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READER'S FORUM

ACTA PÆDIATRICA NURTURING THE CHILD WILEY

Physiological advantages of children against COVID-19

Dear Editor,

We read the editorial by Dr Brodin with great interest, which is discussing why COVID-19 appears to be so mild in children.[1] The author discussed the potential theories that could explain why children have a lower incidence and milder clinical manifestations than adults. Additionally to the theories mentioned by the author, we would like to emphasise the differences between the child and adult respiratory systems that potentially protect children from severe COVID-19 disease.

Currently, the pathogenesis of COVID-19 has not been clearly elucidated, but there is evidence that it can enter the human body through angiotensin-converting enzyme 2 (ACE2) on the surfaces of type II alveolar cells.[2] ACE2 is a functional receptor for COVID-19. ACE2 is widely distributed in the human body; mainly found in the digestive tract, lung, kidney, heart and blood vessels. More than 80% of total ACE2 expression is found in type II alveolar cells. Type II cells express more than 20 other genes closely related to virus replication and transmission and produce surfactant. Newborn has only three million alveoli compared with 500 million alveoli in an adult. Less alveoli with fewer type 2 cells may spare children from excessive immune reaction compared with adults. The cellular serine protease TMRRSS2 is also required to allow the entry of coronavirus into host cells and the type II cells largely express TMPRSS2.[3] This gene was demonstrated to be upregulated by androgenic hormones. Prepubertal state may speak to the diminished entry of coronavirus to the type II cells.

Collateral ventilation, defined as the ventilation of alveoli via pathways that bypass normal airways, is present in many species, including humans.[4] Collateral ventilation is thought to occur through alveolar pores of Kohn interbronchiolar Martin's channels and bronchialveolar Lambert's channels. Pores of Kohn are found in greatest numbers in the apical portions of upper and lower lobes, as well as in peribronchial, perivascular and subpleural areas. The pores of Kohn function primarily as pathway for alveolar lining fluid, surfactant components and macrophages between the adjacent alveoli. In humans, collateral pathways are absent in neonates and these pathways develop during the first 5 years of life. We think that these collateral pathways facilitate the spread of virus in adults and absence of them prevents the excessive spread of virus in children.

It is known that functional residual capacity is smaller and alveolar ventilation is larger in children. So, it can be speculated that less alveolar clearance rate may play a role in viral attachment in adults.

In our opinion, these diverse properties of child respiratory system may also have an impact on the severity of COVID-19 infection.

CONFLICT OF INTEREST

There are no conflicts of interest in connection with this paper, and the material described is not under publication or consideration for publication elsewhere.

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