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# **PET-CT** for detecting the undetected in the ICU

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Critically ill patients often have focuses of infection that are difficult to detect. When conventional imaging techniques fail to demonstrate the focus of infection, FDG-

**PET-CT** ([<sup>18</sup>F]fluorodeoxyglucose positron emission tomography combined with computed tomography) can be of value [1]. In this case, we present a 62-year-old male patient with a history of aplastic anemia. Two weeks following allogenic stem cell transplantation, he was admitted to the ICU and intubated because of respiratory failure by severe Aspergillus pneumonia. His recovery was complicated by persistent positive blood cultures with Enterococcus faecium, Staphylococcus epidermidis (CNS), and Escherichia coli. No focus could be found despite extensive investigations, including echography of great vessels and transesophageal echocardiography (TEE). After 2 weeks, we performed a PET-CT and found increased activity of fluorodeoxyglucose accumulation at the right atrial appendage (RAA) (Fig. 1). Retrospectively, there was an oscillating structure in the right atrium visible on the stored TEE images that was initially not recognized. We had the working diagnosis of infected thrombus. Intensive antibiotic therapy (meropenem and



Fig. 1 a PET/CT images of positive uptake in the right atrial appendage (*arrow*) of an immunocompromised patient with persisting blood cultures for *E. faecium*, *S. epidermidis* (CNS)

and *E. coli*. **b** Corresponding TEE picture (aortic valve, short axis, right ventricular inflow/outflow)

vancomycin) was continued for 6 weeks combined with therapeutic dosages of unfractionated heparin (UFH), after which blood cultures became negative. During repeat TEE after 12 weeks the RAA thrombus had considerably reduced. After weaning from ventilation, the patient was discharged from ICU after 15 weeks in a reasonable condition.

In conclusion, the use of the FDG-PET-CT should be considered in ICU patients for detection of a focus during unexplained positive blood cultures. The PET scan should be organized in ICU ensuring <u>discontinuation of glucose</u> or insulin-containing intravenous infusions (for at <u>least</u> 6 h) and injection of intravenous radiolabeled FDG in the

## scan room 1 h before starting the examinations, thereby allowing the patient to return to the ICU within 3 h.

**Conflicts of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

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### **IMAGING IN INTENSIVE CARE MEDICINE**



## Light in the dark: <sup>18</sup>F-FDG PET/ CT in *Staphylococcus aureus* bacteremia of unknown origin

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An 81-year-old male patient with chronic kidney failure and prior trans-catheter aortic valve and pacemaker (PM) implantation (Fig. 1a) presented to the emergency department of our hospital with a 1-day history of severe, discontinuous, movement-linked high thoracic back pain.

Clinical examination and a native thoraco-abdominal computed tomography (CT) scan were non-contributive for the diagnosis (Fig. 1b).

During evaluation, the patient shivered and became feverish. Sepsis of unknown origin was hypothesized; blood samples were taken and empiric broad-spectrum antibiotics administered.

The day after the admission, five out of six blood cultures revealed growth of methicillin-sensitive *Staphylococcus aureus*. We narrowed the antibiotic spectrum and performed a transesophageal echocardiography study, which ruled out endocarditis.

Fluorine-18-fluorodeoxygluocose positron emission tomography/computed tomography (<sup>18</sup>F-FDG PET/ CT) was performed for advanced source identification. Increased radiotracer uptake was noted around the second dorsal vertebra (Fig. 1c–d, arrowhead) and along the subclavian portion of the PM wires (Fig. 1d, arrow). These findings were consistent with a septic vegetation on the proximal portion of the PM leads and spondylodiscitis from a septic embolism.

Based on these data, we continued antibiotic therapy and removed the PM with leads.

This case shows the role of <sup>18</sup>F-FDG PET/CT in the identification of difficult to find septic foci.

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Fig. 1 a Antero-posterior chest X-ray (arrowhead: pacemaker; arrow: biologic aortic valve). b Sagittal native CT scan without significant abnormalities in the dorsal vertebrae. c Sagittal <sup>18</sup>F-FDG PET/CT scan showing intense radiotracer uptake around the second dorsal vertebra suggestive of spondylodiscitis (arrowhead). d Axial <sup>18</sup>F-FDG PET/CT showing intense radiotracer uptake suggestive of septic foci along the subclavian portion of the pacemaker wires (arrow) and around the second dorsal vertebra (arrowhead)

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#### Authors' contributions

JC, LE, GT and AP were in charge of the patient and collected the data. JC and AP wrote the manuscript. All the authors approved the final version of the manuscript.

#### Compliance with ethical standards

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The authors have no confict of interest to declare regarding the material discussed in the manuscript.

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