Tingkat Kinerja, Dosis Radiasi Dan Kualitas Citra *Computed Tomography Scanner* (CT Scan) Pada Mode Pemeriksaan Kepala

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Abstrak

Telah dilakukan penelitian pada CT *single slice* (SSCT), CT 16 – *slice* dan CT 64-*slice* untuk menganalisis tingkat kinerja, dosis radiasi dan kualitas citra. Proses penelitian dimulai dengan pengukuran tingkat kinerja dan dosis radiasi menggunakan seperangkat multimeter dan fantom CTDI kepala. Proses berikutnya adalah pengukuran kualitas citra menggunakan fantom Gammex ACR 464. Hasil penelitian menunjukkan bahwa simpangan maksimum akurasi kV dari SSCT berkisar 1,35-3,40%, CT 16-slice berkisar 0,91-3,88% dan CT 64-slice berkisar 0,01-1,51%. HVL pada 120 kV semua tipe CT diatas batas keberterimaan (3,8 mmAl). Akurasi keluaran radiasi 120 kV/100 mAs dan koefisien linearitas (CL) SSCT berkisar 21,52-30,67 mGy dan 0,017 - 0,299, CT 16-*slice* berkisar 22,37-28,14 mGy dan 0,008 - 0,018 dan CT 64-*slice* berkisar 12,27 mGy - 17,36 mGy dan 0,004 - 0,010. Simpangan baku pola sebaran radiasi $CTDI_{100}$ dari SSCT berkisar 5,04 – 6.98, 16-slice berkisar 2.78 – 5.46 dan 64-slice berkisar 1.86 - 2.00. Hasil pengukuran kualitas citra semua CT Scan, respon linearitas berada pada kurva kemiringan (R) diatas nilai acuan ($R \leq 0.99$). Homogenitas akurasi CT number, keseragaman noise dan keseragaman CT_{pusat} dan CT_{tepi} berada pada rentang keberterimaan (± 5 HU). *Contrast to Noise Ratio* (CNR) berkisar antara 1,0 – 2,1 sesuai dengan kriteria keberterimaan ($CNR \geq 1.0$). Serta hasil evaluasi resolusi spasial berkisar antara 6 - 7 lp/cm sesuai dengan kriteria keberterimaan (≥ 6 lp/cm).

Kata kunci : SSCT, MSCT, Tingkat Kinerja, Dosis Radiasi, Kualitas Citra

Performance Level, Radiation Dose and Image Quality of Computed Tomography Scanner (CT Scan) In Head Inspection Mode

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Abstract

Research on performance level, radiation dose and CT scan image quality has been done. The process of measuring the level of performance and dose of radiation using a set of multimeter and head CTDI fantom to obtain tube voltage accuracy, HVL, linearity dose and $CTDI_{100}$. Evaluation of image quality using fantom Gammex ACR 464. The data obtained is normalized to obtain constant image noise. The results showed that the maximum deviation of kV accuracy from SSCT ranged from 1.35-3.40%, CT 16-slice ranged from 0.91-3.88% and CT 64-slice ranged from 0.01 to 1.51%. HVL at 120 kV all CT types above the acceptability limit (3.8 mmAl). The accuracy of radiation output of 120 kV/100mAs and linearity coefficient (CL) of SSCT ranged 21.52 - 30.67 mGy and 0.017 - 0.299, CT 16-slice ranged 22.37 - 28.14 mGy and 0.008 - 0.018 and CT 64- slices range 12.27 - 17.36 mGy and 0.004 - 0.010. The standard deviation of $CTDI_{100}$ radiation pattern from SSCT ranged from 5.04 to 6.98, 16-slices ranging from 2.78 to 5.46 and 64-slice ranging from 1.86 to 2.00. Result of image quality measurement, linearity response show that slope curve (R) all CT Scan above reference value (≤0,99). Result of image quality measurement of all CT Scan, linearity response is on slope curve (R) above reference value ($R \leq 0.99$). The homogeneity of CT number accuracy, noise uniformity and uniformity of CT_{center} and CT_{edge} are in the acceptance range (± 5 HU). Contrast to Noise Ratio (CNR) ranges from 1.0 - 2.1 according to acceptance

criteria (CNR ≥ 1.0). And the result of evaluation of spatial resolution ranged from 6 - 7 lp/cm in accordance with acceptance criteria (≥ 6 lp/cm).

Keywords: SSCT, MSCT, Performance Level, Radiation Dose, Image Quality

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