STRESZCZENIE W JĘZYKU ANGIELSKIM

Fungi, including arboreal fungi, seem to be an extremely promising biological material with regards to the production of a plethora of biologically-active substances. Among species that have hitherto been poorly researched is the *C. unicolor*. In this thesis an attempt has been made to isolate new biologically-active compounds from a previously unresearched pool of metabolites secreted during the proliferation of the *C. unicolor* biomass in laboratory conditions on liquid growth media (fraction of molecular mass under 10 kDa). What has been undertaken is the isolation of a low-molecular fraction of secondary metabolites by means of membrane ultrafiltration, filtration in reverse osmosis and gel permeation chromatography.

The resulting fractions have been examined with regards to their biochemical parameters, as well as their antioxidant, antimicrobial, anticancer and hemostatic properties.

In order to ascertain the qualitative composition of the examined preparations analytical techniques have been used, including FT-IR infrared spectroscopy, high-performance liquid chromatography coupled with visible light and ultraviolet spectrometry (HPLC-UV-VIS) and ultra-high-performance liquid chromatography coupled with mass spectrometry (LC-MS).

The analyses carried out on the resulting low-molecular preparations LMS-s1 - LMS-s6 and LMS-b1 - LMS-b4 have indicated a probable presence of a variety of compounds belonging to proteins and peptides, carbohydrates, phenolic compounds, aromatic derivatives containing sulphur, amines and nucleosides. Among the examined preparations compounds with antioxidant properties have been observed, out of which the LMS-b2 and LMS-s6 preparations have shown the highest antioxidant potential.

The microbiological analyses have also shown a possible synergy of the effects of the isolated preparations in suppressing proliferation of Gram-positive and Gram-negative bacteria, as well as the ability of one among the examined preparations to suppress growth of bacteria in biofilm form.

Analyses using human cancer cells have indicated the cytotoxic and antiproliferation potential of the main fraction, as well as the examined preparations, against SiHa and CaSki cervical cancer cells, in addition to their effect on the proliferation of the HT-29 colon cancer cultures, PC3 prostate cancer, as well as MCF7 breast cancer and the MDA-MB-231 mammary gland cancer. The examined preparations had a fairly limited effect on the

proliferation of the CCD 841 CoTr transformed normal large instestinal culture. Analyses of the preparations derived from the final stages of fractionation (LMS-b1 - LMS-b4 and LMS-s1 - LMS-s6) have shown clearly that they suppress the proliferation of the HT-29 cell culture in dose-dependent manner. The LMS-s3, LMS-s4 and LMS-s5 have shown the most promising results, even at concentration as low as 25-50 μg/ml.

This thesis also attempts to assess some of the anticancer mechanisms of the most effective preparations, i.e. suppressing cancer cell migration, which in the case of the LMS-s1 fraction can be linked to the effect on the MMP-9 (extracellular matrix metalloproteinase) activity.

The thesis also proves the ability of the isolated preparations to suppress the activity of select diagnostic proteases, including enzymes belonging to cysteine and aspartic proteases. The ability of the LMS-s1 and LMS-s6 fractions to substantially promote the clotting of human blood plasma has also been proven.

The results acquired in this thesis show the examined species, the *Cerrena unicolor* white-rot fungus, to be a very interesting source of new low-molecular compounds with high biomedical potential.