

Nutritional Neuroscience: a green approach from the field to the table for human metabolic and cognitive health

Arabinoxylans (AXOS) are soluble dietary fibers that have important effects on human nutrition as they reduce the glycemic index and the insulin peak of food products of the metabolic syndrome and diabetes. The mechanism of action of the AXOS is still under investigation.

This research project involves a collaboration with the company Heallo s.r.l., which has patented the JAXplus compound, containing high doses of AXOS. JAXplus is obtained through enzymatic hydrolysis of food waste (especially cereals, sugar beets, and exhausted barley threshers). This is done to combat food waste through the recycling of production waste and their enhancement, in a view of circular economy.

In synergy with Heallo s.r.l, various hydrolysis products of food waste will be functionally tested to evaluate, through in vivo functional studies, their effects on both the glycemic index and the insulin resistance in healthy volunteers. At the same time, functional in vitro tests will be performed to understand the cellular and molecular mechanisms involved in the action operated by the AXOS to produce the lowering of the glycemic index.

Recent studies in animal models show how a diet with a low glycemic index exerts neuroprotective effects on the risk/prevention and progression of some neurodegenerative diseases, including Alzheimer's disease. Dysregulation of glucose metabolism has indeed a critical role in the pathogenesis of Alzheimer's disease, at the point that Alzheimer's Disease is considered a type III diabetes. We will then evaluate - through experiments on mouse models of Alzheimer's disease - the effects of oral supplementation with JAXplus on explicit declarative memory, that is a cognitive component particularly impaired in Alzheimer's disease. To this end, both electrophysiological experiments on brain slices, aimed at evaluating synaptic connectivity and plasticity, and in vivo behavioral tests will be performed.