

ABSTRACT

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Title of diploma thesis: **The effect of selected sesquiterpenes on antioxidant enzymes in Caco-2 cell line**

Colorectal carcinoma is a very frequent type of malignant neoplasms, while the Czech Republic has the sixth highest incidence of this disease globally. Current chemotherapy is often not an ideal option, and there is an effort to find substances that could replace it or reduce its dosage, and therefore its adverse effects. A promising source of natural substances is the Chinese tree *Myrica rubra*, whose extracts have inhibited the proliferation of many tumour cell lines. Also, in several colon carcinoma cell lines, the growth inhibition was observed after their cultivation with the essential oil from the *M. rubra*'s leaves (SMR), with the Caco-2 line being the most sensitive. The main sesquiterpenes of SMR β -caryophyllene, α -humulene (α -HUM), trans-nerolidol (t-NER) and valencene proved the antiproliferative effects on this cell line too. α -HUM and t-NER showed the formation of reactive oxygen species (ROS) on colon carcinoma cells. The aim of our work was to find out how SMR, α -HUM and t-NER at concentrations of 25 and 50 $\mu\text{g/ml}$, influence the activity of antioxidant enzymes, their transcription and the enzyme protein abundance in Caco-2 after 24-hour incubation. Our results showed an increased activity of glutathione reductase (GR) in some cases, including an increase in transcription and in GR protein level in comparison with the control cell line. We did not observe any change in glutathione peroxidase's (GPx) activity, however, there was a reduced gene expression of its isoform 7 (GPx7), which lacks glutathione peroxidase activity and acts as a stress sensor. The quantity of detected protein GPx7 was decreased in half of the examined samples. The activity of glutathione-S-transferase (GST), catalase (CAT) and superoxide dismutase (SOD) remained basically unchanged, as well as their transcription and the amount of CAT protein. NADP(H) quinone oxidoreductase 1 (NQO1) showed no detectable activity both in the control, and in the cells influenced by sesquiterpenes.