

## Presurgical evaluation of chronic osteomyelitis using dual-tracer PET/CT

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### Introduction

Chronic osteomyelitis is a long-standing disease, unless radical resection of necrotic bone can be achieved. CT, MRT and bone scintigraphy are all helpful but are also limited regarding true location and distribution of the necrotic tissue. PET (Positron Emission Tomography) is a technique that measures molecular properties of tissues using specific radiopharmaceuticals in tracer amount. We tested the potential use of PET/CT to localise necrotic bone in patients with chronic osteomyelitis by identifying a focus of activated inflammatory cells (high signal of the glucose analogue 18F-FDG) inside bone combined with absence of mineralisation (low signal of 18F-Fluoride).

### Patients and Methods

This case series consisted of 4 men, 49 years old (28-57y) and with chronic osteomyelitis with a mean duration of 29 years (20-38y). Two patients had infection in tibia, and two patients in femur. All patients were preoperatively examined with FDG-PET/CT (glucose) and a-PET/CT (fluoride) with low-dose CT. High FDG uptake in an area with low fluoride uptake inside bone (CT) indicated inflammation in necrotic bone. All patients were operated with resection of necrotic bone, and three of them with coverage of free soft tissue flap. Based on peroperative tissue cultures the patients were postoperatively given antibiotics orally for 8 months, and PET was repeated 12 months after the operation.

### Results

All 4 preoperative PETs showed a small area with high uptake for FDG but no uptake for FLU, which were assumed to be sequestrae. In one patient this area was separated 6 cm from the major infection and located where we primarily had no suspicion of infection. At 12 months three patients had complete disappearance of the preoperatively detected increase in FDG uptake. The fourth patient had a small remaining increased FDG uptake without uptake of FLU in the soft tissue, and when this area was surgically explored we found a piece of encapsulated textile from the primary open injury. All 4 patients improved clinically after surgery, and are free from antibiotics.

### Discussion

PET was helpful in the preoperative planning of chronic osteomyelitis. FDG-PET localised the true distribution of the infection, and could expose previously unknown areas affected, both extensions in direct contact with the major infection, like fistulas in the bone, and detached areas away from the major infection. FLU-PET localised necrotic bone, and when it was combined with a high uptake in FDG-PET it was an important factor for successful treatment. A careful preoperative planning made it possible to get an adequate access to the infections. The operations with free soft tissue flaps in three of the patients contributed to the treatment of the infections, but chronic osteomyelitis can not be cured if not all infected necrotic bone is completely resected.