

ΜΡΙ ΦΛΕΓΜΟΝΩΔΟΥΣ
ΙΕΡΟΛΑΓΟΝΙΤΙΔΑΣ
στην ΑΞΟΝΙΚΗ ΣΠΑ

Χ. ΧΡΥΣΙΚΟΠΟΥΛΟΣ

ΑΚΤΙΝΟΛΟΓΟΣ

ΕΥΡΩΔΙΑΓΝΩΣΗ ΚΕΡΚΥΡΑ

Aims

1. To know the impact of imaging in the clinical management of axial SpA
2. To understand the current use and limitations of plain X-Rays in axial SpA
3. To recognize the MRI findings in chronic and active Inflammatory Sacroiliitis

Background

- Inflammatory **sacroiliitis** key finding in axial SpA
- 5 subgroups
 - *(AS, PsA, Reiter's/Reactive, Enteropathic, Undifferentiated)*
- SIJ
 - *The most difficult joint in the skeleton to image adequately (A. Brower)*

ASAS Classification Criteria for axial spondylarthritis (SpA)

In pts <45 y with ≥ 3 m back pain

Sacroiliitis on imaging*
+ ≥ 1 SpA feature

OR

HLA-B27
+ ≥ 2 SpA features**

* *Active lesions on MRI or definite Ro findings according to modified NY criteria*

** *arthritis, enthesitis (heel), uveitis, dactylitis, psoriasis, Crohn's, good response to NSAID's, family Hx for SpA, HLA-B27, elevated CRP*

Axial SpA

- *Ro changes develop >5y from symptom onset*
- 7-9y delay in diagnosis



Enthesitis

- SpA principally involve the enthesis as the primary target of the immune response
- ***Enthesis: insertion of tendons, ligaments and articular capsule***

» Benjamin M, McGonagle D. J Anat 01 / Benjamin M, et al. Arthritis Rheum 04

» McGonagle D, et al. Arthritis Rheum 2003

Imaging evaluation of SpA

- **Radiograph SIJ:**
 - 1st line imaging, low cost and available
 - Useful in monitoring disease progression
 - 1 AP view with 30-35° cranial angulation
 - **Low sensitivity for early disease**
- **MRI:** method of choice

Radiological criterion + at least one clinical

New ASAS criteria 2009

Modified New York criteria

- Grade 0: normal
- Grade 1: suspicious changes
- Grade 2: minimal changes: small localized areas with erosion or sclerosis, without involvement of the joint width
- Grade 3: definite changes: moderate or advanced sacroiliitis with **1 or more** of: erosions, evidence of sclerosis, widening, narrowing, or partial ankylosis
- Grade 4: severe changes: total ankylosis

Criterion

Bilateral grade \geq II

Unilateral \geq III

AS: Early disease

- **Sacroiliitis**: hallmark of AS, especially in early stage
- Radiographs are normal, Sens. Scintigraphy:50-70%
- **MRI**: method of choice

➤ HLA-B27 + ≥ 2 SPA features: Sens 85-95%, Spec 90%

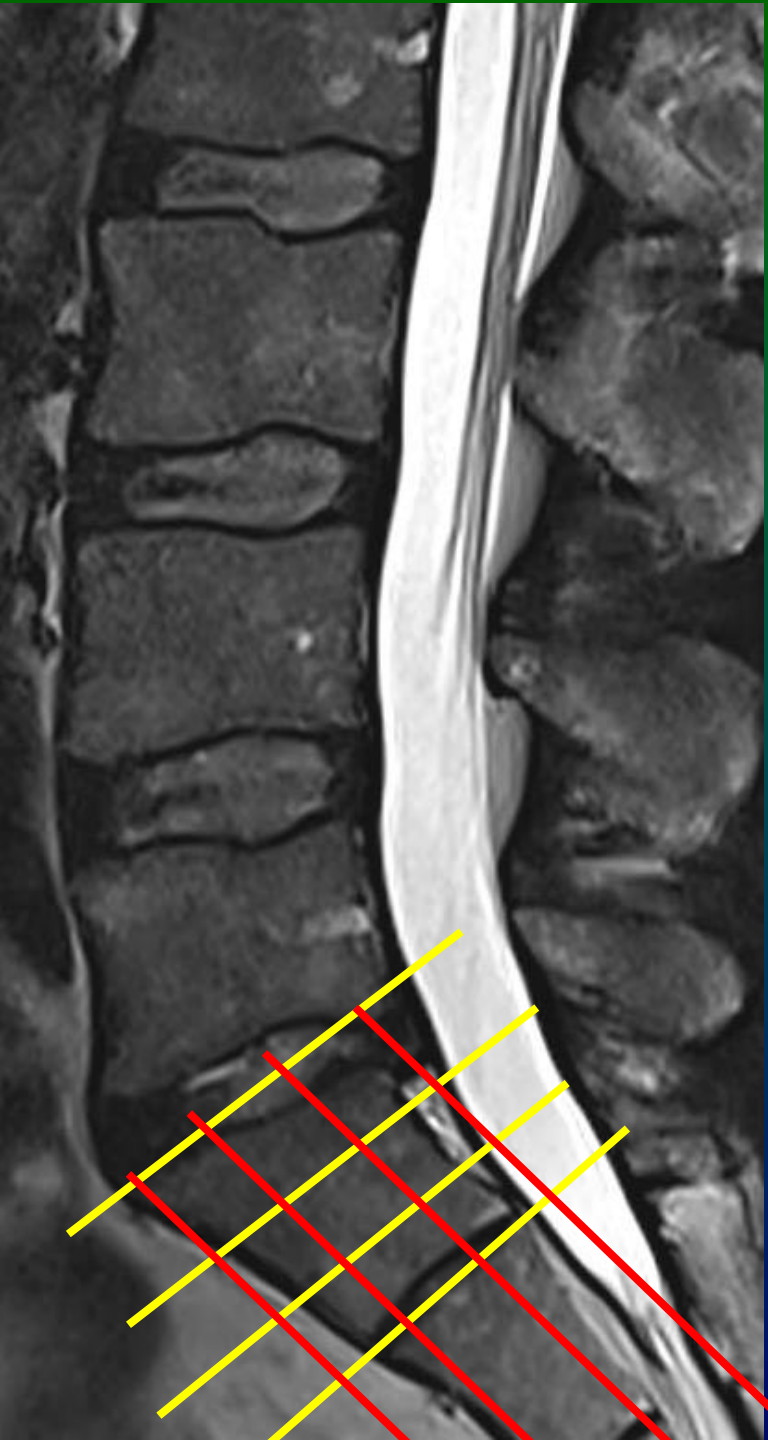
➤ MRI, sacroiliitis: >90% > 90%

➤ MRI + ≥ 1 SpA feature 97.2% 94.2%

• **Subchondral BME**

Normal SIJ anatomy

- **Anterior:** Inferior 1/3 and AntSup are truly **synovial**
- **Posterior:** **syndesmotic** joint traversed by strong interosseous ligaments



MRI SIJ

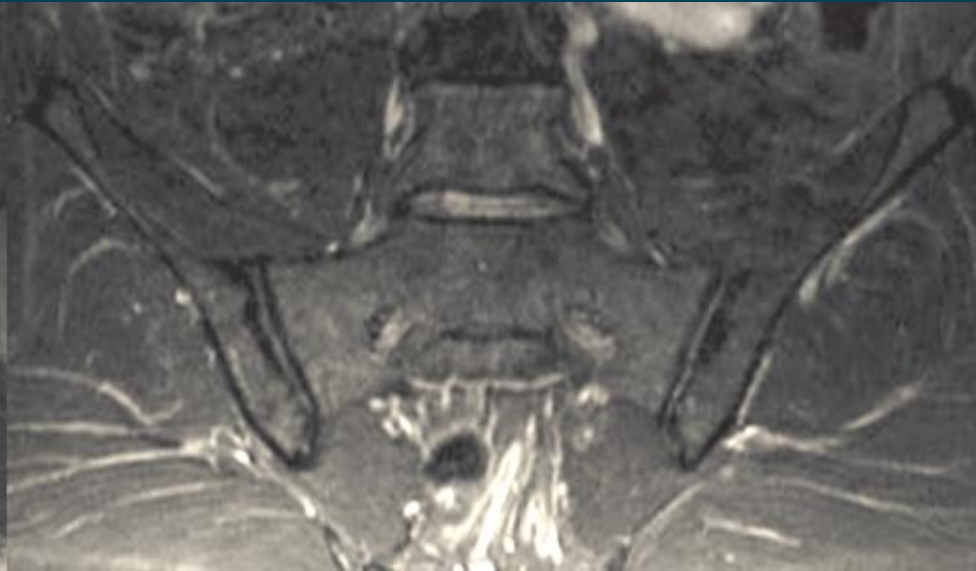
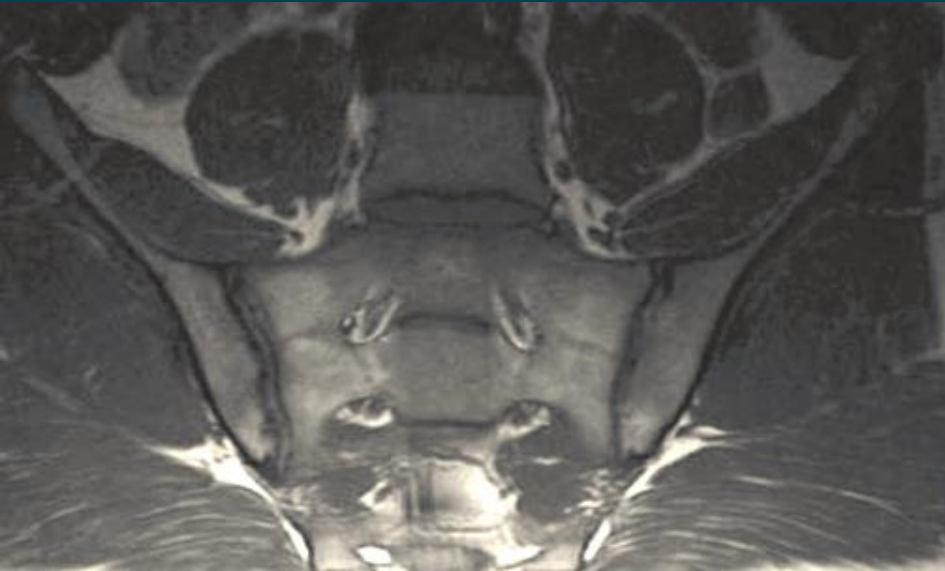
- Oblique coronal
 - T1-w
 - STIR
- Oblique axial
 - FS PD/T2
- Both planes
 - Gd FS T1

Normal SIJ

- Oblique coronal

T1-w

STIR



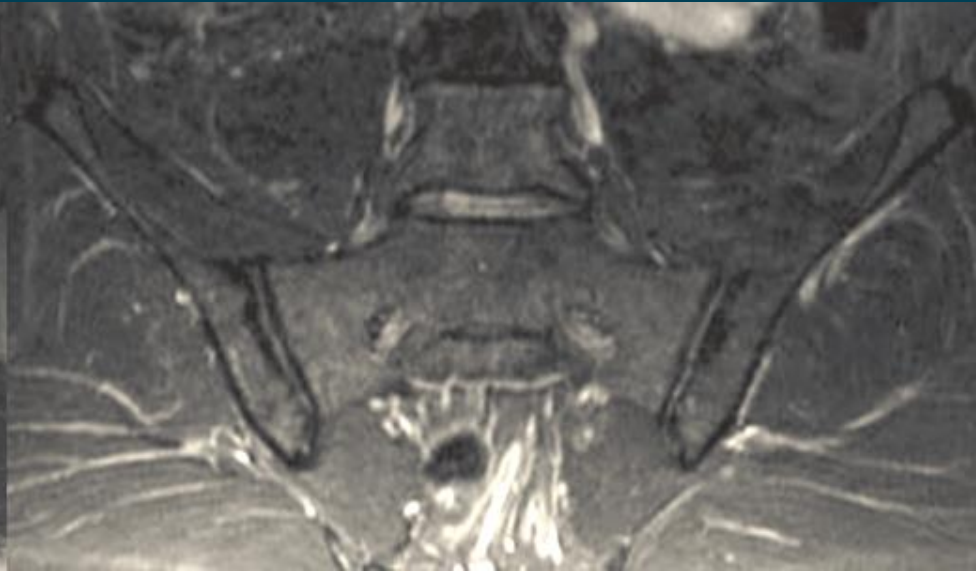
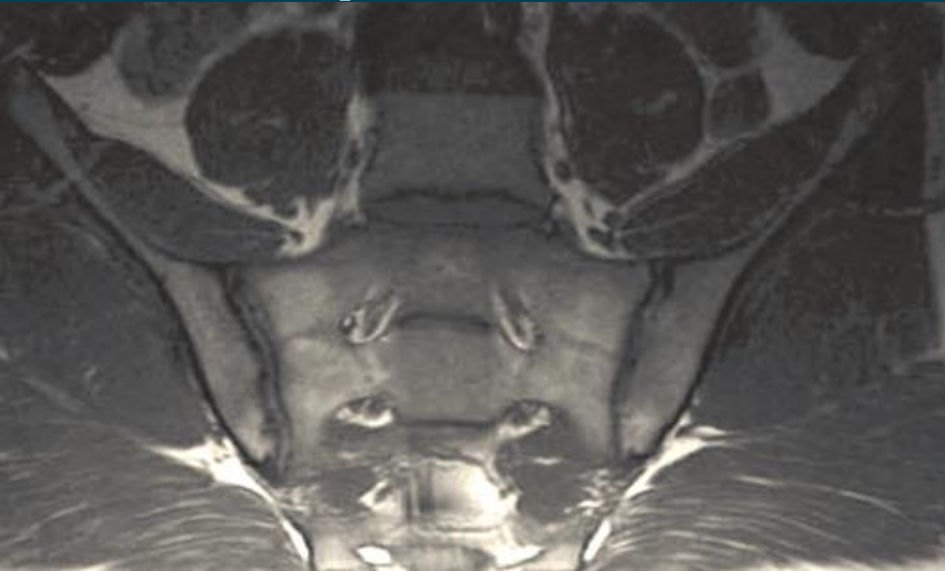
What are we looking for?

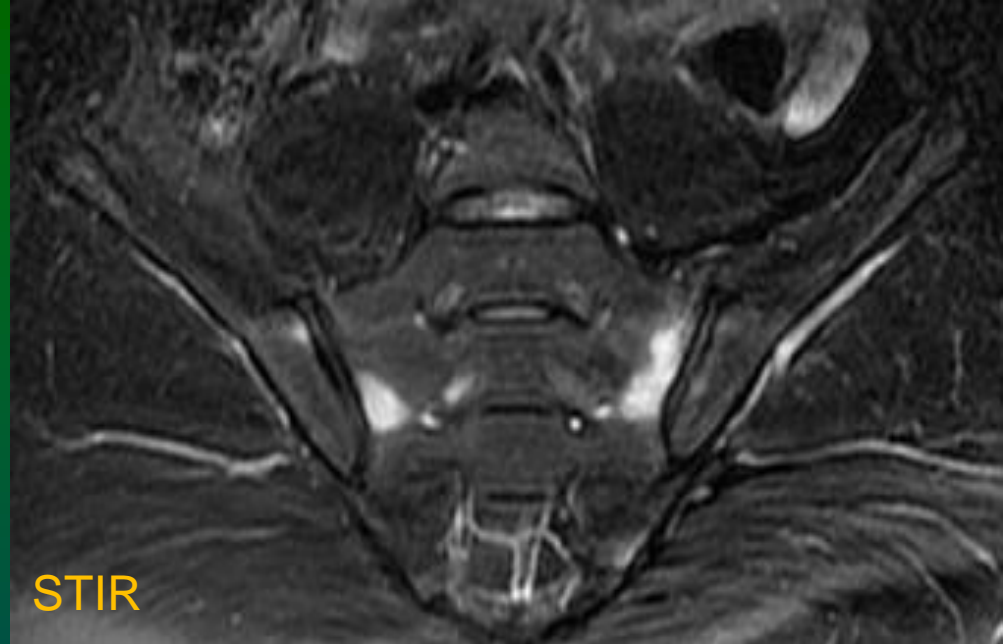
T1-w

Erosions
Sclerosis
Fat deposition

STIR

Bone marrow edema

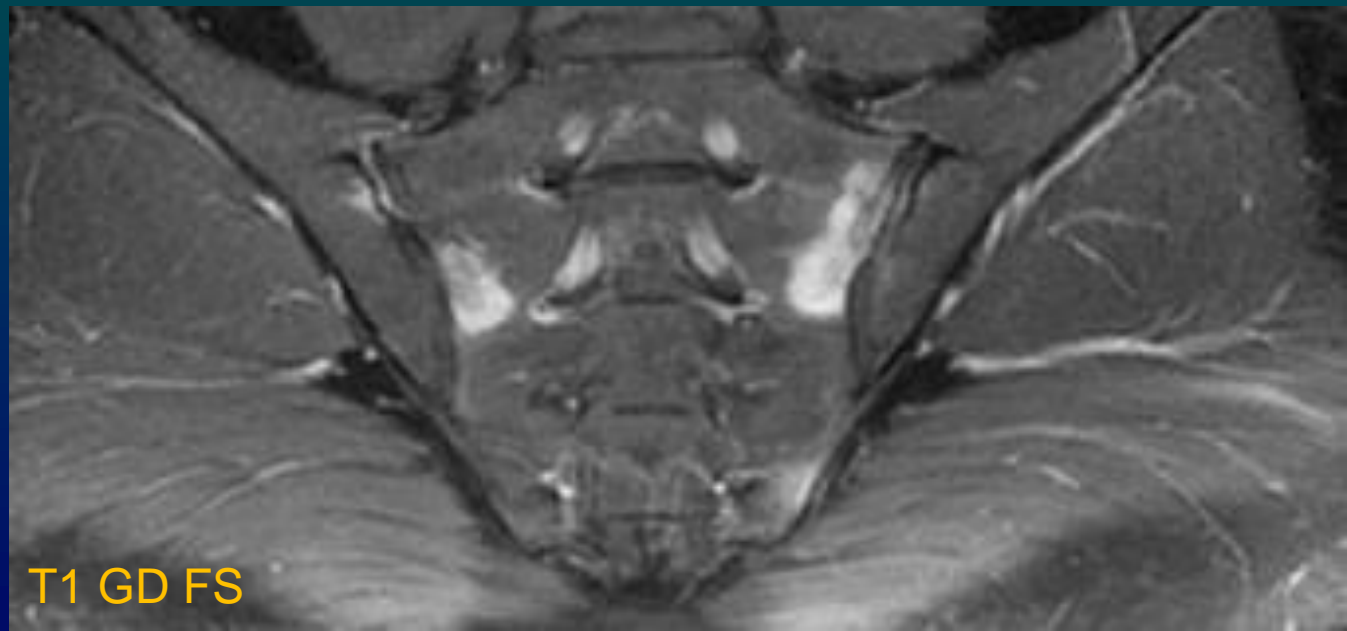




STIR

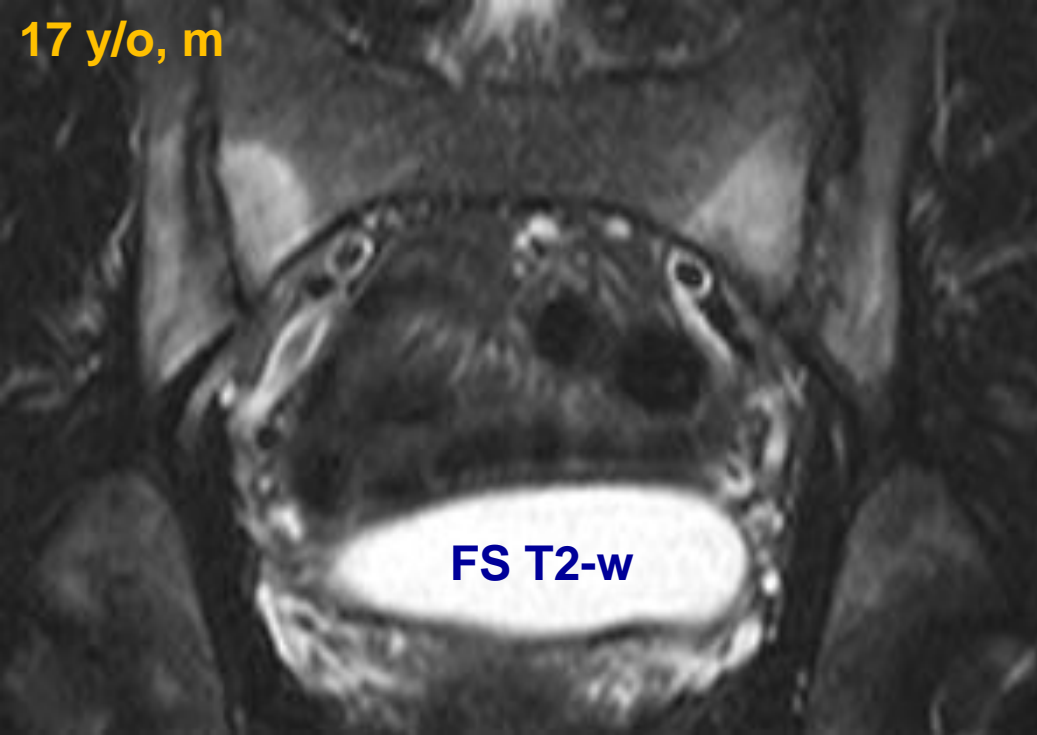
*Dorsocaudal synovial part and marrow most frequently involved in early stages
Enthesitis is not a special feature of early inflammation*

2 or more areas on the
same image or
one on 2 consecutive
images



T1 GD FS

17 y/o, m

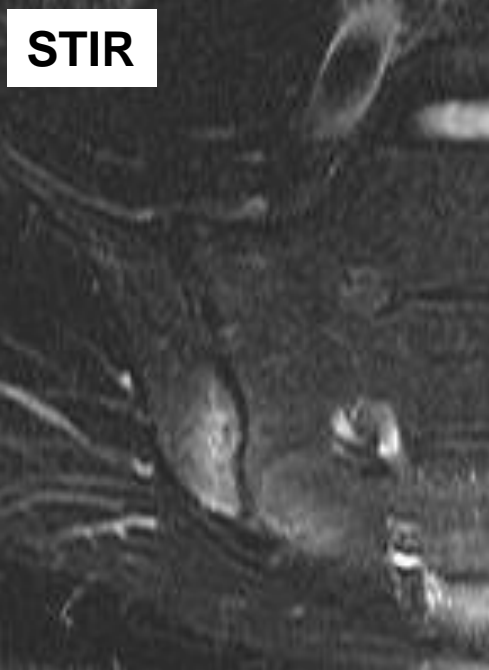


Sacroiliitis

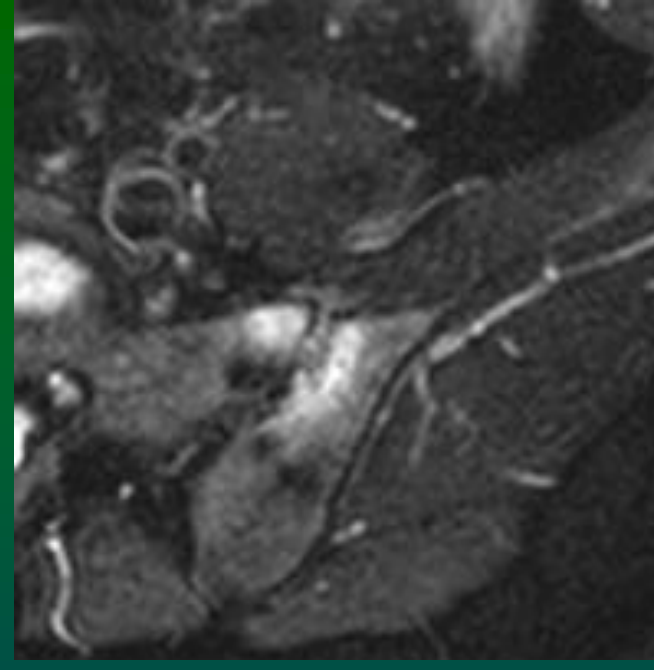
MRI findings of early active AS

1. Sub-articular BME – enhancing
Symmetric, lower/posterior thirds
2. Enhancement of joint space
Synovitis/capsulitis
3. Enthesitis
4. Predict Ro structural changes
3y earlier (PPV 60%)

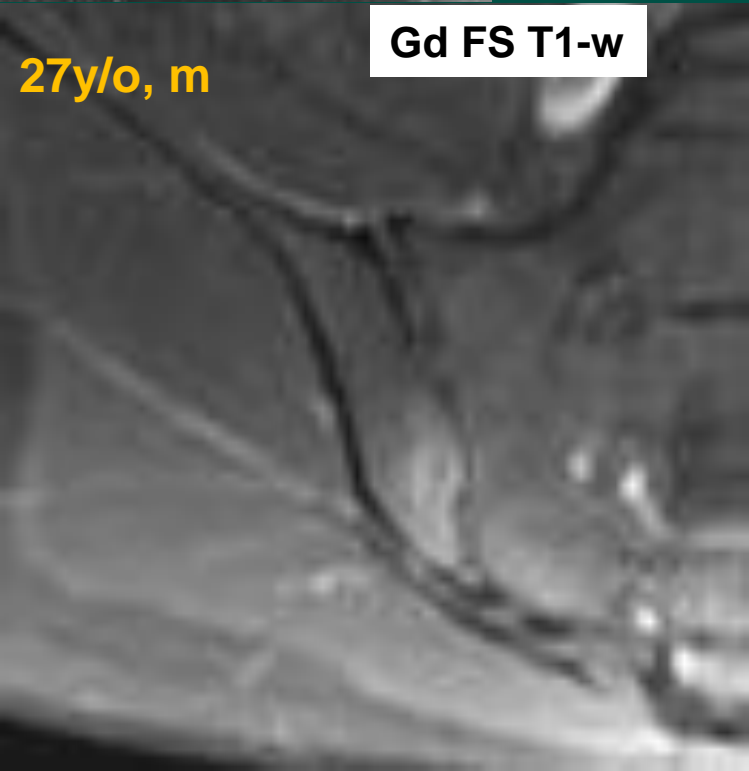
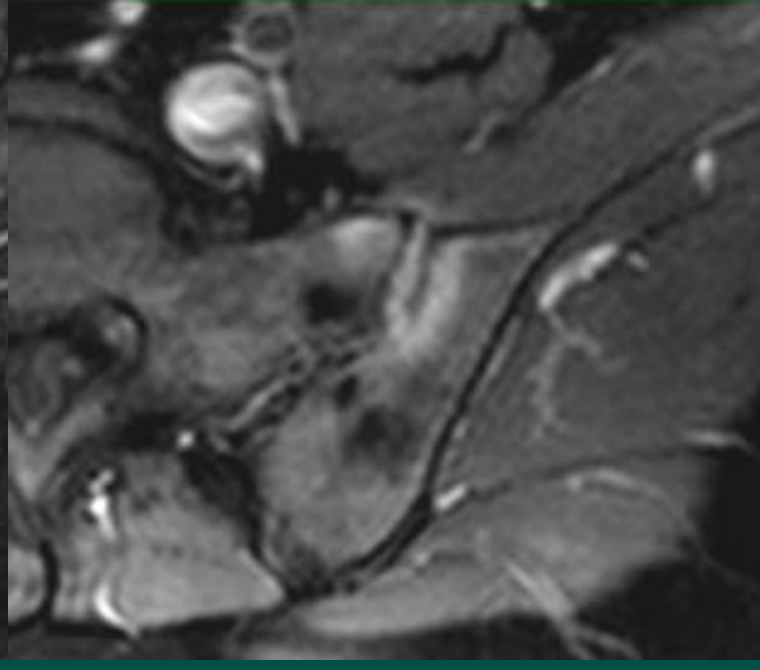
BME: observed within
a few weeks of IBP
presentation



STIR



Gd FS T1-w



27y/o, m

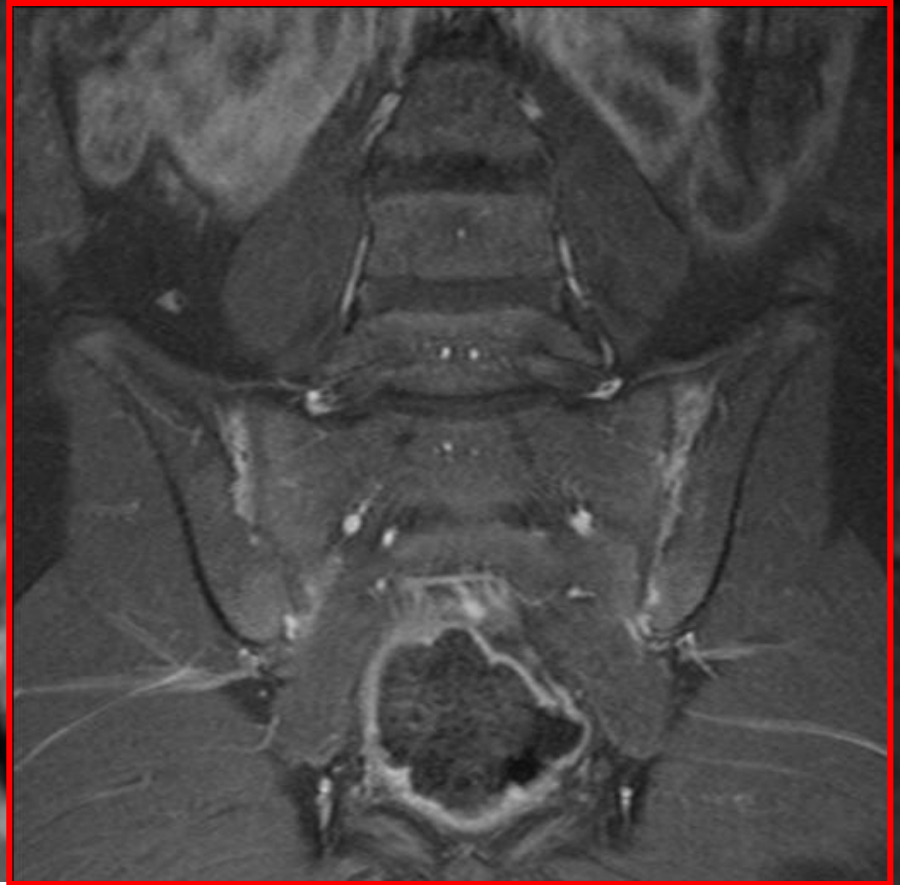
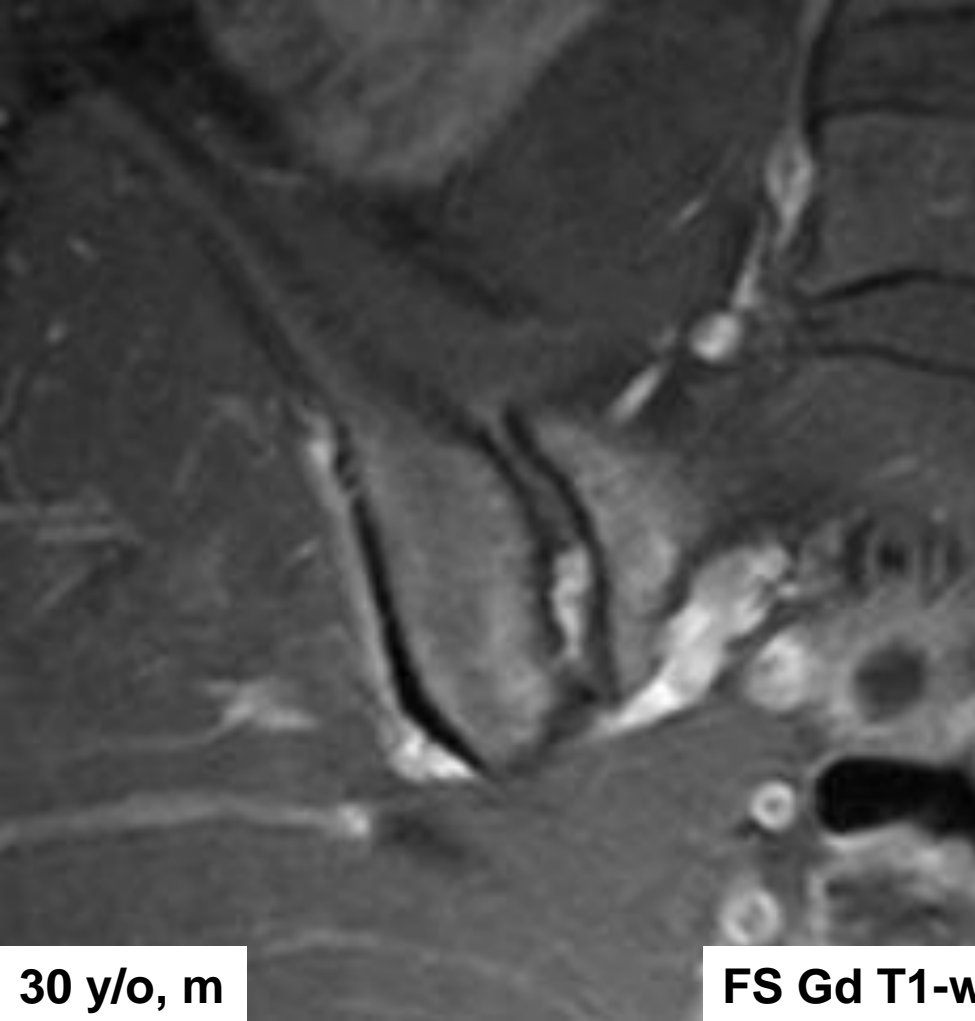
45y/o, m

Gd ?

Superior to FS T2/STIR for active sacroiliitis
Althoff et al. Eur J Radiol 09, Bollow et al. Radiology 95

FS T2 or STIR sufficient for diagnosis ←

Rostom et al. JBS 10, Canella et al. AJR 13



Subchondral BME: osteitis

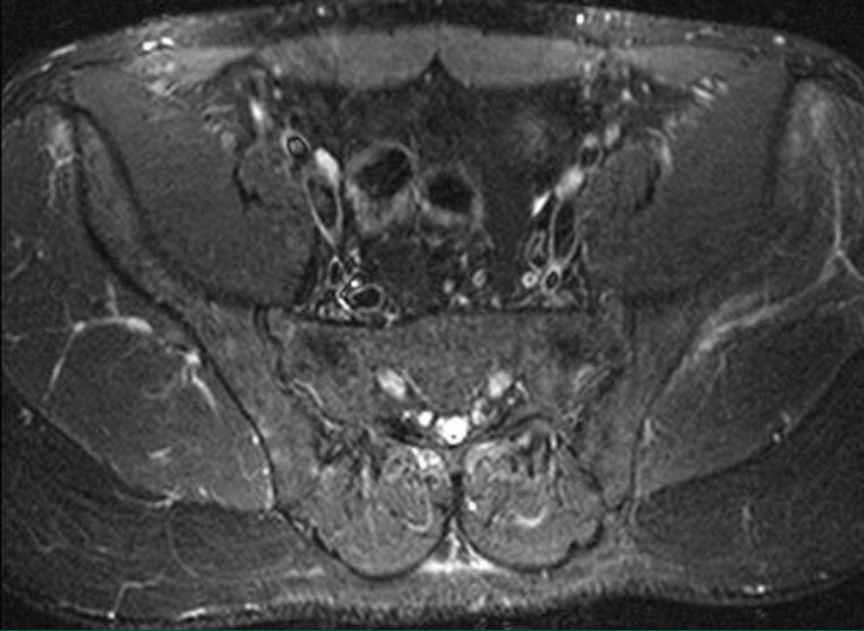
Joint space enhancement:
Related to hyperemia

Puhakka KB, et al. Skeletal Radiol 04

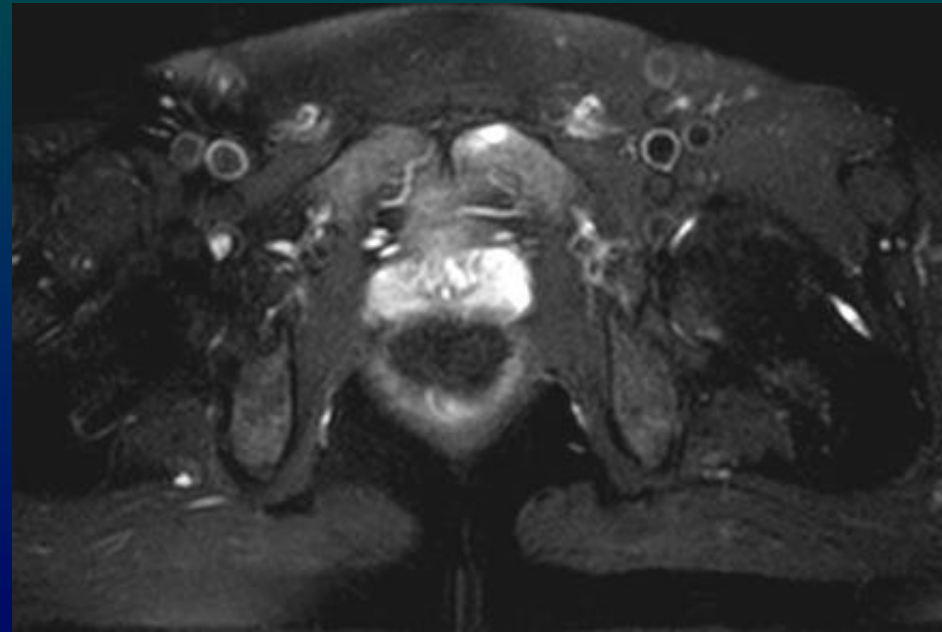
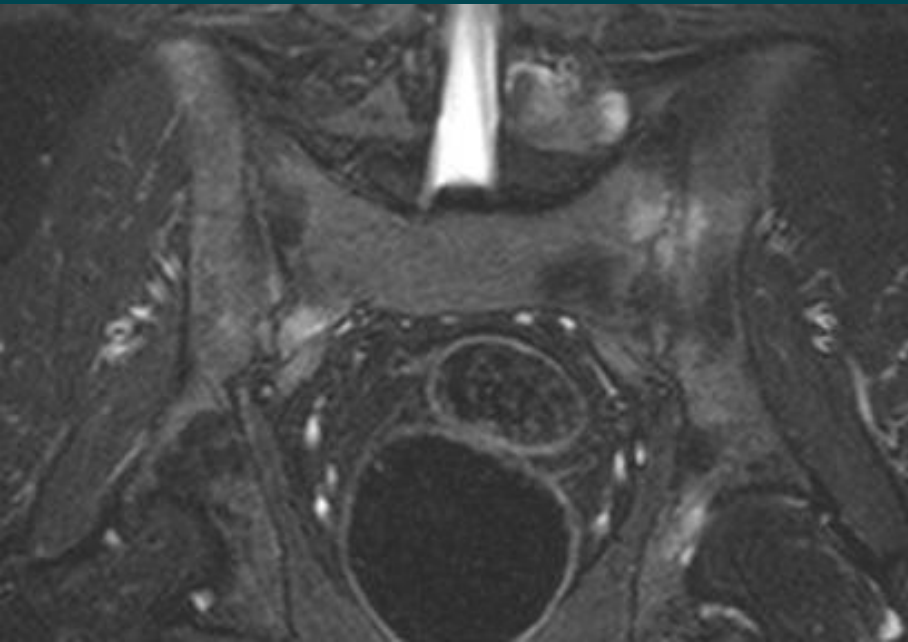
Enthesitis

High SI at junctional areas

High SI may extend to adjacent BM
and surrounding ST



39 y/o, m 2 month pain

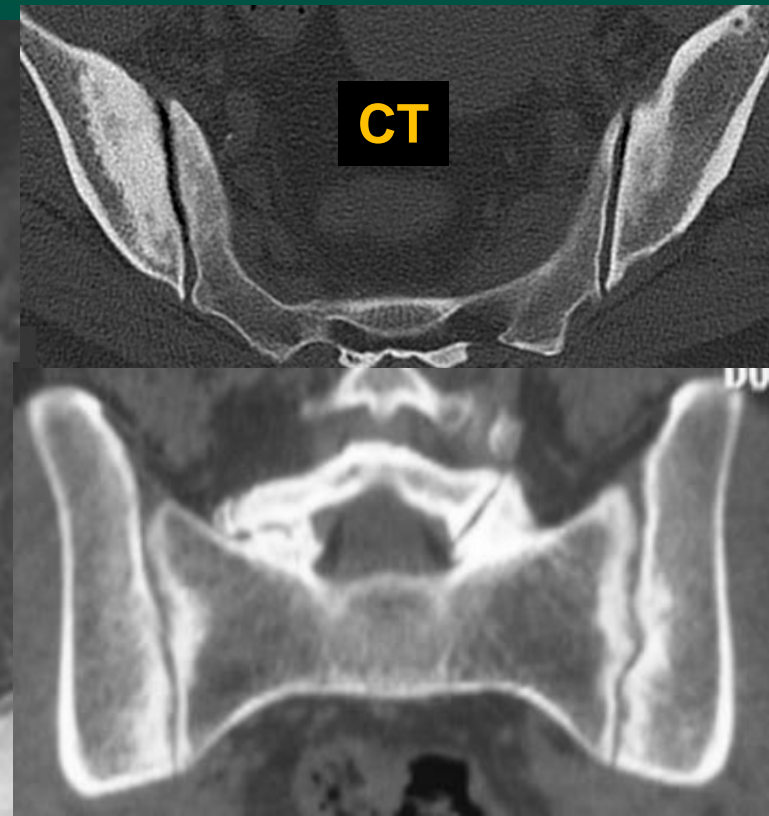
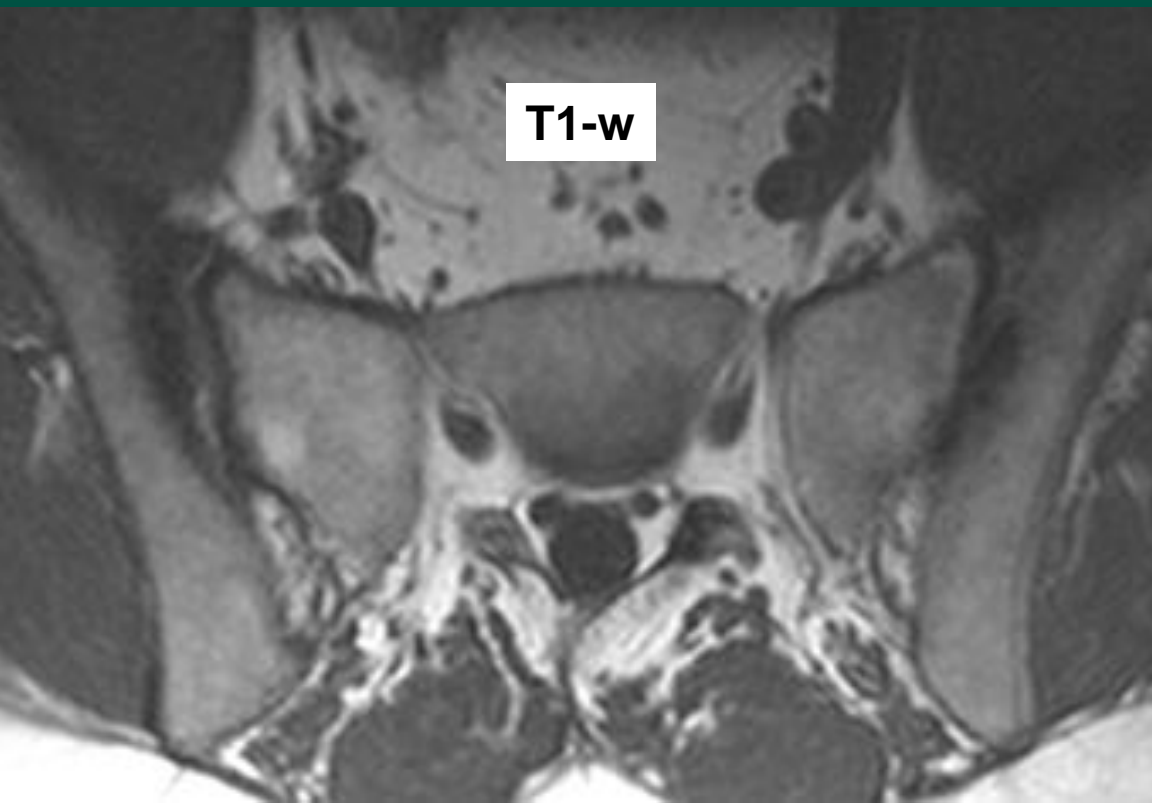


SIJ: Chronic inflammatory lesions

- **Subchondral sclerosis**
- **Erosions**
- **Fat deposition**
- **Ankylosis**

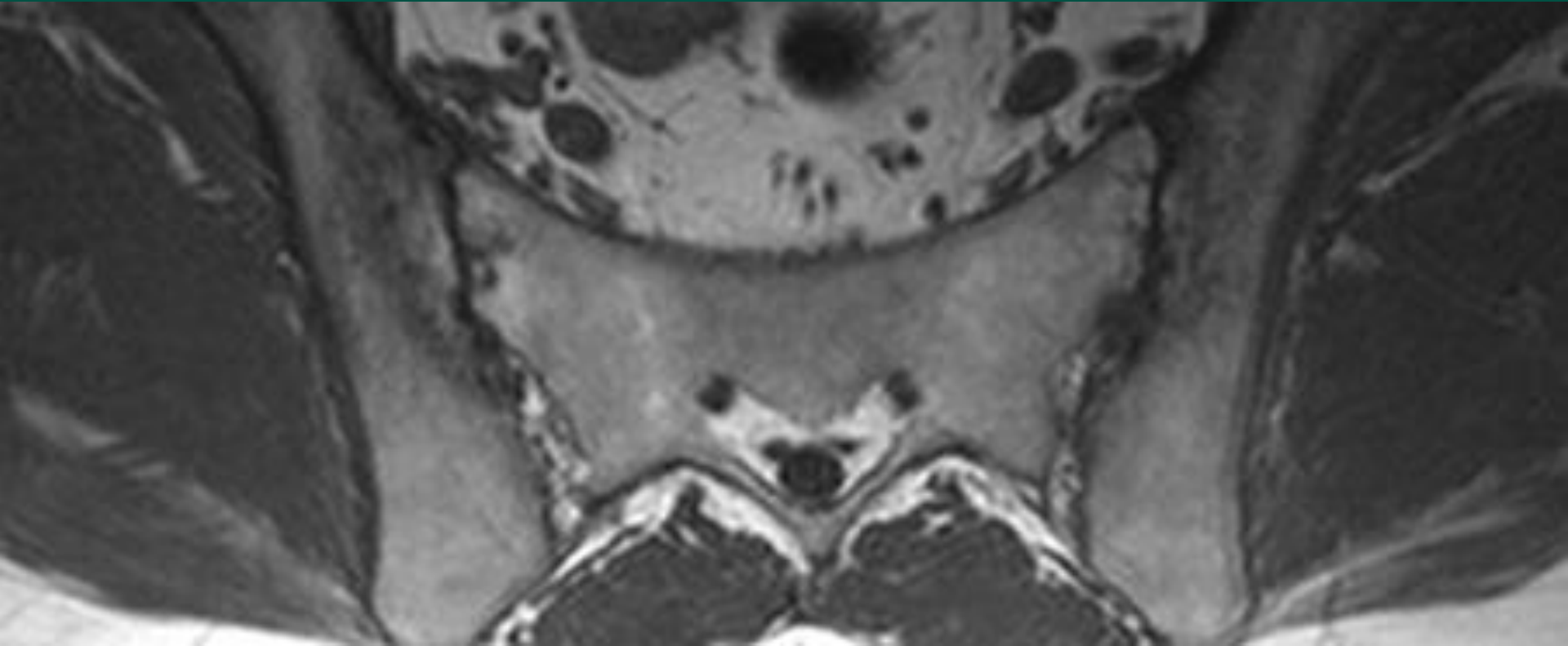
Subchondral sclerosis

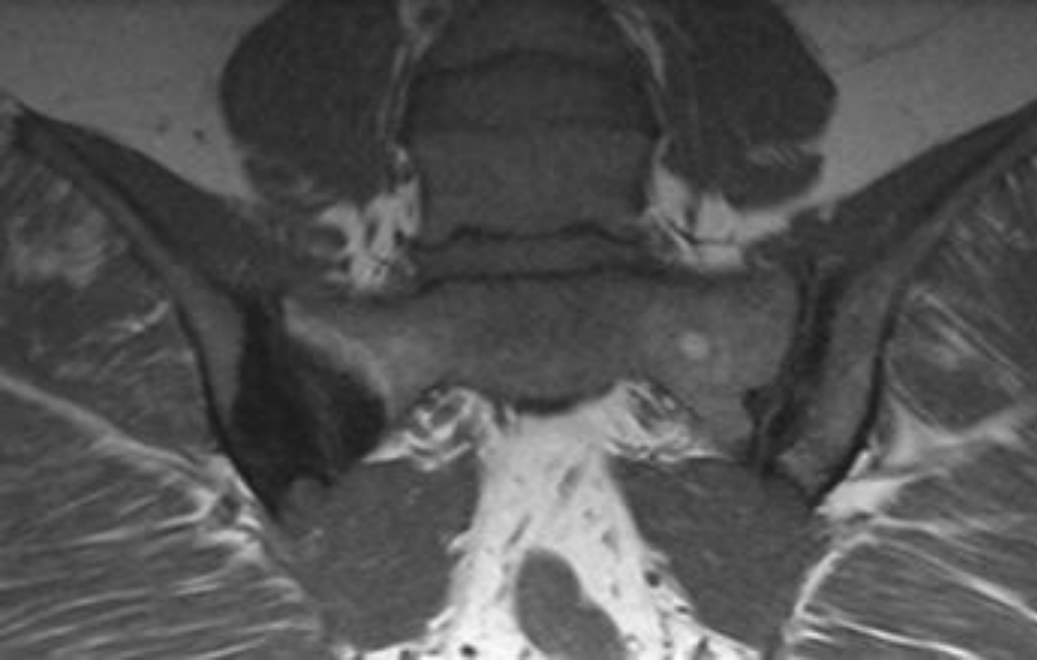
- Low SI on T1-w/STIR, not enhancing
- Typically extends $>5\text{mm}$ from the joint surface



Erosions

- Bony defects at the joint surface
- Low SI on T1-w, may occur throughout the cartilaginous compartment
- Confluent lesions cause a false widening

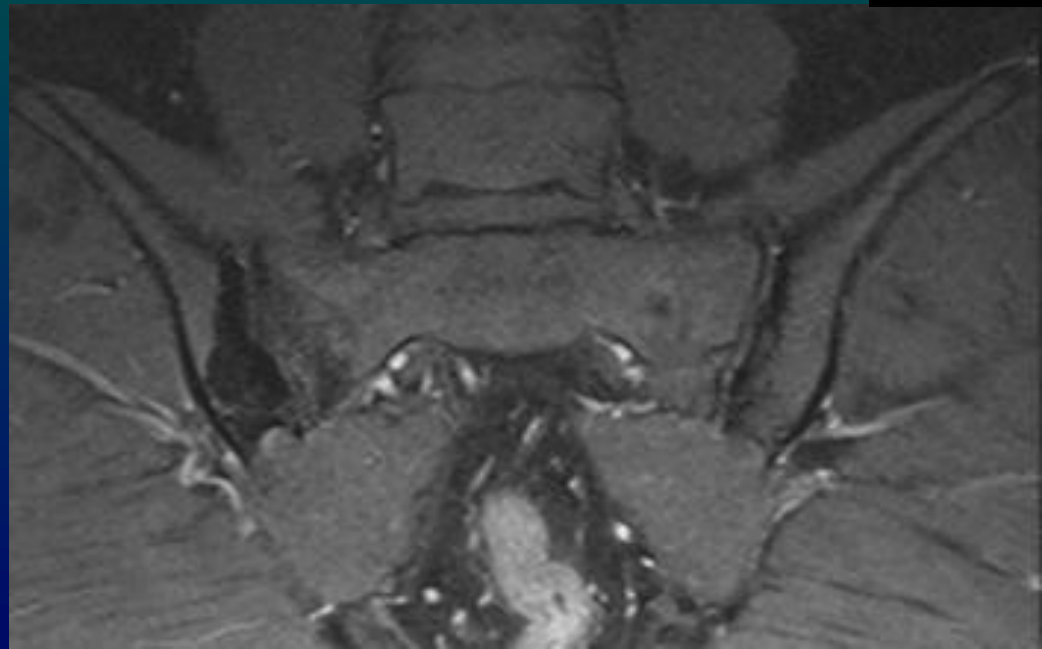




T1

Fat deposition

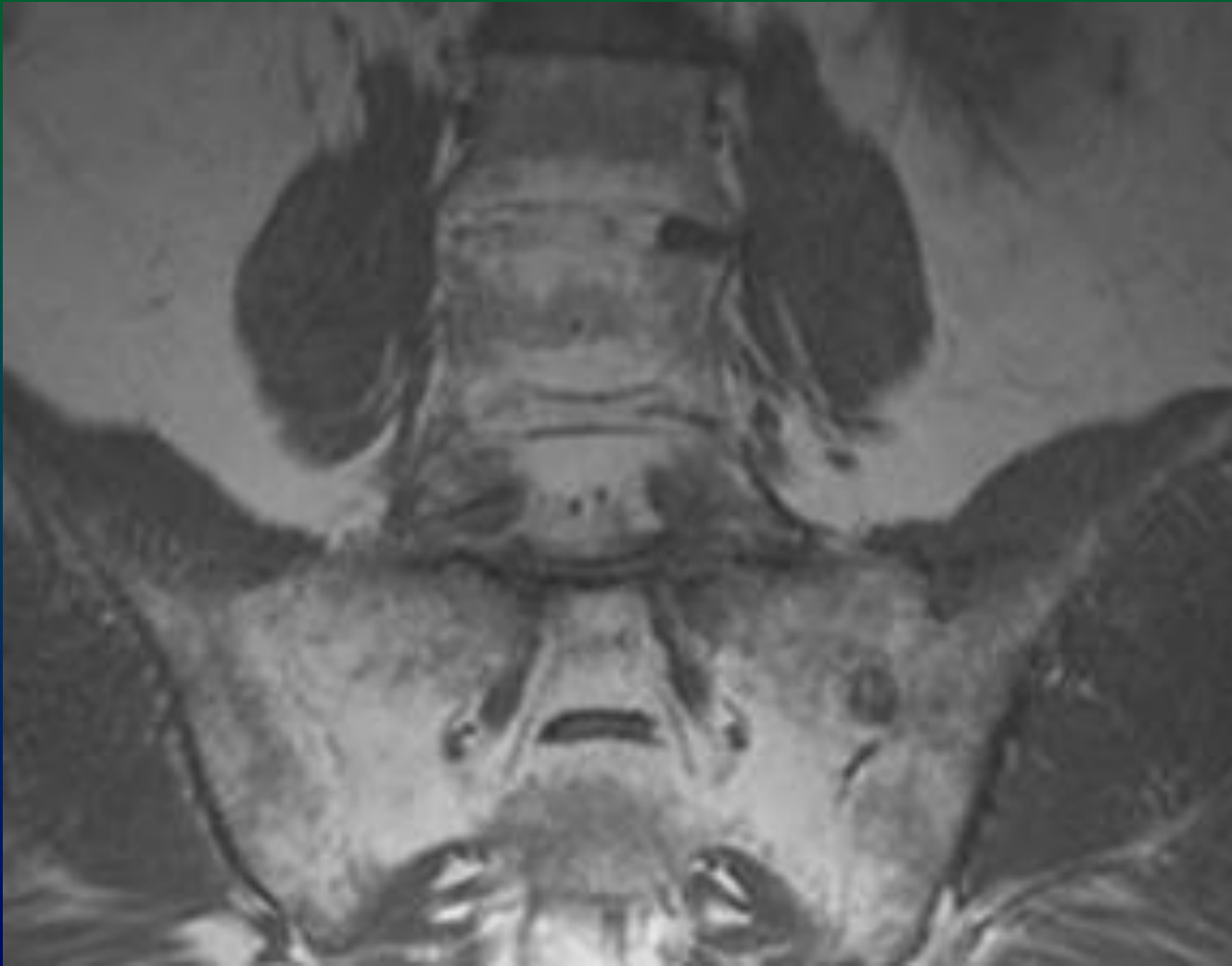
Gd T1



- Healed inflammation, inactive lesion
- High SI T1, low SI on fluid sensitive sequences, no enhancement
- Indicates previous inflammation

Ankylosis

- Fusion of bone surfaces via osseous bridges across the joint



MRI: Sacroiliitis overview

Active inflammatory lesions (fs PD/T2-STIR, fs T1 Gd)

- *Bone marrow edema (osteitis)*
- *Capsulitis*
- *Synovitis*
- *Enthesitis*

Chronic inflammatory lesions (T1-w)

- *Sclerosis*
- *Erosions*
- *Fat deposition*
- *Bone bridges / ankylosis*

Key points

- **ASAS-MRI**: active inflammation of SIJ
- **BME**: 2 or more areas on the same image or one on 2 consecutive images

Key points

- Capsulitis, synovitis or enthesitis **with no BME** should **not** be considered **+** MRI sign
- Coexistence of active and chronic structural changes, are criteria for **+** MRI

