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Early diagnosis of diabetic nephropathy in children with type 1 diabetes mellitus using the VCAM-1 biomarker

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Background. Diabetes mellitus is a global epidemical problem. According to the International Diabetes Federation, in 2019 463 million adults lived with diabetes and more than 1.1 million children suffered from diabetes type 1. Diabetic nephropathy is one of the most common complications of diabetes. Biomarkers play an important role in early diagnosis and adequate treatment. Vascular cell adhesion molecule-1 (VCAM-1) – is a 90-kDa glycoprotein that is expressed in endothelial cells and is involved in the migration and recruitment of inflammatory cells. Recent studies have shown that urinary VCAM-1 levels were significantly increased in patients with kidney disease.

Objective. The aim of the current study was to investigate the features VCAM-1 levels in urine of children depending on the diabetes duration.

Methods. We analysed 3 groups of children with type 1 diabetes mellitus and comparison group of children without diabetes from Regional Children's Clinical Hospital in Sumy. VCAM-1 was measured by ELISA using a Proteome Profiler Human Kidney Biomarker Antibody Array (R&D Systems, Minneapolis, MN, USA). Results were detected with BioRad ChemiDoc Touch. The arrays were analysed semi-quantitatively, using BioRad Image Lab Software.

Results. Study included 47 children with diabetes and 8 children without diabetes. VCAM-1 in urine increased by 24 percent in children with the duration of diabetes below one year compared to the control group. VCAM-1 levels were elevated by 33 percent in children with the duration of diabetes from one to five years. The marker increased by 54 percent in children who lived with diabetes for more than five years.

Conclusions. Increase in urinary VCAM-1 was observed in the first year of diabetes in children. Measuring the level of VCAM-1 in urine may be useful for the early diagnosis of diabetic nephropathy.

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