

Matrix metalloproteinases, their inhibitors and neurotrophic factors as indicators of cardiometabolic risk in Turner syndrome girls

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Context

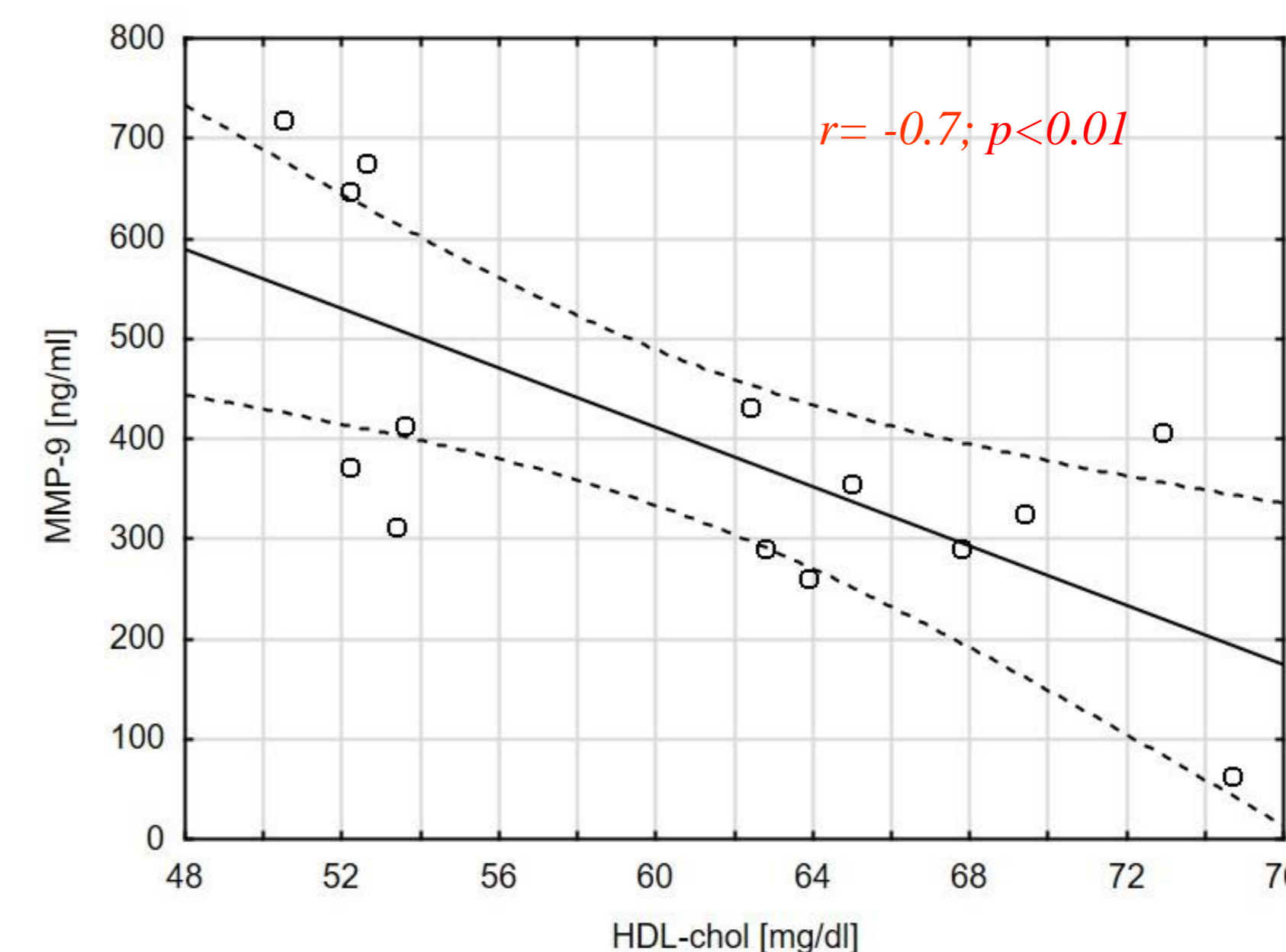
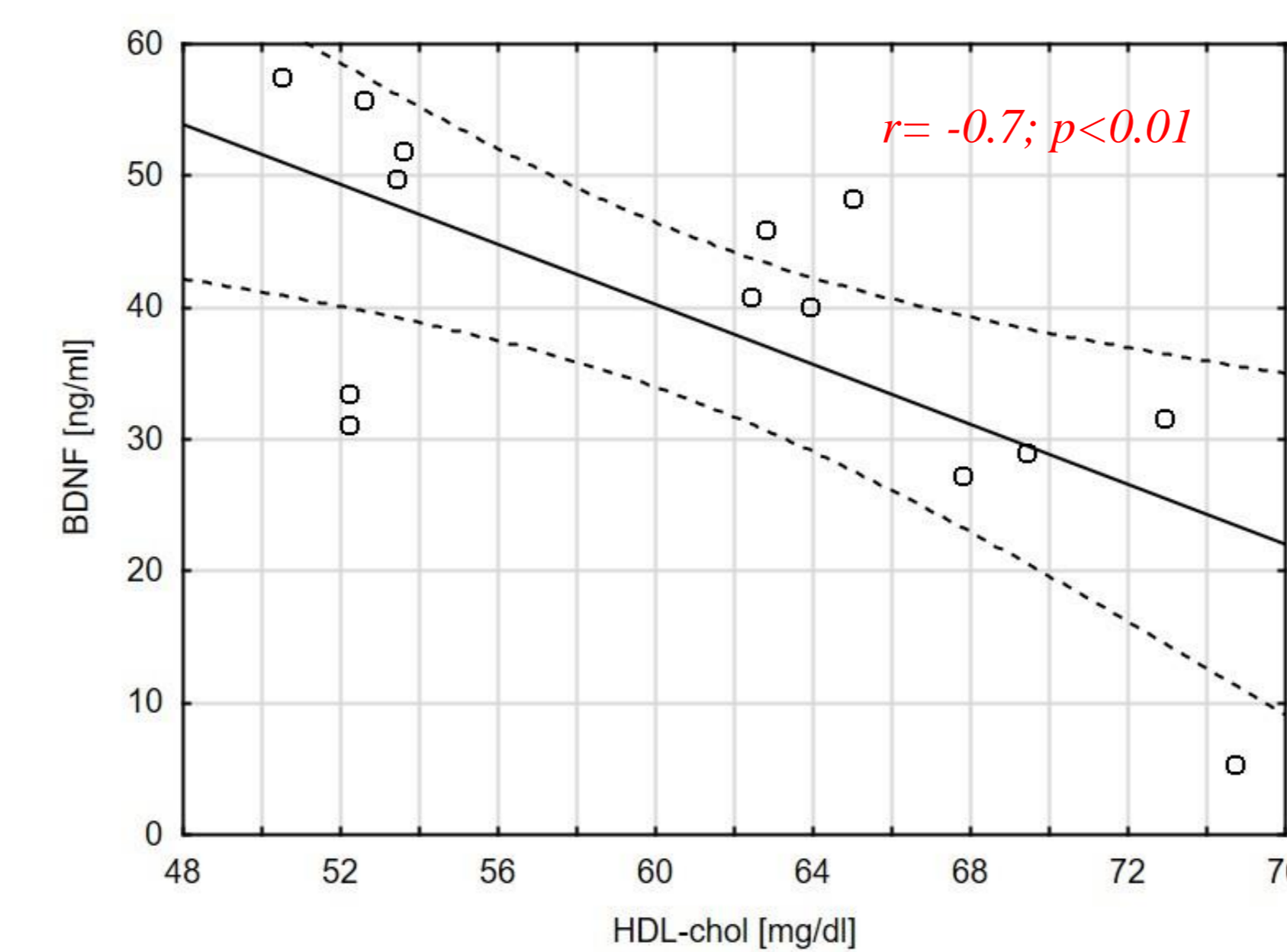
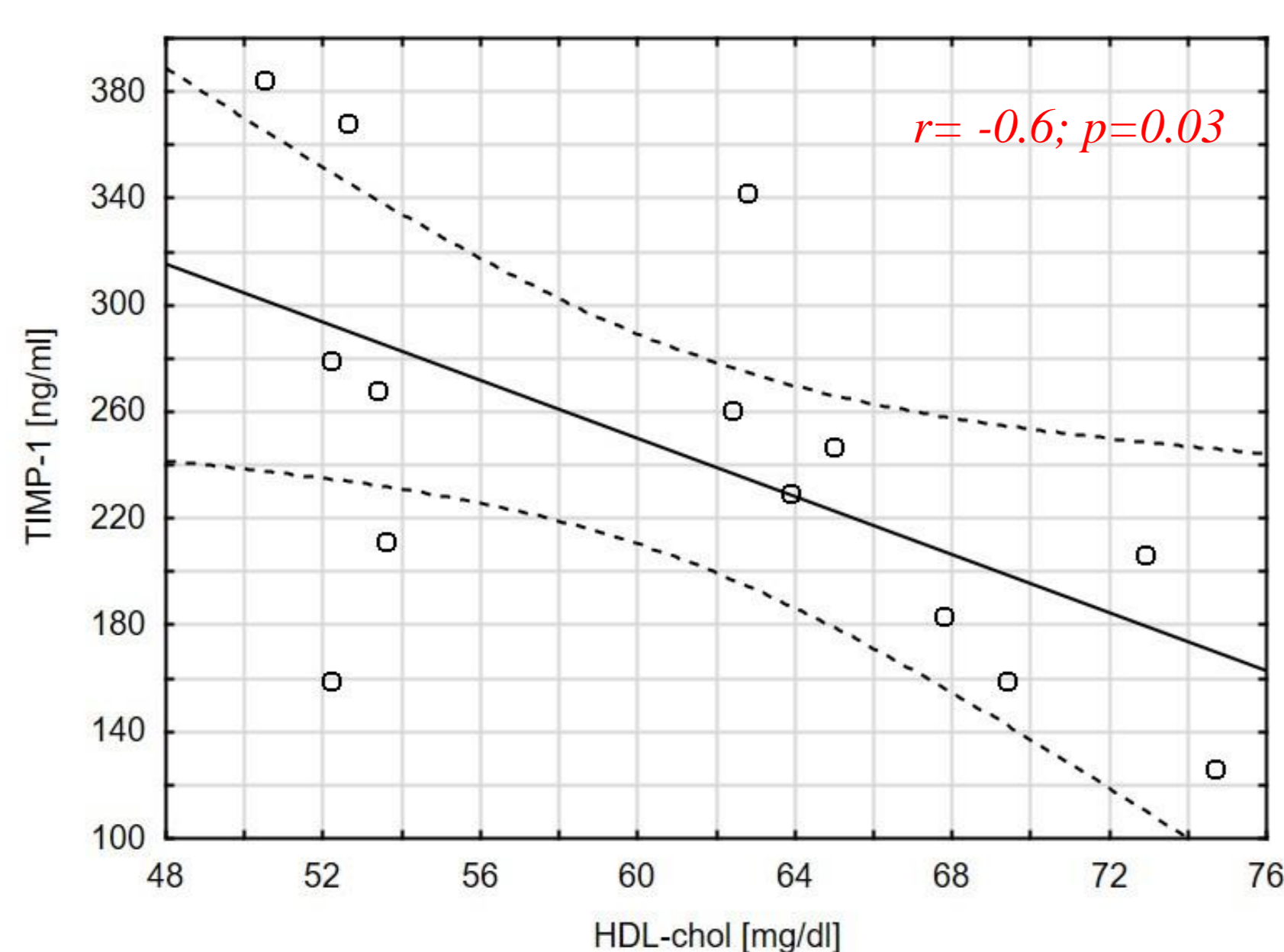
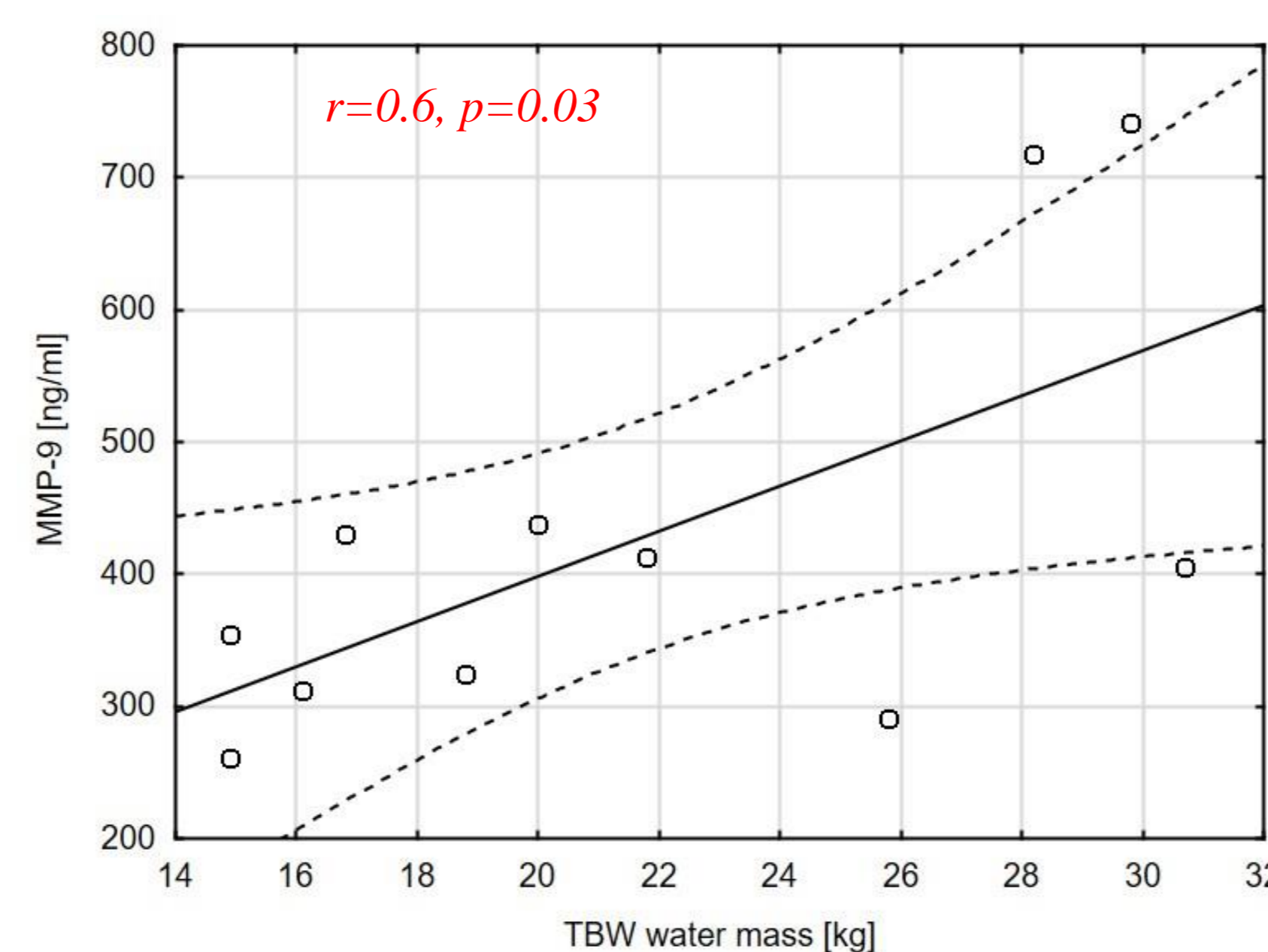
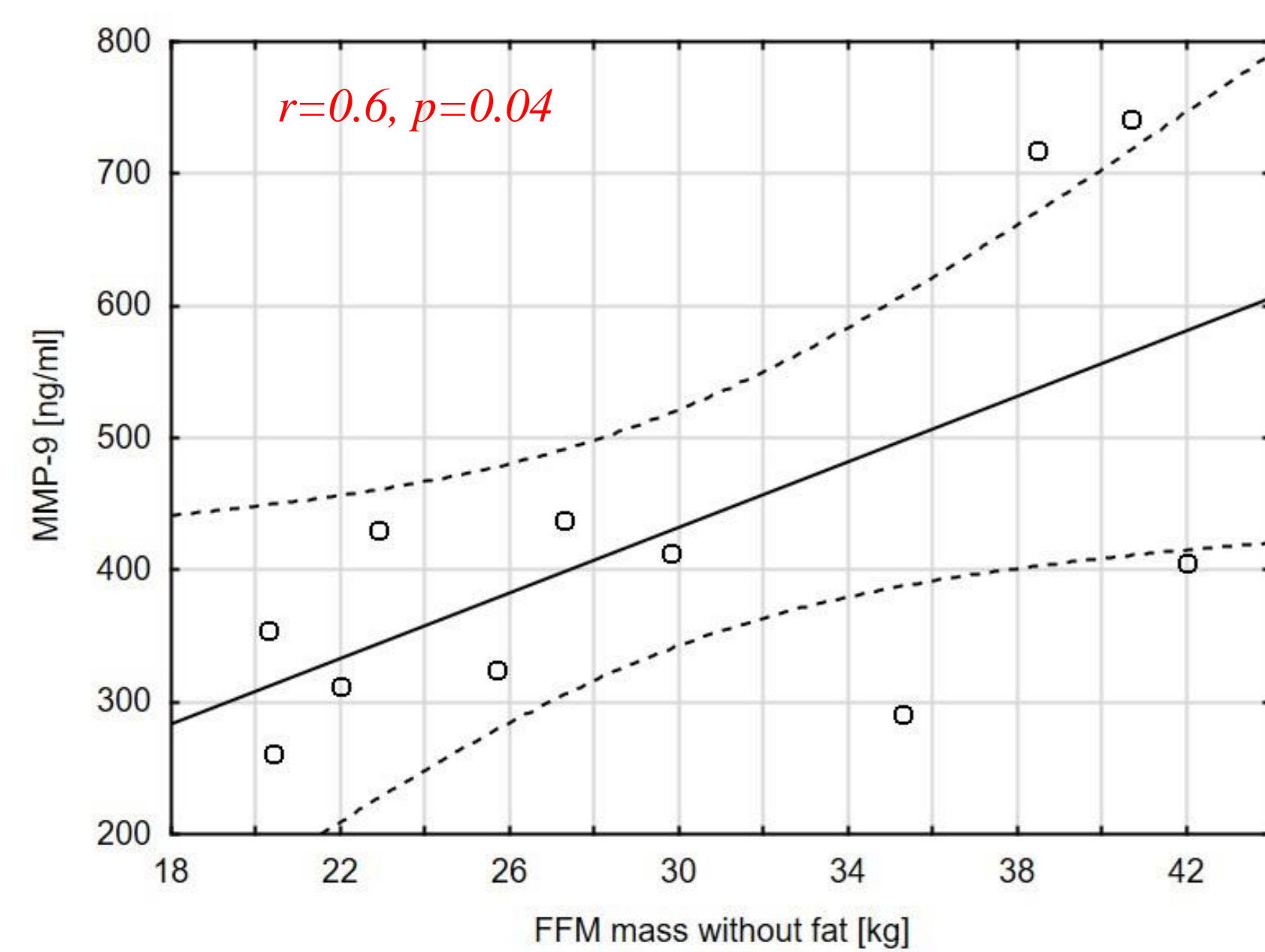
Turner syndrome (TS) predisposes to obesity and related disorders being a part of the metabolic syndrome. As TS population is at a higher risk of cardiovascular diseases, research for laboratory markers of metabolic complications is ongoing. Based on our previous observation special significance is attributed to **MMPs** (matrix metalloproteinases), their inhibitors **TIMPs** and neurotrophic factors, such as **BDNF** (Brain-Derived Neurotrophic Factor) and **GDNF** (Glial Cell-line Derived Neurotrophic Factor) and **VEGF** (Vascular Endothelial Growth Factors).

Patients and methods

17 TS (9 during puberty) girls treated with recombinant growth hormone.

- Clinical phenotype**
 - height, weight, BMI
 - waist and hip circumferences
 - stage of puberty, according to Marshall & Tanner
 - body mass composition - electrical bioimpedance method (BIA)
- Biochemical phenotype**
 - lipid-carbohydrate parameters (T-Chol, HDL-chol, TG; glucose and insulin in OGTT)
 - circulating MMP-1, -2, -9, TIMP-1, BDNF, GDNF and VEGF

Regression analysis was used to investigate the correlation between all quantitative variables, also with division into pre-pubertal and pubescent groups. Only statistically significant differences are presented below.



Objective

The assessment of the correlation between components of metabolic syndrome and selected metabolic markers in TS girls and comparison the effects of puberty on their concentrations.

Results

Biochemical characteristics of TS girls before and during puberty

	Puberty	Before puberty	P value
Age [years]	13.7 ± 2.3	8.8 ± 3.8	0.004
BMI [kg/m ²]	19.6 ± 2.4	17.3 ± 2.6	NS
Z-Score BMI	0.1 ± 0.6	-0.3 ± 1.04	NS
hSDS	-2.4 ± 0.7	-2.9 ± 1.2	NS
Bone age [years]	11.7 ± 2.1	8.4 ± 2.7	0.02
MMP-1 [ng/ml]	13.4 ± 6.5	8.7 ± 6.7	NS
MMP-2 [ng/ml]	264.6 ± 57.9	252.6 ± 73.7	NS
TIMP-1 [ng/ml]	255.1 ± 67.9	227.1 ± 85.4	NS
MMP-9 [ng/ml]	453.7 ± 165.8	380.0 ± 216.6	NS
BDNF [ng/ml]	41.43 ± 10.3	35.0 ± 16.4	NS
GDNF [ng/ml]	3.36 ± 3.3	2.7 ± 1.3	NS
VEGF [ng/ml]	71.5 ± 66.2	67.3 ± 72.0	NS
fT4 [ng/dl]	1.3 ± 0.2	1.2 ± 0.2	NS
TSH [mIU/l]	2.4 ± 0.7	3.6 ± 2.0	NS
AST [IU/l]	27.8 ± 3.2	33.5 ± 12.5	NS
ALT [IU/l]	17.0 ± 3.6	18.2 ± 3.0	NS
Glucose [mg/dl]	90.1 ± 7.7	78.9 ± 12.1	0.03
Glucose 120' [mg/dl]	100.6 ± 13.0	117.0 ± 30.3	NS
Insulin [pmol/l]	16.5 ± 7.1	4.2 ± 2.7	0.001
IGF 1 [ng/ml]	790.4 ± 155.2	381.9 ± 191.4	< 0.001
TCH [mg/dl]	168.0 ± 19.6	163.9 ± 17.3	NS
HDL-chol [mg/dl]	62.14 ± 7.8	59.2 ± 9.0	NS
LDL-chol [mg/dl]	82.9 ± 22.0	84.3 ± 14.4	NS
TG [mg/dl]	115.4 ± 24.7	101.9 ± 60.2	NS
CRP [mg/l]	0.3 ± 0.1	0.5 ± 0.4	NS

Morning fasting venous blood samples were collected to measure biochemical parameters.

Conclusion

- MMP-9, TIMP-1 and BDNF could be useful as a potential indicators of cardiometabolic risk complications in TS girls due to their negative correlation with HDL concentration.
- As estrogens act advantageously on the HDL level, the concentration of mentioned metabolic markers need further study in which the influence of estrogens should be taken into consideration.