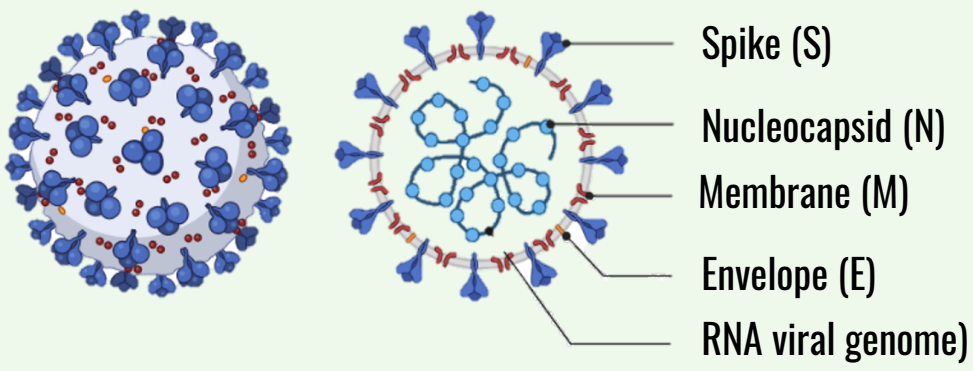
COVID-19

How Does It Affect You?

WHAT IS COVID-19?

A disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2



HOW IT AFFECT YOU?

Gas Exchange in Healthy Cells

- Two types of alveolar cells (air sacs) facilitate gas exchange:
  - **i. Type I cells**: are thin enough for O^2 to pass-through
  - **ii. Type II cells** secrete surfactant (a substance that lines the alveolus and prevents it from collapsing)

Viral Infection

The spike proteins of coronavirus bind ACE2 receptors on Type II alveolar cells, allowing the virus to inject its RNA.

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Replication and assembly of new viruses

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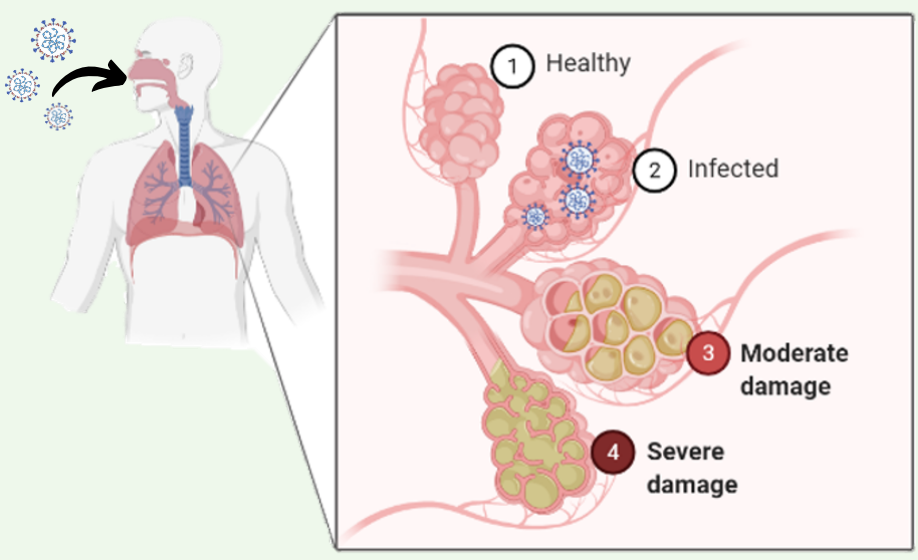
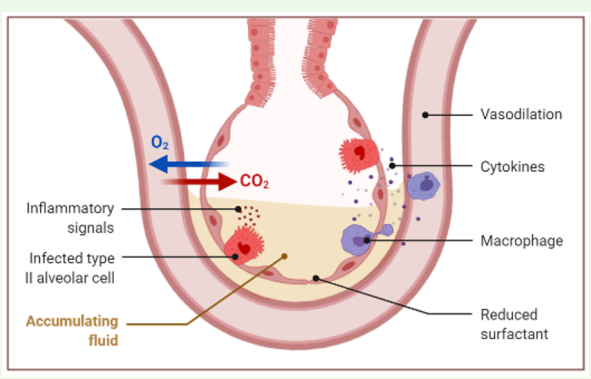
The host cell is destroyed and new coronavirus is released and infects neighbouring cells.



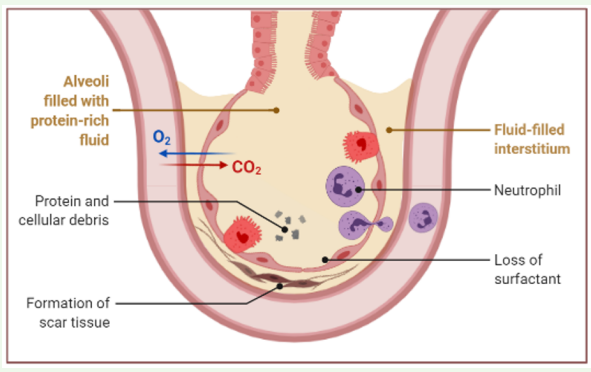
3 Moderate Damage

Accumulating fluid, reduced gas exchange



4 Severe Damage

Build up of protein-rich fluid, very limited gas exchange



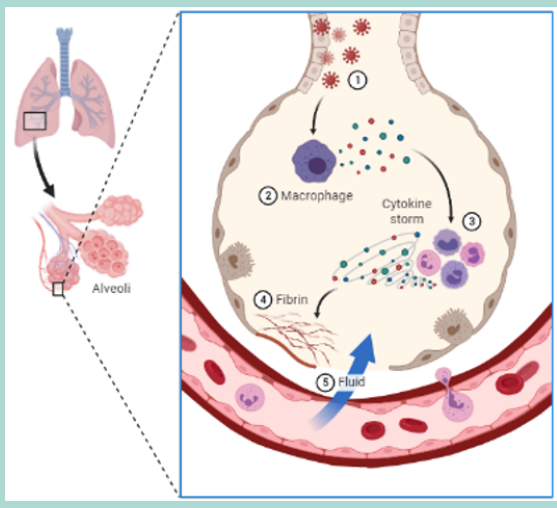
Impaired Gas Exchange

When the immune system attacks the area of infection it also kills healthy alveolar cells, resulting in

- **i.** Alveolar collapse due to loss of surfactant
- **ii.** Less O_2 enters the bloodstream
- **iii.** More fluid enters the alveolus.

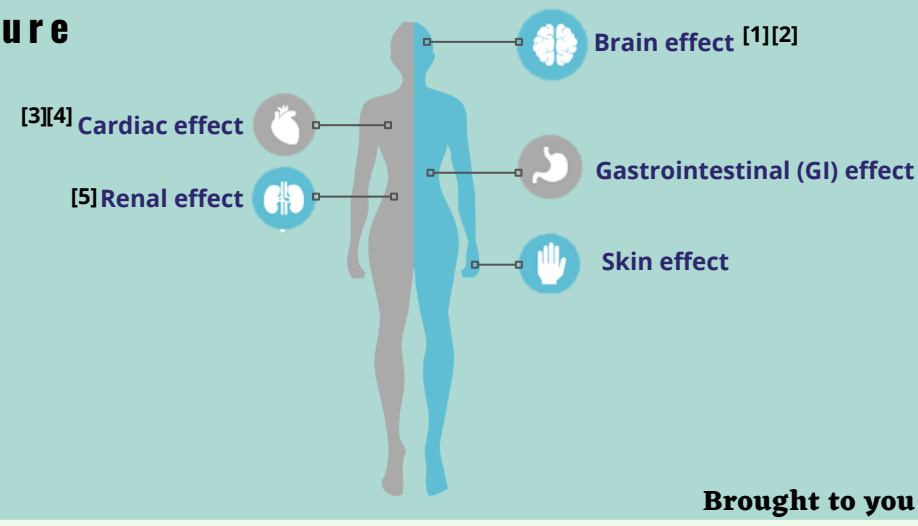
Immune response- cytokine storm

1. Coronavirus infects lung cells
2. Immune cells, including macrophages, identify the virus and produce cytokines
3. Cytokines attract more immune cells (e.g., neutrophils), which produce more cytokines, creating a cycle of inflammation that damages the lung cells.
4. Damage can occur through the formation of fibrin
5. Weakened blood vessels allow fluid to seep in and fill the lung cavities, leading to respiratory failure



Multi-organ failure

If inflammation becomes severe, the protein-rich fluid enters the bloodstream causing Systemic Inflammatory Response Syndrome (SIRS), which leads to septic shock & multi-organ failure, or even fatal.



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