Screening for biologically active compounds in *Iris* genus.

Angelika Michalak, Laboratory of Biologically Active Compounds, Department of Biotechnology, Intercollegiate Faculty of Biotechnology UG and MUG

Supervisor: **Aleksandra Królicka**

Plants from the *Iris* genus represent the *Iridaceae* family which consists of over 260 species, widely distributed around the world. They have been used as ornamental plants for centuries, but that is not the only application of these plants. Many *Iris* species produce biologically active secondary metabolites mostly in their underground organs and tissues. In traditional medicine, extracts from *Iris* plants were used as expectorant, analgesic and disinfectant agents. Nowadays they are widely used in the perfume and cosmetic industry. *Iris* rhizomes are rich in isoflavones, chinons, flavonoids and triterpenoids – substances with cytotoxic and antimicrobial activity, which shows their enormous pharmaceutical potential.

The project includes the investigation of biological activity of secondary metabolites produced in plant tissue of the *Iris* genus. The project requires *in vitro* culture of *Iris* plants with the use of a recently developed temporary immersion bioreactor and various culture conditions (changes in media culture, type of tissue culture). The main focus of the project will be a detailed analysis of the activity of substances isolated from *Iris* tissues (from *in vitro* and *in vivo* cultures, transformed roots – hairy roots) towards human, multidrug resistant pathogens: *Klebsiella pneumoniae, Escherichia coli, Enterococcus faecalis, Candida albicans* including those forming biofilm: *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The application potential of extracts from *Iris* in combination with silver nanoparticles (AgNPs) regarding bacterial and fungal infections will be tested as well. Moreover, cytotoxic activity will be tested on human cancer cell lines: HeLa, MCF-7, HL-60 and human skin cell line HaCaT.

The project assumes the design of a microfluidic device. This device will allow to perform a quick and precise analysis of antibacterial activity of whole extracts as well as extracts combined with silver nanoparticles, which underlines an interdisciplinary character of this project.

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