ABSTRACT

Computed tomography (CT) has grown rapidly over time and is widely used by the public, with some patients even having repeated scans. However, CT has a hurdle in terms of reducing dose while maintaining CT image quality. CT quality evaluation can be handled in several ways, one of which is low contrast detectability. Low contrast detectability is affected by CT reconstruction. Thus, this study aims to compare the low contrast detectability of DLIR and ASIR-V images using 2-AFC. Low-contrast objects obtained from module 610-06 of the AAPM CTPerformance phantom were exposed with a GE Revolution Apex CT using three dose variations of 40.75mGy, 48.9mGy and 57.05mGy. Each dose was reconstructed using DLIR (low, medium, and high levels) and ASIR-V (levels 0, 20, 40, 60, 80, and 100%). The question bank was formed as multiple choice using the AFC method containing 1 correct answer (3mm object) and 1 incorrect answer (background), with a total of 10 questions for each data, resulting in a total of 270 questions obtained for each observer. Seven medical physicist observers and three radiology specialist observers were asked to rate the question bank provided. The results showed that dose and reconstruction level (ASIR-V and DLIR) affect low contrast detectability, so the higher the dose, the easier it is for the observer to identify objects from the background. Meanwhile, increasing the reconstruction level causes the detection of low-contrast objects to become easier. Overall, the lowest detectability was obtained for all human observers (medical physicist and radiologist) at a dose of 40.75mGy with an ASIR-V level of 0% (score around 80%). On the other hand, the highest detectability evenly at DLIR was able to get optimal scores (100%) at all $CTDI_{vol}$ doses and DLIR levels. Based on these results, DLIR outperforms ASIR-V in the aspect of low contrast detectability of various doses and reconstruction levels so that DLIR outperforms ASIR-V when using low doses.

Keywords: *Low Contrast Detectability, DLIR, ASIR-V, AFC, $CTDI_{vol}$.*