

Backscatter

In physics, backscatter (or backscattering) is the reflection of waves, particles, or signals back to the direction from which they came. It is a diffuse reflection due to scattering, as opposed to specular reflection like a mirror. Backscattering has important applications in astronomy, photography and medical ultrasonography.

Sakamoto et al., assessed the radiation backscatter doses associated with sheet and mesh type titanium plates and hydroxyapatite (HAP) samples (porosity, 35%, 50%, and 85%). The samples were irradiated with 6 MV and 10 MV photon beams from a linear accelerator. Measurements were obtained using an ionization chamber and radiochromic films cut from the same batch.

At 6 MV, the titanium sheet showed the highest peak for backscattered radiation, followed by (in decreasing order) HAP30%, HAP50%, titanium mesh, and HAP85%. At 10 MV, HAP30% showed the highest peak, followed by HAP50%, titanium sheet, titanium mesh, and HAP85%. The peaks were at different depths in the titanium and HAP samples. The thickness of the human scalp is approximately 7 mm; therefore, measurements were obtained 0-7 mm above the implants to assess the likely dose on the scalp. A comparison of the maximum dose on the scalp showed the titanium sheet had the highest dose at both 6 and 10 MV.

The backscatter dose differed with the density of the material and the backscatter depth was different for each material. Advances in knowledge: Ulcer formation by the radiotherapy after brain tumor depends on not only radiation but also implant material. Therefore, the density and type of implant material should be considered when planning radiotherapy and selecting bone reconstruction materials ¹⁾.

¹⁾

Sakamoto Y, Koike N, Takei H, Ohno M, Miwa T, Yoshida K, Shigematsu N, Kishi K. Influence of backscatter radiation on cranial reconstruction implants. Br J Radiol. 2016 Dec 7:20150537. [Epub ahead of print] PubMed PMID: 27925774.

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