

AID/APOBECs among important factors in body's defence against SARS-CoV-2

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Together with their multifaceted action mechanisms, activation-induced cytidine deaminase (AID) and so-called APOBEC proteins are important factors in the body's immune response and offer fast and effective

protection against a large number of DNA and RNA viruses. The task of AID is to strengthen the human immune response, while APOBECs are able to block the virus. A MedUni Vienna research team comprising Anastasia Meshcheryakova, Diana Mechtcheriakova and Peter Pietschmann from the Institute of Pathophysiology and Allergy Research has now addressed the potential interrelations between AID/APOBECs and the SARS-CoV-2 virus, particularly in connection with the course of COVID-19 in different patients. This could provide a starting point for future clinical strategies to improve and strengthen individual antiviral response.

The defense mechanisms associated with AID/APOBECs in response to the coronavirus were assessed on the basis of integrative data mining and gene expression analyzes, as part of a study conducted with international partners. It was found that members of the APOBEC family are preferentially expressed in a particular type of cell or tissue: "However, this does not mean that a particular cell type only expresses a particular member of the APOBEC family but that each cell type exhibits its own characteristic APOBEC repertoire," explains Diana Mechtcheriakova.

What is completely new is that the researchers found that APOBEC4 is highly expressed in cells and tissues that are points of attack for SARS-CoV-2. These include epithelial cells in the bronchi, in the lungs, in the trachea and in the nose. It was also found that there is an extremely high level of expression of both molecules (one of the members of the APOBEC family and ACE2, the entry receptor for SARS-CoV-2), in the gastrointestinal tract, in the heart and in the testis.

"Based on this knowledge, the clinical challenge in the future will be to characterize the antiviral cell status attributed to AID/APOBECs specific to patients and/or patient groups and to correlate the cell-type-specific AID/APOBEC gene expression signature with the organs affected by SARS-CoV-2 infection and the severity of COVID-19,"

explains Mechtcheriakova.

A particular role in this process is attributed to AID, since it co-determines the strength of an adaptive immune response. "The AID-driven, highly coordinated sequence of events, which all occur in specialized immunological lymphoid structures with germinal centers, results in the production of high-affinity antibodies by plasma cells or memory B [cells](#). These antibodies are directed against the pathogen causing the disease, such as SARS-CoV-2, either in the course of infection or of an immune response to a vaccine," explains Meshcheryakova. The role of these complex lymphoid structures and of AID is of great importance for our further understanding of the pathobiology of COVID-19, and consequently for the development of new therapeutic approaches.

More information: Anastasia Meshcheryakova et al, AID and APOBECs as Multifaceted Intrinsic Virus-Restricting Factors: Emerging Concepts in the Light of COVID-19, *Frontiers in Immunology* (2021). [DOI: 10.3389/fimmu.2021.690416](https://doi.org/10.3389/fimmu.2021.690416)

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