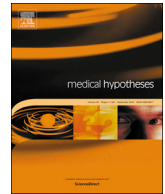




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Epithelial cilia is the first line of defence against Coronavirus; addressing the observed age-gradient in the COVID-19 infection



To the Editor,

On the passage to the lungs, the COVID-19 virus pass via the nose or the lips, through the oral cavity, the pharynx and the larynx before entering the bronchi and into the lungs. All humans have a 'line of defence' namely the respiratory epithelium with cilia lining the upper respiratory tract from the posterior third of the nasopharynx to the bronchioles [1]. The airway epithelium cells are columnar in shape and tapers towards the lumen and each cell can have as many as 200–300 cilia on the luminal surface [2]. The cilia are 0.2–0.3 μm in diameter and the length range from 6 to 7 μm in the upper airway to 4 μm in the smaller airway.

The cilia beat in a coordinated fashion across the epithelium in order to move bacteria, virus, epithelial debris, and other unhealthy items up and out of the airway. The goblet cells of the epithelium produce mucous which assist collecting the debris for expulsion out of the airway. The cilia are exposed through life to cigarette smoke and smoke from different substances, alcohol, medicines, food substances, industrial and environmental pollution. Alcohol alone and alcohol combined with smoking have been found to immobilize the cilia in studies on mice [3,4]. Cilia dysfunction is involved in lung diseases and Tilley et al gives a review of cilia function and dysfunction due to inherited and acquired disorders [2]. Mucociliary clearance is important in several diseases as asthma and chronic obstructive pulmonary disease (COPD) [2].

A normal age related reference range of beat frequency of ciliary was established by Chilvers et al. The beat frequency of cilia was highest in the paediatric population compared to older persons [5]. Included in their study, were 31 children and young persons aged 6 months to 17 years who should undergo elective surgery. Included were also 23 adult volunteers aged 18–43 years. Excluded were individuals with a history of chronic respiratory or nasal disease or a symptomatic upper respiratory tract infection during the previous 6 weeks, were taking regular medication, or were known smokers.

That immunization through vaccination plays a part in the age-gradient of the pandemic is also likely, but vaccine programs and the availability for vaccines vary across the globe [6]. In elderly persons, it is conceivable that cilia do not function as well as for infants and areas of dyskinesia become increasingly more common. Age is therefore important with regard to the functionality of epithelial cilia of the

respiratory tract.

Our primary line of defence is a robust system designed by nature to protect us through life. My hypothesis is that the epithelial cilia lining of the upper respiratory tract may be an important part of the explanation of the age-gradient that is observed in the COVID-19 pandemic across the globe.

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Declaration of Competing Interest

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