Endothelium is an organ of internal secretion that regulates tonus of the vessels, protects them from negative effect of circulating cells and substances, controls transfer of soluble substance into the cells of vascular walls, monitors immune, inflammatory and reparative processes and maintains local homeostatic processes in balance. A number of scientists proved that hypothyroidism is accompanied by endothelial dysfunction. Moreover, in their research J. Lekakis and co-authors showed that endothelial dysfunction occurs even within normal range of TSH and aggravates as TSH levels grow.

The objective of the investigation was to study the condition of the endothelium and its influence on renal function in patients with primary hypothyroidism.

Materials and methods. 188 patients with manifested hypothyroidism were examined. Their average age was 56 ± 8 years and the duration of hypothyroidism reached 7.88 ± 2.3. Assessment of endothelial function was performed at the beginning of the investigation, in 3 months and 6 months after reactive hyperemia test treatment based on the study of endothelial-dependent vasodilation of the brachial artery according to Celermajer method (1992). All patients underwent complex clinical examination; their body mass index was calculated. Levels of thyroid hormones (free T\textsubscript{4} and free T\textsubscript{3}) and concentration of vasculoendothelial growth factor (VEGF) were identified by means of enzyme-linked immunoassay at the beginning of the investigation and after 6 months of treatment.

Kidney lesion was determined by the presence of disruption of glomerular filter permeability, i.e. development of albuminuria and by GFR indices calculated by the following formula: CKD-EPI. Patients were split into following groups: Group I that involved 45 non-obese patients with hypothyroidism on the background of autoimmune thyroiditis (AIT); Group II that included 46 obese patients with AIT and hypothyroidism; Group III that encompassed 47 non-obese patients with overt hypothyroidism and Group IV that consisted of obese patients with overt hypothyroidism, n=50.

Results. Investigating endothelial function in all groups of patients suffering from hypothyroidism, a significant difference in its indices has been revealed, moreover, endothelial dysfunction has appeared to be more pronounced in patients from Group II and Group IV, which proves the influence of obesity on the endothelial dysfunction. Thus, increase in the diameter of the brachial artery after compression in both Group II and Group IV has turned out to be twice less and, respectively, EDVD has become 46.4% and 47.7% less than the one in healthy people (p<0.05). An inverse correlation of medium strength has been established between TSH and EDVD levels (r= -0.44, p<0.05) as well as between EDVD and total cholesterol (r=-0.64, p<0.05) and low-density lipoproteins (LDL) (r=-0.51, p<0.05) in a joint group that involved patients with manifested hypothyroidism. There is evidence that VEGF induces expression of endotheline-1, one of the most powerful causes of endothelial dysfunction. According to the findings of our investigation, in case of manifested hypothyroidism, VEGF levels in blood plasma significantly increase in comparison to
those in control group. Thus, in contrast to control group, a significantly higher level of this mediator has been found in non-obese patients with hypothyroidism on the background of AIT, which reached 46.46±1.39 pg/ml (p<0.05), while in patients with hypothyroidism on the background of AIT and obesity it was 48.09±1.82 pg/ml (p<0.05). In groups involving patients with post-operative hypothyroidism, a significant increase of such chemokine has been observed, too: 43.00±1.45 pg/ml (p<0.05) in patients without obesity and up to 45.76±2.51 pg/ml (p<0.05) in patients with post-operative hypothyroidism and obesity. Thus, the most pronounced changes in VEGF production have occurred in patients with hypothyroidism on the background of AIT and obesity, which is also proved by other researchers. Following the aim to study the influence of VEGF on the renal function, a correlation analysis between VEGF and GFR has been made, which, in its turn, has revealed an inverse correlation of medium strength in Group I and Group II (r= -0.416, p<0.05 and r= -0.337, p<0.05), and weak, but positive inverse correlation between in Group III and Group IV (r= -0.219, p<0.05 and r= -0.173, p<0.05). In 6 months, compensation of hypothyroidism contributed to significant increase of EDVD in patients from Group I and Group II, however, due to complex treatment including Atorvastatin and Enalapril EDVD changes have improved in as early as 3 month (p<0.05), as well as in 6 months. In groups involving patients with post-operative hypothyroidism, administration of Levothyroxine has showed some tendency to EDVD growth; though these changes hasn’t proved to be significant even in 6 months, while patients taking Levothyroxine in combination with 20 mg of Atorvastatin and Enalapril have showed much better EDVD indices, which have proved to be significantly higher in 3 as well as 6 months.

**Conclusions.** Thus, with manifested hypothyroidism, indices of EDVD decrease significantly in both obese and non-obese patients, and endothelial dysfunction is more pronounced in patients with hypothyroidism and obesity. Revealed correlations indicate mutually aggravating influence of thyroid hypofunction, obesity and hypercholesterolemia on the development of endothelial dysfunction in patients with primary hypothyroidism and on decrease of GFR. Use of Levothyroxine, ACE inhibitor Enalapril and Atorvastatin in combination significantly improves EDVD.