

AbstractID: 8473 Title: McGill Monte Carlo Research Platform (MMCTP) for Dose Comparison Studies

Purpose:

To demonstrate recent improvements in the functionality of MMCTP, a radiotherapy research platform GUI, with integrated Monte Carlo (MC) dose calculation submission and dose analysis tools. MMCTP allows for quick MC dose calculations from standard radiotherapy formats. Clinical and MC dose distributions are analyzed under the same platform, which eliminates inherent planning system tool dependent effects.

History:

MMCTP has been internally distributed within the last year. External distribution, which has so far been limited to close contacts, will be open to the public. DICOM-RT plans, which include: images, structures, dose distributions and beam information, have been successfully imported from TPS such as: Eclipse, Corvus and Tomotherapy. MC calculations use the images structures, and beam information to generate a beam and patient model. The GUI is capable of handling the following beam parameters: dynamic wedge, static/dynamic MLC, and static wedge. MC dose distributions are normalized to absolute dose with the beam monitor units and directly compared to the imported clinical dose distributions. The GUI includes a set of built in comparison tools: isodose lines and colour-wash displays in transverse/sagittal/coronal view, DVH calculations, dose difference maps and dose profile graphs. Validation has been extensive and includes profile comparisons between MC and measured data.

Results:

Patient recalculations include a set of: conformal lung and breast patients, gated high dose lung patients, IMRT head and neck patients. Recalculations times vary depending on the number and complexity of beams, size and resolution of patient model. Heterogeneous recalculations reveal differences between planned and delivered dose distributions.

Conclusion:

MMCTP is a flexible research platform for the development of patient specific MC treatment planning for photon and electron external beam radiation therapy. The visualization, dose analysis tools offer extensive possibility for plan analysis and comparison to plans imported from commercial TPS through well-documented protocols such as DICOM-RT.