

Fungal bioactive substances with targeted pro-health potential - the role of interactions, bioavailability and bioavailability as factors creating the functionality of microencapsulated functional additives in the *in vitro* and *in vivo* model

Chronic non-communicable diseases (e.g. cancer, diabetes, obesity) have been a significant problem in highly developed societies in recent years. Preventing it or alleviating their symptoms is a big belief for many fields of science. From the point of view of food technology, the ideal solution seems to be the introduction of ingredients into food that can adjust some functions of human metabolism and/or protect against chronic effects observed in the population. Although the enrichment or fortification does not appear to be new, there is still a lack of knowledge to consciously design functional products.

So far, the research has focused on plant-origin materials, and the use of other additives, including those derived from mushrooms, has been rare and limited. It is commonly known that fungi, and their metabolites, are commonly used in medicine (antibiotics, immunosuppressants and cholesterol-lowering agents). The project aims to 'discover' a new, rich source of bioactive substances and, by developing additives, increase their share in a modern diet. We assumed that mushrooms can be a unique source of highly bioaccessible and bioavailable ingredients with pro-health properties (anti-cancer, anti-diabetic and anti-inflammatory). As our current knowledge in this field is limited to a few commercially cultivated species, we would also like to study wild-growing species. The research will provide knowledge about the composition and bioactivity, but also allow us to identify the key "players" responsible for this action and define the factors limiting the use of mushrooms or their extracts in the design of new foodstuffs. The acquired knowledge will be used to design functional additives with the desired characteristics (activity, stability, bioavailability, consumer acceptability), which will be introduced into commonly consumed products (pasta and bread). Finally, we would like to see if the properties demonstrated in *in vitro* conditions are reflected in real life. Functional bread and pasta enriched with microencapsulated powders will be tested as part of dietary intervention in the human model. In conclusion, we would like to fill the gap in knowledge about mushrooms or their ingredients as valuable ingredients in modern functional diets.

Simultaneous analyzes in *in vitro* and *in vivo* models are aimed at showing the effectiveness, validity and safety of newly prepared functional additives and products enriched with them. The project is a compilation of issues in the field of food technology, nutrition and biochemistry and is to provide new and expanded knowledge on the mechanisms and role of metabolites and fungal components in preventing and/or treating chronic non-communicable diseases.