Ovarian cancer is one of the most dangerous cancers. The results of treatment in this disease still remain unsatisfactory in spite of novel therapies introduced recently. Therapy for patients suffering from ovarian cancer in the most of cases is surgery followed by chemotherapy. Most of patients treated with chemotherapy initially respond to such treatment, unfortunately **80% of them will experience recurrence of the disease.** There are no reliable methods allowing to predict patient's response to particular anticancer medication, so majority of patients is treated with the same drug combination, but only part of them will benefit from such treatment. This situation is one of causes why most of ovarian cancer patients, especially those diagnosed with advanced disease will die within five years following the diagnosis. Ovarian cancer is a good example of heterogenic malignancy, what means that in each tumour there are various populations of cells, with different genetic code. In advanced stages of disease we often observe accumulation of fluid in abdominal cavity, called ascites. This fluid was previously considered only as symptom, but now we know that it contains many ingredients playing pivotal role in cancer development and it is called tumour microenvironment. Recently new technical possibilities of growing small tumours, called **organoids,** from tissue samples of patients tumours, in laboratory conditions were introduced. Organoids are known to be much more similar to real tumours that previously using cancer models and allow for experimental drug testing.
The main goal is to investigate the impact of inter-/intra-tumour differences and tumour microenvironment on testing of response chemotherapy in ovarian cancer organoids derived from patients tumours.
Our project is designed to answer following **urgent questions**:

1. Are there any differences in response to chemotherapy between organoids derived from different tumour sites of the same/different patient(s) and what are genetic differences between them?
2. Do exist microenvironmental components influencing organoids response?
3. Do organoids reflect clinical response of ovarian cancer patients?

We will enrol the patients, collect the samples of both tumours and peritoneal fluid. Tissue samples will be used to develop organoids that will be treated with the same chemotherapeutic agents as patient, which was a donor of samples. In particular experiments microenvironmental factors from peritoneal fluid will be added. The response of organoids to treatment will be measured and compared with response of patients that will be clinically followed up. Detailed **genetic investigation** of both tumour tissue samples and organoids will be performed. Additionally, we will investigate peritoneal fluid to identify its **cellular and protein factors that are potentially affecting tumour response** to applied chemotherapy.

We believe that identification of this factors as well implementation of organoids as a tool to predict patients response to chemotherapy has a potential to set **new directions for future research** including clinical trials aimed to develop new effective drug sensitivity tests. Finally, we hope that in the future results obtained in the project will be used to improve the results of ovarian cancer treatment, helping to avoid applying ineffective anticancer drugs.