

Paula Reichelt (IMMU): Impact of the Covid-19 pandemic lockdown and associated changes of exposure to bioactive chemicals and immune parameters in children

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Abstract: "Background

Children's immune systems significantly differ from adults. Particularly their adaptive immune defense is still developing. Contact with pathogens plays a crucial role, as with each infection, the immune system learns to specifically combat new pathogens. The COVID-19 pandemic lockdown, including daycare and school closures, reduced exposure to pathogens and shifted chemical exposure, potentially affecting immune development. Due to their developmental stage, children are particularly sensitive to these influences.

Objective

This project aims to analyze the impact of the pandemic and lockdown on children's immune systems, linking changes to environmental chemical exposure. The study also investigates the infectious epidemiological development during and after the pandemic and possible connections to autoimmunity.

Methods

Blood samples from 211 children (ages 10-15) before and after the lockdown were analyzed for chemical profiles and chemokine concentrations. These comprised markers from the human Proinflammatory Chemokine Panel 1 (Biolegend), assessed by a multiplex bead-based assay, allowing for simultaneous quantification of 12 chemokines, including MCP-1 (CCL2), IP-10 (CXCL10), Eotaxin (CCL11), TARC (CCL17), MIP-1 α (CCL3), MIP-1 β (CCL4), MIG (CXCL9), MIP-3 α (CCL20), ENA-78 (CXCL5), GRO α (CXCL1), I-TAC (CXCL11) and IL-8 (CXCL8). Furthermore, specific antibodies against EBV, Influenza (H1N1), RSV, and COVID will be measured. To elucidate potential developments of autoimmunity, levels of transglutaminase antibodies will be assessed. Samples were also screened for 940 chemicals from industrial use and consumer products, pesticides, food additives and endogenous compounds.

Results

Significant increases in pro-inflammatory chemokines such as Eotaxin, IP-10, and MIP-1 α were observed, with sex- and age-specific differences. We could preliminarily quantify around 150 chemicals from all categories. Some individual chemicals such as tire additives, PFAS and BPA seem to shift in their concentrations and abundance, with age and lockdown being important factors.

Conclusion

Post-pandemic, changes in pro-inflammatory cytokine levels were noted and further investigations will determine potential changes in abundance of selected antibodies. Additional analyses will explore chemical exotypes and bioactivity correlations with neurotoxic bioassays. We also investigated changes in chemical composition and bioactivity of extracts of exposed and clean storage material."

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