

Metal artefact reduction algorithms prevent false positive results when assessing patients for cardiac implantable electronic device infection

Fozia Z. Ahmed, MBChB, MRCP,^{a,b} Jacqueline James, MBChB, MD, MSc, FRCP,^c Deborah Tout, MSc, MIPEM,^c Parthiban Arumugam, MBBS, MRCP,^c Mamas Mamas, BM, BCh, DPhil, MRCP,^{a,b} and Amir M. Zaidi, MBChB, FRCP^a

^a Department of Cardiology, Manchester Heart Centre, Central Manchester University Hospitals NHS Foundation Trust, Manchester, United Kingdom

^b Cardiovascular Institute, University of Manchester, Manchester, United Kingdom

^c Department of Nuclear Medicine, Central Manchester University Hospitals NHS Foundation Trust, Manchester, United Kingdom

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Software-based metal artefact reduction (MAR) techniques are available to reduce artefacts from cardiac implantable electronic devices (CIED) in the CT data. The impact of disabling MAR techniques on quantification of 18F-FDG uptake around the CIED has not been examined. We consider the importance of enabling MAR in patients with suspected CIED infection to prevent inaccuracies in quantification of tissue tracer uptake on the attenuation-corrected PET images.

Key Words: Molecular imaging • PET/CT imaging • fluorine-18

Metallic implants produce streak artefacts that can significantly degrade computerised tomography (CT) images by obscuring anatomical structures and pathology (Figure 1A). In positron emission tomography (PET), these artefacts may also propagate to CT-based attenuation maps causing inaccuracies in the quantification of tissue tracer uptake in the attenuation-corrected (AC) PET images. 18F-FDG PET/CT is currently being evaluated in patients with suspected CIED infection, with both visual and semiquantitative measures of 18F-FDG uptake around the pectoral device reported to be of value in differentiating between infection and inflam-

mation.¹ Software-based metal artefact reduction (MAR) techniques are available to reduce artefacts from the CIED in the CT data. The impact of MAR on quantification of 18F-FDG uptake around the CIED pulse generator has not been evaluated.²

In the UK, reimbursement for non-oncological FDG PET/CT is provided for examinations that fall within the evidence-based indications for PET-CT.³ In this case of a patient with pain in the region of the CIED generator pocket, increased 18F-FDG uptake was noted around the device pocket on the AC PET images reconstructed with MAR disabled (Figure 1B). However, this increase was not apparent on the non-AC images (Figure 1C). Reconstructing the PET data with MAR enabled confirmed the absence of increased activity in relation to the device (Figure 1D). Studies using a torso phantom with CIED/pacing leads and typical patient FDG activity verified these findings.⁴ To conclude, when the region of interest is the CIED, MAR algorithms should be enabled to reduce the risk of erroneously increased tracer uptake, which may inaccurately infer the presence of infection or inflammation.

Reprint requests: Fozia Z. Ahmed, MBChB, MRCP, Department of Cardiology, Manchester Heart Centre, Central Manchester University Hospitals NHS Foundation Trust, Manchester, United Kingdom; foziaahmed@doctors.org.uk

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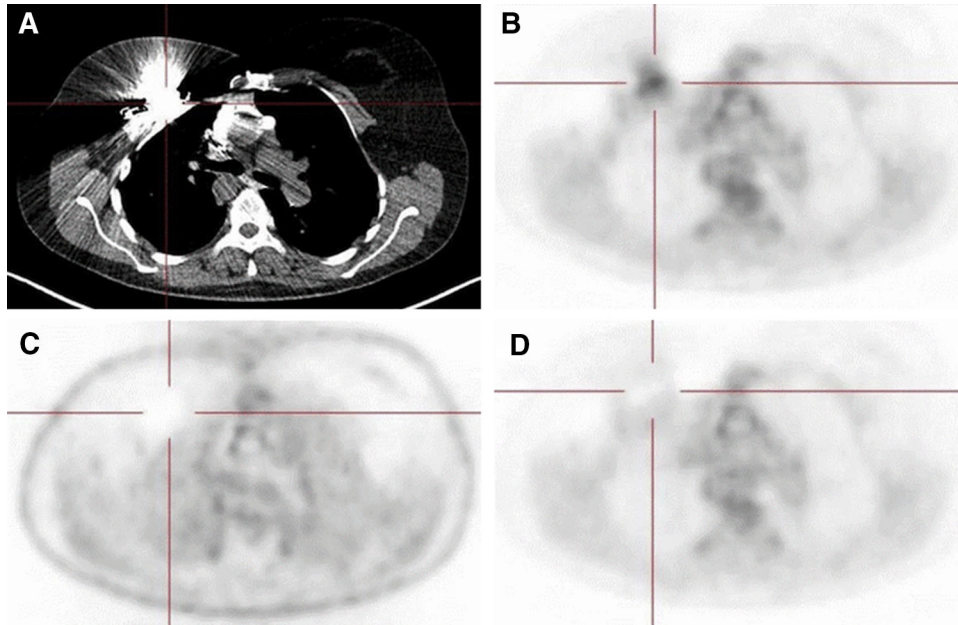


Figure 1. (A) Low dose CT with streak artefacts from a pre-pectoral CIED. (B) Increased 18F-FDG uptakes increased around the CIED pocket on the AC PET images reconstructed with MAR disabled. (C) No increased 18F-FDG uptake around device on non-AC PET images. (D) Absence of increased 18F-FDG activity in relation to the CIED on with MAR enabled.

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