

## ABSTRACT

Cancer is one of the most lethal diseases, capable of causing severe damage to human organs. The increasing use of CT scans in children raises concerns about the adverse effects of radiation on children's health, particularly the potential risk of cancer that may develop later in life. Phantoms can serve as substitute objects in dose optimization studies for CT scans. However, commercially available radiological phantoms must be imported from manufacturing countries at high costs. This study aims to develop a phantom that can represent pediatric cancer cases at a more affordable price. This research used PMMA (Polymethyl Methacrylate) as a substitute for soft tissue, polyurethane foam for lung tissue, and calcium carbonate for rib bones. Cancer/nodule cases were represented by beeswax and paraffin. Phantom validation was performed using IndoQCT software, employing parameters such as *CT number* (HU), Signal-to-Noise Ratio (SNR), and (CNR). The results showed that the HU, SNR, and CNR values of the substitute materials used in the phantom closely approximated the imaging values of patients with cancer/nodules. Beeswax exhibited HU values ranging from -240.51 to -108.05, SNR from -6.48 to -0.84, and CNR from 2.95 to 39.53. For paraffin, the *CT number* values ranged from -206.21 to -91.93, SNR from -3.76 to -0.85, and CNR from 4.03 to 34.43. Patient data revealed *CT number* values ranging from -159.96 to -120.08, SNR from 3.7 to 5.04, and CNR from 8.52 to 45.97. Each type of cancer exhibits different *CT number* values; in this particular case, the patient's *CT number* values were closer to those of paraffin. Additionally, the materials used in this study were more economical and readily available, facilitating the production of radiological phantoms.

Keywords: Pediatric, Kanker, Chest *Phantom*