



Workshop Radiotherapy & Mathematics

Title: Biological optimization of radiation therapy treatment planning – from modelling to clinical implementation

Speaker: Iuliana Dasu

Summary: The progress in dose delivery and treatment planning for radiation therapy has opened new opportunities for advanced Intensity Modulated Radiation Therapy (IMRT) optimized on biological bases. In the current physical optimization of IMRT the outcome of the treatment expressed as tumour control and normal tissue complication probabilities does not play an active role but it is indirectly maximized through the optimized dose distribution within the clinical targets and organs at risk. The need for a new approach for the optimization of IMRT was therefore identified and several methods with different degrees of complexity were proposed. This presentation will describe the biological optimization on which the problem formulation is explicitly expressed in terms of maximization of the probability to eradicate the tumour while the adverse reactions in sensitive normal tissues are minimized. It will present the steps taken from modelling to clinical implementation. The new challenges in treatment optimization and individualization using multimodality imaging will also be highlighted and exemplified.