

## PEDIATRIC LABORATORY MEDICINE: SOME ASPECTS OF OBESITY, METABOLIC SYNDROME, NEONATAL SCREENING, REFERENCE AND CRITICAL VALUES

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The 10<sup>th</sup> EFLM Symposium for Balkan Region under the title »Pediatric Laboratory Medicine: Some Aspects of Obesity, Metabolic Syndrome, Neonatal Screening, Reference and Critical Values« has featured 15 lectures on these topics delivered by lecturers from Europe, Canada, Serbia, Slovenia and Macedonia. The intention was to use this condensed time frame to discuss five very important issues in pediatric laboratory medicine. Namely, the sudden increase in the prevalence of childhood obesity, with its related co-morbidities such as hypertriglyceridemia, hyperinsulinemia, hypertension, early atherosclerosis, metabolic syndrome and non-alcoholic fatty liver disease (NAFLD), has brought about major health care problems in many countries. This highlights the importance of timely monitoring the obesity trends in children and adolescents, especially with the increased frequency of the metabolic syndrome expected in this population in the near future (1). In parallel with the increase in the prevalence of obesity and metabolic syndrome, non-alcoholic fatty liver disease has become recognized as the most frequently occurring hepatopathy in adults and children. Due to the heterogeneity of diagnostic methods used to establish a diagnosis in the available studies and the different characteristics of the populations examined, the exact prevalence of pediatric NAFLD is still unknown. Age, sex and race/ethnicity are recognized as significant risk determinants, and pathogenetic roles have been established for the sex hormones,

insulin sensitivity and adipocytokines (2). Metabolic workup is recommended even for the youngest age group of 2–6 years. There is data pointing to birth weight as a factor in the occurrence of obesity and its complications in later life (3). Conditions such as isolated impaired fasting glucose or impaired glucose tolerance or a combination of these two glucose disturbances may be defined as prediabetes (4).

For this reason, between 1998 and 2013, the Yugoslav Study of Atherosclerosis Precursors in School Children (YUSAD) was undertaken in Serbia as a prospective longitudinal study that included three examinations on the same population of school children done at different time points. The population was first examined in 1998 and included 15 cohorts from Serbia, Bosnia and Herzegovina, Montenegro and Greece. With the study's primary research focus on the risk factors for atherosclerosis development, the population, comprised of more than 5000 participants of both sexes, was examined every five years. The YUSAD was designed in seven chapters: epidemiological, clinical, anthropometric, biochemical, nutrition, genetics and ECG. Of the many biochemical markers, total cholesterol, triglycerides, HDL and LDL cholesterol fractions, and glycemia were presented. Its findings demonstrated the importance of preventive measures and imposing healthier lifestyle habits particularly in school aged children for the purpose of creating a better lipid profile (5).

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Another significant issue discussed here was neonatal screening with the aim of detecting potentially treatable diseases. Sadly, the practice of testing varies greatly with regard to disturbances that may be detected, the technology of testing, disease definition, providing information, informed parental consent, and the storing and elimination of leftover samples, which are dictated by legislations in every country. The number of disturbances included in the testing, thus, greatly differs even in countries with comparable levels of economic development and health protection (6–9).

Reference intervals and borderline values are both vital information in this area. Clinical laboratory reference intervals provide physicians with data that will enable them to interpret the results of quantitative laboratory tests and that will therefore crucially influence the estimate of a patient's health status and the

clinical decisions. Currently, however, there are wide gaps between contemporary pediatric reference intervals for the accurate interpretation of laboratory tests done in children and adolescents that may lead to diagnostic errors or misdiagnosis of many diseases (10).

On the international level, several bodies have launched initiatives towards harmonization of the pediatric reference intervals, such as the KiGGS initiative in Germany, AUSSIE Normals in Australia, AACC – National Children Study in the USA, the NORICHILD Initiative in Scandinavia and CALIPER study in Canada. These studies should provide comprehensive pediatric reference intervals with respect to age and sex for a large number of biochemical parameters, taking also ethnicity into account (11, 12).

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*Received: June 25, 2014*

*Accepted: July 7, 2014*