

AbstractID: 5738 Title: Mega-Voltage CT Image: An attempt to enhance image quality

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, 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 that changing the MVCT dose and consequently the signal to noise ratio (SNR) had on MVCT image quality and resolution were studied. **Method and Materials:** A "cheese" phantom with a resolution plug (different size holes) was scanned. The machine pulse amplitude control (PAC) value was varied in intervals from 2.22 to 3.34 to adjust delivered dose and the resulting images were analyzed. The dose was measured with an A1SL ion chamber at the clinically used PAC value of 2.78 to be 2 cGy, 0.4 cGy at a Pac value of 2.22 and 3.8 cGy at a PAC value of 3.34. **Results:** Increasing the PAC value leads to an increase in both dose and energy. 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. When comparing the MVCT image taken at the normal PAC value of 2.78 and an increased PAC value of 3.34, the smaller diameter density plug holes can be seen more clearly, the contrast between the holes and the cheese phantom are more sharply defined, and the holes appear more concentric for the image taken at PAC 3.34. **Conclusion:** Slightly higher dose during an 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. **Conflict of Interest:** Main author is an employee of TomoTherapy, Inc.