

ABSTRACT

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Title of thesis: Changes of gene and protein expression of selected enzymes in mice due to cranberry antioxidants and obesity

Obesity is a chronic disease coming up to endemic size in contemporary population. It is often associated with an adverse pathophysiological effects in the organism. This condition affects many processes occurring in the body and probably also activity and expression of antioxidant and biotransformation enzymes. Expression of antioxidant enzymes is influenced by dietary intake of antioxidants, which can be definitely beneficial to health.

This thesis concerns about changes in protein and gene expressions of biotransformation and antioxidant enzymes by testing the four groups of experimental mice.

This determination was carried out in normal and obese mice in which obesity was induced artificially by administration of monosodium glutamate. These individuals served as control group to the other two groups, which were used for testing the effect of cranberry extract on enzyme expression. The expressions were determined in subcellular fractions of livers and small intestine. The methods to determination of protein expression is based on polyacrylamide gel electrophoresis, immunoblotting technique and chemiluminescence detection. The relative mRNA level of selected genes was assayed by real-time PCR method.

Protein expression of enzymes catalase (CAT), glutathione S-transferase pi (GSTp) was significantly inhibited by cranberry extract in obese mice's liver cytosol, whereas in a small intestine cytosol aldo-keto reductase (AKR1A1) and glutathion peroxidase (GPx) were detected. The significant increase of expression due to cranberries is evident for GSTp enzyme in both of tested tissues normal mice, i.e. GPx in liver tissue and CAT a NAD(P)H quinone oxidoreductase 1 (NQO1) in the intestinal tissue. The decrease of expression is only shown in liver tissue for GSTp and CAT enzymes, significant increase of protein expression due to obesity was found for glutathione S-transferase zeta (GSTz) in both types of tissues, NQO1 in liver tissue and for AKR1A1, GSTp, CAT and GPx in intestinal tissue.

The inhibitory effect of cranberry extract on mRNA level was determined for genes GSTz in livers and for genes GPx and NQO1 in the small intestine. Increase in the relative gene

expression due to cranberry extract was found for AKR1A1, carbonylreduktase 1 and NQO1 in liver cytosol. It is also evident a significant increase of mRNA expression in a small intestine for GSTz and CAT enzymes. In contrast, obesity significantly reduced mRNA expression in the liver tissue for GSTp, GPx and NQO1 in the small intestine. Obesity had the opposite effect on gene expression of GSTz and NQO1 in livers, where we can find a significant increase.