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Methods for Reducing Metal Artifacts in Computed Tomography

Metal artifacts are common in clinical images. Many methods for artifact reduction have been published to overcome this problem. In this work, three well-known methods and a new one were evaluated, compared and enhanced to achieve artifact suppression (linear interpolation (LI), normalized metal artifact reduction (NMAR) and Frequency split metal artifact reduction (FSMAR)). Furthermore, a new method, based on edge-preserving smoothing via L0 Gradient Minimization filter, is presented and compared in results respect the above mentioned methods. Artifacts are caused by metal hips and dental implants. Image quality was evaluated by two experienced radiologists completely blinded to the information about if the image was processed or not to suppress the artifacts. They graded image quality in a five points-scale, where zero is an index of clear artifact presence, and five, a whole artifact suppression. A comparison of the results was carried out. The new method had the best results and it was statistically significant respect to the other tested methods ($p < 0.05$). This new method has a better performance in artifact suppression and tissue feature preservation.

Primary authors: Mr RODRIGUEZ GALLO, Yakdiel (Universidad Central Marta Abreu de las Villas, Cuba.); Dr OROZCO-MORALES, Ruben (Universidad Central Marta Abreu de las Villas, Cuba.); Prof. PEREZ-DIAZ, Marlen (Universidad Central Marta Abreu de las Villas, Cuba.)

Presenter: Mr RODRIGUEZ GALLO, Yakdiel (Universidad Central Marta Abreu de las Villas, Cuba.)

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