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## References

- Swennen GRJ, Pottel L, Haers PE. Custom-made 3D-printed face masks in case of pandemic crisis situations with a lack of commercially available FFP2/3 masks. *Int J Oral Maxillofac Surg* 2020;**49**:673–7. <http://dx.doi.org/10.1016/j.ijom.2020.03.015>.
- Grinshpun SA, Haruta H, Eninger RM, Reponen T, McKay RT, Lee SA. Performance of an N95 filtering facepiece particulate respirator and a surgical mask during human breathing: two pathways for particle penetration. *J Occup Environ Hyg* 2009;**6**:593–603.
- Danyluk Q, Hon C, Neudorf M, Yassi A, Bryce E, Janssen B, Astrakianakis G. Health care workers and respiratory protection: is the user seal check a surrogate for respirator fit-testing? *J Occup Environ Hyg* 2011;**8**:267–70.
- Kawabe Y, Tanaka S, Nagai H, Suzuki J, Tamura A, Nagayama N, Akagawa S, Machida K, Kurashima A, Yotsumoto H. [Evaluation of quantitative fit-testing of N95 filtering facepiece respirators using Mask-Fitting Tester and improvement of mask fitting by instruction]. *Kekkaku* 2004;**79**:443–8.
- COVID-19 Supply Chain Response Collection. *NIH 3D Print Exchange Website*. 2020 . [Accessibility verified May 9, 2020] <https://3dprint.nih.gov/collections/3dprint.nih.gov/collections/covid-19-response/search>.
- FAQs on 3D printing of medical devices, accessories, components, and parts during the COVID-19 pandemic. *Food and Drug Administration Website*. 2020 . [Accessibility verified May 9, 2020] <https://www.fda.gov/medical-devices/3d-printing-medical-devices/faq-3d-printing-medical-devices-accessories-components-and-parts-during-covid-19-pandemic>.

## Reply to Scott et al., “Safety concerns for facial topography customized 3D-printed N95 filtering face-piece respirator produced for the COVID-19 pandemic: initial step is respiratory fit testing”

The safety concerns raised in the letter of Scott et al. are correct and have obviously to be addressed.

Our paper merely describes a ‘proof of principle’, demonstrating that commercially available 3D photography apps allow data to be acquired that enable 3D printing with great precision, including for custom-made masks<sup>1</sup>. It is obvious that testing of these masks is necessary to provide assurances of safety, as is the case with all masks.

The current standard is that certified staff carry out standardized tests of the fitting of commercially available masks, to ensure that the masks are efficient and safe. Even then, the masks must be used correctly. This is a requirement in all oral and maxillofacial settings, as it is in specific hospital settings, dental surgeries, etc., especially when aerosol-generating procedures are performed. Once a certain type of mask is certified for a specific individual, it can be used by that person according to guidelines of precise use, including disinfection of the masks and

durability of the filters used. This would evidently also apply to 3D-printed masks.

The paper is therefore not misleading, but demonstrates merely a proof of principle to make a custom-made mask that has to be submitted to the same standardized testing as any other type of commercially available mask.

The authors mention correctly that commercially available masks can be affected by poor fit. As the masks are based on 3D printing and are custom-made, they have a potentially higher probability of fitting well without either excessive compression of the skin or leaks.

In the first instance, the 3D-printed mask with its specific filter needs to be approved by the necessary regulatory authorities, and secondly these masks will have to pass the individual standardized fitting tests.

## Patient consent

Not applicable.

## Funding

Not applicable.

## Ethical approval

Not applicable.

## Competing interests

Not applicable.

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## References

- Swennen GRJ, Pottel L, Haers PE. Custom-made 3D-printed face masks in case of pandemic crisis situations with a lack of commercially available FFP2/3 masks. *Int J Oral Maxillofac Surg* 2020;**49**:673–7. <http://dx.doi.org/10.1016/j.ijom.2020.03.015>.