AbstractID: 5015 Title: MMCTP, a radiotherapy research environment for Monte Carlo and patient-specific treatment planning

Purpose:
To develop a flexible software package, on low cost hardware with the aim of integrating new patient specific treatment planning with Monte Carlo dose calculation suitable for large-scale prospective and retrospective treatment planning studies.

Programming Philosophy:
The *McGill Monte Carlo Treatment Planning* system (MMCTP) is designed as a software environment for the research development of patient specific treatment planning. The design includes a workstation GUI for treatment planning tools, and anonymous access to standard low cost hardware for MC dose calculation.

Results:
Before using MMCTP, treatment plans are converted into the so-called McGill RT format. This new file structure was designed for saving patient plans on the workstation. The current MMCTP features are: (a) DICOM and RTOG imports; (b) transverse/sagittal/coronal slice viewing for contours, CT scans, dose distributions; (c) contouring tools; (d) colour-wash and isodose line display; (e) DVH analysis, and dose matrix comparison tools; (f) external beam editing; (g) thumbnail CT navigation tool; (h) EGS/Beam calculation and XVMC patient transport for photon and electron beams. MMCTP uses a two-step process to generate MC dose distributions. The MC module controls egs/Beam and XVMC calculations. Input files, prepared from the beam geometry, are uploaded and run on the cluster using shell commands. Upon completion of XVMC, the GUI downloads individual dose files.

Conclusion:
The MMCTP GUI provides a flexible research platform for the development of patient specific MC treatment planning for photon and electron external beam radiation therapy. MMCTP uses an internal storage format that is flexible in that it allows for multi-instance multi-modality image information useful in the planning process. The visualization, dose matrix operation and DVH tools offer extensive possibility for plan analysis and comparison to plans imported from commercial treatment planning systems through well-documented image storage protocols such as DICOM.