

AbstractID: 14151 Title: Measuring Thyroid Dose for a Multi-Slice CT scanner with OSL, TLD, and ImPACT in an Anthropomorphic Phantom and Teenage patients

Purpose: To estimate thyroid dose from multi-detector CT Head and Neck scans in an Anthropomorphic phantom using TLDs, OSLs, and the Monte Carlo-based ImPACT software, and to compare the results to OSL doses obtained from teenage patients.

Methods and Materials: Five TLD chips were inserted into each of the three holes surrounding the thyroid gland in the 9th slice of a Rando phantom. Four InLight/OSL nanoDot (Landauer Inc.) dosimeters were taped on the phantom surface (anterior, laterals, and posterior of the 9th slice) which was then positioned for head and neck scans on a 16-slice CT scanner. A standard axial head scan was used followed by a helical neck scan. ImPACT software was used to determine the contribution of each scan to the total thyroid dose. Clinical doses were obtained from nanoDots which were placed on the skin over the thyroids of pediatric patients (ages from 15 to 17 y/o).

Results: Average dose of all TLDs was 25.3 mGy. The total thyroid dose as calculated by ImPACT for both scans was 25.2 mGy. OSL dosimeters in the phantom gave the following readings: 40.1, 39.7, 39, and 32.8 mGy for anterior, left lateral, right lateral, and posterior positions, respectively. The average dose from the OSL placed on the patients' necks was found to be 37.5 mGy.

Conclusion: The thyroid dose measurements obtained by using TLDs in a Rando phantom were similar to the dose calculated with the ImPACT software ($p = 0.8$). There was also good agreement between the values of the OSLs placed on the necks of the phantom and of three subjects. Preliminary results show the neck OSL readings overestimating the thyroid dose by a factor of 1.5. Results will be presented with a larger number of patient data and a relationship between surface and thyroid dose will be explored.