Group 14

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**Do you think Monkeypox is at risk of becoming a pandemic? Explain.**

No, it is unlikely to become a pandemic. Unlike SARS-CoV-2 where the virus spreads through airborne particles and droplets, Monkeypox spreads via direct contact with the affected person (World Health Organization 2022). This means that in order to spread the virus, a person needs to physically be in contact with the affected person, rather than simply being in the vicinity of them (Government of Canada 2022). This results in the spread being much slower. Furthermore, a person with Monkeypox will have noticeable rashes on their skins (World Health Organization 2022), which will be a lot more noticeable to other people compared to SARS-CoV-2, where the affected person can still spread the virus even if they may be asymptomatic or might believe they just have a common cold. Lastly, we already have approved vaccines for Monkeypox a lot sooner than one for SARS-CoV-2, which would greatly reduce the chance of large populations getting affected by one (World Health Organization 2022).

**Part 2 - In essay or poster format, including in-text citations and reference list, address the following (300 - 500 words):**

*For a vaccine approved in Canada for either Sars CoV-2 or Monkeypox:* Explain how the vaccine helps us develop immunity from disease. Include in your discussion the role of innate and acquired immune systems.

The Pfizer-BioNTech Comirnaty Covid-19 Vaccine (hereby Pfizer vaccine) is an mRNA vaccine approved by Health Canada for individuals 6 months or older. It is typically delivered by injection into muscle. Clinical trials have shown that the vaccine was 95% effective for people aged 16 or above (Government of Canada 2022).

The Pfizer vaccine’s active ingredient consists of mRNA, in addition to other stabilizers in the vaccine. mRNA, or messenger RNA, is used for a wide range of functions in the cells of living organisms (National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases 2022). In most cells, mRNA carries gene instructions from the DNA out of the nucleus (transcription) and to the ribosomes to create amino acid building blocks (translation). These blocks are used for making proteins essential for life.

In a similar fashion, the injected mRNA in the vaccine is also used to create proteins. The mRNA in the vaccine is delivered to immune cells (e.g dendritic cell). These cells then use the mRNA to construct foreign proteins, similar to how the cell usually translates the mRNA from the nucleus, or how viruses can inject viral RNA into cells to create more viruses. Because the mRNA has been engineered to produce proteins that are just like proteins created/shed by a virus, the immune system is able to collect these protein spikes into the lymphatic system, where antibody T-Cells / B-Cells are able to use the proteins to generate antibodies (Polykretis 2022).

The first line of defense that exists in every human being from the moment of birth is innate immunity. Its response time is quick. Innate immunity responds in the same manner as the initial exposure and lacks an immunological memory. Innate immunity is made up of skin, mucous membranes, phagocytes, and epithelial cells. Eg: Innate immunity is demonstrated by the inflammatory response to an allergy or a wound.

In order to develop acquired immunity, a person must either recover from a sickness or receive vaccinations. It serves as the second line of defense and only steps in once the first line is broken. Its response time is longer. The acquired has an immunological memory and is what makes the second exposure result in a quicker response. The cells that make up acquired immunity are T-cells and B-cells. Eg: Acquired immunity include the reaction that T and B cells produce in response to exposure to the measles virus or any other virus (Jagranjoshcom, 2022)

## **References**

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