



Immune System Worksheet

1. We have various types of physical barriers to prevent invasion by a microorganism. Name three of these barriers and explain how they are specialised to prevent infection.
2. If a microorganism isn't cleared from the body by the innate immune response (when the body's phagocytes respond to eliminate the pathogen), what happens next?
3. *Legionella pneumophila* is a bacterium that causes Legionnaire's disease. In humans it is engulfed by macrophages but is able to evade the normal mechanisms that macrophages use to kill it. It is therefore able to live inside the macrophage and use its nutrients to stay alive.
 - a) Why can't B cells recognise the *L. pneumophila* antigens?
 - b) How would the immune system identify *L. pneumophila* and how is it removed from the body?
 - c) Why would someone with a deficiency in T cells be more prone to intracellular microorganism infection?
4. Once the acquired immune response is initiated, plasma cells (lymphocytes) can produce antibodies. Explain why antibodies will only be effective against one pathogen.
5. Cytokines have many roles in the immune response. From the animation, can you describe two ways that cytokines help the body fight infection?



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6. *Clostridium botulinum* is a bacterium that produces the botulinum neurotoxin. This is commonly known in the medical industry as Botox. It is the botulinum toxin that is lethal as it causes flaccid paralysis in humans and animals.

Clostridium botulinum that produces it however is not considered dangerous by itself. The immune system can recognise toxins as well as microorganisms.

a) How does the immune system recognise and clear toxins?

b) Why would a vaccine for the *Clostridium botulinum* bacterium not be considered as effective as a vaccine against the botulinum toxin?

7. What is the function of the following cells:

a) Cytotoxic T cells?

b) Helper T cells?

c) Plasma cells (lymphocytes)?

8. Explain why vaccines are preventative in protecting against infection.

9. Explain how a vaccine results in a memory response in the immune system.

10. Herd immunity arises when a significant proportion of the population is vaccinated against a disease. What could happen if the vaccination rates were to fall in a population for the following vaccines? (Hint: think about their transmission methods. Measles is spread through touch and in the air through contagious droplets from infected people, and cholera is a water-borne disease).

a) MMR

b) Cholera