

## Patchiness of Paediatric Bone Marrow: Evaluation of Bilateral Material by Automated Hematology

*Sergey Nikulshin, Iveta Tolstikova, Dagne Gravele,  
Marina Bogdanova, Veronika Jakupcevic, Jana Skrule,  
Tamara Lopatina, Simona Paule*

*Children's Clinical University Hospital, Latvia*

**Introduction.** Main components of bone marrow (BM) are hemopoiesis, fat cells and stroma. Data obtained by histology and radiology suggest that distribution of hemopoiesis within BM is not homogenous, it tends to form “hot spots” or “islands” even in bones with high BM content. The issue is of practical importance, since sampling artifacts from “hot spots” in BM failure or from hypocellular zones in reactive or proliferative conditions may cause diagnostic mistakes. Fat content in BM increases with age, it is highly cellular in children. Theoretically, there should be no significant patchiness of paediatric hemopoiesis, but no studies performed on BM suspension have been reported.

**Aim, Materials and Methods.** The aim of the study is to evaluate the unevenness of hemopoiesis by analyzing differences in hematological parameters of bilateral BM aspirates of paediatric patients.

139 pairs of bilateral iliac crest aspiration samples were acquired at Hematooncology Department of Riga Children's Clinical University Hospital in 2015–2016. 89 pairs were considered representative after excluding samples suspicious for technical artifacts in one or both tubes (hemodilution, clotting, insufficient sampling) and samples from patients with asymmetric infiltration of aspiration sites. The samples were tested by hematological analyzer Sysmex XN-2000 (Sysmex Inc, USA), using pre-installed BM protocol. Relative and absolute counts of neutrophils (NEU), immature granulocytes (IG), lymphocytes (LYM), nucleated red blood cells (NRBC) and total cellular content were evaluated. Statistics were calculated by IBM SPSS Statistics.

**Results.** Median difference of total cellularity between paired samples was 25.6% (90% range 6.8–64.6%). Median differences of counts were: NF relative 5.9% and absolute 19.9%, IG relative 8.6% and absolute 31.2%, LYM relative 14.7% and absolute 26.3%, NRBC relative 9.2% and absolute 17.3%. Differences did not correlate with age, gender or the sampled side. Differences in all absolute counts positively correlated with overall cellularity of the samples (Spearman rho,  $p < 0.001$  for all parameters). Differences in relative counts significantly declined with increasing cellularity (IG  $p = 0.003$ , LYM  $p < 0.001$ , NRBC  $p = 0.005$ ), except NEU (no correlation of relative counts with cellularity).

**Conclusions.** The study demonstrated moderate patchiness of paediatric BM aspirates, median difference in cellularity between samples was about 25%. Patchiness increased with cellularity, but differences in relative content of hemopoietic lineages decreased, hemopoiesis becoming more homogenous. Of the studied parameters, immature granulopoiesis and erythropoiesis displayed the most conspicuous inhomogeneity. The results proved that, after excluding technical artifacts and asymmetrical processes in iliac bones, marrow patchiness by itself does not significantly affect qualitative evaluation of paediatric BM aspirates.