

**High Country Nuclear Medicine Meeting
March 2013**

Low back pain : Sacroiliac Joint Dysfunction

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Outline

- **History of SIJ dysfunction**
- **Pelvic girdle pain syndrome**
- **Epidemiology of SIJ dysfunction**
- **Anatomy and function of the SIJ**
- **Clinical tests – reference standard**
- **Why no imaging?**
- **Imaging findings on SPECT/ CT**
- **Performance of SPECT/ CT**
- **Examples**
- **Conclusions**

History of SIJ dysfunction

First described as a source of low back pain in 1905

Lost in the noise of the intervertebral disc as source of LBP

Rediscovered as a source of low back pain in the peri-partum period in the 1990s (PGP syndrome)

Diagnosed on basis of clinical testing

Goldthwaite JE, Osgood RB. A consideration of the pelvic articulation from an anatomical, pathological, and clinical standpoint. *Boston Med Surg J.* 1905;152:593-601

Mixter WJ, Barr J. Rupture of the intervertebral disc with involvement of the spinal canal. *New Engl J Med.* 1934;11:210-215.

Pelvic girdle pain syndrome

Described in northern European literature in peri-partum women ~ lateralising lower back pain below L5

Incidence of 20% with 8% developing long-term disability

No imaging test – clinical diagnosis with evidence-based criteria ~ European guidelines for diagnosis

Post-traumatic stereotypic symptoms distinguished from PGP by term “sacroiliac incompetence”

Vleeming A, Albert HB, Ostgaard HC, Sturesson B, Stuge B. European guidelines for the diagnosis and treatment of pelvic girdle pain. *Eur Spine J.* Jun 2008;17(6):794-819.

Epidemiology of SIJ dysfunction

15% of low-back pain due to intervertebral disc pathology

85% labelled as non-specific low back pain (non-disc)

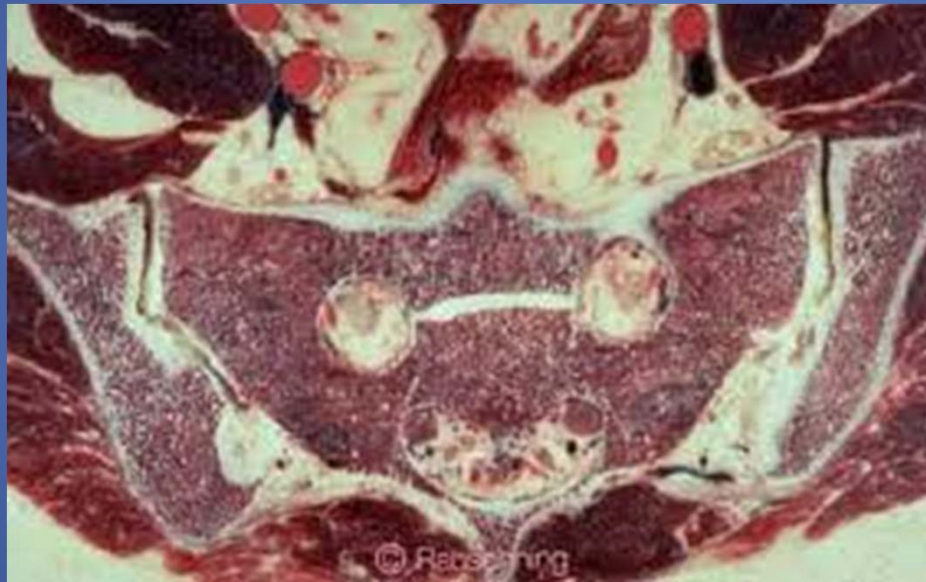
15-30% of non-specific low back pain may be due to SIJ dysfunction

Ehrlich GE. Low back pain. *B World Health Organ*. 2003;81(9):671-676.

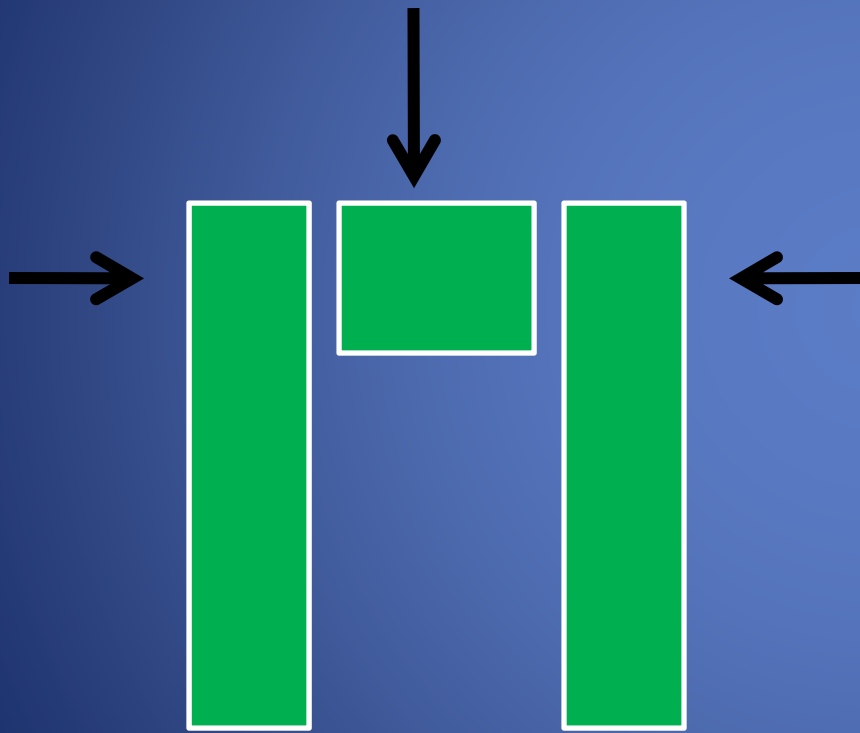
Maigne JY, Aivaliklis A, Pfefer F. Results of Sacroiliac Joint Double Block and value of Sacroiliac Pain Provocation Tests in 54 Patients with Low Back Pain. *Spine*. 15 August 1996 1996;21(1):1889-1892.

Schwarzer AC, Aprill CD, Bogduk N. The Sacroiliac Joint in Chronic Low Back Pain. *Spine*. January 1995;20(1):31-37.

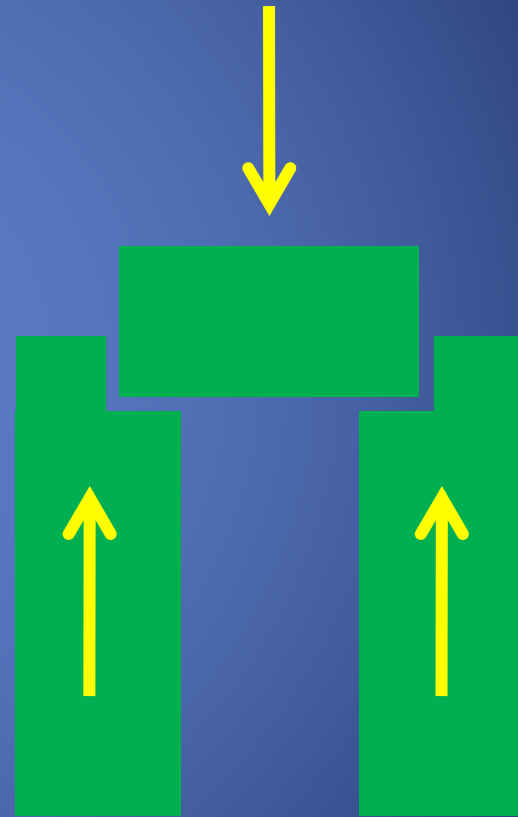
Anatomy & function



Strategies to transfer load

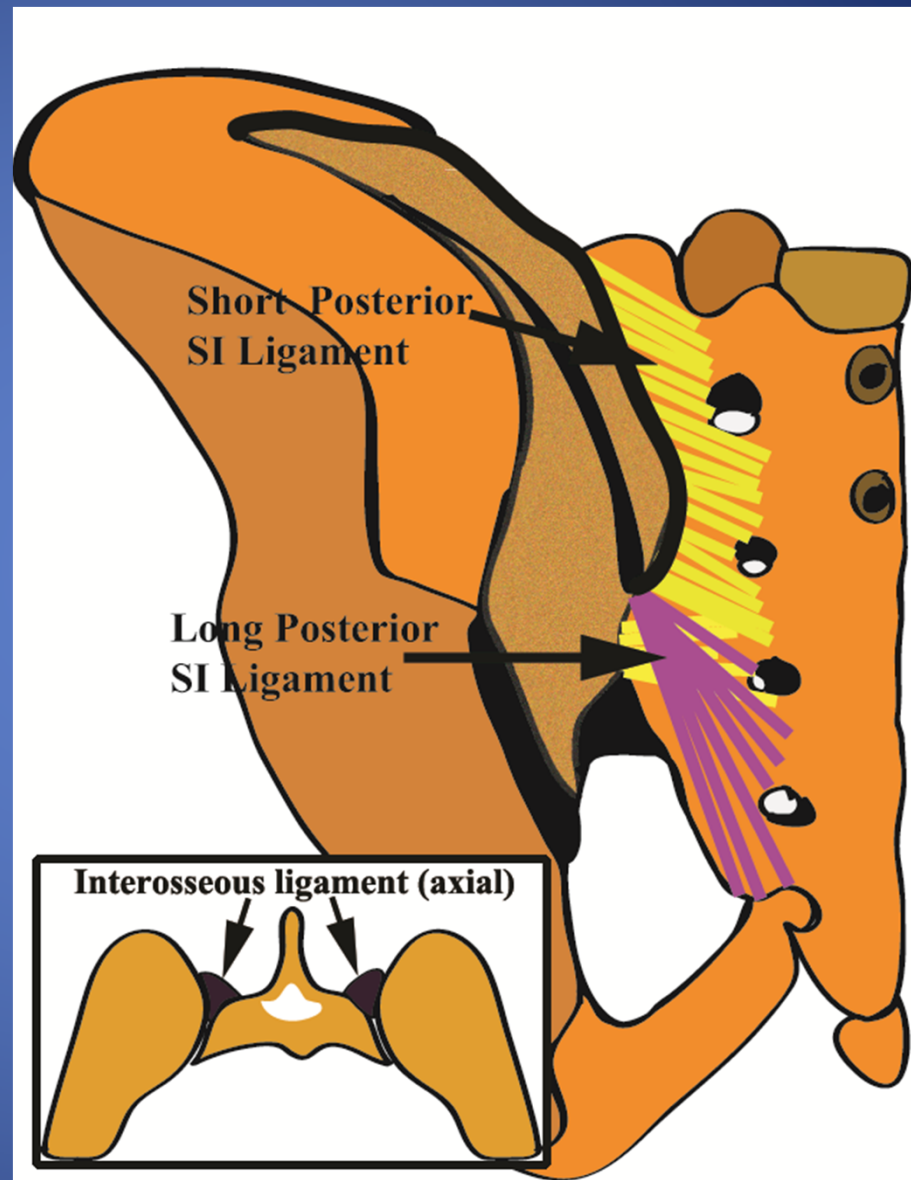


Force closure

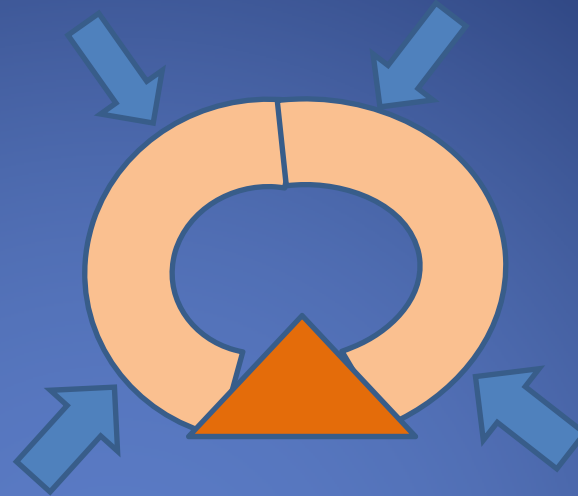


Form closure

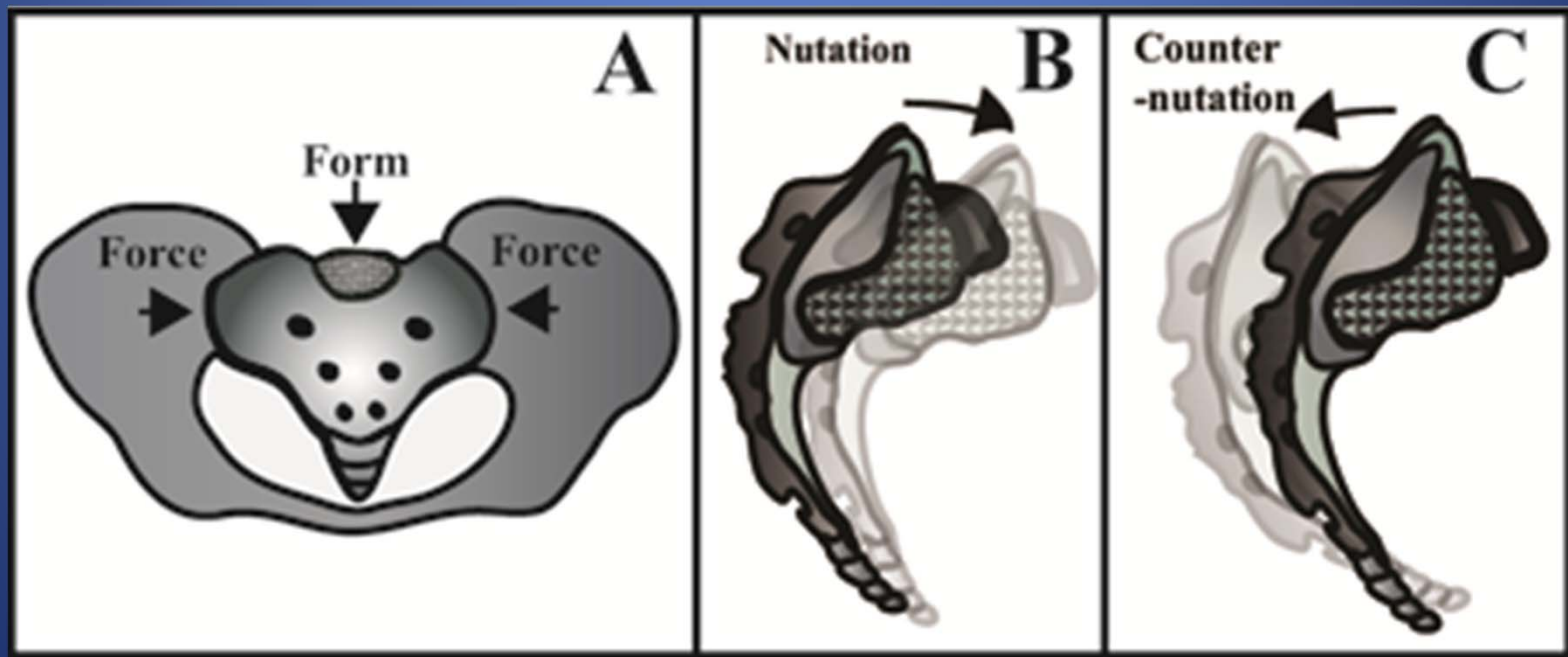
Ligamentous anatomy



Form closure

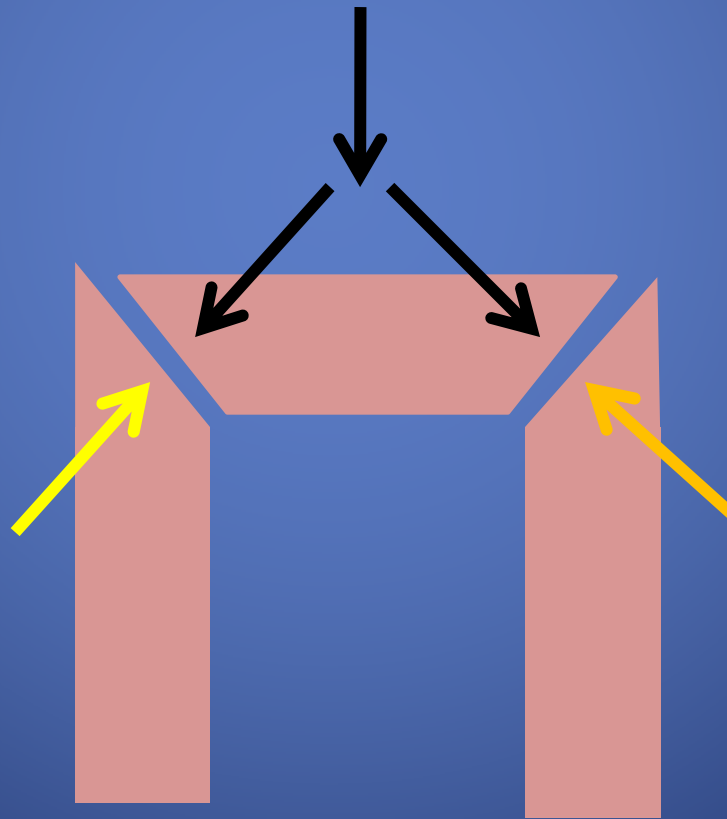


Force closure



Self bracing mechanism

For load transfer



Clinical History

- Typically post pregnancy or post trauma e.g. fall on buttock(s), MVA (foot on brake)
- Worse in loading situations
 - Standing
 - Walking, running, stairs
 - Sitting
 - In and out of car, driving long distances
 - Turning in bed
 - At times, urge incontinence / dyspareunia

Common clinical examination features

- Buttock pain (+/- radiation to thigh)
- “Hip” pain (lateral buttock to trochanter)
- Trochanteric pain (+/- bursitis)
- ITB tightness
- Glut med/piriformis failure excess demands on TFL / ITB
- Lateral knee pain (fatigue, overuse) →
- Pain in groin / symphysis

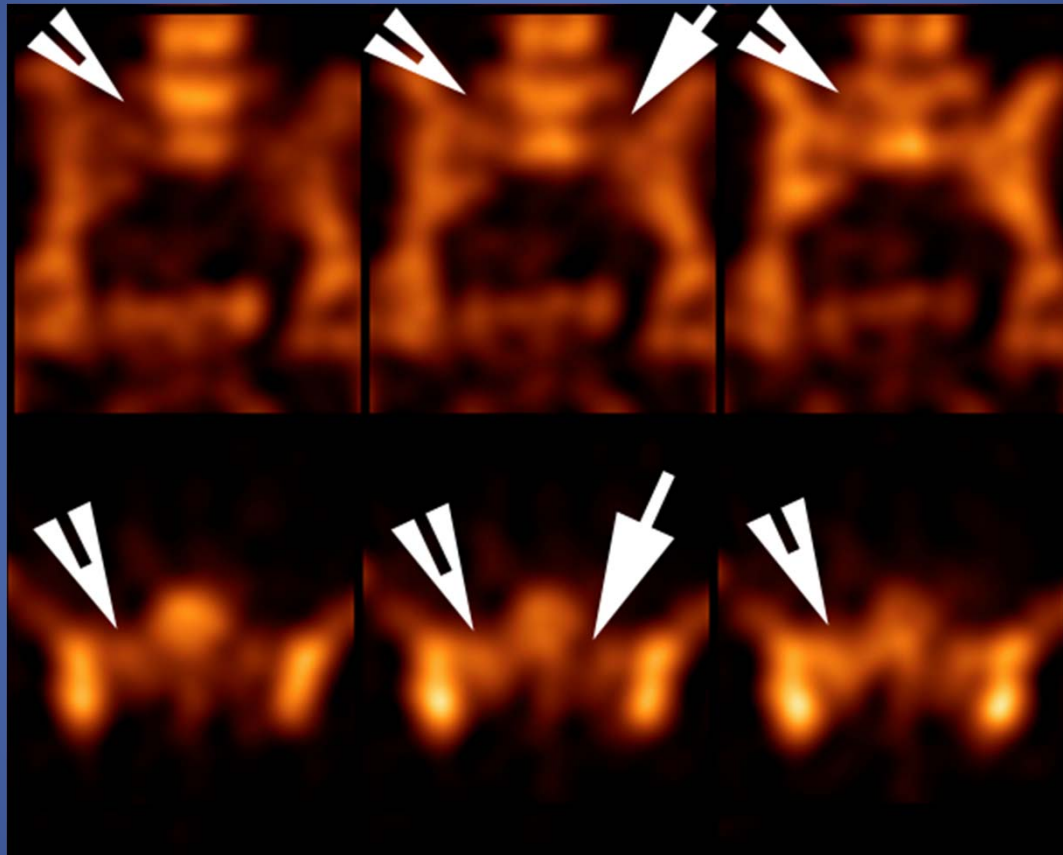
Clinical Examination (validated)

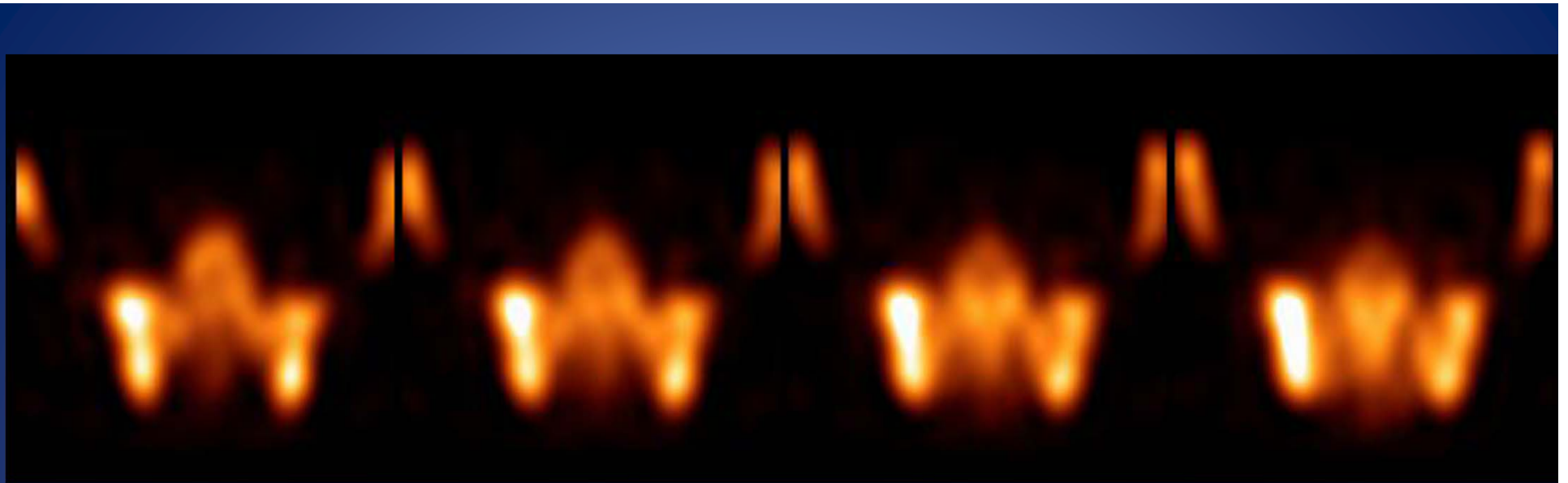
- **Stork test (Hungerford)**
- **Posterior pelvic pain provocation test PPPP or P4 (Ostgaard, Sturesson)**
- **Active Straight Leg Raise, ASLR (Mens)**
- **Tender Long Dorsal Sacro-Iliac Ligament, LDSIL (Vleeming)**

Why no imaging test ?

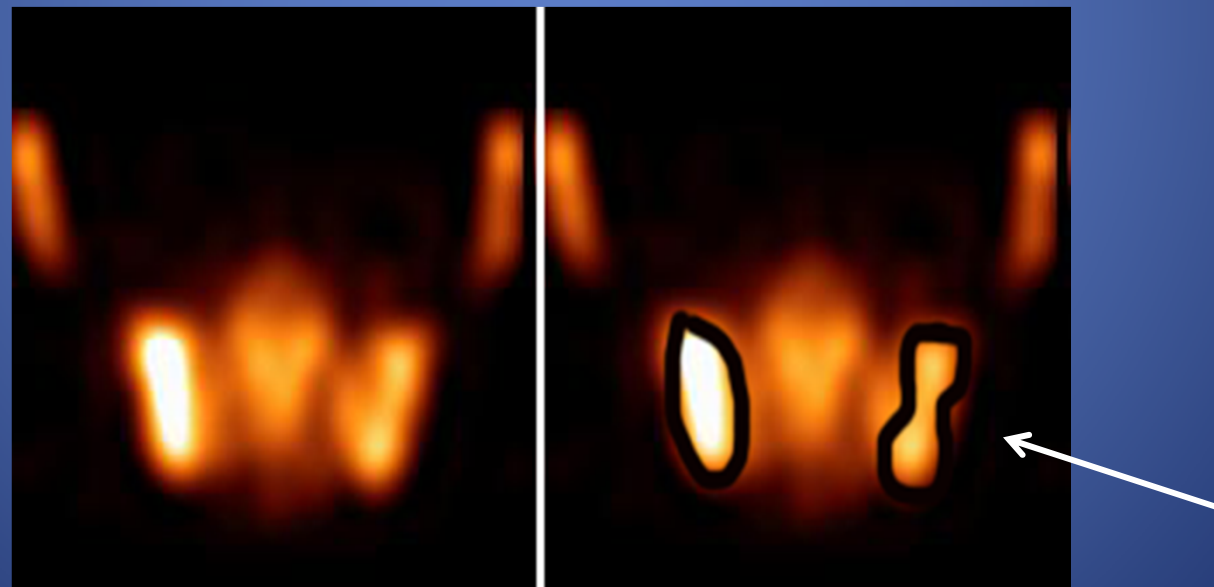
- Slipman (1996) failed to show utility of SPECT (sens 30%)
- Fundamentally this is a functional disorder
- Similarities to shoulder with scapulohumeral rhythm
- MRI not helpful in 3 papers

Observations on SPECT / CT



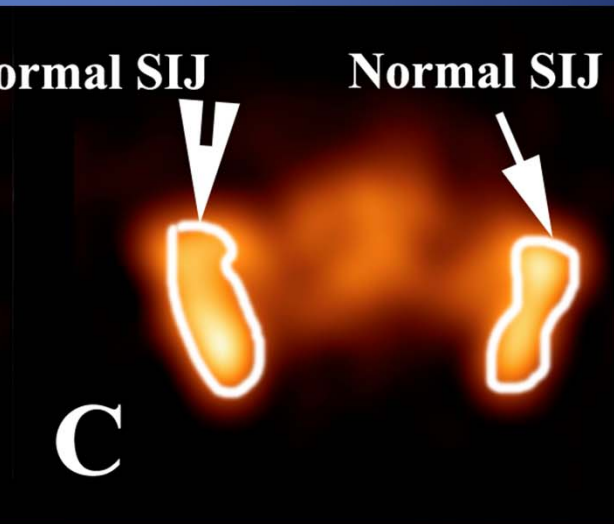
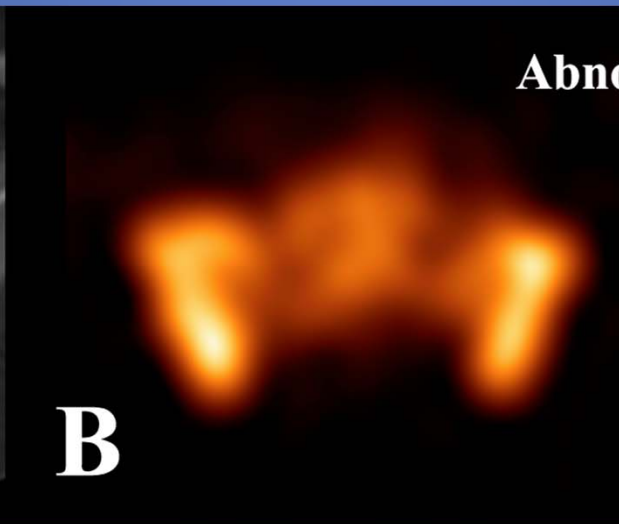
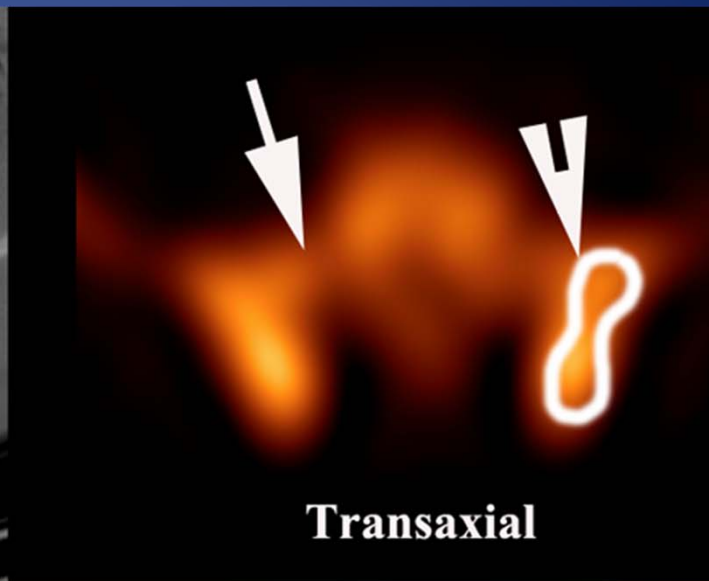


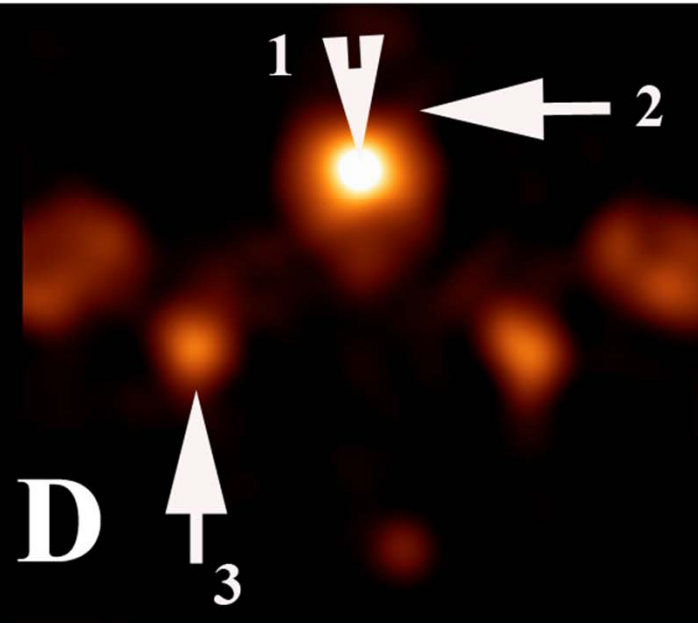
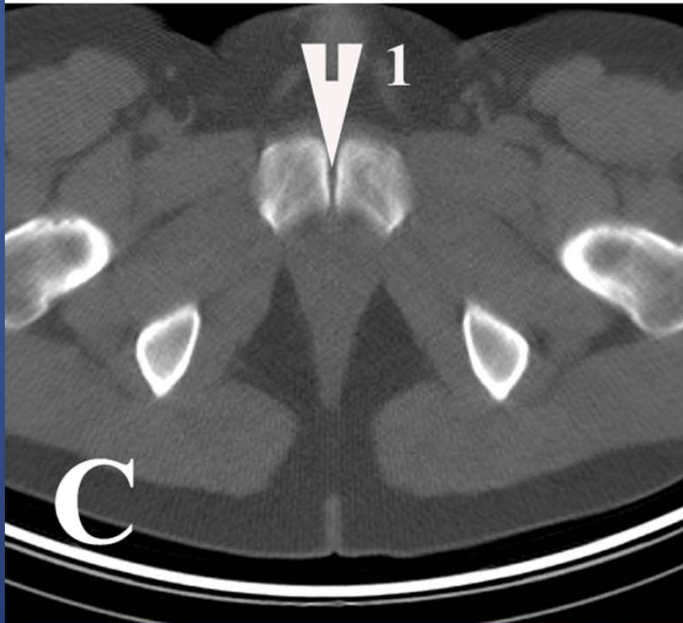
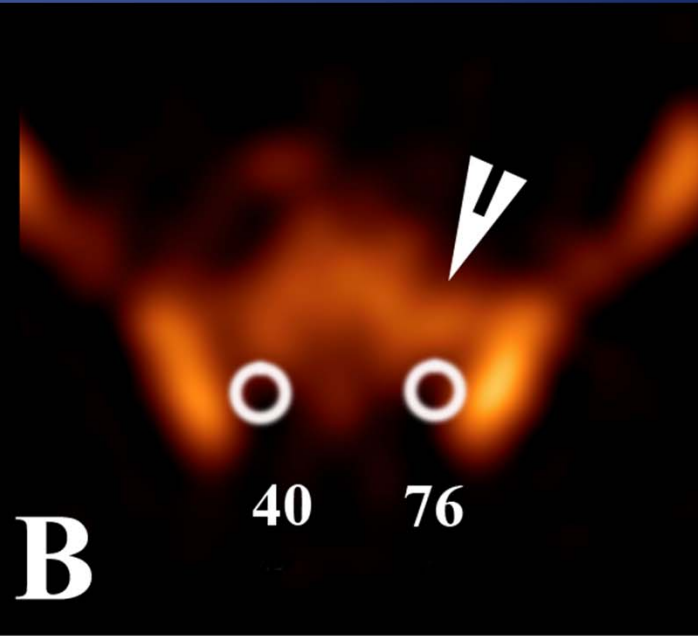
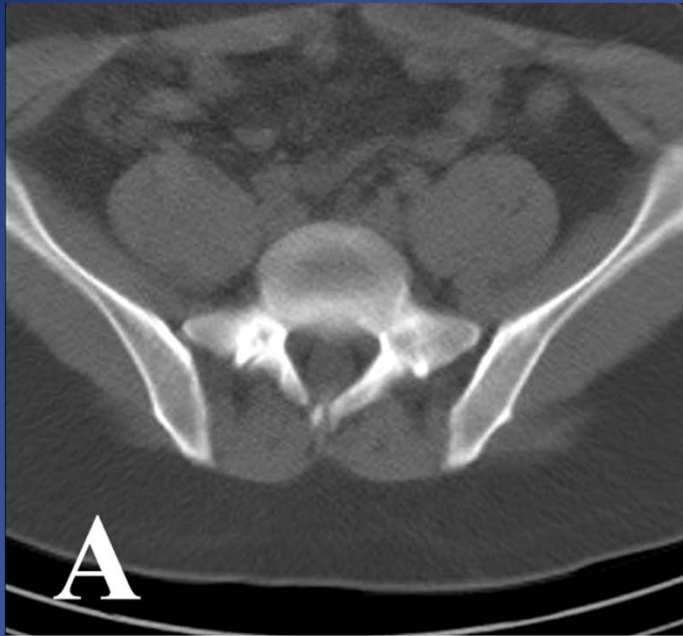
Dumbbell



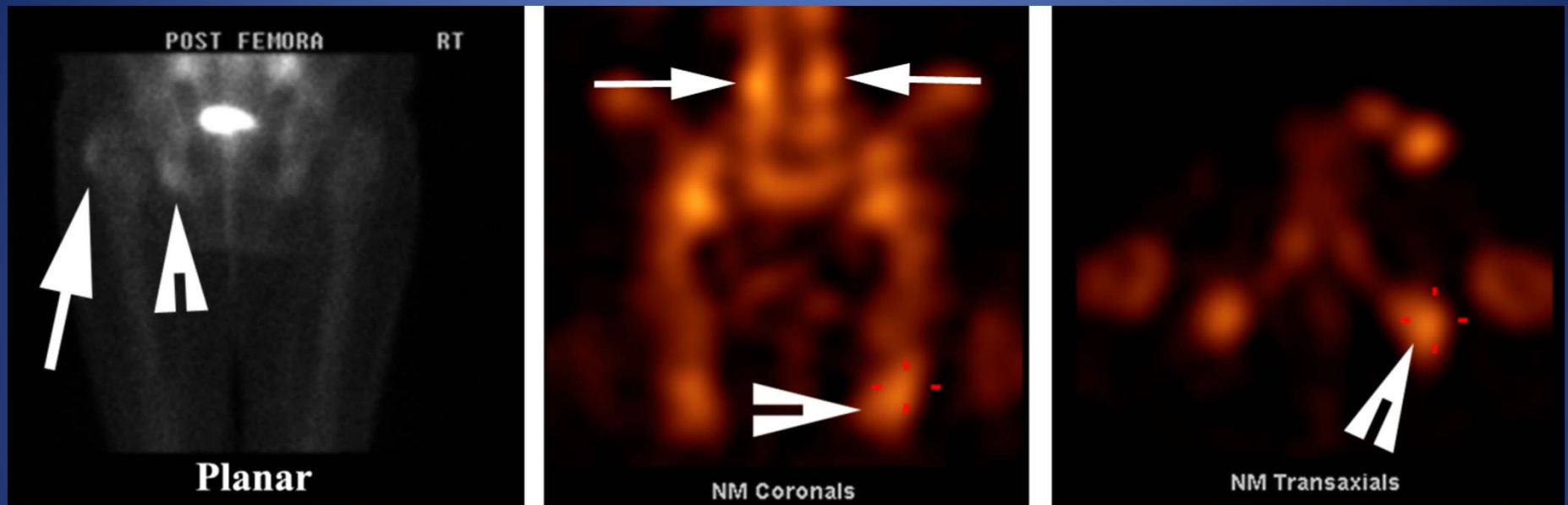
Posterior ligamentous attachment to ilium

Normal SIJ

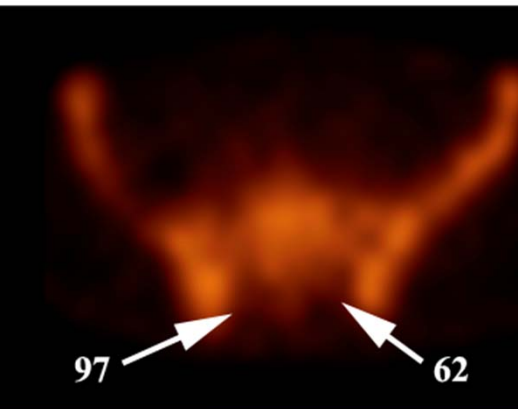
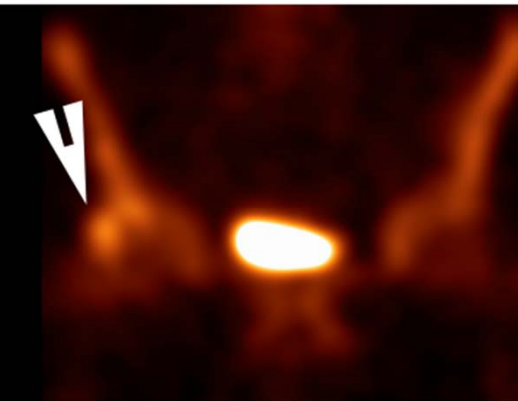
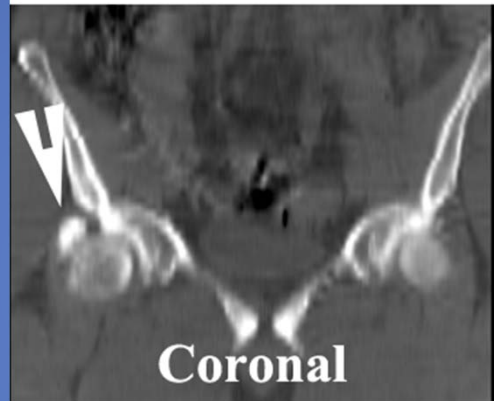
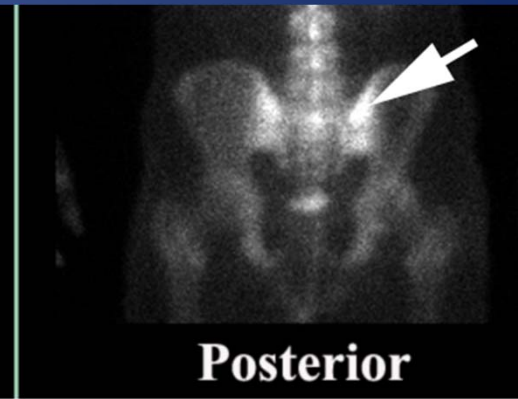
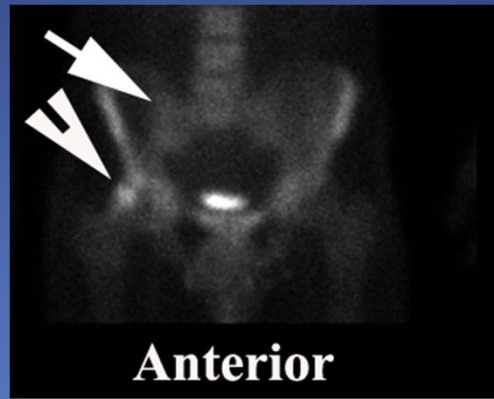




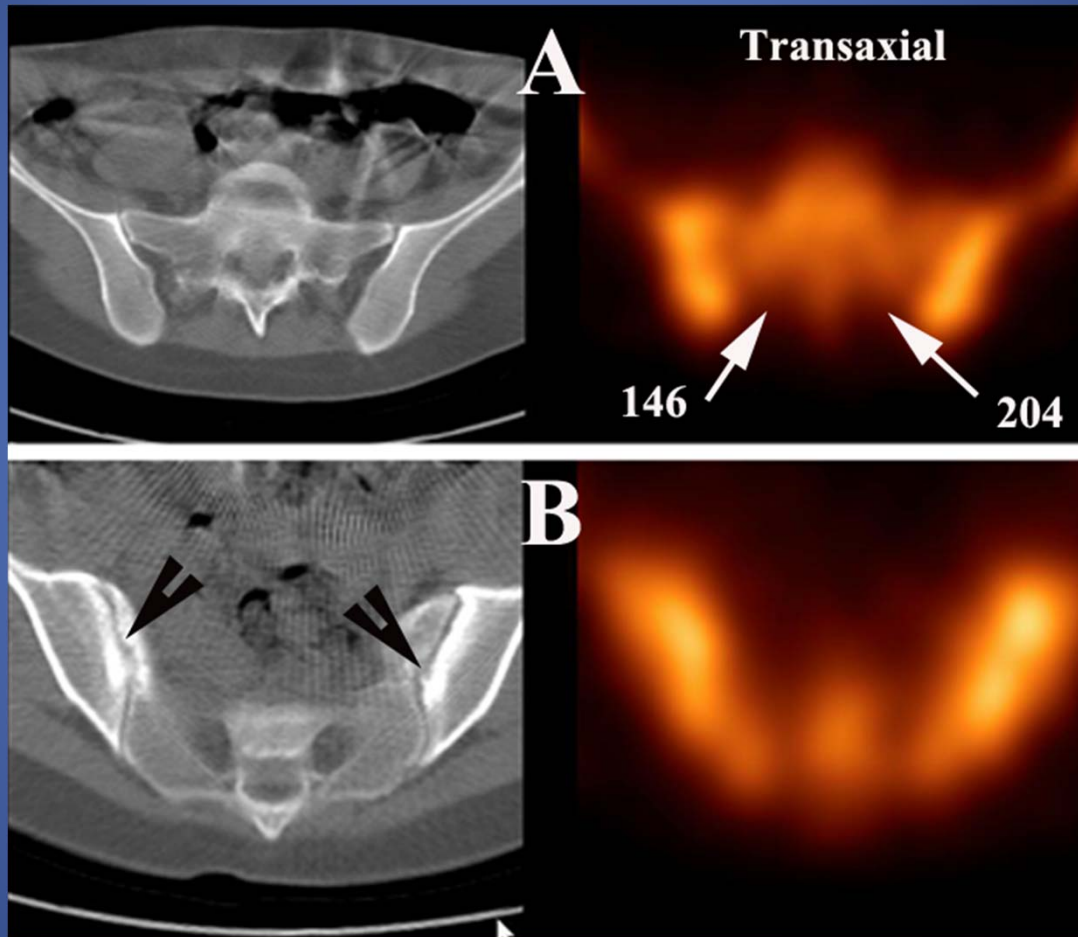
Hamstring enthesopathy



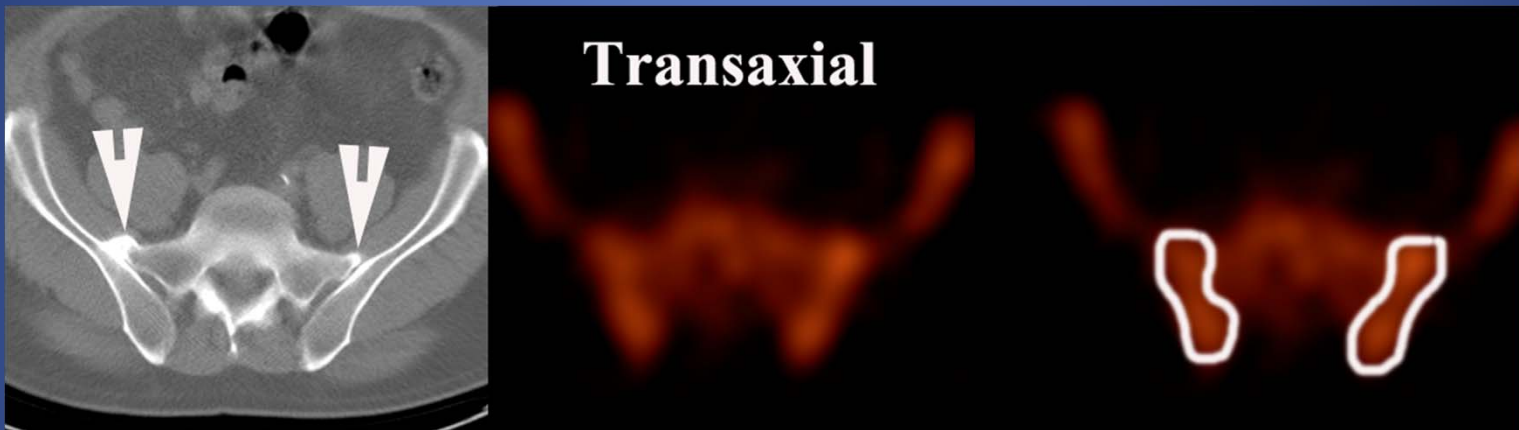
SIJ incompetence and Hip impingement



SIJ incompetence and sacroiliitis



SIJ degenerative disease



SIJ stress fracture

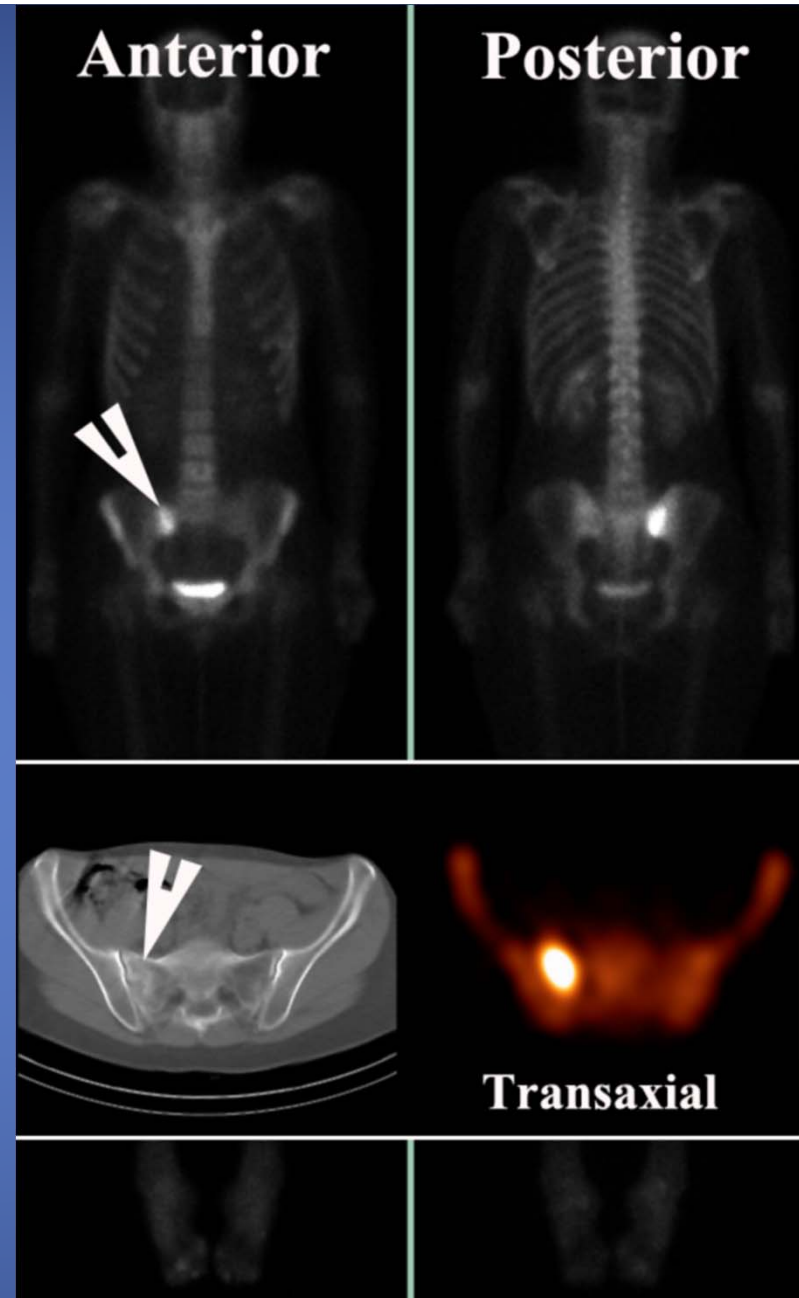


Image findings

Main findings

- **Increased uptake**
 - Superior SIJ
 - Posterior soft tissues (interosseous lig)
 - Ligamentous attachment to ilium (dumbell sign)
- **Increased sclerosis of the joint**

Associated findings

- **Hamstring entesopathy**
- **Adductor entesopathy**
- **Hip impingement**
- **Acetabular tears**
- **Osteitis pubis**
- **Disc, facet joint degeneration**

SPECT/ CT performance

High specificity when compared to patients with either no lower back pain (mainly oncological screening in asymptomatic patients), non-specific lower back pain or patients with facet joint or intervertebral disc disease.

Sensitivity was 95% and specificity 99%. Positive predictive value was 99% and negative predictive value 94%. Reproducibility of inter/ intra-observer reporting was good with a kappa value of 0.85.

ROC analysis, uptake in the upper joint and posterior ligamentous structures had the best diagnostic criteria, with the area under the curve being 1.0.

Imaging Findings in 250 cases

Increased uptake

Superior SIJ / soft tissue ligaments 100%

Joint sclerosis 98.8%

Increased uptake other sites Same side Opp. side Bilateral

Hamstring enthesopathy 39% 61% 23%

Adductor enthesopathy 69% 57%

Hip impingement 72%

Other (Lx, #, OP etc) 57%

Others include sacroiliitis (3 cases), fractures, osteitis pubis, facet joint and disc disease, other enthesopathies

Conclusions

- **PGP/ SIJ incompetence is more frequent than initially thought**
- **Diagnosis not difficult but should be considered when lateralising lower back pain**
 - **Subtle changes on SPECT/ CT**
- **Exercise programme needs to be VERY specific and well targeted – response rate of 85%**