Trauma and sports medicine
Traumatismes et médecine sportive
Trauma en sportgeneeskunde
Soon after fracture → A: Early periosteal response (acute phase)
  Early bridging callus
  Angiogenesis
  Intense cellular activity → Early increased radiopharmaceutical uptake
  Long before RX changes
  (24 – 48 hours: uptake in about 90% of cases --- > 100%)

B: Process of calcification (subacute phase)
followed by endochondral calcification → Persistent uptake
Progressive mature laminar structure
(for about 3 months)

C: Healing phase → Progressive normalization of uptake
(several years)
Scintigraphic alterations
-observed long before radiographic changes
  (especially if RX encounters difficulties: small bones of hands)

-can ascertain whether complications occur
  (infection, avascular necrosis, neuroalgodystrophy, pseudarthrosis)

-history of the patient has to be known
  (especially in case of search for metastases: during healing phase, uptake can be observed for years)
Polytrauma: multiple fractures: ribs, sternum, pelvis, sacrum (left part), Open fracture of distal part of right tibia, ankle bone and adjacent calcaneum: osteitis ?
Same patient: leucocytes scintigraphy indicates the presence of osteitis of the right calcaneum, well demonstrated by SPECT/CT fusion images.
Severe unsuspected injury of sacro-iliac joints and sacrum 3 days after a fall. RX of pelvis are negative.
Sacral insufficiency fracture is characterized by H-shaped accumulation identified in both sacro-iliac joints and sacrum.
Polytrauma: ribs, right knee, left foot, left mid radius. A neuroalgodystrophy was clinically suspected (left hand) and patient complained from the neck.
Same patient: neuroalgodystrophy added to a fracture of left radius hyperkinetic stage
Same patient: lesion of the right part of the second cervical vertebra: interest of SPECT/CT fusion imaging
Recent pertrochanteric right femoral fracture in an elderly osteoporotic patient. It must be kept in mind that avascular osteonecrosis of femoral head can occur.
Painful wrist

-Radiographs can remain negative even two weeks after the trauma ➔ Scintigraphy is helpful to detect Fractures
- distal radius
- carpal bones
- other lesions: osteoid osteoma…

- SPECT can be helpful in case of doubtful planar image

- Three phase bone scan should be performed if neuroalgodystrophy is suspected

- Search for eventual avascular necrosis and pseudarthrosis
Distal part of right radius fracture, RX negative
Unsuspected semi-lunar fracture
Patient presenting with R wrist pain after a fall 4 days earlier. RX negative, planar scan: doubtful. SPECT/CT indicates a fracture of scaphoid bone.
Children

-Difficulties to obtain precise history of trauma or correct location of pain (reported pain)

-Total bone scan is mandatory (unsuspected sites of fracture-s-): especially if suspicion of abused child. Note that radionuclide procedure is less reliable than RX in case of skull fracture because of a low osteoblastic response
Abused child with a fracture of a right rib: Scintigraphy is often helpful to detect unsuspected fracture sites.
Bursitis

Trochanteric bursitis: traumatic cause of pain (fracture) has to be excluded.
Inflammation related to tendon insertion is associated with periosteal reaction and increased uptake of tracer by great trochanter.

Other sites of bursitis: olecranon, poplitus bursea.
Left trochanteric bursitis: increased uptake of tracer: a bone scintigraphy, b 67 Ga: planar image c SPECT/CT fusion of 67 Ga scan indicating periosteal inflammatory reaction (arrow)
Trauma and sports nuclear medicine

-Shint splint
-Bone bruising
-Stress fracture
-Meniscal injuries
-Pubic osteitis
-Bursitis, epicondylitis (tennis elbow), fractures (wrist, etc….)
Shint splint

Shint splint (jogging)
In case of tearing of the fibers anchoring muscle to periostum, periosteal reaction occur, with as a result increased uptake of bone seeking agents (typical delineated uptake of cortical tibial shaft)
Bone bruising

Acute injury produced by direct trauma at a level of force that leads to trabecular microfractures without overt cortical disruption (RX and CT generally -) (sites include ankle, calcaneum, hip and wrist): excess of jogging
Patient complaining from left foot since a few days (football player)
Bone scintigraphy shows hyperactivity of proximal part of fourth metatarsal bone indicating metatarsal stress fracture
Lesions of the knee

Lesions of the knee are best detected by SPECT. Meniscal injuries present as a crescentic pattern in the tibial plateau.

Injuries of knee ligaments can also be observed as increased focal uptake at insertion sites.

Patient with right knee injury involving internal tibial plateau (subchondral infarction + internal meniscus)