COVID-19 Information Brochure #2 ALL ABOUT COVID-19 VACCINES

This brochure is a follow up for Brochure #1 with information on the SARS-II CoV
http://www.adastraletter.com/2020/2/brochure/

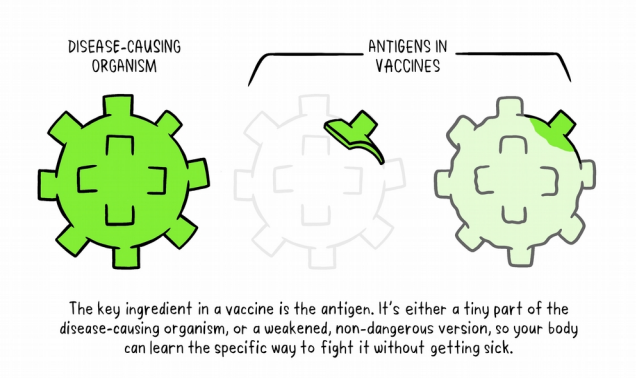
The brochure is available in five languages: English, Spanish, Korean, Albanian and Portuguese, it was prepared and translated by LaGuardia students.

The work was done under the supervision of Dr. A. Lucia Fuentes.

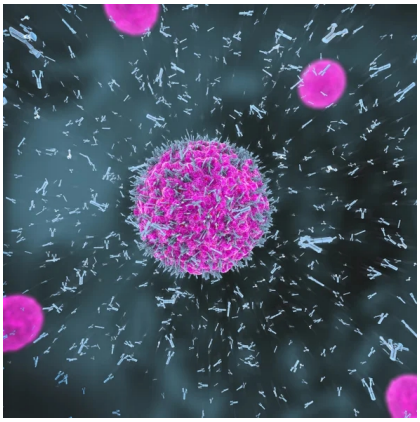
The summaries were extracted from the research term papers of the SCB-201 Honors class Spring 2021, with special contributions from Viona Agushi, Kayoung Lee, Mateo Ortiz, Alex Segundo and Edwin Galdamez. CRSP Scholars Felipe Perez and Gisela Ismaili and NIH-Bridges scholar Kerly Lozano edited and contributed images. Translations were as follows: Albanian by Viona Agushi and Gisela Ismaili; Korean by Kayoung Lee, Portuguese by Laura Pesoa and Spanish by Kerly Lozano and Felipe Perez. The project was a part of Dr. Fuentes initiative for the "Language Across the Curriculum" CTL Seminar.

1. **Our natural defense (immune system) serves as the basis for vaccines.**

   Our body's defense against disease-causing agents (pathogens) such as viruses, bacteria and fungi, is called the immune system response. The immune system is composed of many cells that are termed as macrophages, B-lymphocytes and T-lymphocytes. These cells that stream in our blood vary in size, shape and have the crucial role in protecting the organism by fighting off infections. When the body is introduced to a new pathogen, it may take several days to fight off the infection. Once the immune system has succeeded in destroying the pathogen, some T-lymphocytes are stored for future encounters with the same pathogen. If the body is invaded by a former pathogen, T-lymphocytes are capable of recognizing them and stimulating B-lymphocytes to rapidly produce antibodies. Antibodies (also known as immunoglobulins) are proteins of the immune system that identify and counteract with the specific molecule of the pathogen called antigen. The secondary immune response to the same pathogen is more effective compared to the primary encounter with the pathogen. This serves as the principal for how vaccines work; vaccines contain the weakened version of the pathogen and when they are injected to people, no serious disease is caused. From vaccination, the body produces T-lymphocytes and B-lymphocytes after a few weeks, this ensures a stronger defense against the particular pathogen in the future.



https://www.who.int/news-room/feature-stories/detail/how-are-vaccines-developed



https://blogs.scientificamerican.com/observations/beware-of-antibody-based-covid-19-immunity-passports/

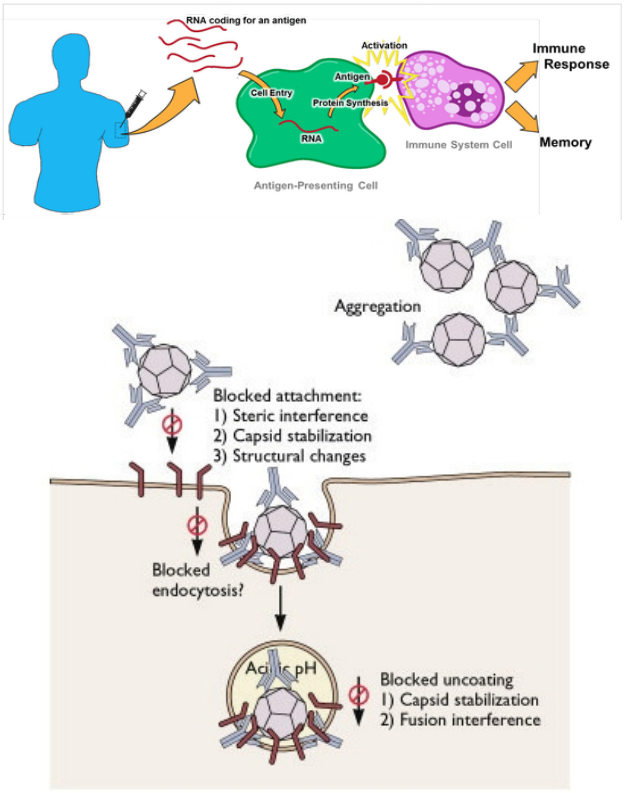
2. **Vaccines have helped humanity by preventing spread of infectious diseases caused by viruses or bacteria**.

   Although vaccines are a contentious topic for many people, their results in preventing millions of deaths globally are undeniable. A prime example is the DPT vaccine, which protects us against diphtheria, pertussis, and tetanus. Another historic example of vaccination is the smallpox vaccine, which eradicated the deadly disease of smallpox in 1980.The Global Action Plan created in 2011 by the World Health Organization, has distributed vaccine doses and vaccinated 86% of kids worldwide. The success of vaccination continued with the eradication of polio from the United States since 1979 (CDC, 2019). Additionally, during 2018-2019, the Flu vaccine prevented an estimated 4.4 million influenza illnesses (CDC, 2020).

3. **How does the COVID-19 vaccine work?**

   There are different types of vaccines, some rely on established technologies, while others,such as those produced by Pfizer and Moderna, the mRNA vaccines, are new technologies. These types of vaccines contain small amounts of genetic material (mRNA-messenger RiboNucleicAcid-) with the information to

make the spike viral protein (for info see http://www.adastraletter.com/2020/2/brochure/.) The mRNA is injected into our arm and directs some of our own cells to produce the spike protein. Once that piece of protein has been synthesized, some of our cells bring them up to their surface so our immune system can recognize them as an intruder, and create antibodies. When the spike protein is recognized by our immune cells as foreign, special cells produce “antibodies" which specifically recognize and neutralize the spike protein; the immune system will keep the memory for these antibodies so that if the actual virus infects us, they will be able to quickly recognize it and destroy it. The mRNA vaccine does not cause Covid-19 because it only has one component of the virus and so it cannot produce more viruses. On the other hand, if a person has been vaccinated, and if they get exposed to the actual virus, then they will be able to neutralize the real virus.

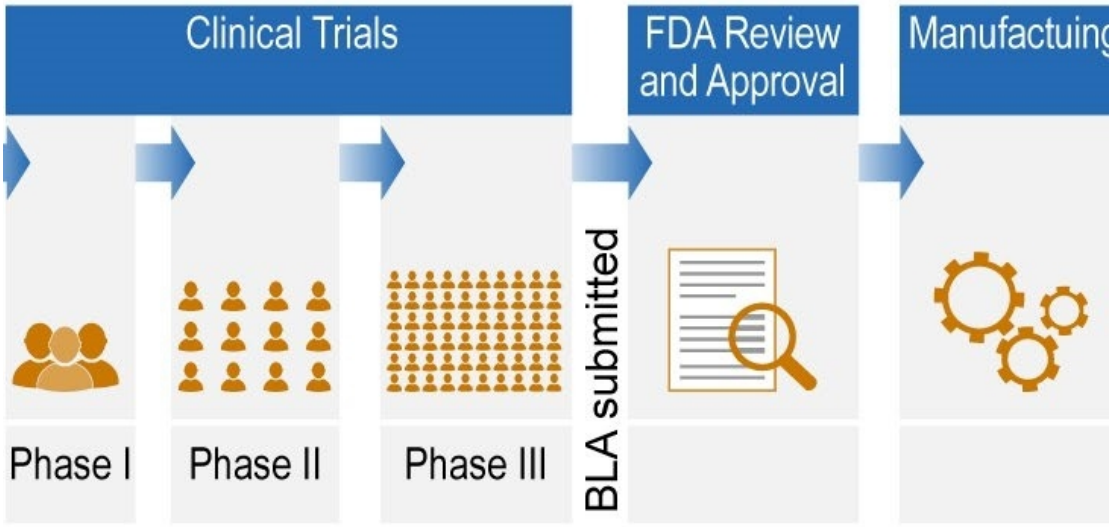


www.virology.ws/2009/07/24/virus-neutralization-by-antibodies/

4. **How do we know vaccines are safe?**

The Centers for Disease Control and Prevention (CDC) have stated 3 crucial points that everyone should know before getting vaccinated. First of all, the safety of vaccines is thoroughly analyzed before approval through a three phase process (below*). Second, this established system helps scientists and vaccine manufacturers monitor vaccine safety before they are distributed. Lastly,vaccines possess certain additives that could cause side effects as some medications usually do, however severe acute effects are rare (CDC, 2020).

*In Phase 1, a small number of healthy participants receive the vaccine to ensure it is well calculated and causes the desired effect. Phase 2 includes similar characteristic participants but in bigger numbers; this helps to further evaluate vaccine safety and the immune response. Finally, in Phase 3, thousands of volunteers receive the vaccine alongside participants who receive the placebo. Neither the scientist nor the volunteers know which of the compounds they have been injected with, this avoids biases during the result analysis. Phase 3 is carried out through several different populations to ensure it works widely for the disease it was intended.



https://blog.gao.gov/2020/05/28/the-reward-and-risk-of-expediting-covid-19-testing-and-vaccine-development/

5. **Who approves vaccines?**

In the United States, vaccine approval comes under FDA authority through the Federal Food, Drug, and Cosmetic Act and is also governed by the Public Health Service Act, which regulates biological products. Vaccines undergo a rigorous review of laboratory, clinical, and manufacturing data to ensure the safety and effectiveness of these products (FDA, 2020). Worldwide, once a vaccine has been developed, national regulators decide whether to introduce a vaccine in their countries. The WHO, World Health Organization, provides information to support this process, through comprehensive evaluation of the available evidence, and its regularly updated position papers on vaccines (WHO, 2020, https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-vaccine-safety).

6. **Why should we all get vaccinated?**

Hundreds of thousands of people have died from COVID-19 complications in the United States, more than 2 million worldwide. If you have not been directly affected by COVID-19, ask anyone who has lost loved ones in this pandemic and think about whether you could have done something to prevent their loss. You might not be able to change their past, but you now have the possibility of doing something. If a large proportion of the population is vaccinated, we can achieve herd immunity. Herd immunity (or community immunity) occurs when a high number of the population are immune to a disease (through vaccination), causing the spread of the virus to slow down. Therefore, individuals who are more at risk of a disease and may not be able to get vaccinated (such as the elderly, pregnant women, people with autoimmune diseases, etc.) have a lower chance of getting infected. Getting vaccinated also means strengthening your own immune system to fight the specific virus, so that if you are infected by the virus, your body will be able to neutralize it much faster and prevent you from getting sick. Remember, vaccines protect you, but more importantly, protect those vulnerable members of your family and communities, so please get vaccinated!