PATIENT SPECIFIC QUALITY ASSURANCE IN 3D CONFORMAL RADIOTHERAPY: A KYAMCH EXPERIENCE

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Introduction: The goal of three-dimensional conformal radiotherapy (3D-CRT) is to deliver a conformal dose distribution to tumors, while sparing surrounding normal structures. The use of patient specific 3D images in the treatment planning process distinguishes 3D-CRT from conventional radiotherapy. Higher doses of radiation can be delivered to cancer cells while significantly reducing the amount of radiation received by surrounding healthy tissues. Patient’s specific Quality assurance (QA) in radiation therapy is the method used to ensure that the correct amount of radiation is being delivered to the correct location into the patient and ensures that the delivery system is capable of delivering the field as planned.

Methods: The QA of fixed-beam or multiple beams of 3D-CRT treatment generally consists of two major parts: an absolute dose measurement to a reference point, and at least one measured plane of dose distribution.

Point Dose Analysis: The percentage difference between calculated and measured dose is determined, and the QA passes if the difference is within some predetermined threshold (3%, for example). Elekta Synergy Platform Linac, Precise Plan Planning System, 0.6cc ionization chamber of PTW, Unidos electrometer and solid water phantom are used for that purpose.

Planer Analysis: In this part a measured isodose distribution is overlaid on the top of a calculated distribution and the agreement mainly gamma analysis is inspected. This method gives quantitative information on the agreement between the calculated and measured distributions. A 2D array and a solid water phantom from PTW are used for this issue.

Results: For single point dose measurement location, dose was measured for each patient in solid water phantom; the deviation from the calculated value was within the limit (3%) for all the cases except in few cases, where the isocenter of the patent was laying out side the tumor volume. Planner analysis was performed and found that the gamma criteria also were within the limits.

Conclusions: Patient QA is very important in 3D-CRT, especially when high dose radiation is delivered near critical organs at risk. Therefore these tests must be taken into high consideration to avoid any unwanted radiation damage on the patients. If the tests do fail the prescribed criteria other radiation techniques must be thoughtful.

Keywords- 3DCRT, QA, 2D, PTW