

Study ID:

Reader Last Name:

(Supplement 1)

Only record lesions with bone edema in Inflammation section

Maximal signal strength is determined based on comparison to fluid intensity (i.e. bladder, CSF, vasculature).

Relative size will be reported as the proportion of the **maximum areal size** of each lesion in relation to the assessed area (i.e. epiphysis, metaphysis), 1-25% mild, 25- 50% moderate, >50% severe.

Soft tissue/periosteal inflammation, bony expansions are reported as present/absent.

Damage is reported separately

Hand is considered as one unit, **foot** is divided to hindfoot (talus/calcaneus), mid/forefoot (tarsals, metatarsals, phalanges)

§Complex bones/truncal long bones will be assessed as **one unit except:**

***Sacrum** will be divided into left and right halves

#**Pelvis** will be divided into ilium, peri-acetabulum, pubis/ischium

&**Mandible** will be divided into left and right halves

Manubrium and sternum are combined

*******General Section*******

1. Are there lesions with hyperintensity in bone marrow consistent with CNO? _____
If yes, please use corresponding templates. ***If unsure, please mark your confidence level (low or medium).*** No need to mark if confidence is high.
Long bones templates: humerus, ulna, radius, femur, tibia, fibula
Complex bone templates: Scapula, Sacrum (combine S1-5 for each side), pelvis (ilium, peri-acetabulum, pubis/ischium), ribs, manubrium/sternum, mandible, skull, patella, clavicle
Spine templates: C, T, L spine
Hand/feet templates
2. Are there CNO-related bony damages? _____ If yes, please complete "damage scoring".
3. Are there joint effusion concerning for synovitis? If yes, please list all _____
4. Are there non-CNO bony abnormalities? If yes, please list all _____
5. Are there any limb hypertrophy? If yes, please list all _____

*******Damage scoring*******

Kyphosis: Yes, No, NA

Pathological fracture: _____ Sites: _____

Bone units as a single bone:

Vertebrae (C, T, L)

Clavicle

Scapula

Rib

Long bones

Patella

Bone units divided by laterality:

Skull

Mandible

Sacrum

Pelvis divided into:

Ilium

Periacetabulum

Pubis/ischium

Bone units combined:

Manubrium + sternum

Hand (carpals, metacarpals, phalanges)

Hindfoot (talus, calcaneus)

Fore/mid foot (tarsals, metatarsals, phalanges)

Long bones divided into:

Proximal epiphysis

Proximal metaphysis

Diaphysis

Distal metaphysis

Distal epiphysis

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Long bones (extremities) Template:

Lesion site: Right, Left
Bone marrow hyperintensity: absent, <fluid signal, similar to fluid signal
Signal size within proximal epiphysis: absent, <25%, 25-50%, >50%
Signal size within proximal metaphysis: absent, <25%, 25-50%, >50%,
Signal size within diaphysis: absent, <25%, 25-50%, >50%; contiguous?
Signal size within distal metaphysis: absent, <25%, 25-50%, >50%
Signal size within distal epiphysis: absent, <25%, 25-50%, >50%
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
 Only mark if confidence is *low* or *medium*, sites: _____

Long bones (extremities) Template:

Lesion site: Right, Left
Bone marrow hyperintensity: absent, <fluid signal, similar to fluid signal
Signal size within proximal epiphysis: absent, <25%, 25-50%, >50%
Signal size within proximal metaphysis: absent, <25%, 25-50%, >50%,
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Signal size within distal epiphysis: absent, <25%, 25-50%, >50%
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
 Only mark if confidence is *low* or *medium*, sites: _____

Complex bone (scapula[§], pelvis[#], sacrum^{*}, mandible[&], skull[§]) or truncal long bones (clavicle[§], rib[§], manubrium/sterna[§]) and patella[§] template:

Lesion site: Right, Left
Bone marrow hyperintensity: absent, <fluid signal, similar to fluid signal
Signal size: absent, <25%, 25-50%, >50%, present (not gradable due to artifact), **extends to adjacent contiguous bone?** If so, please write the name of site _____ and the size _____
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
 Only mark if confidence is *low* or *medium*, sites: _____

Hand/feet template:

Lesion site: Right, Left
Bone marrow hyperintensity: absent, <fluid signal, similar to fluid signal
Signal size: absent, <25%, 25-50%, >50%, present (not gradable due to artifact),
of bones with edema: _____, **specific bones:** _____
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
 Only mark if confidence is *low* or *medium*, sites: _____

Cervical/thoracic/lumbar spine (Vertebral body) template:

Lesion site: (i.e. C2, T5, L3)
Bone marrow hyperintensity: absent, <fluid signal, similar to fluid signal
Signal size: absent, <25%, 25-50%, >50%, present (not gradable due to artifact), **involving posterior and/or lateral elements?**
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
Compression: absent, height loss, plana
 Only mark if confidence is *low* or *medium*, sites: _____

Long bones (extremities) Template:

Lesion site: Right, Left
Bone marrow hyperintensity: absent, <fluid signal, similar to fluid signal
Signal size within proximal epiphysis: absent, <25%, 25-50%, >50%
Signal size within proximal metaphysis: absent, <25%, 25-50%, >50%,
Signal size within diaphysis: absent, <25%, 25-50%, >50%; contiguous?
Signal size within distal metaphysis: absent, <25%, 25-50%, >50%
Signal size within distal epiphysis: absent, <25%, 25-50%, >50%
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
 Only mark if confidence is *low* or *medium*, sites: _____

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Signal size within distal epiphysis: absent, <25%, 25-50%, >50%
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
 Only mark if confidence is *low* or *medium*, sites: _____

Complex bone (scapula[§], pelvis[#], sacrum^{*}, mandible[&], skull[§]) or truncal long bones (clavicle[§], rib[§], manubrium/sterna[§]) and patella[§] template:

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Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
 Only mark if confidence is *low* or *medium*, sites: _____

Hand/feet template:

Lesion site: Right, Left
Bone marrow hyperintensity: absent, <fluid signal, similar to fluid signal
Signal size: absent, <25%, 25-50%, >50%, present (not gradable due to artifact),
of bones with edema: _____, **specific bones:** _____
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
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Cervical/thoracic/lumbar spine (Vertebral body) template:

Lesion site: (i.e. C2, T5, L3)
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Signal size: absent, <25%, 25-50%, >50%, present (not gradable due to artifact), **involving posterior and/or lateral elements?**
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present
Compression: absent, height loss, plana
 Only mark if confidence is *low* or *medium*, sites: _____

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<p><u>Long bones (extremities) Template:</u></p> <p>Lesion site: <input style="width: 50px;" type="text"/> Right, Left</p> <p><u>Bone marrow hyperintensity:</u> absent, <fluid signal, similar to fluid signal</p> <p><u>Signal size within proximal epiphysis:</u> absent, <25%, 25-50%, >50%</p> <p><u>Signal size within proximal metaphysis:</u> absent, <25%, 25-50%, >50%,</p> <p><u>Signal size within diaphysis:</u> absent, <25%, 25-50%, >50%; contiguous?</p> <p><u>Signal size within distal metaphysis:</u> absent, <25%, 25-50%, >50%</p> <p><u>Signal size within distal epiphysis:</u> absent, <25%, 25-50%, >50%</p> <p><u>Soft tissue/periosteal hyperintensity:</u> absent, present</p> <p><u>Bony expansion:</u> absent, present</p> <p>Only mark if confidence is <i>low</i> or <i>medium</i>, sites: _____</p> <p><u>Long bones (extremities) Template:</u></p> <p>Lesion site: <input style="width: 50px;" type="text"/> Right, Left</p> <p><u>Bone marrow hyperintensity:</u> absent, <fluid signal, similar to fluid signal</p> <p><u>Signal size within proximal epiphysis:</u> absent, <25%, 25-50%, >50%</p> <p><u>Signal size within proximal metaphysis:</u> absent, <25%, 25-50%, >50%,</p> <p><u>Signal size within diaphysis:</u> absent, <25%, 25-50%, >50%; contiguous?</p> <p><u>Signal size within distal metaphysis:</u> absent, <25%, 25-50%, >50%</p> <p><u>Signal size within distal epiphysis:</u> absent, <25%, 25-50%, >50%</p> <p><u>Soft tissue/periosteal hyperintensity:</u> absent, present</p> <p><u>Bony expansion:</u> absent, present</p> <p>Only mark if confidence is <i>low</i> or <i>medium</i>, sites: _____</p> <p><u>Complex bone (scapula^{\$}, pelvis[#], sacrum[*], mandible^{&}, skull^{\$}) or truncal long bones (clavicle^{\$}, rib^{\$}, manubrium/sterna^{\$}) and patella^{\$} template:</u></p> <p>Lesion site: <input style="width: 50px;" type="text"/> Right, Left</p> <p><u>Bone marrow hyperintensity:</u> absent, <fluid signal, similar to fluid signal</p> <p><u>Signal size:</u> absent, <25%, 25-50%, >50%, present (not gradable due to artifact), <u>extends to adjacent contiguous bone?</u> If so, please write the name of site _____ and the size _____</p> <p><u>Soft tissue/periosteal hyperintensity:</u> absent, present</p> <p><u>Bony expansion:</u> absent, present</p> <p>Only mark if confidence is <i>low</i> or <i>medium</i>, sites: _____</p> <p><u>Hand/feet template:</u></p> <p>Lesion site: <input style="width: 50px;" type="text"/> Right, Left</p> <p><u>Bone marrow hyperintensity:</u> absent, <fluid signal, similar to fluid signal</p> <p><u>Signal size:</u> absent, <25%, 25-50%, >50%, present (not gradable due to artifact),</p> <p><u># of bones with edema:</u> _____, <u>specific bones:</u> _____</p> <p><u>Soft tissue/periosteal hyperintensity:</u> absent, present</p> <p><u>Bony expansion:</u> absent, present</p> <p>Only mark if confidence is <i>low</i> or <i>medium</i>, sites: _____</p> <p><u>Cervical/thoracic/lumbar spine (Vertebral body) template:</u></p> <p>Lesion site: <input style="width: 50px;" type="text"/> (i.e. C2, T5, L3)</p> <p><u>Bone marrow hyperintensity:</u> absent, <fluid signal, similar to fluid signal</p> <p><u>Signal size:</u> absent, <25%, 25-50%, >50%, present (not gradable due to artifact), <u>involving posterior and/or lateral elements?</u></p> <p><u>Soft tissue/periosteal hyperintensity:</u> absent, present</p> <p><u>Bony expansion:</u> absent, present</p> <p><u>Compression:</u> absent, height loss, plana</p> <p>Only mark if confidence is <i>low</i> or <i>medium</i>, sites: _____</p>	<p><u>Long bones (extremities) Template:</u></p> <p>Lesion site: <input style="width: 50px;" type="text"/> Right, Left</p> <p><u>Bone marrow hyperintensity:</u> absent, <fluid signal, similar to fluid signal</p> <p><u>Signal size within proximal epiphysis:</u> absent, <25%, 25-50%, >50%</p> <p><u>Signal size within proximal metaphysis:</u> absent, <25%, 25-50%, >50%,</p> <p><u>Signal size within diaphysis:</u> absent, <25%, 25-50%, >50%; 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Supplement 2.

CRMO/CNO MRI Scoring Atlas

Pediatric Radiology & Rheumatology
CRMO Imaging Consortium

Disclaimer

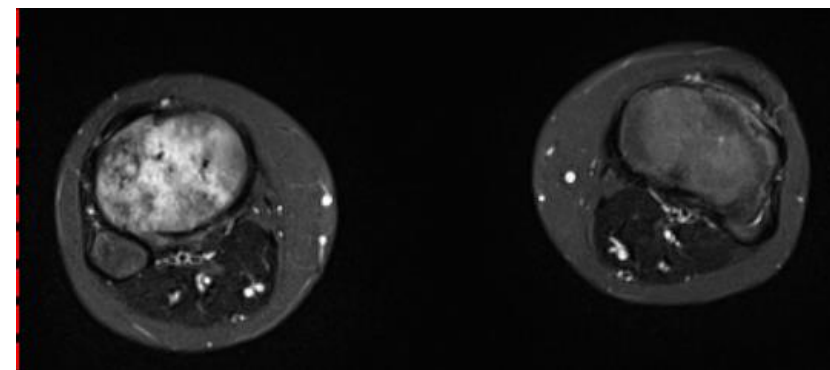
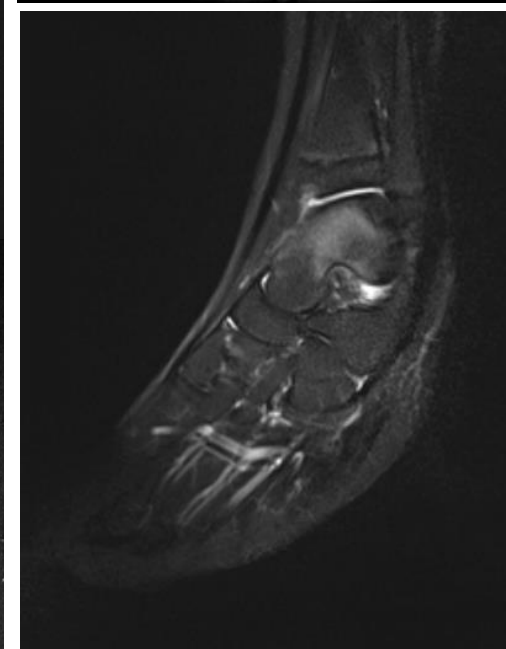
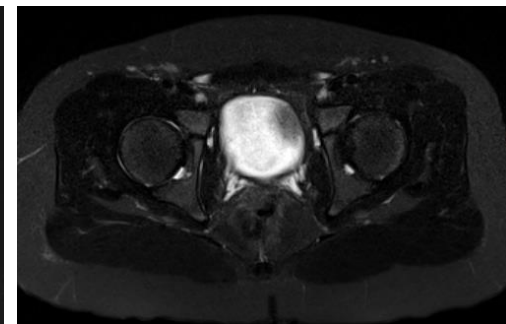
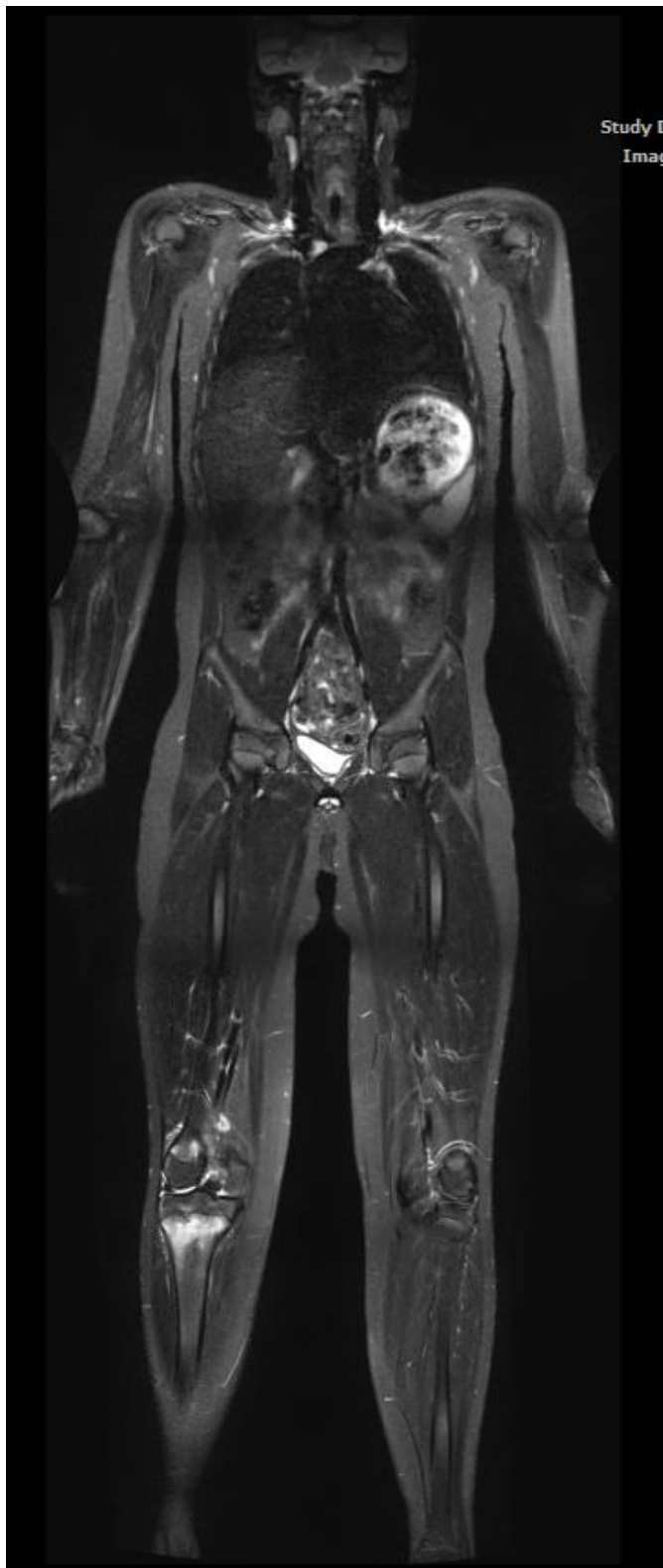
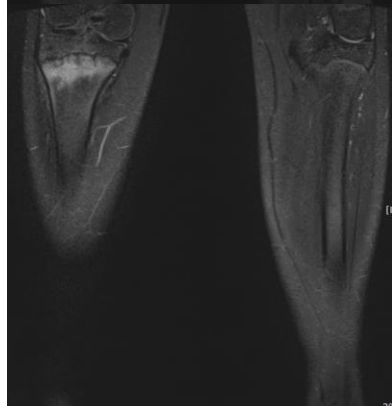
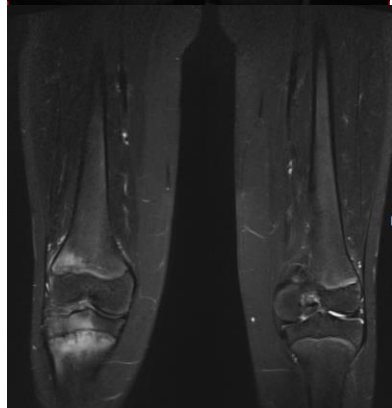
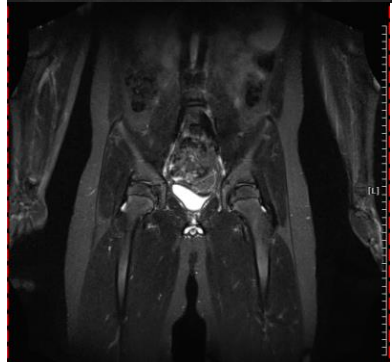
- This atlas is designed for research use only

Content

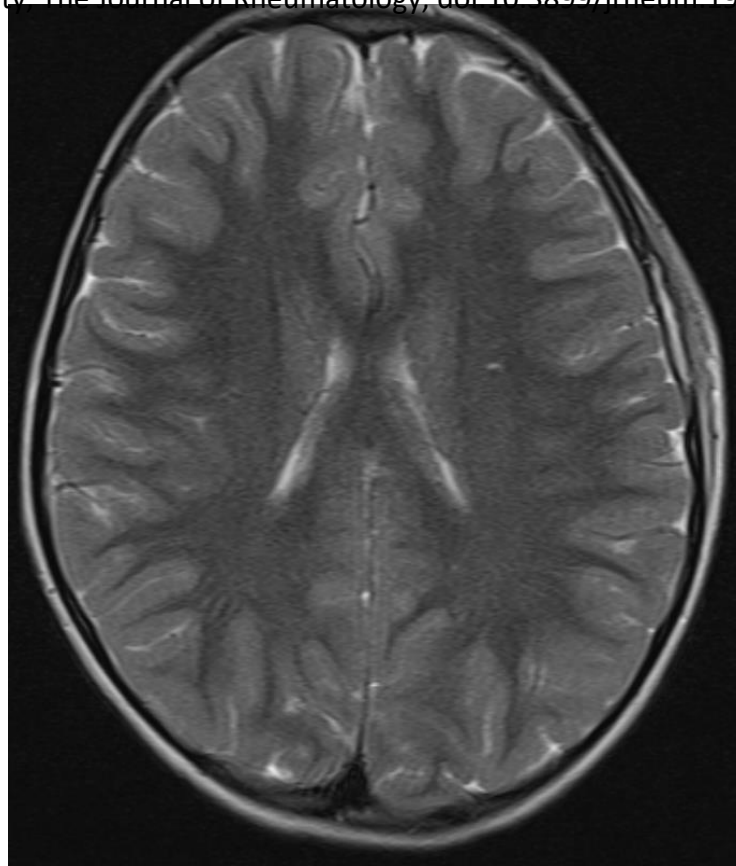
- A group of pediatric radiologists and rheumatologists have developed a CRMO MRI scoring tool for research purposes
- This video will walk you through examples of CRMO lesions from different bones and how they are scored

Recommended WBMRI Protocol

- Planes (all preformed as STIR)
 - Sagittal total spine – in 2 stations
 - Coronal total body (from Vertex to feet) – in 4 to 5 stations
 - Prone positioning of the upper extremities by side
 - Axial Pelvis
 - Axial Knees
 - Sagittal Feet
 - Fused coronal whole body
- Regional imaging (e.g., axial skull for mandibular lesion) as needed



Skull



(T2) – left parietal lesion

Signal site: Skull (left parietal)

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

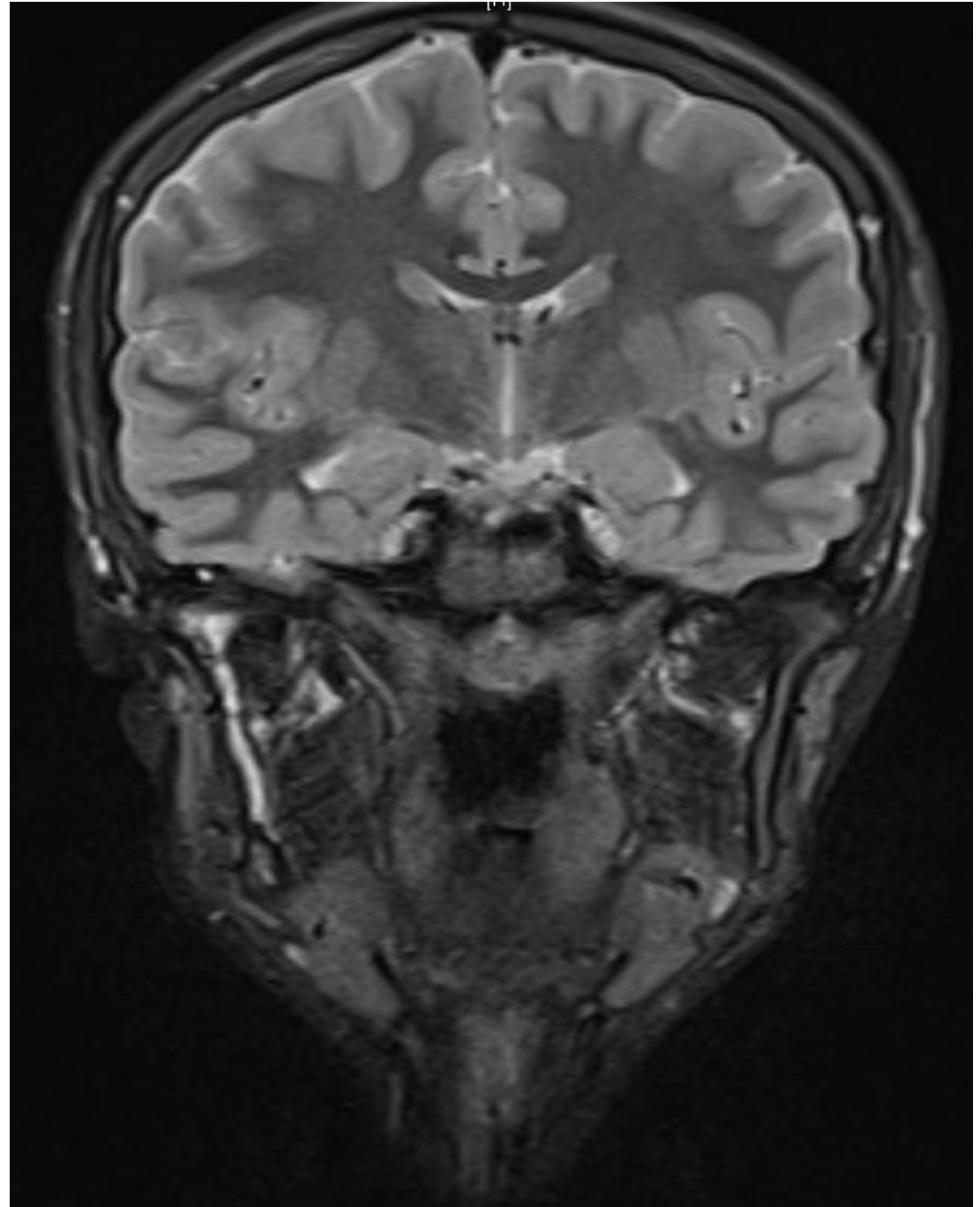
Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact)

Soft tissue or periosteal hyperintensity: absent, present

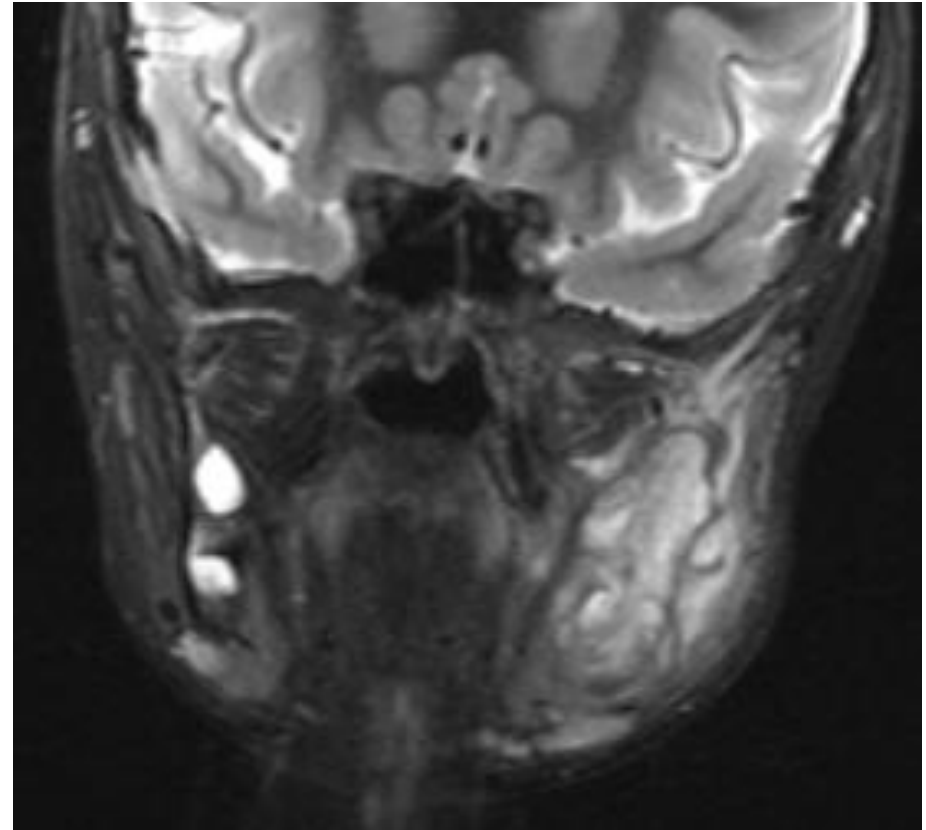
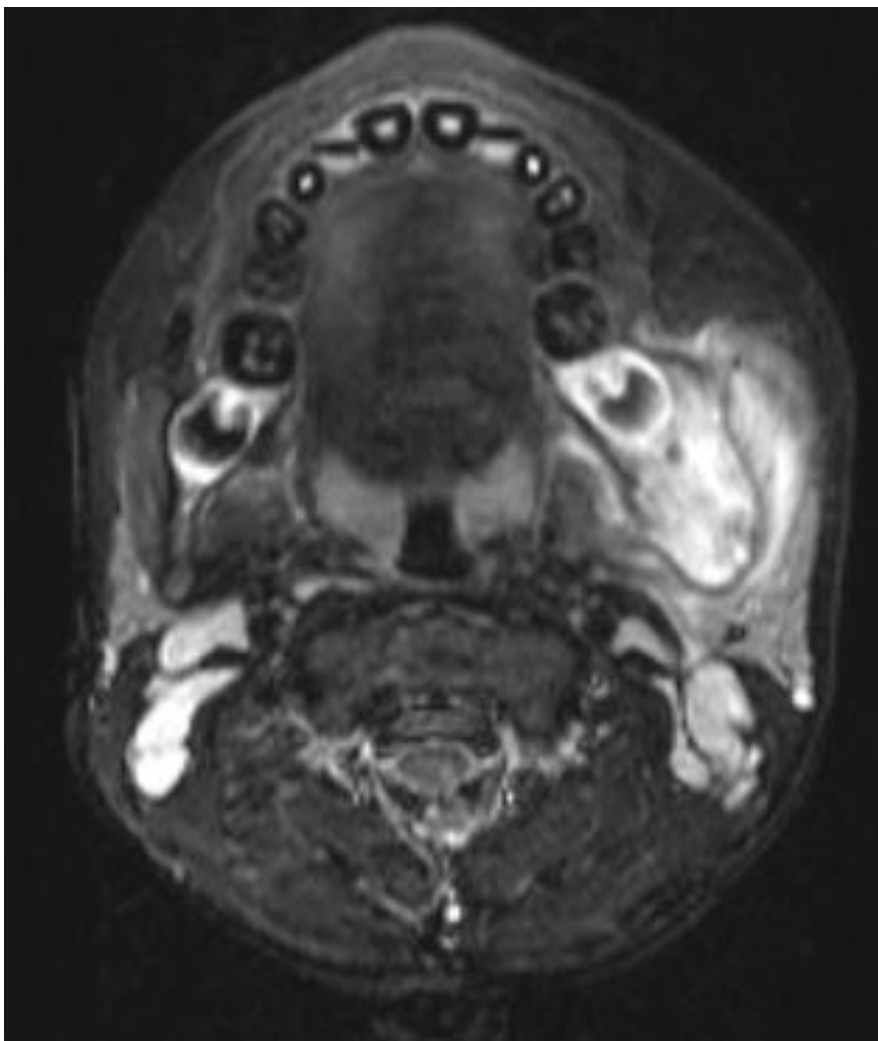
Bony expansion: absent, present

Mandible

- **Signal site:** Mandible, R
- **Bone marrow hyperintensity:** absent, < fluid signal, similar to fluid signal
- **Signal size:** absent, <25%, 25-50%, >50%, present (unable to grade due to artifact)
- **Soft tissue/periosteal hyperintensity:** absent, present
- **Bony expansion:** absent, present



Mandible



- **Signal site:** Mandible, L
- **Bone marrow hyperintensity:** absent, < fluid signal, similar to fluid signal
- **Signal size:** absent, <25%, 25-50%, >50%, present (unable to grade due to artifact)
- **Soft tissue/periosteal hyperintensity:** absent, present
- **Bony expansion:** absent, present

Clavicle

Signal Site: Clavicle, R

Bone marrow hyperintensity:

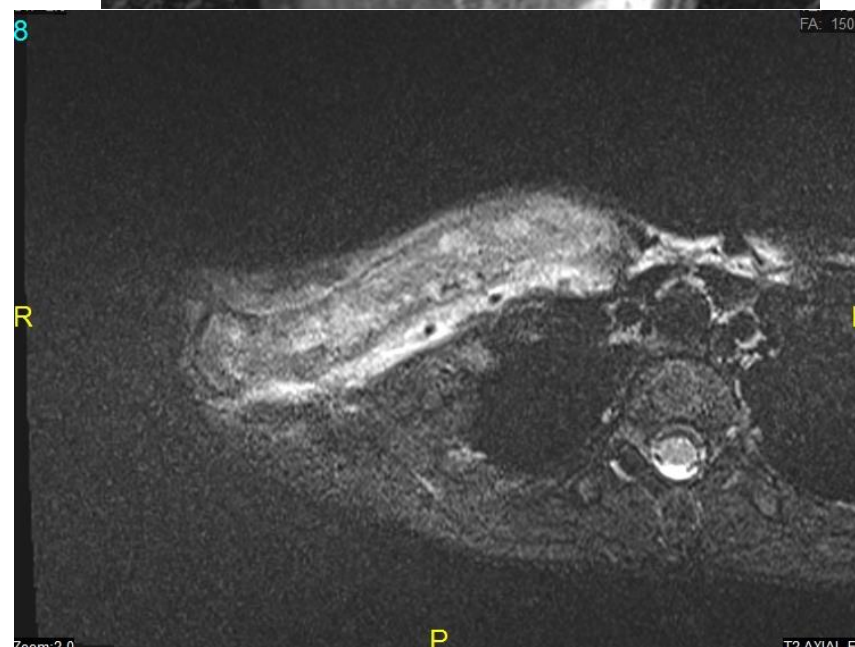
absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact)

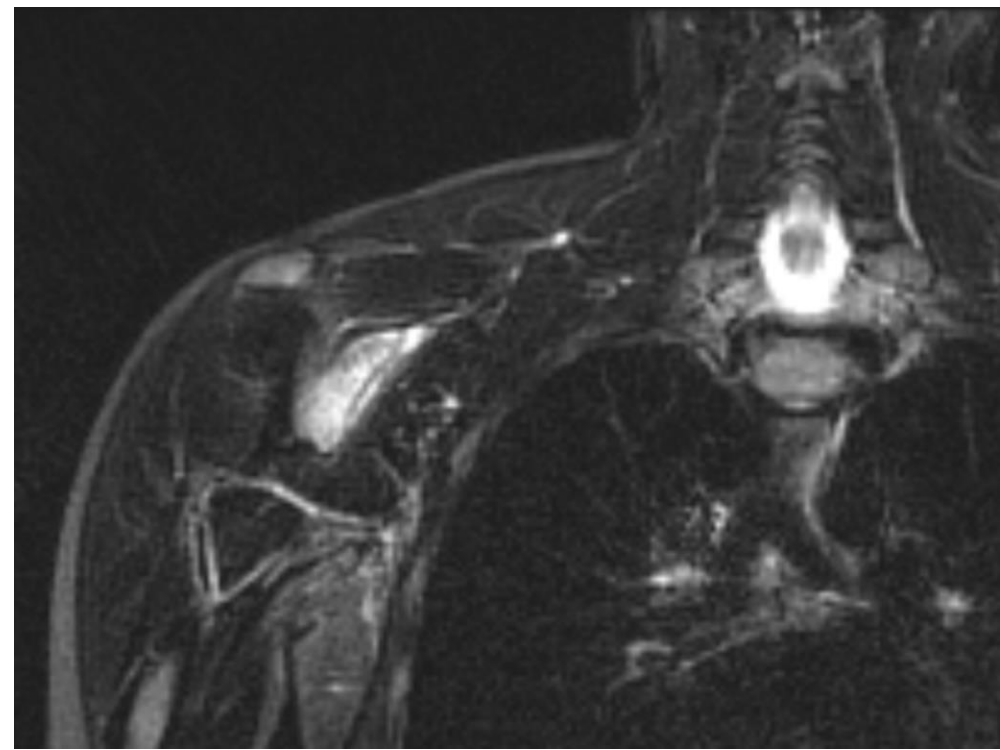
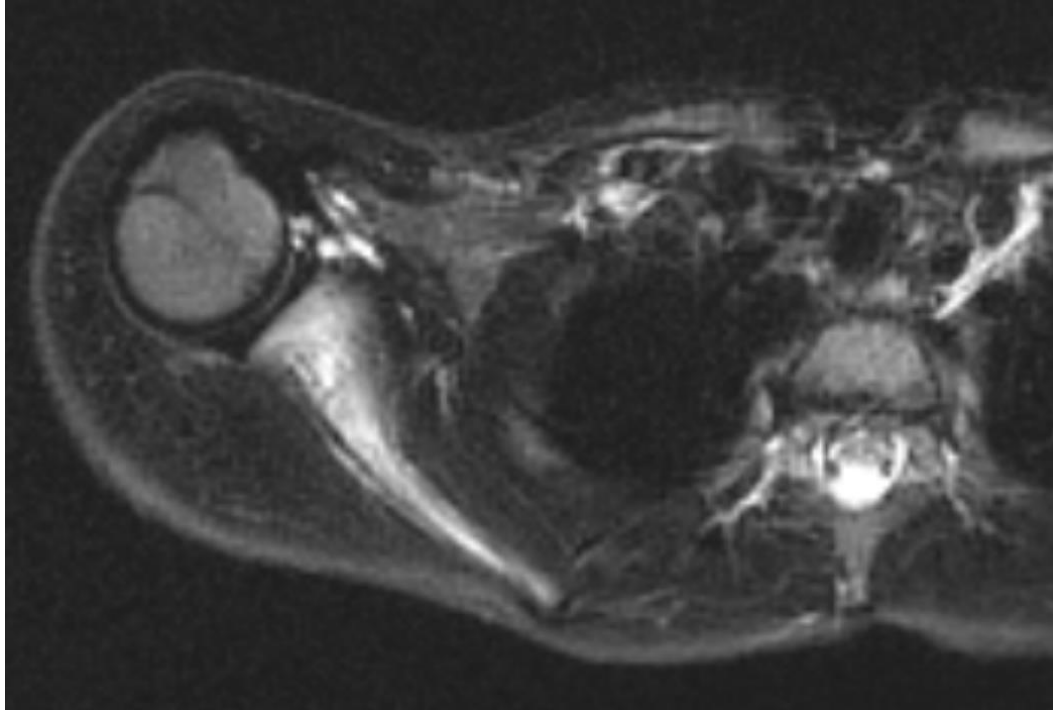
Soft tissue/periosteal

hyperintensity: absent, present

Bony expansion: absent, present



Scapula



Signal site: scapula Right, Left

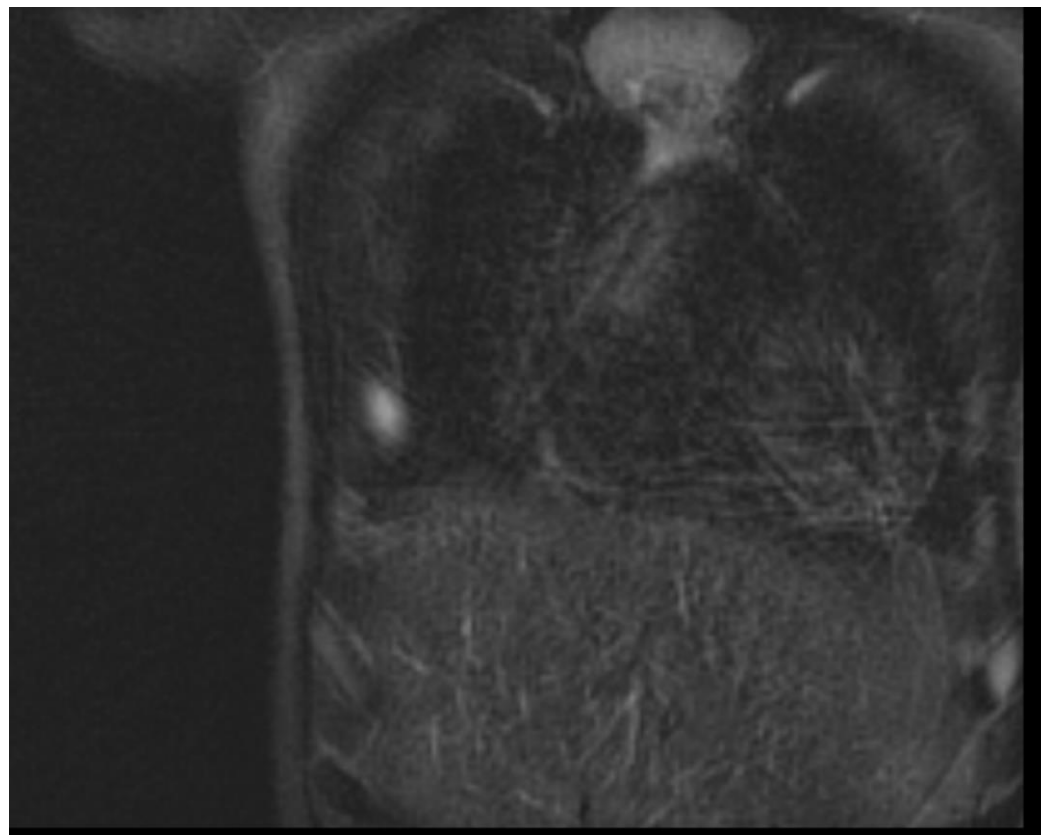
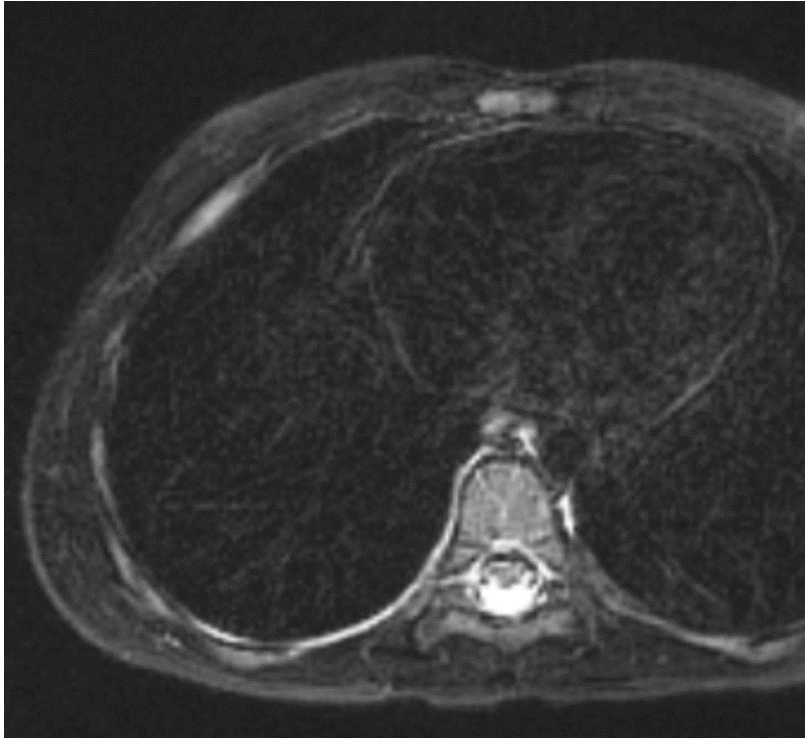
Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact)

Soft tissue or periosteal hyperintensity: absent, present

Bony expansion: absent, present

Rib



The abnormality in this patient was limited to that seen on these images (i.e. less than 25%), the remainder of this rib was normal.

Signal site: Rib A, Right, Left

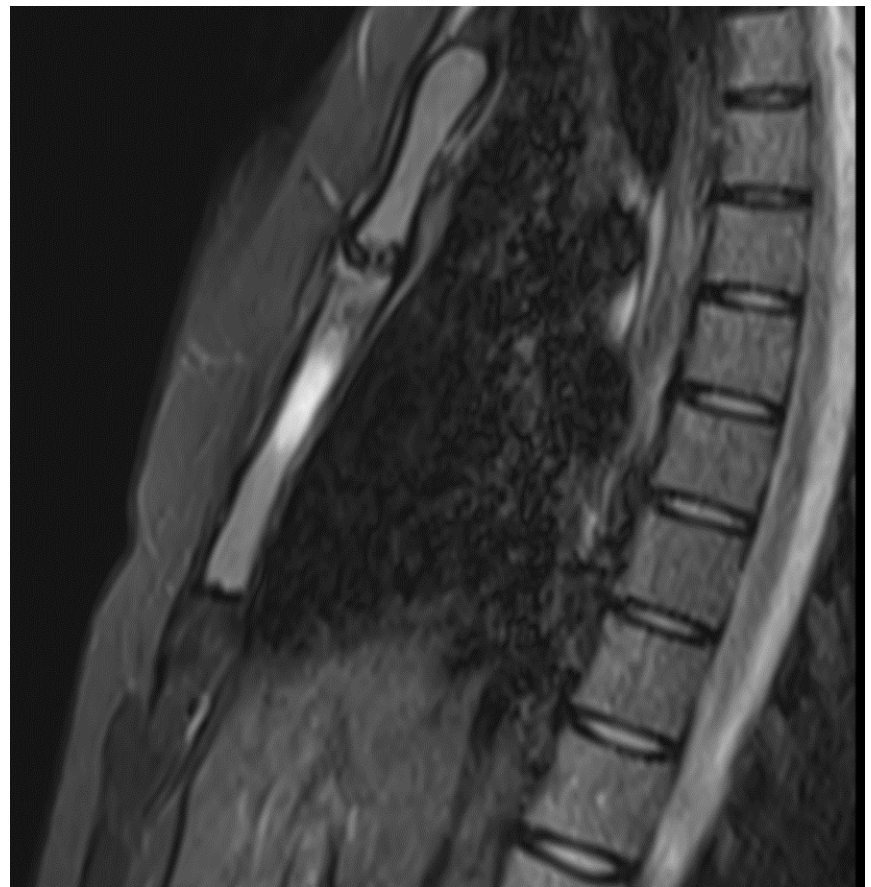
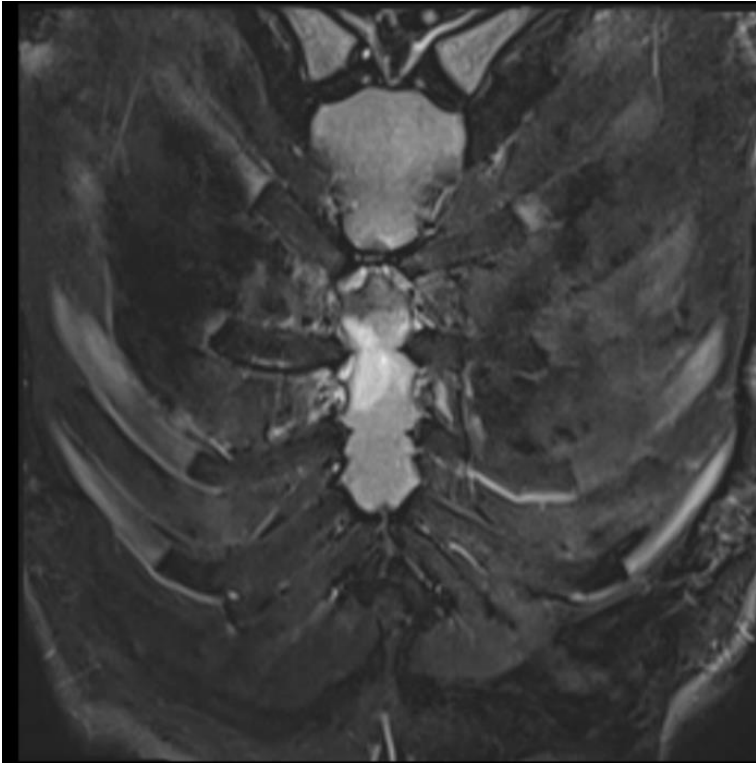
Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact)

Soft tissue or periosteal hyperintensity: absent, present

Bony expansion: absent, present

Sternum



Signal site: Sternum

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25% (of entire manubrium+sternum), 25-50%, >50%, present (not gradable secondary to artifact)--

-Soft tissue or periosteal hyperintensity: absent, present

Bony expansion: absent, present

Site: C spine

Signal site: C7 (i.e. C2, T5, L3)

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: <25%, 25-50%, >50%, present (not gradable due to artifact)

Soft tissue/periosteal hyperintensity: absent, present

Periosteal reaction: absent, present

Bony expansion: absent, present

Spinal compression:

Site: C7, height loss, plana



Site: T spine

Signal site: T6 (i.e. C2, T5, L3)

Bone marrow hyperintensity: Maximal signal strength: < fluid signal, similar to fluid signal

Signal size: <25%, 25-50%, >50%, present (not gradable)

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Signal site: T7 (i.e. C2, T5, L3)

Bone marrow hyperintensity: Maximal signal strength: < fluid signal, similar to fluid signal

Signal size: <25%, 25-50%, >50%, present (not gradable)

Soft tissue/periosteal hyperintensity: absent, present

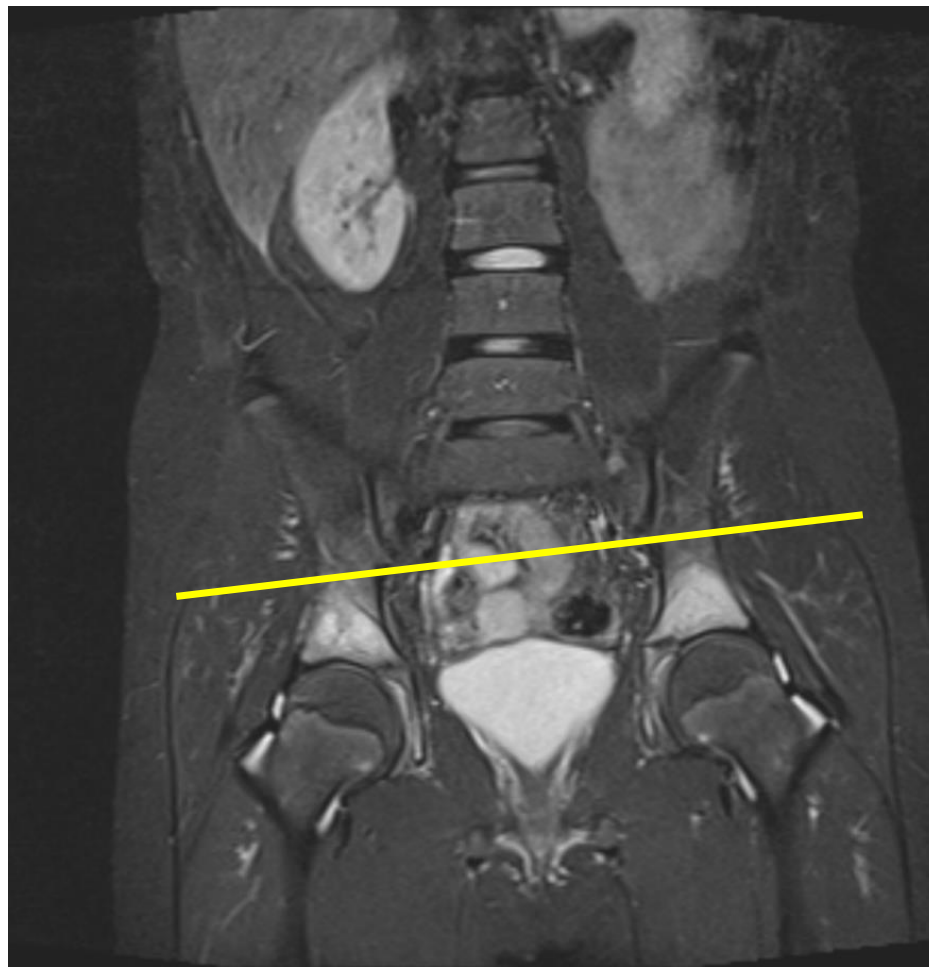
Bony expansion: absent, present

Spinal compression:

Site: T7, height loss, plana



Pelvis



Border between ilium and peri-acetabulum

Signal site: periacetabular Right, Left

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), **extends to adjacent contiguous bone?** If so, please write the **name of site** _____ and the **size** _____

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Signal site: periacetabular Right, Left

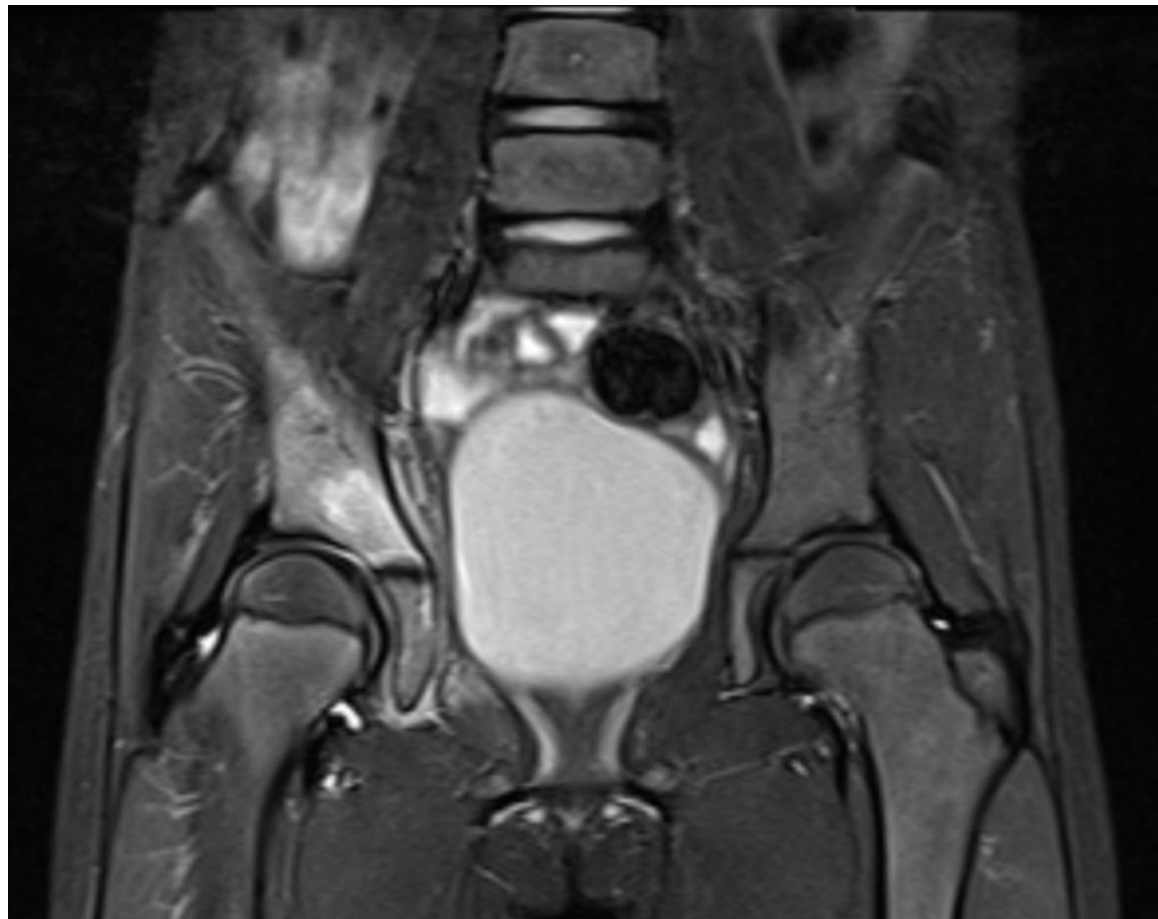
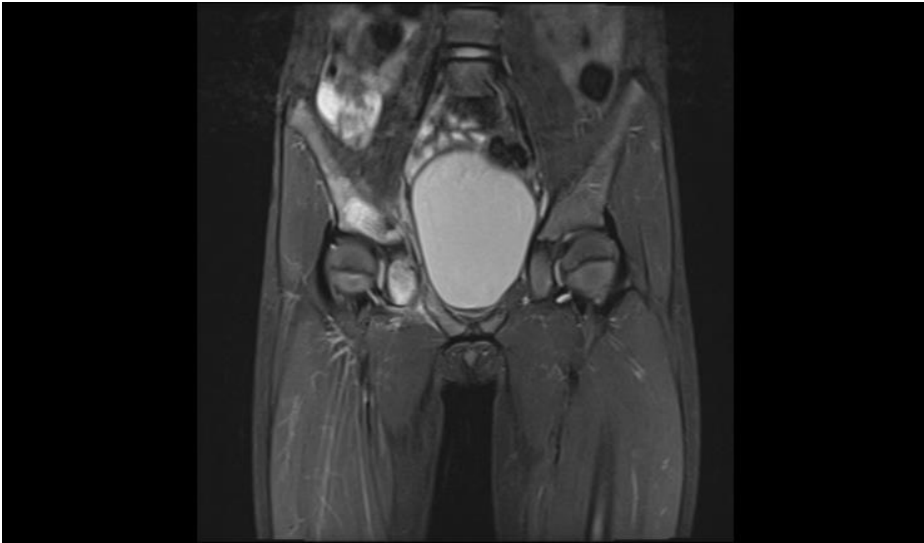
Bone marrow hyperintensity: **Maximal signal strength:** < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), **extends to adjacent contiguous bone?** If so, please write the **name of site** _____ and the **size** _____

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Pelvis (extended lesion)



Signal site: periacetabular Right, Left

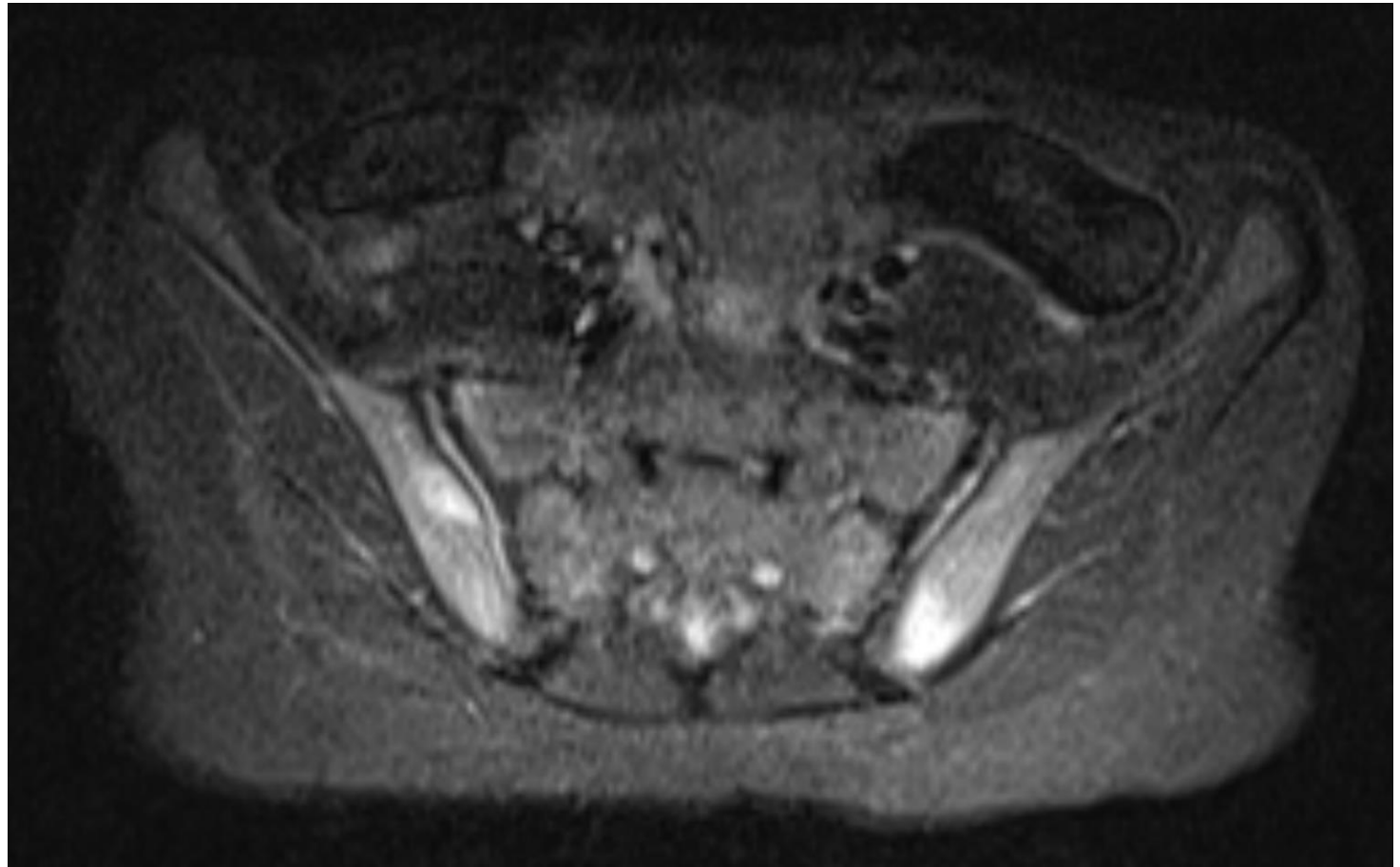
Bone marrow hyperintensity: Maximal signal strength: < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable), extending to adjacent region? If so, please write the name of site ilium and the size <25%

Soft tissue / periosteal hyperintensity: absent, present

Bony expansion: absent, present

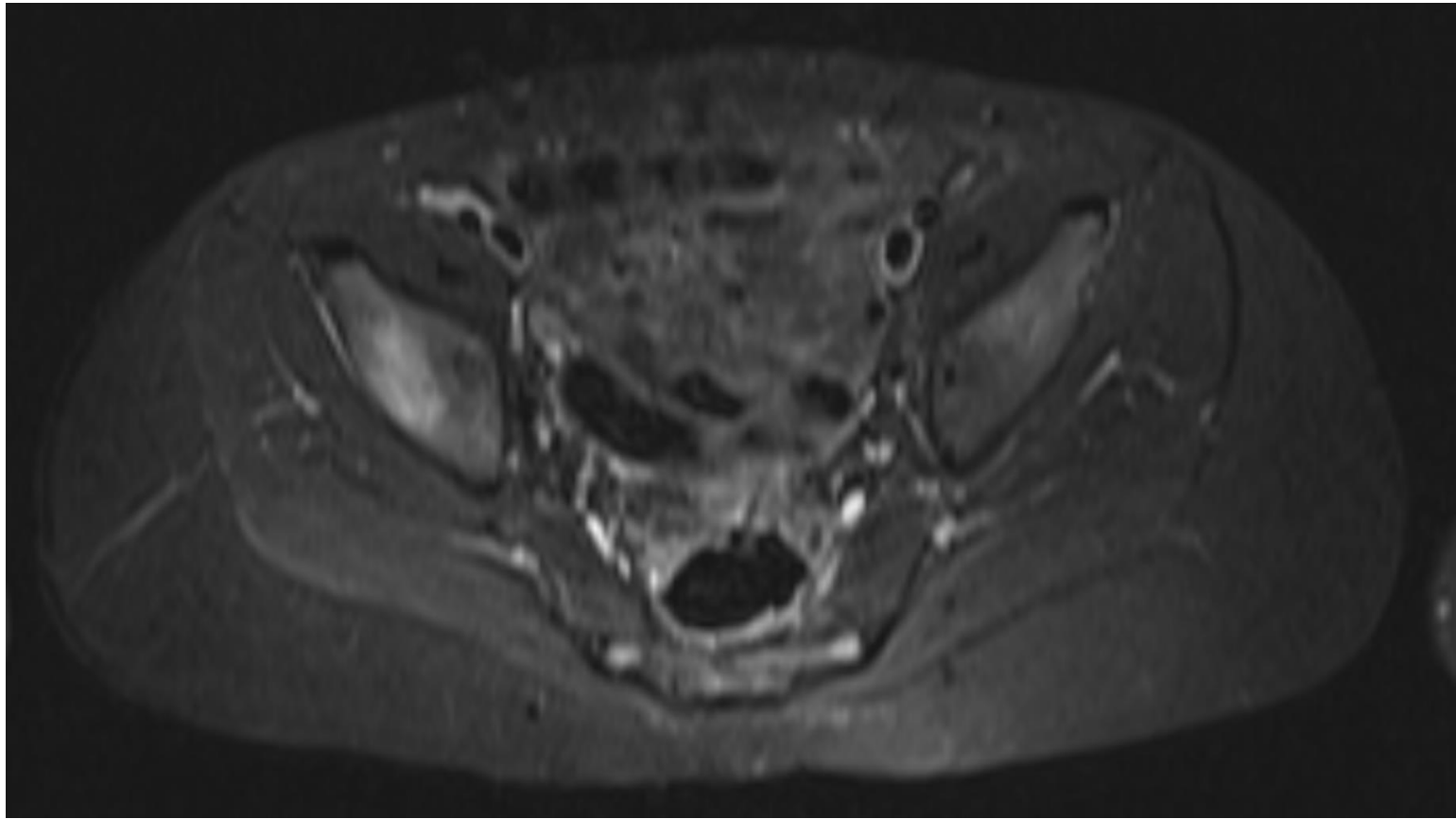
Pelvis



Signal site: ilium Right, Left
Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal
Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), **extends to adjacent contiguous bone?** If so, please write the **name of site** _____ and the **size** _____
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present

Signal site: ilium Right, Left
Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal
Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), **extends to adjacent contiguous bone?** If so, please write the **name of site** _____ and the **size** _____
Soft tissue/periosteal hyperintensity: absent, present
Bony expansion: absent, present

Pelvis



Signal site: periacetabular Right, Left

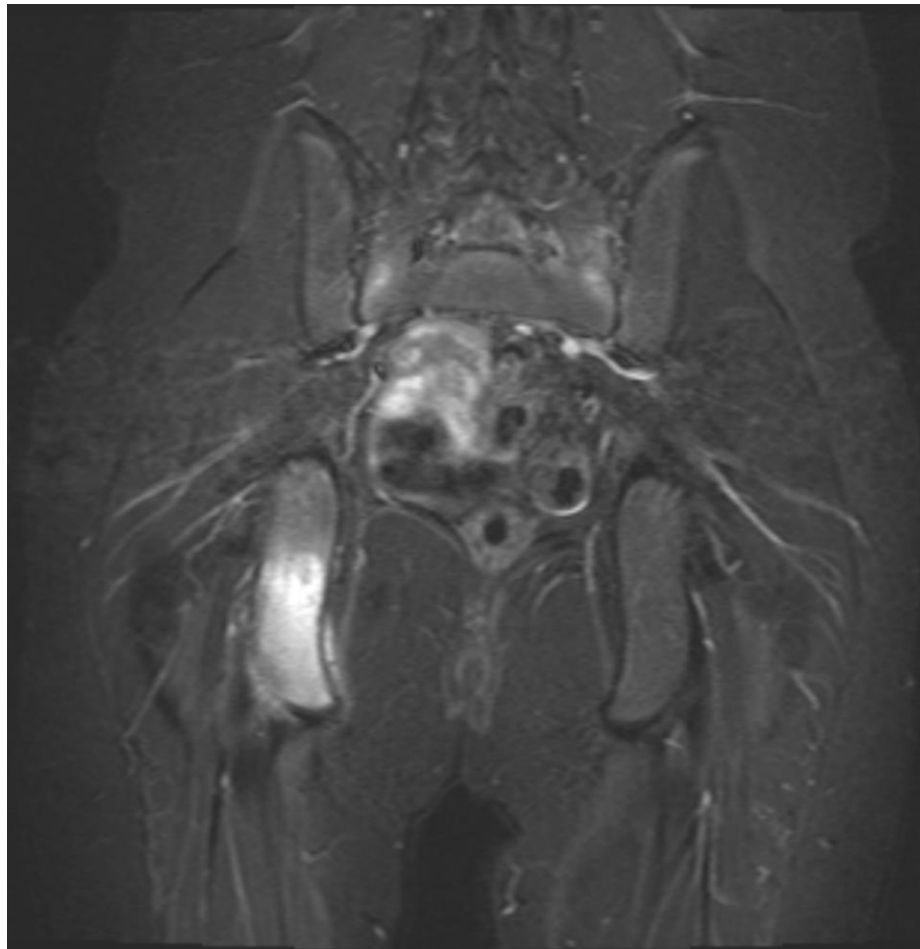
Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact),
extends to adjacent contiguous bone? If so, please write the **name of**
site_____and the **size**_____

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Pelvis



Signal site: pubis/ischium Right, Left

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), **extends to adjacent contiguous bone?** If so, please write the **name of site** _____ and the **size** _____

Soft tissue or periosteal hyperintensity: absent, present

Bony expansion: absent, present

Pelvis



Signal site: periacetabular Right, Left

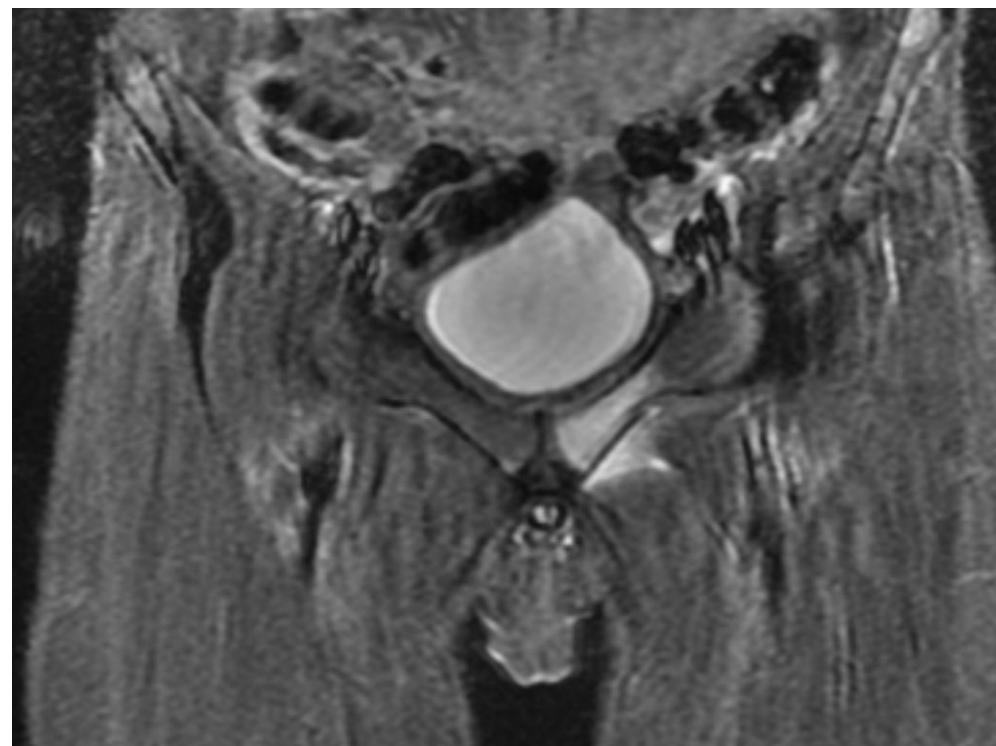
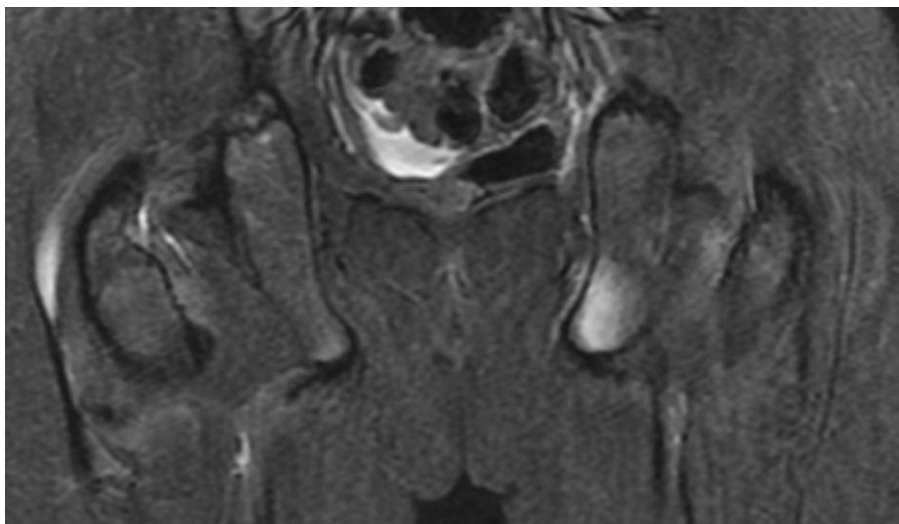
Bone marrow hyperintensity: Maximal signal strength: < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), **extends to adjacent contiguous bone?** If so, please write the name of site _____ and the size _____

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Pubis/Ischium



Signal site: Pubis/Ischium Left

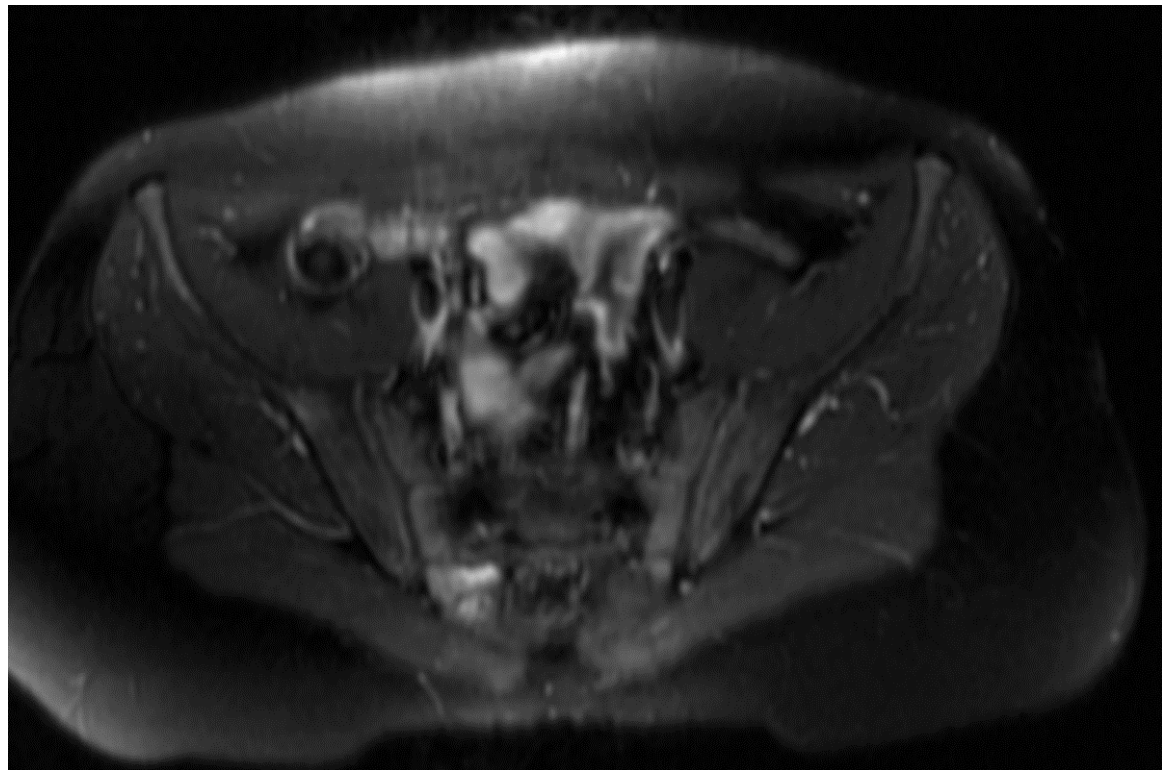
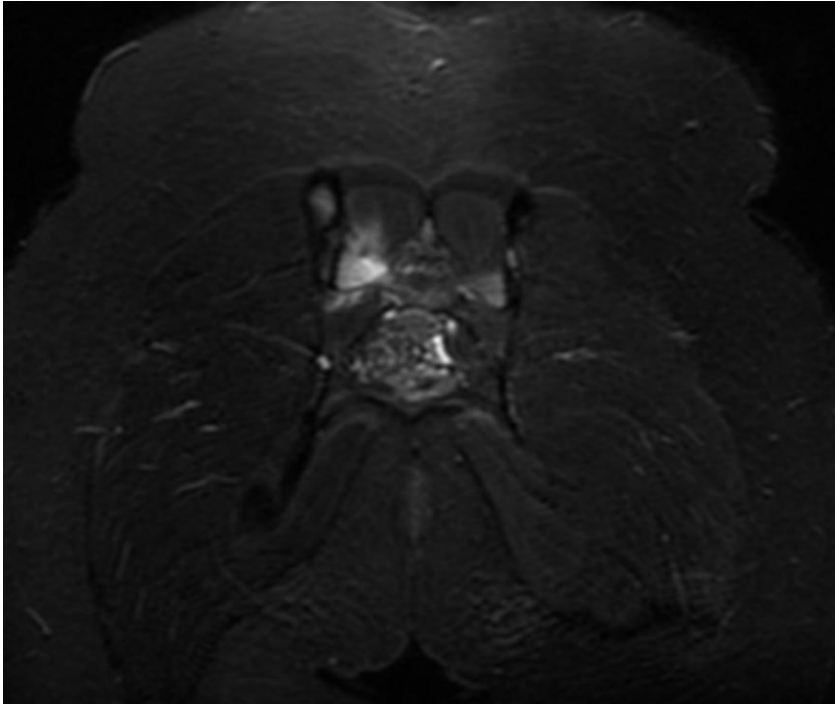
Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), **extends to adjacent contiguous bone?** If so, please write the **name of site** _____ and the **size** _____

Soft tissue or periosteal hyperintensity: absent, present

Bony expansion: absent, present

Sacrum



The abnormality in this patient was limited to that seen on these images (i.e. less than 25%), the remainder of this hemisacrum was normal.

Signal site: Sacrum Right

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact), extends to adjacent contiguous bone? If so, please write the name of site _____ and the size _____

Soft tissue or periosteal hyperintensity: absent, present

Bony expansion: absent, present

Humerus

Signal site: humerus **Right**

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size of prox epiphysis: absent, <25%, 25-50%, >50%

Signal size of prox metaphysis: absent, <25%, 25-50%, >50%

Signal size of diaphysis: absent, <25%, 25-50%, >50%;
contiguous

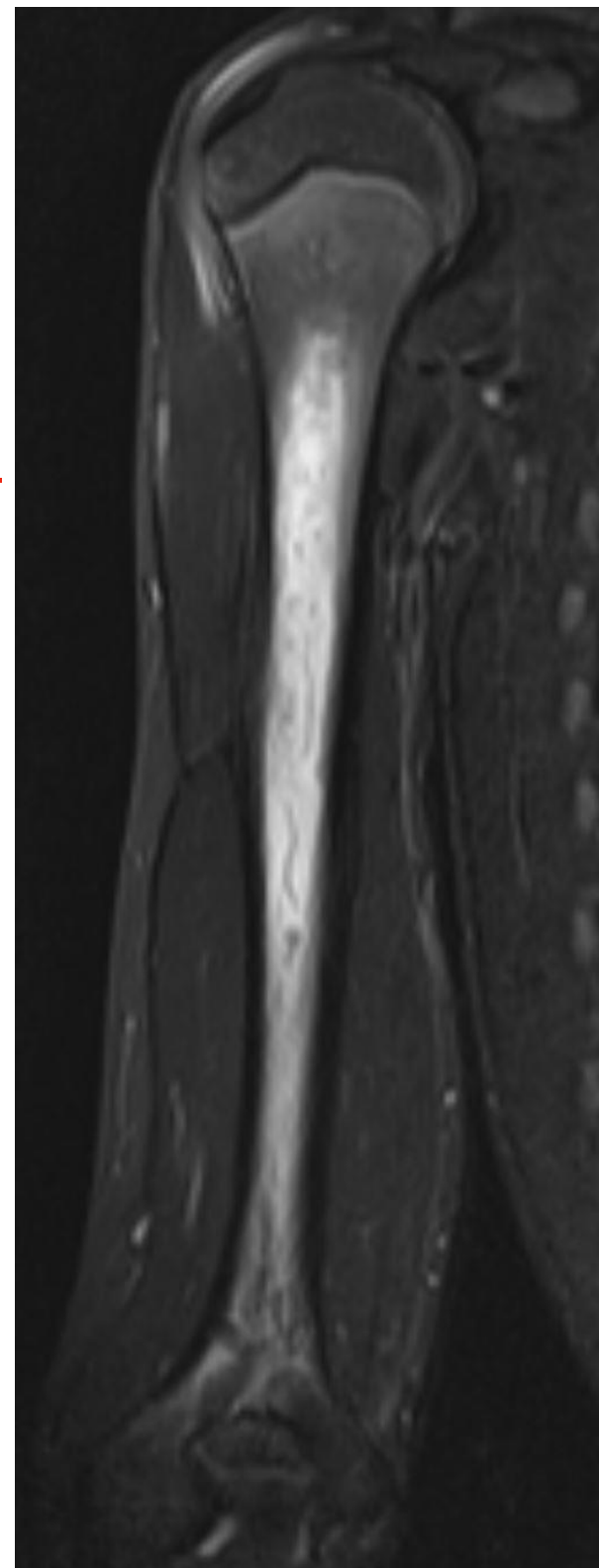
Signal size of dis metaphysis: absent, <25%, 25-50%, >50%

Signal size of dis epiphysis: absent, <25%, 25-50%, >50%

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Only mark if confidence is *low* or *medium*,
sites: _____



Radius

Signal Site: Radius Right

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size of prox epiphysis: absent, <25%, 25-50%, >50%

Signal size of prox metaphysis: absent, <25%, 25-50%, >50%

Signal size of diaphysis: absent, <25%, 25-50%, >50%;
contiguous

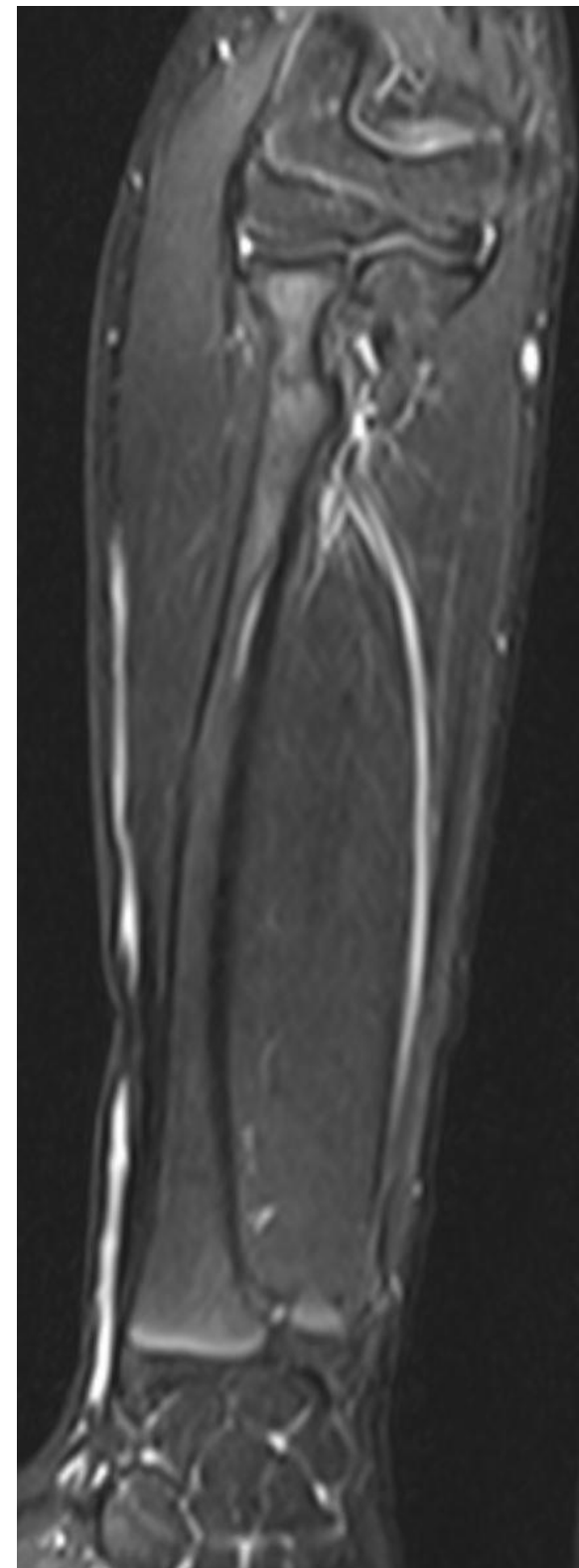
Signal size of dis metaphysis: absent, <25%, 25-50%, >50%

Signal size of dis epiphysis: absent, <25%, 25-50%, >50%

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Only mark if confidence is *low* or *medium*,
sites: _____



Ulna

Signal Site: Ulna Left

Bone marrow hyperintensity: absent,
< fluid signal, similar to fluid signal

Signal size of prox epiphysis: absent,
<25%, 25-50%, >50%

Signal size of prox metaphysis: absent,
<25%, 25-50%, >50%

Signal size of diaphysis: absent,
<25%, 25-50%, >50%; contiguous

Signal size of dist metaphysis: absent,
<25%, 25-50%, >50%

Signal size of dist epiphysis: absent,
<25%, 25-50%, >50%

Soft tissue/periosteal hyperintensity:
absent, present

Bony expansion: absent, present

Only mark if confidence is *low* or
medium, sites: _____



Femur

Signal Site: Femur Left

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size within proximal epiphysis: absent, <25%, 25-50%, >50%

Signal size within proximal metaphysis: absent, <25%, 25-50%, >50%,

Signal size within diaphysis: absent, <25%, 25-50%, >50%;
contiguous

Signal size within distal metaphysis: absent, <25%, 25-50%, >50%

Signal size within distal epiphysis: absent, <25%, 25-50%, >50%

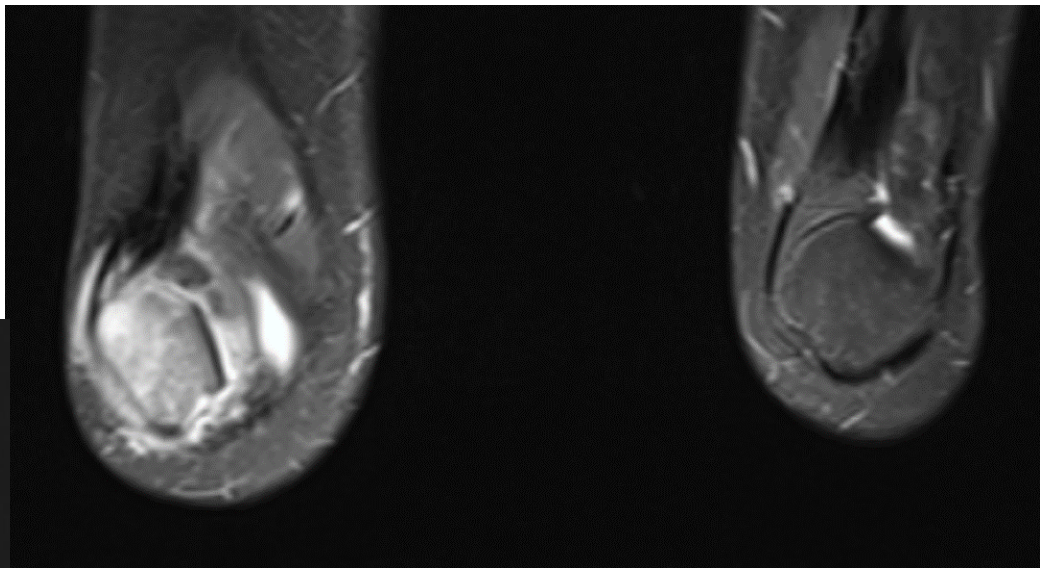
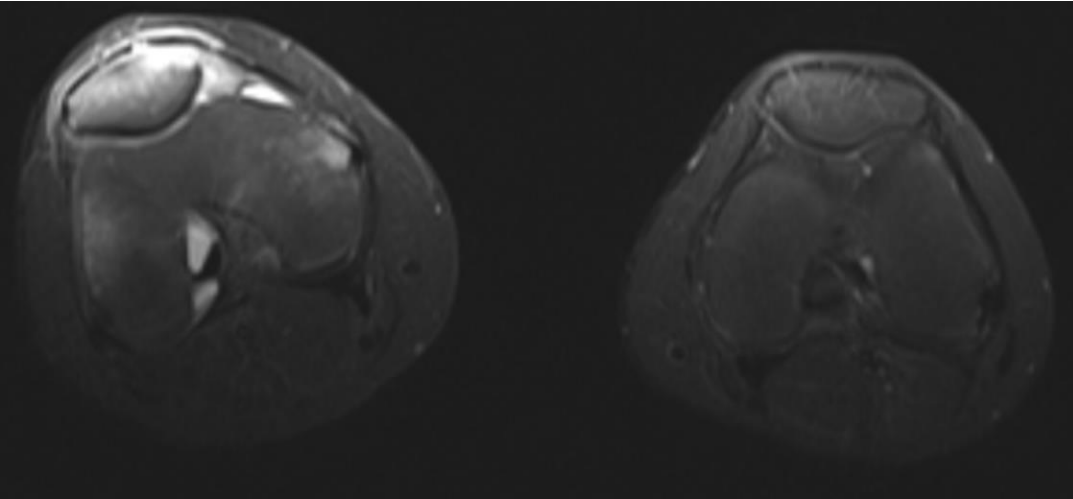
Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Only mark if confidence is *low* or *medium*,
sites: _____



Patella



Signal site: Patella Right

Bone marrow hyperintensity: Maximal signal strength:

< fluid signal, similar to fluid signal

Signal size: absent, <25%, 25-50%, >50%, present (not gradable secondary to artifact),

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Tibia

Signal Site: Tibia **Left**

Bone marrow hyperintensity: absent, < fluid signal, **similar to fluid signal**

Signal within proximal epiphysis: absent, <25%, **25-50%**, >50%

Signal within proximal metaphysis: **absent**, <25%, 25-50%, >50%,

Signal within diaphysis: **absent**, <25%, 25-50%, >50%; contiguous

Signal within distal metaphysis: absent, <25%, 25-50%, **>50%**

Signal within distal epiphysis: absent, **<25%**, 25-50%, >50%

Soft tissue/periosteal hyperintensity: absent, **present**

Bony expansion: **absent**, present

Only mark if confidence is *low* or *medium*,

sites: _____



Tibia

Signal Site: Tibia Left

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size within proximal epiphysis: absent, <25%, 25-50%, >50%

Signal size within proximal metaphysis: absent, <25%, 25-50%, >50%,

Signal size within diaphysis: absent, <25%, 25-50%, >50%; contiguous

Signal size within distal metaphysis: absent, <25%, 25-50%, >50%

Signal size within distal epiphysis: absent, <25%, 25-50%, >50%

Soft tissue/periosteal hyperintensity: absent, present,

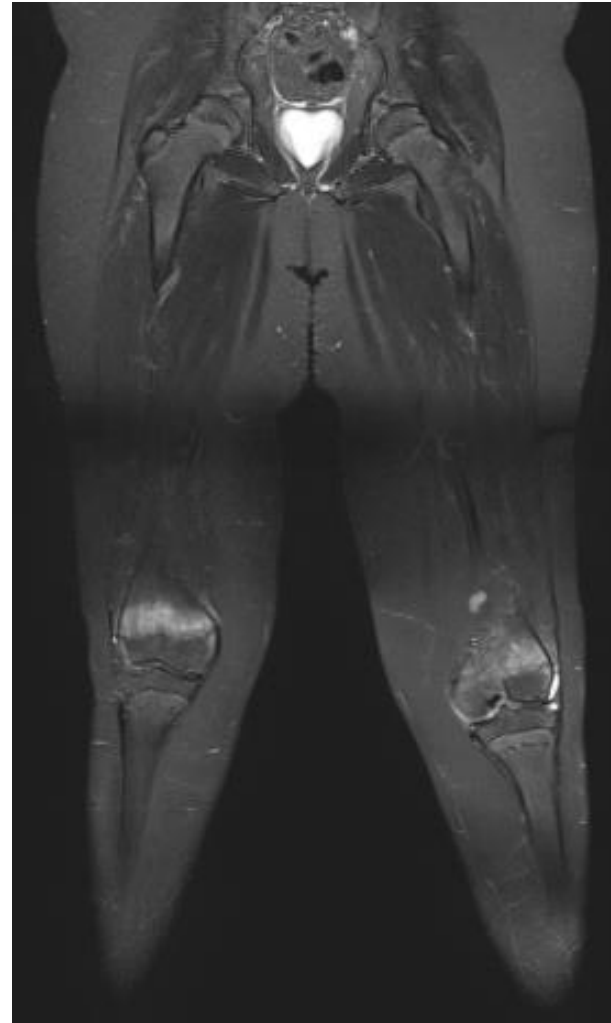
Bony expansion: absent, present

Only mark if confidence is *low* or *medium*, sites: _____



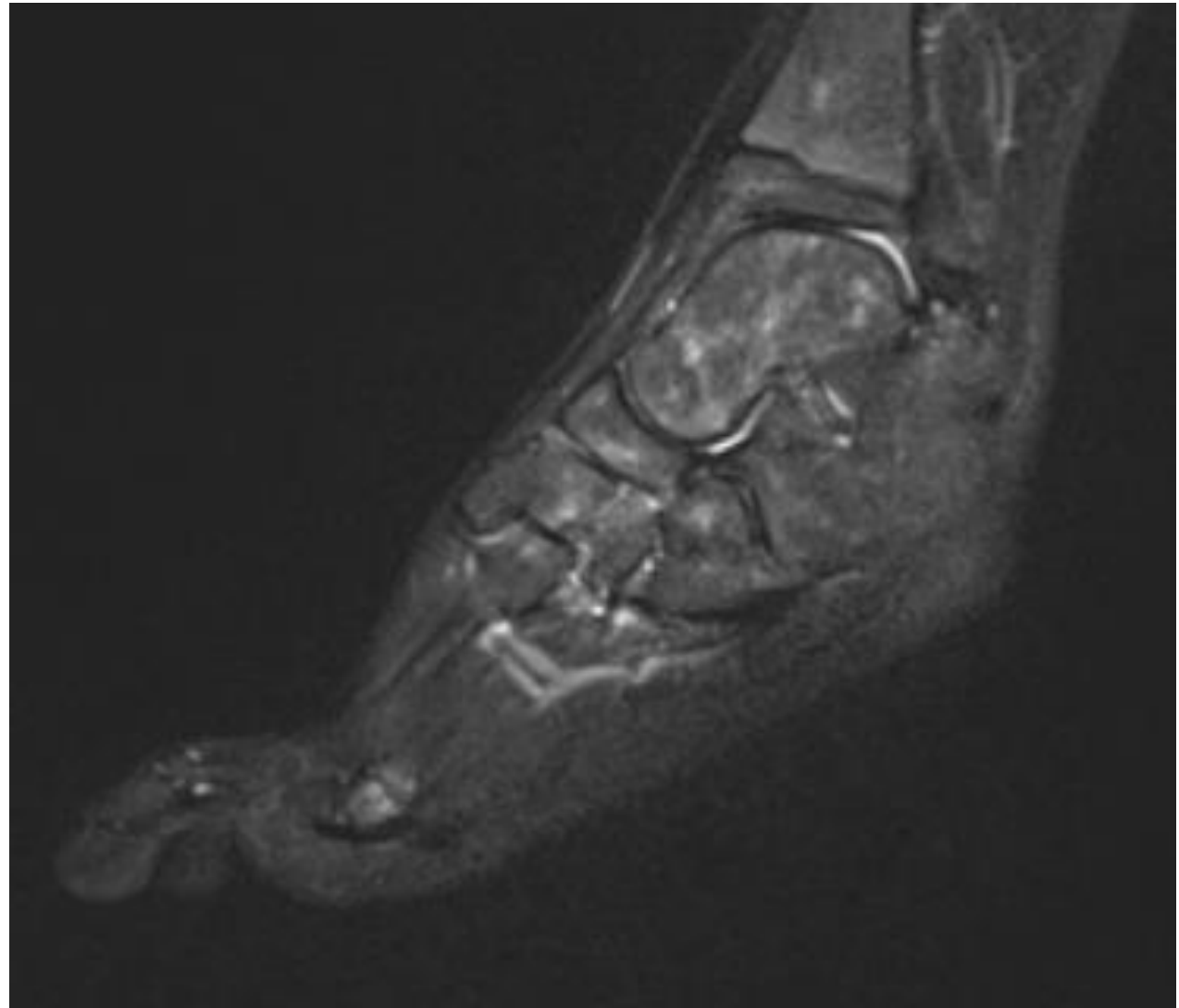
Hypertrophy of limb

Left femur is longer and wider than the contralateral side secondary to distal disease



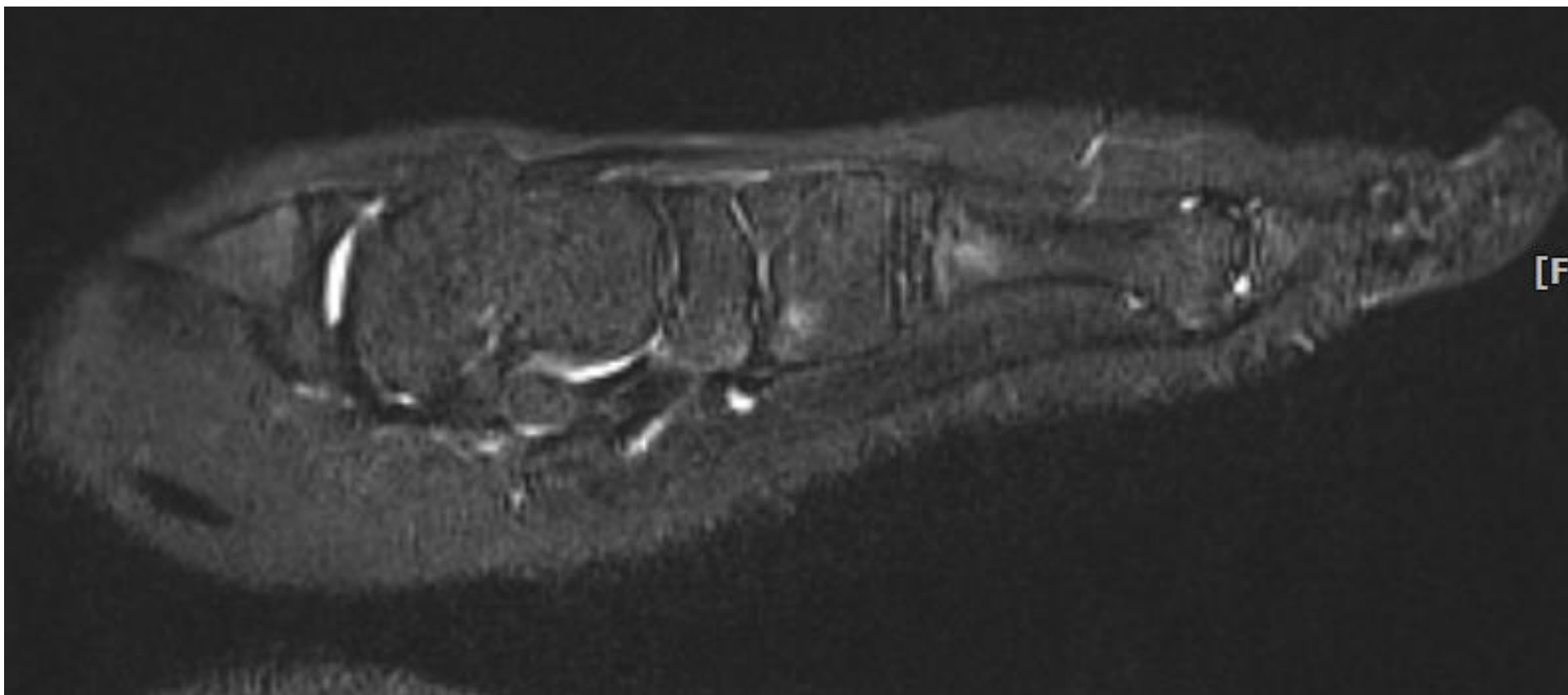
Normal foot

Patchy, non-confluent high STIR signal involving almost all bones.



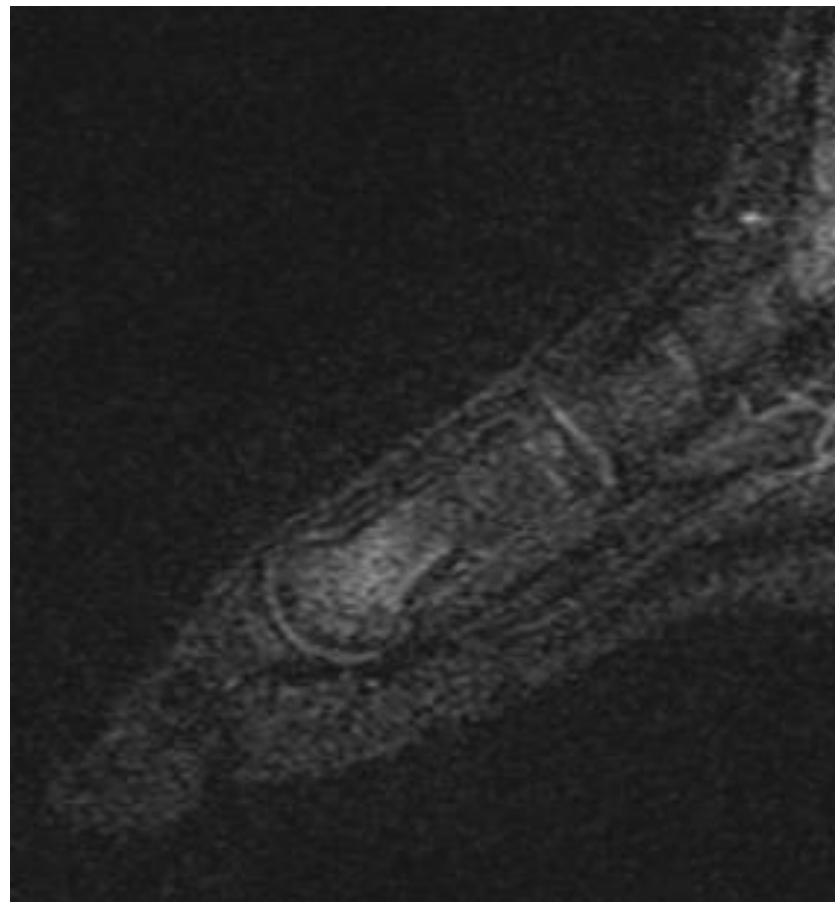
Abnormal foot

Abnormal foot at the MT bone: treat it as a long bone



Shabshin et al. Pediatric Radiology 2006, 36: 673 (see Figure 3)

Foot



Signal site: forefoot/midfoot

Right, Left

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: <25%, 25-50%, >50%, present (not gradable secondary to artifact)

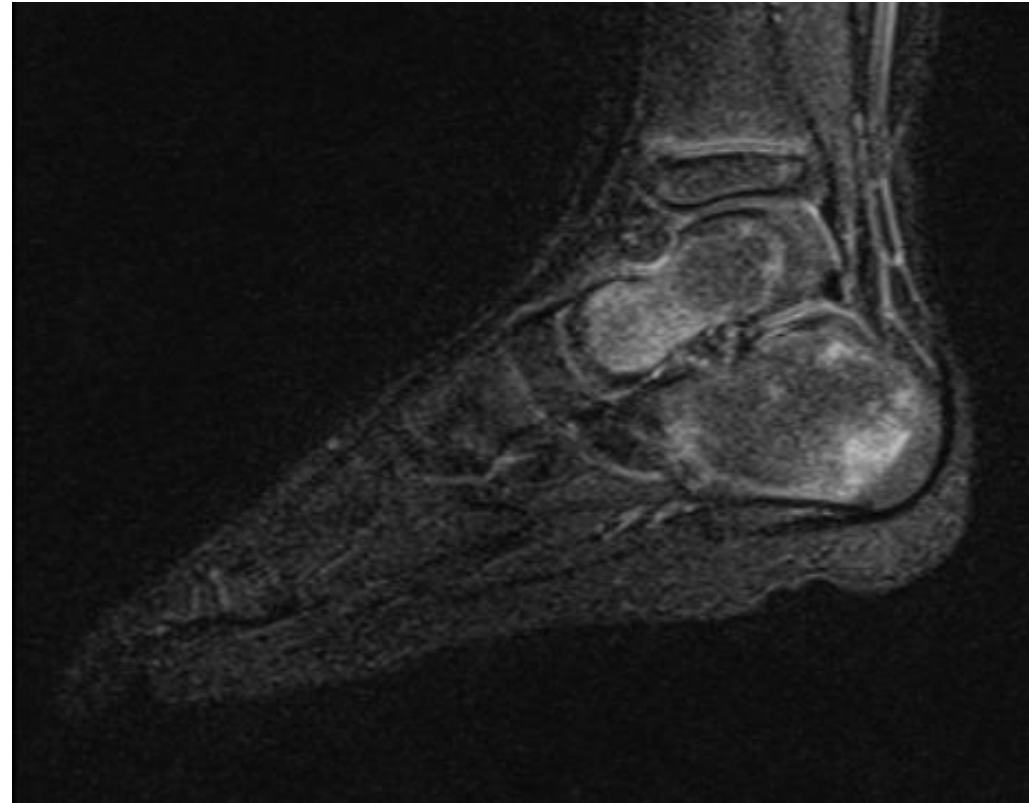
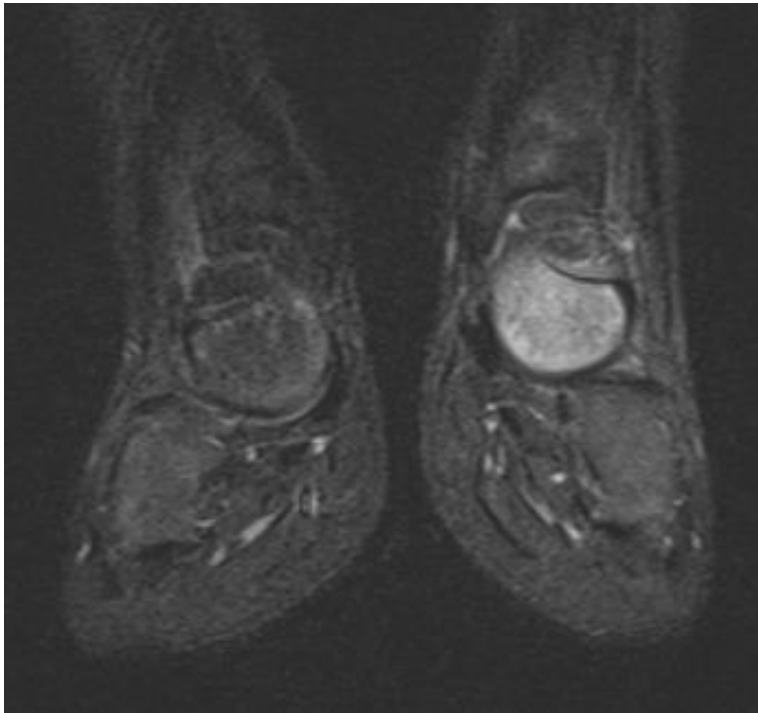
of bones with edema: 1, **specific bones:** 1st metatarsal

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Only mark if confidence is *low* or *medium*, sites: _____

Foot



Signal site: hindfoot

Right, Left

Bone marrow hyperintensity: absent, < fluid signal, similar to fluid signal

Signal size: <25%, 25-50%, >50%, present (not gradable secondary to artifact)

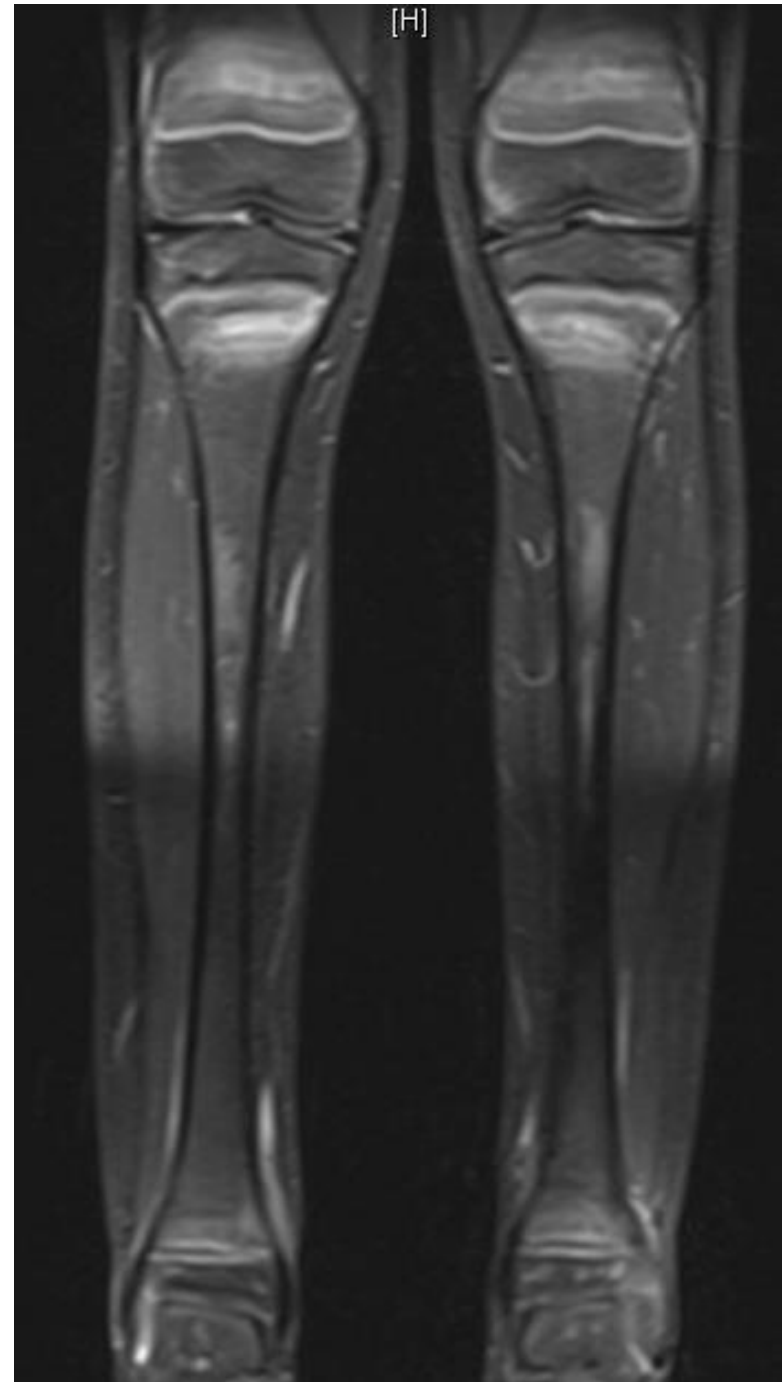
of bones with edema: 2, **specific bones:** talus, calcaneus

Soft tissue/periosteal hyperintensity: absent, present

Bony expansion: absent, present

Only mark if confidence is *low* or *medium*, sites: _____

Pamidronate (or
other
bisphosphonate)
treatment may cause
uniform linear
hyperintensity within
metaphysis and
should NOT be
scored



Supplement 3. Reader's characteristics*

Variables	Readers
	(n=11)
Country	
USA, n (%)	7 (64%)
Canada, n (%)	2 (18%)
Germany, n (%)	1 (9%)
Italy, n (%)	1 (9%)
Years of experience	7 (6-10)
Number of MRI read per year	20 (10-36)

*Data are presented as medians (IQR) unless stated otherwise.

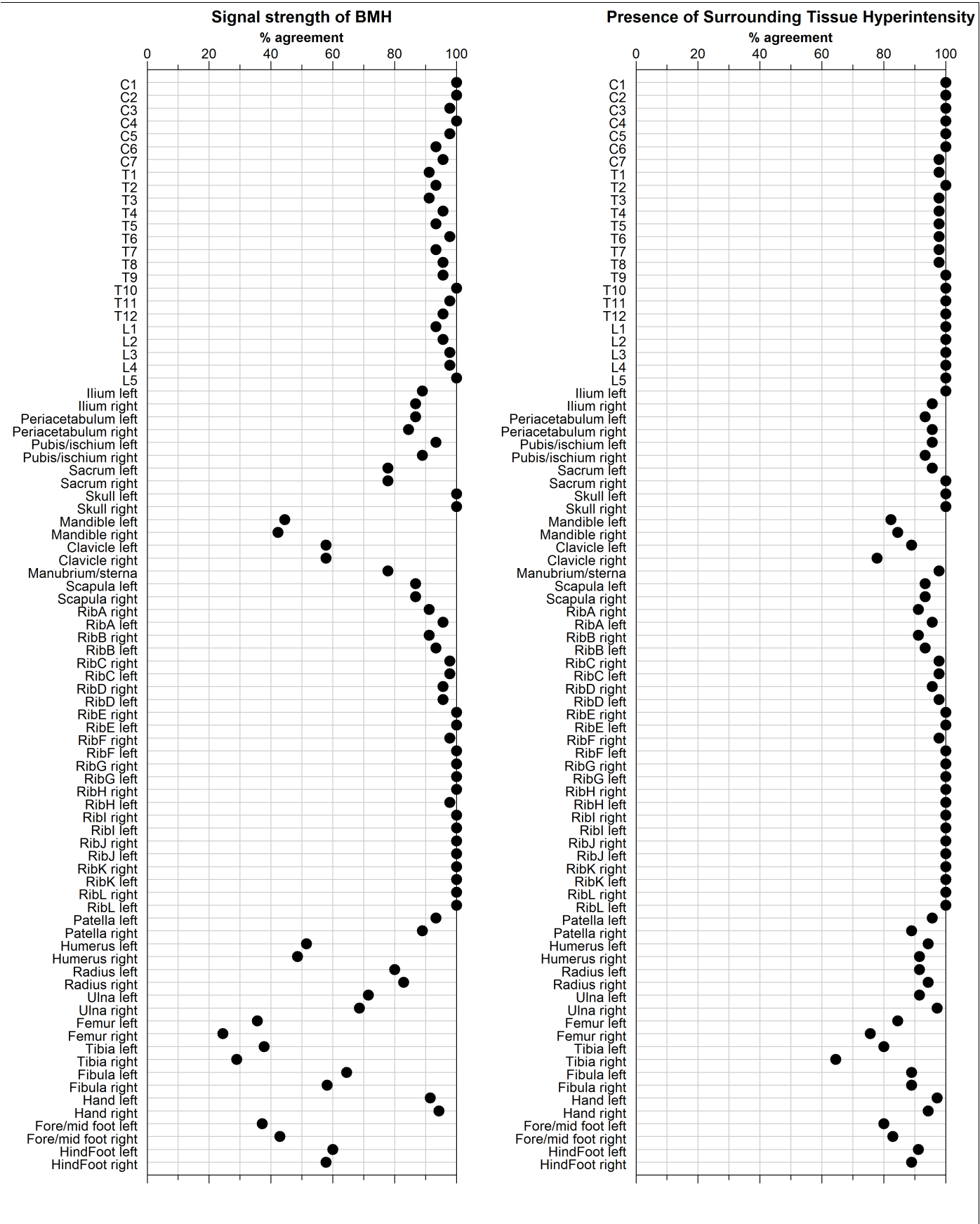
Supplement 4. Prevalence of bone marrow hyperintensity, surrounding tissue hyperintensity and bony expansion in individual bone units among patients

Site	Bone marrow hyperintensity	Vertebral compression	Surrounding tissue hyperintensity	Bony expansion
C1	0%	0%	0%	0%
C2	0%	0%	0%	0%
C3	0%	0%	0%	0%
C4	0%	0%	0%	0%
C5	0%	0%	0%	0%
C6	0%	0%	0%	0%
C7	0%	0%	0%	0%
T1	2%	0%	0%	0%
T2	0%	2%	0%	0%
T3	4%	4%	0%	0%
T4	2%	2%	0%	0%
T5	4%	4%	0%	0%
T6	2%	4%	0%	0%
T7	0%	2%	0%	0%
T8	2%	0%	0%	0%
T9	0%	0%	0%	0%
T10	0%	0%	0%	0%
T11	0%	0%	0%	0%
T12	0%	0%	0%	0%
L1	2%	0%	0%	0%
L2	0%	0%	0%	0%
L3	0%	0%	0%	0%
L4	0%	0%	0%	0%
L5	0%	0%	0%	0%
Ilium left	0%	-	0%	0%
Ilium right	4%	-	0%	0%
Periacetabulum left	2%	-	2%	0%
Periacetabulum right	7%	-	0%	0%
Pubis/ischium left	0%	-	0%	0%
Pubis/ischium right	2%	-	0%	0%
Sacrum left	7%	-	0%	0%
Sacrum right	2%	-	0%	0%
Clavicle left	4%	-	0%	0%
Clavicle right	9%	-	2%	2%
Mandible left	2%	-	2%	2%
Mandible right	0%	-	0%	0%
Manubrium/sterna	0%	-	0%	0%
Patella left	0%	-	0%	0%
Patella right	2%	-	0%	0%
Rib A right	0%	-	0%	0%
Rib B right	0%	-	0%	0%
Rib C right	0%	-	0%	0%
Rib D right	0%	-	0%	0%
Rib E right	0%	-	0%	0%
Rib F right	0%	-	0%	0%
Rib G right	0%	-	0%	0%
Rib H right	0%	-	0%	0%
Rib I right	0%	-	0%	0%

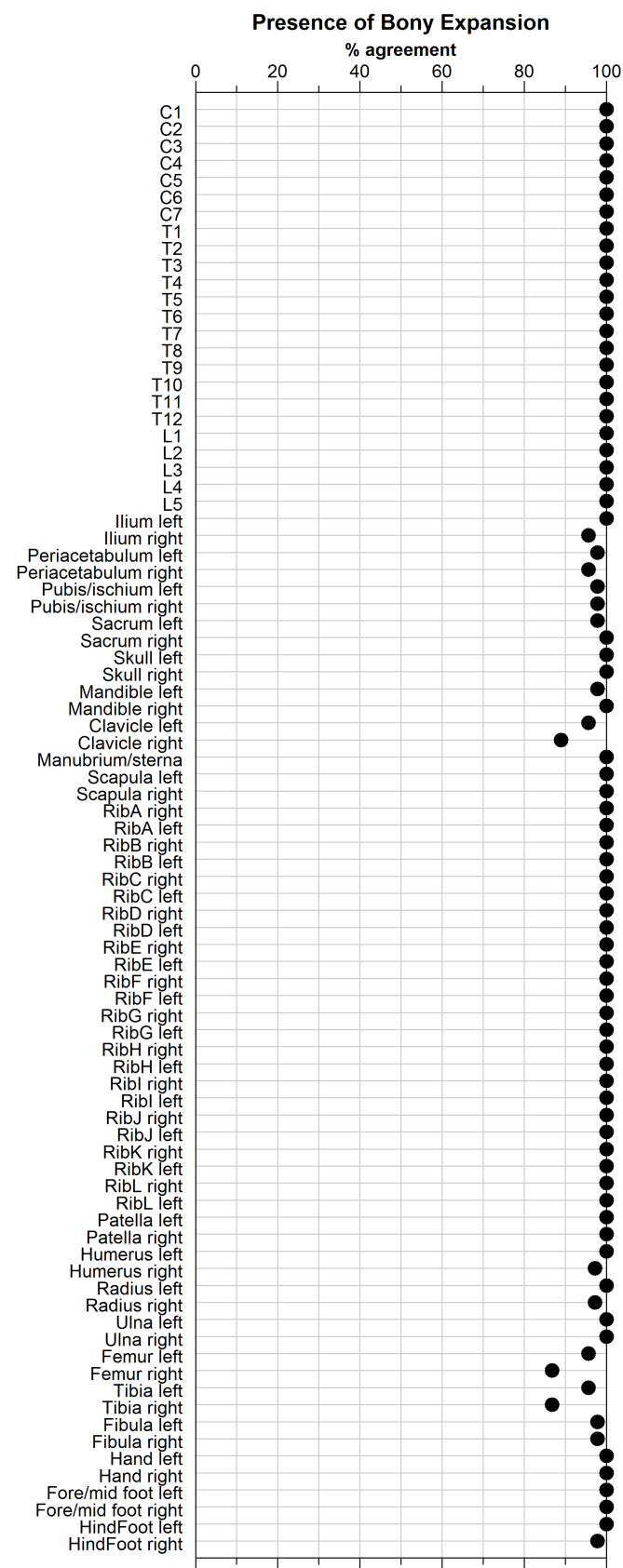
Rib J right	0%	-	0%	0%
Rib K right	0%	-	0%	0%
Rib L right	0%	-	0%	0%
Rib A left	0%	-	0%	0%
Rib B left	0%	-	0%	0%
Rib C left	0%	-	0%	0%
Rib D left	0%	-	0%	0%
Rib E left	0%	-	0%	0%
Rib F left	0%	-	0%	0%
Rib G left	0%	-	0%	0%
Rib H left	0%	-	0%	0%
Rib I left	0%	-	0%	0%
Rib J left	0%	-	0%	0%
Rib K left	0%	-	0%	0%
Rib L left	0%	-	0%	0%
Scapula left	0%	-	0%	0%
Scapula right	0%	-	0%	0%
Skull left	0%	-	0%	0%
Skull right	0%	-	0%	0%
Fore/mid foot left	23%	-	3%	0%
Fore/mid foot right	9%	-	0%	0%
Hindfoot left	18%	-	0%	0%
Hindfoot right	9%	-	0%	0%
Hand left	3%	-	0%	0%
Hand right	3%	-	0%	0%
Femur left	24%	-	4%	2%
Femur right	38%	-	7%	4%
Fibula left	11%	-	2%	0%
Fibula right	12%	-	4%	0%
Humerus left	6%	-	0%	0%
Humerus right	9%	-	3%	3%
Radius left	9%	-	0%	0%
Radius right	6%	-	0%	0%
Tibia left	29%	-	4%	0%
Tibia right	51%	-	9%	0%
Ulna left	0%	-	0%	0%
Ulna right	0%	-	0%	0%

Supplement 5. Absolute agreement among radiologists in signal strength of bone marrow hyperintensity (A), presence of surrounding tissue hyperintensity (B), presence of bony expansion (C), signal size of bone marrow hyperintensity in long bones (D), signal size of bone marrow hyperintensity in other bones (E) and presence of vertebral compression (F) in individual bone units among patients

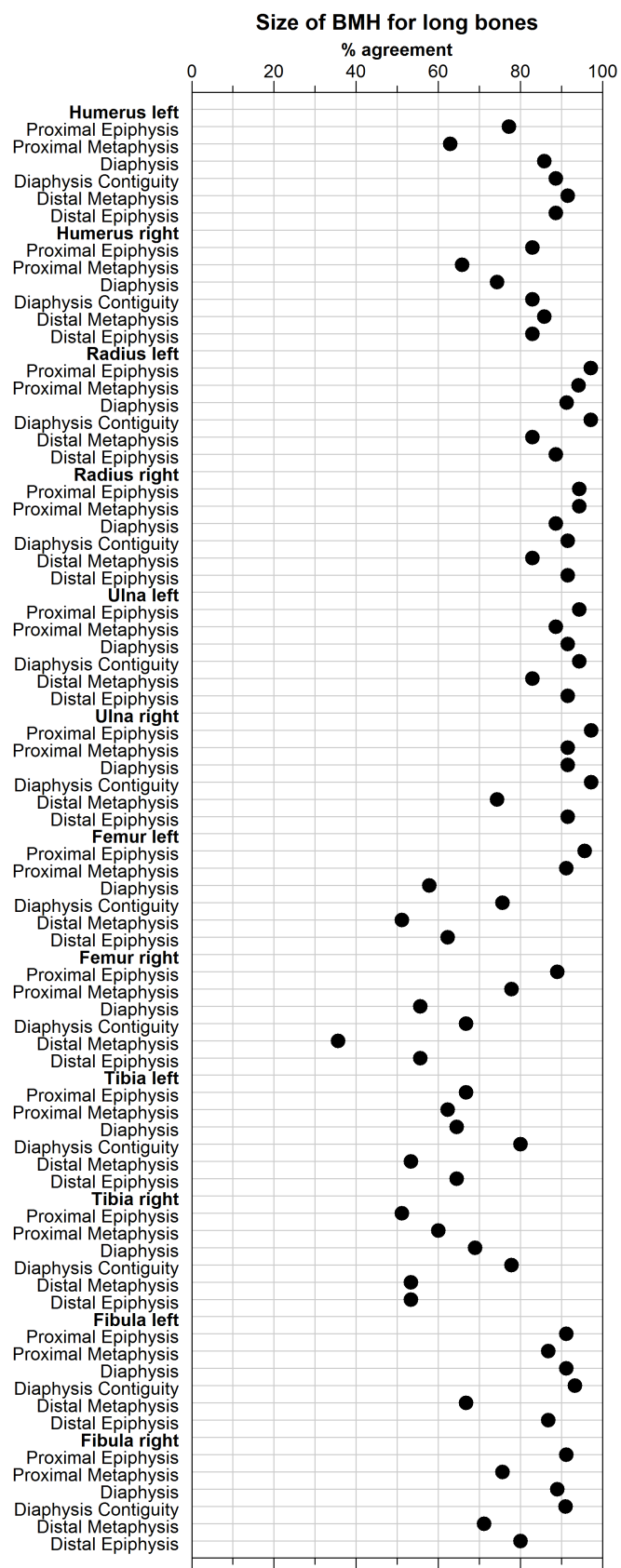
A. B.



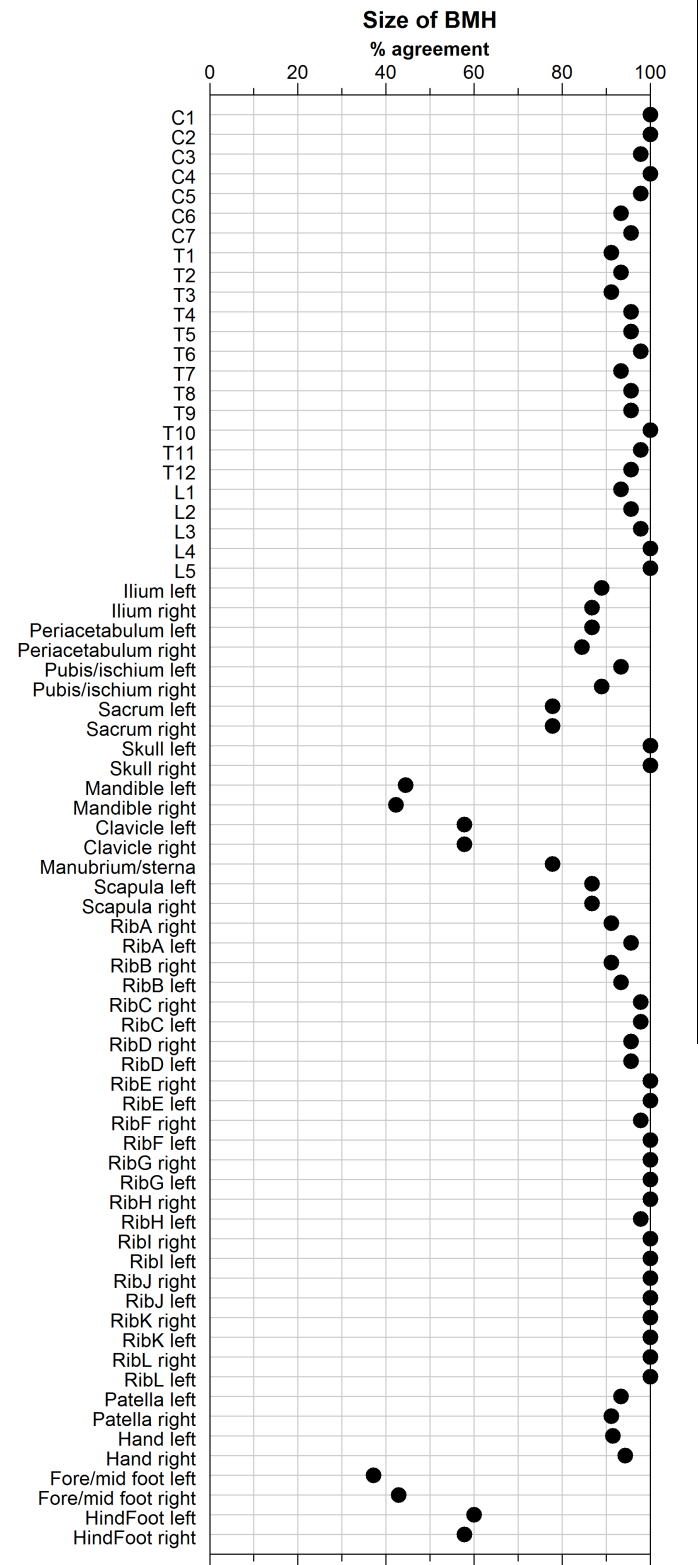
C.



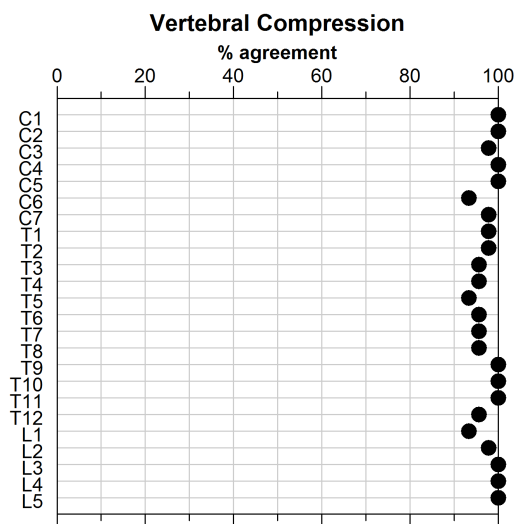
D.



E.



F.



Supplement 6. Kappa results and agreement for individual bone units

A. Signal intensity of bone marrow hyperintensity

Site	n subjects	Kappa (95%CI)	Agreement (%)
Spine			
C1	45	NA*	100%
C2	45	NA*	100%
C3	45	0.99 (0.98-1.00)	98%
C4	45	NA*	100%
C5	45	0.99 (0.98-1.00)	98%
C6	45	0.97 (0.94-1.00)	93%
C7	45	0.98 (0.94-1.00)	96%
T1	45	0.98 (0.95-1.00)	91%
T2	45	0.98 (0.96-1.00)	93%
T3	45	0.96 (0.91-1.00)	91%
T4	45	0.98 (0.95-1.00)	96%
T5	45	0.98 (0.95-1.00)	93%
T6	45	0.99 (0.97-1.00)	98%
T7	45	0.97 (0.94-1.00)	93%
T8	45	0.96 (0.90-1.00)	96%
T9	45	0.97 (0.92-1.00)	96%
T10	45	NA*	100%
T11	45	0.99 (0.98-1.00)	98%
T12	45	0.98 (0.96-1.00)	96%
L1	45	0.96 (0.91-1.00)	93%
L2	45	0.98 (0.96-1.00)	96%
L3	45	0.99 (0.98-1.00)	98%
L4	45	0.99 (0.98-1.00)	98%
L5	45	NA*	100%
Complex bone			
Ilium left	45	0.97 (0.93-1.00)	89%
Ilium right	45	0.94 (0.89-0.99)	87%
Periacetabulum left	45	0.93 (0.87-1.00)	87%
Periacetabulum right	45	0.92 (0.85-0.99)	84%
Pubis/ischium left	45	0.98 (0.95-1.00)	93%
Pubis/ischium right	45	0.93 (0.87-1.00)	89%
Sacrum left	45	0.89 (0.82-0.96)	78%
Sacrum right	45	0.90 (0.83-0.97)	78%
Flat bone			
Clavicle left	45	0.85 (0.77-0.92)	58%
Clavicle right	45	0.83 (0.74-0.92)	58%
Mandible left	45	0.74 (0.66-0.82)	44%
Mandible right	45	0.72 (0.64-0.81)	42%
Manubrium/sterna	45	0.93 (0.88-0.98)	78%
Patella left	45	0.97 (0.94-1.00)	93%
Patella right	45	0.92 (0.85-0.99)	89%
Rib A left	45	0.98 (0.96-1.00)	96%
Rib A right	45	0.96 (0.92-1.00)	91%

Rib B left	45	0.98 (0.95-1.00)	93%
Rib B right	45	0.96 (0.92-1.00)	91%
Rib C left	45	0.99 (0.98-1.00)	98%
Rib C right	45	0.99 (0.98-1.00)	98%
Rib D left	45	0.98 (0.96-1.00)	96%
Rib D right	45	0.97 (0.94-1.00)	96%
Rib E left	45	NA*	100%
Rib E right	45	NA*	100%
Rib F left	45	NA*	100%
Rib F right	45	0.99 (0.98-1.00)	98%
Rib G left	45	NA*	100%
Rib G right	45	NA*	100%
Rib H left	45	0.99 (0.98-1.00)	98%
Rib H right	45	NA*	100%
Rib I left	45	NA*	100%
Rib I right	45	NA*	100%
Rib J left	45	NA*	100%
Rib J right	45	NA*	100%
Rib K left	45	NA*	100%
Rib K right	45	NA*	100%
Rib L left	45	NA*	100%
Rib L right	45	NA*	100%
Scapula left	45	0.92 (0.86-0.99)	87%
Scapula right	45	0.91 (0.83-0.98)	87%
Skull left	45	NA*	100%
Skull right	45	NA*	100%
Hand/foot			
Fore/mid foot left	35	0.63 (0.51-0.75)	37%
Fore/mid foot right	35	0.68 (0.55-0.80)	43%
Hindfoot left	45	0.84 (0.77-0.92)	60%
Hindfoot right	45	0.76 (0.66-0.87)	58%
Hand left	35	0.94 (0.88-1.00)	91%
Hand right	35	0.94 (0.86-1.00)	94%
Long bone			
Femur left	45	0.69 (0.59-0.80)	36%
Femur right	45	0.65 (0.54-0.76)	24%
Fibula left	45	0.75 (0.62-0.88)	64%
Fibula right	43	0.76 (0.63-0.88)	58%
Humerus left	35	0.79 (0.68-0.90)	51%
Humerus right	35	0.73 (0.58-0.88)	49%
Radius left	35	0.90 (0.80-0.99)	80%
Radius right	35	0.89 (0.78-1.00)	83%
Tibia left	45	0.63 (0.51-0.75)	38%
Tibia right	45	0.60 (0.49-0.71)	29%
Ulna left	35	0.81 (0.69-0.93)	71%
Ulna right	35	0.84 (0.73-0.95)	69%

95%CI, 95% confidence interval.

* Kappa could not be calculated due to full agreement.

B-I. Signal size of bone marrow hyperintensity in non-long bones

Site	n subjects	Kappa (95%CI)	Agreement (%)
Spine			
C1	45	NA*	100%
C2	45	NA*	100%
C3	45	0.99 (0.98-1.00)	98%
C4	45	NA*	100%
C5	45	0.99 (0.98-1.00)	98%
C6	45	0.98 (0.96-1.00)	93%
C7	45	0.98 (0.96-1.00)	96%
T1	45	0.97 (0.95-1.00)	91%
T2	45	0.98 (0.96-1.00)	93%
T3	45	0.96 (0.92-1.00)	91%
T4	45	0.99 (0.99-1.00)	96%
T5	45	0.97 (0.93-1.00)	96%
T6	45	0.99 (0.97-1.00)	98%
T7	45	0.97 (0.91-1.00)	93%
T8	45	0.97 (0.92-1.00)	96%
T9	45	0.97 (0.92-1.00)	96%
T10	45	NA*	100%
T11	45	0.99 (0.98-1.00)	98%
T12	45	0.98 (0.96-1.00)	96%
L1	45	0.97 (0.94-1.00)	93%
L2	45	0.98 (0.96-1.00)	96%
L3	45	0.99 (0.98-1.00)	98%
L4	45	NA*	100%
L5	45	NA*	100%
Complex bone			
Ilium left	45	0.95 (0.89-1.00)	89%
Ilium right	45	0.96 (0.91-1.00)	87%
Periacetabulum left	45	0.95 (0.90-1.00)	87%
Periacetabulum right	45	0.92 (0.85-0.98)	84%
Pubis/ischium left	45	0.96 (0.89-1.00)	93%
Pubis/ischium right	45	0.94 (0.88-1.00)	89%
Sacrum left	45	0.95 (0.92-0.99)	78%
Sacrum right	45	0.91 (0.85-0.98)	78%
Flat bone			
Clavicle left	45	0.91 (0.86-0.96)	58%
Clavicle right	45	0.90 (0.84-0.95)	58%
Mandible left	45	0.88 (0.83-0.93)	44%
Mandible right	45	0.87 (0.82-0.93)	42%
Manubrium/sterna	45	0.93 (0.88-0.99)	78%
Patella left	45	0.95 (0.90-1.00)	93%
Patella right	45	0.91 (0.80-1.00)	91%
Rib A left	45	0.98 (0.96-1.00)	96%
Rib A right	45	0.96 (0.92-1.00)	91%
Rib B left	45	0.98 (0.95-1.00)	93%
Rib B right	45	0.96 (0.92-1.00)	91%

Rib C left	45	0.99 (0.98-1.00)	98%
Rib C right	45	0.99 (0.98-1.00)	98%
Rib D left	45	0.98 (0.96-1.00)	96%
Rib D right	45	0.98 (0.96-1.00)	96%
Rib E left	45	NA*	100%
Rib E right	45	NA*	100%
Rib F left	45	NA*	100%
Rib F right	45	0.99 (0.98-1.00)	98%
Rib G left	45	NA*	100%
Rib G right	45	NA*	100%
Rib H left	45	0.99 (0.98-1.00)	98%
Rib H right	45	NA*	100%
Rib I left	45	NA*	100%
Rib I right	45	NA*	100%
Rib J left	45	NA*	100%
Rib J right	45	NA*	100%
Rib K left	45	NA*	100%
Rib K right	45	NA*	100%
Rib L left	45	NA*	100%
Rib L right	45	NA*	100%
Scapula left	45	0.94 (0.89-0.99)	87%
Scapula right	45	0.95 (0.90-0.99)	87%
Skull left	45	NA*	100%
Skull right	45	NA*	100%
Hand/foot			
Fore/mid foot left	35	0.67 (0.52-0.81)	37%
Fore/mid foot right	35	0.77 (0.67-0.86)	43%
Hindfoot left	45	0.84 (0.76-0.93)	60%
Hindfoot right	45	0.80 (0.70-0.91)	58%
Hand left	35	0.95 (0.87-1.00)	91%
Hand right	35	0.97 (0.92-1.00)	94%

95%CI, 95% confidence interval.

* Kappa could not be calculated due to full agreement.

B-II. Signal size of bone marrow hyperintensity in long bones

Site	n subjects	Kappa (95%CI)	Agreement (%)
Proximal Epiphysis			
Femur left	45	0.97 (0.92-1.00)	96%
Femur right	45	0.95 (0.88-1.00)	89%
Fibula left	45	0.96 (0.93-1.00)	91%
Fibula right	45	0.94 (0.88-1.00)	91%
Humerus left	35	0.92 (0.86-0.99)	77%
Humerus right	35	0.94 (0.88-1.00)	83%
Radius left	34	0.99 (0.97-1.00)	97%
Radius right	35	0.96 (0.89-1.00)	94%
Tibia left	45	0.90 (0.84-0.95)	67%
Tibia right	45	0.87 (0.80-0.94)	51%
Ulna left	35	0.97 (0.91-1.00)	94%
Ulna right	35	0.99 (0.97-1.00)	97%
Proximal Metaphysis			
Femur left	45	0.96 (0.92-1.00)	91%
Femur right	45	0.93 (0.86-0.99)	78%
Fibula left	45	0.83 (0.69-0.98)	87%
Fibula right	45	0.82 (0.69-0.95)	76%
Humerus left	35	0.86 (0.77-0.95)	63%
Humerus right	35	0.85 (0.75-0.95)	66%
Radius left	34	0.96 (0.88-1.00)	94%
Radius right	35	0.96 (0.90-1.00)	94%
Tibia left	45	0.80 (0.69-0.91)	62%
Tibia right	45	0.78 (0.67-0.90)	60%
Ulna left	35	0.95 (0.88-1.00)	89%
Ulna right	35	0.93 (0.83-1.00)	91%
Diaphysis			
Femur left	45	0.89 (0.83-0.94)	58%
Femur right	45	0.89 (0.84-0.95)	56%
Fibula left	45	0.95 (0.89-1.00)	91%
Fibula right	45	0.96 (0.92-1.00)	89%
Humerus left	35	0.95 (0.89-1.00)	86%
Humerus right	35	0.91 (0.80-1.00)	74%
Radius left	34	0.97 (0.92-1.00)	91%
Radius right	35	0.96 (0.90-1.00)	89%
Tibia left	45	0.91 (0.86-0.96)	64%
Tibia right	45	0.94 (0.90-0.97)	69%
Ulna left	35	0.96 (0.90-1.00)	91%
Ulna right	35	0.95 (0.90-1.00)	91%
Diaphysis Contiguity			
Femur left	45	0.84 (0.75-0.94)	76%
Femur right	45	0.80 (0.71-0.90)	67%
Fibula left	44	0.96 (0.92-1.00)	93%
Fibula right	44	0.94 (0.88-1.00)	91%
Humerus left	35	0.95 (0.90-1.00)	89%

Humerus right	35	0.92 (0.84-0.99)	83%
Radius left	34	0.97 (0.90-1.00)	97%
Radius right	35	0.92 (0.83-1.00)	91%
Tibia left	45	0.86 (0.76-0.95)	80%
Tibia right	45	0.84 (0.74-0.94)	78%
Ulna left	35	0.98 (0.95-1.00)	94%
Ulna right	35	0.98 (0.94-1.00)	97%
Distal Metaphysis			
Femur left	45	0.71 (0.58-0.85)	51%
Femur right	45	0.65 (0.51-0.78)	36%
Fibula left	45	0.72 (0.56-0.88)	67%
Fibula right	45	0.82 (0.71-0.94)	71%
Humerus left	35	0.96 (0.91-1.00)	91%
Humerus right	35	0.91 (0.80-1.00)	86%
Radius left	35	0.86 (0.74-0.98)	83%
Radius right	35	0.82 (0.67-0.98)	83%
Tibia left	45	0.83 (0.75-0.92)	53%
Tibia right	45	0.81 (0.72-0.89)	53%
Ulna left	35	0.85 (0.72-0.97)	83%
Ulna right	35	0.82 (0.70-0.95)	74%
Distal Epiphysis			
Femur left	45	0.92 (0.88-0.96)	62%
Femur right	45	0.91 (0.87-0.95)	56%
Fibula left	45	0.90 (0.81-0.99)	87%
Fibula right	45	0.93 (0.87-0.99)	80%
Humerus left	35	0.94 (0.87-1.00)	89%
Humerus right	35	0.94 (0.87-1.00)	83%
Radius left	35	0.90 (0.77-1.00)	89%
Radius right	35	0.87 (0.72-1.00)	91%
Tibia left	45	0.90 (0.84-0.97)	64%
Tibia right	45	0.85 (0.77-0.92)	53%
Ulna left	35	0.96 (0.92-1.00)	91%
Ulna right	35	0.96 (0.92-1.00)	91%

95%CI, 95% confidence interval.

* Kappa could not be calculated due to full agreement.

C. Presence of surrounding tissue hyperintensity

Site	n subjects	Kappa (95%CI)	Agreement (%)
Spine			
C1	45	NA*	100%
C2	45	NA*	100%
C3	45	NA*	100%
C4	45	NA*	100%
C5	45	NA*	100%
C6	45	NA*	100%
C7	45	0.99 (0.98-1.00)	98%
T1	45	0.99 (0.98-1.00)	98%
T2	45	NA*	100%
T3	45	0.98 (0.93-1.00)	98%
T4	45	0.98 (0.93-1.00)	98%
T5	45	0.98 (0.93-1.00)	98%
T6	45	0.98 (0.93-1.00)	98%
T7	45	0.99 (0.98-1.00)	98%
T8	45	0.99 (0.96-1.00)	98%
T9	45	NA*	100%
T10	45	NA*	100%
T11	45	NA*	100%
T12	45	NA*	100%
L1	45	NA*	100%
L2	45	NA*	100%
L3	45	NA*	100%
L4	45	NA*	100%
L5	45	NA*	100%
Complex bone			
Ilium left	45	NA*	100%
Ilium right	45	0.97 (0.93-1.00)	96%
Periacetabulum left	45	0.96 (0.92-1.00)	93%
Periacetabulum right	45	0.97 (0.93-1.00)	96%
Pubis/ischium left	45	0.98 (0.94-1.00)	96%
Pubis/ischium right	45	0.98 (0.95-1.00)	93%
Sacrum left	45	0.97 (0.92-1.00)	96%
Sacrum right	45	NA*	100%
Flat bone			
Clavicle left	45	0.94 (0.88-1.00)	89%
Clavicle right	45	0.91 (0.85-0.96)	78%
Mandible left	45	0.92 (0.87-0.98)	82%
Mandible right	45	0.94 (0.89-0.98)	84%
Manubrium/sterna	45	0.99 (0.98-1.00)	98%
Patella left	45	0.98 (0.94-1.00)	96%
Patella right	45	0.93 (0.86-1.00)	89%
Rib A left	45	0.98 (0.96-1.00)	96%
Rib A right	45	0.97 (0.94-1.00)	91%
Rib B left	45	0.98 (0.95-1.00)	93%
Rib B right	45	0.97 (0.94-1.00)	91%
Rib C left	45	0.99 (0.98-1.00)	98%

Rib C right	45	0.99 (0.98-1.00)	98%
Rib D left	45	0.99 (0.98-1.00)	98%
Rib D right	45	0.98 (0.96-1.00)	96%
Rib E left	45	NA*	100%
Rib E right	45	NA*	100%
Rib F left	45	NA*	100%
Rib F right	45	0.99 (0.98-1.00)	98%
Rib G left	45	NA*	100%
Rib G right	45	NA*	100%
Rib H left	45	NA*	100%
Rib H right	45	NA*	100%
Rib I left	45	NA*	100%
Rib I right	45	NA*	100%
Rib J left	45	NA*	100%
Rib J right	45	NA*	100%
Rib K left	45	NA*	100%
Rib K right	45	NA*	100%
Rib L left	45	NA*	100%
Rib L right	45	NA*	100%
Scapula left	45	0.97 (0.93-1.00)	93%
Scapula right	45	0.97 (0.93-1.00)	93%
Skull left	45	NA*	100%
Skull right	45	NA*	100%
Hand/foot			
Fore/mid foot left	35	0.92 (0.86-0.98)	80%
Fore/mid foot right	35	0.93 (0.87-0.99)	83%
Hindfoot left	45	0.93 (0.86-1.00)	91%
Hindfoot right	45	0.92 (0.85-0.99)	89%
Hand left	35	0.98 (0.94-1.00)	97%
Hand right	35	0.97 (0.93-1.00)	94%
Long bone			
Femur left	45	0.90 (0.83-0.98)	84%
Femur right	45	0.85 (0.77-0.94)	76%
Fibula left	45	0.93 (0.87-1.00)	89%
Fibula right	45	0.94 (0.89-1.00)	89%
Humerus left	35	0.98 (0.95-1.00)	94%
Humerus right	35	0.95 (0.89-1.00)	91%
Radius left	35	0.97 (0.93-1.00)	91%
Radius right	35	0.97 (0.93-1.00)	94%
Tibia left	45	0.88 (0.79-0.96)	80%
Tibia right	45	0.76 (0.65-0.87)	64%
Ulna left	35	0.97 (0.93-1.00)	91%
Ulna right	35	0.99 (0.97-1.00)	97%

95%CI, 95% confidence interval.

* Kappa could not be calculated due to full agreement.

D. Presence of bony expansion

Site	n subjects	Kappa (95%CI)	Agreement (%)
Spine			
C1	45	NA*	100%
C2	45	NA*	100%
C3	45	NA*	100%
C4	45	NA*	100%
C5	45	NA*	100%
C6	45	NA*	100%
C7	45	NA*	100%
T1	45	NA*	100%
T2	45	NA*	100%
T3	45	NA*	100%
T4	45	NA*	100%
T5	45	NA*	100%
T6	45	NA*	100%
T7	45	NA*	100%
T8	45	NA*	100%
T9	45	NA*	100%
T10	45	NA*	100%
T11	45	NA*	100%
T12	45	NA*	100%
L1	45	NA*	100%
L2	45	NA*	100%
L3	45	NA*	100%
L4	45	NA*	100%
L5	45	NA*	100%
Complex bone			
Ilium left	45	NA*	100%
Ilium right	45	0.97 (0.92-1.00)	96%
Periacetabulum left	45	0.98 (0.93-1.00)	98%
Periacetabulum right	45	0.98 (0.96-1.00)	96%
Pubis/ischium left	45	0.99 (0.98-1.00)	98%
Pubis/ischium right	45	0.99 (0.98-1.00)	98%
Sacrum left	45	0.99 (0.96-1.00)	98%
Sacrum right	45	NA*	100%
Flat bone			
Clavicle left	45	0.97 (0.92-1.00)	96%
Clavicle right	45	0.93 (0.87-1.00)	89%
Mandible left	45	0.99 (0.96-1.00)	98%
Mandible right	45	NA*	100%
Manubrium/sterna	45	NA*	100%
Patella left	45	NA*	100%
Patella right	45	NA*	100%
Rib A left	45	NA*	100%
Rib A right	45	NA*	100%
Rib B left	45	NA*	100%
Rib B right	45	NA*	100%

Rib C left	45	NA*	100%
Rib C right	45	NA*	100%
Rib D left	45	NA*	100%
Rib D right	45	NA*	100%
Rib E left	45	NA*	100%
Rib E right	45	NA*	100%
Rib F left	45	NA*	100%
Rib F right	45	NA*	100%
Rib G left	45	NA*	100%
Rib G right	45	NA*	100%
Rib H left	45	NA*	100%
Rib H right	45	NA*	100%
Rib I left	45	NA*	100%
Rib I right	45	NA*	100%
Rib J left	45	NA*	100%
Rib J right	45	NA*	100%
Rib K left	45	NA*	100%
Rib K right	45	NA*	100%
Rib L left	45	NA*	100%
Rib L right	45	NA*	100%
Scapula left	45	NA*	100%
Scapula right	45	NA*	100%
Skull left	45	NA*	100%
Skull right	45	NA*	100%
Hand/foot			
Fore/mid foot left	35	NA*	100%
Fore/mid foot right	35	NA*	100%
Hindfoot left	45	NA*	100%
Hindfoot right	45	0.99 (0.98-1.00)	98%
Hand left	35	NA*	100%
Hand right	35	NA*	100%
Long bone			
Femur left	45	0.98 (0.96-1.00)	96%
Femur right	45	0.93 (0.88-0.99)	87%
Fibula left	45	0.99 (0.98-1.00)	98%
Fibula right	45	0.99 (0.96-1.00)	98%
Humerus left	35	NA*	100%
Humerus right	35	0.99 (0.97-1.00)	97%
Radius left	35	NA*	100%
Radius right	35	0.98 (0.94-1.00)	97%
Tibia left	45	0.98 (0.96-1.00)	96%
Tibia right	45	0.94 (0.89-0.99)	87%
Ulna left	35	NA*	100%
Ulna right	35	NA*	100%

95%CI, 95% confidence interval.

* Kappa could not be calculated due to full agreement.

E. Vertebral compression

Site	n subjects	Kappa (95%CI)	Agreement (%)
Spine			
C1	45	NA*	100%
C2	45	NA*	100%
C3	45	0.99 (0.98-1.00)	98%
C4	45	NA*	100%
C5	45	NA*	100%
C6	45	0.97 (0.93-1.00)	93%
C7	45	0.99 (0.96-1.00)	98%
T1	45	0.98 (0.93-1.00)	98%
T2	45	0.99 (0.96-1.00)	98%
T3	45	0.97 (0.92-1.00)	96%
T4	45	0.98 (0.96-1.00)	96%
T5	45	0.98 (0.96-1.00)	93%
T6	45	0.97 (0.94-1.00)	96%
T7	45	0.98 (0.95-1.00)	96%
T8	45	0.97 (0.92-1.00)	96%
T9	45	NA*	100%
T10	45	NA*	100%
T11	45	NA*	100%
T12	45	0.98 (0.94-1.00)	96%
L1	45	0.98 (0.95-1.00)	93%
L2	45	0.99 (0.98-1.00)	98%
L3	45	NA*	100%
L4	45	NA*	100%
L5	45	NA*	100%

95%CI, 95% confidence interval.

* Kappa could not be calculated due to full agreement.

F. Joint effusion

Site	n subjects	Kappa (95%CI)	Agreement (%)
Shoulder left	45	NA*	100%
Shoulder right	45	NA*	100%
Elbow left	45	NA*	100%
Elbow right	45	0.97 (0.92-1.00)	96%
Wrist left	45	NA*	100%
Wrist right	45	NA*	100%
Hip left	45	0.88 (0.82-0.95)	73%
Hip right	45	0.88 (0.81-0.95)	76%
Knee left	45	0.89 (0.83-0.95)	73%
Knee right	45	0.90 (0.84-0.96)	76%
Tibiotalar left	45	0.86 (0.78-0.95)	76%
Tibiotalar right	45	0.82 (0.73-0.91)	67%
Subtalar left	45	0.98 (0.95-1.00)	93%
Subtalar right	45	0.98 (0.95-1.00)	93%

95%CI, 95% confidence interval.

* Kappa could not be calculated due to full agreement.

Supplement 7. Descriptive data of readings with various confidence levels.

