Soft tissue sarcomas are rare cancers. The main method for treating sarcomas is surgery with wide margins of healthy tissue performed in an experienced sarcoma center. In the past, limb amputation was the treatment of choice. Nowadays, the combination of conservative surgery and radiotherapy has the same efficacy as amputation while saving the affected limb. Unfortunately, sarcomas are often diagnosed in the advanced stages, when tumors are bulky or infiltrate important structures (joints or proximity of nerves or blood vessels). In this case, it is impossible to remove the tumor or there is a very high risk of a surgery without adequate margins. It may lead to leaving the tumor cells and finally regrowth of tumor.

In such clinical situations, radiotherapy and chemotherapy are used. They are aimed at destroying sarcoma cells and making the tumor resectable (possible to be effectively removed). Our center has unique experience in short radiotherapy regimens (five days), but with a much higher dose intensity (radiation dose per single session) than in conventional five week radiotherapy. The biological properties of sarcoma cells and their low or medium radiosensitivity give the rationale to choose this treatment regimen: increasing the single radiation dose causes more damage to the sarcoma cell DNA.

Our investigated treatment consists of three chemotherapy courses that is effective in soft tissue sarcomas and a short radiotherapy regimen with a higher dose per single irradiation. The advantage of such approach is the fact that the patient constantly receives treatment - after the first course of chemotherapy, a five-day radiotherapy begins immediately, and within a few weeks break from radiotherapy to surgery, two more courses of chemotherapy are administered. In conventionally used regimens, no treatment is given within the period between radiotherapy and surgery. Preliminary results of our study suggest high efficacy and good tolerance of this combined treatment, despite locally advanced disease and burdens related to the volume of the tumor itself. Aforementioned results were presented at international oncological conferences.

The future of the management of rare cancers is the individual choice of therapy for the patient. We plan to analyze the tumor samples of 20 study participants, which were collected routinely as a part of diagnostic process and those from the tumor removed during the final surgery, for the number of mutations (also known as tumor mutational burden) and the genomic profile of sarcomas. Additional microscopic, molecular biology and genetics analyses will allow us to identify factors predicting particular sensitivity to the combination of radiotherapy and chemotherapy. In the future we will know for which patients such combination of treatment methods is beneficial and also identify a group of patients who need other effective therapeutic schemes.