PENGARUH FILTER ALUMINIUM INDUSTRI TERHADAP KUALITAS CITRA MAMMOGRAFI TIPE *GE TOMOSYNTHESIS*

SKRIPSI

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ABSTRAK

Telah dilakukan penelitian tentang pengaruh penggunaan filter aluminium industri terhadap kualitas citra mammografi tipe *Ge Tomosynthesis*. Penelitian ini bertujuan menganalisis pengaruh penggunaan filter aluminium terhadap nilai *Half Value Layer* (HVL) dan kualitas citra pada sistem mammografi digital tipe *GE Tomosynthesis*. Penelitian dilakukan di Instalasi Radiologi RSUP Dr. Ahmad Mochtar Bukittinggi dengan variasi ketebalan filter aluminium (0,085; 0,170; 0,510; dan 1,000) mm. Pengukuran dilakukan pada tegangan tabung (22, 26, 30, dan 34) kVp dengan arus–waktu eksposi 50 mAs dan 63 mAs. Metode yang digunakan untuk mengambil MGD pada konsol dilakukan secara tidak langsung, sebagai dasar perhitungan HVL, serta evaluasi kualitas citra menggunakan fantom ACR 18-220 sesuai standar BAPETEN No 2 tahun 2022. Nilai HVL berada pada rentang (0,250–0,313) mmAl dan meningkat seiring kenaikan tegangan tabung, sedangkan variasi mAs tidak berpengaruh signifikan. Jika dibandingkan dengan standar kualitas berkas sinar-X pada mammografi kombinasi target/filter W/Rh (≥ 0,30 mmAl), nilai HVL pada tegangan rendah masih berada di bawah batas, sementara pada tegangan lebih tinggi telah memenuhi kriteria. Evaluasi kualitas citra menunjukkan seluruh citra fantom memenuhi kriteria kelulusan. Dengan demikian, penggunaan filter aluminium efektif menurunkan dosis radiasi, namun pada ketebalan tertentu terjadi penurunan kualitas citra, meskipun masih memenuhi kriteria kelulusan.

Kata kunci: filter aluminium, *GE Tomosynthesis*, *Half Value Layer* (HVL), kualitas citra, *Mean Glandular Dose* (MGD).

THE EFFECT OF ALUMINUM FILTER ON HALF VALUE LAYER AND IMAGE QUALITY OF GE TOMOSYNTHESIS MAMMOGRAPHY

ABSTRACT

A study has been conducted to analyze the effect of industrial aluminum filter usage on the image quality of GE Tomosynthesis mammography. This study aims to evaluate the influence of aluminum filters on the Half Value Layer (HVL) and image quality in a digital mammography system. The research was carried out at the Radiology Installation of RSUP Dr. Ahmad Mochtar Bukittinggi using aluminum filters with thickness variations of (0.085, 0.170, 0.510, and 1.000) mm. Measurements were performed at tube voltages of (22, 26, 30, and 34) kVp with exposure settings of 50 mAs and 63 mAs. An indirect method was applied by utilizing Mean Glandular Dose (MGD) values obtained from the system console as the basis for HVL calculation, along with image quality evaluation using the ACR 18-220 phantom in accordance with BAPETEN Regulation No. 2 of 2022. The HVL values ranged from (0.250 to 0.313) mmAl and increased with higher tube voltage, while variations in mAs did not show a significant effect. Compared to the X-ray beam quality standard for mammography with a W/Rh target/filter combination (≥ 0.30 mmAl), HVL values at lower tube voltages were below the threshold, whereas those at higher voltages met the criteria. The image quality evaluation indicated that all phantom images met the acceptance criteria. Therefore, the use of aluminum filters effectively reduces radiation dose; however, at certain thicknesses, a decrease in image quality was observed, as indicated by the reduced visibility of fibres and specks, although the images still met the acceptance criteria.

Keywords: aluminum filter, GE Tomosynthesis, Half Value Layer (HVL), image quality, Mean Glandular Dose (MGD).