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A poor and delayed anti-SARS-CoV2 IgG response is associated to severe COVID-19 in children

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Abstract

Background: Most children and youth develop mild or asymptomatic disease during severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. However, a very small number of patients suffer severe Coronavirus induced disease 2019 (COVID-19). The reasons underlying these different outcomes remain unknown.

Methods: We analyzed three different cohorts: children with acute infection (n=550), convalescent children (n=138), and MIS-C (multisystem inflammatory syndrome in children, n=42). IgG and IgM antibodies to the spike protein of SARS-CoV-2, serum-neutralizing activity, plasma cytokine levels, and the frequency of circulating Follicular T helper cells (cTfh) and plasmablasts were analyzed by conventional methods.

Findings: Fifty-eight percent of the children in the acute phase of infection had no detectable antibodies at the time of sampling while a seronegative status was found in 25% and 12% of convalescent and MIS-C children, respectively. When children in the acute phase of the infection were stratified according disease severity, we found that contrasting with the response of children with asymptomatic, mild and moderate disease, children with severe COVID-19 did not develop any detectable response. A defective antibody response was also observed in the convalescent cohort for children with severe disease at the time of admission. This poor antibody response was associated to both, a low frequency of cTfh and a high plasma concentration of inflammatory cytokines.

Interpretation: A weak and delayed kinetic of antibody response to SARS-CoV-2 together with a systemic pro-inflammatory profile characterize pediatric severe COVID-19. Because comorbidities are highly prevalent in children with severe COVID-19, further studies are needed to clarify their contribution in the weak antibody response observed in severe disease.

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Keywords: Disease severity, antibodies, T cells; Pediatric COVID-19.

Figures

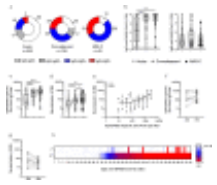

Fig. 1 Antibody response against SARS-CoV-2 in...

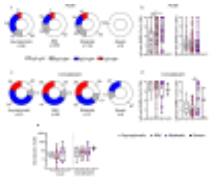

Fig. 2 Antibody response against SARS-CoV-2 across...

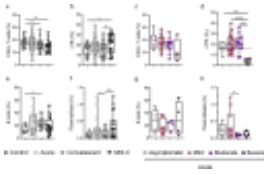

Fig. 3 Frequency of cTfh cells and...

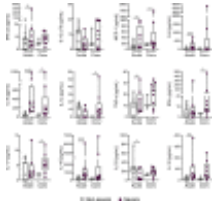

Fig. 4 Plasma levels of cytokines in...

Supplementary concepts

pediatric multisystem inflammatory disease, COVID-19 related

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