Along with a gradual spread of diet-related diseases in the developed countries, there is a growing importance of "functional food" that represents one of the most essential tools in the fight against these diseases. In addition to the knowledge on the concentration of health-promoting components in the food, the knowledge on the bio-stability during processing and digestion in human gastrointestinal tract is crucial for their effective use.

Besides antioxidants, cereal grains, such as oat and rye, contain sugar polymers, being active in prevention and treatment of heart diseases and diabetes. The health benefits of these polysaccharides, a major component of dietary fiber, are related to their physicochemical properties, controlled by structure and aggregation ability. Polysaccharides consumed as a constituent of cereal-based products, cause an increase in the digesta viscosity of small intestine, which results in lowered cholesterol and glucose levels in the blood. Digesta viscosity is positively related to the chain length of dietary fiber polysaccharides (molecular weight) and their aggregation capability and negatively linked to the activities of enzymes present in the grain that hydrolyze dietary fiber polysaccharides.

It should be stressed that comparatively low hydrolysis degree of polysaccharides leads to significant reduction in their chain length, thus the expected rise in the digesta viscosity, being a consequence of high dietary fiber content in the product, does not occur in that case.

In oat grain, the major fraction of dietary fiber polysaccharides includes: predominating unbranched β-glucans and highly branched arabinoxylans. These arabinoxylans are unique, as they are characterized by two times higher branching degree in comparison to their analogues present in the grains of other cereals. It is ascribed to the rigidity of the polysaccharide chain containing high proportion of units with two substituents that represent a steric barrier for hydrolytic action of arabinoxylan-hydrolysing enzyme (endo-xylanase). The question therefore arises: is it possible that this specific arabinoxylan sub-fraction, resistant against endo-xylanase hydrolytic action, form aggregates with β-glucan, partially "covering" it and blocking accessibility of β-glucan-hydrolysing enzyme (endo-glucanase). The β-glucan chain without any substituents is extremely susceptible to endo-glucanase hydrolytic actions. This could limit β-glucan chain degradation during production of oat products, stabilizing its bio-activity. Currently, there is no available knowledge that can answer to that question.

The research hypothesis of the project assumes the occurrence of associations between highly branched arabinoxylans and linear β-glucan, which physically hinder endo-glucanase accessibility to a substrate and effectively stabilize β-glucan bio-activity level during processing and digestion in the human small intestine.

The project aims to investigate:

- the interactions between native forms of β-glucans and arabinoxylans of oat grain, being extractable under *in vitro* conditions, simulating digestion in the human small intestine,
- their mechanisms based on the native and model systems with combination of certain polysaccharide building sub-fractions,
- and their impact on the level of endo-glucanase activity and extract viscosity of oat grain.

The native β-glucan and arabinoxylan populations will be isolated from oat extracts, including their structural units (arabinoxylan sub-fractions with different branching degree and β-glucan sub-fractions with different molecular size). Polysaccharide preparations will be analyzed in detail with respect to composition and structural features by using advanced analytical techniques. The β-glucan ability to interact with arabinoxylan in the native and model systems will be determined, taking into account the presence of different arabinoxylan substituents, their aggregation ability and the role of co-existing arabinogalactans and protein. The high-performance size exclusion chromatography system coupled with three detectors (HPSEC-MALLS-RI-UV), including laser light scattering detector, will allow for direct observation of occurring aggregates.

The results obtained will represent the significant update of the current knowledge on the mechanisms of β-glucan-arabinoxylan interactions and their influence on quality and health-properties of cereal-based food. In the future they may help to standardize the products with high β-glucan content, supporting the fight against diet-related diseases and ensuring their effective use.