**Effect of iodoquinolines biofortification on iodine bioavailability and inflammatory response - studies in a rat model**

The aim of the project is to: [1] examine the basic chemical composition of lettuce biofortified with iodoquinolines, [2] assess the absorption of iodine from lettuce supplemented with iodoquinolines by determining its concentration in the urine, faeces and selected organs of rats fed a diet containing this lettuce and selected biochemical parameters in the serum, [3] assessment of the consumption of lettuce enriched with iodoquinolines in terms of health safety of potential consumers, [4] determination of the effect of lettuce biofortified with iodoquinolines on the inflammatory response induced by carrageenan in rats by determining the concentration of inflammatory markers, as well as [5] determining the effect of this lettuce on oxidative stress and peroxidation associated with the inflammatory response induced by carrageenan.

The hypotheses of the research project are as follows: [1] biofortification with iodoquinolines causes the accumulation and obtaining the same or higher content of iodine in lettuce compared to inorganic forms of iodine and influences the basic chemical composition of lettuce in different ways, [2] iodine from lettuce biofortified with iodoquinolines is bioavailable for laboratory animals, because in rats fed a diet containing this lettuce, the iodine content in selected organs is the highest, and the presence of this lettuce in the diet does not affect the concentration of thyroid hormones, thyroid stimulating hormone and the expression of selected genes, [3] lettuce biofortified with iodoquinolines shows anti-inflammatory effect in the carrageenin-induced paw edema model, as in rats fed a diet containing this lettuce, a decrease in the expression of inflammatory markers, neutralization of oxidative stress by an increase in the activity of antioxidant enzymes and a decrease in the degree of lipid peroxidation are observed that.

Malnutrition caused by insufficient micronutrient supply affects approximately 3 billion people (of which approximately 2 billion are iodine deficient), which is approximately one third of the population. Insufficient iodine intake, one of the world's leading micronutrient deficiencies, leads to a series of dysfunctions called iodine deficiency disorders. In 1993, WHO and UNICEF recommended Universal Salt Iodination as a global strategy to eliminate these disorders by iodizing all salt for human consumption, but in most industrialized countries, excessive salt intake contributes to the development of cardiovascular disease, osteoporosis and even stomach cancer. Therefore, there is a need to find new, alternative strategies for increasing the proportion of iodine in the human diet. One of them is biofortification, i.e. a method of enriching crops with vitamins and /or minerals by using the most appropriate agronomic and biotechnological techniques. The agrotechnical method of biofortification of plants with mineral components is one of the cheapest and, at the same time, the most cost-effective methods of reducing their deficiencies in the diet. In recent years, significant advances in the research and development of biofortified foods have been observed, however, the effectiveness of biofortification in combating elemental deficiency in humans is not yet a fully understood topic, causing controversy among research. Despite the potential of biofortification to increase the nutritional value and yield of crops, more evidence needs to be gathered about its effects on human health while alleviating iodine deficiency. The use of iodoquinolines for plant biofortification may have a positive effect on their health-promoting properties, therefore research is needed on the safety of potential consumers. In addition, potential auxiliaries that will support pharmacotherapy used in the treatment of inflammatory diseases are increasingly being sought. Both iodine and quinoline have anti-inflammatory and antioxidant effects, making iodoquinolines promising compounds for inflammatory studies.

Iodoquinolines are quinoline derivatives that exhibit a broad spectrum of biological activity, including anti-inflammatory, antioxidant, antitumor and antiviral properties. The structure of quinoline has become a template for the design and identification of new anti-inflammatory agents. Quinoline derivatives have the ability to combat several causes of inflammation. These compounds have been patented for the treatment of acute and chronic inflammation, pain and fever (non-steroidal anti-inflammatory drugs; NSAIDs). However, long-term use of NSAIDs is associated with numerous side effects from the gastrointestinal tract, cardiovascular system and kidneys. Therefore, there is a need to develop safer and strengthened natural aids through supplementation/biofortification, supporting pharmacotherapy and alleviating side effects during the treatment of inflammation.