BIOCHEMICAL PARAMETERS OF METABOLIC SYNDROME AND IMPACT OF FREE RADICALS

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They are three stages in the short history of metabolic syndrome (MS) utilisation. The first definition of this term (1993 Reaven). WHO and National cholesterol education program (ATPIII) expert panel have proposed separate definitions of MS and finally E.S.Ford (1) in 2004 examined the association between MS and morbidity and mortality from all causes and cardiovascular disease among 2431 US adults aged 35 – 75 years in period from 1976 – 1992). This association was near linear ($p = 0.007$) and Ford did not find any other statistically important relationship between mortality as between MS and age of probands. Any other parameter, staying independently out of MS was not associated with the mortality of any type of cardiovascular illness. The aim of this study is to support the suggestion of Ford and to demonstrate this finding on groups of obese patients. Our second effort was to show, which relationship can have free radicals (FR) to the metabolic syndrome.

Oxidative stress parameters were determined in obese people fulfilling at least 3 criteria of MS (MS, 15 patients), obese ones without MS (OB, 18 patients), and in 48 healthy controls (C) Obese people were recruited from trainees of the Healthy Lifestyle Courses, in which they have acquired knowledge on the recommended dietary guidelines, being supervised in order to decrease their energy uptake

MS criteria: waist circumference > 102 cm in men and > 88 cm in women, hypertriglyceridemia ≥ 1.695 mmol/l; low levels of HDL cholesterol < 1.036 mmol/l in men and < 1.295 mmol/l in women, high blood pressure ≥ 130/85 mm Hg; high fasting glucose ≥ 6.1 mmol/l (Ford et al. 2003).

Oxidative stress parameters: total amount of free radicals.

Analysed parameters:

Free radical concentration: direct spectrophotometric method based on determination of electron acceptance by chlorophyllin (kit Free radicals, Sevapharma, CZ)

Plasma levels of glucose, triacylglycerols, HDL-ch, and LDL-ch, were measured by standard procedures on the automatic analyser Dimension, (Dade-Behring, USA).

The highest level of free radicals concentration we found in patients with metabolic syndrome. In MS group were found significantly ($p < 0.05$) higher levels of glucose, triacylglycerols and LDL-ch as well as significantly lower level of HDL-ch.

Based on multidimensional statistical analysis, component weight plots revealed correlations among individual studied parameters. The most important, statistically significant correlations are:

In MS group: positive correlation between free radical amount and triacylglycerol concentration, negative correlation between free radicals and HDL-ch.

In obese group without MS: positive correlation between free radical amount and triacylglycerol concentration.

From the thermodynamical point of view the multidimensional analysis presents that decreasing of entropy occurs, caused by equilibrium breaking due to stage of obesity. From the control group to the obesity with MS we can see that the grades of freedom increase and the associations between the parameters, forming the term metabolic syndrome assign

important changes. The specific role play free radicals, which are in persons of control group totally independent, being in equilibrium with the antioxidant capacity, but in both groups of obese peoples they are going to be associated with triacylglycerol and HDL-cholesterol.

Conclusion

Our results confirm high significance of obesity as a risk factor leading to metabolic syndrome and cardiovascular disease, respectively. High levels of free radicals together with low total antioxidant capacity detected in case of obese patients indicate elevation of the oxidative stress, which is potentiated in case of obese patients with metabolic syndrome, especially. This imbalance in oxidative/antioxidative status results in higher risk of atherosclerotic and diabetic complications.

Acknowledgement

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References:

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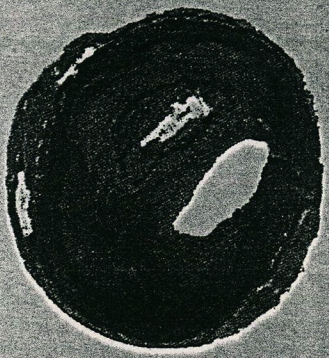

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