

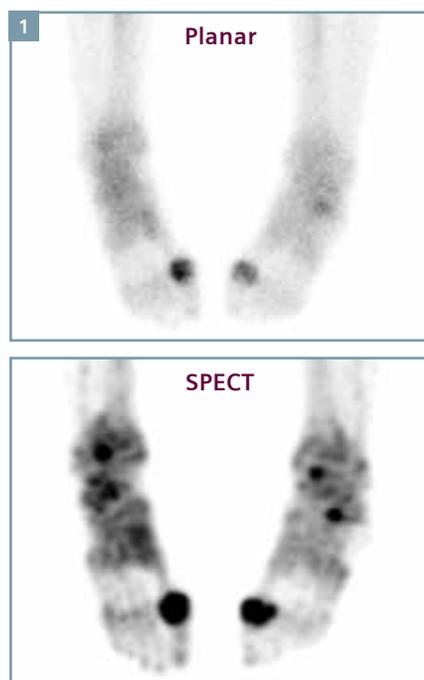
Case Study

Differentiation of Osteoarthritic Changes from Cortical Stress Fracture by xSPECT Bone

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History

A 28-year-old man, who was a triathlon runner, presented with a chronic history of pain in the bilateral first metatarsophalangeal joint pain, which was more severe in the right foot. The patient was referred for a ^{99m}Tc MDP bone scan. Planar and xSPECT study was performed on a Symbia with xSPECT Bone.*



1 A planar spot view of the feet acquired in the delayed phase of a 3-phase-bone scan shows increased uptake in both first metatarsophalangeal joints, the intensity being higher on the right foot. A SPECT MIP reconstruction of the feet shows enhanced uptake in the bilateral first metatarsophalangeal joints along with small focal hot areas in the lower end of tibia and calcaneum on both sides. These focal lesions are not well visualized on the planar study.

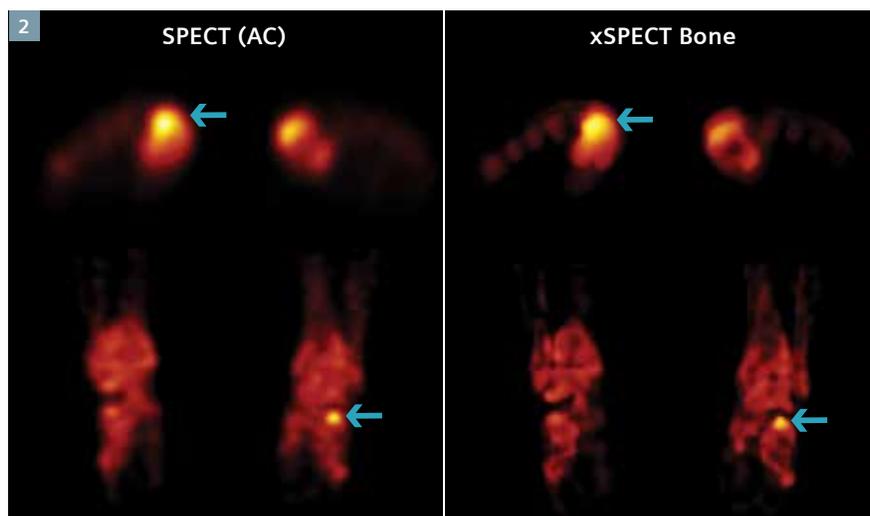
Diagnosis

xSPECT Bone shows focal increase in uptake within the first metatarsophalangeal joint exactly corresponding to the joint space and adjacent subchondral regions. Increased uptake corresponds to osteophytes on the dorsal subarticular margin of the distal end of the first metatarsal. CT shows subchondral sclerosis and joint space narrowing, which in addition to the overhanging osteophytes indicates severe degenerative joint disease. Despite mild sclerosis of the sesamoids, no abnormal tracer uptake is noted within them on either side

xSPECT Bone shows focal increase in uptake of ^{99m}Tc MDP in the right talo-calcaneal joint space (Figure 5) exactly corresponding to a bulky osteophyte within the joint space,

which suggests osteoarthritic changes. The sharp definition of the focal uptake limited to and exactly corresponding to the osteophyte within the joint space with clear delineation of absence of degenerative change in the rest of the joint margins reflects the high resolution and image quality achieved with xSPECT Bone.

A small focal area of slightly increased uptake of ^{99m}Tc MDP in the anterior and lateral articular facet of the lower right tibia is demonstrated on xSPECT Bone (Figure 6). The focal uptake exactly corresponds to a very small osteophyte. CT shows a sclerotic growth plate scar without cortical disruption, displacement or joint space alteration. xSPECT Bone shows the articular uptake corresponding exactly to the small osteophyte and clearly separate and distinct from the growth plate sclerosis.



2 A comparison of xSPECT Bone and conventional SPECT (AC) shows sharper definition of ^{99m}Tc MDP uptake in the articular surface of distal end of the bilateral first metatarsals, as well as a small focal hot lesion in the left talo-calcaneal joint space.

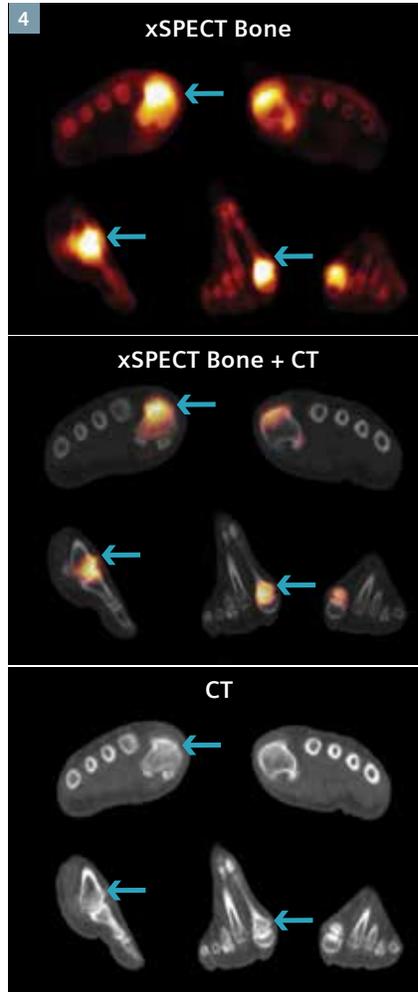
Comments

Absence of significant uptake at the tibial cortical growth plate sclerosis and exact coregistration of tibial articular surface uptake to a very small osteophyte suggests that the articular uptake is related to osteoarthritic changes rather than stress cortical injury. xSPECT Bone could help physicians identify early osteoarthritic changes related to small osteophyte and exclude cortical stress injury, which is also common in long distance runners. Ongoing growth of the tibial articular spur may lead to anterior impingement. Definition of osteophyte reflecting osteoarthritic changes and differentiation from stress injury by xSPECT may direct more proactive management to prevent subsequent development of anterior impingement.

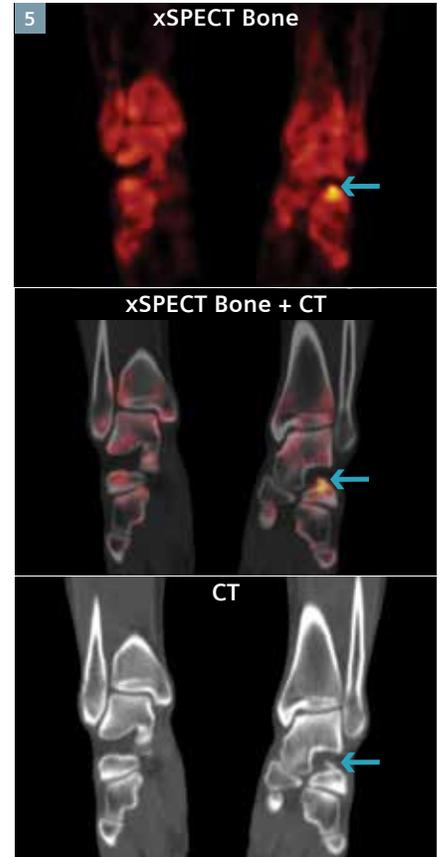
Examination Protocol

Scanner	Symbia with xSPECT Bone
Scan dose	25 mCi (925 MBq) ^{99m} Tc MDP
Scan delay	3 hours post injection
Parameters	64 frames, 25 sec/frame
CT	130 kV, 60 eff mAs, 3mm slice thickness

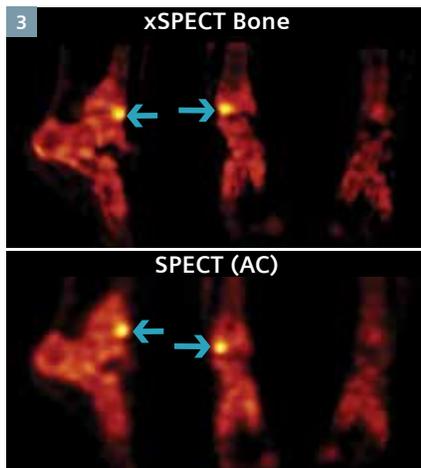
* Symbia Intevo and xSPECT are not commercially available in all countries. Due to regulatory reasons their future availability cannot be guaranteed. Please contact your local Siemens organization for further details.



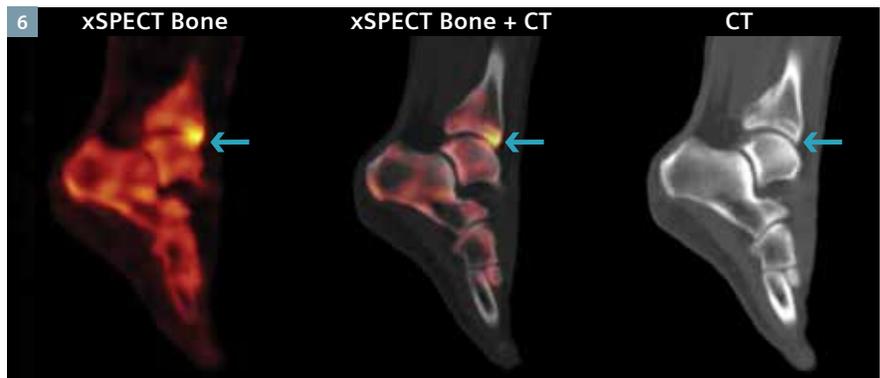
4 xSPECT Bone, Fused xSPECT Bone + CT and CT images show severe degenerative changes in the first metatarsophalangeal joints.



5 xSPECT Bone, CT and fused images of CT and xSPECT Bone show hypermetabolic osteophyte in the Talo-Calcaneal joint space suggestive of osteoarthritis.



3 A comparison of xSPECT Bone and SPECT (AC) shows sharp delineation of focal uptake at the articular surface of lower end of right tibia.



6 xSPECT Bone and CT shows focal increase in uptake at the anterior edge of the tibial articular surface corresponding to a small osteophyte. The xSPECT Bone and CT fusion image shows the uptake to correspond exactly to the anterolateral edge of the articular surface without involving the cortical sclerotic growth plate scar.