Diabetes has a complex background, and factors such as lifestyle changes, nutrition habits, and stress complicate it even more. In particular, type 2 diabetes is an increasingly prevalent disease that causes several life-threatening complications. Modulation of glucose absorption in gut is attributed to a combination of specific enzymes and glucose transporters. In type 2 diabetes, there is an increase in the ability of the intestine to absorb glucose. Sodium-dependent glucose transporters are more abundant in the intestinal epithelium of humans with type 2 diabetes than in healthy people. Increased intestinal absorption of glucose which is observed in type 2 diabetes can be explained by the greater activity of sodium-dependent glucose transporters in comparison to healthy individuals.

Food and its nutrients are essential for maintaining homeostasis of the body. This means that diet can be a source of bioactive substances that may affect the proper functioning of the body both positively or negatively. It is also assumed that those components might have a use in the prevention of diet-related diseases, such as type 2 diabetes.

Betalains are one of the groups of biologically active compounds with evidence for beneficial health effects. Betalain compounds do not belong to the widespread pigments in the plant world, but because of their properties are widely distributed in food production as a source of natural red colour (E162). Besides, currently is no experimental data on the potential antihyperglycaemic properties of betalain compounds. Therefore, the project aims to assess the possible inhibitory activity of betalains against enzymes linked to 2 type diabetes and glucose cotransporters. In the first part of the project, we are going to extract of compounds from various products rich in these natural pigments, which further will be isolated and tested for potential to inhibit enzymes which break down polysaccharides into monosaccharides. In the next step, human intestinal model cell line and the fluorescence glucose analogue will be adopted to study the effect of the obtained extracts, and isolated compounds on the level of inhibitory potential on SGLT1 mediated glucose absorption in the small intestine. Then, an *in vivo* experiment is planned to investigate the inhibition of postprandial glucose by the tested compounds. Protein content and expression of glucose transporter genes from *in vitro* and *in viv*o experiments will also be determined.

The originality and innovation of the project are justified by the fact that to the best knowledge of the author, no such studies had been conducted before. Moreover, obtained results can become an evidence basis to run human studies on anti-glycemic properties of betalains and betalain-containing food products.