

# Seminar general

## Radiation-induced bystander effects in Chondrosarcoma in a context of hadrontherapy: Proteomic approaches

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Chondrosarcomas are malignant tumors of the cartilage that are chemoresistant and radioresistant to X-rays. This restricts the treatment options essential to surgery. Hadrontherapy with carbon ions (C-ions) presents three major advantages when compared with conventional radiotherapy (X-rays). First, the physics of accelerated particles allows a main dose deposition at the end of the beam track i.e. Bragg peak, reducing the dose in healthy tissues before the tumor, increasing the dose within the tumor and preventing tissues exposition after the tumor. The second advantage of C-ions irradiation is related to the relative biological effect (RBE) of such particle, which allow for the same dose deposit within the tumor to an increased biological effect (2.5 to 3 times) The third advantage of C-ions corresponds to the physical accuracy of accelerated particles, allowing a higher irradiation precision of the tumor volume. According to these three advantages, C-ions should be used more often in the treatment of cancer, especially against cancer resistant to X-rays. However, this kind of treatment platform is not yet fully developed, especially in Europe, and many studies in radiobiology are still needed to allow such treatment. Over the past two decades, considerable evidence has accumulated showing that irradiations can induce a biological response in non-irradiated cells that are in proximity to irradiated cells. This biological effect, named Radiation-induced bystander effect (RIBE), is mainly dependent of the cell type, and treatment (irradiation quality, dose, time of contact...). RIBE is defined (i) to occur in close proximity to irradiated cells, (ii) to induce a biological response in non-irradiated cells, and (iii) this effect induces a cellular response typically associated with direct radiation exposure. While hadrontherapy allows a better precision of the radiation towards the tumor, intercellular communication triggered by the irradiated damaged cells could occur, counterbalancing such physical accuracy of accelerated ions by a biological imprecision, which may represent an important cause for radiation side effects. For this seminar, I will present our recent results on the study of RIBE in a context of chondrosarcoma irradiation, with a special focus on cellular mechanisms and factors involved using proteomic analysis strategies.

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**Zoom & Sala de seminar Prof. Marius Petrașcu (DFN)**