown at time of writing
- **Storage:** Refrigerate at a temperature of between 2 and 8 degrees C for 24 months
- **Side-effects:** Headaches, muscle aches and fever
- **Age groups that the vaccine has been authorized for:** Late-stage clinical trials with the vaccine are ongoing.
- **Number of vaccine doses needed:** One