

Optimized Registering of Film Dosimetry to Calculated Doses for IMRT Quality Assurance

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The purpose of this study is to develop a software for optimized registering of film dosimetry with calculated dose for Intensity Modulated Radiation Therapy (IMRT) quality assurance. The newly developed software consists of a film device driver and the verification of fluence map. A film device driver follows the TWAIN 32 protocol. This driver enables us to easily calibrate and scan the films in any film scanner. The fluence map verification software is programmed by C++, which is suitable for the extension of future work. Taking advantages of that multi platform Qt (Trolltech, Norway) GUI library, we have made it run on Windows and Linux operating systems even Mac OSX. For drawing and viewing the fluence map in 2 and 3D, OpenGL (SGI Corp., USA) is implemented. Both absolute point dosimetry and 3D film dosimetry were performed throughout the IMRT using Clinac 21EX's millennium MLC. With these custom-written software modules, the measured and calculated dose distributions for axial planes were superimposed by coincidence of their origins, followed by comparison of the point doses at all matched positions. Then, with the optimization algorithm the setup errors were recovered. We have developed custom-written software modules for managing dose-distribution files, optimizing the position, calculating dose differences, and printing out the report. Differences between the calculated and measured doses over the 3% criterion could be reduced by 15% after applying the optimization algorithm. Optimization dramatically reduced the difference between measured and calculated dose distributions in all cases investigated.

Keywords : Film Dosimetry, Intensity Modulated Radiation Therapy, Quality Assurance