

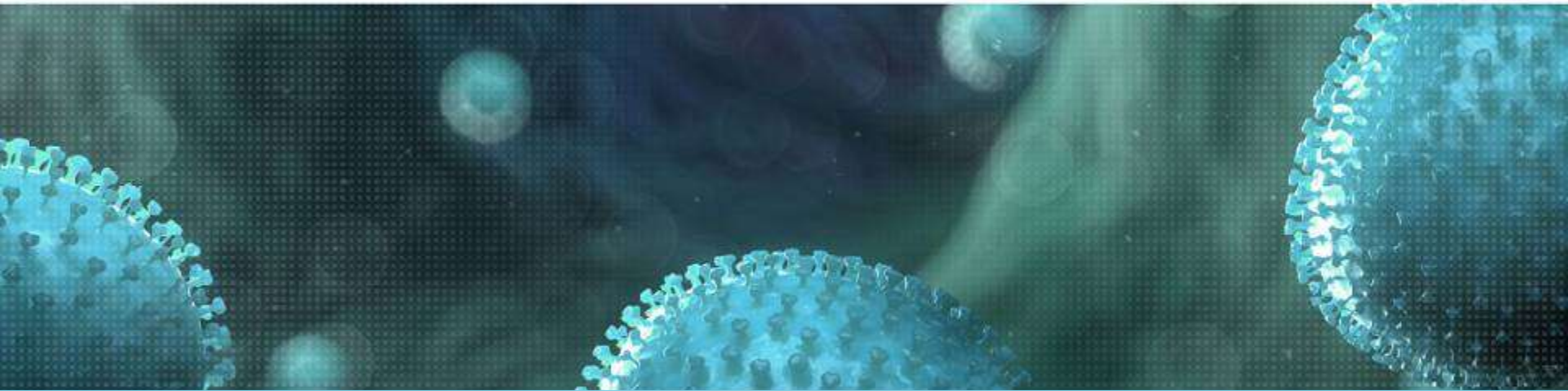
Erasmus MC



NCOH, 02-09-2020

Viroscience lab

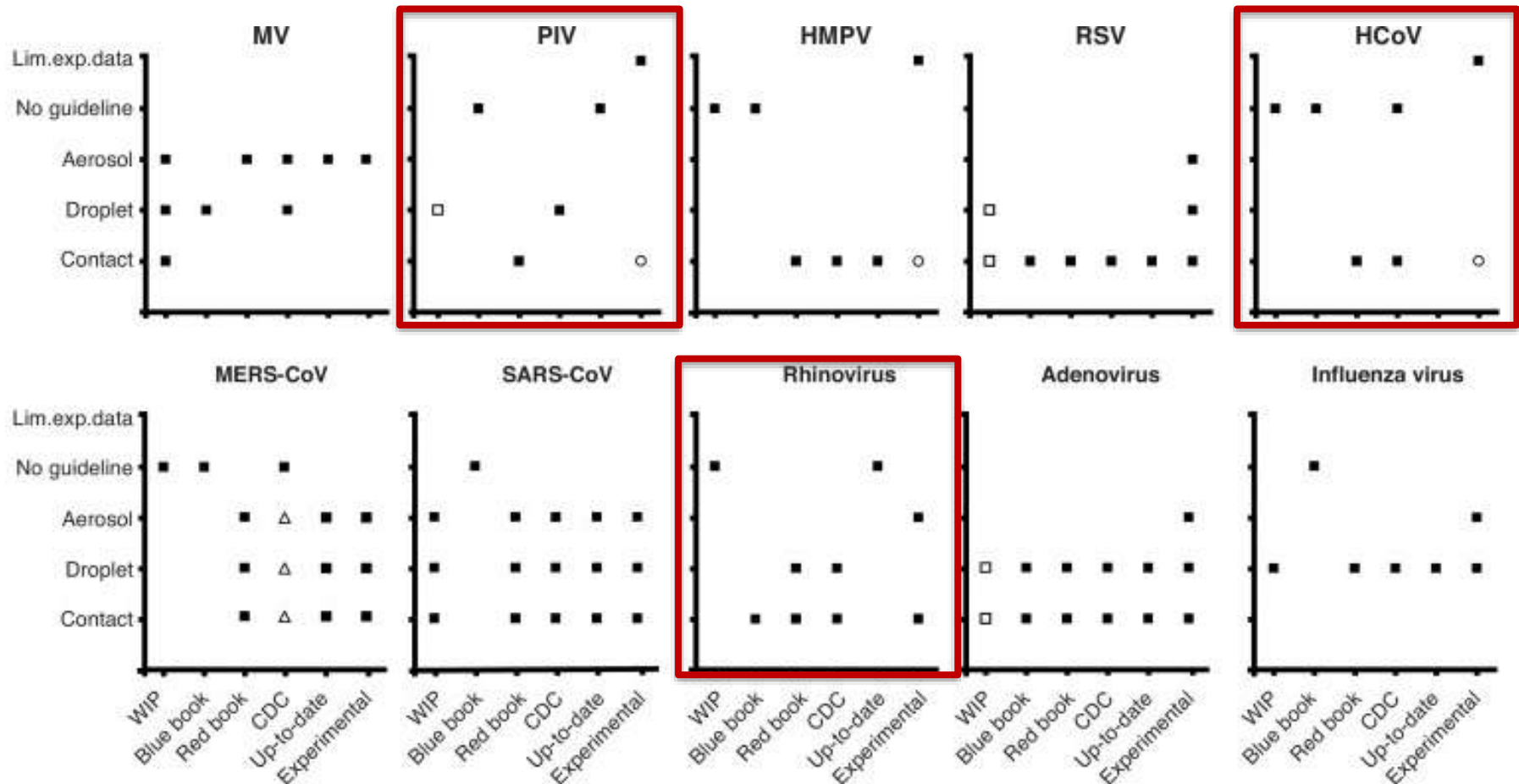
WHERE SKILLS MEET TO STUDY & PROTECT



Collection of infectious aerosolized respiratory viruses from the air

Sander Herfst, PhD

Isolation guidelines for respiratory virus infections vs. experimental evidence on transmission routes



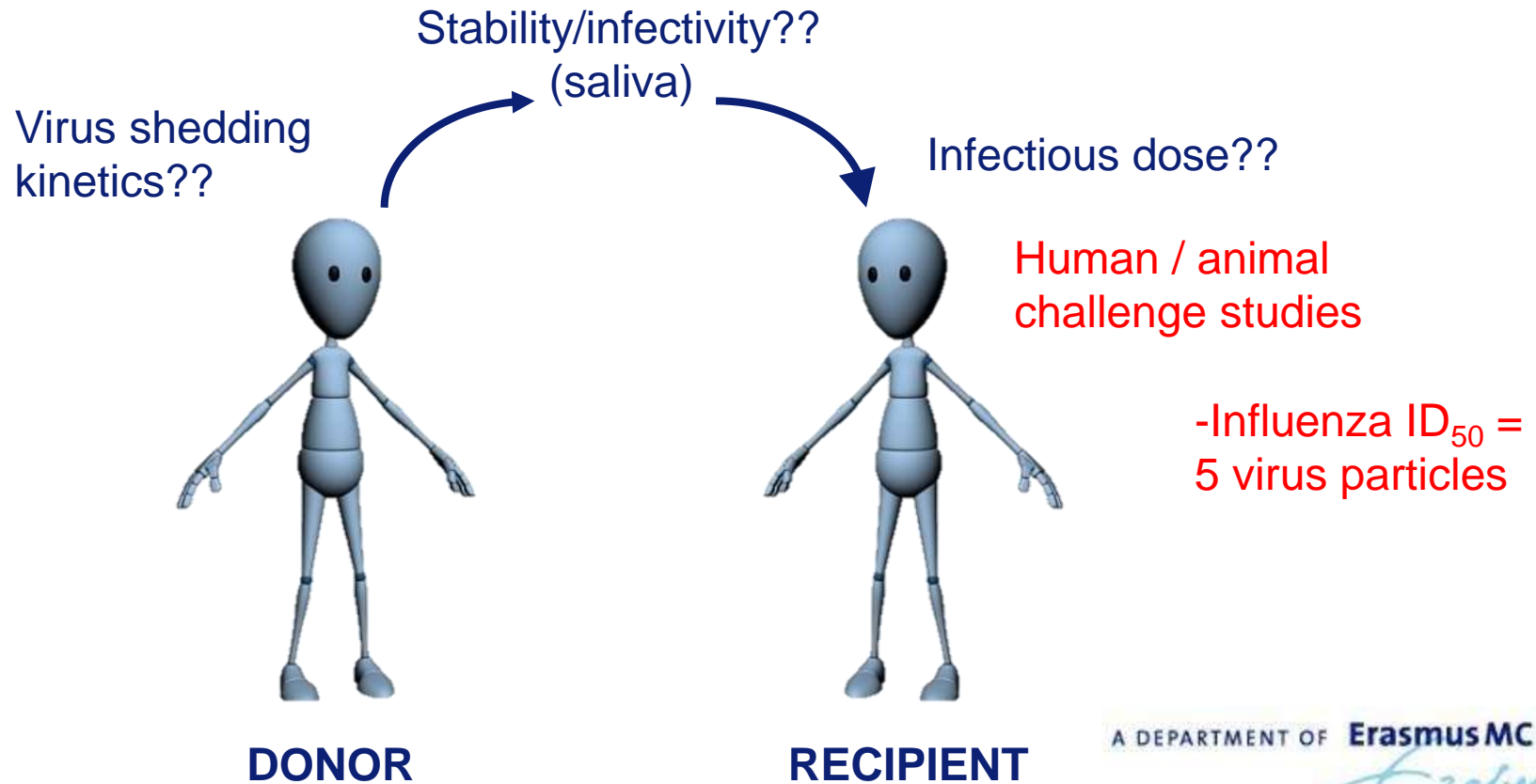
- : isolation guidelines
- : guidelines only for children ≤6 years old
- : data from stability experiments only.
- △: specific CDC guidelines for Healthcare Professionals

Transmission via the air

- Obtaining quantitative data of virus transmission -

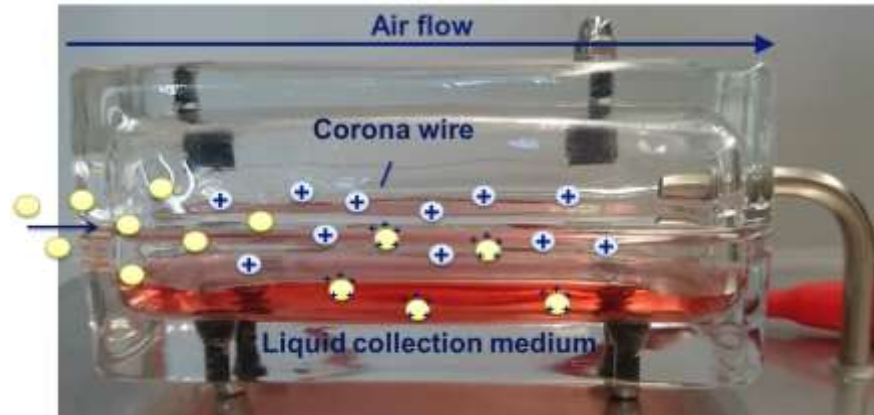


Air sampling



The future: air samplers

- Improved existing and new in-house developed -



Electrostatic precipitation

Liquid impingement



Swirling collection medium



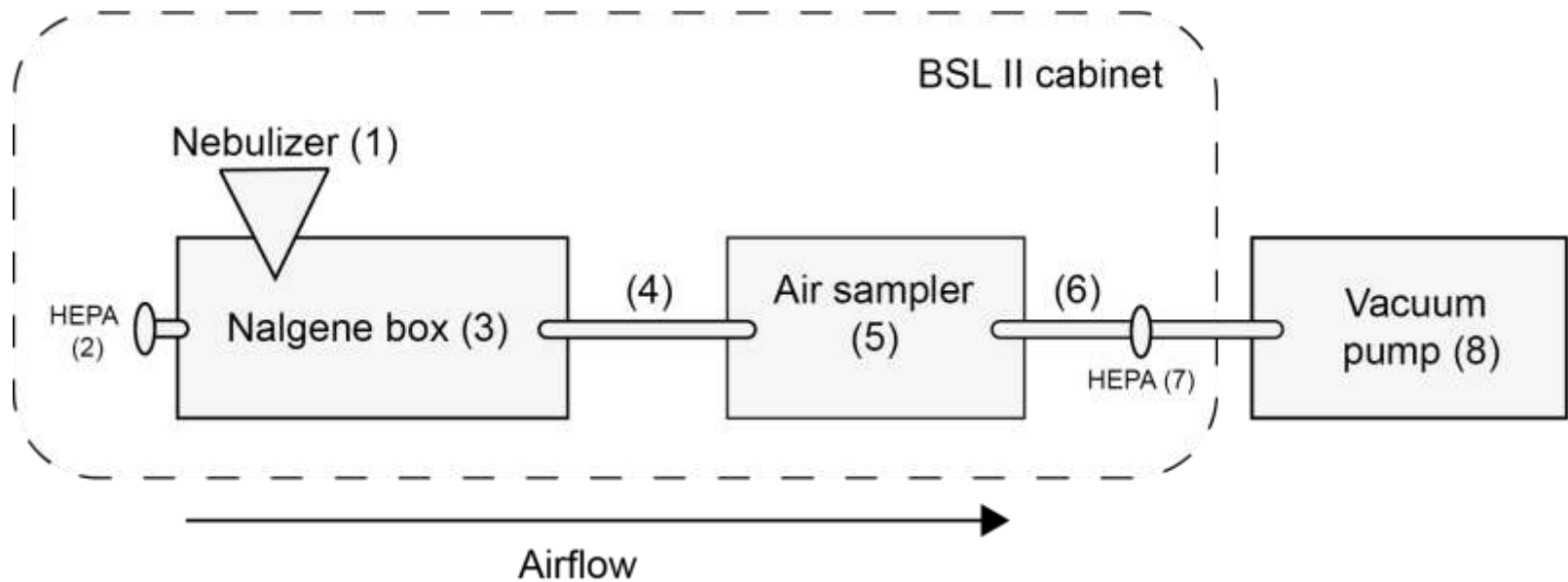
**Solid impaction:
semi-solid gelatin**



Designed and produced by Ard Mulders

In-vitro Setup

- Air sampling of infectious virus in a BSL-2 cabinet-

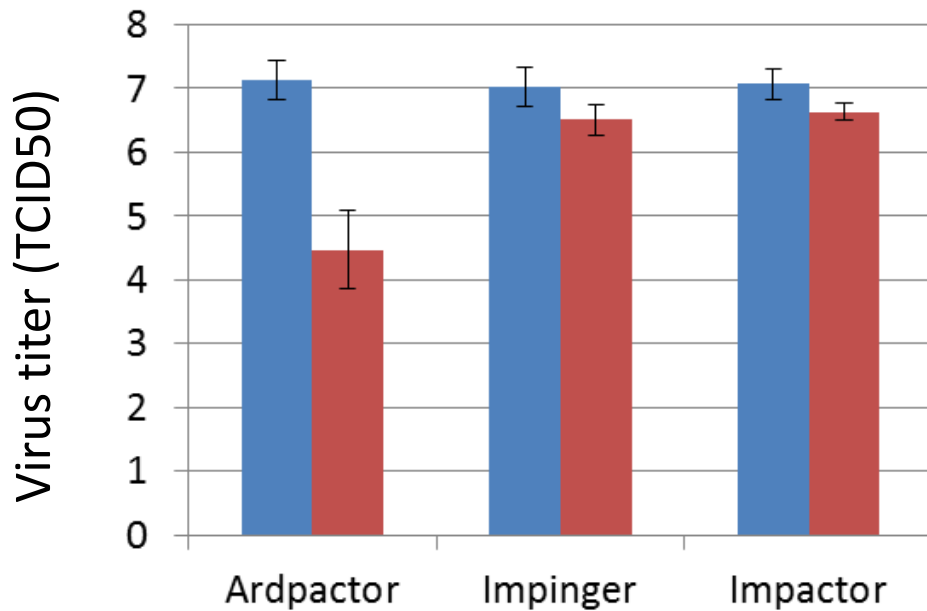


Efficiency of all Air Samplers

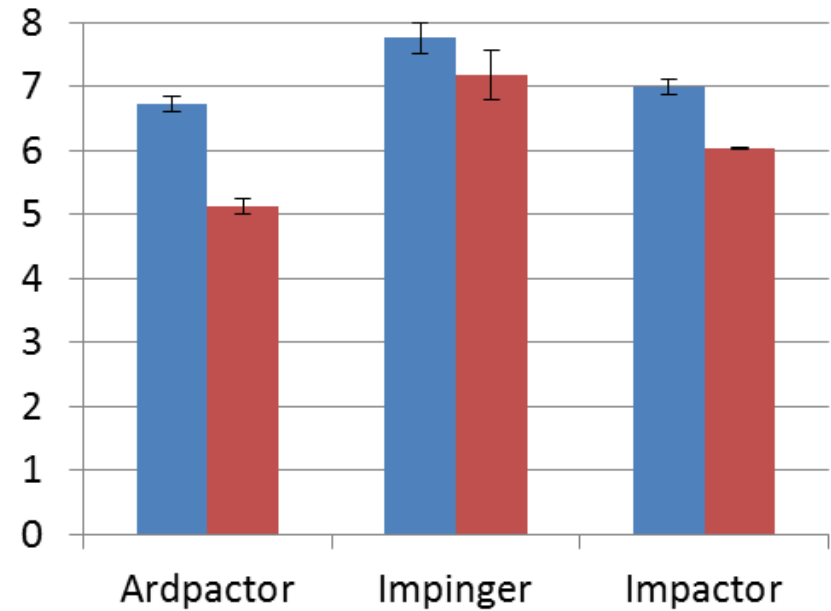
- Collection of infectious virus -



H1N1



HMPV



■ Aerosolized Virus

■ Collected virus

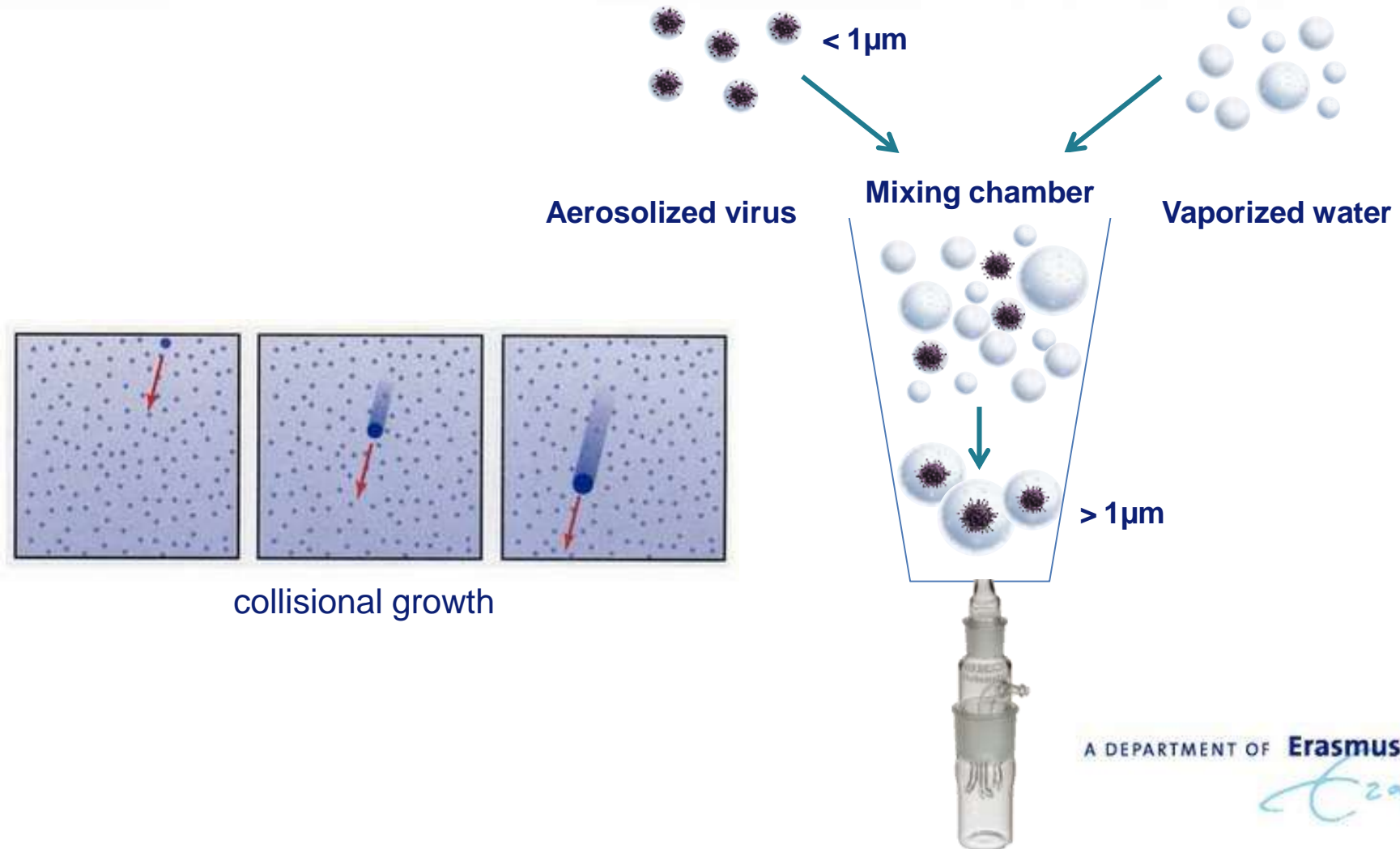
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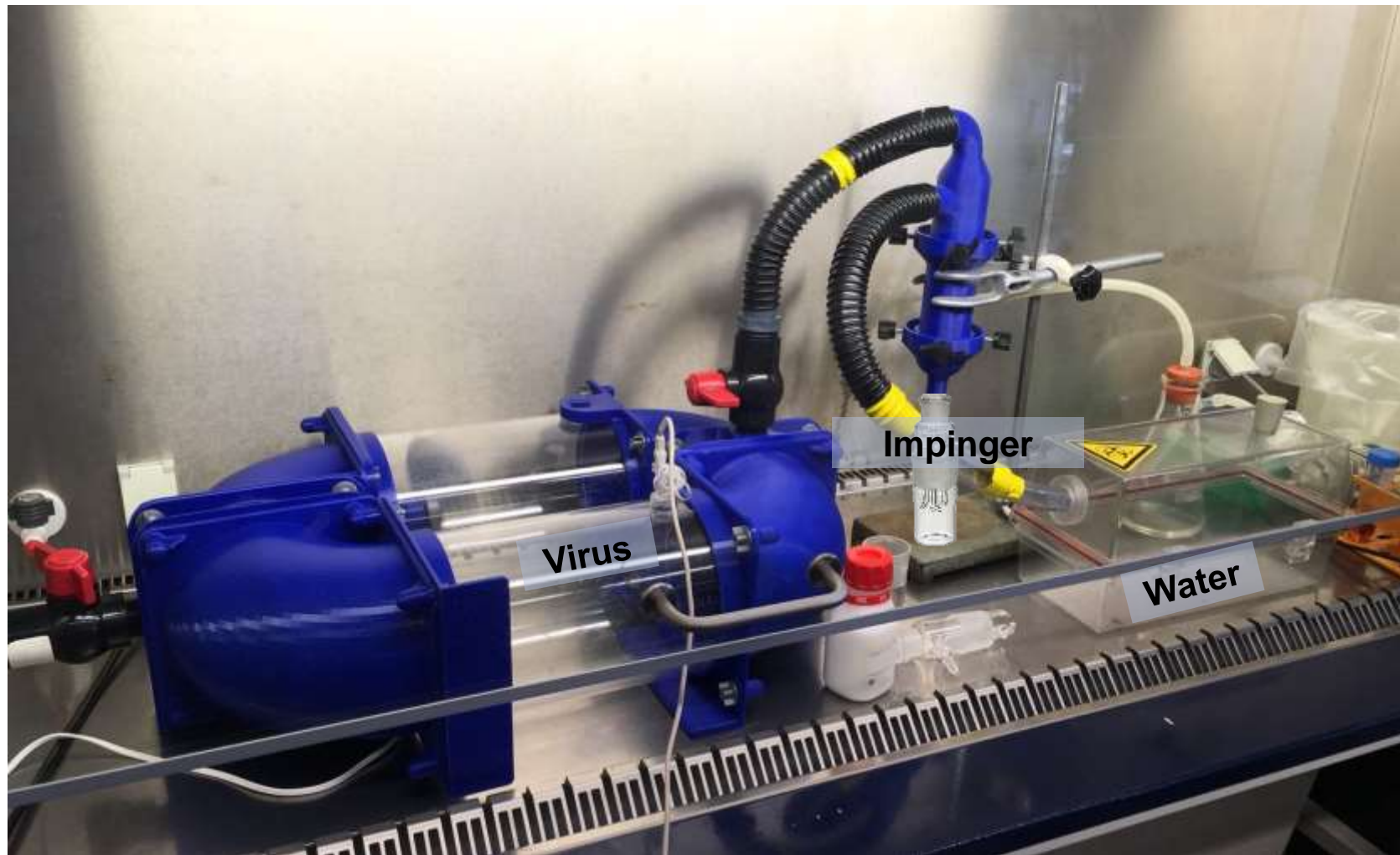
Improved collection of submicron aerosols

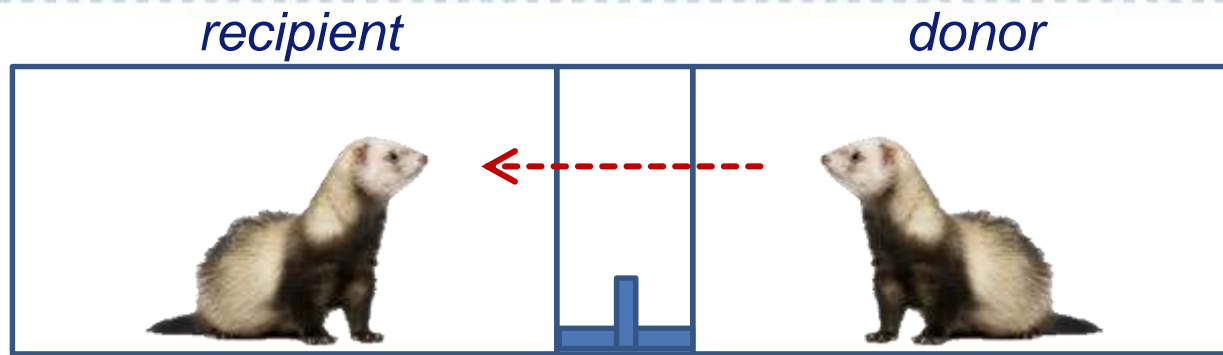
- Aerosol enlargement by collisional growth method -



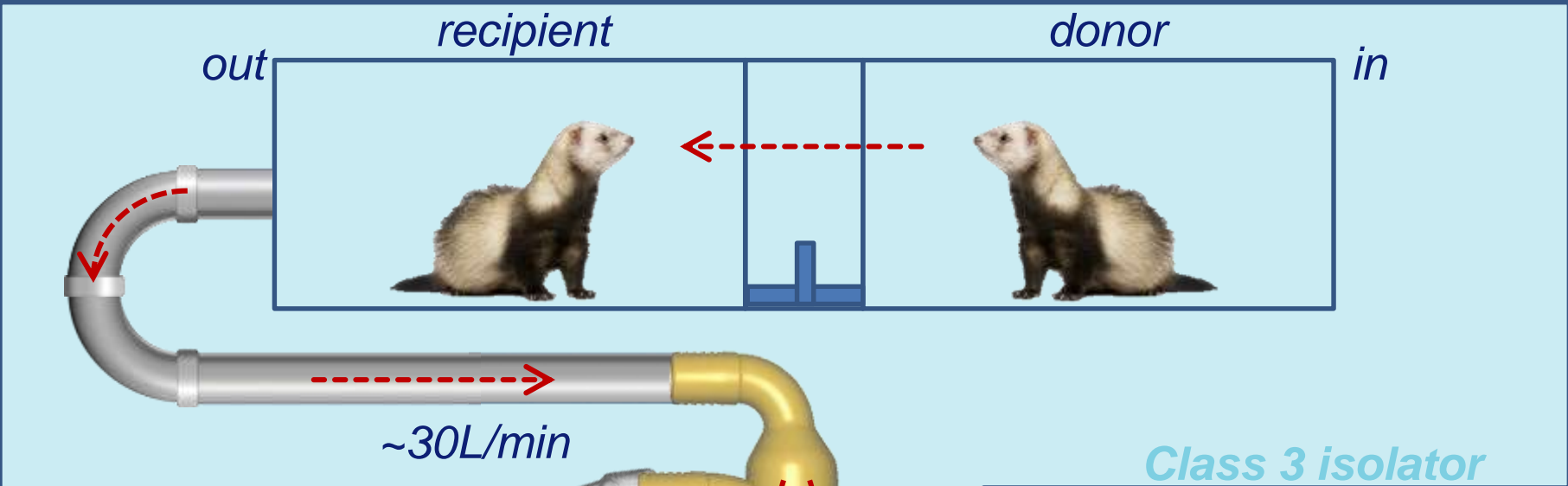
Improved collection of submicron aerosols

- New in-vitro setup -

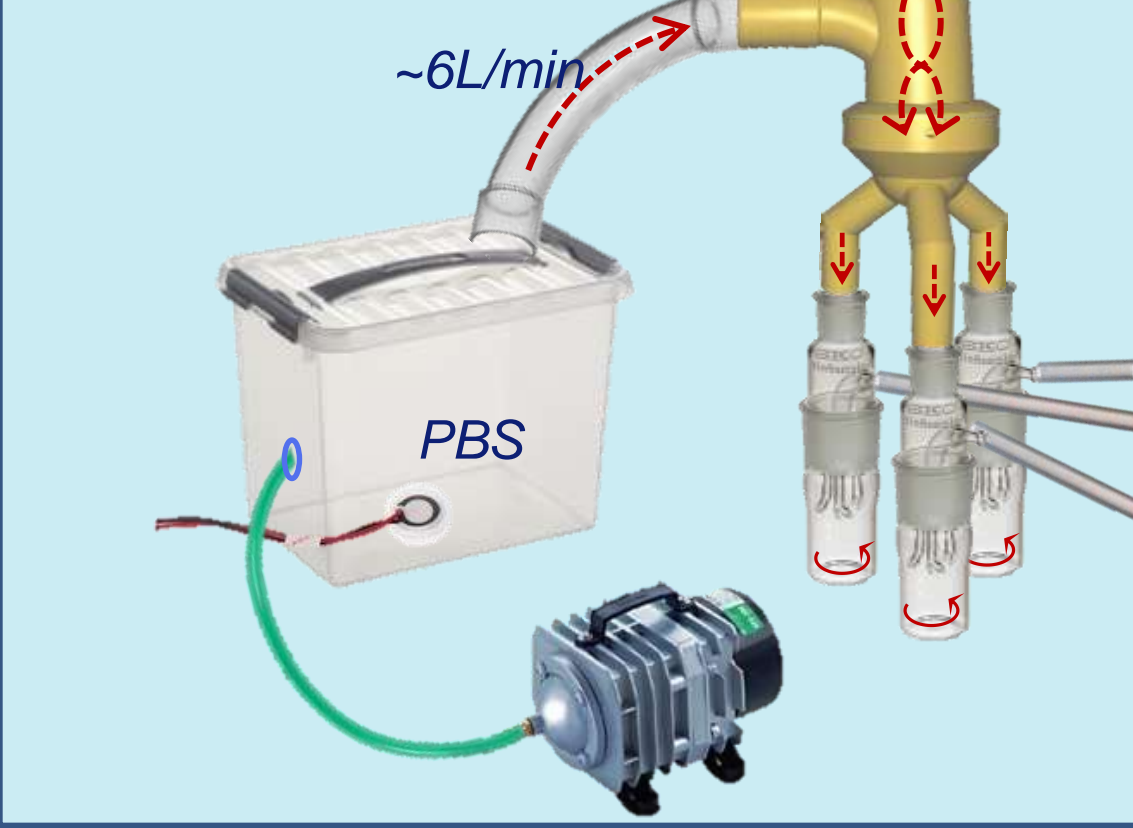




- pH1N1 - Munster et al., Science, 2009
- H7N9 - Richard et al., Nature, 2013
- H5N1 - Herfst et al., Science, 2012
- H5N1 - Linster et al., Cell, 2014
- MERS (rabbits) - Widagdo et al., Viruses, 2019
- SARS-2 - Richard et al., Nat Commun, 2020

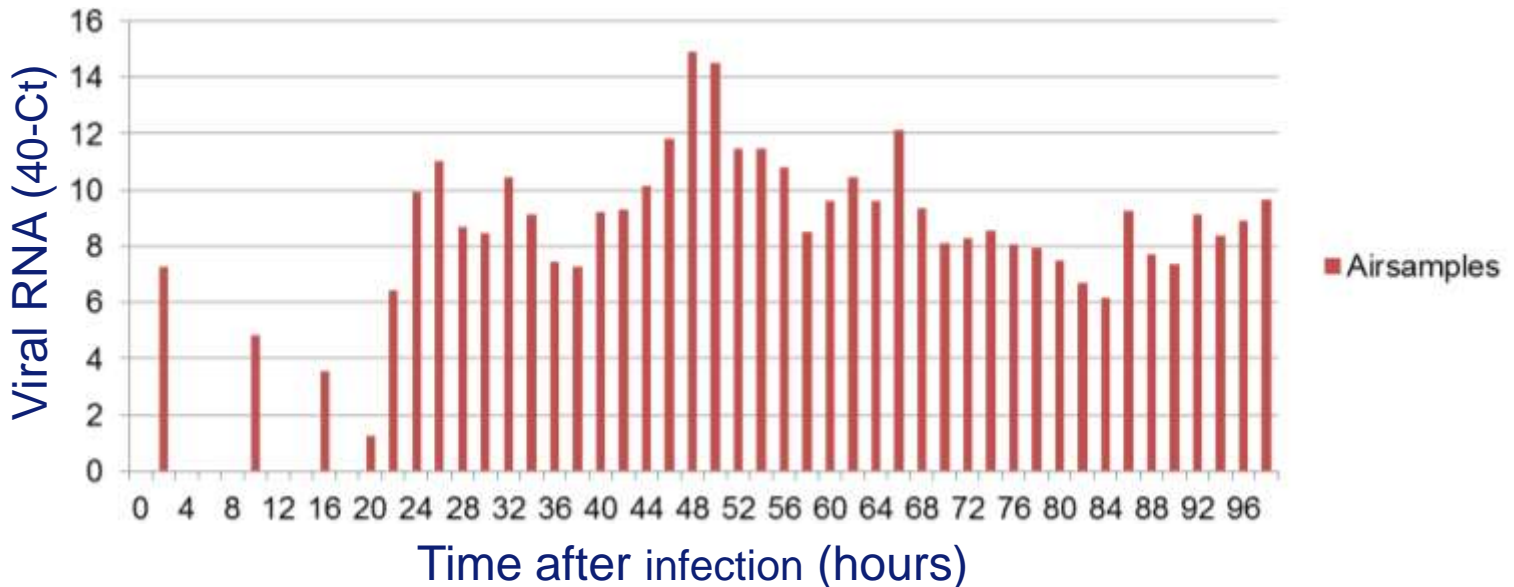
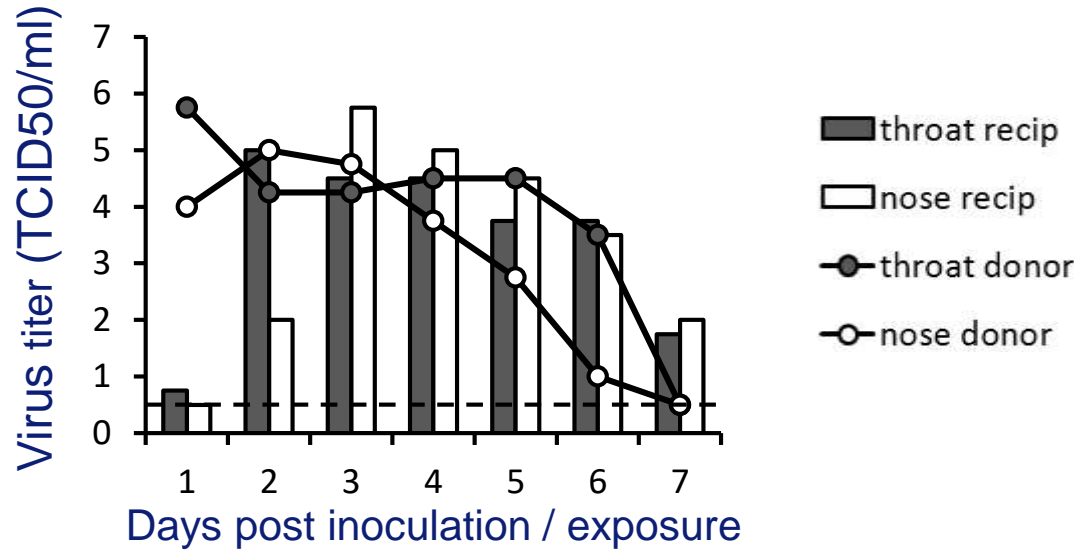


Class 3 isolator



Improved collection of submicron aerosols

- Aerosol enlargement by collisional growth method -



Conclusion and discussion



- Knowledge on the combination of virus shedding kinetics, stability in the air and infectious dose will help to determine relative contribution of transmission via the air.
- High collection efficiency of infectious virus with in-house developed, impinger-based, collisional growth method sampler (in vitro).
- In ferret model no infectious virus was collected, but viral RNA was collected continuously from 16 hrs post-infection of donor onwards.
- More 'elegant' methods should be developed / applied to ensure survival of collected viruses (condensation-based?).

Acknowledgements



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