

Main Lymphocyte Subsets in Paediatric Patients are Age and Gender-Related

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Introduction. Main subsets of blood lymphocytes (Ly) include T-Ly (further subdivided into CD4⁺, CD8⁺ and CD4⁺CD8⁻ double-negative (DN) cells), B-Ly and NK cells; multicolor flow cytometry is the routine method for enumerating subsets. Surprisingly, there are few published cohort-based studies of cytometrically defined Ly subsets in children; no data has been published on gender-related differences.

Aim, Materials and Methods. The aim of the study is to analyze the main subsets in a large cohort of paediatric patients subdivided by age and gender. 4130 sequential tests performed at Children's Clinical University Hospital Laboratory in 2012–2016 were analyzed; patients with proven immune disorders and haematological tumors were not included. The tests were carried out on routinely calibrated FacsCanto II flow cytometer (Becton-Dickinson), using IVD certified 6-colour BD 6-TBNK kit. Relative counts (percent of total T, CD4, CD8, DN, B and NK cells from Ly; CD4, CD8 and DN cells from Ly and T-Ly), CD4 : CD8 ratio and absolute counts were studied. The patients were subdivided by age (one year groups, infants younger than 1 year further subdivided into groups of 0–5 months and 6–11 months old) and by gender. Statistics were calculated by Microsoft Excel (data groupings and medians) and IBM SPSS Statistics (Spearman for correlations and Mann–Whitney for differences).

Results. The study revealed major age-related changes in all subsets: absolute counts of T, B, CD4 cells and CD4 : CD8 ratio dropped steeply from neonates to adolescents; CD8 and NK cells decrease was milder. Relative counts of T and CD8 Ly increased with age, while percent of B-Ly decreased. There were more boys (53.5%) in the cohort and they were older (median 6 vs. 5 years, Mann–Whitney $p < 0.001$).

Unexpectedly, significant gender-related differences of T-subsets were found after age adjustment: relative and absolute T-cell count was significantly higher in girls (Wilcoxon SRT $p = 0.010$ and $p = 0.004$, correspondingly) as well as CD4 cell percent from Ly, from T-Ly, absolute count and CD4 : CD8 ratio ($p < 0.001$ in all cases). Boys had higher CD8 cell percent from Ly and from T-Ly ($p = 0.010$ and $p < 0.001$) and DN percent from Ly, from T-Ly and absolute count ($p = 0.001$, $p < 0.001$ and $p = 0.008$). Divergence of gender-related curves of relative T-Ly, CD4 and DN counts was maximal in adolescence and thus will probably persist into adulthood. Though there was no gender-related difference of B-Ly population in the total cohort, percentage of B-Ly was significantly higher in girls at ages 13 ($p = 0.006$), 15 ($p = 0.005$), 16 ($p = 0.013$), and 17 ($p = 0.039$).

Conclusions. Results confirm general age-related dynamic changes of lymphoid populations that have been reported in smaller paediatric cohorts. Previously undescribed significant gender-related differences could be of particular interest. The obtained data may help to better define normal ranges of main Ly subsets in children.

VPP Biomedicīna sabiedrības veselībai, projekts Nr. 6 (bērnu slimības).