sihta SOCIETÀ ITALIANA DI HEALTH TECHNOLOGY ASSESSMENT

XV Congresso Nazionale 2022

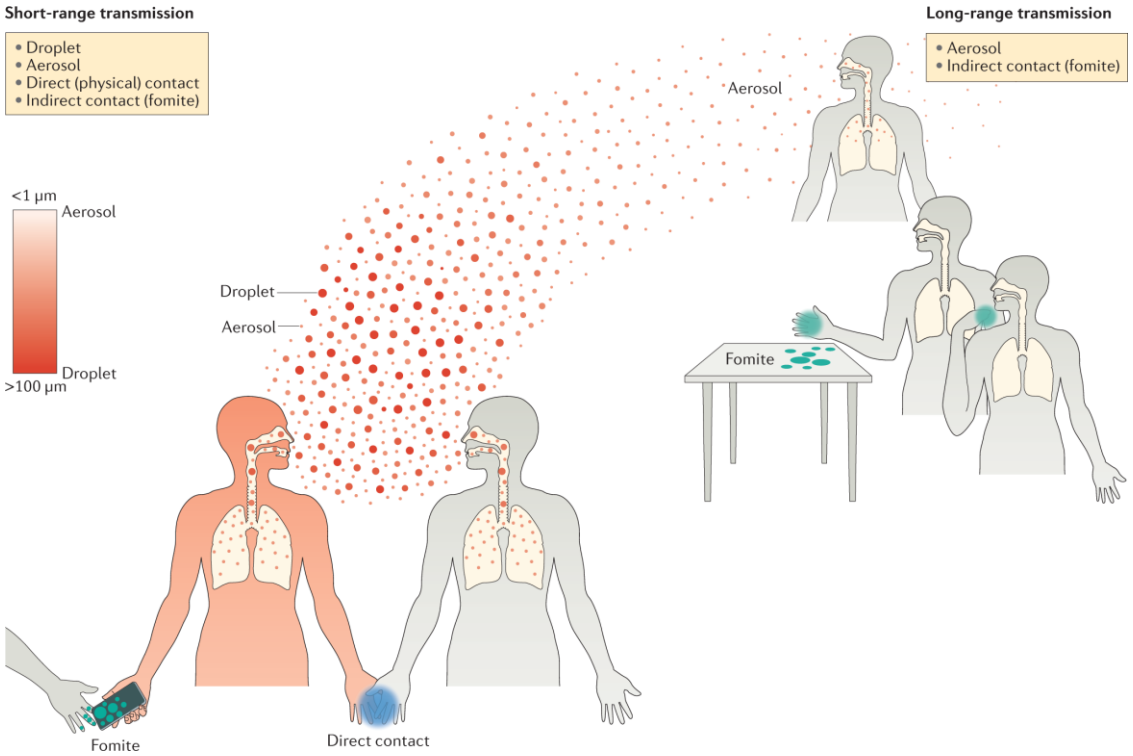
ROMA DAL 25 AL 27 OTTOBRE '22

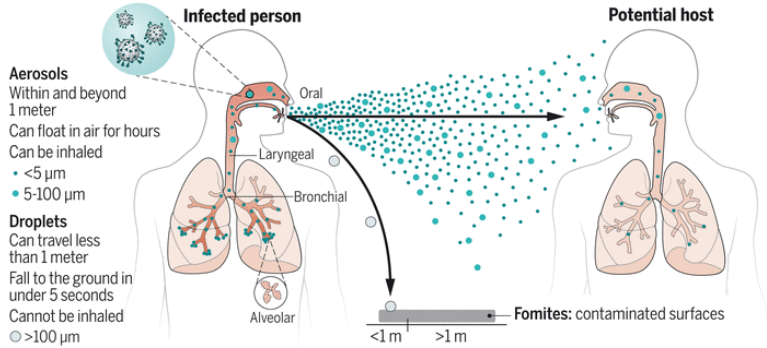
HTA è Valore

IL PUNTO DI VISTA MICROBIOLOGICO

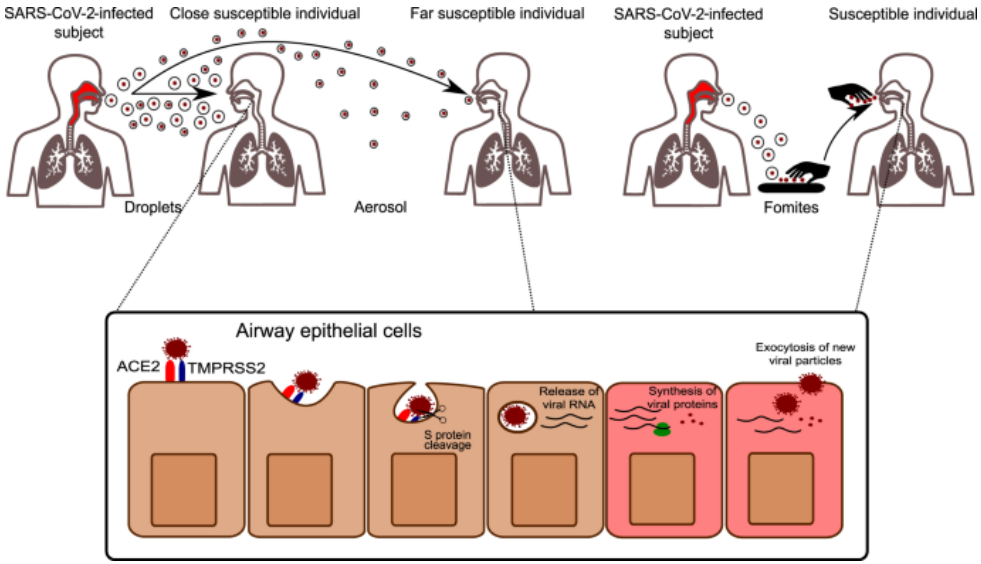
VALUTAZIONI DEI FILTRI ENDONASALI COME PRESIDIO DI SANITÀ PUBBLICA

Major modes of transmission of respiratory viruses during short-range and long-range transmission.





Airborne transmission of respiratory viruses
SCIENCE 373, Issue: 6558, DOI: (10.1126/science.abd9149)

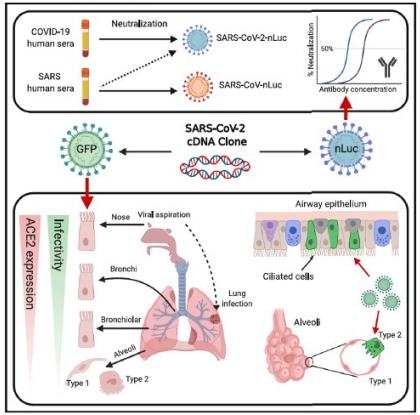


Cell

Article

SARS-CoV-2 Reverse Genetics Reveals a Variable Infection Gradient in the Respiratory Tract

Graphical Abstract



Highlights

- A SARS-CoV-2 infectious cDNA clone and reporter viruses are generated
- SARS-CoV-2 and SARS-CoV neutralization assays show limited cross neutralization
- SARS-CoV-2 shows a gradient infectivity from the proximal to distal respiratory tract
- Ciliated airway cells and AT-2 cells are primary targets for SARS-CoV-2 infection

Authors

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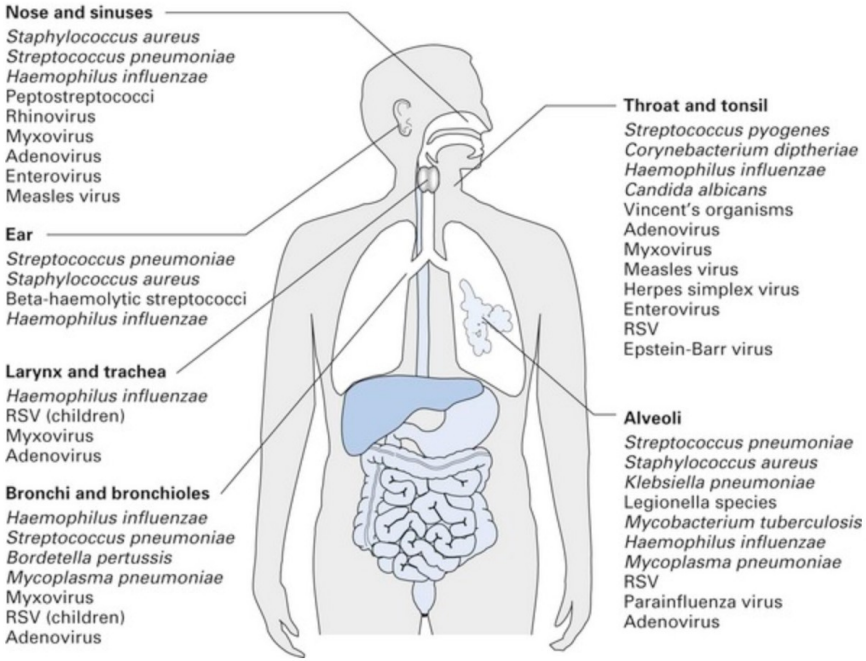
In Brief

Hou et al. present a reverse genetics system for SARS-CoV-2, which is then used to make reporter viruses to quantify the ability of patient sera and antibodies to neutralize infectious virus and to examine viral tropism along the human respiratory tract.

Important pathogens of the respiratory tract

The major causative agents of bacterial and viral respiratory infections of both the upper and lower respiratory tract are illustrated in Figure 23.1.



Mask Efficacy

Coherence

International Journal of
Environmental Research and Public Health

MDPI

Protocol

Operative Protocol for Testing the Efficacy of Nasal Filters in Preventing Airborne Transmission of SARS-CoV-2

Sabrina Semeraro [1,†], Anastasia Serena Gaetano [1,2,†], Luisa Zupin [3,*], Carlo Poloni [1,4], Elvio Merlach [2], Enrico Greco [1,2,5,*], Sabina Licen [1,2], Francesco Fontana [6], Silvana Leo [7,*], Alessandro Miani [5,8], Francesco Broccolo [5,9,10] and Pierluigi Barbieri [1,2,5,*]

Int. J. Environ. Res. Public Health **2022**, *19*, 13790. https://doi.org/10.3390/ijerph192113790 www.mdpi.com/journal/ijerph

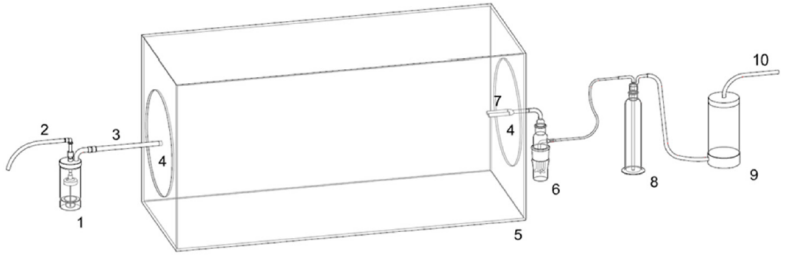
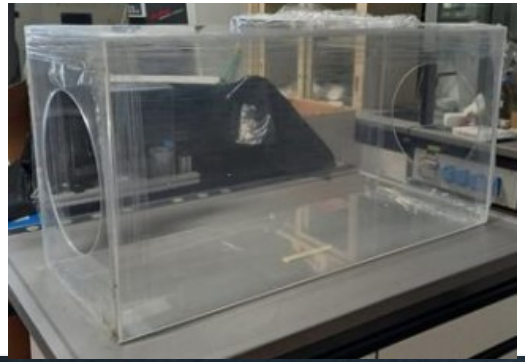


Figure 1. 1. CH-Technology BLAM aerosol generator; 2. Connection to compressor (TCR-TECORA Aero Particle Generator) 3. tube connection to 5. Bioaerosol Chamber: 4. side circular bioaerosol chamber closures; 6. SKC BioSampler; 7. Y shape bioaerosol inlet (internal to the bioaerosol box); 8. NaClO trap; 9. Air desiccator/drier; 10. connection to pump (TCR-TECORA BioBravo).



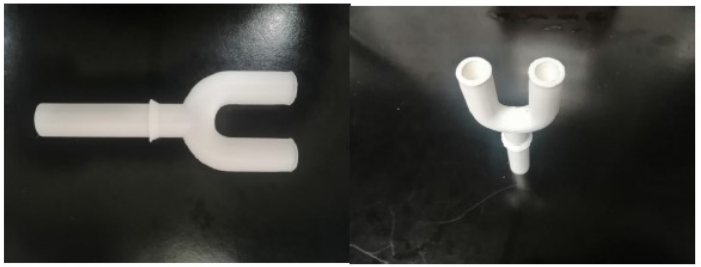


Figure 2. Photographic images of the Y shaped tube sampling port.

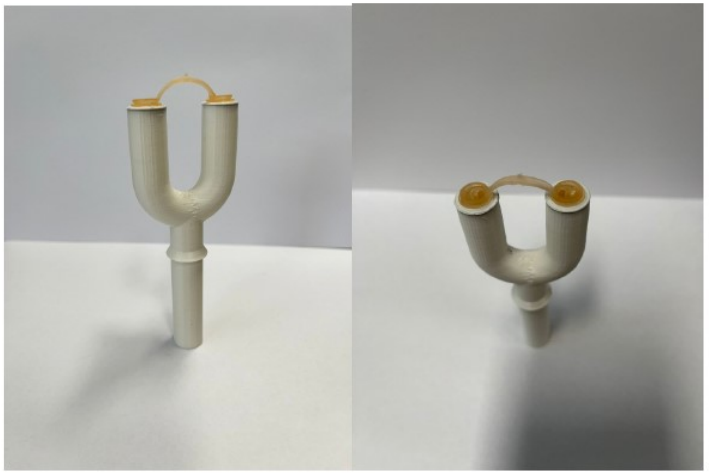
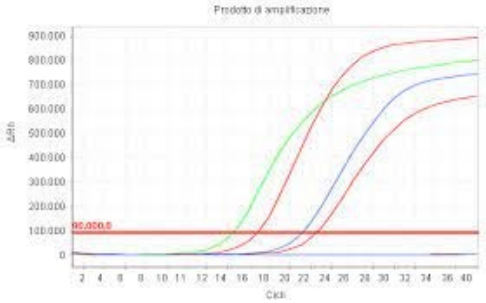
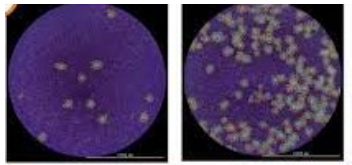


Figure 3. Photographic images of the Y shaped tube sampling port with endonasal filters.

Abstract: Background: Standardized methods for testing Viral Filtration Efficiency (VFE) of tissues and devices are lacking and few studies are available on aerosolizing, sampling and assessing infectivity of SARS-CoV-2 in controlled laboratory settings. NanoAg-coated endonasal filters appear a promising aid for lowering viable virus inhalation in both adult and younger populations (e.g., adolescents). Objective: to provide an adequate method for testing SARS-CoV-2 bioaerosol VFE of bio-gel Ag nanoparticles endonasal filters, by a model system, assessing residual infectivity as cytopathic effect and viral proliferation on in vitro cell cultures. Methods: A SARS-CoV-2 aerosol transmission chamber fed by a BLAM aerosol generator produces challenges (from very high viral loads (10^5 PFU/mL) to lower ones) for endonasal filters positioned in a Y shape sampling port connected to a Biosampler. An aerosol generator, chamber and sampler are contained in a class II cabinet in a BSL3 facility. Residual infectivity is assessed from aliquots of liquid collecting bioaerosol, sampled without and with endonasal filters. Cytopathic effect as plaque formation and viral proliferation assessed by qRT-PCR on Vero E6 cells are determined up to 7 days post inoculum. Results: Each experimental setting is replicated three times and basic statistics are calculated. Efficiency of aerosolization is determined as difference between viral load in the nebulizer and in the Biosampler at the first day of experiment. Efficiency of virus filtration is calculated as RNA viral load ratio in collected bioaerosol with and without endonasal filters at the day of the experiment. Presence of infectious virus is assessed by plaque forming unit assay and RNA viral load variations. Conclusions: A procedure and apparatus for assessing SARS-CoV-2 VFE for endonasal filters is proposed. The apparatus can be implemented for more sophisticated studies on contaminated aerosols.

Keywords: SARS-CoV-2 airborne transmission; endonasal filters; viral filtration efficacy protocol; bio-gel AgNP filters





Metric	Sample 1	Sample 2
Plaque Count	12	165
AVG Plaque Area (μm^2)	7.43E+05	6.15E+05
Total Plaque Area (μm^2)	8.91E+06	1.02E+08

PROTECTION SYSTEMS: COMPLEMENTARY MEASURES

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WEAR ENDONASAL FILTERS