

## **Rozdział 8. Streszczenie w języku angielskim**

Colorectal cancer is the third most frequently diagnosed form of cancer. Currently, colorectal cancer is the second most common cancer in Poland in terms of incidence and mortality, with only lung cancer in men and breast cancer in women being more common. Every year it is diagnosed in more than 18,000 people, of whom 11,000 patients die.

Nanotechnology is an interdisciplinary, modern and forward-looking field of knowledge and due to this might be applied in many areas, including medicine. Pharmacoeconomics is a part of health economics, and the main purpose is to evaluate applied pharmacotherapy from an economic perspective. Like nanotechnology, it is categorized as an interdisciplinary field by combining sciences, medical and peri-medical, such as medicine, pharmacology, medical statistics or economics. The aforementioned combination makes it possible to objectively evaluate and analyze the cost-effectiveness of the pharmacological agents used. This serves to determine the relationship between the cost of treatment and the health effects achieved through it.

The purpose of this doctoral thesis was to recognize the impact of the use of solutions based on the dynamically developing field which is nanotechnology on the experimental and pharmacoeconomic aspects of colorectal cancer treatment using new smart drug carriers based on thermoresponsive polymers.

This dissertation is based on a series of coherently thematic publications, the first of which is a review paper reflecting the new opportunities and challenges of colorectal cancer treatment using nanotechnology and personalized medicine, as well as an approximation of the pharmacoeconomic aspects of such solutions, for instance the costs accompanying the entire treatment process. The second paper is an original work, in which the possibilities of using novel polymeric carriers functionalized with folic acid for targeted delivery of 5-fluorouracil (5-FU) in the treatment of colorectal cancer in an *in vitro* model were evaluated.

Studies have shown that encapsulation of 5-fluorouracil in a polymeric carrier significantly modulates its cytotoxicity via improving the compatibility of the cytostatic agents against non-tumorigenic cells. The above leads to the hypothesis that the use of 5-FU delivery systems exhibits a protective effect on normal cells, which might consequently translate into a reduction of chemotherapy side effects, such as bone marrow immunosuppression associated with monocytopenia, acute cardiotoxicity and chronic

intestinal mucositis. In turn, the evaluation of the survival of neoplastic cells after application of the synthesized nanosystems showed a more potent antitumor effect than 5-FU applied in free form, as well as the ability to sensitize tumor cells to 5-FU, despite confirmed resistance to this chemotherapeutic. In addition, the obtained nanosystems containing the encapsulated chemotherapeutic agent possess the ability to induce apoptosis and necrosis in treated cancer cells, including those characterized by a drug-resistant phenotype.

In conclusion, the implementation of new forms of drugs into the pharmaceutical market using nanotechnology solutions and the treatment of patients based on personalized therapy might reduce the direct and indirect costs of the treatment process by increasing the efficiency of therapy and improving the compliance of patients diagnosed with cancer.