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Metal Artifact Reduction using virtual monochromatic imaging with dual-energy CT[1] ALAN LI, University of North Carolina at Chapel Hill, OTTO ZHOU RESEARCH GROUP TEAM — Diagnostic CT scanners use polychromatic x-ray beams. The presence of materials with a high atomic number causes metal artifacts. Virtual monochromatic images(VMIs) generated from dual-energy CT(DECT) reduce such artifacts. X-ray attenuation coefficients can be represented as a linear combination of a Compton scatter and a photoelectric component, which can be modeled using two basis materials at a given energy. For DECT, high and low energy images can be represented similarly to get two linear equations for each voxel, then by solving which, one can obtain the density maps for two basis materials and calculate monochromatic images. DECT images for a head phantom with a large metal bead were collected, and VMIs were generated. Then metal artifacts were evaluated with Metal artifact index(MAI) and qualitatively. For VMI with energy$\geq$100keV, metal artifacts were noticeably reduced visually. A maximum drop by a factor of 5 was observed in MAI at 150keV compared to original images. However, the contrast to noise ratio decreased across the VMI as the energy increased. VMI technique was implemented using DECT images and was shown to be effective in reducing metal artifacts in a head phantom.

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