

**Summary of PhD thesis of Katarzyna Kurzepa entitled "The preparation process of novel hydrolysates of natural proteins", performed under the guidance of the late prof. dr. Andrzej W. Lipkowski, supervisor dr. hab. Izabela Witońska.**

Protein hydrolysates derived from protein-rich raw materials of plant and animal organisms are the source of easily assimilable nitrogen. The protein hydrolysates contain short peptides, that can exhibit antimicrobial and immunosuppressive properties. The use of high-protein waste products from the herbal and food industry as raw materials for the preparation of biologically active compounds help to reduce the amount of environmentally harmful bio-waste whose storage and/or disposal is expensive.

The PhD thesis describes the conditions for the digestion of proteins during the process of enzymatic hydrolysis, yeast fermentation, and associated processes. Before the hydrolysis extraction or activation was used to removed ballast substances; this allowed to increase the yield of the hydrolysis and improved physico-chemical properties of obtained peptide products. The type of enzyme and the enzymatic hydrolysis conditions were determined according to the raw material and subsequent application of the obtained products. Hydrolysates containing 70-85% of protein from various materials (peeled fruits and husk of milk thistle, the spinal cord of slaughtered animals, casein) were obtained. Chestnut seeds and whey hydrolysates contained about 15% of protein. Natural proteins hydrolysates contain active substances ballast substances and amino acids responsible for the bitter taste. The study of the different digestion processes of proteins has shown that bitter amino acids – a source of nitrogen, present in protein preparations or derived from fermentation are absorbed by yeast.

Natural antimicrobial peptides are part of the innate immune system of living organisms. From the plant protein hydrolysates peptide fractions were precipitated and analyzed for their microbiological activity against strains of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans*. Individual peptide fractions of protein hydrolysates from milk thistle peeled fruits have a bacteriostatic activity at 0,125-0,0078 ug/ml and fungistatic activity at 0,25-0,125 ug/ml. Peptide fractions of protein hydrolysates from chestnut seeds have fungistatic properties of 0,125-0,062 mg/ml.

The hydrolysis of the spinal cord proteins of slaughtered animals was carried out under conditions similar to those found in the gastrointestinal tract in order to obtain the peptide resistant to digestion. Very similar amino acid sequences of pig and human myelin proteins allowed to use of pig spinal cord hydrolysates as preparations for food tolerance induction in the treatment of multiple sclerosis. In cooperation with Mossakowski Medical Research Centre PAS the potential therapeutic efficacy of the preparations was confirmed in animals models.

In the case of hydrolysis and/or fermentation of casein and whey, the studies aimed at broadening the range of applications of milk fractions that are no longer considered as waste. The caring out of the associated processes allowed to obtain the preparations with an acceptable taste as potential nutraceuticals and functional foods. The use of yeast additionally enriched these preparations in vitamins and trace elements.