AbstractID: 6902 Title: Patient-Specific Treatment Planning System for BNCT Based on Dose Calculation Using MCNP

Purpose:
A patient-specific treatment planning system for Boron Neutron Capture Therapy (BNCT) based on dose calculation using MCNP, called BTPS, was developed at Hanyang University, Korea. To facilitate treatment planning for BNCT, overall procedures of the BTPS were designed based on a graphical user interface (GUI) and matched to clinical treatments of BNCT. Appropriate tools automatically associated with MCNP were built-in. To provide optimized irradiation time in treatment by re-calculating absorbed doses with measured boron concentrations and irradiating neutron flux, various tools, which can decrease computation time, were employed into the BTPS.

Method and Materials:
The GUI based BTPS was built with a C++ Builder, and works on Windows. The BTPS reconstructs a 3D voxel phantom from patient's images, and simulates treatment environments including the delineated target, irradiation field, and boron concentrations in tumor/normal tissues with easy manipulations through the GUI. MCNP input with the treatment environments are automatically generated for calculating the absorbed dose or neutron fluxes in the voxel phantom.

Results:
Computation time for calculating the absorbed dose and neutron fluxes in a voxel phantom (17x18x23 cm of 1 cm^3 voxels, boron concentration of 10 ppm in each voxel, and histories of 10 millions) was about 5 minutes by using accelerated tallying techniques in MCNP and a parallel computing system (Pentium IV, 48 nodes). The results from the MCNP run are automatically imported. Total absorbed dose or neutron fluxes are calculated with irradiating neutron flux and treatment time, and displayed as an isodose contour or dose volume histogram.

Conclusion:
Since the BTPS facilitates patient-specific treatment planning for BNCT with efficient computation time, it is expected that the BTPS is applicable to clinical treatments of BNCT.

Conflict of Interest (only if applicable):
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