Abstract

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Oxidative stress is an imbalance between the formation of free radicals and the organism's ability to remove those radicals naturally. There can be cell and DNA damage, premature aging, the emergence of various diseases if there is an excessive production of free radicals in the body and they are not scavenged. However, free radicals are also beneficial for the body, as it uses them to remove dead cells and bacteria. Normally, the organism has enough mechanisms to compensate for the activity of free radicals and prevent oxidative stress. Antioxidants can inhibit the activity of free radicals. They are divided into enzymatic and non-enzymatic antioxidants. The most important enzymatic antioxidants are glutathione peroxidases (GPx). Eight genes encoding GPx have been discovered in the human genome. GPx is a cytosol enzyme that catalyzes the reduction of hydrogen peroxide to water and oxygen, as well as it catalyzes the reduction of peroxide radicals to alcohols and oxygen. The reduction of expression or inactivation of enzymes may pose danger to the organism. MicroRNA (miRNA) may participate in inactivation, by binding to the 3 'UTR area of mRNA and reducing gene expression of GPx.

In this thesis, the interaction between selected miRNAs and GPx was monitored at the level of gene expression. SW480 cells were transfected by each tested miRNA. RNA isolation and reverse transcription were performed followed by measuring the intensity of transcription of individual GPxs by real-time PCR.

Some significant changes in GPxs expression were found. The effects of miR-30c-3p on GPx2 and GPx7 expression and of miR-29b-3p and miR-137 on GPx7 expression were confirmed.