Contribution ID: **5** Type: **Poster**

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Monday, 25 October 2021 16:15 (2 hours)

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Radiotherapy is currently the main method of cancer treatment in addition to surgery and chemotherapy. The choice of the right treatment method depends on the tumor type and location in the patient's body. Therefore, it is principal to compare available alternative methods in order to choose the most optimal one. To understand better the effects of ionizing radiation on the tumor and surrounding tissue, it is important to explore and quantify the relationship between energy deposition and initial biological events.
Glioblastoma is the most common and the most malignant and difficult to treat among brain tumors [1]. Two human glioma cell lines which differed in their intrinsic sensitivity to ionizing radiation (radiosensitive M059J and radioresistant M059K) [2] were chosen for preliminary research.
Both of the cell lines were irradiated by a carbon ion beam (12C) of energy 45.3 MeV generated by a U200P cyclotron located at the Heavy Ion Laboratory at University of Warsaw according to the irradiation procedure described previously [3]. To investigate the biological response of the irradiated cells, a colony formation assay was performed.
To obtain the desired doses, the radiation field's parameters and the time of irradiation were estimated by Monte Carlo simulations using the MCNP6.2 code.
Results of the cancer cell's survival fraction after irradiation by carbon ion beam will be compared with the data obtained after irradiation by other high LET (Linear Energy Transfer) and low LET radiation that is planned to perform.

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Session Classification: Poster session