

Why does SARS-CoV-2 have prolonged spreading time in Children?

To the Editor,

We read the article written by Lin et al with interest and would like to share our opinion on it.¹

On the basis of the literature, child patients with SARS-Cov-2, especially those below the age of 15, have shown to experience very mild infections.² What are the reasons for these clinical differences between the elderly and young people? The current literature provides no clear explanation.

In the pathogenesis of a standard viral infection, the pathogen's contact with the mucosa is initially followed by an innate immunity response (macrophage, antigen-presenting, and natural killer cell). The objective is to eliminate the pathogen in the initial stage. Subsequently, adaptive immunity comes into play and is responsible for the elimination of infected cells, activation of the antibody response, and production of memory T cells. T cells are the primary, decisive element in adaptive immunity capability. For this reason, the adaptive immune response mediated by the thymus is a process that regulates the immune response responsible for preventing invasive damage from a virus. Thus, the thymus-mediated adaptive immune response plays a vital role against viral infections.

Aging presents structural and functional loss affecting the entire system and precisely, the immune system.³ Thymus hypoplasia and the gradual decrease in both function and number of T cell/Treg cells in the elderly make them susceptible to autoimmune disorders, obstructive lung disease, cancer, and viral infections. The pathogen-induced immune response cannot be regulated in elderly people due to loss of macrophage function as well as reduced Treg cell and function; this results in an immune storm and severe tissue damage.³

In children, the thymus is active and an associated adequate adaptive immune response is present. Vaccines and common viral infections in childhood produce a dynamic and effective adaptive immune response.^{3,4} As a result, children have a more controlled immune response compared to the elderly due to their effective thymus functions and related effective adaptive immune response. This controlled and organized immune response protects children from severe tissue damage.

Although this controlled response prevents tissue damage, it also makes viral elimination more difficult. An example of this case is the viral Hepatitis-B infection of infants. It is known that the immune response is the primary component of a clinical and histopathological case of Hepatitis B. In maternal Hepatitis-B exposure of newborns, the virus cannot be eliminated from the body due to an ineffective and un-

coordinated immune response. Regulatory T cell dysfunction and impaired T-cell receptor signaling may represent the immune-tolerant state of the adaptive immune system in response to chronic HBV infection in neonates. Therefore, the infection commonly persists and becomes chronic.⁵

In your article, the case of the 7-year-old involves a prolonged respiratory positivity for SARS-Cov-2. However, the article did not include any clarification on the possible causes of this situation.

We believe that this situation can be explained by the differences in the immune response of age groups. Children have a more controlled immune response compared to adults and even though this prevents tissue damage, it also prolongs the full elimination time of the virus from the human body. Therefore, children have an extended time to transmit the virus compared to adults. For this reason, we should be very mindful when observing children during the epidemic control of SARS-Cov-2.

We are curious to hear your views on this topic.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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