Journal of Nuclear Medicine, published on June 16, 2022 as doi:10.2967/jnumed.121.263626

Long axial field of view enables PET/CT in toddler without sedation

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Short title: Pediatric PET without sedation

No potential conflicts of interest relevant to this article exist.

Keywords: LAFOV PET, Pediatric, sedation

Total-Body PET and long axial field-of-view (LAFOV) PET are game-changing innovations at the threshold of clinical implementation. Early experience has demonstrated high sensitivity (84 cps/kBq), time-of-flight resolution of 214 ps and improved image quality enabling ultra-fast or low-dose scanning (*1*). A LAFOV PET/CT (Siemens Biograph Vision Quadra) was installed at Rigshospitalet in September 2021. This post illustrates how this 10-fold increased sensitivity can enable avoidance of general anesthesia by fast and flexible PET acquisition. The departmental review board approved this study and the parents signed a written informed consent.

A LAFOV FDG-PET/CT scan was performed in a 17 months-old girl suspected for incomplete Kawasaki disease after 12 days of fever despite broad-spectrum antibiotics. Previously, she had left heminephrectomy due to duplex kidney and repeated urinary tract infections. She had high C-reactive protein, anemia, hypoalbuminemia and thrombocytosis. The patient had relapse of fever despite immunoglobulin therapy and high dose acetylsalicylic acid. PET/CT was performed to rule out malignancy or focal infection.

The patient was positioned in a vacuum fix pillow supplemented with light fixation across the body using a Velcro belt with arms free. The mother was present during the scan, keeping the toddler calm by singing. PET/CT scan was acquired 74 min p.i. of 35 MBq ^{18}F-FDG (3 MBq/kg); Low-dose CT followed by 5 min PET acquisition in list mode while observing the patient for movement. An image frame of 120 sec with minimal movement was reconstructed using a standard protocol of 4 iterations 5 subsets, 1.65 x 1.65 mm voxels and a Gaussian post-filter of 2.0 mm FWHM. The reconstruction method was ordinary Poisson using point-spread modelling and time-of-flight with a maximum ring distance of 85. The

images were of good quality for interpretation despite slight misalignment over the extremities.

PET/CT demonstrated no signs of infection or malignancy (Figure 1). Thus, the patient was discharged. All parameters had normalized at follow-up a week later. This case illustrates how LAFOV PET enables whole-body PET-imaging in children without the risks and logistical challenges associated with sedation.

References

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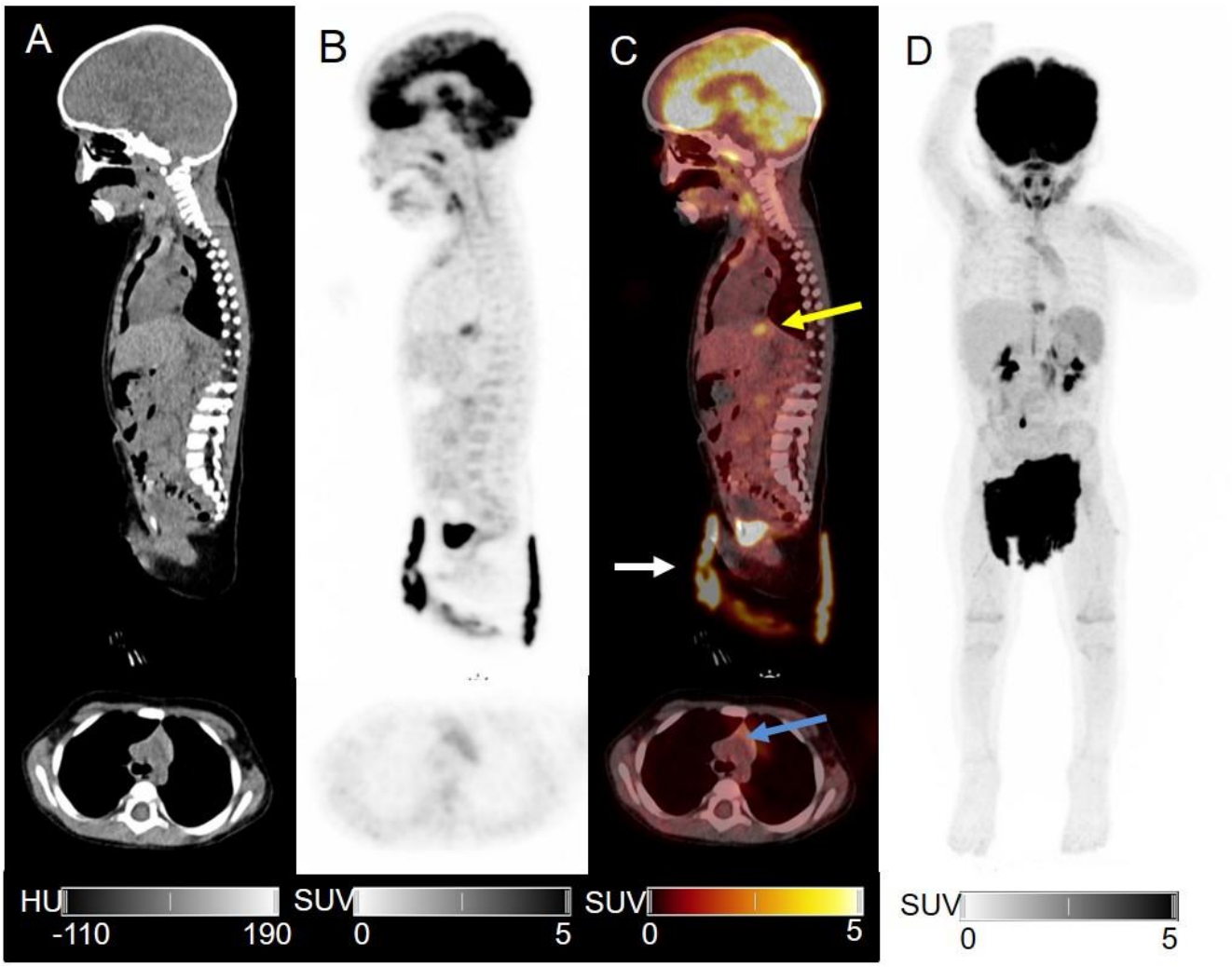

Figure 1: CT, PET and fused PET/CT in sagittal, axial and MIP reconstructions (A-D) after 120 sec PET acquisition. Color scale from 0-5 SUV. No pathological uptake, but reactive accumulation in the distal part of esophagus (yellow arrow), physiological thymic uptake (blue arrow) and accumulated urinary activity in the diaper (white arrow).