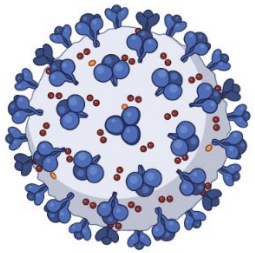
SARS-CoV-2: Transmission & Pathogenesis

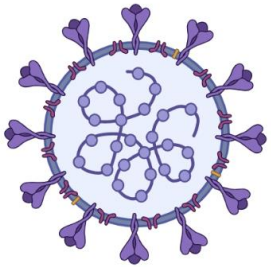
Biochem 4C03: Group 2

Introduction

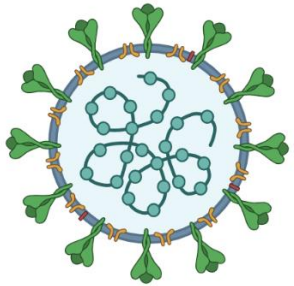
- COVID-19 virus: Transmission & Pathogenesis
- Origins of the virus
- History of the virus
- Vaccinations
- Variants
- Our paper selection



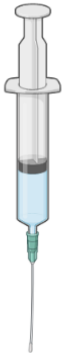
SARS-CoV-2



MERS-CoV



SARS-CoV



A cohort autopsy study defines COVID-19 systemic pathogenesis

Xiao-Hong Yao, Tao Luo, ... Xiu-Wu Bian + Show authors

Cell Research **31**, 836–846 (2021) | Cite this article

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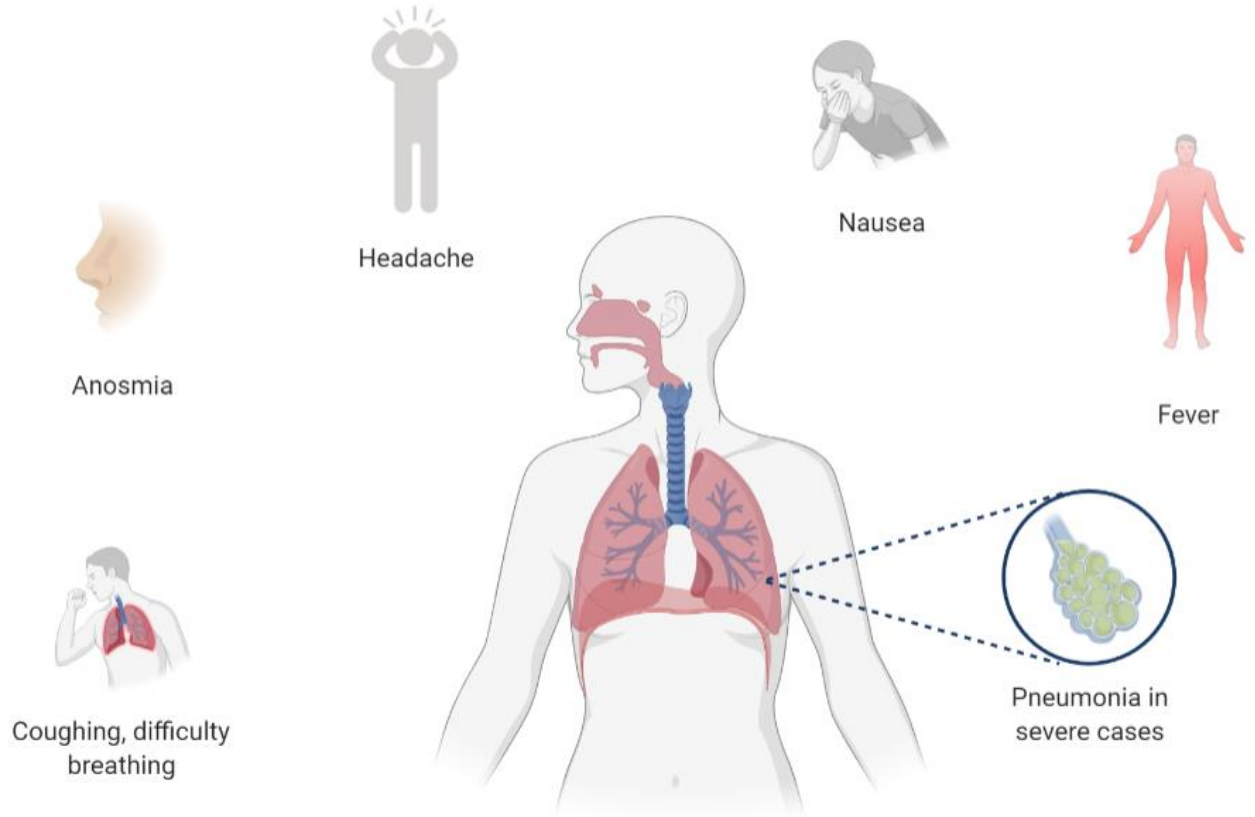
Clinical Presentation



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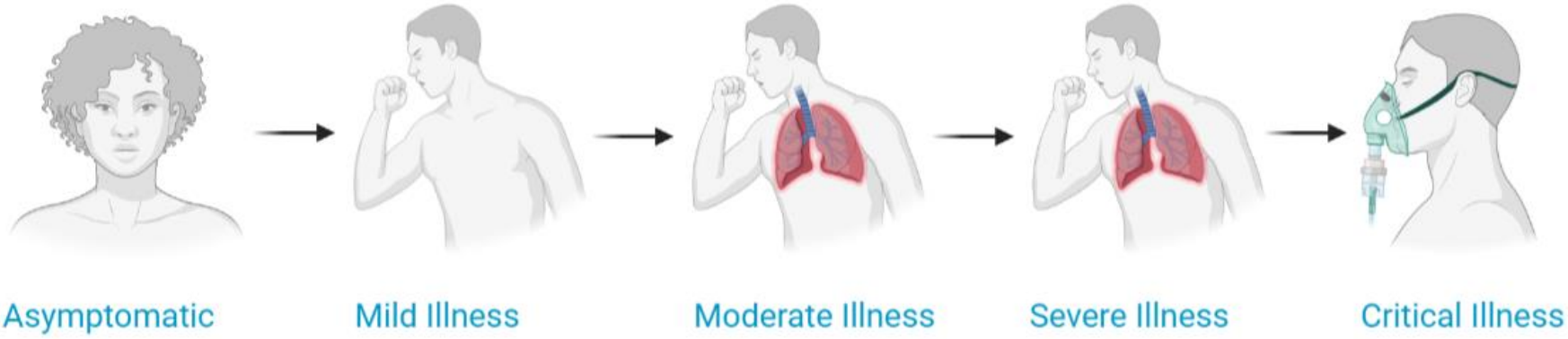
Disease Progression



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Variants of Concern: Disease Progression

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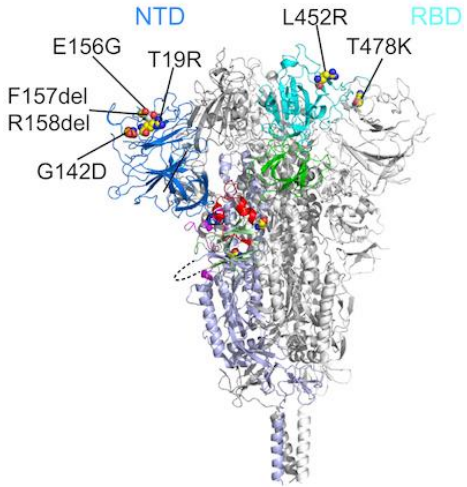
B.1.1.7
Discovered:
Dec. 14 2020

B.1.351
Discovered:
Dec. 18 2020

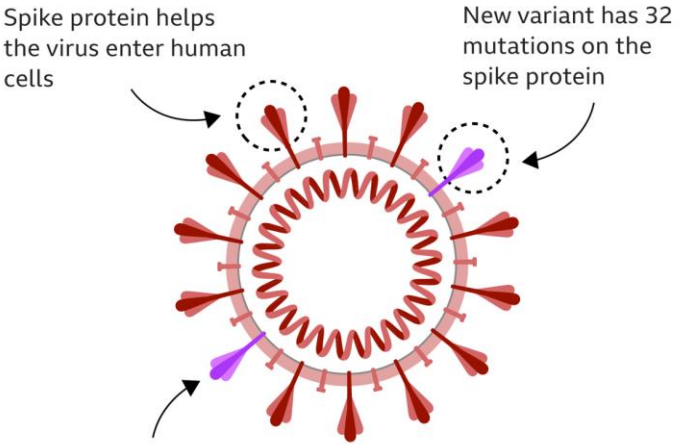
P.1
Discovered:
Dec. 4 2020

B.1.617.2
Discovered:
Oct. 2020

B.1.1.529
Discovered:
Nov. 2021



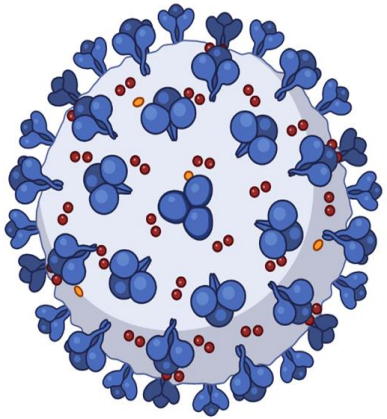
Delta (B.1.617.2)

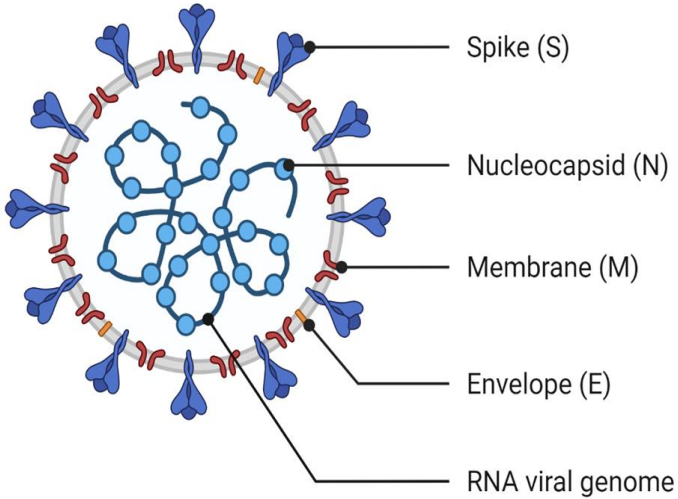


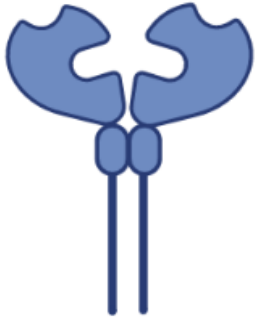
(BBC News, 2021)

(Boston Children's Hospital, 2021)

Genome and Structure

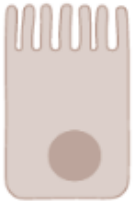






ACE2

Macrophage



Epithelial cell

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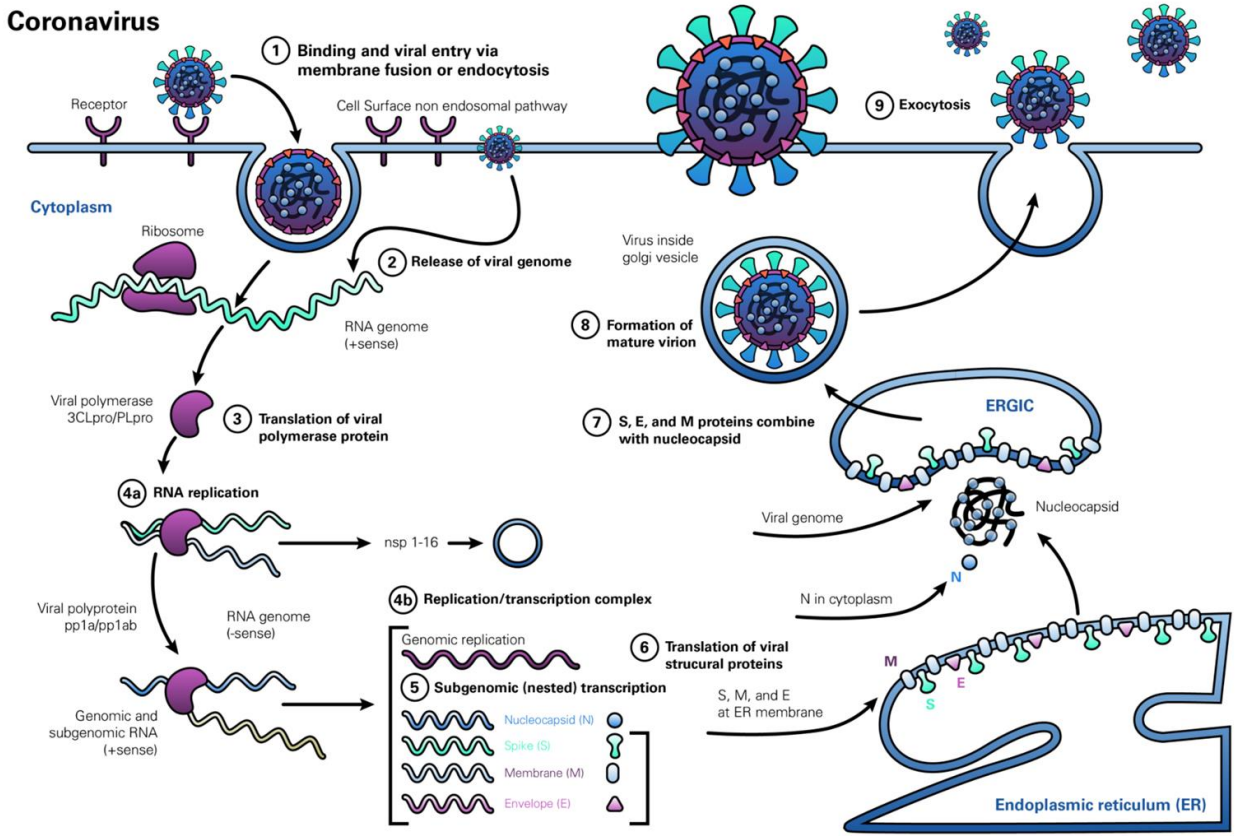
Viral Life Cycle



(V'kovski et al., 2020)

Transmission - Introduction & Infectious Period

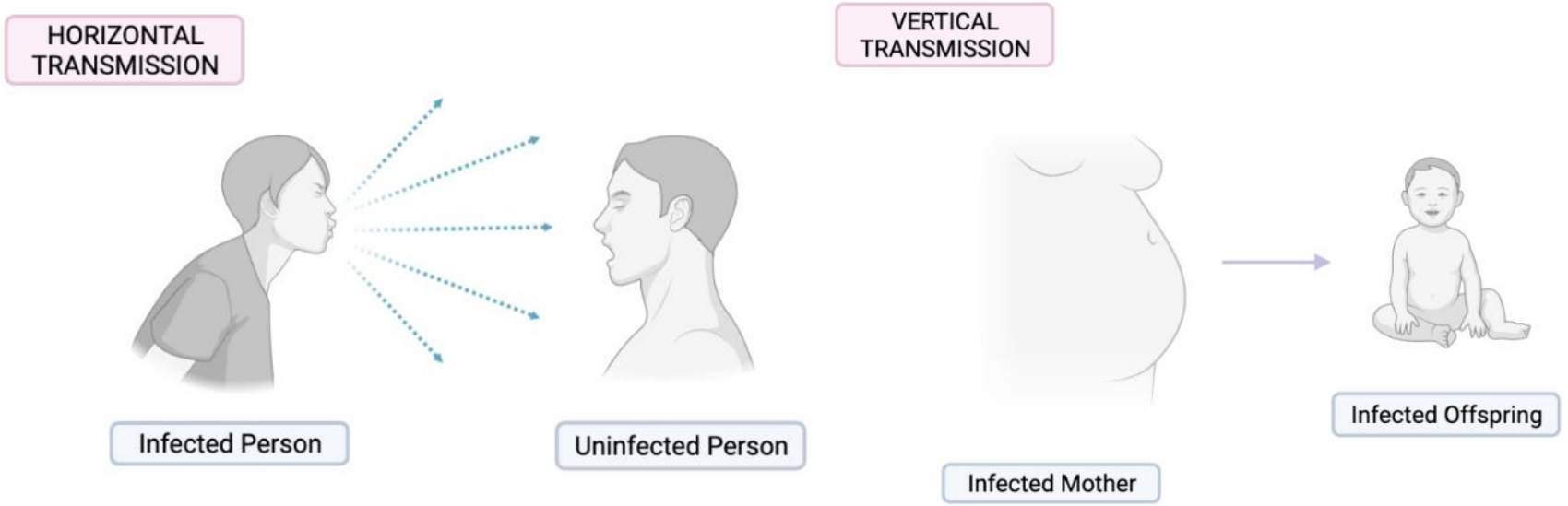
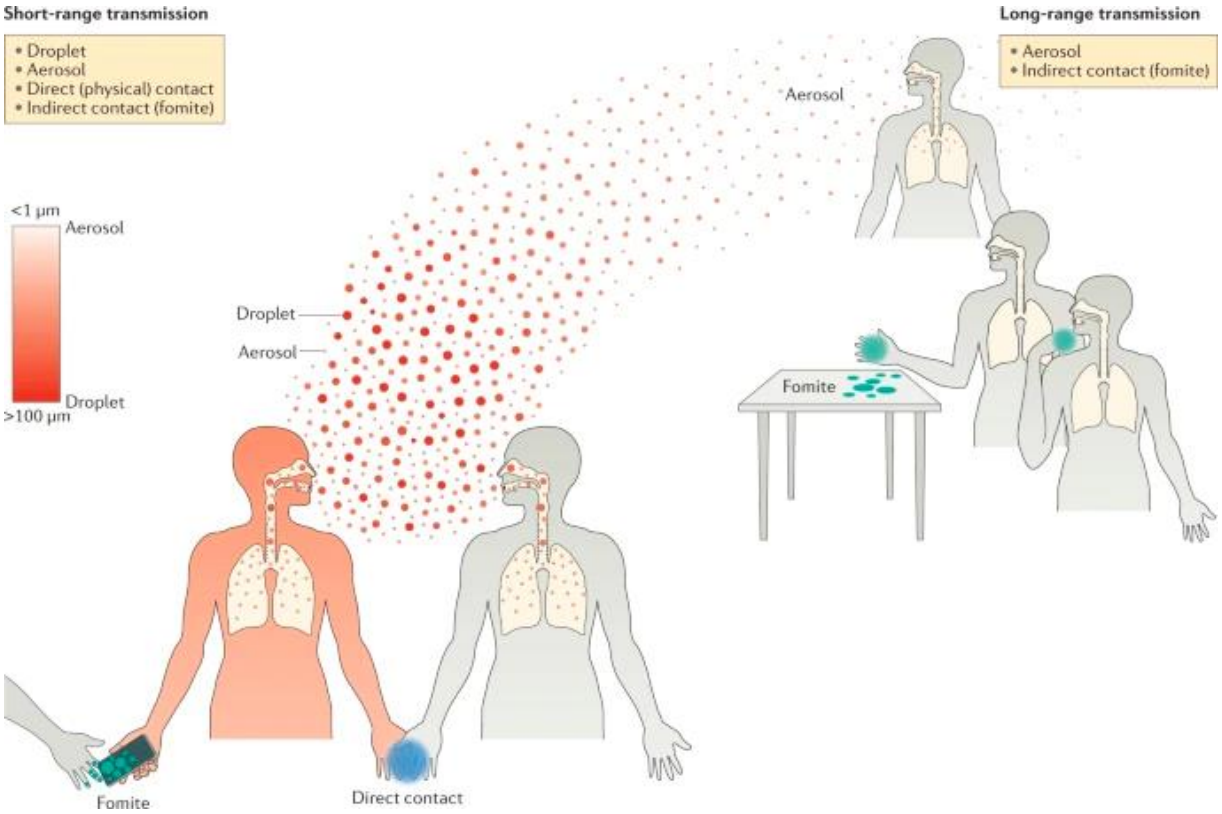


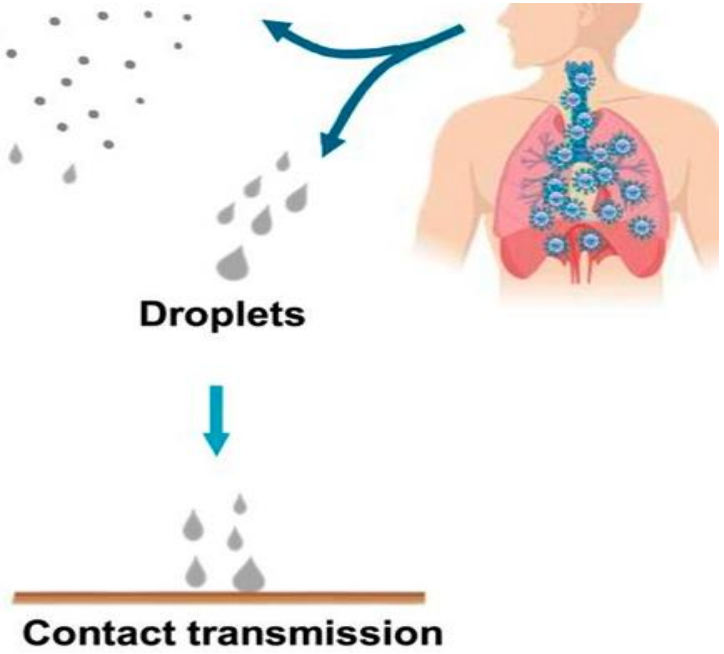
Image created on BioRender

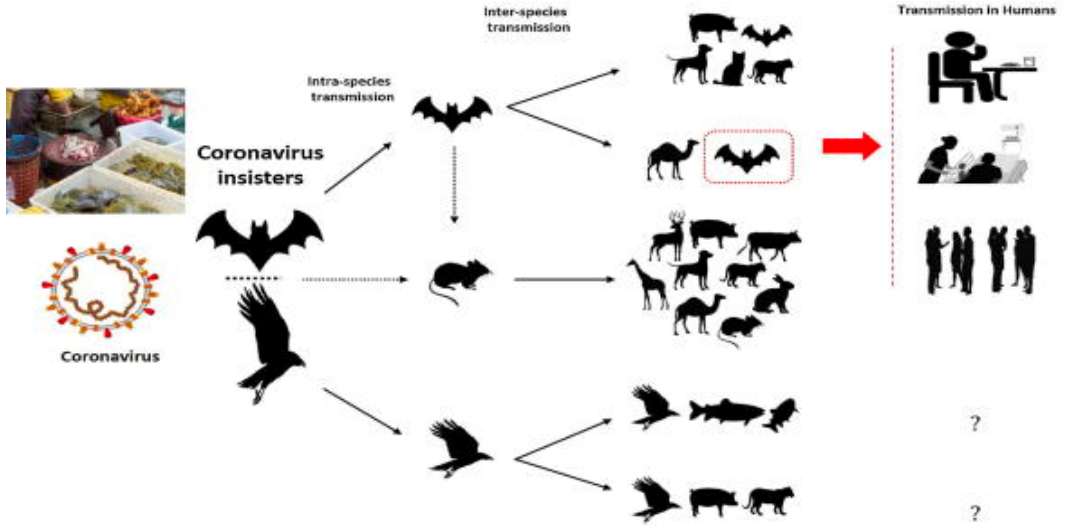
Common Modes of Transmission



(Zhang et al., 2020).

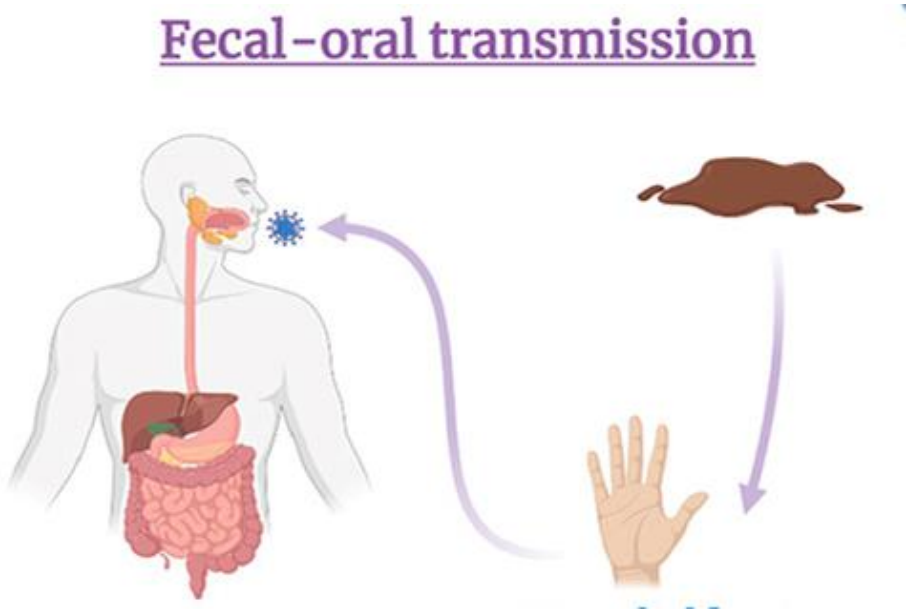
Rare Modes of Transmission





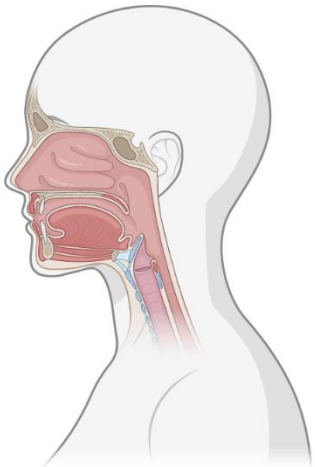
(Harrison et al., 2020) & (Muhammad et al., 2020).

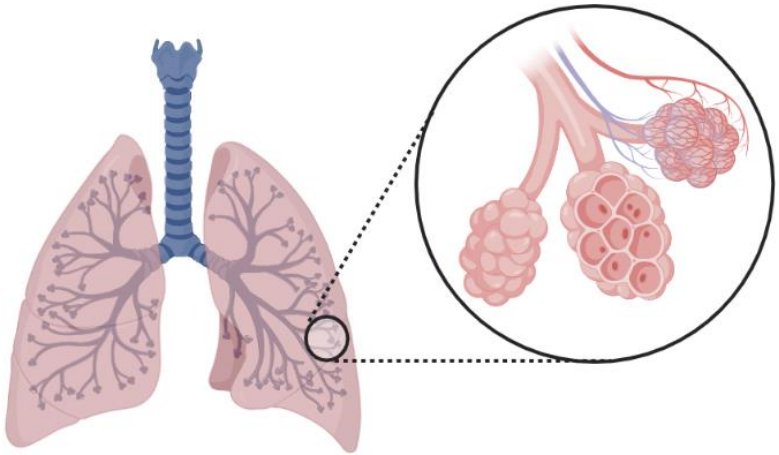
Rare Modes of Transmission

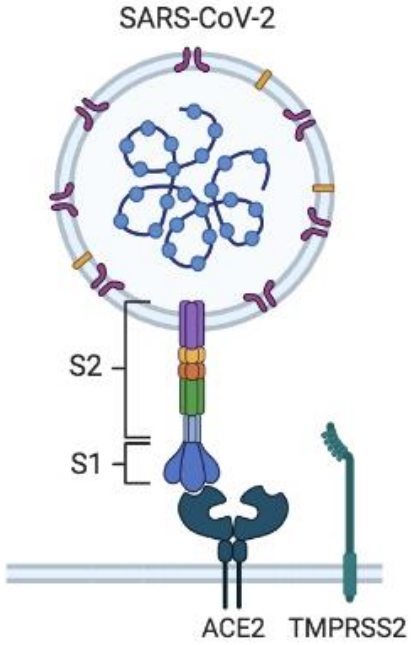


(Elsamadony et al., 2021)

Pathogenesis - Early Stages of Infection







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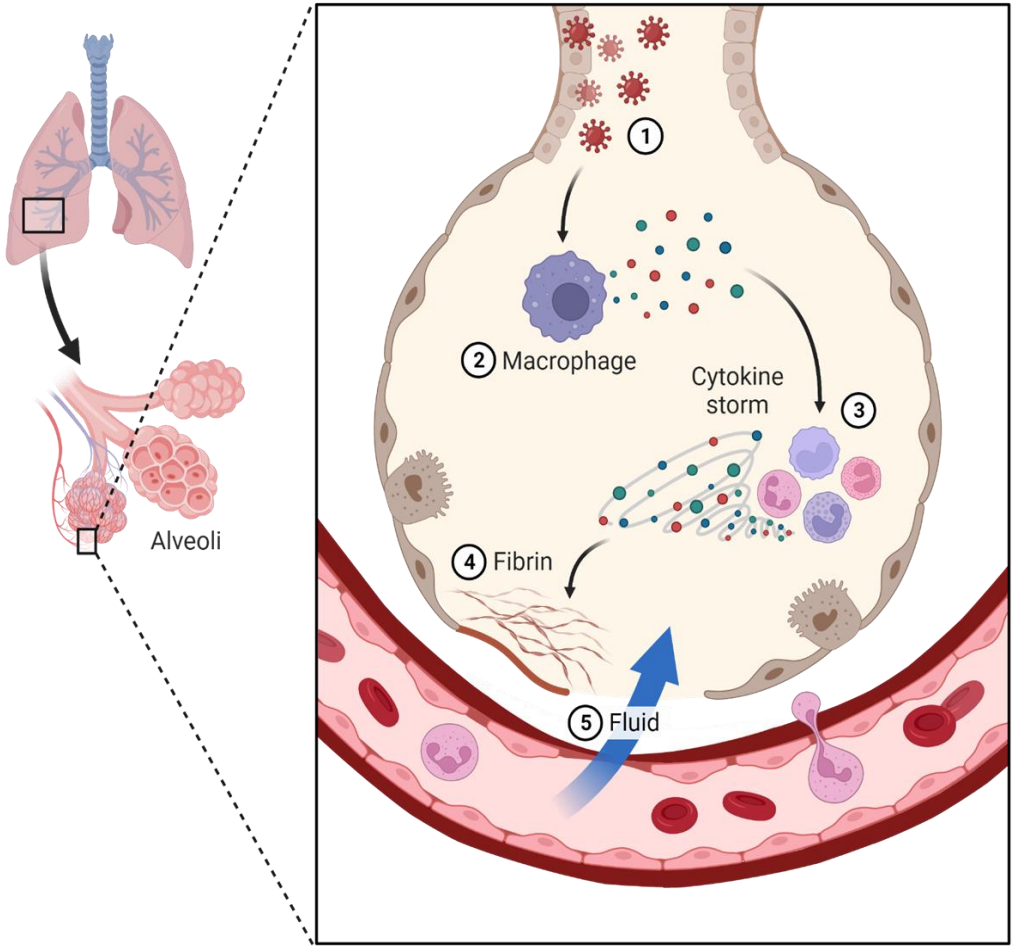
COVID-19 Cytokine Storm



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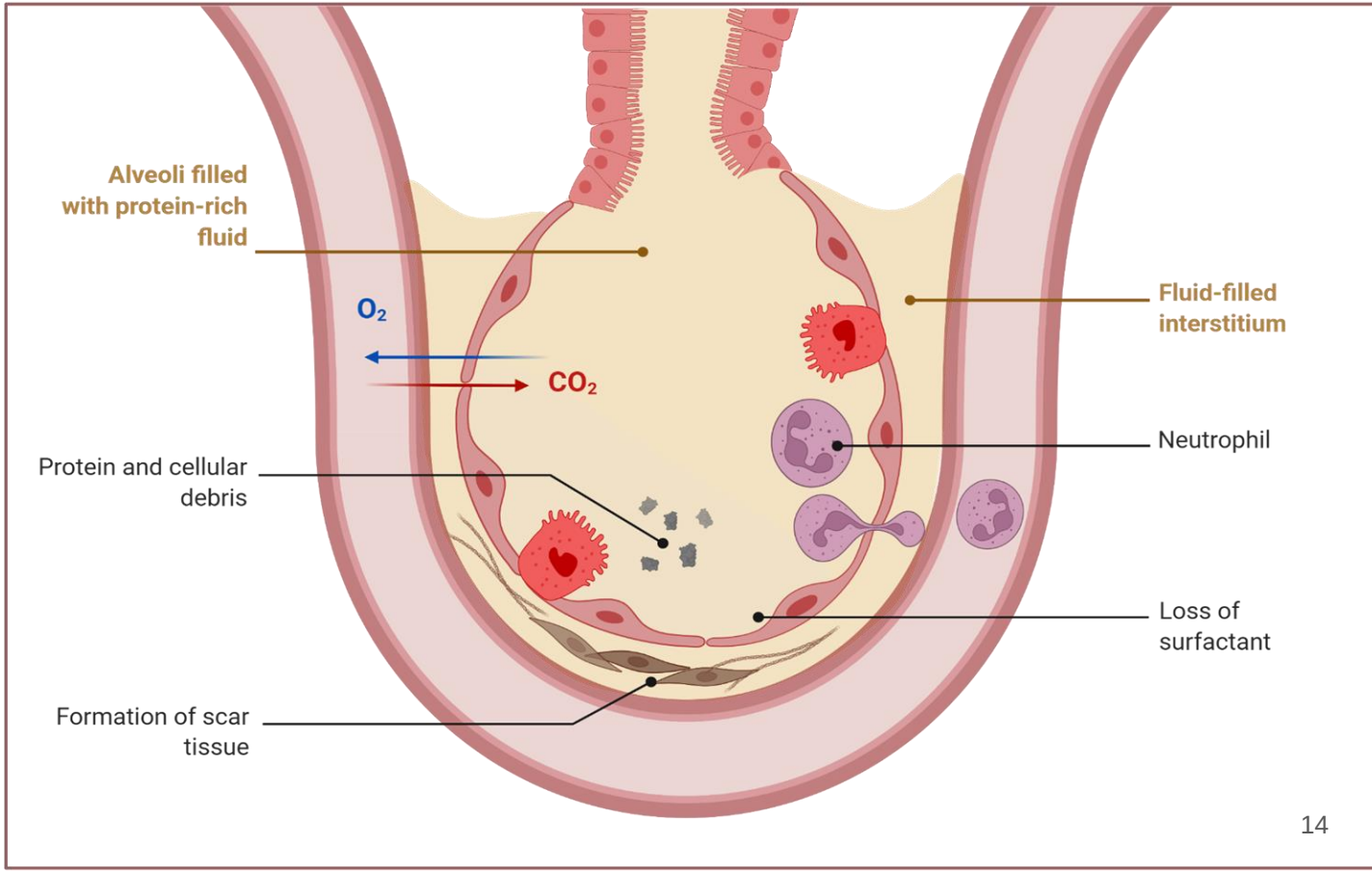
COVID-19 Pulmonary Damage

- Flooding compromises gas exchange
- Fibrosis reduces gas exchange surface area
- Loss of surfactant reduces compliance



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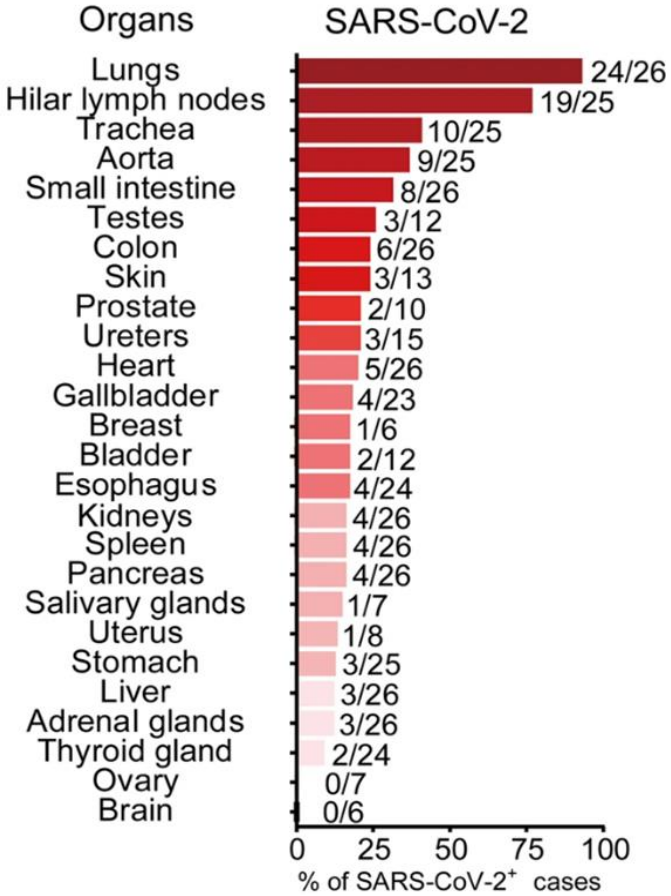
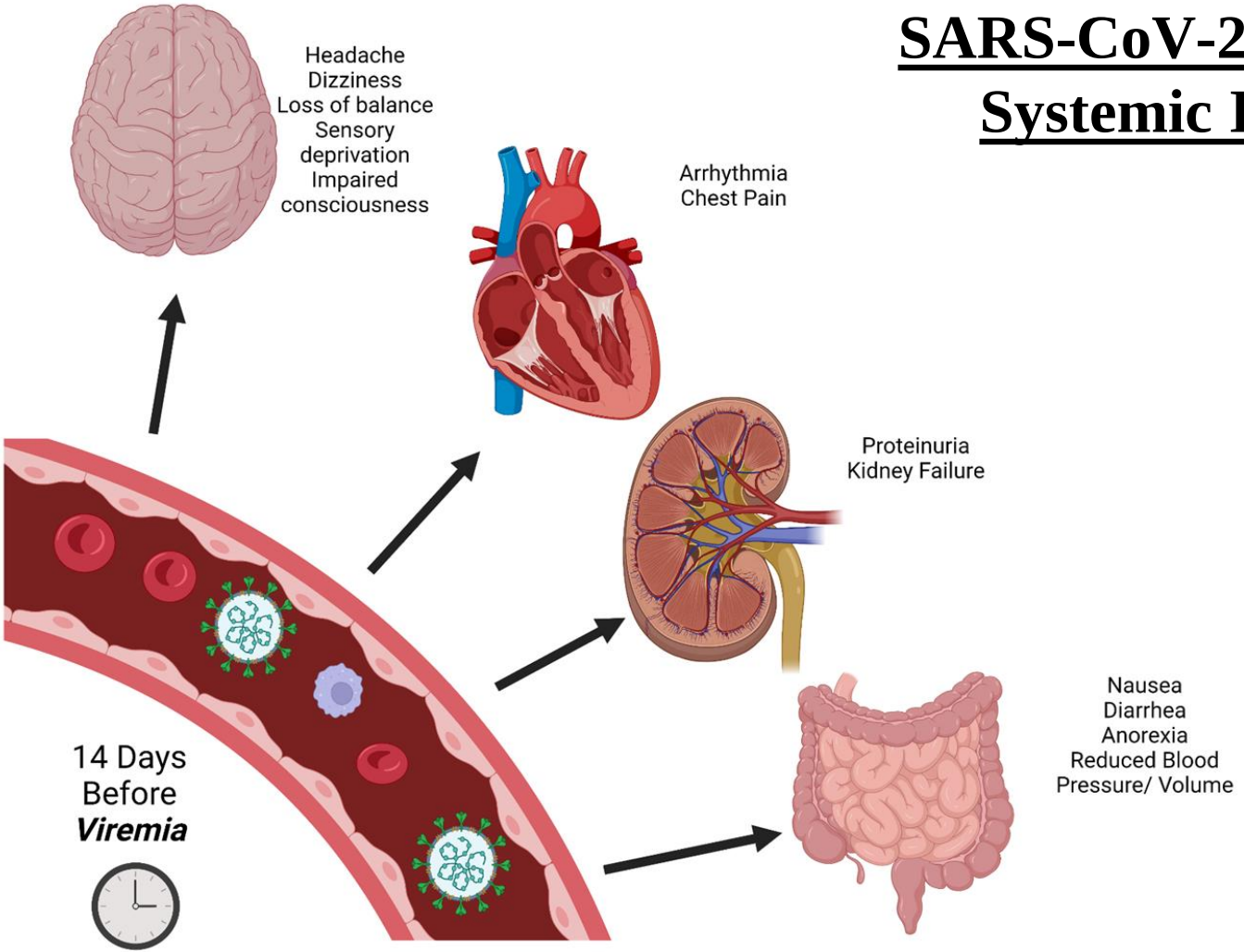
COVID-19 Systemic Infection



(Yao et al., 2021)

SARS-CoV-2 Viremia & Systemic Infection



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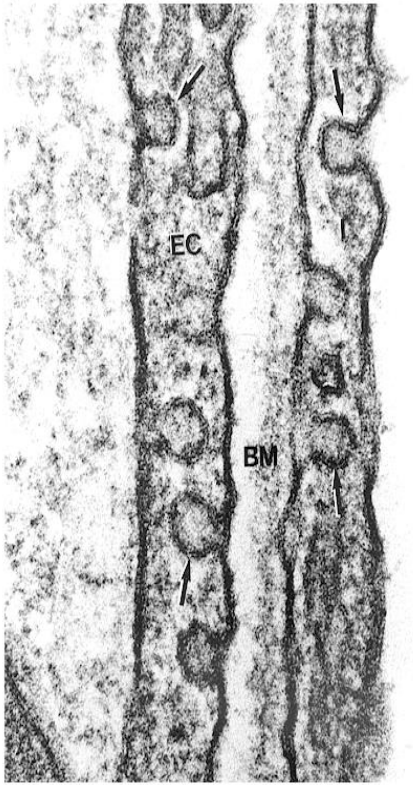
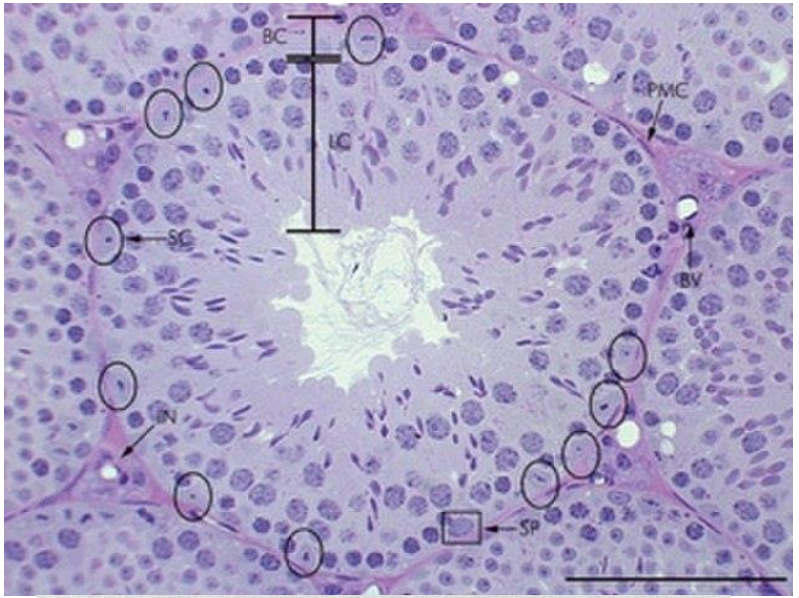
Knowledge Gaps

- Are physiological barriers being penetrated en route to infection sites?
- If so, how?
- Key host cell targets for systemic dissemination and infection of protected regions?
- Differences in viral entry for extrapulmonary tissue?





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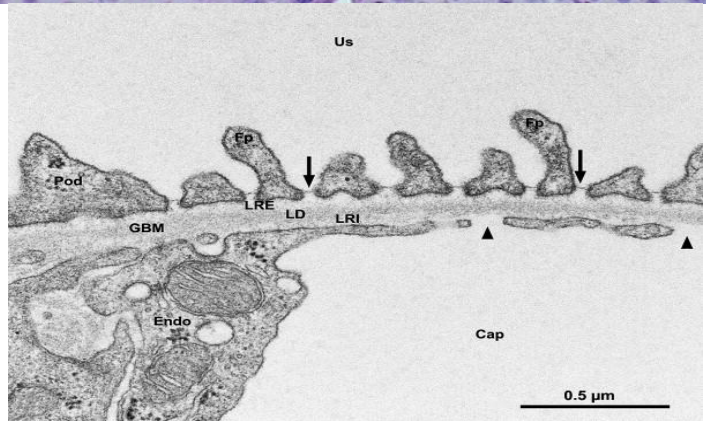


Alpern et al., 2021

Knowledge Gaps

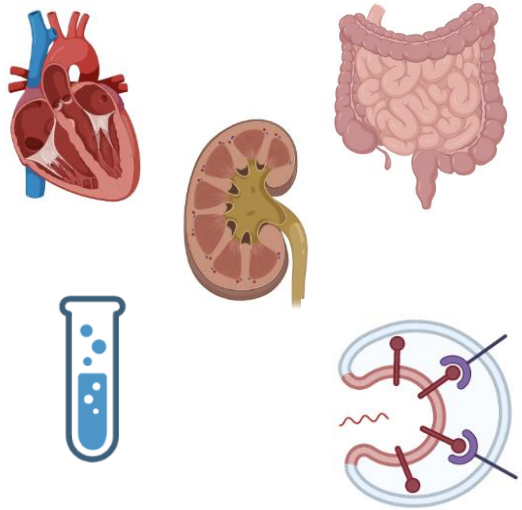
Article | Open Access | Published: 16 June 2021

A cohort autopsy study defines COVID-19 systemic pathogenesis

Xiao-Hong Yao, Tao Luo, ... Xiu-Wu Bian + Show authors

Conclusion & Next Steps

- COVID-19 disease migration from pulmonary tissue to targets such as the heart, kidney and intestines
- Understanding the binding mechanism employed to target non-pulmonary tissue
- Potential therapeutic applications
- Mechanisms of cell infiltration and replication
- Understanding COVID-19 strains and mutants



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Thank you for your time!