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## **CRITERIA FOR PREDICTING DIABETIC NEPHROPATHY IN CHILDREN WITH**

### **TYPE 1 DIABETES MELLITUS**

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#### **Relevance**

Diabetic nephropathy is the most common cause of death in patients with type 1 diabetes. The complexity of the pathogenesis, long-term asymptomatic course and untimely diagnosis lead to unsatisfactory effectiveness of pathogenetic therapy for diabetic nephropathy. According to epidemiological screening, the true prevalence of diabetic nephropathy exceeds the actual one by 2 - 4 times. The high medical and social significance of diagnosing diabetic nephropathy in patients with type 1 diabetes mellitus explains the large number of works devoted to this topic. Over the past decades, given the development of new laboratory methods, the standards for diagnosing kidney pathology of diabetic origin have changed. Modern screening tests make it possible to detect diabetic nephropathy only from the stage of microalbuminuria, while the initial morphofunctional disorders that develop long before the increase in urinary albumin excretion are missed. The earliest signs of kidney damage can be detected already in the first 5 years from the onset of type 1 diabetes. According to a number of researchers, it is during this period that the initiation of preventive measures to prevent the progression of DN can be most effective. All of the above determines the relevance of searching for early non-invasive markers for the preclinical diagnosis of diabetic nephropathy.

#### **Objective:**

To determine the clinical and functional characteristics of kidney damage in type 1 diabetes mellitus (DM) in children to establish criteria for prediction and early diagnosis of diabetic nephropathy (DN).

#### **Materials and methods:**

125 children aged 4–18 years with type 1 diabetes were examined in accordance with federal clinical guidelines for the management of children with type 1 diabetes. Renal function was assessed by determining serum cystatin C concentrations and calculating glomerular filtration rate (GFR) using Hawke's formula.

The subjects were divided into 2 groups. The first included 29 children with DD. The comparison group was formed from 96 patients with type 1 diabetes, but without signs of renal damage.

**Results:**

In the majority of patients with type 1 diabetes with DN, the median age was 2.5 years greater than in the comparison group 16.5 [10.0 – 16.0] versus 14.0 [10.0 – 16 .0] ( $p < 0.01$ ). The duration of diabetes in patients with DN is twice as long: 10.5 years [8.0 – 13.0] versus 5.0 [3.0 – 8.0] in the comparison group,  $p < 0.005$ . In half of the cases, the manifestation of its clinical manifestations was noted before 5 years of life. DN is 100% combined with other complications of the disease: neuropathy, retinopathy. Patients with DN are characterized by lower birth weights: 3100 [2800 - 3400] g. versus 3280 [3100 - 3600] gr. and weight-height index: 60.0 [56.3 - 63.0 ] g/cm versus 63.9 [60.4 - 67.3] g/cm,  $p < 0.005$ . In a third of cases (37.9%) they were diagnosed with intrauterine growth retardation syndrome in the neonatal period (versus 14.6% in the comparison group,  $p < 0.05$ ). When assessing physical development in children with DN, the following were more often recorded: excess body weight (31.0% versus 13.5%,  $p < 0.05$ ) and short stature (20.7% versus 1.0%,  $p < 0.005$ ) . Assessment of blood pressure levels revealed its increase in the majority of patients with DN. Signs of dyslipidemia were noted in the majority of children with DN: 72.4%) versus 29.2% in the comparison group,  $p < 0.005$  . In the main group, the median of total cholesterol was higher by 26.4% ( $p < 0.05$ ), triglycerides by 66.7% ( $p < 0.005$ ), low-density lipoprotein cholesterol by 34.5% ( $p < 0.01$ ), and high-density lipoprotein cholesterol is lower by 19.2% ( $p < 0.05$ ) compared to the group of patients without DN. A significant increase in the concentration of cystatin C was revealed in the group of children with DN: 1.10 [1.06 – 1.20] mg/l, versus 0.77 [0.70 – 0.86] mg/l,  $p < 0.005$ . Accordingly, GFR, calculated by the level of cystatin C, in patients with DN was significantly lower than 68.0 [62.6 – 73.0] ml/min versus 102.0 [92.0 – 115.0],  $p < 0.005$ .

**Conclusions:**

Risk factors for the formation of DN in children are age over 15 years, duration of the disease more than 10 years, the presence of neuropathy, retinopathy, cataracts and a combination of these complications, short stature, arterial hypertension, and disorders of the lipid spectrum of the blood plasma.