Relationship between androgen levels and markers of endothelial dysfunction in men with type 2 diabetes

Irina Khripun, Igor Belousov, Sergey Vorobiev, Elizaveta Dzantieva, Zalina Gusova, Valentina Puzireva,

Asiat Sultanmuradova, Maria Haritonova

Rostov State Medical University, Rostov-on-Don, Russia

Background: It is well known that type 2 diabetes causes the endothelial dysfunction. However, insufficient attention is paid to the role of androgen deficiency in the formation of the early signs of endothelial dysfunction.

Objectives: The aim of the work was to evaluate the relationship between testosterone deficiency and markers of endothelial dysfunction in men with type 2 diabetes.

Methods: Were examined 88 men aged 40-65 years (mean age 53,0 ± 7,4 years) with type 2 diabetes. Clinical examination included the measurement of body weight, height, hip (HC) and waist (WC) circumferences and arterial blood pressure. A sample of fasting venous blood was taken to measure glucose, HbA1c, lipid profile, total testosterone, concentrations of ICAM-1, VCAM-1, resistin, e-selectin, p-selectin, C-reactive protein (CRP).

All patients were divided into two groups matched for age and levels of arterial blood pressure (table 1). The first group included 47 patients with normotestosteronemy, the second - 41 men with testosterone concentration below 12,1 nM/L.

Statistical analysis was performed using analysis of the median Me [LQ; UQ] and comparison of two independent groups (Mann – Whitney U test).

Results:

Table 1. Clinical characteristics of the groups according to the level of testosterone

Parameter	Group 1	Group 2	P
IMC, kg / m^2	30,0 [22,7; 33,1]	31,5 [29,5; 36,9]*	0,023
WC, sm	107,0 [101,0; 115,0]	111,5 [102,0; 127,0]*	0,049
HC, sm	108,0 [102,5; 114,0]	115,0 [108,0;120,0]*	0,047
SBP, mm Hg	139,0 [130,0; 151,0]	141,0 [136,0;150,0]	0,329
DBP, mm Hg	84,0 [80,0; 91,0]	83,0 [79,0; 92,0]	0,692
TC, mM/l	5,4 [4,9; 6,9]	5,7 [4,7; 6,3]	0,088
TG, mM/l	1,7 [1,2; 2,3]	2,0 [1,6; 3,0]*	0,031
HDL, mM/l	1,4 [1,3; 1,6]	1,5 [1,4; 1,6]	0,091
VLDL, mM/l	0,7 [0,6; 1,0]	0,9 [0,7; 1,4]*	0,034
HbA1c	7,5 [6,3; 9,3]	8,4 [7,0; 11,7]*	0,049

Picture 1.The concentration of resistin and CRP in two groups
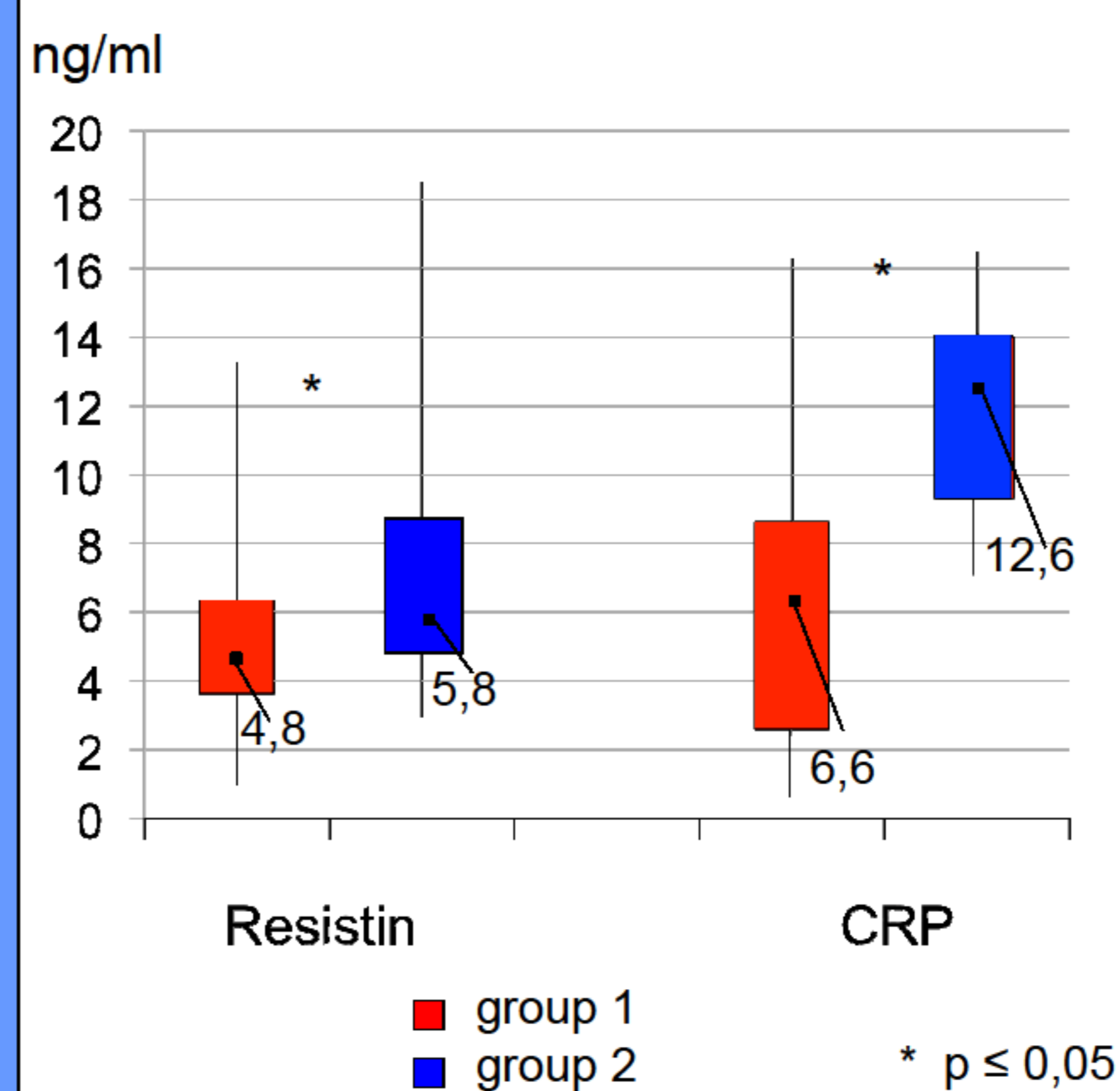
Picture 2.The concentration of ICAM-1, VCAM-1, P-selectin in two groups
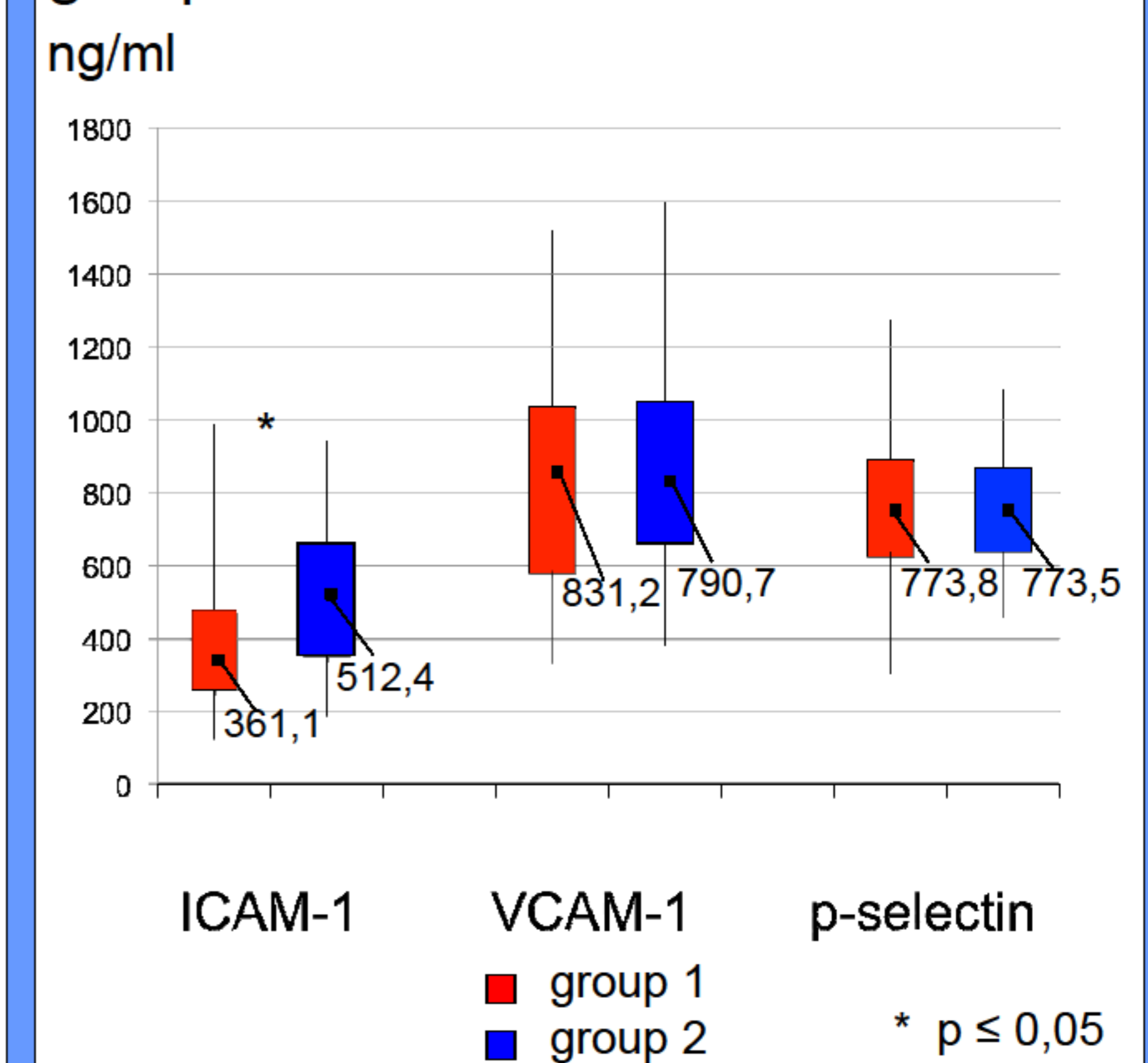
The analysis of the data shows that hypogonadal patients had a significantly higher body mass index (BMI), WC, HC. Also the levels of HbA1c, triglycerides (TG), very low dencity lipoproteins (VLDL) were statistically higher in patients of the second group. It indicates the deterioration of control of carbohydrate and lipid metabolism in the state of androgen deficiency.

We have not found statistically significant differences between the two groups in a concentration of E-selectin, P-selectin and VCAM-1. This may reflect a slight influence of hypotestosteronemy on these markers of endothelial dysfunction.

In the second group was found a significant increase of resistin (p = 0,01) : 5.81 [5.05; 8.7] ng / ml vs 4,82 [3,63; 6.34] ng / ml and ICAM-1(p = 0,04): 512.45 [350.1; 644.4] ng / ml vs 361,15 [256,8; 478.5] ng / ml. In addition, was observed an increase in CRP levels in patients with late onset hypogonadism compared to eugonadal men (12.65 [10.9, 14.00] vs 6,62 [2,59; 8,61] mg / L) (p = 0.0001).

Thus, in patients with a deficiency of testosterone were significantly higher levels of markers of endothelial dysfunction: resistin at 17% and ICAM-1 at 29.5%; also the concentration of CRP at 47.7% compared to eugonadal men with type 2 diabetes.

Conclusions: The identified patterns suggest that in diabetes with androgen defficiency occur biochemical processes, reflecting the presence of endothelial dysfunction. Along with a synchronous increase in CRP level, this indirectly indicates a rise in cardio-vascular risk in this group of patients.

Established a significant increase in the concentrations of resistin and ICAM-1 in patients with type 2 diabetes and late onset hypogonadism may be the basis for the study of their role as predictors of the development of cardio-vascular diseases at an early stage.