

Poland is a one of global leaders in the production of raspberries. These fruits are known as a rich source of dietary antioxidants largely due to their high level of phenolic compounds, which are primarily comprised of anthocyanins, ellagitannins, phenolic acids, and conjugates of ellagic acid. In addition to their strong antioxidant properties, raspberry polyphenols have also shown other beneficial bioactivities including anti-inflammation, antimicrobial activity against pathogenic intestinal bacteria, and anti-proliferation of human cancer cells. Nevertheless health-promoting potential of the raspberry polyphenols is still not sufficient explored.

Our preliminary *in vitro* study on hepatocytes presented that native polyphenols from raspberry may also regulates immune-metabolic signals associated with development of nonalcoholic fatty liver disease (NAFLD). This liver disorder has become the most common liver pathological state worldwide affecting an estimated 15-30% of most populations. Actually most of the studies are focused on direct hepatoprotective effects of the resveratrol, curcumin and quercetin. The available literature about nutritional experiments with polyphenols from raspberries and their influence on the development of liver-related disorders is limited. Moreover, there is lack of information about broader polyphenolic effects combining regulation of the signals from gastrointestinal tract and liver. Therefore **the aim of the project** is to investigate effect of diet enriched with polyphenolic preparation from raspberry and its dietary combination with functional fiber on microbiota activity in the gastrointestinal tract and systemic parameters involved in the regulation of metabolic liver-related disorders. The experiments will be performed on Wistar and Zucker rats, used as well-recognized experimental model for precise assessment of the body's response. The project will comprised three research tasks with the use of dietary raspberry polyphenolic extract. Two nutritional experiments on Wistar rats will be performed with two types of diets; standard for laboratory rodents and diet inducing metabolic liver disorders. In the first part of the project it will be analyzed effects of two doses of polyphenolic extract (0.1% or 0.3% polyphenols in diet) and two types of soluble fibers (fructooligosaccharides or pectin) on intestinal microbiota activity, production of polyphenol metabolites (with higher bioavailability than native form) and regulation of molecular mechanisms activated upon hepatic metabolic disorders. Based on the results from the first stage of the project, will be selected a diet showing the most effective reduction of liver metabolic disorders and then used in the last part of the project concerning nutritional experiment on Zucker rats with genetic predisposition to develop NAFLD.

The studies will show a new insight into polyphenolic local action in the gastrointestinal tract and related systemic responses of healthy organism and organism with liver metabolic disorders. Moreover, according to fact that in recent years bile acids have emerged as relevant signaling molecules able to act at hepatic level via regulation of lipid metabolic pathways as well as energetic homeostasis, the proposed experiments will present new insights into the possible approach of targeting bile acid-related pathways in the prevention or support of treatment against NAFLD-related disorders.