Predicting airborne SARS-CoV-2 Infection Risk with CFD

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BACKGROUND

- Did **your contacts** today pose infection risks?
- Where are **transmission hotspots**?
- How effective are potential **counter measures**?

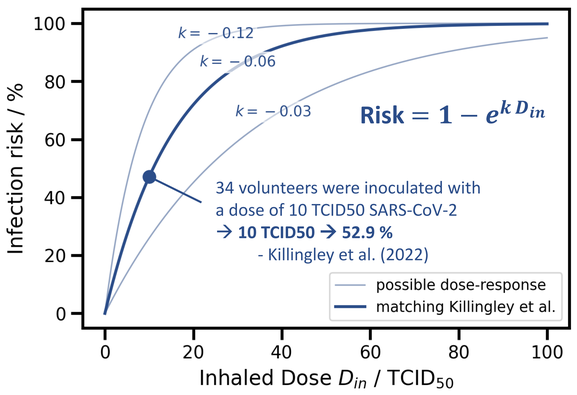
*Infection risk models help to answer these questions in the **upcoming pandemic**.*

METHODS

- **Step 1:** Estimating inhaled dose:

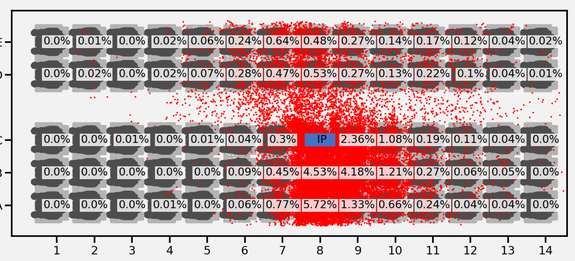
$$D_{in} = \frac{\dot{R}}{\dot{P}} f s C_B p_{in} t$$

- **Step 2:** Estimating Infection risk via Dose-response relationship

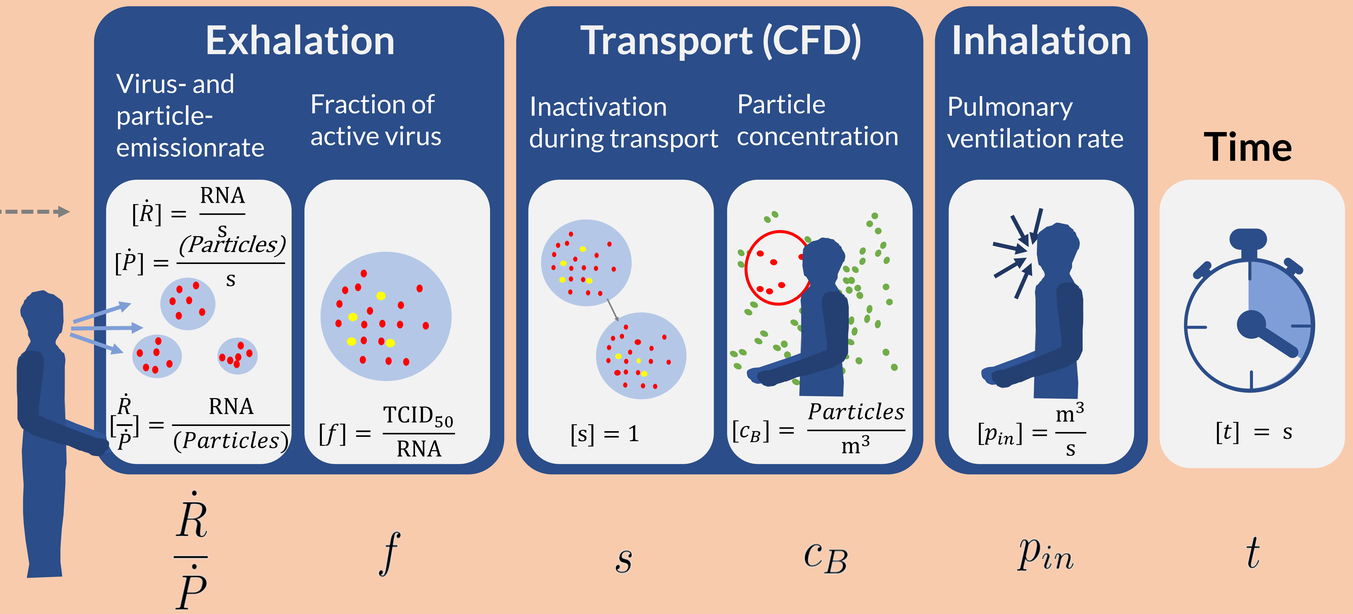


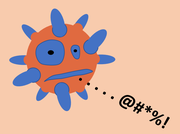
RESULTS: INFECTION RISK

(reference case in aircraft cabin)



Our **infection risk model** can predict your chance of catching **COVID-19** on the flight home.





Scan here!

FREE FULL PAPER (JAN 2024)

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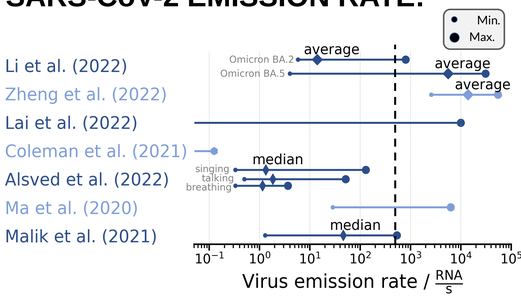
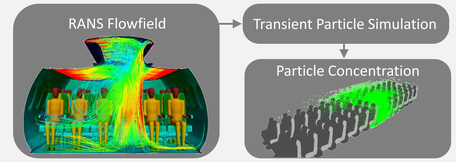
ADDITIONAL DATA

SARS-CoV-2 EMISSION RATE:



PARTICLE TRANSPORT (CFD):



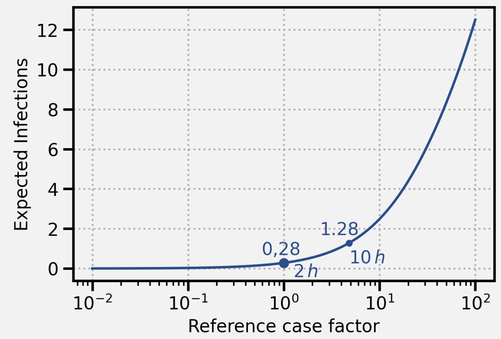
Boundary Conditions:
- Mixed ventilation (MV)
- 70 passengers
- 73 W per manikin
- 700 l/s, 16°C fresh air

Simulation Parameters:
- 50 Mio. cells: 0.5–20mm
- k-ω SST – turb.- model
- Adiabatic walls
- 800k particles

REFERENCE CASE (SARS-CoV-2):

$\dot{R}$	f	L	p_{in}	t	c_B
500 RNA/s	10^{-4} TCID50/RNA	0.6 %/min	6 l/min	2 h	x particles/m³
Literature				Free choice	CFD

EXPECTED INFECTIONS:



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