

SPECT-CT in MSK

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Introduction

- General use of SPECT-CT in MSK
- Head and neck
- Spinal SPECT-CT
- Hands
- Legs and feet

SPECT-CT in MSK

- As with most SPECT-CT advantages lie in better specificity
- May be some increase in sensitivity
- However, in reality only 40cm field of view
- Limits use in multi site disease
- Outside of chest, abdo and pelvis radiation dose are reduced

Head and neck

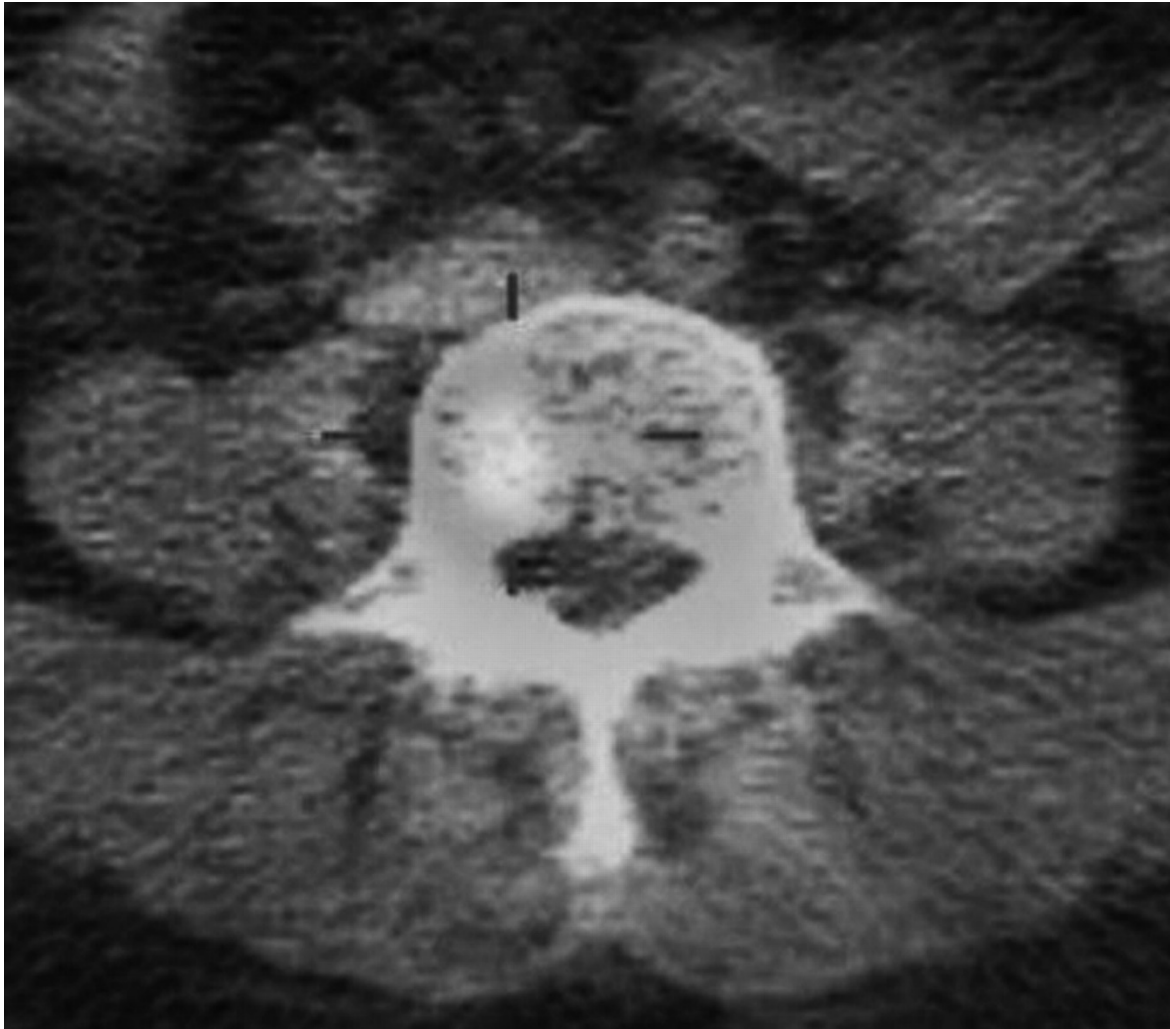
- Single paper in bone imaging
- Kolk et al ENJNMMI 2014 Munich
- 30 patients with head and neck SCC imaged
- 17 had local bone metastases on planar imaging and MRI
- 2 additional patients had bone mets seen on SPECT/CT alone
- No FP or FN seen

SPECT/CT in the spine

- Few papers
- Iqbal et al JNMT 2011 Wagga Wagga Australia
- 80 patients with solitary site of increased uptake in spine
- Site of lesion identified correctly in 6% on planar increased to 79% with SPECT/CT
- 31 false negatives reduced to 7 with SPECT/CT



Baseline planar scan of spine. Basit Iqbal et al. J. Nucl. Med. Technol. 2011;39:201-207



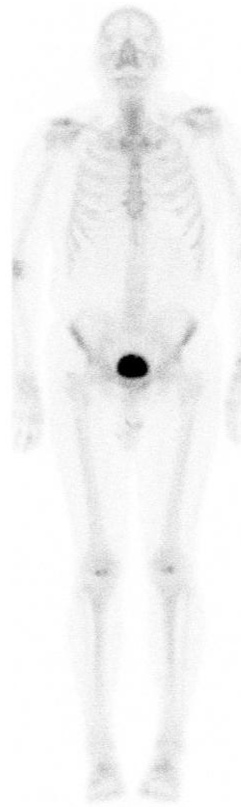
Baseline SPECT/CT scan. Basit Iqbal et al. J. Nucl. Med. Technol. 2011;39:201-207

A case from Cambridge



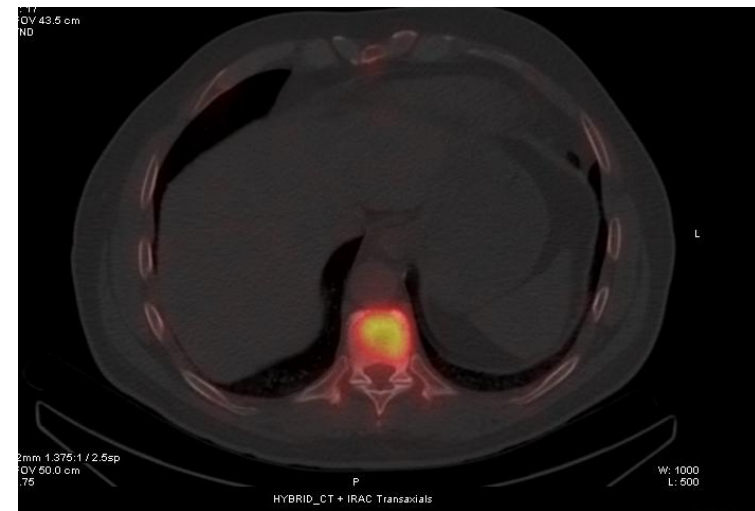
LT

RT



RT

LT



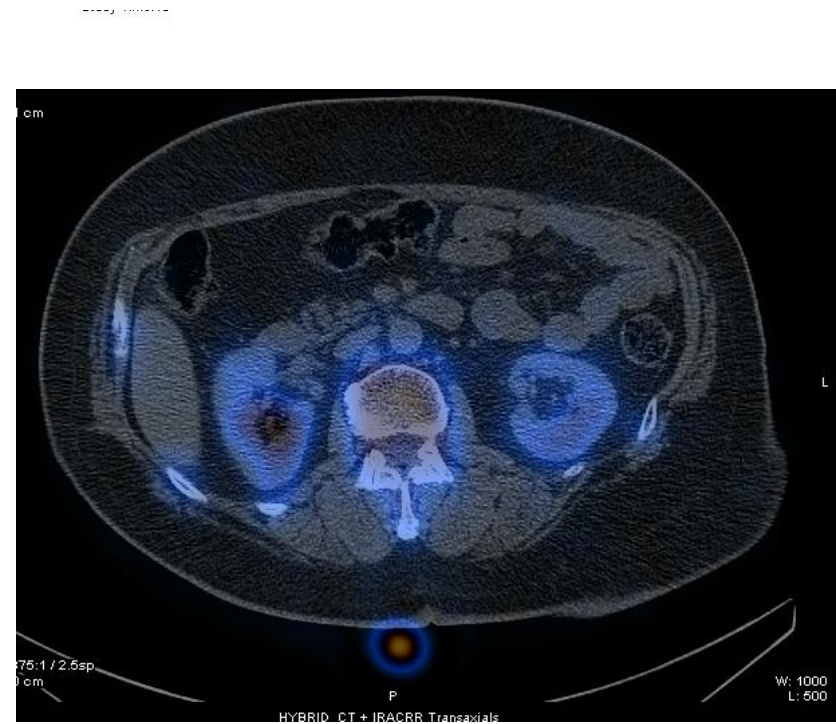
Another case



L

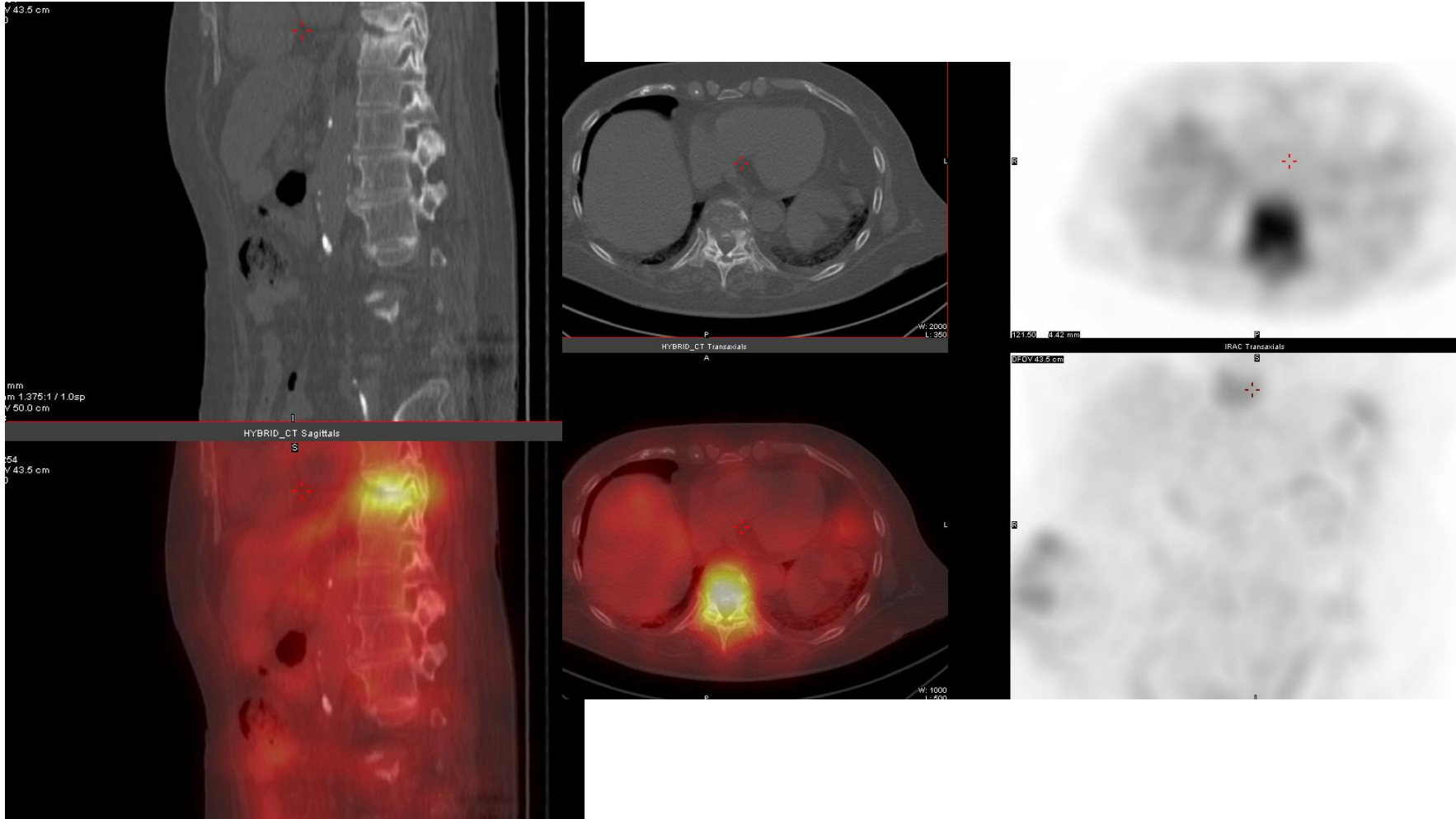


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Can be used in benign causes –
discitis – Ga-67



SPECT-CT of the hand

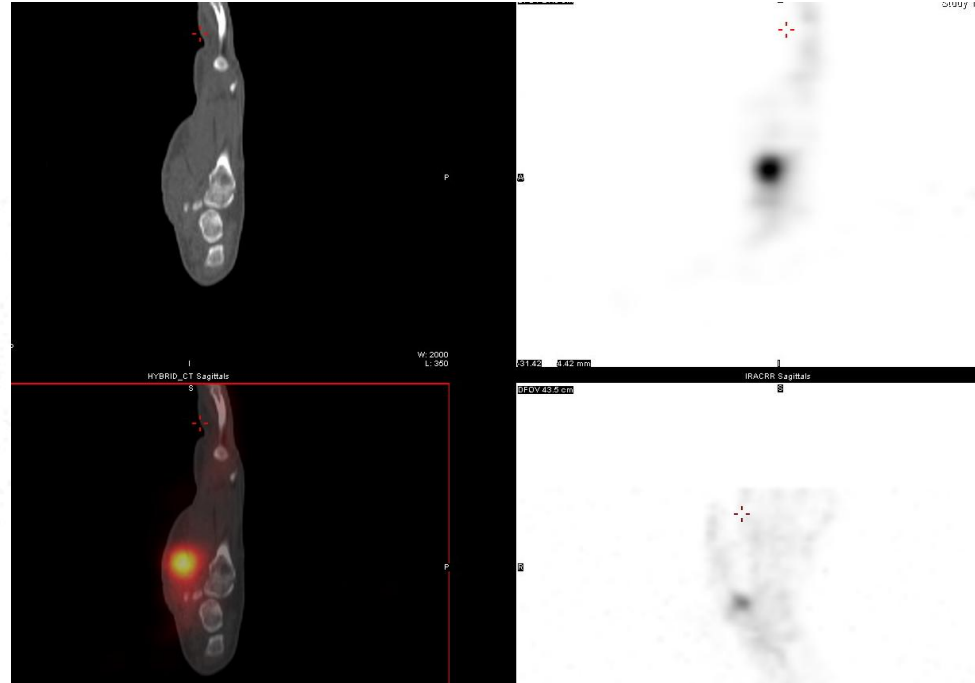
- Schleil et al 2012 EJNMMI Res
- Imaged 51 patients with wrist pain
- 48 lesions seen on planar X-ray
- 117 lesions on planar bone scintigraphy
- 142 lesions on SPECT/CT
- Overall SPECT/CT changed management in 37% of patients with wrist pain

Fractured lunate



A 25-year-old male with left-sided wrist pain when grabbing and lifting. Tendinitis was suspected. (A) Plain radiographs showed no bone lesion. (B) SPECT/CT revealed an intense radioisotope uptake in the lunate bone corresponding with osteomalacia of the lunate bone followed by surgery (top row: three-dimensional (3D)-SPECT and fusion SPECT/CT, bottom row: planar SPECT and CT-alone).

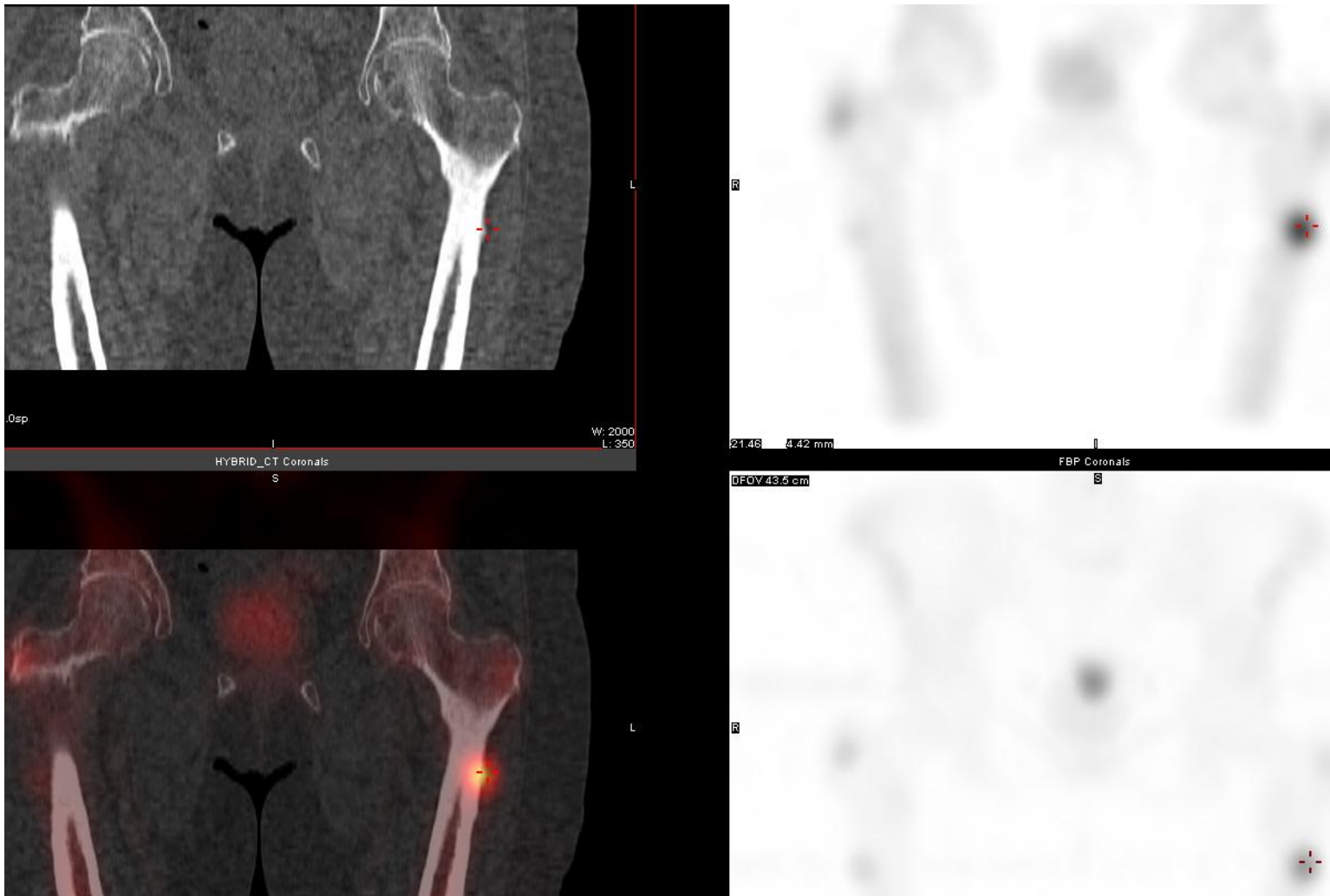
The Cambridge image



SPECT-CT in hips/thighs

- Normally studies performed in patients who have has THRs
- Metal an issue in SPECT reconstruction can result in false positive “hot” spots by prostheses due to over zealous attenuation correction
- Bladder activity may lead to count stealing and reduced uptake
- Care is needed in reading images in this areas

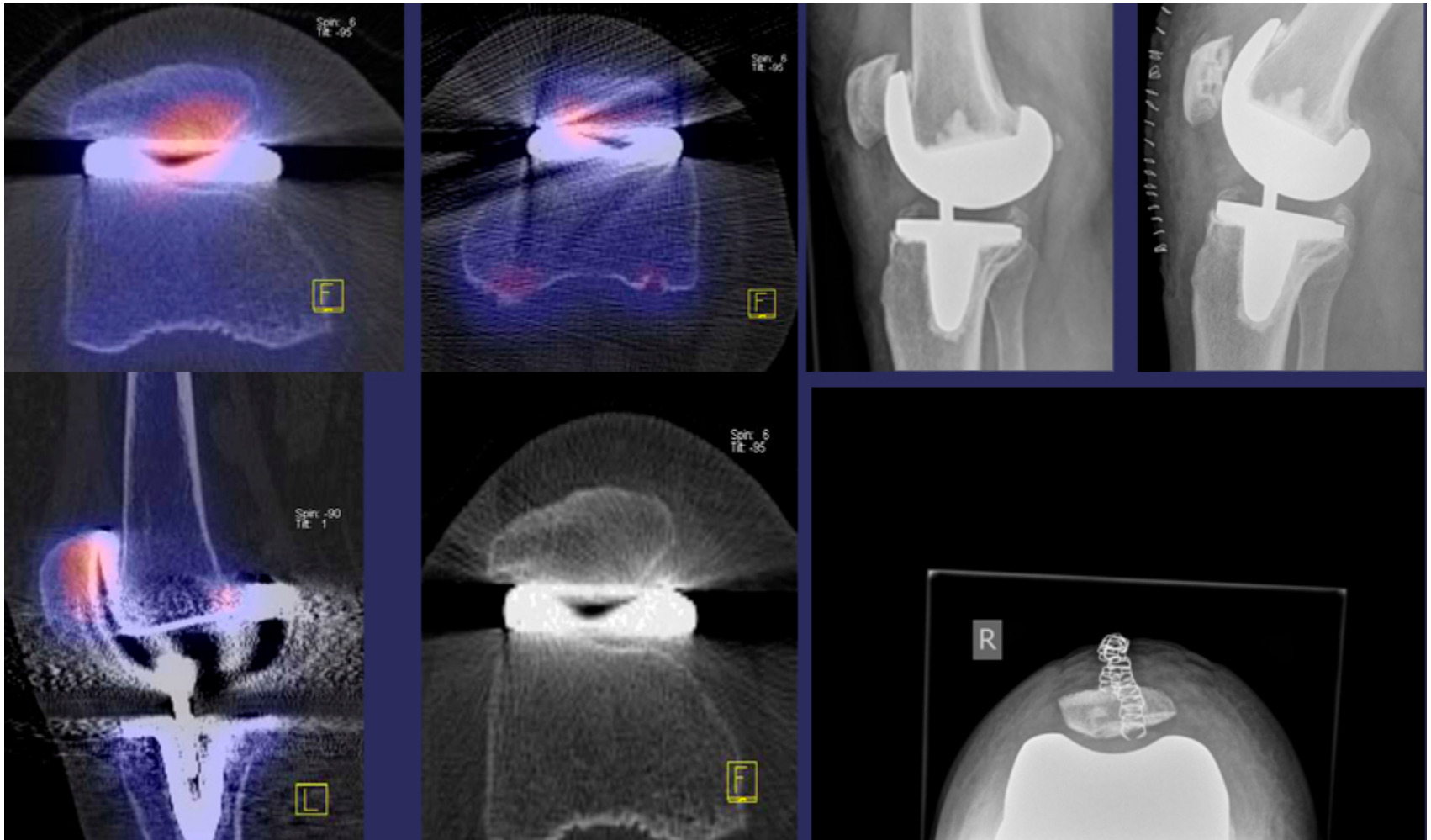
Sappho causing focal femoral uptake note burnt out disease



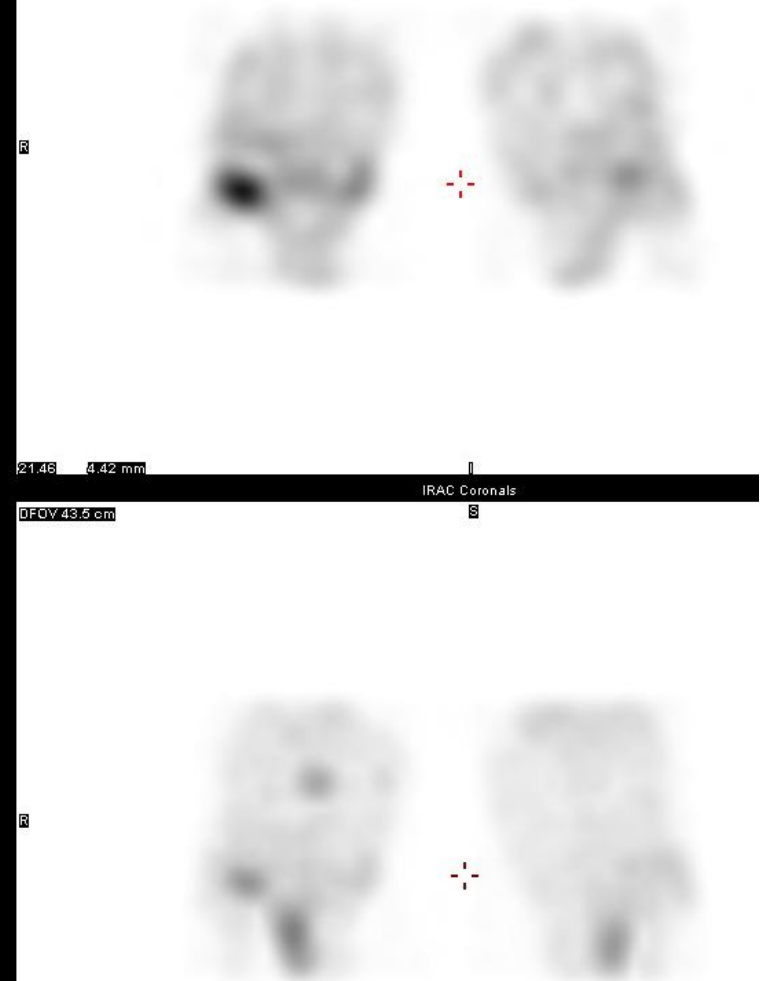
SPECT-CT of the knees

- Al-Nabhani et al NMC 2013 use of SPECT/CT in painful knee prosthesis UCL, London
- Follow up of 60 patients
- Identified loosening in 9 patients and infection in 2 other causes-mainly patella-femoral disease in 43 patients
- Positive and negative studies helpful in 86%
- 24 patients went to surgery and SPECT-CT was correct in 21 (88%).

Patello-femoral arthropathy



Also be used in knee pain



Finally we get to the feet

- Feet hurt
- Lots of bones
- MRI really popular but not so good at bones
- Planar imaging often not that helpful
- Advantage of SPECT-CT can find site of uptake
- Ligament insertions and sesamoid bones are often pain generators

Use of SPECT-CT in the feet

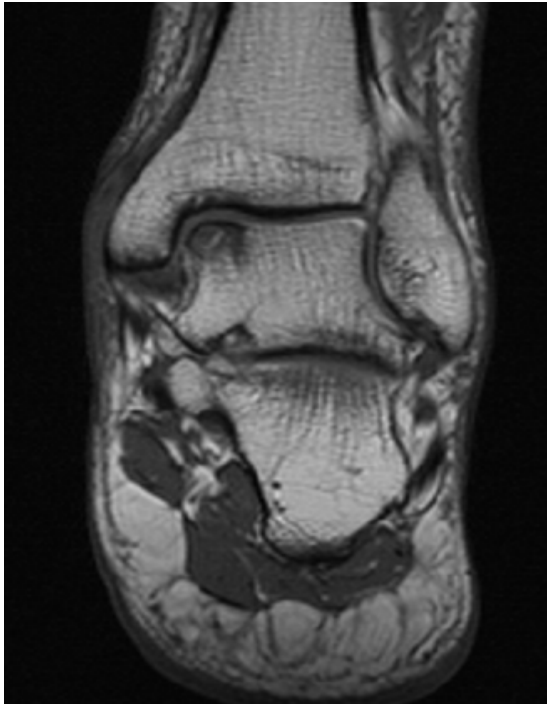
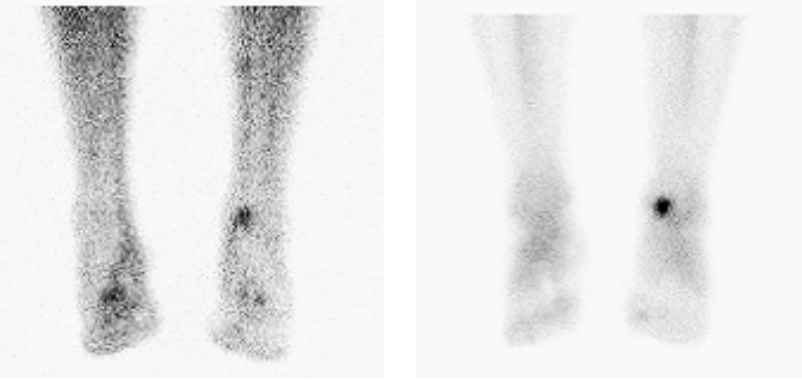
- Low et al in prep
- 60 patients imaged with foot pain
- Use of SPECT-CT reviewed
- Only one study was abnormal
- 29/59 SPECT/CT changed management

Findings	No.
Stress fractures	15
Degenerative	10
Plantar fasciitis	5
Inconclusive	3
CRPS	2
Crystal arthropathy	2
Enthesopathy	2
Impingement	2
Mid foot fracture	2
Ossicle uptake	2
Post fusion/uptake	2
post op uptake	2
AVN	1
Bechet's	1
Charcot	1
Coalition	1
Loosening	1
Normal	1
Rheumatoid Arthritis	1
Sesamoiditis	1
Sesamoid fracture	1
Spur fracture	1
Total	59

Foot SPECT/CT and management

Management	No.
Referred to Orthotists	7
Air cast boot	5
Pain clinic referral	5
Conservative not specified	3
Discharged	2
Physiotherapy	2
Plaster	2
Steroid injection	2
Surgical	1
Total	29

9 patients also had MRI but only positive in 3. In other 6 SPECT/CT abnormal

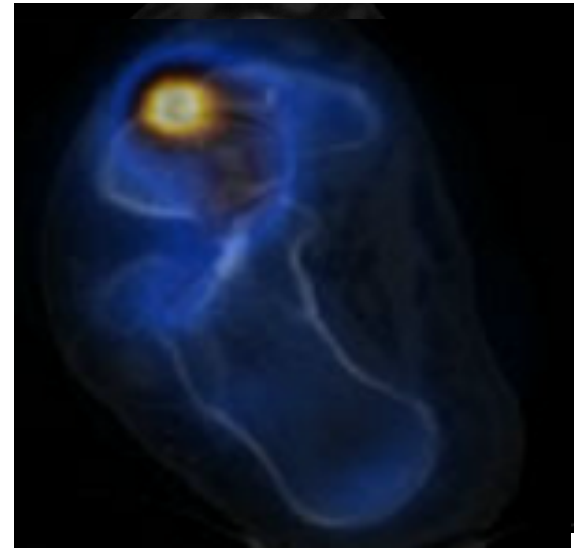
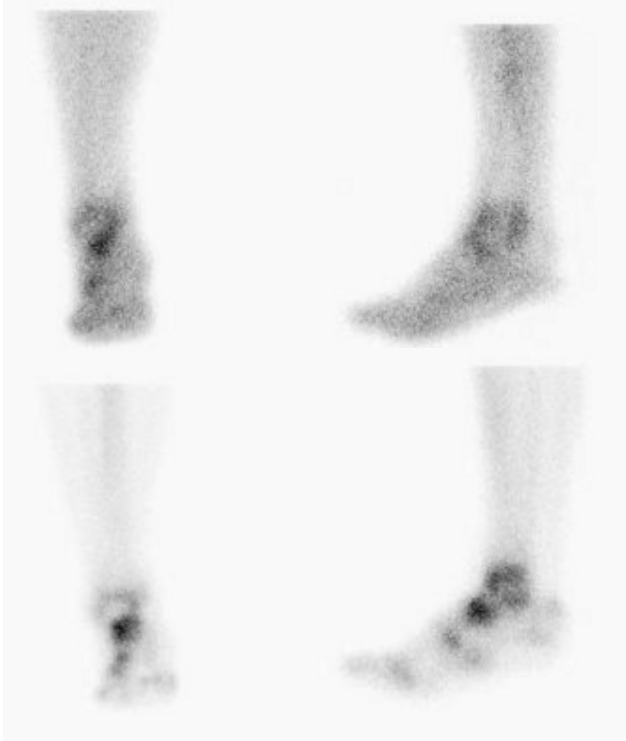


Pain in left hind foot

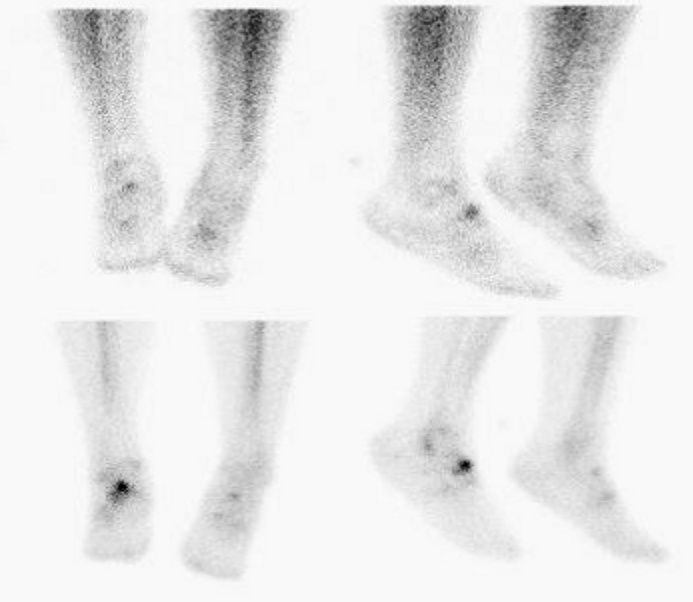


Osteochondral lesion/defect

Pain in right foot



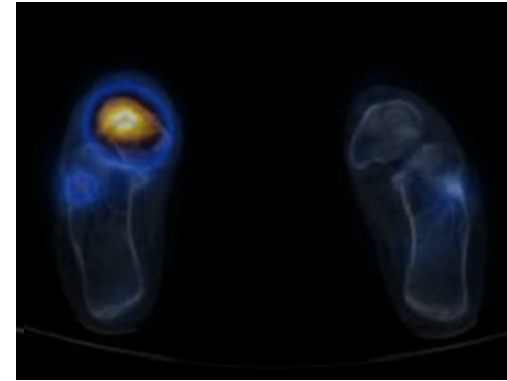
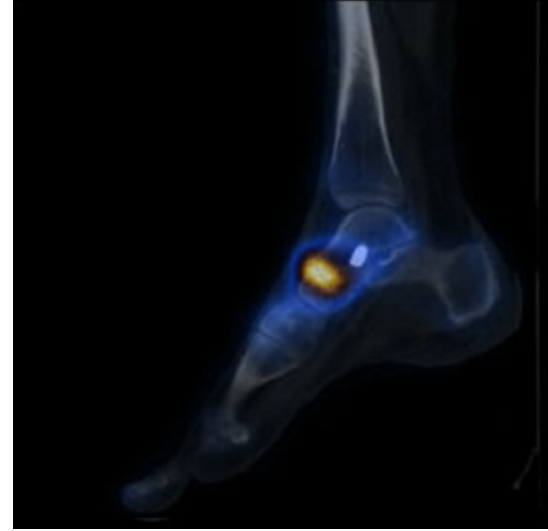
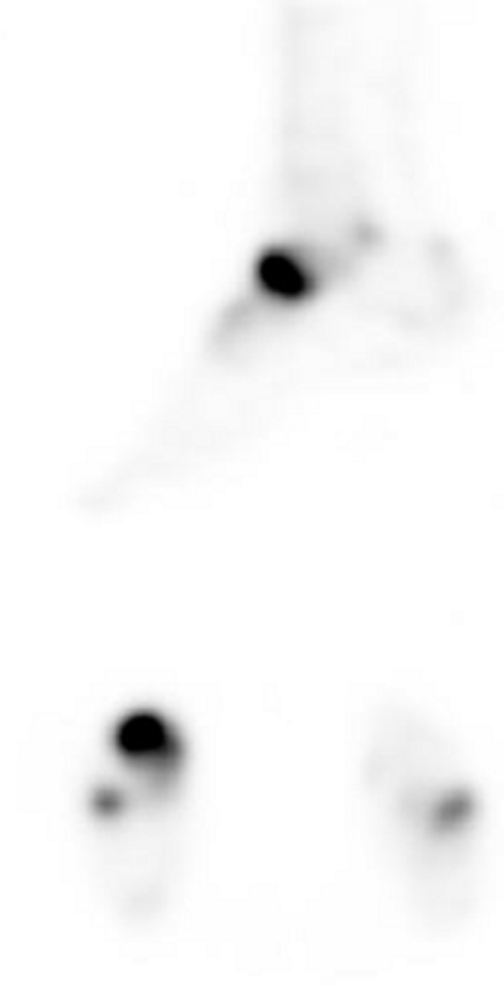
Stress fracture



Pain (Right foot surgery)



Screw head Osteochondral defect

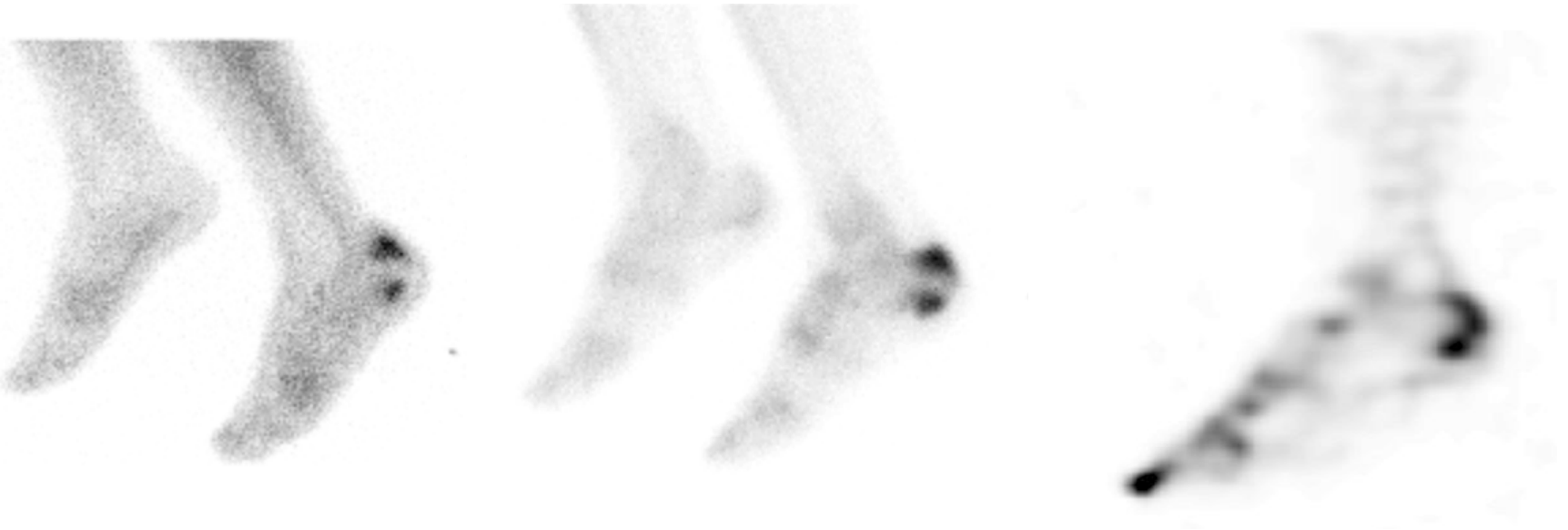


Talo-Navicular fusion

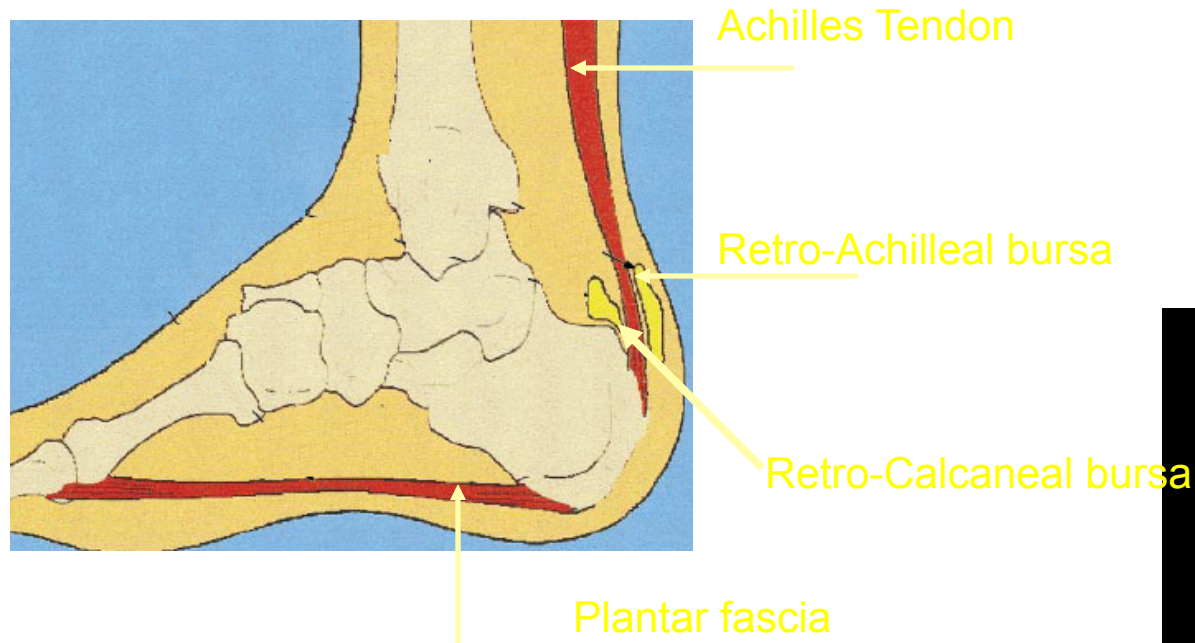
Non-union

Right heel pain

- Plain radiography demonstrated a right plantar calcaneal spur
- Increased opacification of Kager's fat pad



Right heel pain



Uptake superior to the right calcaneus is indicative of increased metabolic activity in the region of the retrocalcaneal bursa, which is consistent with a **bursitis**

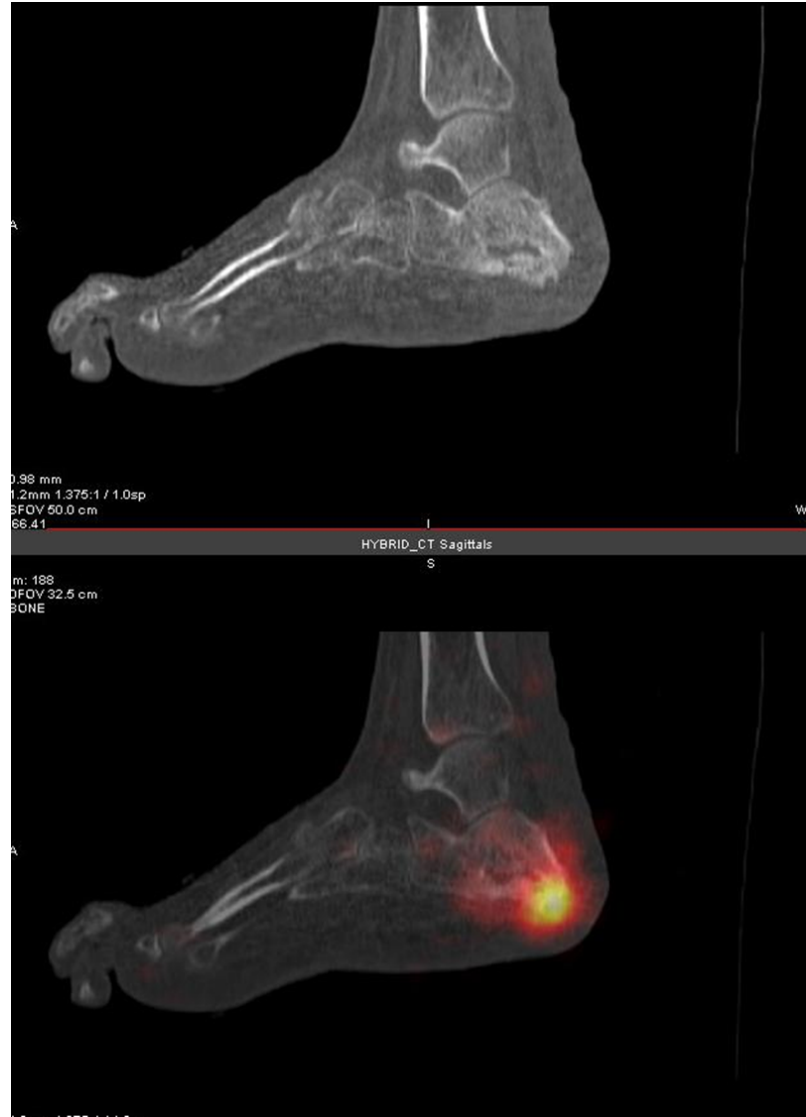


Tibiotalar impingement on the left foot

Image courtesy: Dr Hans Vanderwall

In-111 WBC in OM

48 year old diabetic man had not noticed he has stood on a carpet nail
No has pus from heal
In-111 WBC shows calcaneal osteomyelitis



Summary

- SPECT-CT can be used anywhere
- Most useful in feet
- Can improve both sensitivity and specificity of bone scintigraphy
- Maybe begin to challenge MR