

DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Every year doctors diagnose more and more cases of colorectal cancer. It is therefore very important to develop modern dietary treatment methods that are easily accessible, effective and well tolerated by patients and that could be used in research on both new treatments for early stages of colorectal cancer and modern ways of preventing it. Various food ingredients, mainly of plant origin, are becoming increasingly important due to their carcinogenic potential. Beta-glucans have a specific, directional and at the same time very strong effect. These polysaccharides, present in plants and fungi, have several different isomeric forms. Particular attention has been paid to those present in some cereals, especially oat, and several published studies have shown their anti-inflammatory, antioxidant and possibly anti-cancer properties.

The macrophages present in the intestine absorb the low molecular weight 1-3, 1-4-beta-D-glucan delivered with food and this mechanism appears to be responsible for their stimulative effect on the immune system, as shown by our recent studies. Low molecular weight beta-glucans, therefore, appear to be good candidates for an anti-cancerogenic nutrient.

In this project, we plan to further investigate the impact of low molecular weight oat 1-3, 1-4-beta-D-glucan (free of proteins and peptides residues) provided as a dietary supplement in the early stages of colorectal cancer. The assessment of this activity will be based on early markers of colorectal cancer formation.

Colorectal cancer will be stimulated in an animal model (rats) and a sample of 1-3, 1-4-beta-D-glucan will be fed. In biological samples (descending part of colon), epigenetic and metabolic biomarkers of early-stage colorectal cancer, as well as the number and metabolism of the intestinal microflora and selected markers of cell death and cell metabolic stress in colon will be measured. A histopathological analysis of the colon wall will also be performed. Several state-of-the-art techniques will be used, such as flow cytometry, metabolomics and epigenetic analysis, immune imaging, RT-PCR and quantitative analysis of lactic bacteria.

The planned studies will provide new information not only on the low molecular weight 1-3, 1-4-beta-D-glucan anticancer effects but also on the molecular and cellular mechanisms of this effect as well. The social aspect of the planned study is of particular importance as, with the increasing number of new cases, the availability of accessible, well-tolerated nutritional therapy and a better understanding of cancer mechanisms is very valuable.