

ABSTRACT

This study aims to assess the effectiveness of a Silicone Rubber-Copper (SR-Cu) thyroid shield in reducing radiation dose by comparing the dose reduction achieved using the SR-Cu shield and analyzing the quality of images produced during CT examinations with the SR-Cu shield, considering the SNR value. The thyroid shields are made from SR-Cu with Cu percentages of 0%, 5%, 10%, 15%, and 20%. The thyroid shield positioned over the anthropomorphic neck of the phantom. Scanning was performed using a GE 128-slice CT scanner with fixed tube current of 150 mA and tube current modulation (TCM). The elasticity of thyroid shields was tested using an universal testing machine (UTM). The ability of thyroid shields for dose reduction was measured using a 10X6-3CT Radcal detector, and quality of the resulted images was characterized with metric of signal-to-noise ratio (SNR) at the anterior, posterior, and lateral areas of the neck area of anthropomorphic phantom. It is found that the elasticity of the thyroid shields increased from 0.09 to 0.12 N/mm² for Cu percentages from 0 to 20%. The measured dose decreased as the percentage of Cu increased. 20% of SR-Cu was able to reduce the dose by 32.4% for the fix tube current. The TCM approach reduced the dose by 44.5%. However, the dose reduction achieved with the SR-Cu-based shield was lower than that of the TCM approach. It was found that the application of the thyroid shield did not significantly reduce image quality, and no artifacts were observed. The highest SNR, 3.84, was observed in the image with 20% SR-Cu, while the SNR value using the TCM approach was 3.59. Therefore, the image quality with the SR-Cu shield is higher than that achieved with the TCM approach.

Keywords: *SR-Cu thyroid shield, Tube Current Modulation (TCM), dose absorption, image quality, Computed Tomography*