

# **Penentuan Quality Control (QC) Resolusi Spasial pada Citra CT Scan dengan Menggunakan Point Spread Function (PSF) dan Line Spread Function (LSF)**

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## **Abstrak**

Computed Tomography (CT Scan) merupakan salah satu modalitas perangkat sinar X yang digunakan dalam radiodiagnostik, sehingga sangat perlu dilakukan Quality Control (QC). Pada penelitian ini mengkaji tentang uji kualitas citra CT Scan dengan memperhatikan parameter resolusi spasial dan menggunakan metode perhitungan dari citra digital. Serta pengaruh faktor ekspos (tegangan dan arus) terhadap kualitas citra yang dihasilkan. Penelitian ini menggunakan Multislice CT (MSCT) 128 slice, serta menggunakan AAPM CT Performance Phantom. Phantom dipindai dengan memberikan variasi faktor ekspos (80, 100, 120 kV dan 50, 100, 150, 200, 250, 300, 350, 400, 450, 500 mA). Penentuan nilai resolusi spasial diperoleh dari nilai Full Width at Half Maximum (FWHM) dari grafik Line Spread Function (LSF) dan Point Spread Function (PSF). Hasil penelitian menunjukkan bahwa semakin tinggi tegangan yang diberikan, maka nilai FWHMnya semakin kecil yang menunjukkan kualitas citra semakin baik. Dimana ketika tegangan 80 kV nilai FWHMnya 0.32419 mm, 100 kV (0.32722 mm) dan 120 kV (0.31902 mm). Citra terbaik diperoleh ketika phantom dipindai dengan parameter faktor ekspos 120 kV dan 250 mA. Serta metode ini mampu mendeteksi resolusi spasial hingga level ke-5 (diameter lubang 0.75 mm), sedangkan secara visual hanya mampu mendeteksi hingga level ke-3 (1.25 mm). Dari hasil penelitian kualitas citra yang dihasilkan dan telah dibandingkan dengan peraturan West Austr Compliance Testing Protocol 2006, kualitas citranya masih bagus karena diameter lubang yang terbaca  $\leq 1$  mm, sehingga perangkat CT Scan masih layak untuk digunakan.

**Kata kunci:** CT Scan, Resolusi Spasial, Line Spread Function (LSF), dan Point Spread Function (PSF)

# **Determination of Spatial Resolution Quality Control (QC) on CT Scan Image by Using Point Spread Function (PSF) and Line Spread Function (LSF)**

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## **Abstract**

Computed Tomography (CT scan) is one of the X-ray modalities used in the radiodiagnostic, thus the Quality Control (QC) is necessary needed. This study focused on the image quality test of CT Scan by considering the spatial resolution parameters and using calculation method of the digital image. Also the effect of exposure factors (voltage and electric current) on image quality. This study using multislice CT (MSCT) 128 slice and AAPM CT Performance Phantom. Phantom scanned with the variation of exposure factors (80, 100, 120 kV and 50, 100, 150, 200, 250, 300, 350, 400, 450, 500 mA). The determination of spatial resolution value derived from the value of Full Width at Half Maximum (FWHM) of the Line Spread Function (LSF) and Point Spread Function (PSF) graphics. The results showed that the higher voltage applied, smaller the value of FWHM which shows better image quality. When a voltage of 80 kV the value of FWHM of 0.32419 mm, 100 kV (0.32722 mm) and 120 kV (0.31902 mm). The best image obtained when the phantom scanned with parameters of exposure factors 120 kV and 250 mA. And also this method is able to detect spatial resolution

up to the 5 level (hole diameter 0.75 mm), whereas it is only up to 3th level (1.25 mm) visually. The image quality on this study has been compared with the rules of West Austr Compliance Testing Protocol 2006, and it is proved that the image quality is still good, thus the CT Scanner is still feasible to use.

**Keywords:** CT Scan, Spatial Resolution, Line Spread Function (LSF) and Point Spread Function (PSF)

**Pembimbing Akademik**

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