The increased frequencies of two novel B cell populations defined as $IgM^+CD19^+CD27^-CD21^{low}CD38^{low}CD24^+$ and $IgM^+CD19^+CD27^-CD21^{low}CD38^{low}CD24^-$ in peripheral blood of patients with common variable immunodeficiency (CVID) compared to healthy donors were found. The aim was to search for such B cells in patients with rheumatoid arthritis (RA) and their further characterization.

The production of immunoglobulin (Ig) mRNA in single B cells was analyzed using flow cytometry, single cell sorting and RT-PCR, IgV_H-specific PCR, cycle sequencing and statistical analysis. The study was focused on analysis of variable regions of the heavy chains of Igs and significant differences in the usage of V_H, D_H and J_H gene segments, mutational frequencies, distribution of silent and replacement mutations, length and composition of CDR3 regions, clonal relation and RAG gene expression in above mentioned B cell populations were found.

Because of lack of the surface CD27 molecule being regarded as marker of B cells that have undergone antigen-driven germinal reactions, analyzed populations were considered as naive. However, the pattern and type of mutations suggested that these cells could represent a new type of differentiated memory/antigen-experienced B lymphocytes (in CVID less maturated) with the likely role in protecting of organism against infections or with so far unknown regulatory function.

The most interesting finding was remarkable restriction of V_H gene repertoire to only 10 V_H genes with predominance of V_H3-48 and V_H4-34 genes as the result of extremely high degree of clonal relation in B cells

of patient with RA. Since V_H4-34 gene is coding for anti-dsDNA autoantibodies the data might suggest for susceptibility of these cells to escape negative selection and to become autoreactive.

However, this was not confirmed in controls and in patients with CVID, and our data indicate that $CD24^-$ B cells might represent more differentiated and antigen-experienced cells as compared to their $CD24^+$ counterparts.

Discovered $CD27^-$ B cells could be included in healthy subjects into maintenance of homeostasis of immune system (in CVID disturbed) whereas in autoimmune diseases they display rather autoreactive features.

Detailed analysis of these particular B cells in patients with other autoimmune diseases could confirm the role of these cells in physiological or pathological process.