



Protective face masks add significant dead space

Christoph Elbl¹, Josef X. Brunner², Dominic Schier¹, Adrian Junge¹ and Helge Junge¹

¹Grisons Institute for Patient Safety and Simulation (GRIPS), Cantonal Hospital Graubünden, Chur, Switzerland. ²neosim AG, Chur, Switzerland.

Christoph Elbl (christoph.elbl@ksgr.ch)



Shareable abstract (@ERSpublications)

Protective face masks significantly increase dead space ventilation. Rebreathing of carbon dioxide through the added dead space may create discomfort and perceived increase of work of breathing.
<https://bit.ly/32QRme3>

Cite this article as: Elbl C, Brunner JX, Schier D, *et al.* Protective face masks add significant dead space. *Eur Respir J* 2021; 58: 2101131 [DOI: 10.1183/13993003.01131-2021].

This single-page version can be shared freely online.

Copyright ©The authors 2021. For reproduction rights and permissions contact permissions@ersnet.org

Received: 22 Jan 2021
Accepted: 21 April 2021

To the Editor:

Lately, protective face masks have become part of everyday life and many patients and healthcare workers complain of reduced well-being and performance due to the permanent wearing of such masks. Reportedly, the main symptoms are headaches and difficult breathing, especially in combination with stress and physical exertion [1–3]. It is suspected that protective masks impede oxygen supply to the lungs and increase carbon dioxide rebreathing [4]. Theoretical estimations suggest that indeed the dead space increases for mask wearers [5] and this would translate into increased arterial CO₂ levels with concomitant increase in work of breathing through control-of-breathing mechanisms. Added flow resistance of protective face masks, as well as comfort and general physiological effects, have been described in the literature [6–8]. However, the effect on gas exchange is poorly investigated, basically because standard procedures involve using a mouthpiece and a nose clip, or a dedicated face mask (European Respiratory Society recommendation [9]), which is obviously not possible in subjects wearing a protective face mask. To investigate this question, the use of a lung simulator seemed to be an obvious approach.