


If Global Citizens are people who make informed decisions that better themselves, others and the natural world, then while living through a viral pandemic it seems logical to be educated about this virus and the ways we can prevent it. The Life Sciences 11 curriculum also lends itself nicely to this topic.

During our Cells & Viruses unit, continuing the global citizenship and scientific literacy conversations, I developed this worksheet to supplement the Netflix documentary "Coronavirus Explained" which also sparked a large class discussion. As the educator, I remained as unbiased as possible as we discussed questions like What is a virus? How does our immune system react to viruses and other invaders? What is a vaccine? What types of vaccines are there? How do the different types of vaccines work? What is the structure of COVID-19 and how do the different vaccines work of this type of virus?

We also discussed why people might have fear surrounding vaccines and the history of vaccines that may impact our decisions now.

LIFE SCIENCES 11  
UNIT 1

**CORONAVIRUS EXPLAINED**  
"The race for the vaccine"



How long does it take a vaccine to "make it" start to finish? **10 years**

As of May 2020, how many vaccines were in the "race"? **> 100**

Our immune system has "memory" when it comes to intruders. Explain what this means.

- Immune system remembers antigen
- Has antibodies, recognizes intruder
- Immune system ramps up way faster

Why don't vaccines need to be perfect to end epidemics?

- Herd immunity
- Virus has trouble spreading when enough people are immune

Types of vaccines:

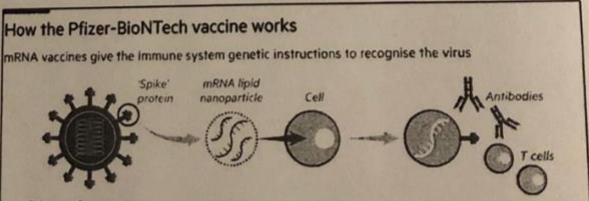
**1<sup>st</sup> generation vaccines (weakened virus)**  
-Inject a weakened version of the virus into the body - can't reproduce or do damage but still has antigen so immune system can learn what to watch out for

**2<sup>nd</sup> generation vaccines (antigens only)**  
-insert antigens into body so antibodies are created

**3<sup>rd</sup> generation vaccines (instructions)**  
-mRNA  
-gives our body instructions to produce antigens that activate immune response (produce antibodies)

**How the Pfizer-BioNTech vaccine works**

mRNA vaccines give the immune system genetic instructions to recognise the virus



Scientists focus on the genetic sequence for the virus's 'spike' protein. This is used to synthesise an mRNA sequence - instructions that cells can use to make the 'spike' protein

The synthetic mRNA is packaged in a lipid nanoparticle that delivers the instructions to a cell

Once inside the cell, its cellular machinery follows the mRNA instructions to produce the viral protein. This is displayed on the surface of the cell and stimulates an immune system response

Source: Pfizer  
TFT

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How many phases are there in clinical trials? How long do they usually take? 3 ; 4 years

How many viruses are a part of the human coronavirus family? 7

→ we already know stuff about coronaviruses  
→ head start on vaccine

What is CEPI? Coalition for Epidemic Preparedness Innovations

To reach Herd Immunity, what percentage of the people on earth must be vaccinated?

100% 4.7 bill.

List a few "roadblocks" the race for the vaccine must deal with:

- funding
- distribution
- politics
- making them (factories)
- money to buy
- vaccines made + approved

What is your opinion on "vaccine nationalism"? Do you think wealthier countries should share with poorer countries? Should rich countries pay more? Should poorer countries pay less? Explain your reasoning.

Additional thoughts:

Some reputable websites:

<https://www.cdc.gov/>

<https://www.who.int/>

<https://coronavirus.jhu.edu/>

<https://www.raps.org/news-and-articles/news-articles/2020/3/covid-19-vaccine-tracker>