

How production of vascular endothelial growth factor (VEGF) influences formation of vascular disorders in children with obesity

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Background: VEGF is largely produced by adipose tissue and is an important regulator of physiological and pathological angiogenesis in adults with obesity.

Objective: to determine the nature of VEGF production and its connection to the formation of vascular complications in patients with childhood obesity

Methods: in 87 children 9-17 years old with obesity and 35 healthy peers with normal weight serum levels of VEGF were measured by ELISA. The presence of insulin resistance (IR) was estimated using HOMA Calculator v.2.2. We evaluated the presence of microcirculatory disorders (MD) using capillaroscopy and arterial hypertension (AH) by measuring blood pressure (BP).

Results. We found significantly higher levels of VEGF in obese children compared with healthy peers ($350,14 \pm 30,81$ pg/ml vs. $135,82 \pm 16,38$ pg/ml, $p=0.045$), especially in the presence of IR ($518,88 \pm 68,65$ pg/ml vs. $296,06 \pm 27,19$ pg/ml, $p=0.003$). Increased association of IR and VEGF production was observed at concentrations of $VEGF > 320$ pg/mL, especially at the level of $VEGF > 450$ pg/mL. The growth was accompanied by an increase in the degree of MD indicator VEGF (from $234,98 \pm 31,21$ pg/ml to $361,71 \pm 45,05$ pg/ml and $432,26 \pm 67,28$ pg/ml, $p=0.02$).

Indicators	VEGF > 320 pg/ml		VEGF > 450 pg/ml	
	OR	OR (LogR)	OR	OR (LogR)
II degree of MD	4,67 [1,46-14,96] $p < 0,02$	4,29 [1,26-14,56] $p < 0,01$	3,67 [0,92-14,54] $p < 0,055$	4,44 [1,01-19,51] $p < 0,03$
IR "+"	1,18 [0,43-3,20] $p < 0,70$	1,09 [0,37-3,2] $p < 0,9$	5,07 [1,23-19,95] $p < 0,01$	5,15 [1,21-21,97] $p < 0,01$
Insulin > 25 mIU/ml	5,44 [1,62-18,19] $p < 0,004$	5,27 [1,47-18,93] $p < 0,006$	13,14 [3,54-48,75] $p < 0,0001$	20,72 [4,23-45,57] $p < 0,0001$

No significant differences in VEGF production were found depending on the level of BP in obese children, except for a trend towards an increase in AH compared with patients without AH ($397,90 \pm 56,91$ pg/ml vs. $244,26 \pm 44,38$ pg/ml, $p=0.07$).

Conclusions. We discovered an increased production of VEGF in obese children, as well as its relation to IR and the formation of MD, but not AH.