ESPE 2014

# "FAMILY AND GENETIC FACTORS INFLUENCE THE METABOLIC CHANGES IN CHILDREN"

P2-D2-375

A. Solntsava[1], L. Viazava[1], E. A.Sukalo[1], Aksionava[2], N. Danilenko[2]

[1] - Belorussian state medical university, [2] - Institute of genetics and cytology, National Academy of Science, Belarus

## Background

The metabolic changes associated with childhood obesity define a cluster of cardiovascular risk factors that have been shown to predict the development of cardiovascular disease (CVD) and type 2 diabetes in adult [1] . On the other hand, there are strong evidence data concerned to positive family history (1st and 2nd degree relatives) of CVD (myocardial infarctions or stroke) and glucose intolerance or diabetes mellitus increases risk for the obesity associated diseases development in adolescence, youth and adulthood [2, 3, 4]. Moreover persons with a positive family history of diabetes and CVD, including children, can show early signs of insulin resistance [5], glucose intolerance [6], lipid abnormalities, high BP and large weight gains [7].

Recent studies have shown, that the 1st variant of VTRN polymorphism insulin gene promoter may contribute to insulin resistance and metabolic syndrome development [8, 9].

## Objectives

Study objective was to determine relationships between families, genetic and metabolic obesity risk factors in children.

## Methods

782 children (204 lean and 578 obese; male/female = 414/368) aged from 2 to 17.9 years were examined and classified according to the pubertal stage: 392 was in prepubescence (Tanner 1), 141 – early puberty (Tanner 2-3) and 249 – late puberty (Tanner 4-5).

The information about family history (FH) of impaired glucose tolerance or diabetes mellitus (IGT/DM), cardiovascular disease (myocardial infarctions and stroke) and obesity was obtained from standard parents questionnaires. There were measured anthropometrical parameters (height, weight, waist circumference), systolic and diastolic blood pressure. Body mass index (BMI) was calculated and standardized according to national reference data for age and sex.

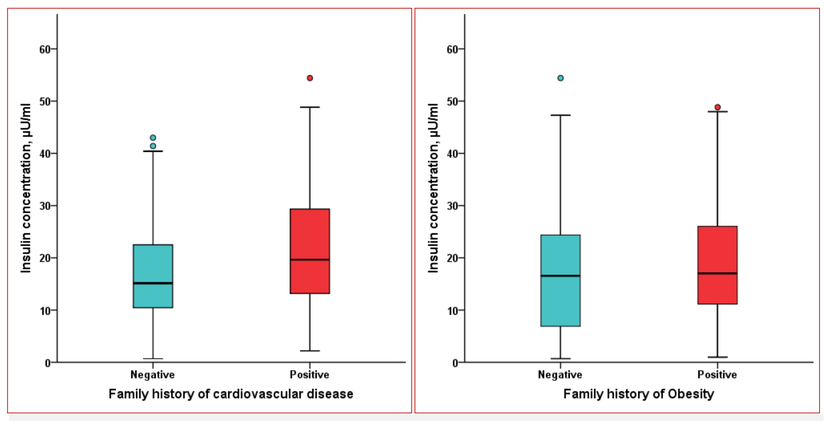
243 obese and 112 lean children were genotyped in INS gene (A-23HphIT polymorphism). In order to assess metabolic changes, serum fasting insulin (INS), cholesterol, triglycerides, high (HDL) and low density lipoprotein (LDL), capillary blood glucose (mmol/l) levels were detected. Homeostatic model assessment of insulin resistance (HOMA-IR) was calculated. Statistical analysis was performed using SPSS 16.0 (p=0.05).

## Results

INS level was significantly higher in children with FH of CVD (fig. 1a) and obesity (fig. 1b) (21.46±11.17 and 19.76±11.26) than in ones without (17.75±11.25 and 16.47±12.49 μU/ml) p1=0.001 and p2=0.014 respectively.

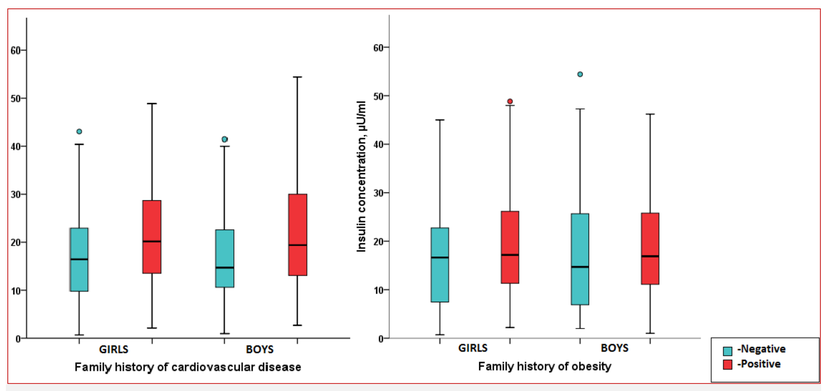
Children with FH of IGT/DM had the same INS levels as the peers without (p>0.05). These patterns of relationships were similar regardless of sex (fig. 2 a and b) and pubertal stage (fig. 3 and 4).

## Results



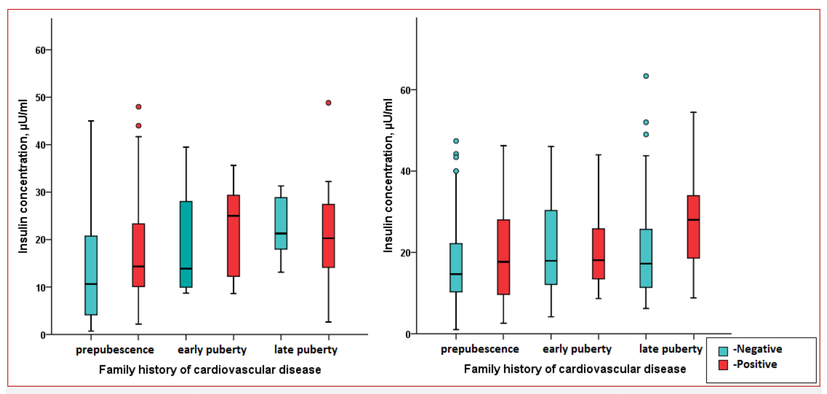

a) b)

Figure 1. Boxplot reflecting insulin concentrations in children depends on their family history of CVD (a) and obesity (b)



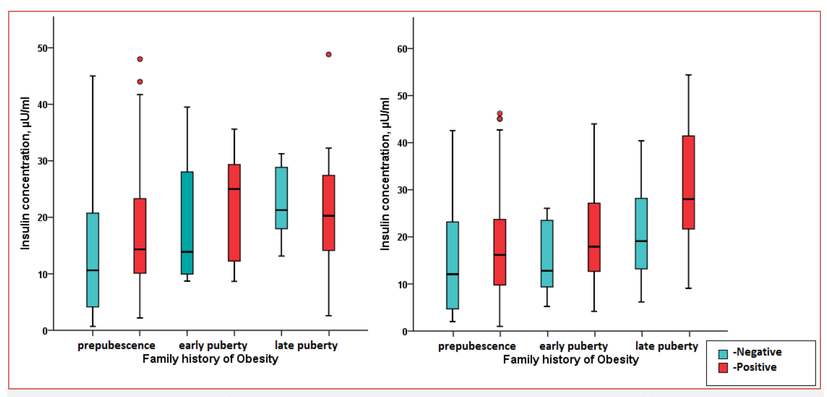

a) b)

Figure 2. Insulin concentrations in girls and boys depends on their family history of CVD (a) and obesity (b)
-negative FH of obesity marked by green color
-positive FH of obesity marked by red color




a) b)

Fig 3. Insulin concentrations in girls (a) and boys (b) depends on their family history of CVD and pubertal stage
-negative FH of obesity marked by green color
-positive FH of obesity marked by red color




a) b)

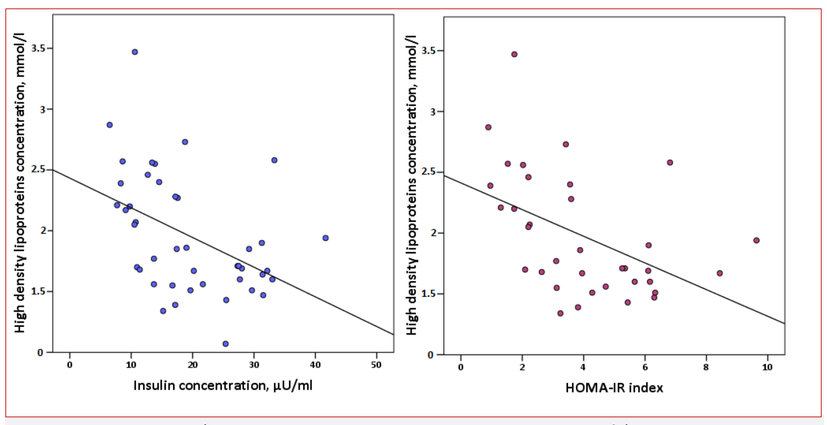
Fig 4. Insulin concentrations in girls (a) and boys (b) depends on their family history of obesity and pubertal stage.
-negative FH of obesity marked by green color
-positive FH of obesity marked by red color

In multivariate analysis with INS indexes as dependent variables, parameters independently associated to INS was FH of CVD (β=0.203 p=0.006 in girls and β= 0.149 p=0.028 in boys). Family history of IGT/DM and O were not influenced INS levels.

There were positive correlations between LDL, INS and HOMA-IR index levels in late pubertal obese children (r=0.3, p=0.05 and r=0.3, p=0.05 respectively).

## Results

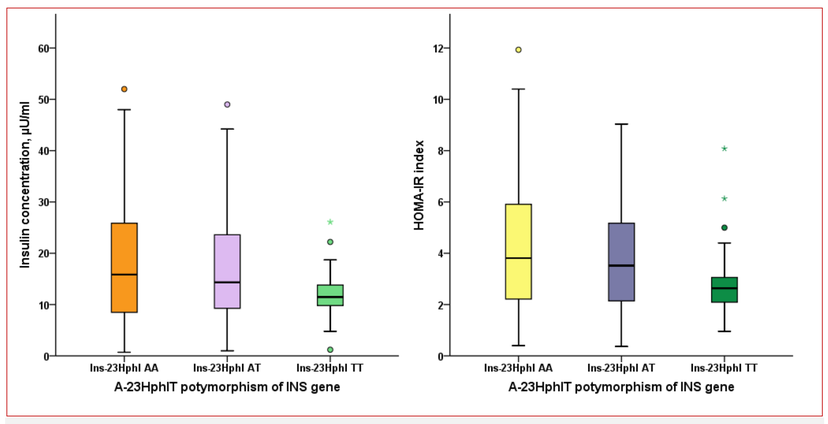
HDL concentrations negatively correlated with INS (fig. 5a) and HOMA-IR index (fig. 5b) (r=-0.5, p=0.003 and r=-0.5, p=0.004 respectively) in late pubertal overweight girls.




a) b)

Figure 5. Scatterplot of correlations between HDL and Insulin concentrations (a) and HOMA-IR index (b) in late pubertal obese girls
-HDL and insulin correlations marked by blue color
-HDL and HOMA-IR correlations marked by red color

INS (fig. 7a) and HOMA-IR (fig. 7b) were higher in AA homozygous obese children respecting to TT-genotype of INS gene (p=0.003 and 0.006 in order).




a) b)

Figure 7. Boxplot reflecting Insulin concentrations (a) and HOMA-IR index (b) in obese children depends on type of A-23HplT polymorphism

## Conclusions

Family history of cardiovascular disease and obesity, AA homozygous genotype of A-23HphIT polymorphism influenced insulin level in children.

Lipid spectrum in obese children associates with insulin and HOMA-IR index.

## References

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