Science is the Exit Strategy:
Lessons from the Story of Covid19 Vaccine Development

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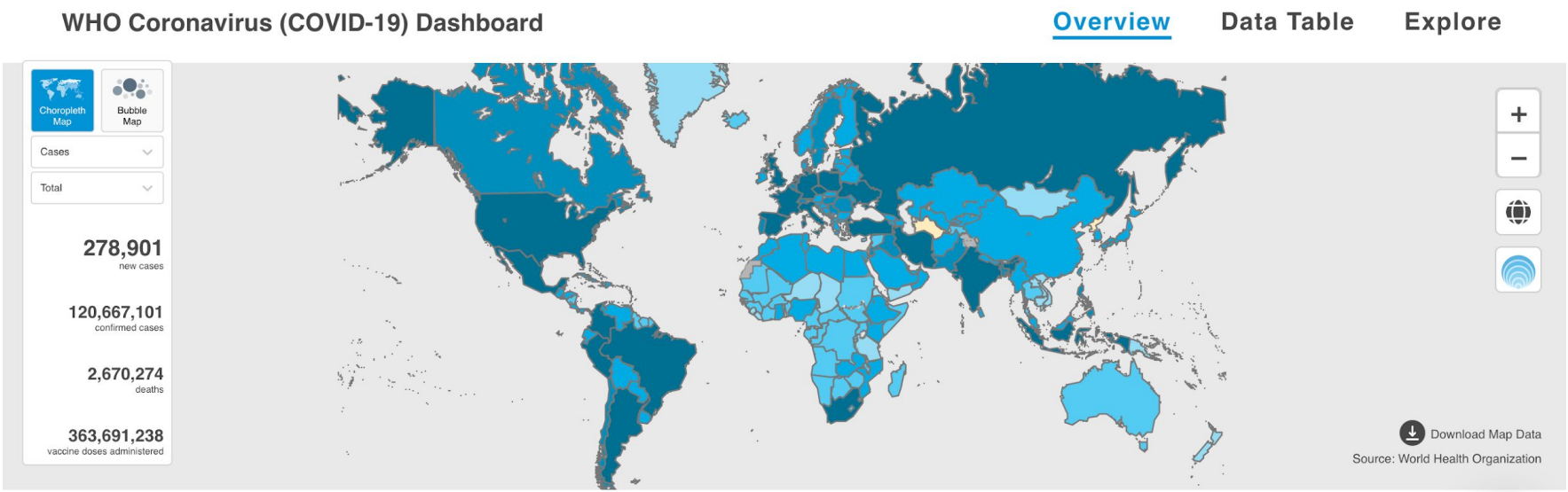
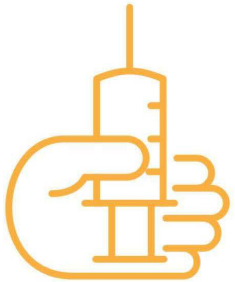
CIFAR



Globally, as of **1:27pm CET, 18 March 2021**, there have been **120,667,101 confirmed cases** of COVID-19, including **2,670,274 deaths**, reported to WHO. As of **16 March 2021**, a total of **363,691,238 vaccine doses** have been administered.

How vaccines work

- Vaccines greatly reduce the risk of infection by training the immune system to recognize and fight pathogens such as viruses or bacteria
- Vaccines safely deliver an **immunogen** which is a *specific type of antigen that elicits an immune response*, to train the immune system to recognize the pathogen when it is encountered naturally.



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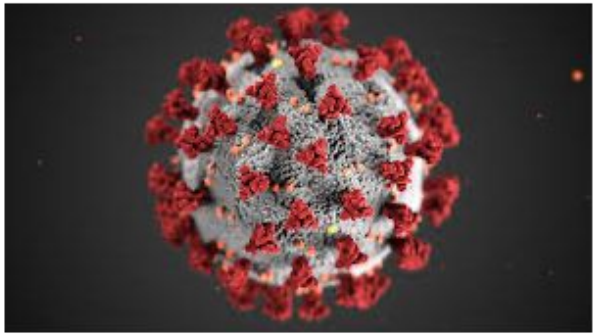


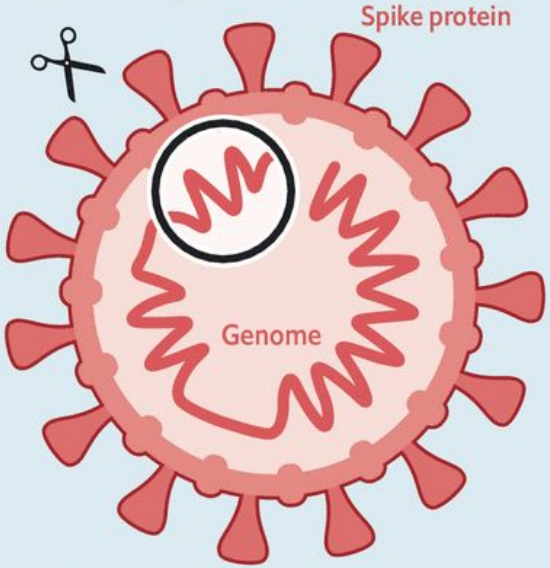
DEAD OR ALIVE!

Armed intervention

Genetically engineered covid-19 vaccine types

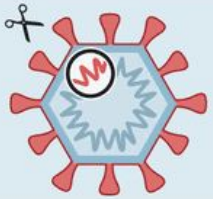
Take the virus and make a...

Isolate the gene which describes the SARS-CoV-2 spike protein and...



...vaccine...

...for a **recombinant vector vaccine,** put it in another virus so that it makes spike proteins too.

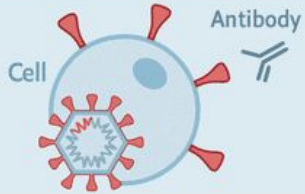


...for a **subunit vaccine,** use it to mass produce spike proteins.

...for a **nucleic-acid vaccine,** just make lots of copies of the spike protein gene.

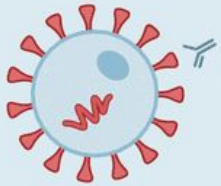
...which shows the immune system this

Cells infected by the vaccine produce spike protein as if they were infected by SARS-CoV-2



Lots of copies of free-floating spike protein

Cells which have taken up the gene producing spike protein and thus looking infected

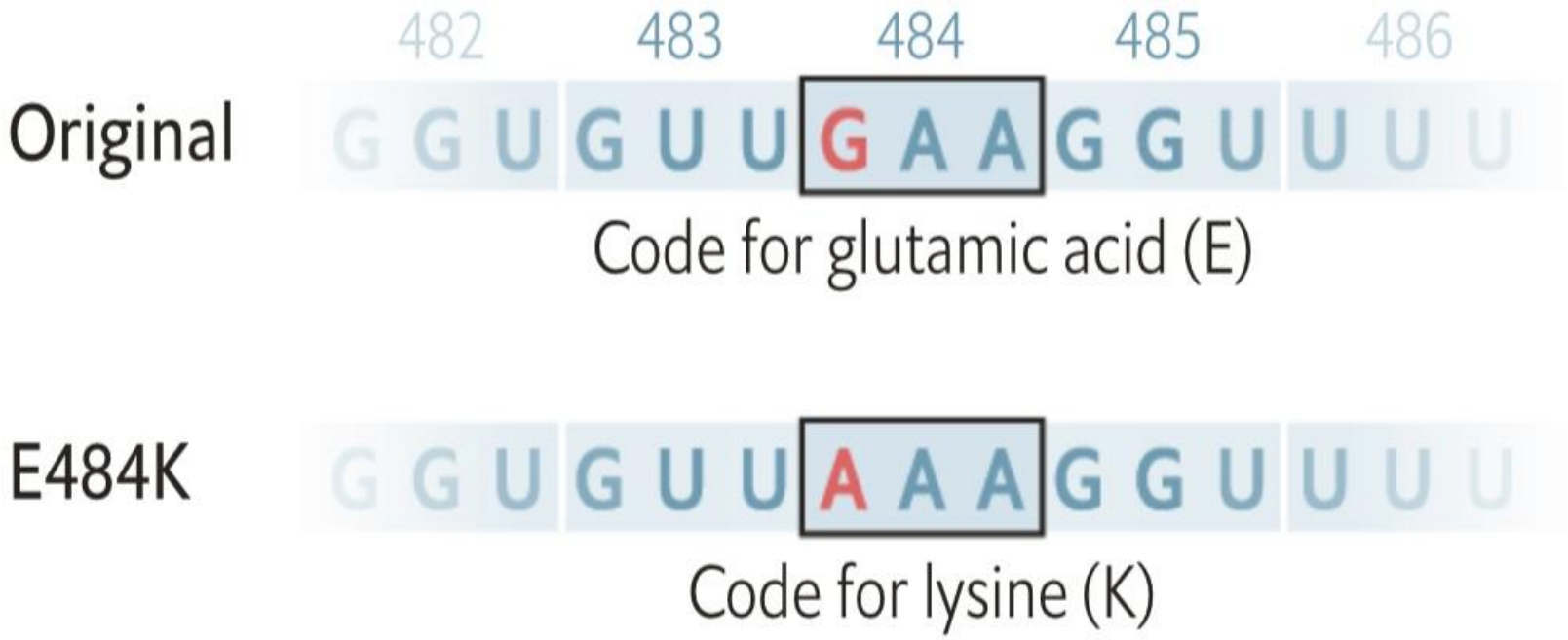


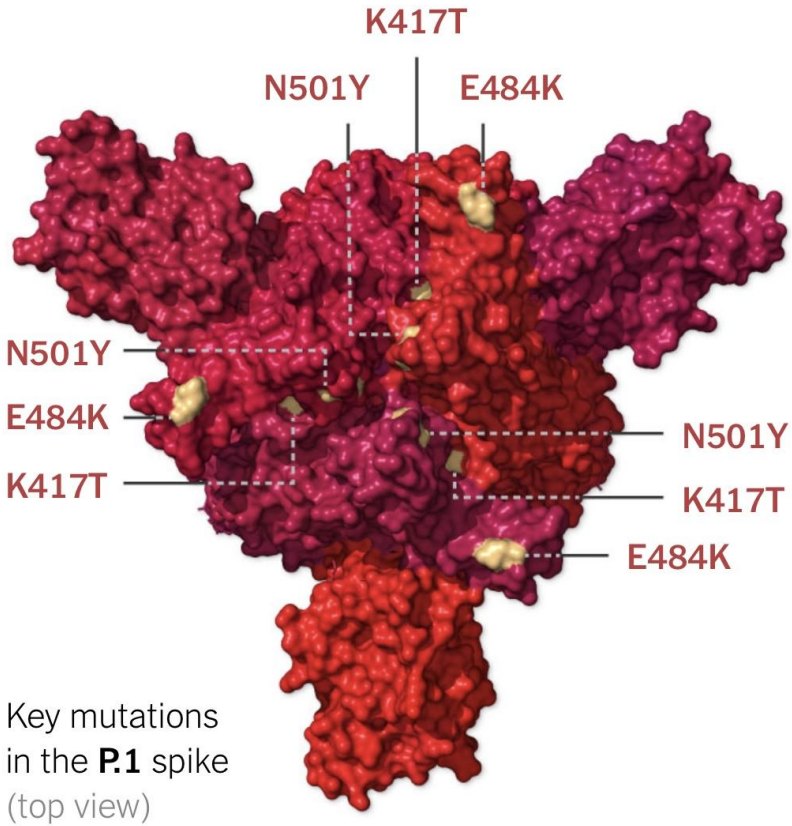
Source: *The Economist*

The Economist

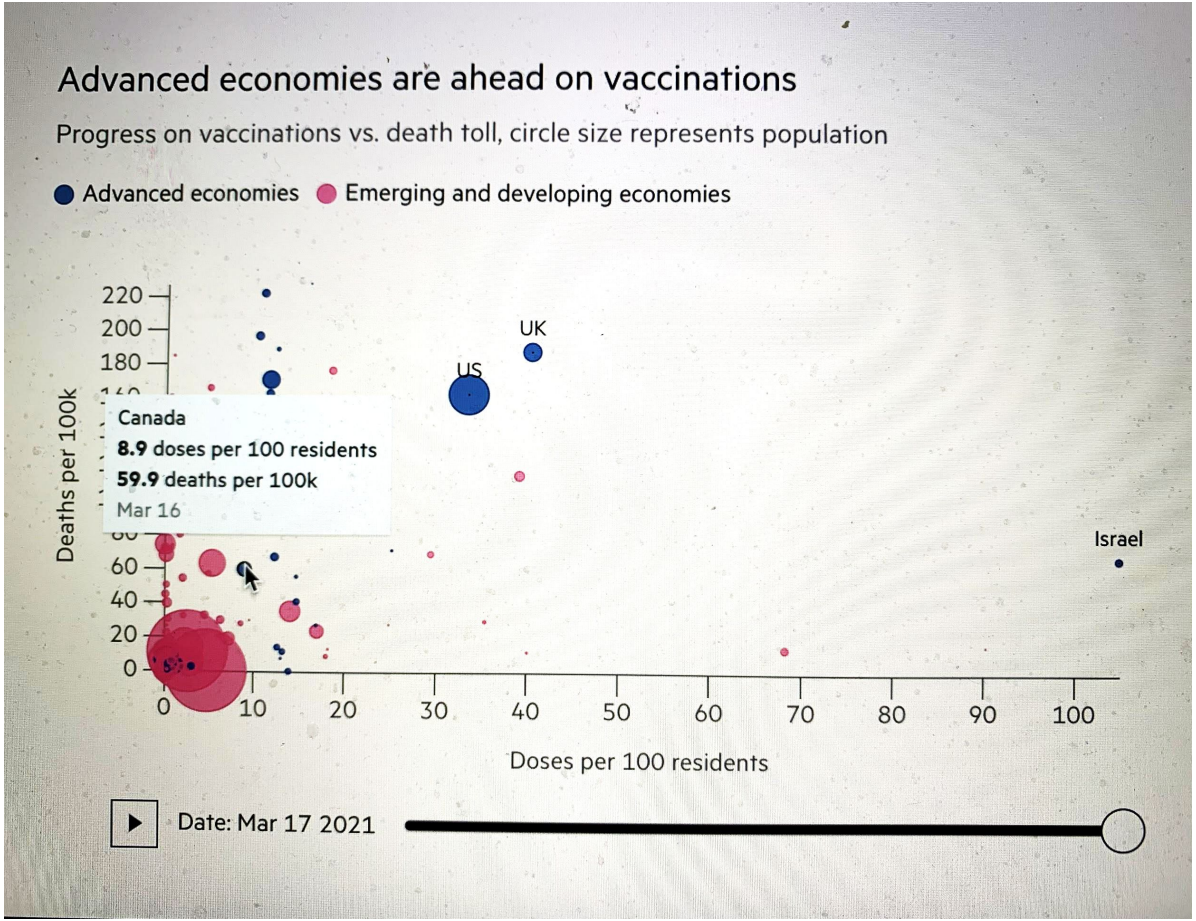
Source: https://www.economist.com/briefing/2020/04/16/can-the-world-find-a-good-covid-19-vaccine-quickly-enough

Spike-protein gene





Key mutations
in the **P.1** spike
(top view)


Advanced economies are ahead on vaccinations
Progress on vaccinations vs. death toll, circle size represents population
Advanced economies
Emerging and developing economies
Deaths per 100k
220
200
180
60
40
20
0
UK
US
Israel
Canada
8.9 doses per 100 residents
59.9 deaths per 100k
Mar 16
0
10
20
30
40
50
60
70
80
90
100
Doses per 100 residents
Date: Mar 17 2021