

Study of release and absorption into human body of bioelements and biologically active organic compounds from fruiting bodies and biomass of selected edible medicinal mushrooms.

Edible mushrooms and their *in vitro* cultures have been researched for years. In Asian medicine the use of mushrooms is based on their direct use, the preparation of mushroom extracts or the usage of isolated therapeutic substances. In Poland, their consumption still raises many controversies. Unfortunately, even in medical society there is a misconception about the low therapeutic and dietary value of edible mushrooms, which is mainly the result of dissemination of wrong opinions in the media. All of these aspects are a direct cause of the need to review safety issues and the benefits of eating edible medicinal mushrooms.

The research objective of the project is the basic research, which consists on evaluating the health-promoting potential of the fruiting bodies of selected edible mushrooms and mycelium cultivated in laboratory conditions (*in vitro* cultures) by the identification of biologically active/health-promoting substances released into artificial digestive juices under conditions imitating the human digestive tract. The next aim is to clarify the mechanisms of mycelial imbibition and accumulation and then the distribution and absorption of selected biologically active substances from the mushroom material into the human body.

The first and basic research task will be to harvest selected fruiting bodies of edible mushrooms from the natural state and to obtain mycelium on artificial media and the same, but enriched with certain pro-health substances. The selection of species for experiments will depend on their natural occurrence, because the appearance of certain fruiting bodies of edible mushrooms in the years is quite unpredictable and variable. Among the commercially available species we will use e.g. *Agaricus bisporus* and *Lentinula edodes* species, really popular among consumers. The choice of species for cultivation will be dictated primarily by their pro-health properties and ability to obtain of satisfactory biomass growth that can be used to carry out research experiments. Selected species of mushrooms and mycelial cultures will be extracted into artificial digestive juices under conditions imitating those that occur in the human digestive system. The extracts obtained after digestion will be determined for content beneficial for the human body (e.g. antioxidant, antidepressant, anti-inflammatory) selected bioelements, non-hallucinogenic indole compounds and phenolic acids.

An important and innovative stage for the proposed project will be the evaluation of absorption in conditions similar to those occurring in the human body. For this purpose will be used self-made constructed capsules. Inside, there will be a semipermeable membrane by which the transition will be assumed to correspond to passive transport and Caco-2 cell lines will be used through which transport will be analogous to active transportation. The obtained extracts will be analyzed using analytical methods such as AAS, DP ASV and RP-HPLC to determine the content of the researched substances. The biomass of selected species, mushrooms methanol extracts, and culture medium solutions will also be subjected to the study.

In view of the available information, the mushroom material and its effect on the human body is a necessary direction of research requiring detailed analysis. Selection of the topic of the project is also related to the existence of a global list of medicinal mushrooms, which is a real reaffirmation of the health-promoting properties of these organisms. The use of commercially available species of mushrooms, naturally occurring and properly enriched mycelium will demonstrate their dietary and/or therapeutic potential. Verification of the safety and benefits of eating edible mushrooms after extraction of this material under conditions imitating those in the human body appear to be necessary. It needs to be highlighted that the project can be the beginning of a comprehensive study that will allow for future development of dietary supplements and even drugs using mushroom materials of various origins.