

# Photon-counting computed tomography for the diagnosis of myocardial infarction with non-obstructive coronary artery disease

Malgorzata Polacin\*, Christian Templin , Robert Manka, and Hatem Alkadhi 

University Hospital Zurich, Zurich, Switzerland

Received 25 November 2021; first decision 9 December 2021; accepted 4 January 2022; online publish-ahead-of-print 4 February 2022

A 61-year-old male with acute chest pain was referred with suspicion of acute coronary syndrome. Blood troponin T (high sensitive) was elevated (100 ng/L, norm <14 ng/L), electrocardiogram (ECG) showed no ST-elevation ([Supplementary material online, S1](#)). Invasive coronary angiography revealed left coronary dominance with irregularities of the left anterior descending artery (LAD), but no significant stenosis or culprit lesion (*Panel A*). Echocardiography was normal, showing no regional wall motion abnormalities. ECG-gated computed tomography (CT) was performed using first-generation dual-source photon-counting detector CT for ruling-out pulmonary embolism and acute aortic syndrome. CT showed mild coronary calcifications (Agatston score 39) and confirmed absent obstructive coronary artery disease (*Panel B*). In addition, hypodense myocardium was detected in the midventricular inferolateral wall (*Panel C*). Dual-energy derived iodine maps from photon-counting CT overlaid onto coronary CT angiography images confirmed the area with reduced iodine concentration (*Panels D and E*), yielding a reduced normalized iodine content (11.3% and 10.5% in the

corresponding segments, compared to 14.3% and 12.9% in the LAD and CX territory, respectively; *Panel F*). Cardiac magnetic resonance imaging confirmed normal global (ejection fraction 62%) and regional left ventricular function (*Video 1*) and demonstrated a small ischaemic, transmural scar in the midventricular inferolateral wall in late gadolinium enhancement and native T1 maps (*Panels G–I*), corresponding to the findings from photon-counting CT. Thus, myocardial infarction with non-obstructive coronary artery disease was the most probable diagnosis.

Photon-counting detector CT uses energy-resolving X-ray detectors, which count the number of incoming photons and measure their photon energy. The inherent and optimized spectral imaging capabilities in combination with the high temporal resolution enable an improved soft tissue characterization with iodine quantification in cardiac CT.

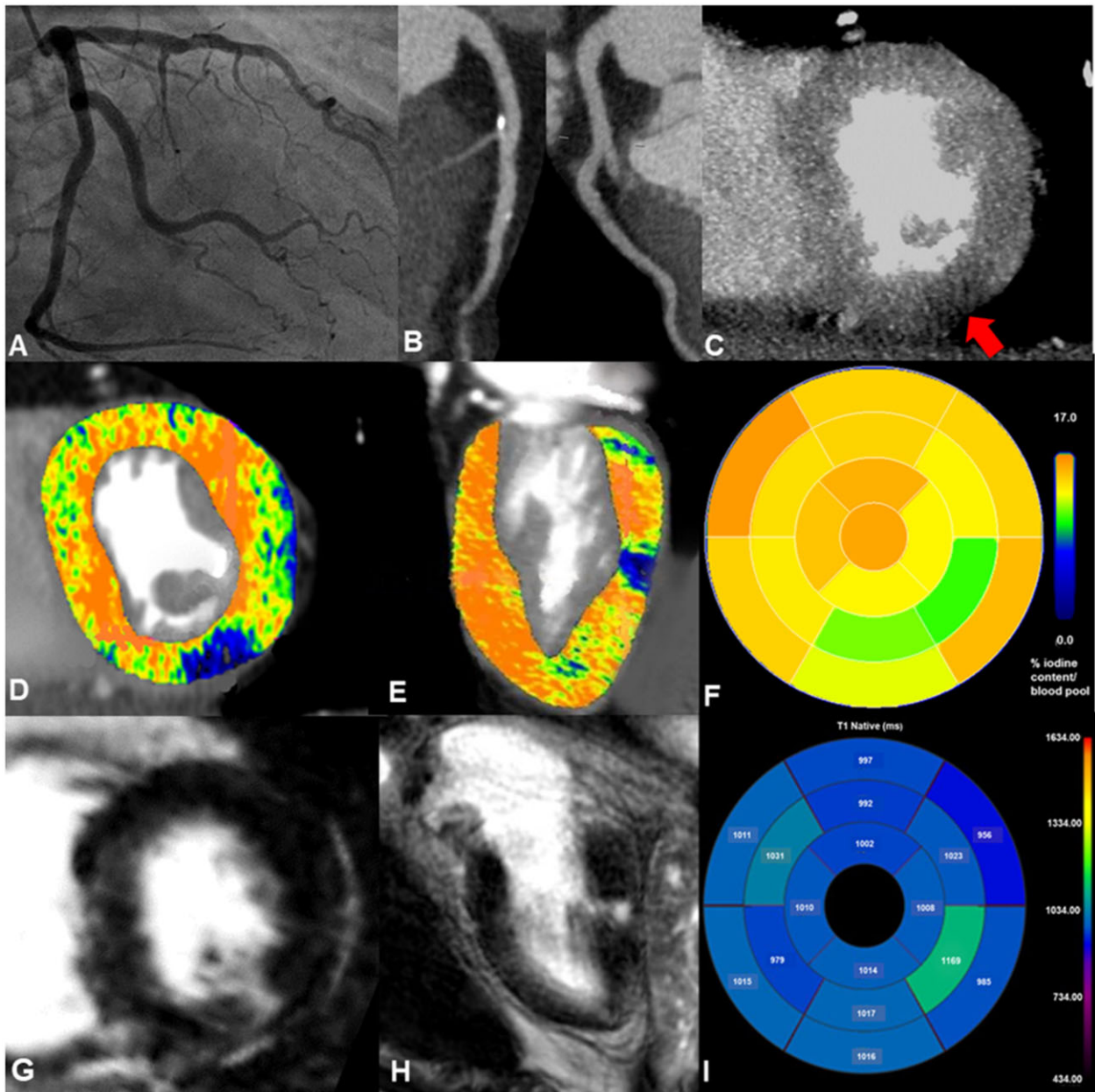
[Supplementary material](#) is available at *European Heart Journal - Case Reports* online.

\* Corresponding author. Tel: +41 432531521, Email: [malgorzata.polacin@usz.ch](mailto:malgorzata.polacin@usz.ch)

Handling Editor: Edoardo Conte

© The Author(s) 2022. Published by Oxford University Press on behalf of the European Society of Cardiology.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com)



**Video I** Cine short axis stack with normal global and regional left ventricular function.

**Consent:** The authors confirm that written consent for submission and publication of this cardiovascular flashlight including images and associated text has been obtained from the patient in line with COPE guidance.

**Conflict of interest:** None declared.

**Funding:** None declared.