

## AbstractID: 6869 Title: Image Quality Enhancement in MVCT Scanning

**Purpose:** TomoTherapy uses Megavoltage CT (MVCT) to verify patient position and alignment prior to treatment and it is usually good enough to verify the patient's position and anatomy prior to treatment. However, sometimes, a greater resolution and contrast in patient images obtained by the MVCT scan would be beneficial in verifying patient anatomy and set-up. The effects of changing different machine parameters and consequently the signal to noise ratio (SNR) had on MVCT image quality and resolution were studied.

**Method and Materials:** The machine parameters were changed in two ways and their effects on MVCT image quality were studied, first by imaging with different doses, and then with different beam energies. A cylindrical phantom with a resolution plug (different size holes) was scanned. The machine pulse amplitude control (PAC) value was varied in intervals to adjust delivered dose and the resulting images were analyzed. CTDI measurements were then made at each of the varying PAC values. A Catphan phantom was imaged to measure low contrast visibility, uniformity, and spatial resolution. Next, the injector current (INJI) was changed to modify the MVCT beam energy. The cylindrical phantom was scanned again and the Catphan phantom tests were repeated.

**Results:** Increasing the PAC value leads to an increase in dose. In observing the images that were taken, it can be seen that the resolution and quality of the image improves as the PAC value is increased. Also the low contrast visibility and uniformity of the images improve. The images were not noticeably improved as much for changes to INJI as measured visually or by imaging tests.

**Conclusion:** Slightly higher dose during a MVCT scan can improve the image quality and resolution for the TomoTherapy system. These observations will be used in future investigation of more complex imaging tasks to improve MVCT imaging.