

Data from the Polish National Cancer Registry from 2017 shows that the growth rate of colon cancer in Poland is higher than in other European countries. Despite considerable progress in chemotherapy over recent years, designing an efficient anti-neoplastic therapy is a serious challenge for contemporary oncology. The cytostatic drugs used at present cause many adverse effects that reduce their therapeutic efficacy and dramatically lower patients' quality of life. The search for compounds with alternative mechanisms of action in relation to known anticancer drugs is the leading research aim of modern science and the pharmaceutical industry. The entire oncological world is eagerly awaiting the next substances that will significantly improve treatment effectiveness, positively affect prognosis, patients' life expectancy, and improve quality of life. **The aim of this project is to conduct advanced preclinical studies on MM-129, a new 1,2,4-triazine derivative (MM-129) as a potential anti-cancer drug that may be found applicable in the treatment of patients with colorectal carcinoma.** MM-129 is a compound obtained by synthesis, the chemical structure of which deviates from the structure of currently used anticancer drugs, which makes it a promising subject of planned research. Lack of sufficient knowledge about the tumorigenesis process, the mechanisms of drug resistance, or finally the escape of cancer cells from the immune system is the cause of the uneven and difficult fight against cancer. The phenomenon of cancer cells avoiding immune response discovered in recent years has become the basis for the development of a new, groundbreaking direction in cancer treatment, which is immunooncology. One of the main mechanisms of avoiding an immune attack is the immunosuppressive effect of substances released by cancer cells. We assume that MM-129 may have the ability to inhibit intracellular pathways promoting tumorigenesis, with simultaneous activation of the body's natural immune system, which would undoubtedly make it the first molecule with such a unique effect. Therefore, the present project concerns comprehensive preclinical studies of the new MM-129 compound in the treatment of colorectal cancer. In the initial stage, we will attempt to assess the physicochemical properties (*in vitro*) of MM-129 and the pharmacokinetic parameters in the *in vivo* model. Next, we will analyze acute and chronic toxicity as well as do a broad molecular and biochemical evaluation of the mechanisms responsible for the observed anti-neoplastic activity. The results of our preliminary research are very promising and indicate the high anti-cancer potential of this compound. MM-129 has been shown to strongly inhibit cell viability and DNA biosynthesis, which indicates its high cytotoxic and antiproliferative activity. Furthermore, MM-129 effectively inhibits tumor progression leading to a significant reduction in tumor volume and weight in the animal colorectal carcinoma model. The realization of this project, apart from broadening the knowledge about the mechanisms of action of MM-129, may also have clinical implications and contribute to more effective treatment of patients with colorectal cancer.