ABSTRACT

B-lymphocytes are a subset of immune cells that can be distinguished mainly by carrying clonally diversified membrane-bound immunoglobulin specialized to specific antigen recognition. Together with other immunocytes B-lymphocytes play a central role in adaptive immune system which takes part in defense of the host against wide variety of pathogens.

Recently the evidence has supported the emerging concept of different B-cell subpopulations to play a direct or indirect role in a pathogenesis of spectrum of disorders. However, so far the knowledge has been limited mainly in the way of how the specific differentiation stages of B-lymphocytes are involved in pathogenesis of diseases and how course of disease, stage, and eventually different treatment can affect B-cell homeostasis.

That is the reason for the thesis to be focused on an analysis of B-cell population profile changes in disease, identification of any association present among specific B-cell subpopulations, as well as association between these subpopulations and clinical parameters.

Using polychromatic flow cytometry we analyzed frequencies of 11 B-cell subpopulations including stages of transient B-lymphocytes through effector antibody-producing plasma cells. We examined 81 individuals including 22 healthy controls and 59 patients with various pathologies (Rheumatoid arthritis/RA – 29, Colorectal carcinoma/CRC – 19, other – 11).

Interesting results were found in “suma“ (defined as a sum of naive, memory and plasma cell frequencies). This value was significantly decreased below 95% in patients with RA and CRC. The frequency of memory CD19+CD20+CD27+ B-lymphocytes was found to be decreased (5,65±1,48%) in patients with CRC and conversely increased in patients with RA (17,53±1,78%) compared to healthy controls (8,49±2,30%) possibly reflecting an impairment in further differentiation of naive B-cells.

In CRC patients the FO I B-cell subpopulation was found to significantly dominate over FO II cells (41,98±4,88% vs. 25,8±23,51% for FOII; p=0,0035), while in RA the FO II cell prevailed (42,47±3,29%). Differences in both cases were statistically significant (p<0,0001 and p=0,0333 respectively).

Our early correlation analyses point to a possible association between DAS28 FW clinical score and MZ B-lymphocyte cell frequency in RA patients. Also, there might be an association of plasma cells and/or CD24+ cell frequency to total white blood cell count in these patients. The most valuable output is considered to be a confirmation of an assumption that FO I and FO II B-lymphocytes are two distinct subpopulations from which only the FO I cells meet the characteristics of mature follicular cells whereas FO II cells represent immature T2 lymphocytes.

This thesis is a pilot study aiming to suggest possible trends and future course of the research.

Understanding the particular aspects of B-lymphocytic subsets behavior can in future provide convenient markers allowing to evaluate course and prognosis of a given disease, eventually serve as a suitable diagnostic marker of selected disorders in the clinical setting.

Keywords

immunophenotype, immunopathology, cell subpopulation, B lymphocyte, CD marker, polychromatic flow cytometry, rheumatoid arthritis, colorectal carcinoma.