

The effect of physical activity enlargement on anthropometric parameters and blood lipids depending on genetic polymorphisms of beta-2 and beta-3 adrenoreceptors

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Background: Assessment of genetic factors, which determine the effect of physical exercise, allows to identify individuals that are not susceptible to positive effects of enlargement of physical activity.

The aim of the study was to assess the effect of enlargement of physical activity on anthropometric parameters and blood lipids in individuals without cardiovascular diseases.

Methods: One hundred ten persons, mean age 41.1±8.1 y.o. were included in the study. Blood pressure, body mass index, fat to muscular ratio (bioimpedance method), blood lipids and glucose levels, eating habits were assessed before and after 6 month of physical activity enlargement. Patients were instructed how to increase physical activity and their activity was monitored monthly with the pedometer and with "International Questionnaire on Physical Activity". Genotyping of polymorphic sites of ADRB2 (C531G, rs1042714 and A46G, rs1042713) and ADRB3 (T190C, rs4994)

genes was done with real-time polymerase chain reaction. Statistical analysis was performed in SPSS 17 (IBM).

Results: It was found out that carries of AA+AG genotypes of A46G polymorphism of ADRB2 gene and TT genotype of T190C polymorphism of ADRB3 gene had significant reduction of fat tissue and rise of muscular tissue proportion as well as a rise of muscular strength. Higher level of physical activity was associated with reduction of low-density cholesterol in carries of TT genotype of T190C polymorphism of ADRB3 gene and carries of AA+AG genotypes of A46G polymorphism of ADRB2 gene (Table 1).

Conclusion: Carrying of AA+AG genotypes of A46G polymorphism of ADRB2 gene and TT genotype of T190C polymorphism of ADRB3 gene is associated with significant decline of proportion of fat tissue and decrease of low-density cholesterol after physical activity enlargement.

Table 1. Dynamics of studied parameters

Parameter	ADRB2 (Gln27Glu)		ADRB2 (Arg16Gly)		ADRB3 (Trp64Arg)		
	CC	CG+GG	AA+AG	GG	TT	TC	
N (%)	51 (46,4%)	59 (53,6%)	41 (37,3%)	69 (62,7%)	58 (52,7%)	52 (47,%)	
Body mass index, kg/m ² (M±SD)	before	31.4±7.7	32.5±7.9	30.9±8.2	33.6±8.9	31.1±7.4	29.3±11.3
	after	31.1±6.9	32.1±7.2	27.1±7.7*	32.9±9.1	26.6±7.1#	29.3±10.9
Fat tissue, % (M±SD)	before	38.2±8.6	42.5±8.5	37.6±8.1	41.5±6.7	39.8±9.1	34.1±9.2
	after	37.2±8.1	40.1±9.3	33.3±8.2**	40.4±8.2	35.6±9.2##	33.4±8.1
Low density lipoprotein-cholesterol, mmol/l (M±SD)	before	3.34±0.71	3.50±0.91	3.71±0.91	3.63±0.91	3.39±0.97	3.2±1.83
	after	3.32±0.59	3.60±1.1	3.11±0.87***	3.21±1.1	2.98±0.98###	3.4±1.89

M, mean; SD, Standard Deviation. *p=0.03; **p=0.01; ***p=0.003; #p=0.01; ##p=0.01; ###p=0.02.