

THE FEATURES OF CONNECTIVE TISSUE METABOLISM IN THE FORMATION OF DIABETIC KIDNEY DISEASE IN CHILDREN



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BACKGROUND AND AIMS

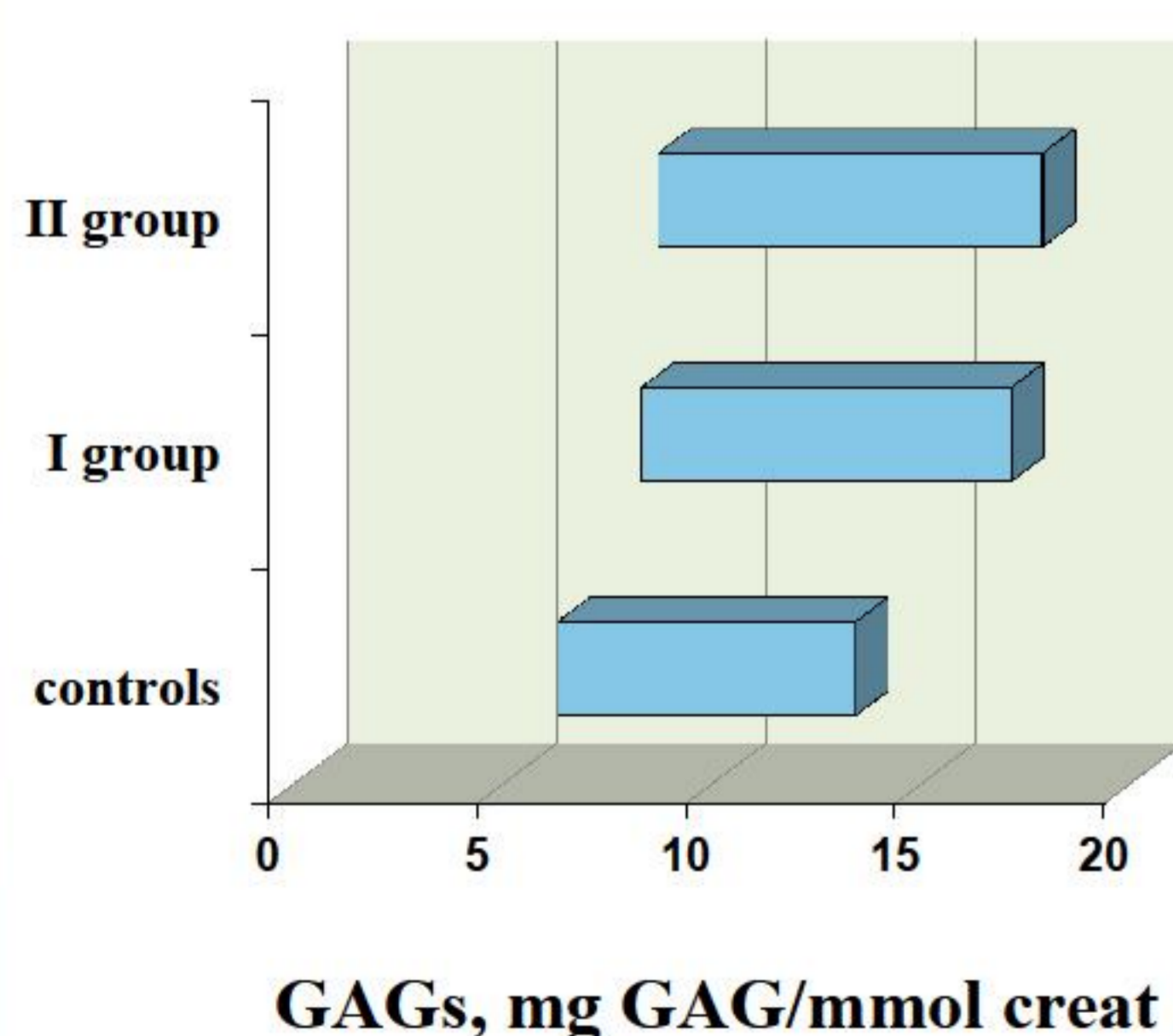
Type 1 diabetes mellitus (T1D) is one of the most common endocrine and metabolic diseases in childhood. The number of children developing this form of diabetes every year is increasing rapidly, especially among the youngest children. Every year worldwide, approximately 79,100 children under 15 years of age develop T1D. Diabetic nephropathy (DN) is the most common renal complication of diabetes mellitus and a leading cause of end-stage chronic kidney disease. The main morphological substrate for the formation of diabetic vascular complications is the connective tissue. The study of the connective tissue metabolism is one of the perspective research directions. It will allow to work out of new therapeutic strategies to prevent of diabetic kidney disease progress. The aim was to determine the peculiarities of connective tissue metabolism in children suffering from T1D.

MATERIAL AND METHODS

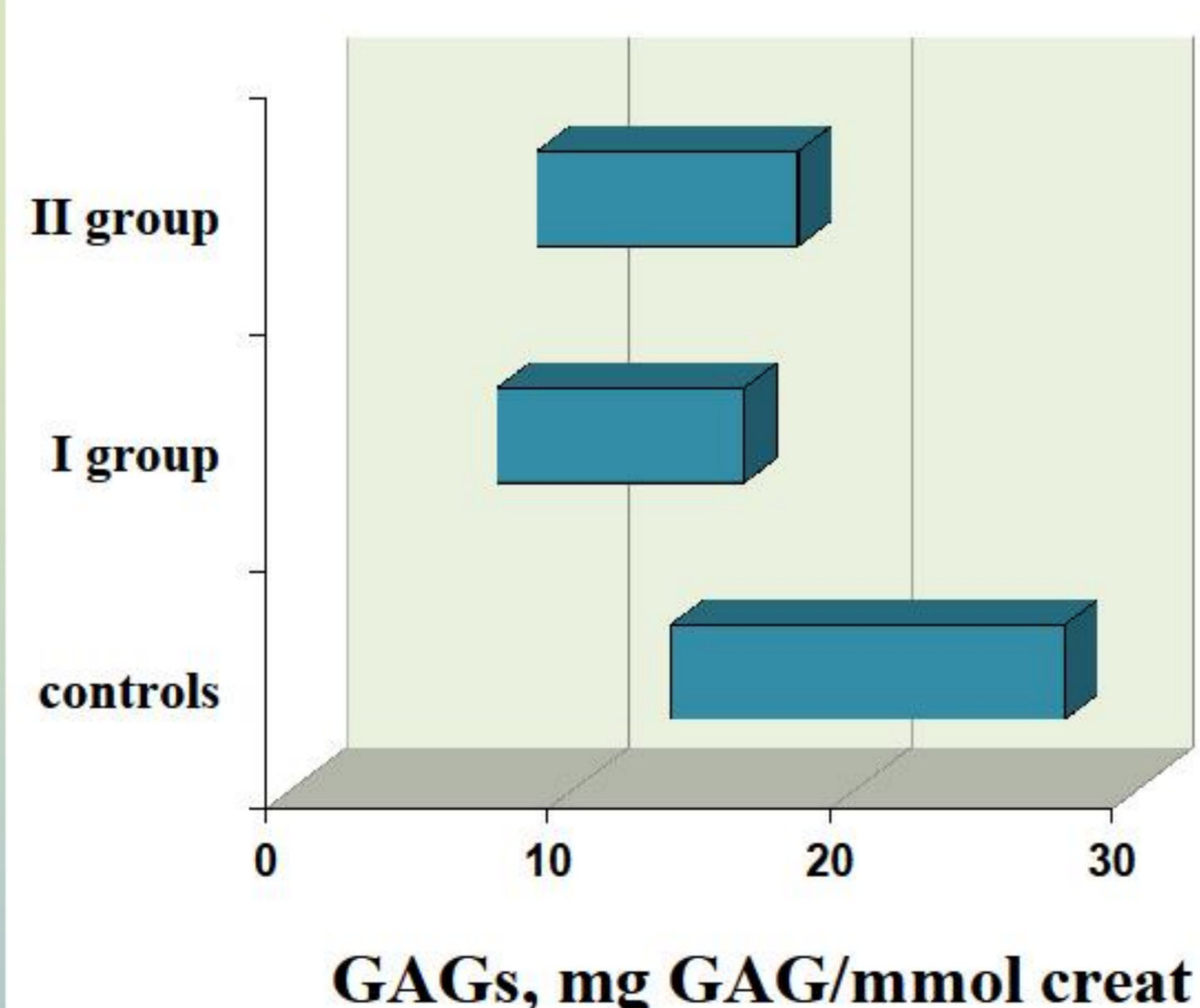
42 children aged 6-17 years with T1D were examined, among them 24 normoalbuminuric patients (1st group) with T1D duration to 5 years and 18 microalbuminuric patients (2nd group) with T1D duration more than 5 years. 15 healthy children were included in controls. We measured serum and urine levels of glycosaminoglycans (GAGs), oxyproline and collagenolytic activity (CA). The definition of CA was performed on the total amount (at the enzymatic hydrolysis) free and peptide-bound oxyproline in the sample. Statistical analyses were performed with StatSoft STATISTICA Version 8 (Tulsa, OK). Non-parametric variables are given as median (interquartile range). Differences between groups were tested using Mann-Whitney test. Logistic regressions were performed to address the independent relationship between VD status and DN.

RESULTS

GAGs levels in urine at investigated children



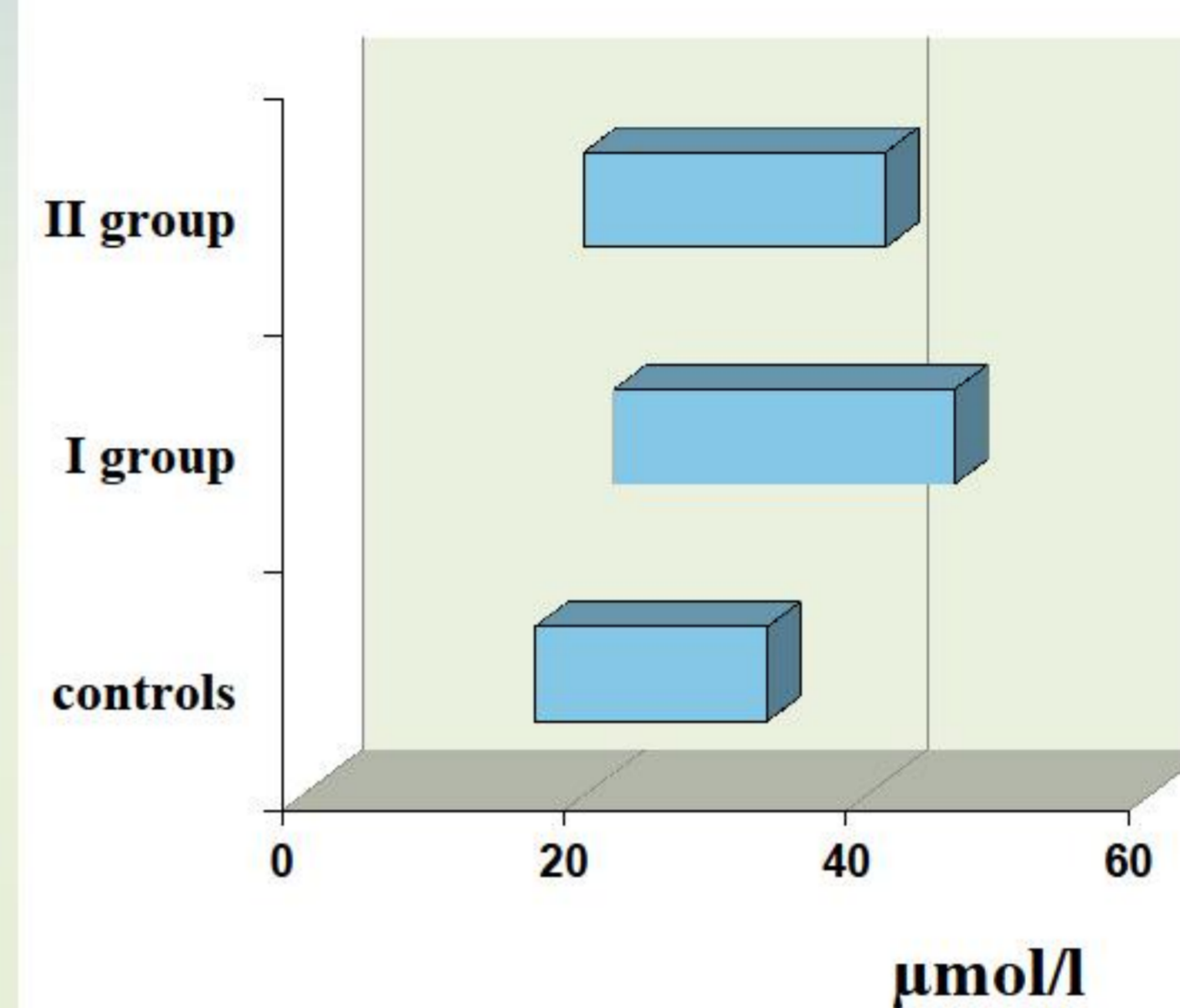
GAGs serum levels at investigated children



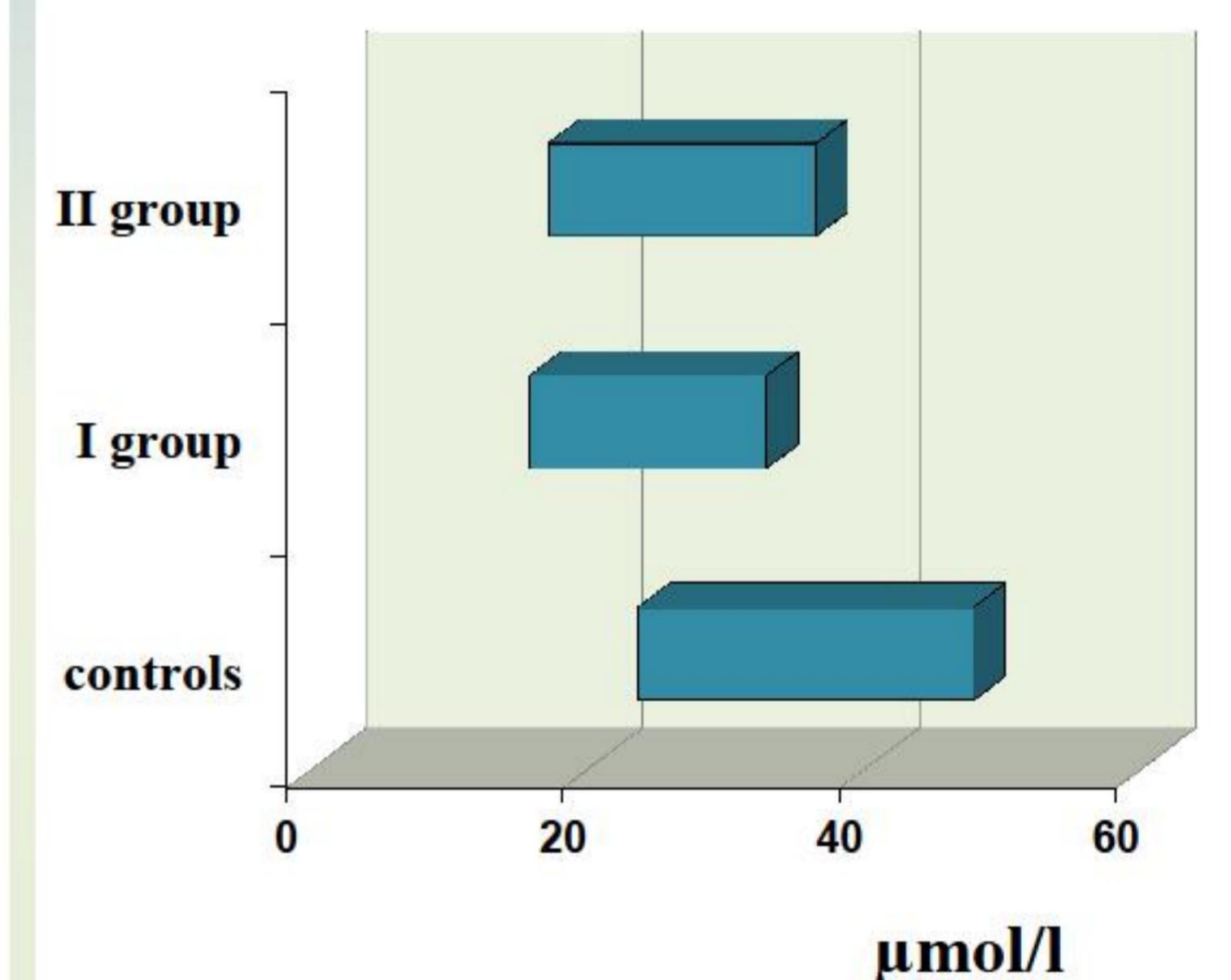
GAGs levels in urine were increased in the patients of the 1st and 2nd groups, compared with controls ((8.66 (8.35; 8.85) and 8.95 (8.75; 9.2), compared with 6.74 (6.36; 7.12) mg GAG/mmol creat, respectively) ($p < 0.001$)). GAGs serum levels were decreased in the patients of the 1st and 2nd groups, compared with control group ((7.66 (7.34; 8.75) and 9.1 (8.75; 9.25), compared with 13.7 (13.5; 13.95) mg GAG/mmol creat, respectively) ($p < 0.001$)).

RESULTS

Levels of Oxyproline in urine at investigated children

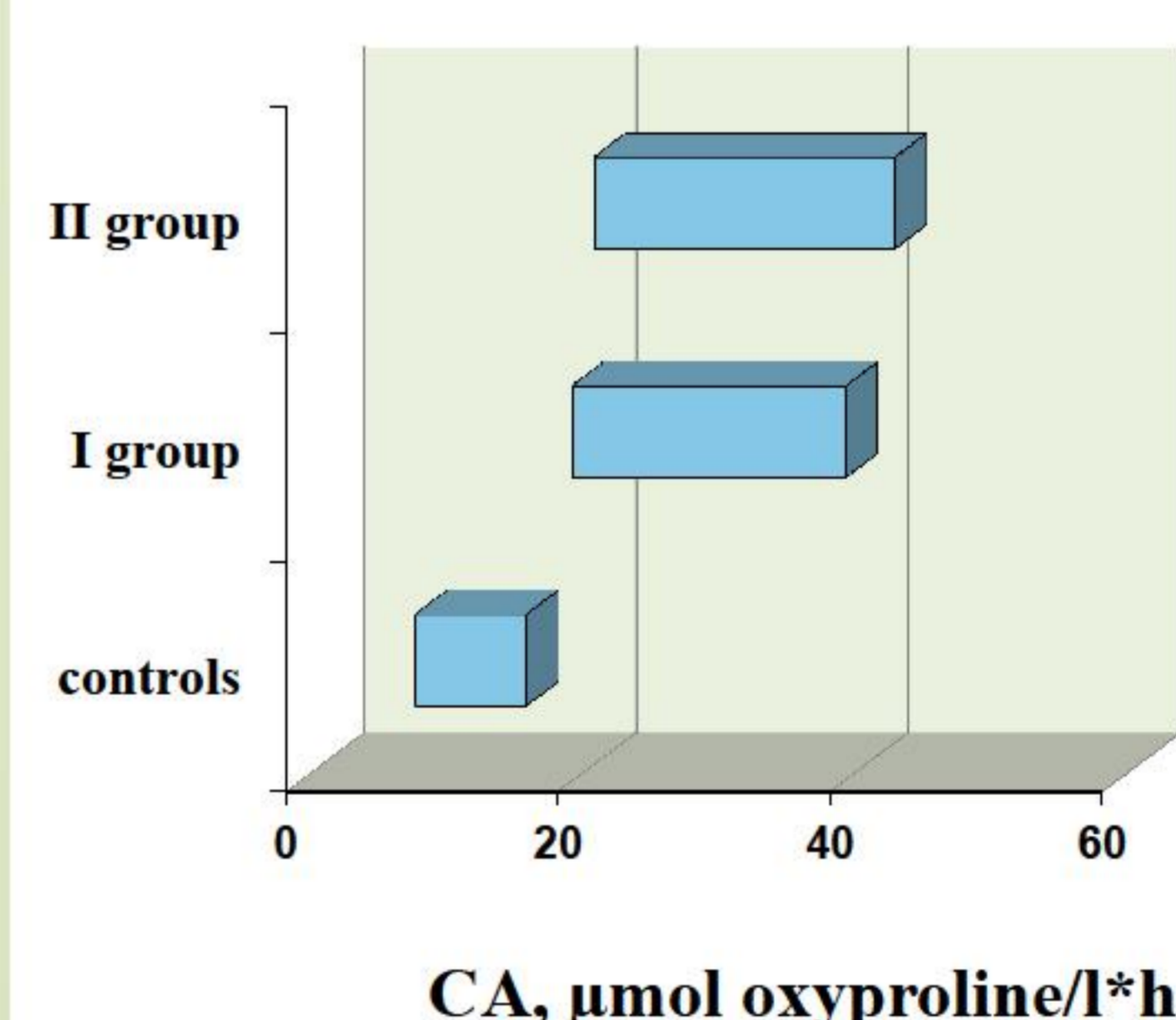


Levels of Oxyproline in serum at investigated children

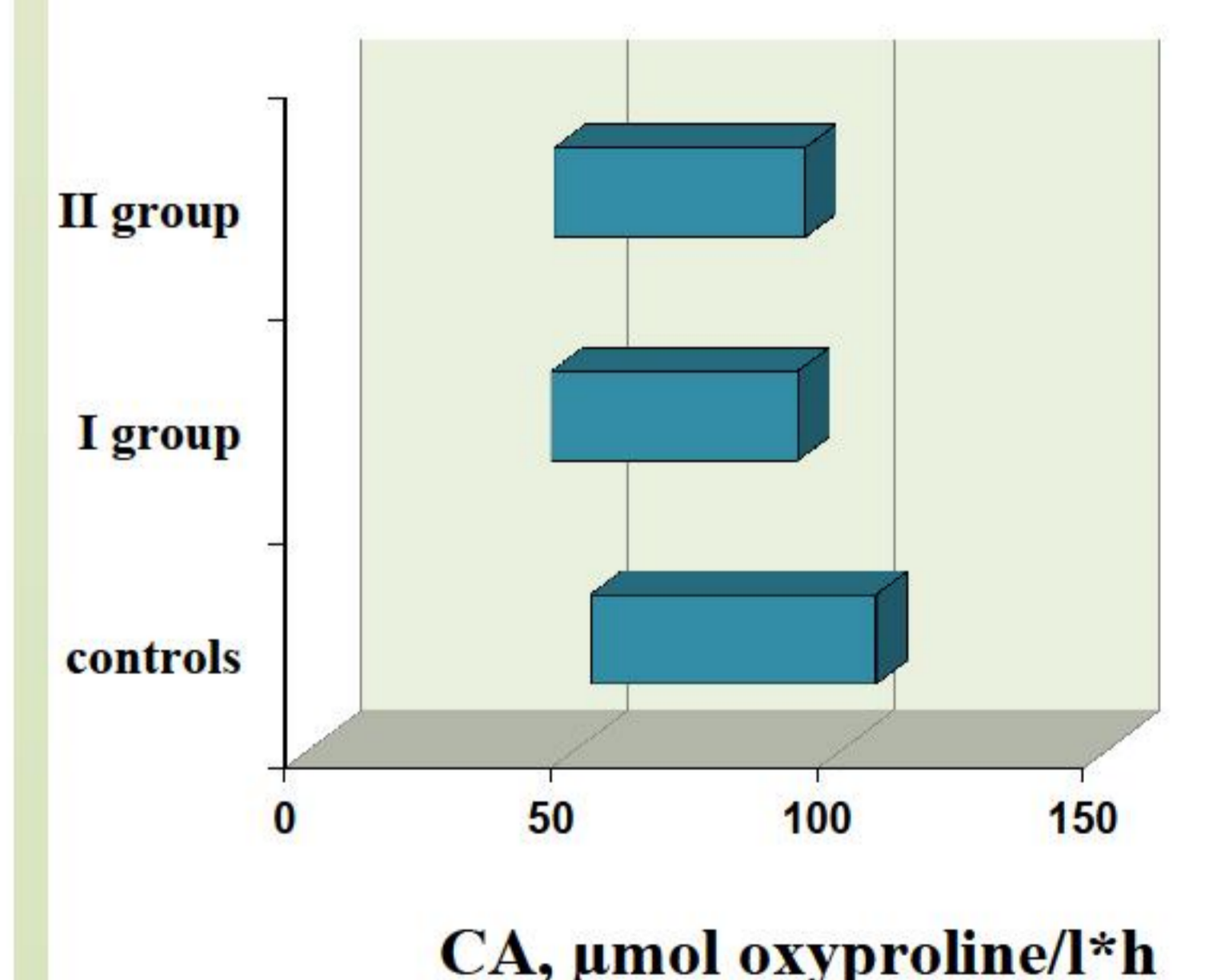


Oxyproline levels in urine were elevated in the patients of the 1st and 2nd groups, compared with controls ((22.75 (21.8; 24.12) and 20.35 (19.7; 21.35), compared with 16.31 (16.24; 16.45) µmol/l, respectively) ($p < 0.001$)). Oxyproline serum levels were decreased in the patients of the 1st and 2nd groups, compared with control group ((16.5 (15.85; 17.12) and 18.75 (17.2; 19.35), compared with 23.85 (23.65; 24.3) µmol/l, respectively) ($p < 0.001$)).

Levels of Collagenolytic Activity in urine at investigated children



Levels of Collagenolytic Activity in serum at investigated children



CA levels in urine were increased in the patients of the 1st and 2nd groups, compared with control group ((19.75 (19.33; 20.12) and 21.5 (20.95; 22.1), compared with 8.01 (7.8; 8.17) µmol oxyproline/l*h, respectively) ($p < 0.001$)). CA levels in serum were decreased in the patients of the 1st and 2nd groups, compared with control group ((46.12 (45.75; 46.2) and 46.75 (46.25; 47.1), compared with 53.25 (53.1; 53.55) µmol oxyproline/l*h, respectively) ($p < 0.001$)).

CONCLUSIONS

The processes of collagen disintegration in kidney dominate in the early stages of T1D. Possibly it reflects of the adaptive response of the organism to the damaging effect of hyperglycemia. The decay rate of collagen decreases with the progression of diabetes, which is associated with the accumulation of modified collagen. The decline of connective tissue metabolism indexes in blood suggests of diabetic vascular complications progress. It can be explained by increased permeability of the kidney barrier and decrease its selectivity.

