Bone scan and vascular disorders
Scintigraphie osseuse et désordres vasculaires
Botscan en vasculaire stoornissen
Avascular necrosis

Femoral head

Fem. head necrosis affects frequently patients who need steroid treatment, alcoholic patients and those with a subcapital neck fracture

Other sites of AVN:
- second metatarsal head (Freiberg’s disease)
- navicular (Kohler’s disease)
- lunate (Kienbock’s disease)
- scaphoid

More frequent if blood supply derived from limited vascular distribution

AVN can be a consequence of disruption of arterial flow (mechanical interruption, embolism): rapid death of osteocytes (cold phase)

Surrounding bone response: necrotic tissue removed by osteoclasts new bone formation (osteoblastic response: increased activity)
Posttraumatic osteonecrosis

More frequent in displaced fractures of femoral head

Mechanism: compression/transsection/occlusion by fracture of
- femoral circumflex artery (supplies lower femoral head)
- lateral epiphyseal artery (supplies upper half of fem head)
- retinacular arteries (peripheral vessels)

Bone scan: + within 72 hours, MRI: variation of fat cells within marrow after 5 days
Patient operated on from a left subcapital femoral fracture
Increasing pain
Bone scan demonstrated a hypoactivity surrounded by hyperactive osteoblastic activity
Radiographs showed deformation of the head, in favour of AVN
Secondary osteonecrosis

Induced by - high doses of corticosteroids
  (increase of size of marrow fat cells caused by treatment responsible for diminution of arterial blood flow)

-alcohol abuse (initial insult is generally a stress fracture, with induced ischaemia)

Spontaneous osteonecrosis

Joints frequently involved: femoral heads > knees > humeral heads
Osteonecrosis of both femoral heads in a patient under high dose of corticosteroids for asthma (external and superior part of the femoral heads)
Intense accumulation of tracer in medial right femoral condyle
Osseonecrosis of inner condyle
Note: elongated increased uptake by a rib. Origin?
Sickle cell disease

Occlusion of small vessels occurs frequently causing infarction

Weight-bearing areas of long bones frequently affected

Infarction induce photopenia, followed by increased uptake as revascularization occurs

Differential diagnosis: osteomyelitis (frequent in this disease)
Sickle cell disease: infarction(s) in the left femoral shaft (photopenia)  
Increased uptake in right femur (revascularization)
In diseases such as scleroderma, in which obliterative disorders of small arteriolar vessels, fibrosis and increase of skin connective tissue occur, typical findings can be found in the extremities (reduction of bone seeking agents and foci of accumulation confined to the terminal phalanges) (same process of obliteration of vessels, followed by revascularization, as found in sickle cell disease)
Child presenting with a Legg Calve Perthe’s disease of left hip, well seen in Normal position and also in frog position
Pin hole collimator
Complex regional pain syndrome (neuroalgodystrophy)

Associated with an injury, a trauma or neurologic abnormalities

Affects predominantly the extremities

Syndrome occurs after nerve injury (peripheral or central)

Induction of disturbance of autonomic regulation culminating in an abnormal central reflex with as a consequence, vasodilatation followed by vasoconstriction

Patients present with pain, trophic skin changes, edema and swelling. If disease progresses until the late stages, atrophy of the skin occurs

Radiologic findings include patchy bone resorption on a late stage
Trauma ➔ Noxious sensory input ➔ excess afferent impulses induces:

Release of: enkephalins, VIP, prostaglandins, neuropeptides

**Stage I**: inflammation (pain, swelling, edema, flush, hot phase) (vasodilation)

Abnormal spinal signal induces:
More pronounced dysfunction of sympathetic afferent nerve and hyperexcitement of efferent neurons: trophic changes

Progressively: Stage I to II

**Stage II**: cyanosis, atrophy, hypoxia, cold phase (vasoconstriction)

**Stage III**: ankylosis
Osteoporosis of the wrist and periarticular osteoporosis of the fingers in a case of late stage NAD of left upper limb
Neurolagodystrophy of the left Lower limb (1978)

Patient (paratrooper of the Belgian Army) sprained one’s ankle and developed pain, swelling and edema of the foot

Intense articular and periarticular uptake is observed on delayed images (rectilinear scanner)
Quantification indexes include carpal and metacarpal ROI

Dynamic phase calculated on neutral ROI
Vascular phase: different ROI: B: neutral M: distal: reflects predominantly the vascular phenomenon
Stress fracture of the left foot without associated NAD: differential Diagnosis between stress Fracture and NAD
Patient suffering from highly hyperkinetic NAD of right foot
Active paraosteoarthropathy of the right knee