Karakteristik interaksi radiasi material fantom berbahan dasar lilin dan karbon aktif: Studi hamburan balik rentang diagnostik = Characteristics of interaction radiation of phantom with material clay and activated carbon based: A study of back scatter radiation within diagnostic range

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Abstrak

Penelitian ini bertujuan untuk memperoleh lima komposisi bahan phantom ekuivalen jaringan dan membahas karakteristik interaksi radiasi phantom ekuivalen jaringan dengan bahan penyusunnya, yaitu campuran lilin batik (lilin gondorukem, lilin cecek, lilin parafin, dan lilin lebah) dan karbon aktif. . Komposisi yang diperoleh terdiri dari lima variasi bahan phantom ekuivalen jaringan, antara lain white matter brain (20% cecek wax, 20% karbon aktif, dan 60% gondorukem wax), grey matter brain (16% cecek wax, 16% karbon aktif, 68 % lilin gondorukem), otot (10% lilin cecek, 10% karbon aktif, 80% lilin gondorukem), lemak (10% lilin cecek, 10% karbon aktif, 80% lilin parafin), dan hati (40% tepung beras, 60 % lilin). Masing-masing bahan dibuat kemudian diuji menggunakan mesin x-ray dan dosimeter ruang pengion untuk mendapatkan nilai dosis permukaan masuk (ESD) dan faktor hamburan balik (BSF) pada kondisi sinar standar Radiation Quality Attenuated Beam 5 (RQA 5). Pengukuran ESD dan BSF dilakukan dengan variasi ketebalan phantom dari 6 cm sampai 10 cm dan variasi lapangan 20 cm × 20 cm dan 25 cm × 25 cm. Nilai rata-rata ESD dan BSF cenderung meningkat pada ketebalan 6 cm hingga 8 cm untuk jaringan otak materi putih, otak materi abu-abu, otot, lemak, hati di bidang 20 cm × 20 cm masing-masing (5,31% ± 1,73%) ; (2,86% ± 2,01%); (1,81% ± 0,79%); (0,62% ± 2,24%); dan (1,34% ± 2,2%). Sedangkan bidang 25 cm × 25 cm mengalami peningkatan (4,86% ± 0,67%); (6,03% ± 5,25%); (0,98% ± 1,31%); (12,42% ± 5,71%); dan (3,81% ± 1,16%). Nilai ESD dan BSF untuk masing-masing jaringan dijenuhkan pada ketebalan 10 cm.

.....This study aims to obtain five tissue equivalent phantom compositions and discuss the interaction characteristics of tissue equivalent phantom radiation with its constituent materials, namely a mixture of batik wax (gondorukem wax, cecek wax, paraffin wax, and beeswax) and activated carbon. . The composition obtained consisted of five variations of tissue equivalent phantom materials, including white matter brain (20% cecek wax, 20% activated carbon, and 60% gondorukem wax), gray matter brain (16% cecek wax, 16% activated carbon, 68 % gondorukem wax), muscle (10% cecek wax, 10% activated carbon, 80% gondorukem wax), fat (10% cecek wax, 10% activated carbon, 80% paraffin wax), and liver (40% rice flour, 60 % wax). Each material was made and then tested using an x-ray machine and an ionizing chamber dosimeter to obtain the value of the incoming surface dose (ESD) and backscattering factor (BSF) under standard beam conditions of Radiation Quality Attenuated Beam 5 (RQA 5). ESD and BSF measurements were carried out with variations in phantom thickness from 6 cm to 10 cm and field variations of 20 cm × 20 cm and 25 cm × 25 cm. The mean values of ESD and BSF tended to increase at 6 cm to 8 cm thickness for white matter brain tissue, gray matter brain, muscle, fat, liver in the areas of 20 cm × 20 cm respectively (5.31% ± 1 ,73%); (2.86% ± 2.01%); (1.81% ± 0.79%); (0.62% ± 2.24%); and (1.34% ± 2.2%). While the area of 25 cm × 25 cm experienced an increase (4.86% ± 0.67%); (6.03% ± 5.25%); (0.98% ± 1.31%); (12.42% ± 5.71%); and (3.81% ± 1.16%). ESD and BSF values for each tissue were saturated at a thickness

of 10 cm.