

Screening for Clinically Significant Myeloperoxidase Deficiency in Pediatric Patients: Algorithm and Preliminary Results

*Sergey Nikulshin*², *Irina Ribakova*^{1,2}, *Anda Bartule*²,
*Iveta Tolstikova*¹, *Dagne Gravelle*², *Dace Gardovska*^{1,2}

¹ Rīga Stradiņš University, Latvia

² Children's Clinical University Hospital, Latvia

Introduction. Myeloperoxidase (MPO) is a lysosomal enzyme of myeloid cells that is closely linked to antimicrobial activity; deficient MPO synthesis by granulocytes may be responsible for reduced neutrophil-associated immune functions. Data on clinical relevance and incidence of myeloperoxidase deficiency are scarce and contradictory. Haematological analyser Advia 2120i (Siemens AG, Germany), while performing a routine blood test, separates leukocyte populations by measuring cytochemically defined cellular MPO content as myeloperoxidase index (MPXi, normal values 0 ± 10). The information could be used for identifying cases with abnormally low neutrophil MPO.

Aim. The aim of the study is to propose a rational algorithm and to retrospectively screen for possible cases of MPO deficiency among the Children's Clinical University Hospital patients.

Material and methods. The study was carried out as a part of the Latvian National Research Program VPP "BIOMEDICINE", project No. 8 "Clinical, molecular-biological, biomechanical and morpho-functional research of diagnostics and treatment of congenital and acquired diseases of childhood". Results of blood tests performed at the Hospital's Clinical Laboratory consequently from February, 2011 till January, 2014 and clinical data of selected patients were analysed. The laboratory and clinical data were obtained from "Dialab" (SIA Diamedica, Latvia) and "Andromeda" information systems. Patients treated for haematological/oncological disorders and neonates were excluded due to possible therapy and age-related artefacts; the remaining working database included 33 770 individuals and 64 002 tests.

Results. MPXi below - 10 was found in 4601 samples of 2731 patients. Further analysis revealed that dynamic changes of MPXi were a common occurrence; thus, in 767 patients (28.1%) both decreased and normal MPXi values were detected. The finding made it necessary to exclude the majority of cases (1894) as insufficiently informative due to the small number of measurements and/or admittances; finally, three separate episodes of illness without a single normal MPXi measurement were considered as the minimal requirement. Of the 70 remaining patients, additional 15 were tentatively excluded because of immunosuppressive therapy for asthma or autoimmune diseases. The remaining 55 patients were preliminary checked for common features. Median MPXi in the group was - 17.0. The patients included those of 2 months old to 18 years old (median - 50 months), M : F = 1.6 : 1. The patients had been repeatedly tested (average 6.8 tests during the studied period, median for the whole database - 1.9 tests). Recurrent infections were the most common cause of hospitalisation. 9 patients suffered genetic abnormalities and stigmata, in 5 cases coeliac disease had been diagnosed.

Conclusions. The study has identified 55 cases of probable MPO deficiency, returning the incidence 1.6 : 1000 paediatric patients; by definition, the screening algorithm has missed cases of MPO deficiency without clinical manifestations. More objective methods such as immunophenotyping or genetic testing are necessary for the final diagnosis. A deeper clinical study of the selected cases is necessary to understand the significance of the findings and their practical relevance.