

In every organism cell division is controlled by genes and by other cells from the body. If organism lose control of this process cells start to divide without control that eventually can lead to neoplasia development.

Ovarian cancer is the leading cause of death among gynecological malignancies. According to epidemiological data in 2010, 3587 women were diagnosed with ovarian cancer in Poland, and 2547 women died. There are two main reasons of high mortality among ovarian cancer patients. The initial phase of ovarian cancer development may be asymptomatic, making it difficult to detect. In most cases ovarian cancer is diagnosed when the disease is very advanced, which greatly reduces the effectiveness of treatment. Another reason for the high mortality rate is low effectiveness of the treatment. The standard treatment for ovarian cancer is surgical removal of the tumor, followed by chemotherapy to kill cancer cells, which could not be removed during surgery.

Chemotherapy involves the administration of drugs, which, by blocking a wide variety of processes occurring in tumor cells, leads to their death. Unfortunately, cancer cells are able to successfully defend in different ways and limit the effectiveness of chemotherapy. The main cells responsible for drug resistance are cancer stem cells (CSCs). Many of the defense mechanisms are already well known. However, so far, many of them remain unsolved. Particularly the role of substance bulking spaces between cells in the tumor is poorly understood in this process. This substance is called the extracellular matrix (ECM).

Studies on the development of resistance to chemotherapy are carried out on tumor cells grown *in vitro* in culture vessels. This model differs significantly from the conditions prevailing in tumor tissue. It lacks the extracellular matrix and the cells grow loosely and do not form three-dimensional structure characteristic to the tissue.

The aim of this project is to better understand the role of the ECM and CSCs in the resistance of ovarian cancer to chemotherapy and to create a three-dimensional model of the development of resistance, which will reflect conditions in the tumor tissue much better.

This project covers the area of knowledge designated as a medical biology. It involves the application of biology as a basic science to explain the phenomena occurring in the human body during illness - which are of interest for practical science - medicine. The project will apply knowledge from various fields of biology, such as molecular biology - the study of life processes at the molecular level, cell biology - to demonstrate the presence of tested molecules in the cellular structures and histology - the study of the structure and functioning at the tissue level. The results of basic research will be combined with clinical data of patients.

The application of basic science to explain the medical phenomenon - limited effectiveness of treatment in ovarian cancer, will deepen our knowledge about the causes of this phenomenon, which may lead to the introduction of new therapeutics and increase the effectiveness of treatment in the future.