

**BIOL 483 - Infection, Immunity, and Evolution of Disease**  
**Spring 2022**  
**Homework 10**

**Directions:**

**Part 1: Watch the youtube video that provides an animation of activation of the acquired immune response.**

[https://www.youtube.com/watch?v=SSYOVbEQj\\_4](https://www.youtube.com/watch?v=SSYOVbEQj_4)

What happens after the antigen presenting cells processed the antigen? (i.e., the next step in the process of immune activation)

After the antigen presenting cells (dendritic cell) processes the antigen, they afterwards migrate to the lymph nodes to continue the immune activation process. In the lymph nodes, B and T cells are activated in which T cells become helper T cells, and the immature B cells pick up and process the antigen, and later are activated by helper T cells.

How does the helper T cell stimulate the immature B cell to activate?

The helper T cell stimulates the immature B cell by binding to the B cell and releasing cytokines to activate the B cells

What happens when the infection is over? What is this phase called? What is the difference between what happens to the plasma cells vs. the memory B cells?

When the infection is over the plasma cells die off and the antibody concentration falls. This phase is known as the contraction phase. The memory B cells remain in the bone marrow and will circulate between lymph nodes to help in future infections, however, when activated again memory B cells will proliferate and differentiate into plasma cells that produce high-affinity antibodies that increase the concentration more resulting in a faster response.

**Part 2: Read the article titled, "Different Approaches to a Coronavirus Vaccine" and answer the questions below**

What is a key target of the majority of vaccines developed for COVID-19?

The majority of vaccines developed for COVID-19 target the spike proteins that cover the virus. Our immune system can develop antibodies that can attach to the spike proteins and overall stop the virus.

What is a key difference between live attenuated vaccines and genetic vaccines?

The key difference between live attenuated vaccines and genetic vaccines, is that with the live attenuated vaccine the entire coronavirus is modified and used to provoke an

immune response. A weakened form of the virus this is not able to cause diseases is used to create the immune response. On the other hand, genetic vaccines use a part of the viruses' genetic code, such as in this case, the spike protein gene, and inserts it into a cell which then assembles the viral proteins resulting in an immune response. In summary, live attenuated vaccines use the entire virus, while genetic vaccines only use a portion of the viruses' genetic code.

What is an adenovirus vaccine?

An adenovirus vaccine is a type of vaccine in which a specific gene is added to the adenovirus genome, which in this case is the spoke protein gene. The adenovirus is then able to slip into the cell and unload the added gene. However, since the adenovirus is missing one of its genes, it is not able to replicate and make more copies of itself, deeming the virus and vaccine safe.

**Part 3: Please provide 2-3 questions for the COVID Heroes speaker (Director and Epidemiologist of Washoe County Public Health). Please add your name and questions here:**

[https://docs.google.com/document/d/1e4qp157c-Z6n\\_neqYU\\_mbP5JFsc-WjELKjQCttmpCG4/edit?usp=sharing](https://docs.google.com/document/d/1e4qp157c-Z6n_neqYU_mbP5JFsc-WjELKjQCttmpCG4/edit?usp=sharing)

**Questions:**

- What are the benefits of RNA vaccines vs. DNA vaccines and vice versa?
- With the many mutations and variations of the coronavirus, will our B cells be able to still recognize the virus? Will getting the booster shot even be effective in this case?
- If you were to create a vaccine for the coronavirus, would you use a live attenuated vaccine or a genetic vaccine? Why?