

The main subject of our studies will focus on newly described estrogen receptor GPER in inflammatory and functional diseases of colon i.e. Le niowski-Crohn's disease (CD) and ulcerative colitis (UC) and irritable bowel syndrome type C and D (IBS-C/D) as well as colorectal cancer (CRC).

Le niowski-Crohn's disease and ulcerative colitis are among the so-called non-specific inflammatory bowel diseases (IBD). This means that the main cause is long-lasting inflammation of colon mucosa. IBD is relatively frequent in Europe. Up to 25 per 100 000 individuals may suffer one of the form of IBD, what in Poland means about 9 000 people. IBS is even more common in society. Epidemiological reports indicate that even up to 20% of the population may suffer from disorders of the digestive system that can be classified as IBS, which in turn means that about 3% of all applications to the GP refers to gastrointestinal disorders related to IBS. Unfortunately, in the case of IBS we do not know the cause of its occurrence, which greatly hinders prevention and treatment. It is pointed out, however, that in the development of IBS, low grade inflammation may be involved. Identification of the mechanisms that cause these diseases, as well as the possibility of effective treatment is also important, because patients with IBD and IBS are suspected to be group with increased risk of colorectal cancer.

The incidence of inflammatory and functional bowel diseases is a heavy burden for the entire healthcare system, particularly in developed countries. Furthermore, the lack of effective treatments is also problematic for patients who often suffer the inconvenience of the illness itself but also are frustrated by the inefficiency of treatment, lack of opportunities for self-realization in personal and professional life.

The aim of the research is to understand the participation of estrogen signaling and attempt to answer the question whether inflammatory and functional diseases of the gastrointestinal tract may predispose to an increased risk of developing colorectal cancer. Estrogens, naturally occurring hormones in the human body, are considered to be factors that modulate inflammation. During the study we plan to assess whether patients with colon diseases including colorectal cancer have noticeable changes of estrogen receptors in colon cells. Estrogen receptors are proteins produced by various cells of the body that allow cells to respond to the appearance of estrogen. Three types of estrogen receptors are known – the canonical ER receptors and described in recent year's receptor GPER. More and more evidence suggests that changes in the level of these receptors may be responsible for the development of many diseases. Our research will focus on the GPER receptor because of its role in our body is much less known.

In addition to the analysis of estrogen receptors in the intestine cells collected from patients with IBD, IBS and tumors of the colon an animal model of induced Crohn's disease will be investigated what allow to determine the impact of GPER receptor switch on and off on the development of the disease. In the search for the mechanisms responsible for differential expression of estrogen receptors in the intestinal pathologies, we will conduct methylation analysis of promoter regions of estrogen receptors and evaluate the expression of microRNA important for GPER receptor and CRC. The latter studies will determine whether the natural epigenetic mechanisms occurring in our body influence the development of colon diseases.