

UPDATES:

Vaccine development and rollouts; Emerging SARS-CoV-2 variants

PAPUA NEW GUINEA PRIVATE SECTOR COVID-19 COMMITTEE

Monday 11 January 2021, 16:00 – 17:00 (PNG Time)

Robert Makombe, FHI 360

Types of Covid-19 Vaccines

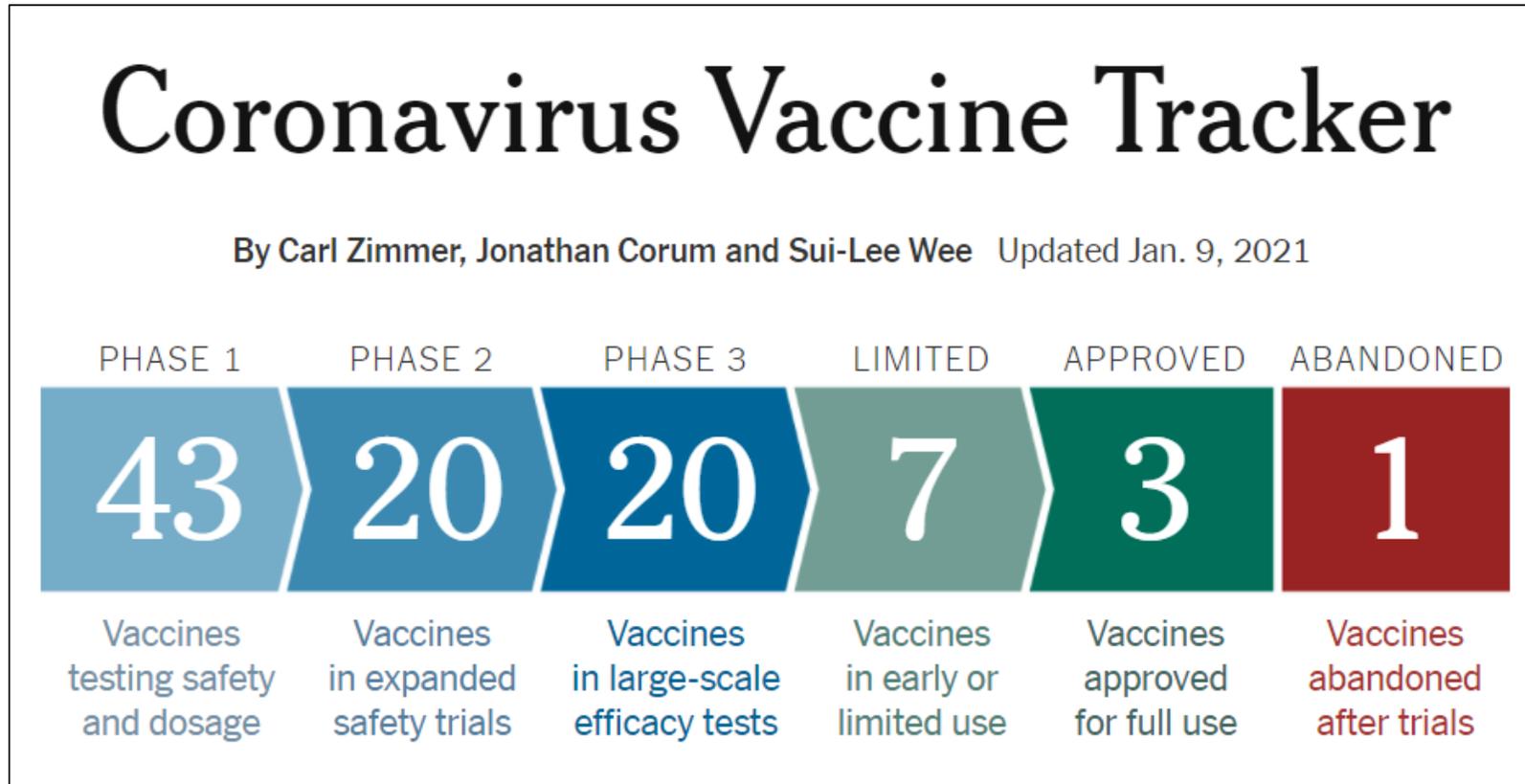
The body develops an immune response to an **antigen** (any substance that comes from outside the body)

- Some vaccines try to smuggle the antigen into the body
- Others use (hijack) the body's own cells to make the antigen

Type	Mechanism	Challenges
Whole virus	Use whole virus (with antigens) to trigger an immune response. Two types: <ul style="list-style-type: none"> • Live attenuated (replicate but don't cause disease) • Inactivated (cannot replicate) 	<ul style="list-style-type: none"> • Live attenuated vaccine can cause disease in people with low immunity • Both require cold storage
Protein subunit	Use antigens (often fragments of protein) from virus to trigger immune response	<ul style="list-style-type: none"> • Often trigger lower immune response and need adjuvants to boost the response
Viral vector	Use a harmless virus to carry genetic materials to instruct to cells to make viral antigen to trigger immune response.	<ul style="list-style-type: none"> • Previous exposure to the viral vector may reduce the immune response
Nucleic acid	Use genetic material (RNA, DNA) to instruct cells to make viral antigen to trigger immune response	<ul style="list-style-type: none"> • Require ultra-cold temperatures (-20 to -70 deg Celsius)



The Path to a Covid-19 Vaccine



<https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html>



The Path to a Covid-19 Vaccine

Covid-19 vaccines, to January 6th 2021

Approved by: ● Stringent regulators ● Other regulators

Producer	Name	Type	Price per dose, \$*	Doses delivered in 2020 and promised for 2021*	Approved in
● AstraZeneca-Oxford Uni.	AZD1222 [†]	Viral vector	1.50-4	 3.0bn in total	Britain, India and 3 others
Novavax	NVX-CoV2373	Protein subunit	16	 2.1bn	–
● Pfizer-BioNTech	tozinameran	mRNA	19.50	 1.4bn	Britain, EU, US and 21 others
● Sinopharm	BBIBP-CorV	Inactivated	<77	 1.3bn	Bahrain, China, Egypt, UAE
● Gamaleya Centre	Sputnik V	Viral vector	<10	 1.0bn	Argentina, Belarus, Russia
Johnson & Johnson	JNJ-78436735	Viral vector	10	 1.0bn	–
● Sinovac Biotech	CoronaVac	Inactivated	14	 900m	China
● Moderna	mRNA-1273	mRNA	32-37	 770m	Canada, EU, Israel, US
● Bharat Biotech-ICMR	Covaxin	Inactivated	1	 720m	India

<https://www.economist.com/briefing/2021/01/09/the-great-task>

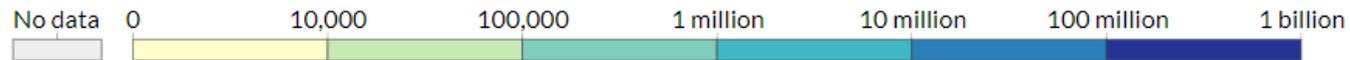
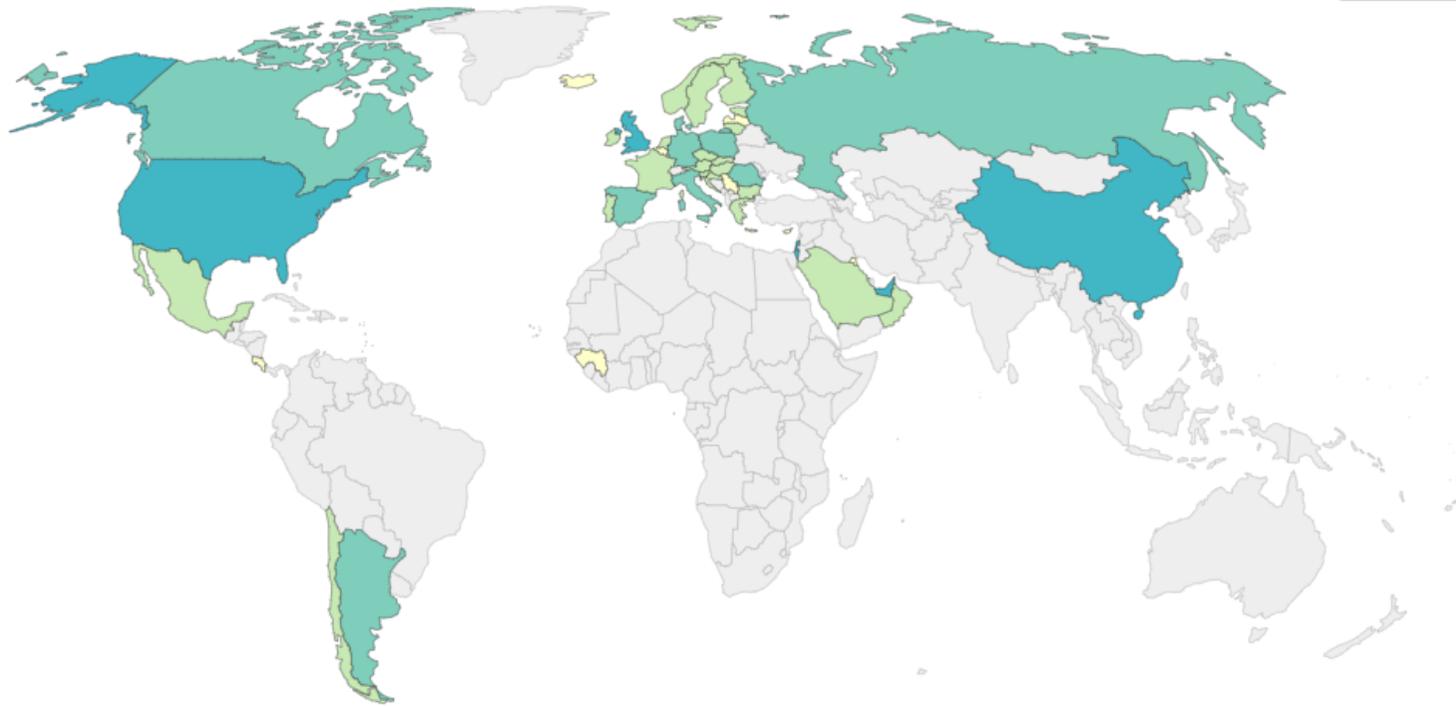


Cumulative COVID-19 vaccination doses administered, Jan 10, 2021

This is counted as a single dose, and may not equal the total number of people vaccinated, depending on the specific dose regime (e.g. people receive multiple doses).



World



Source: Official data collated by Our World in Data - Last updated 10 January, 20:00 (London time)

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Emerging SARS-CoV-2 Variants

- All viruses undergo genetic changes (mutations) – most changes don't affect how infectious or deadly the virus is.
- Many variants of SARS-CoV2 in circulation globally
- UK variant (20B/501Y.V1, VOC 202012/01, or B.1.1.7 lineage. Emerged ~September 2020)¹
 - Spreading rapidly. Now in at least 45 other countries, including Australia
 - More infectious (up to 70% more), affects greater population <20 years, not more lethal than other strains²
- South African variant (20C/501Y.V2 or B.1.351 lineage. First detected October 2020)¹
 - Also spreads more easily and quickly than other variants, but currently no evidence that it causes more severe illness or increased risk of death
 - Spread to at least 13 other countries, including Australia



1. <https://www.cdc.gov/coronavirus/2019-ncov/more/science-and-research/scientific-brief-emerging-variants.html>

2. <https://www.imperial.ac.uk/news/211793/new-covid-19-variant-growing-rapidly-england/>

Emerging SARS-CoV-2 Variants

Implications

- Vaccines stimulate the immune system to build an arsenal of cells to bind to many different parts of the virus.
- Therefore, mutations in a few spots are unlikely to reduce vaccine efficacy
- New research suggests Pfizer's COVID-19 vaccine protects against the UK and South African variants. Expected to be the same for the Moderna and AstraZeneca vaccines
- Currently there is no evidence to suggest that the variant has any impact on the severity of disease or vaccine efficacy.

1. <https://www.cdc.gov/coronavirus/2019-ncov/more/science-and-research/scientific-brief-emerging-variants.html>
2. <https://www.imperial.ac.uk/news/211793/new-covid-19-variant-growing-rapidly-england/>

