

AbstractID: 4733 Title: A new Monte Carlo Treatment Planning Toolkit for modulated electron radiation therapy (MERT)

Purpose: Investigation of Modulated Electron Radiation Therapy (MERT) in our department using Monte Carlo led to a number of codes that are interacting with each other in order to calculate the final dose distribution. In this work, we present a treatment planning toolkit (TP toolkit) that controls the data flow at each step of the procedure.

Methods and materials: The codes involved in the MERT process are the initial beamlet calculations, beamlet optimization, dose calculation, secondary optimization, leaf sequence, etc. The major drawback of the whole MERT calculation process is that there are several steps until the final dose calculation in the patient and mistakes in the input files are common that lead to erroneous results. Furthermore, all the inputs are written in text and parameters are stated in numbers without any indication of their meaning. The TP toolkit will able the user to plan the treatment and review the results.

Results: The TP Toolkit is written in Java that makes it operational regardless of the operating system. It consists of windows that provide common-style menus and buttons to navigate the user through the edit dialog boxes. The most important feature of the TP Toolkit is its graphical user interface (GUI) and its ability to link programs that are used for the computation and visualization of the dose distributions obtained after each step throughout the treatment planning process. The TP Toolkit can be also be used to create input files for photon beam dose calculations using EGS4/MCSIM using RTP files, intensity maps, blocks or simple rectangular fields.

Conclusions: Since Java is a modern language, it offers advanced tools to create the TP Toolkit and to "glue" different applications to it that allow the user to plan, review and evaluate treatment plans.