

## Letters to the Editor

### The possibility of COVID-19 transmission from eye to nose

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Editor,

The Coronavirus Disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is not only spreading throughout China but has reached more than 20 countries and has already posed threats to global health and economy. So far, the number of people infected in China has climbed to more than 70 000. Of them, at least 3019 healthcare workers have been infected. However, the specific causes of infection among healthcare workers in hospital environments are unclear. It has been confirmed that COVID-19 is mainly transmitted through both respiratory droplets and direct contact. Aerosols are another possible transmission route requiring attention. In February 2020, a report in *The Lancet* raised the issue that ocular surfaces may be a potential target for SARS-CoV-2 invasion (Lu et al. 2020). However, two recent studies do not fully support this assumption (Li et al. 2020; Zhou et al. 2020, unpublished paper). The reason is that although a small number of COVID-19 patients have conjunctivitis, not all of them show positive test of SARS-CoV-2 nucleic acid in conjunctival sac swabs. In addition, some patients did not have conjunctivitis despite positive test results for the SARS-CoV-2 nucleic

acid in their conjunctiva sac swabs (Dr. Yanping Song from Wuhan City, China, the outbreak area in China, unpublished paper). Interestingly, the medical history of the clinical physicians with COVID-19 revealed that neither of them used eye goggles when examining (physician 1) and intubating infected patients (a high-risk procedure to produce aerosol) (physician 2).

Studies show that, like the severe acute respiratory syndrome coronavirus (SARS-CoV) that caused SARS, SARS-CoV-2 binds to human angiotensin-enzyme II (ACE2), using it as a cell entry receptor to invade respiratory and lung epithelium through the spike (S) protein (Zhou et al., 2020a, 2020b). However, ACE2 is mainly expressed in posterior tissues of the eye, such as the retina and the retinal pigment epithelium, not in the human conjunctival and corneal epithelium (Choudhary et al. 2017). We presume that these previous studies ignored the characteristics of lacrimal drainage. Tears are constantly renewed by the lacrimal system. Therefore, we speculate that the virus enters the tears through droplets, which may pass through the nasolacrimal ducts and then into the respiratory tract. Combined with all this information, we assert that, when coming into contact with confirmed or suspected cases of COVID-19, healthcare workers should wear eye safety goggles. This should become one of the critical measures for preventing the spread of COVID-19. The authors hope this topic is helpful for work in the outbreak area.

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### Coronavirus disease 2019 (COVID-19) outbreak at the Department of Ophthalmology, Oslo University Hospital, Norway

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Editor,

Since the end of 2019, an outbreak of a novel coronavirus (SARS-CoV-2) originating in the Chinese city of Wuhan has rapidly spread across the world. The disease is designated COVID-19, an abbreviation for coronavirus disease 2019 (World Health Organization 2020a, 2020b). While most patients experience mild sickness or are asymptomatic, COVID-19 can