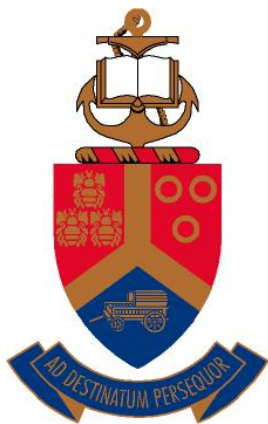




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Imaging infection in the diabetic foot

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The foot in diabetes

- Pathophysiology
- Infection vs Charcot's joint
- Bone scintigraphy
- Labelled leucocytes
- Labelled antibodies
- PET techniques

Introduction

- The cause of infection of the feet in diabetic is multi-factorial
 - Peripheral vascular disease reduces tissue viability
 - Neuropathy allows occult damage
 - Cutaneous infection not cleared and breaches skin
- Feared by patients and their carers
- Once established difficult to treat.

What we do not want

- When infection is this bad the underlying bone is involved and amputation may be the only option
- Note ischaemic skin edge
- Bone at bottom of cavity



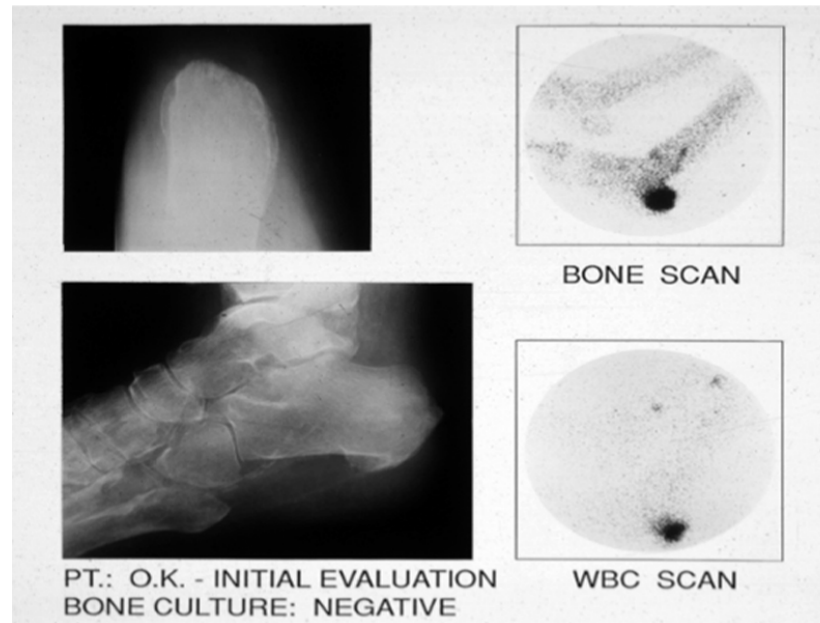
Charot's joint

- Primary injury neuropathy
- Micotraumas
- Dysregulated autonomic system
- Increased blood flow/
red marrow
- Can occur in any neuropathic condition
inc syphilis



Infection vs Charcot's

- 90% in peripheral foot inc metatarsals and phalangeal bones
- 10% in heel
- 60% in tarsal bones
- 30% in metatarsals
- 10% in heel.



Prevention is better than cure

- Preventing foot problems is the key
- Generally the better the diabetic control the lower the chance of foot problems
- Best to measure glycosylated Hb (HbA1c)
- Should be kept to below 6.5% (7.8mmol/l)
- Also need to look at feet-foot care nurse
- Avoid injuries-good footwear

Is good control possible

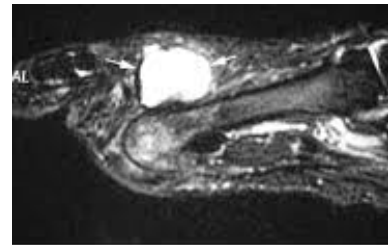


Diagnosis

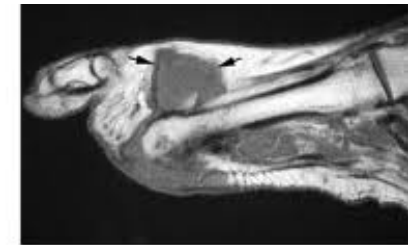
- Suspect a problem
- Examine foot NB a warm diabetic foot can be an ischaemic foot due to skin shunting
- Remember when looking at foot to look between toes
- X-ray good to see late changes Yuh et al AJR 1989

MRI

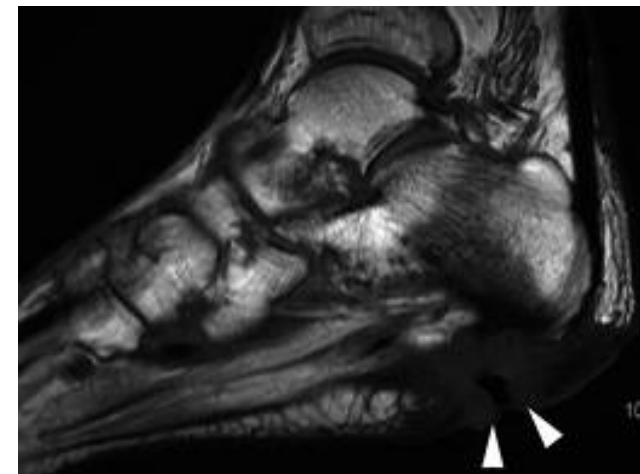
- Often seen as standard investigation
- Can found soft tissue involvement
- Bone oedema
- Capriotti NMC 2006 meta-analysis sensitivity of MRI 90% specificity 74%



(a)

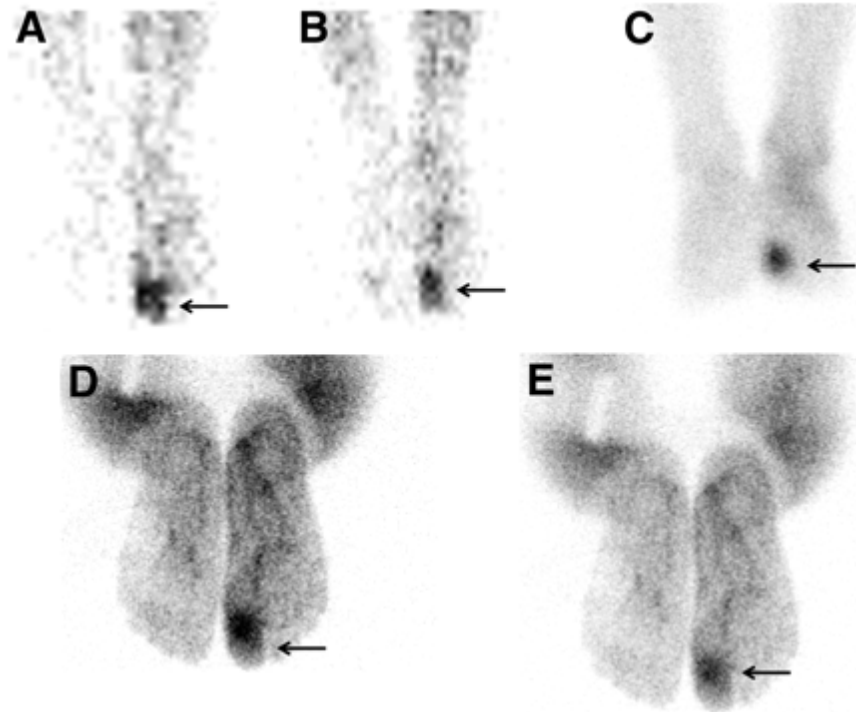


(b)



Is there a role for bone scint

- Advantage of Tc-99m MDP/HDP is that technology cheap
- Can obtain idea of flow but beware foot shunting
- Can determine if there is bone involvement
- Sensitivities as high as 100%, specificity 40-60%



Asli et al JNM MT 2011

More infection specific methods

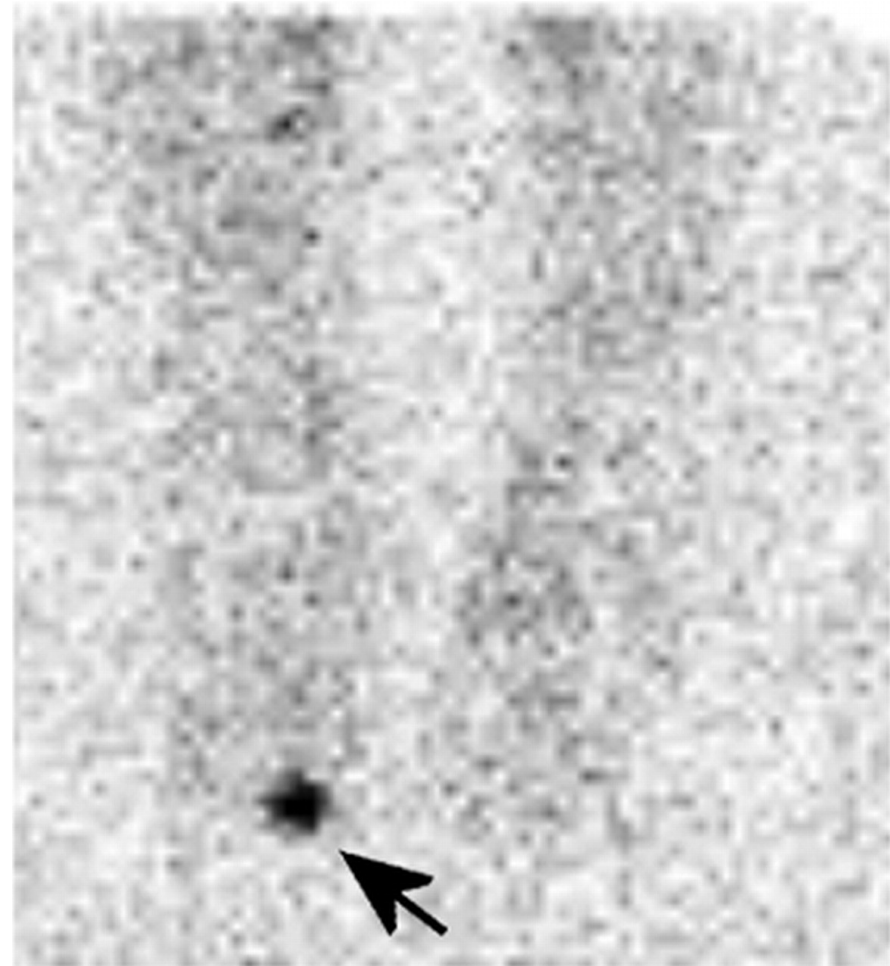
- Ga-67
 - Low count rate in feet and some uptake in non-infected bone
- Labelled leukocytes
 - Beware of marrow uptake in Charcot's delivers best specificity but best read with bone scan or SPECT/CT
- Antibodies
 - Lower BM uptake can be good but expensive

Ga-67 in diabetic feet

- Johnson et al Foot Ank Int 1996
- Prospective trial comparing Ga-67, In-111 WBC alone and in combination with Tc-99m MDP
- Ga-67 did not improve on results of bone scanning alone
- Best combination In-111 WBC and Tc-99m MDP (sens 100%, spec 80%)

Labelled WBCs

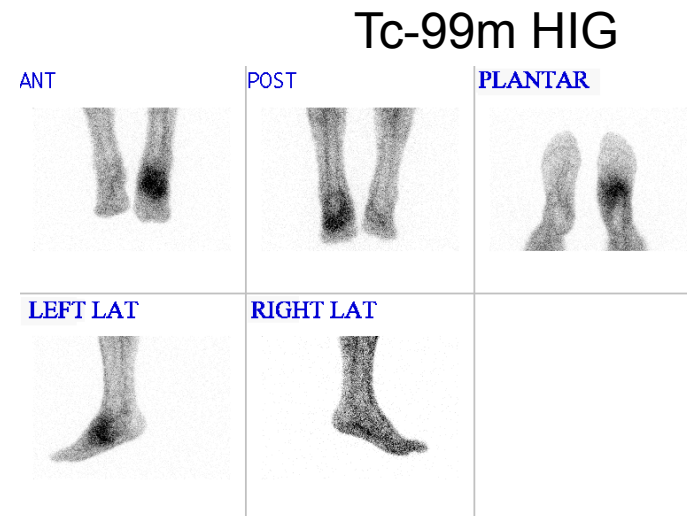
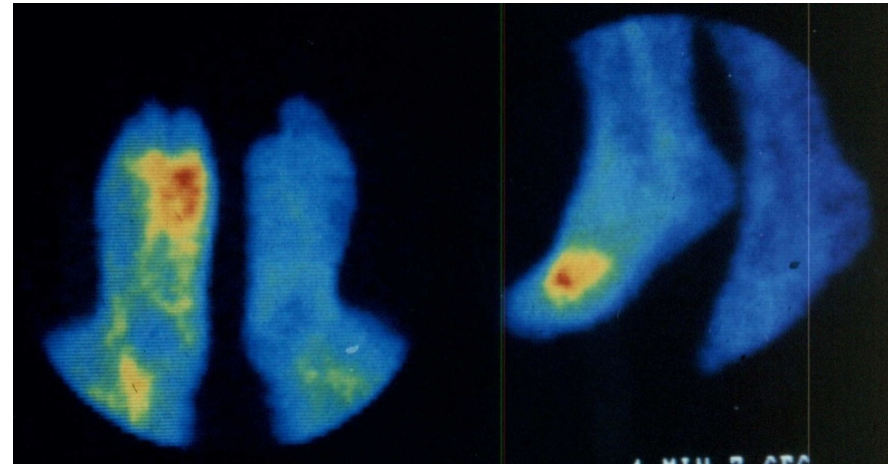
- Advantage of specificity
- However sensitivity often less than in other sites
- Capriotti et al NMC meta-analysis
- Sens 81%, spec 88%
- Can be combined with marrow imaging to diff OM and Charcot's



Rini et al Radiographic 2006

Antibodies

- Less data on infection in diabetics using antibodies such as Tc-99m HIG, Tc-99m granuloscint or Tc-99m leukoscan
- These agents do not need blood labelling but cost is higher
- Evidence base less

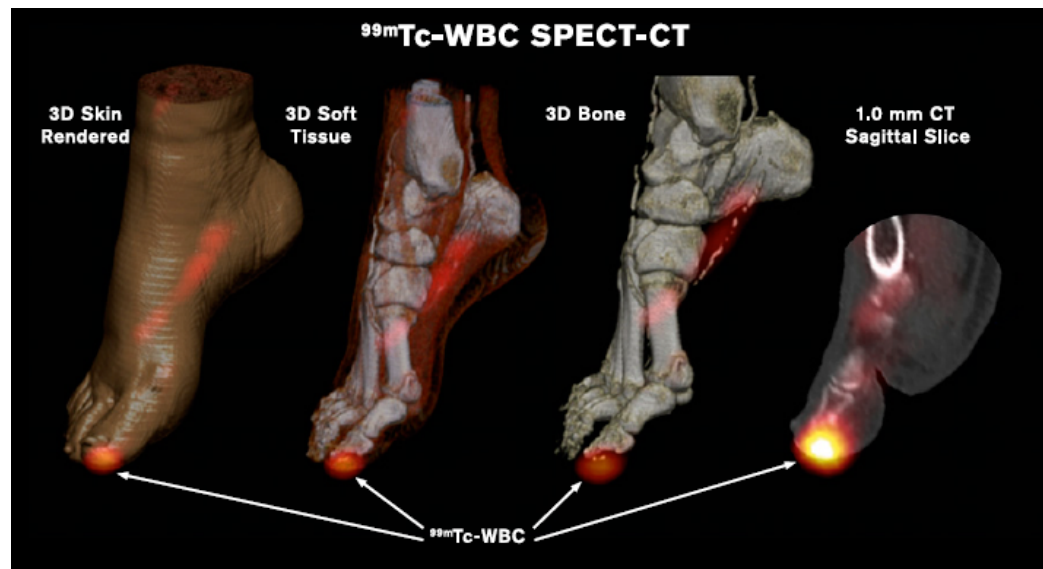


4 hr Tc-99m leucoscan

SPECT-CT

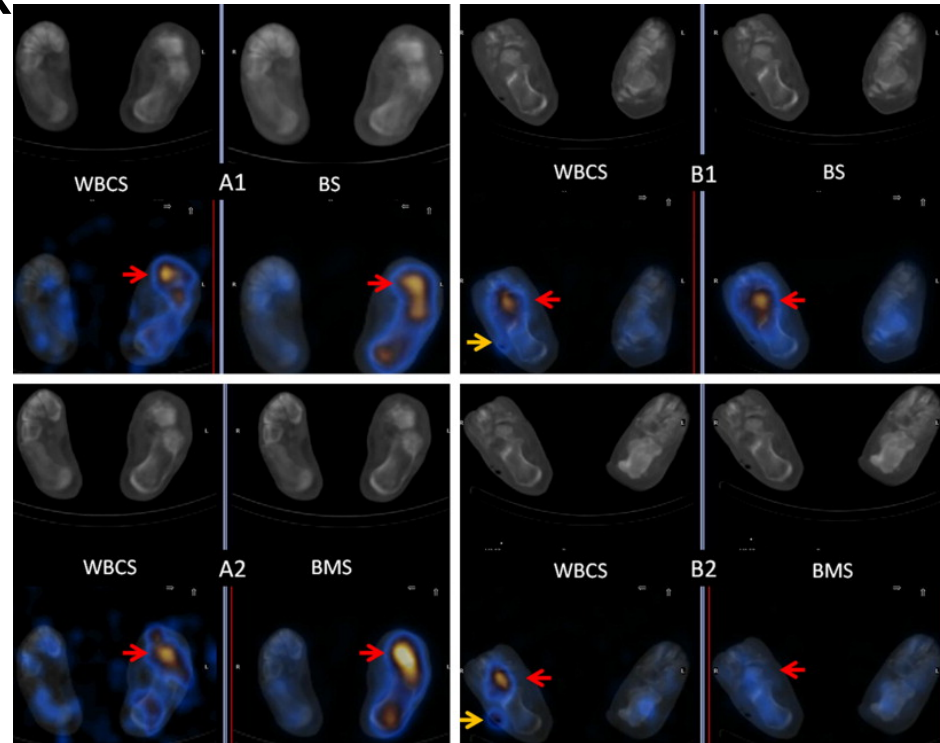
- Fillipi et al 2009 NMC
- Tc-99m HMPAO SPECT-CT in 19 patients with ?infected diabetic feet
- 52% increase in accurate localisation c/w planar

From
Radiographics



SPECT-CT

- Heiba et al J Foot Ank surg 2010
- 67 patients had bone and labelled leukocyte SPECT-CT
- SPECT-CT significantly better than SPECT
- Localises uptake with confidence

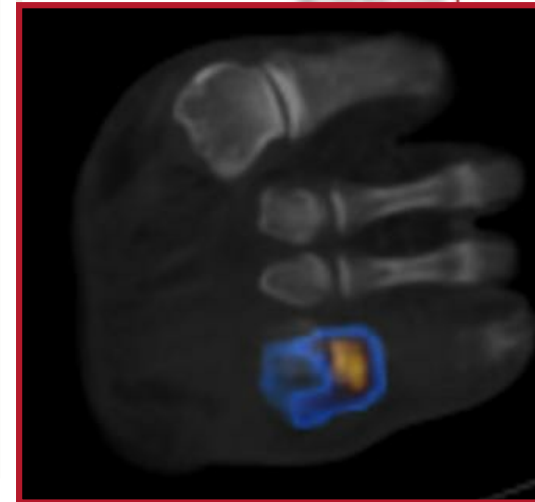
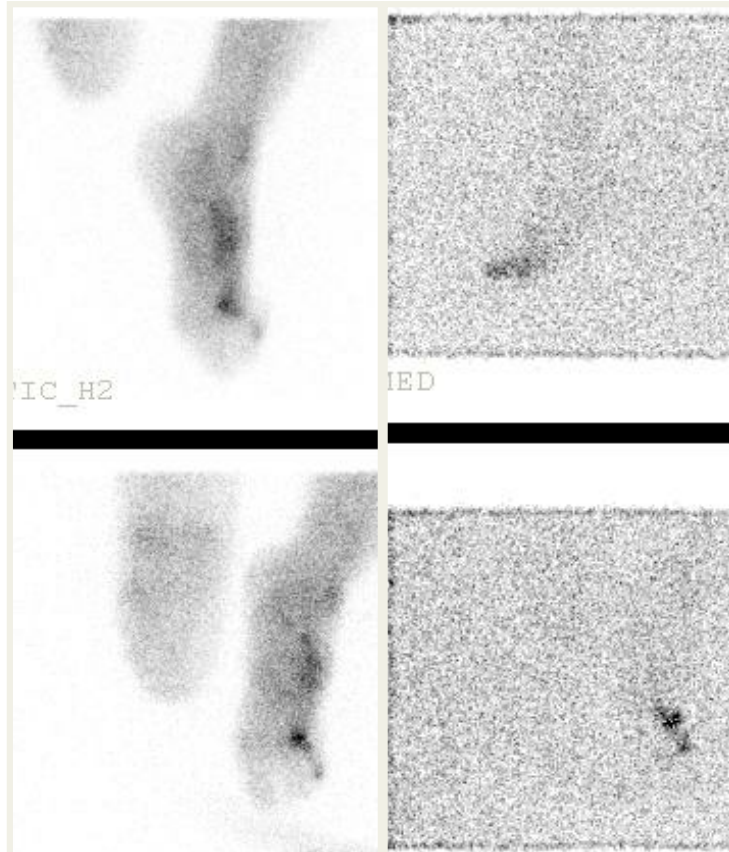
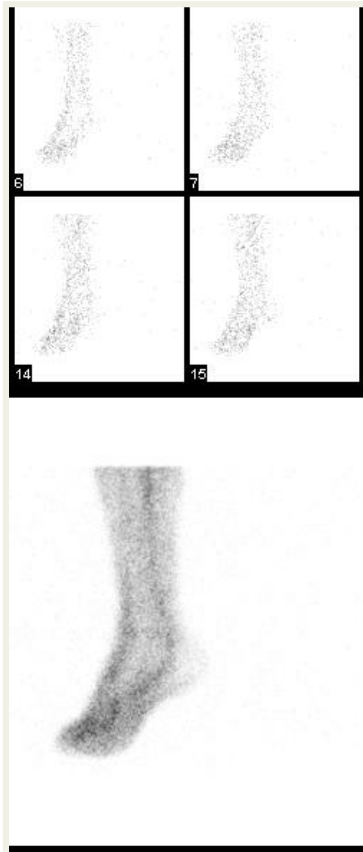


What about PET

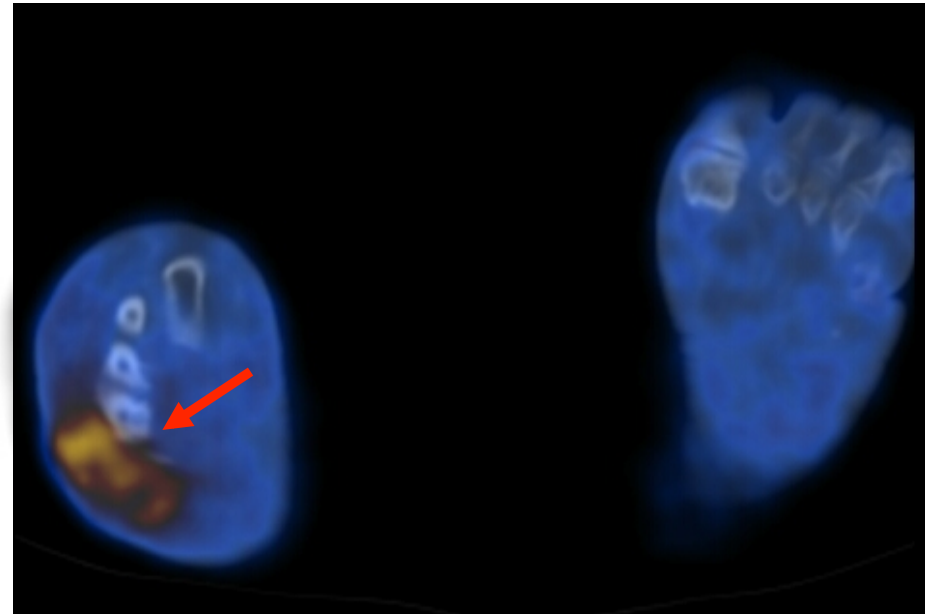
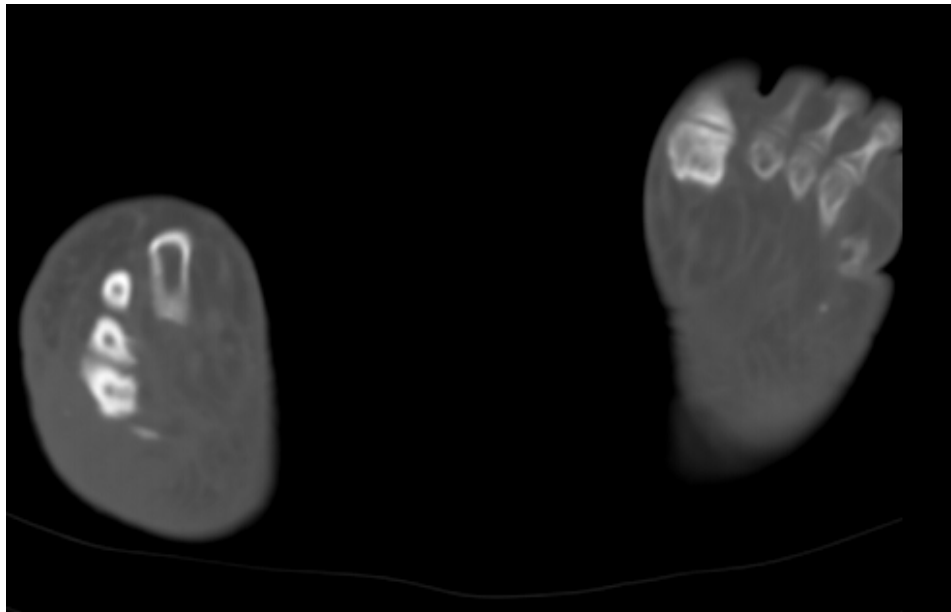
- At present main agent available F-18 FDG
- Thought unlikely to work as competitive with glucose
- However evidence that FDG may indeed have a role in the diabetic foot
- Some contradictions Basu et al 2007 NMC Yes, Familiari et al JNM 2011 No
- SNMMI/EANM joint guidelines on F-18 FDG in infection state limited data but can be used in diabetic foot infection

Diabetic foot

NM investigations for osteomyelitis

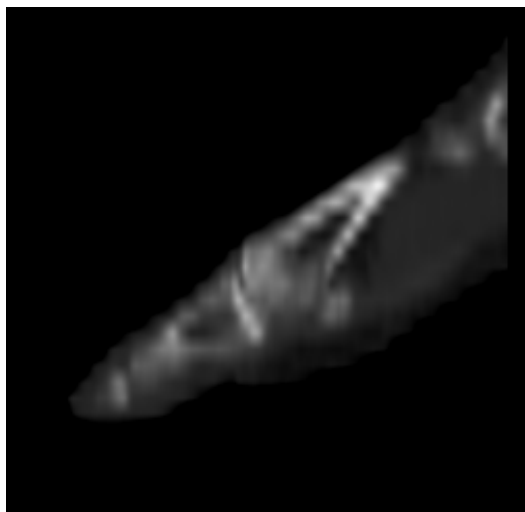
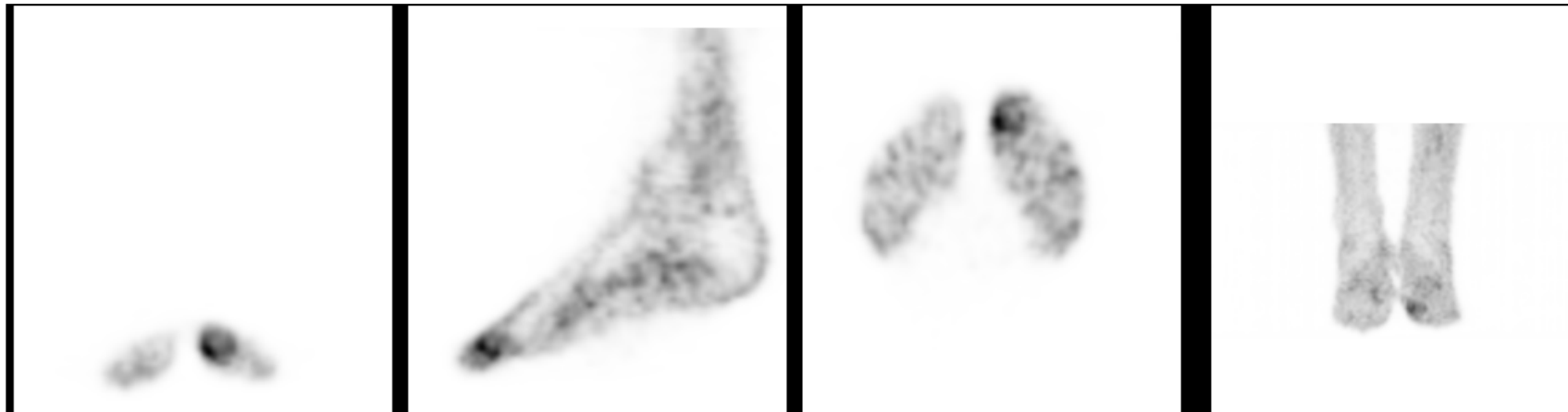


F, 43, Non-healing ulcer, lateral aspect rt. foot
suspected osteomyelitis



Diagnosis of osteomyelitis

Local signs of infection involving the left 1st toe.





Thank you for listening

