Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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See **Online** for video

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SARS-CoV-2 transmission via speech-generated respiratory droplets

During a pandemic, identifying modes of transmission is paramount to devise effective and practical mitigation strategies. Mohamed Abbas and Didier Pittet[1] challenge the conclusions of our reports that normal speaking might be an important mode of transmission for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), involving small particles that remain airborne for minutes.[2,3] Whereas the opening remarks in Abbas and Pittet's correspondence are irrelevant to our work, we eagerly welcome an intellectual debate on the scientific merits of our research. In their correspondence, they claim that our "findings have no immediate implications".[1] Nothing could be further from the truth. While we refer readers to the appendix (pp 1–5) for a detailed response to all issues raised, we here address two of Abbas and Pittet's more pertinent concerns.

See **Online** for appendix

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Abbas and Pittet contend that our work is flawed by a lack of generalisability because the published results involved only a single speaker.[1] Their implication that the generation of speech droplets might be idiosyncratic discounts the well understood physics of speech droplet formation. Speech-generated acoustic waves involve high-speed passage of air, pressurised by the lungs, past the mucosal epithelial layers of the vibrating vocal folds.[4] The sounds generated are further modulated by travel of this air through narrow passages between the tongue, lips, and teeth, dislodging oral fluid at all of these locations.[4] Emission of droplets is inextricably linked to the physics of speech generation[5] and unlikely to differ much from one individual to another. As shown in the appendix (p 6) and video in the supplementary materials, all speakers spit. Fortunately, when exiting the mouth, such droplets are still fairly large and easily blocked from entering the atmosphere by a generic cloth mask.[2]

Abbas and Pittet also raise the criticism that the size of the box used for observing the shrunken, dried-out nuclei of speech droplets was small, thereby limiting the physical distance such nuclei could travel. Indeed, our measurements only established that, even in a quiescent environment, droplet nuclei require many minutes to descend to the bottom of the box. The extent to which dehydrated speech droplets can travel before reaching the ground in real-life situations depends crucially on factors such as air convection and ventilation. Physics dictates that air movement will carry such particles over considerable distances, fully analogous to the dispersion of cigarette smoke throughout a room.

The medical community has long acknowledged infection via speech-generated respiratory droplets, including droplet nuclei that might stay airborne for an extended time.[5] The importance of symptomless transmission of SARS-CoV-2 (ie, in the absence of coughing or sneezing), whether retrospectively identified as asymptomatic, presymptomatic, or even oligosymptomatic, has also been well established,[6,7] despite claims to the contrary by Abbas and Pittet. With high viral titres in the oral fluid of such carriers well documented and a substantial proportion of speech droplets of oral fluid now shown to remain airborne for many minutes, inhalation of such particles represents a direct route to the nasopharynx. Retrospective analyses of indoor superspreader events further support the role of speech droplets in airborne transmission.[8]

We declare no competing interests.

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Willingness to vaccinate against COVID-19 in Australia

More than half of the world's population faces long-term restrictions as the new normal to prevent the