

Flavonoids are one of the most widespread group of secondary metabolites consumed with vegetables, fruits, tea, coffee or wine. Even though they are not essential for life it is known that they have broad spectrum of biological activities. A multifaceted biological activity of flavonoids is associated with several complex effects of which the best known is called. "French paradox" - life expectancy of the French is higher than average, despite the theory of their unhealthy fat diet and drinking plenty of alcoholic beverages – wine. Besides the flavonoids present in the diet, such as glycosides of quercetin or catechin, there are also those which are limited and occur only in a very few species of plants and possess very valuable and desired biological activity. These limitations cause, that they are only commercially present as ingredients of dietary supplements.

In most cases the flavonoids consumption is much lower than is necessary to fully benefit their positive effects on the human body. This is fact is not only related to the amount of their occurrence in food but mostly due to their low bioavailability and poor water solubility. Studies of recent years shows that the various forms of these compounds have significant difference of bioavailability, and thus induction of a biological effect. Bioavailability might be understood as the amount of compound which reached the circulatory system after oral administration. One of the flavonoid forms, which is currently considered as the easier absorbed is its conjugate with glucose molecule. Glucosylated flavonoids although observed in nature, are in a minority of the total flavonoid content present in the food, moreover there are some flavonoids for which such conjugate have never been discovered so far.

**The main goal of our project is broaden the knowledge concerning the influence of presence sugar moiety in flavonoid molecule on its bioavailability, by obtaining natural glucosilated derivatives of selected flavonoids of proven high biological activity by means of biotransformation, and to evaluate in vivo in a mouse model, whether this transformation will increase their bioavailability.**

Research scheduled in the project may be briefly divided on two stages: obtaining of flavonoids with interesting biological activities and biological studies that will answer the question whether the glucose moiety increases bioavailability or not.

At first a library of flavonoids will be purchased or isolated from natural sources. Next step will be selection of microbial strains that are able to regioselective glucosylation of flavonoids with a high yield. Last step will concise preparative laboratory scale processes to obtain sufficient amounts of highly purified flavonoids glucosides that will be used in an in vivo biological studies panel on mice. Chosen flavonoids, their glucosides, and natural glycosides other than glucosides will be administered to mice orally. Concentration of flavonoids and their mice metabolites in plasma will be evaluated in time. Resulted pharmacokinetic data of tested compounds will provide which of the administered compounds have better absorption rate and bioavailability.

Research aimed at imitating the long-term intake of a given compound, will find out whether and how it affects chronical intake of aglycones and glucosides of flavonoids on their concentration in the body.

Noteworthy is that high impact and quality of the planned studies are supported by the fact that research are planned in consortium of Wrocław Centre of Biotechnology, awarded The Leading National Research Centre (KNOW) and also in collaboration with The Academy of Sciences of the Czech Republic.

Many among nowadays studies concerns problems associated with food, functional food, dietetics and the usage of food components in prevention and treatment of diseases, in particularly civilization diseases. During the last decade there is a growing interest in studies concerning bioavailability of biologically active compounds, such as flavonoids. The growing interest of the developed countries population in flavonoids and biological activities for which they are responsible, contributed to the fact that today on the market there are many dietary supplements containing these valuable molecules.

Unfortunately, most scientific work on the bioavailability and ways to improve it relates to compounds that are commonly found in food. Moreover, it is still not clear whether the positive impact of glucosilation observed for quercetin, daidzein and genistein is curiosity, whether a general trend.

The results obtained may relate with results of previous bioavailability studies and also may increase consumer and producer awareness. Producers might apply new technologies according to obtained results to create new better products, on the other hand consumers, that are more aware of such phenomena, may decide better what products or what kind of food should they use to display best biological effect.