Radiology Pathology conference

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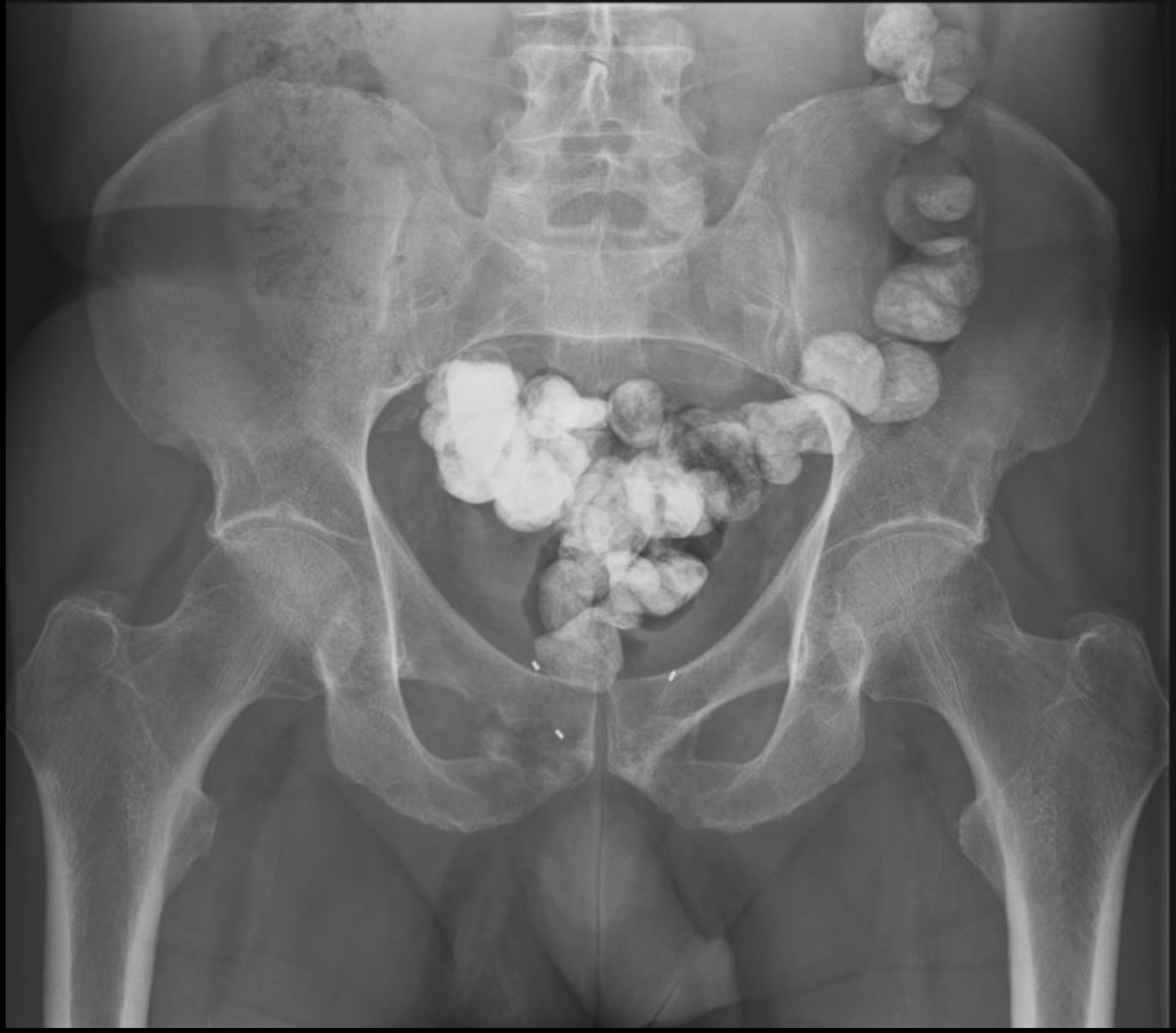
Appropriateness

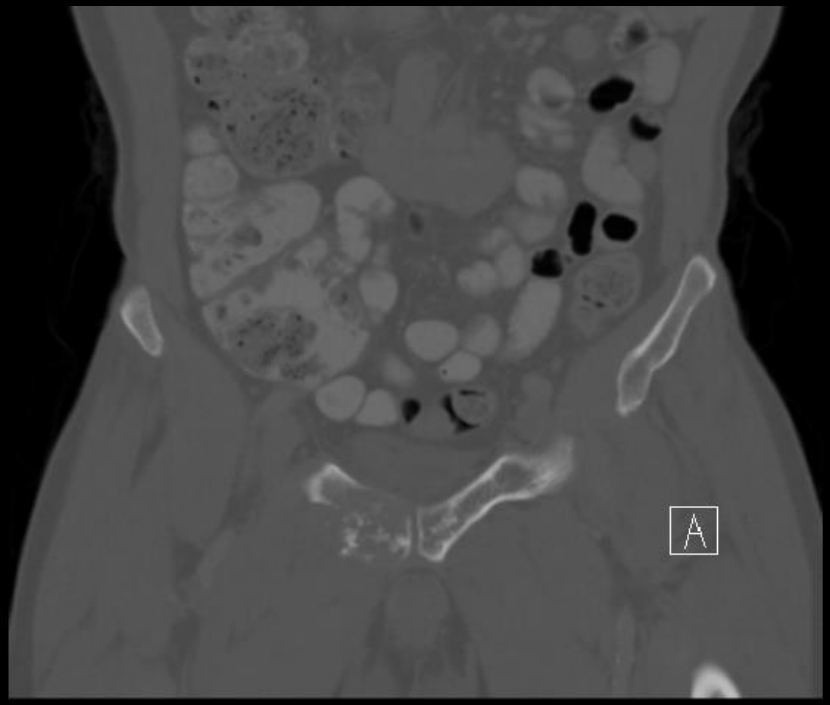
Clinical Condition: **Primary Bone Tumors**

Variant 1: **Screening. First study.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray area of interest	9	This procedure is absolutely required in a patient with suspected bone lesion.	Varies
US area of interest	1		O
MRI area of interest without and with contrast	1		O
MRI area of interest without contrast	1		O
Tc-99m bone scan whole body	1		☢☢☢
CT area of interest without contrast	1		Varies
CT area of interest with contrast	1		Varies
CT area of interest without and with contrast	1		Varies
FDG-PET/CT whole body	1		☢☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Rad Path Case #1

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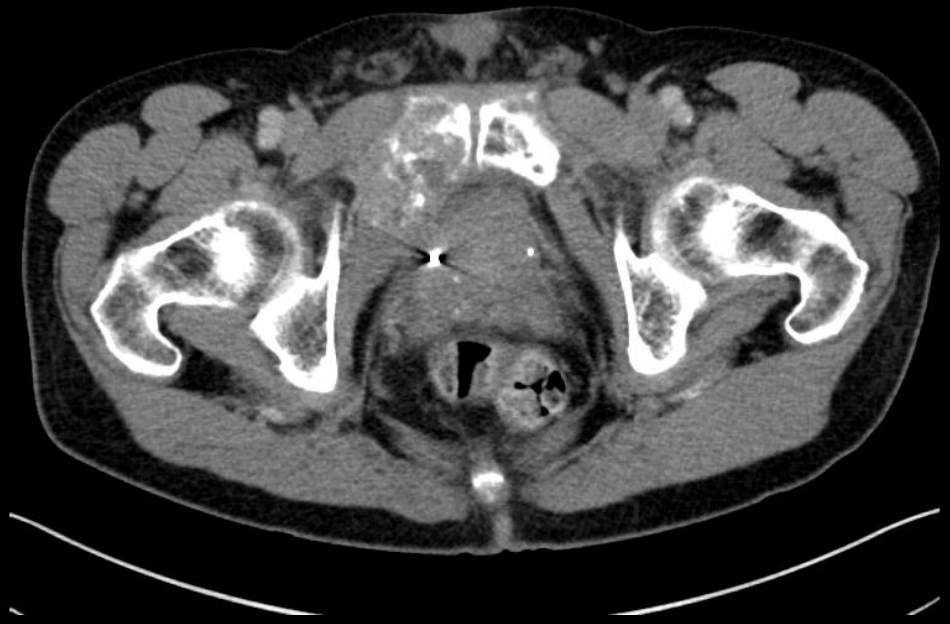
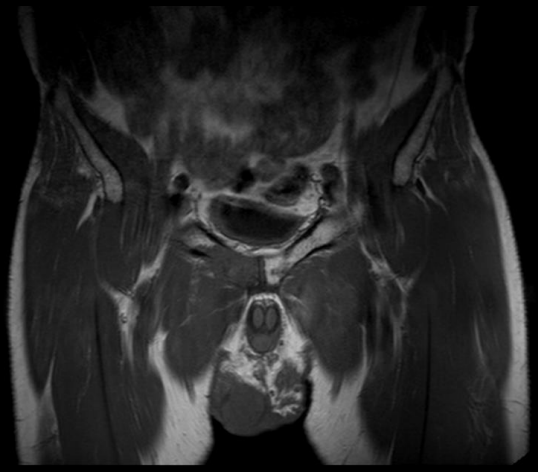
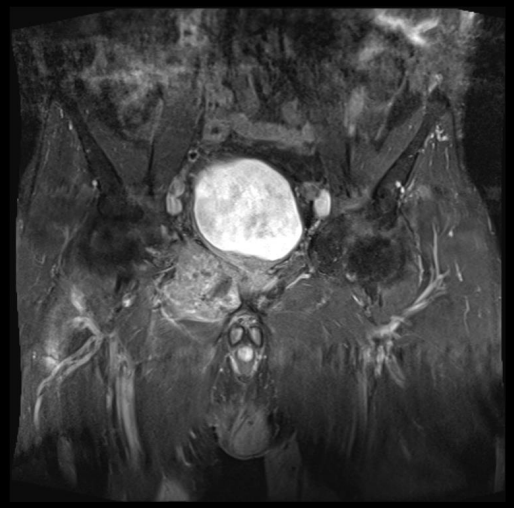
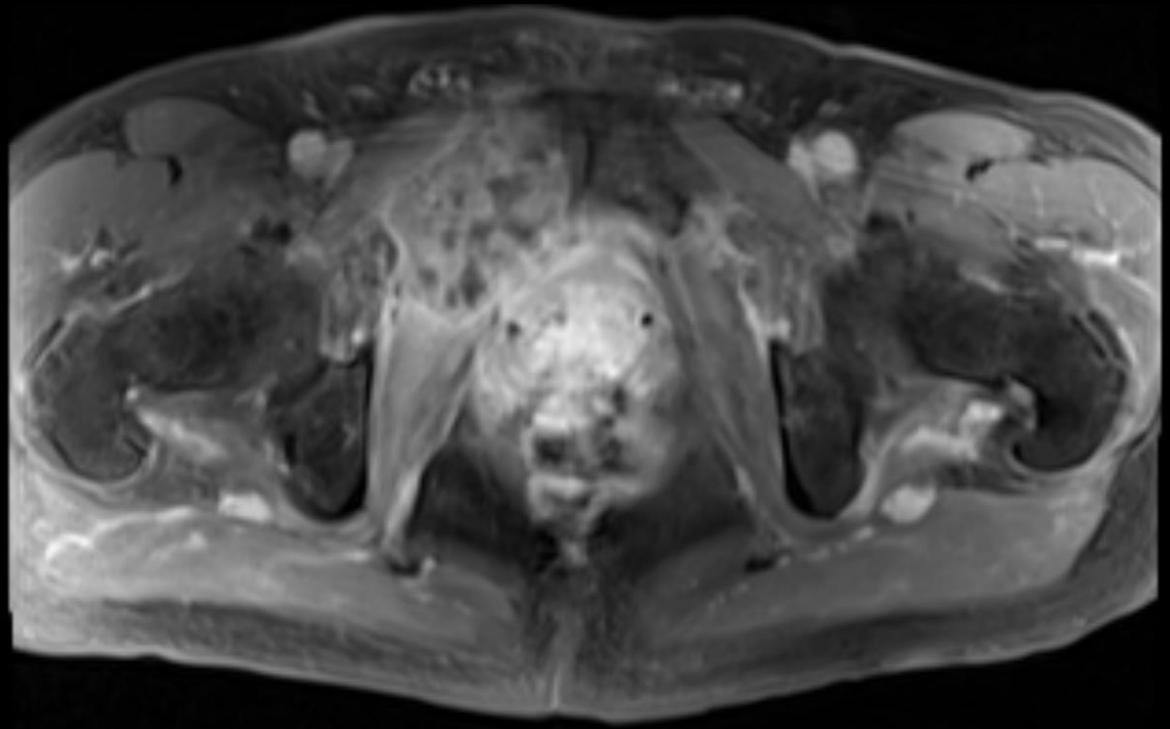
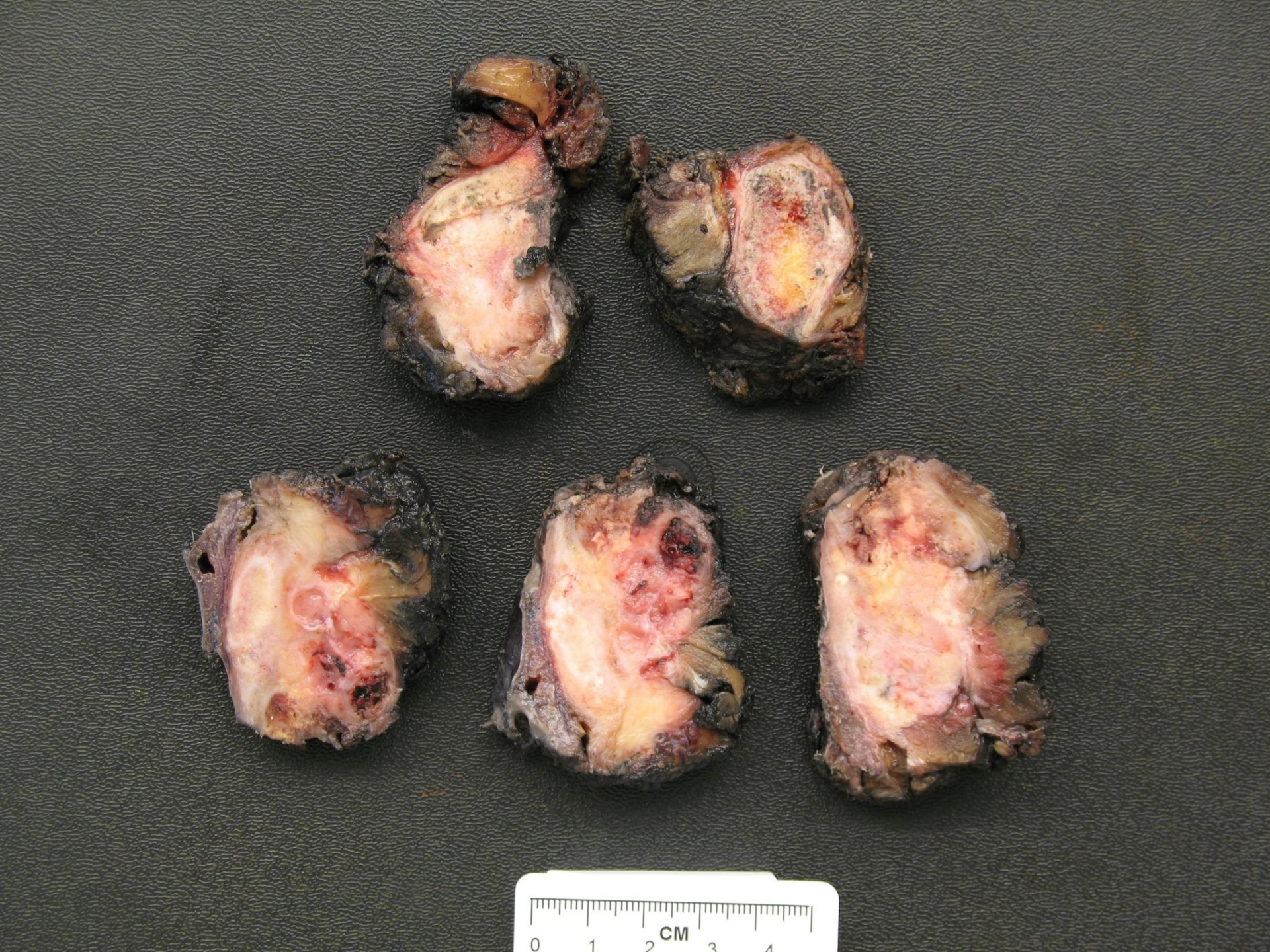








Pathology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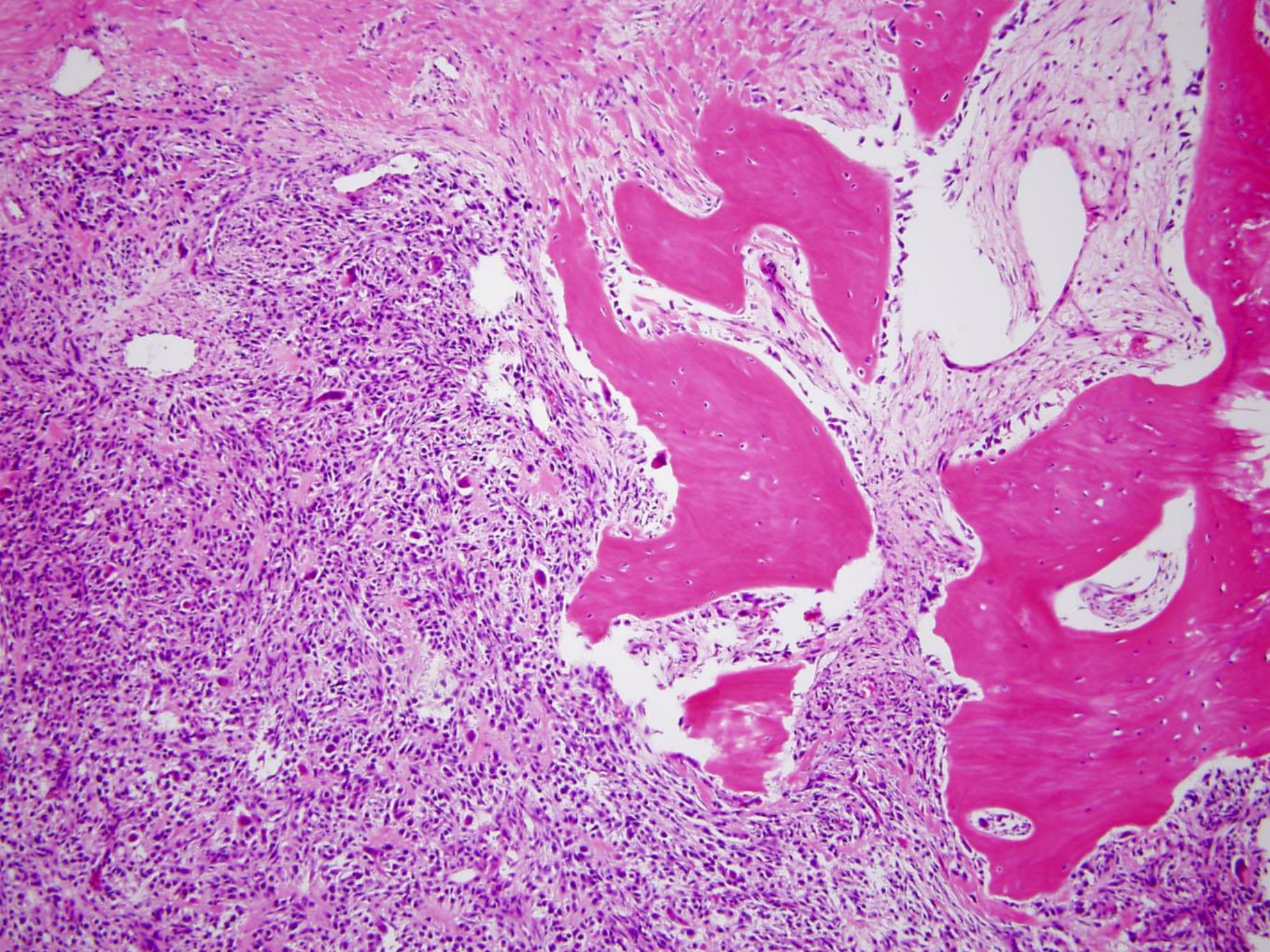
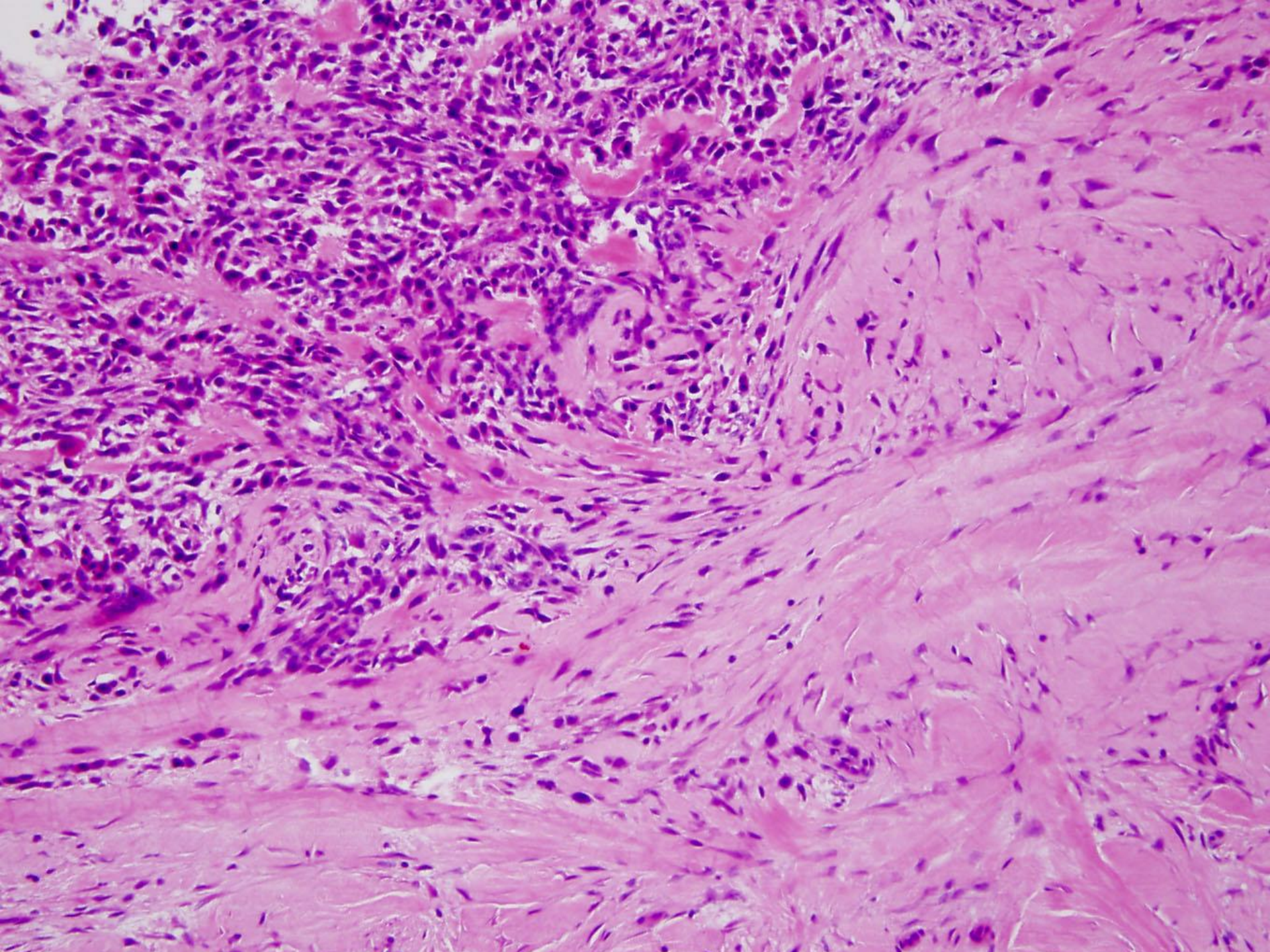
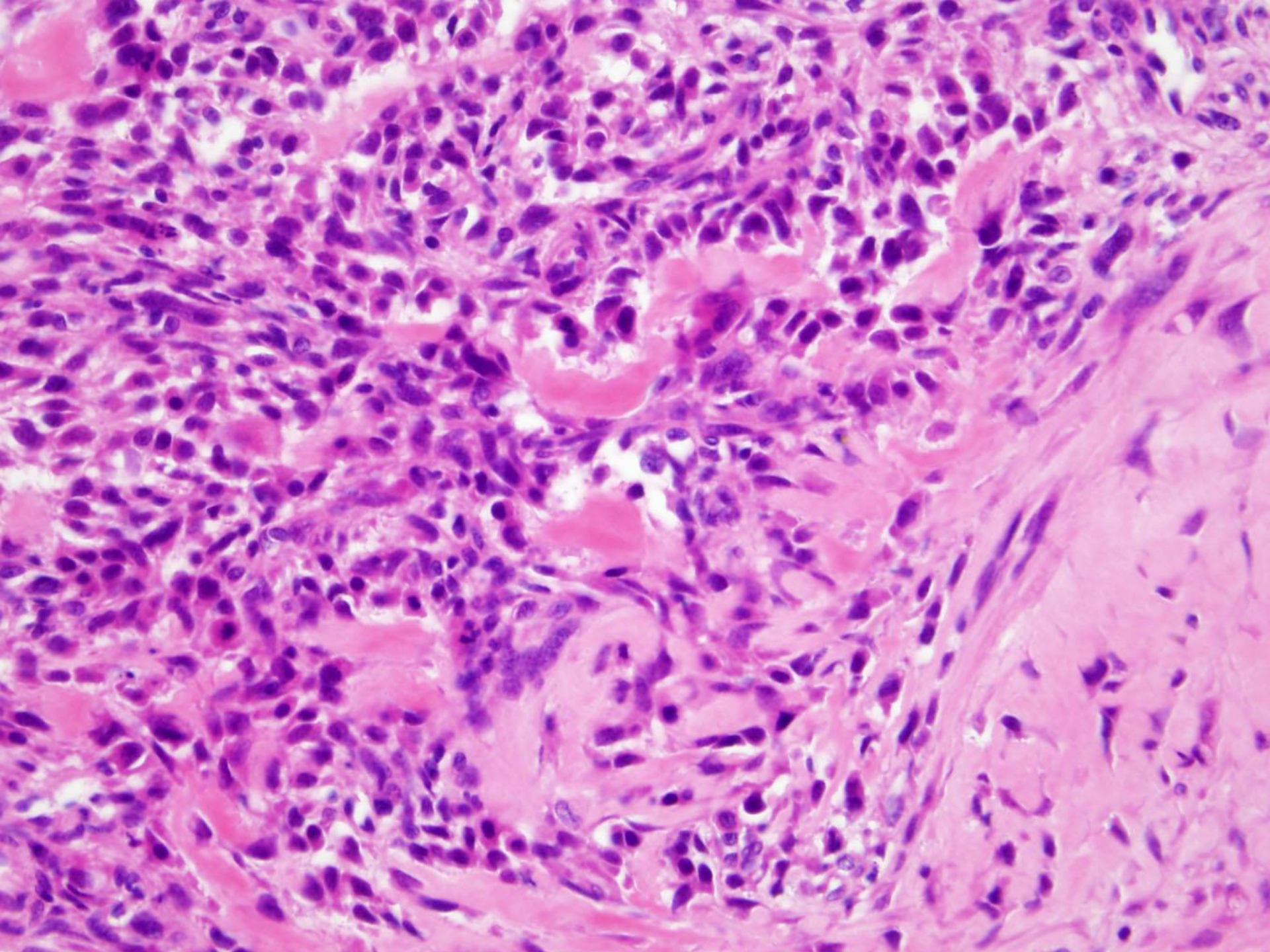
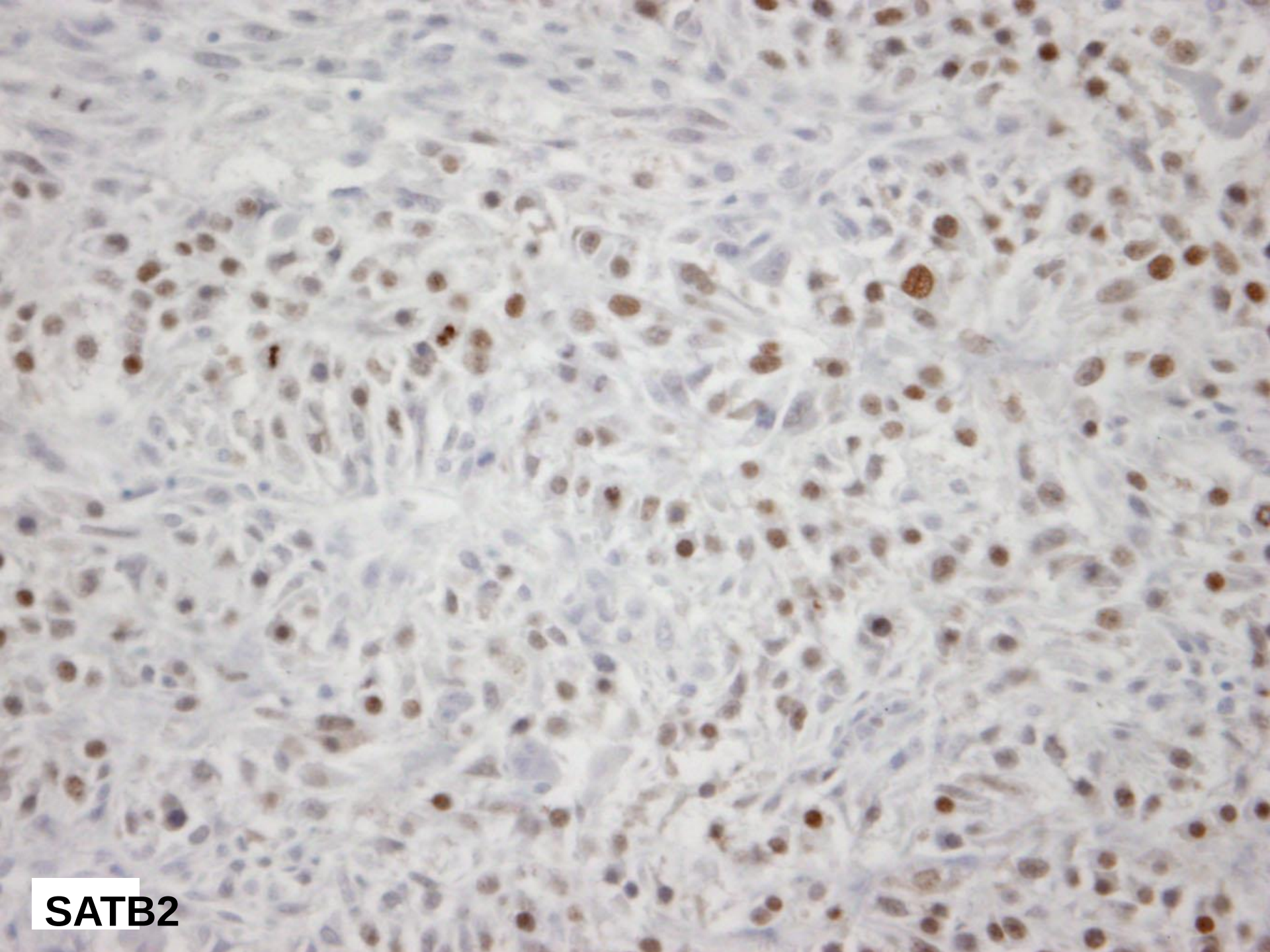







SATB2

OSTEOSARCOMA (4.8 cm), high grade, likely radiation-associated.

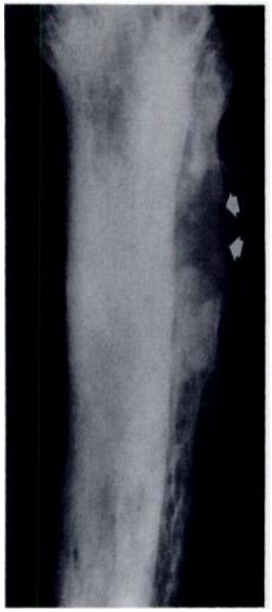
- Mitoses number 25 per 10 HPF.
- No necrosis is present.
- Tumor is focally <0.1 cm of the unoriented soft tissue margin (bounded by a thin rim of periosteum). Bone resection margins are negative for tumor (0.5 cm, 0.9 cm to tumor).

Immunohistochemistry performed at BWH demonstrates the following staining profile in lesional cells:

Positive - SATB2

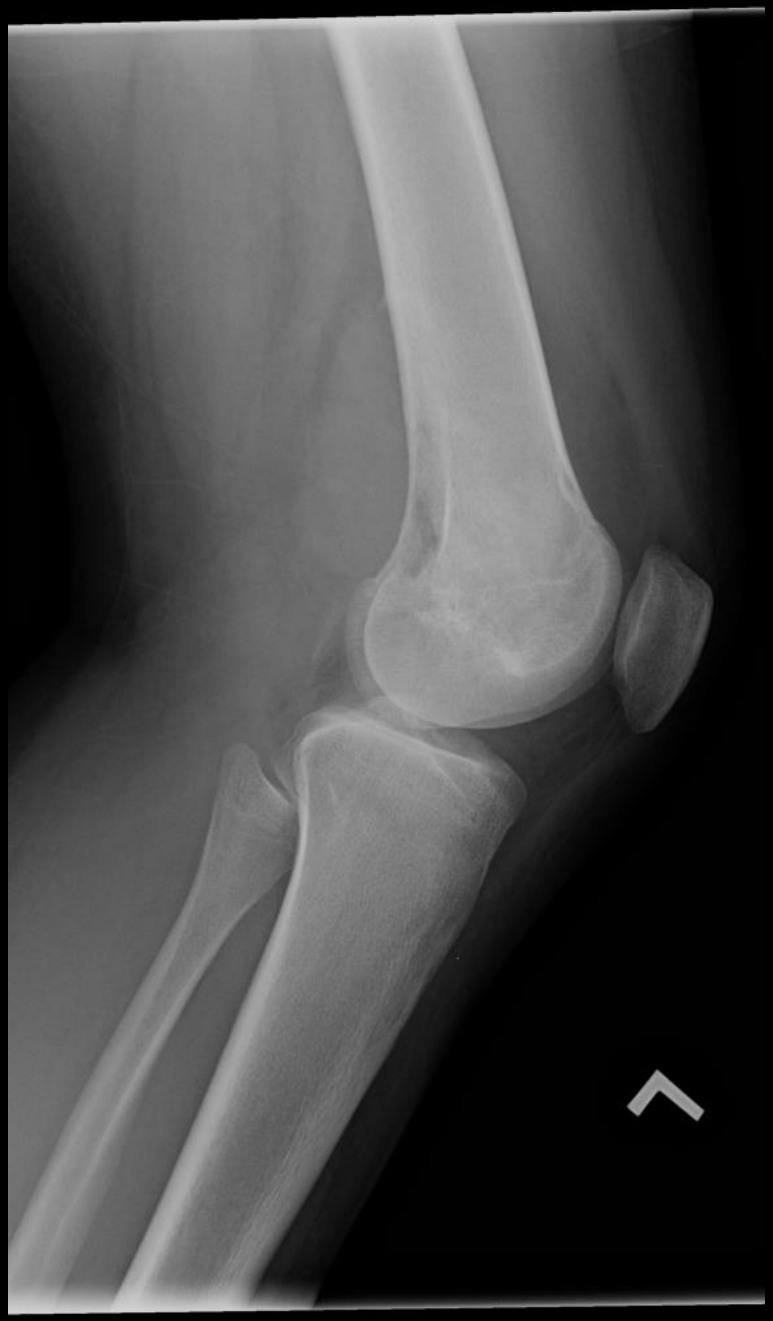
Osteosarcoma (post-radiation)

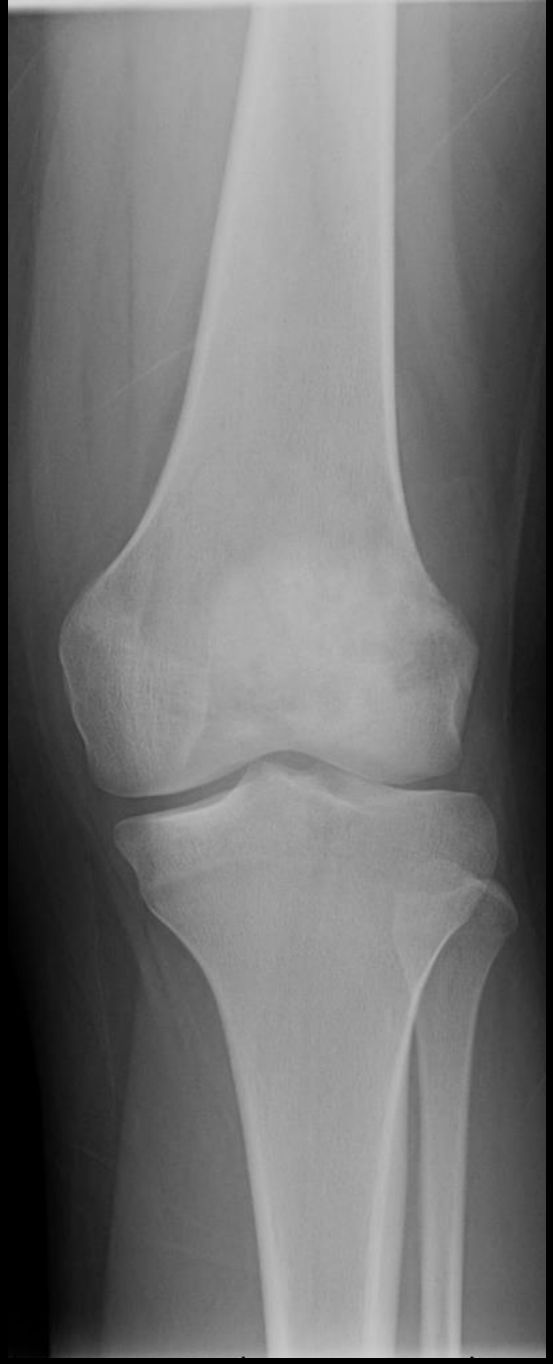
- Secondary osteosarcoma: post-radiation, Paget's, dedifferentiated chondrosarcoma
- Radiographic appearance similar to primary osteosarcoma
  - Permeative, destructive lesion
  - Mixed lytic and sclerotic appearance
  - Prominent soft tissue component
  - Aggressive periosteal reaction

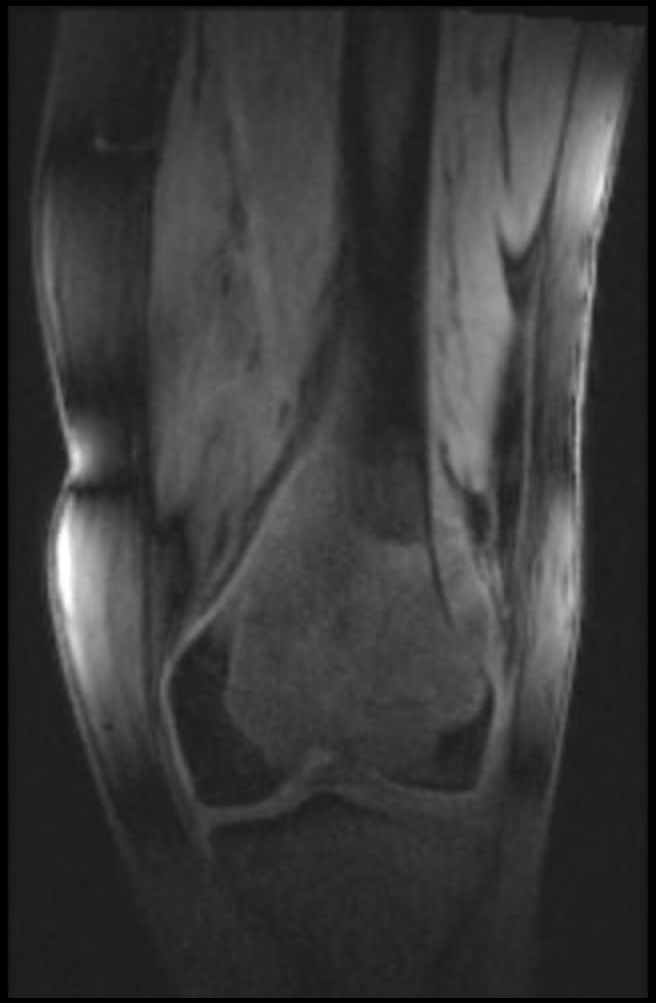


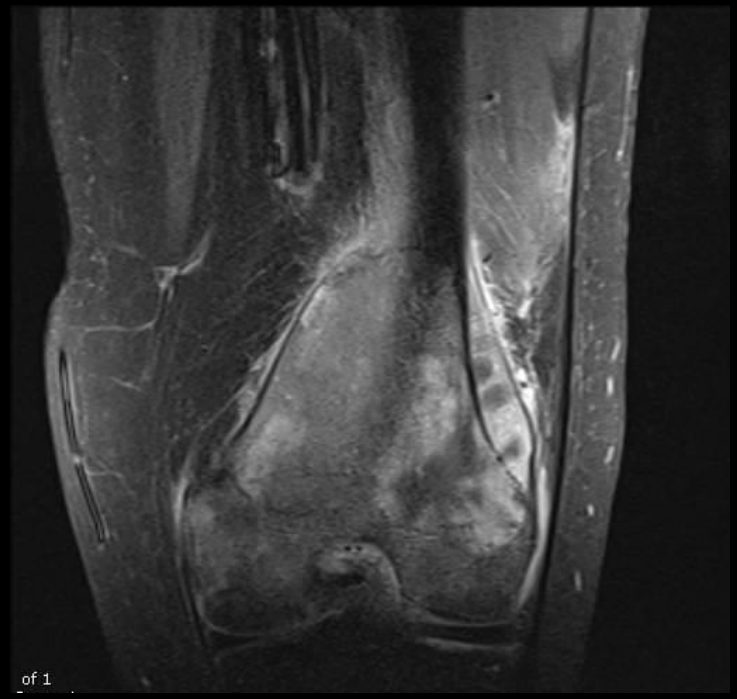
Moore et al. AJR 1991

Companion Case





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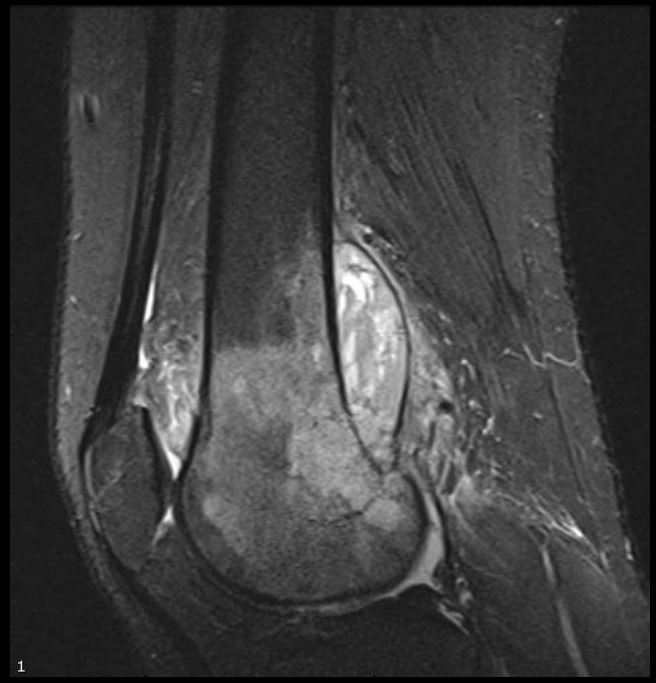
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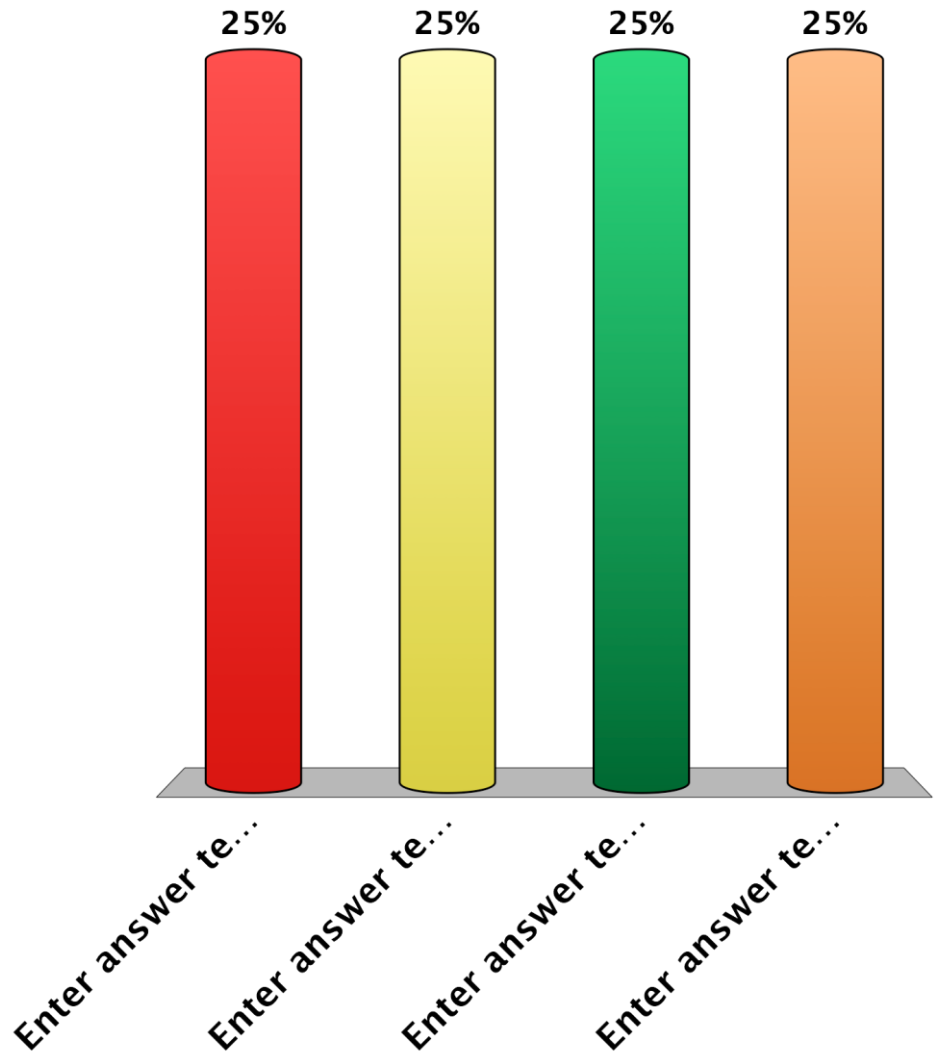
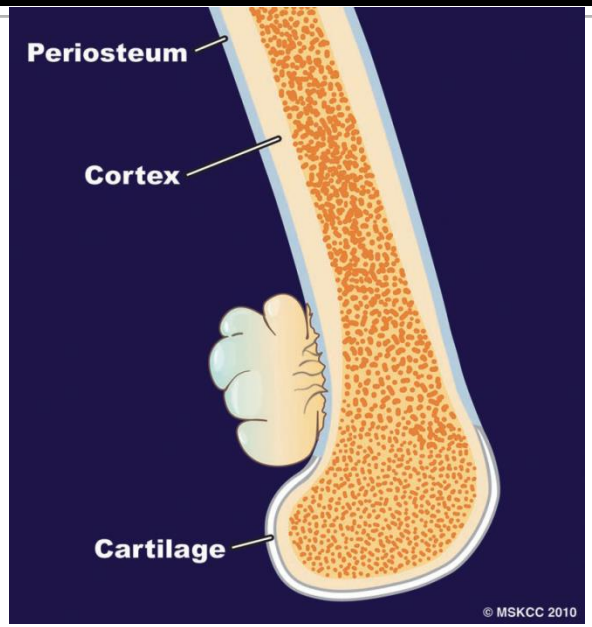
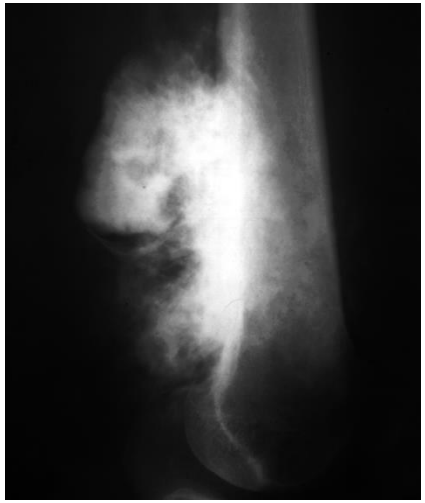
Which subtype of osteosarcoma has the best prognosis?

A. Parosteal
B. Periosteal
C. Telangiectatic
D. Conventional



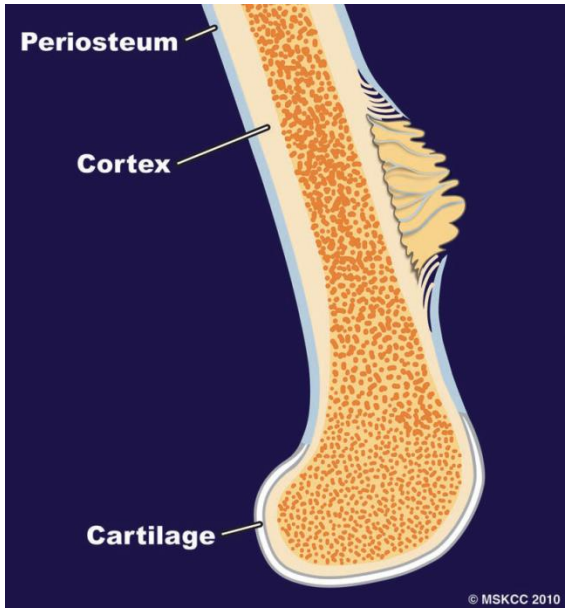
Parosteal osteosarcoma





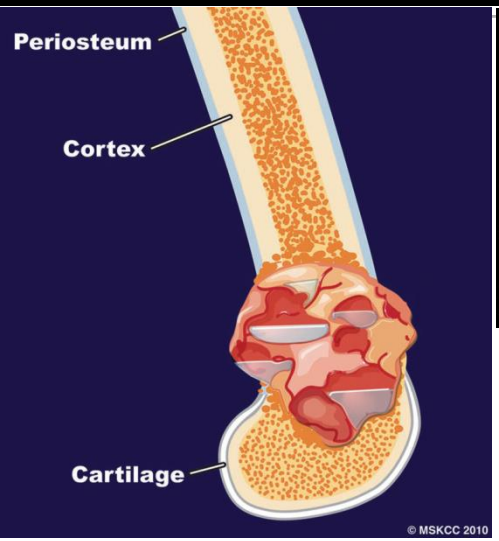
- 2nd-4th decades of life
- Most common at posterior aspect of distal femur
- Originates from outer periosteum
- Usually low grade
- Lobulated, exophytic mass
- 90-95% survival at 5 years

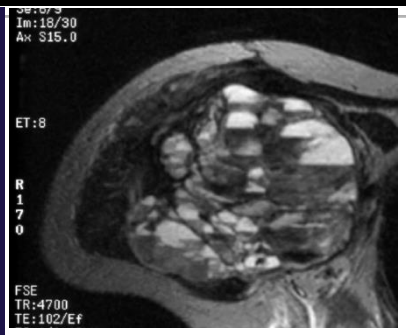
Periosteal Osteosarcoma

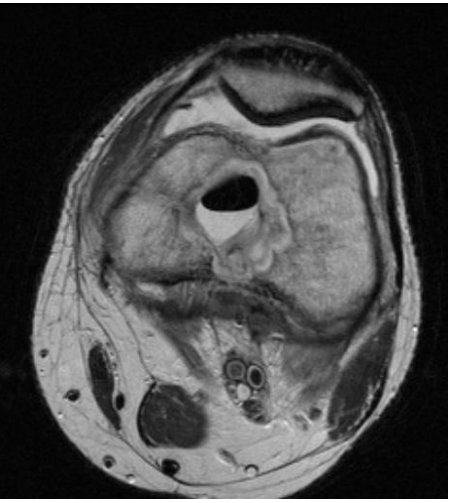


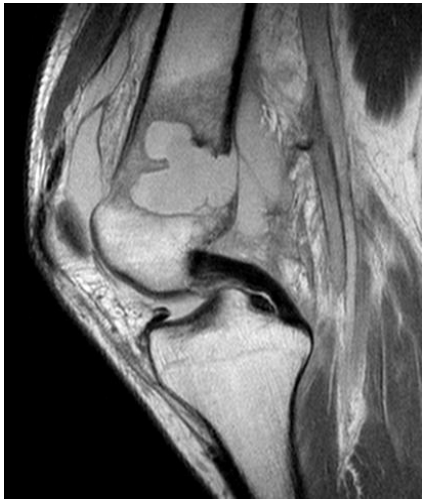
- 2^{nd}-3^{rd} decades of life
- Typically arises along <u>diaphysis</u>
- Arises from *inner* periosteum
- Often perpendicular periosteal reaction

Telangiectatic Osteosarcoma





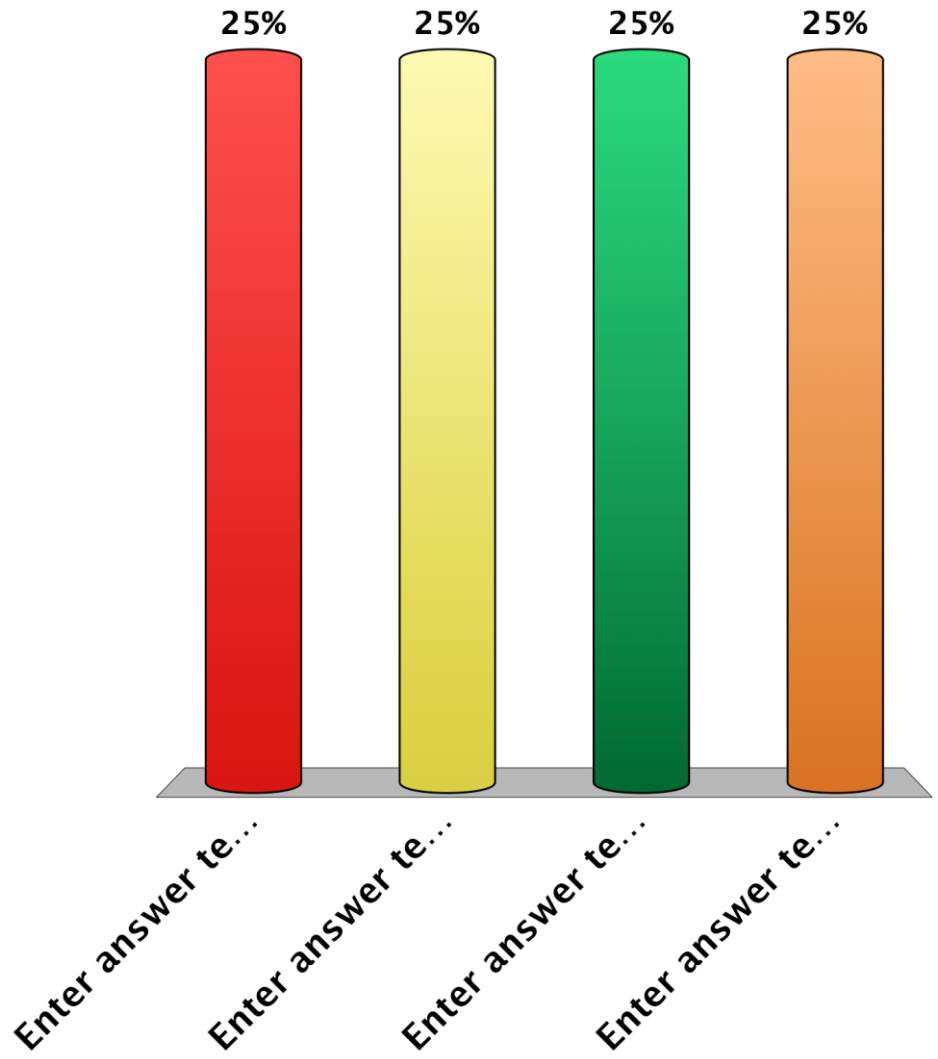


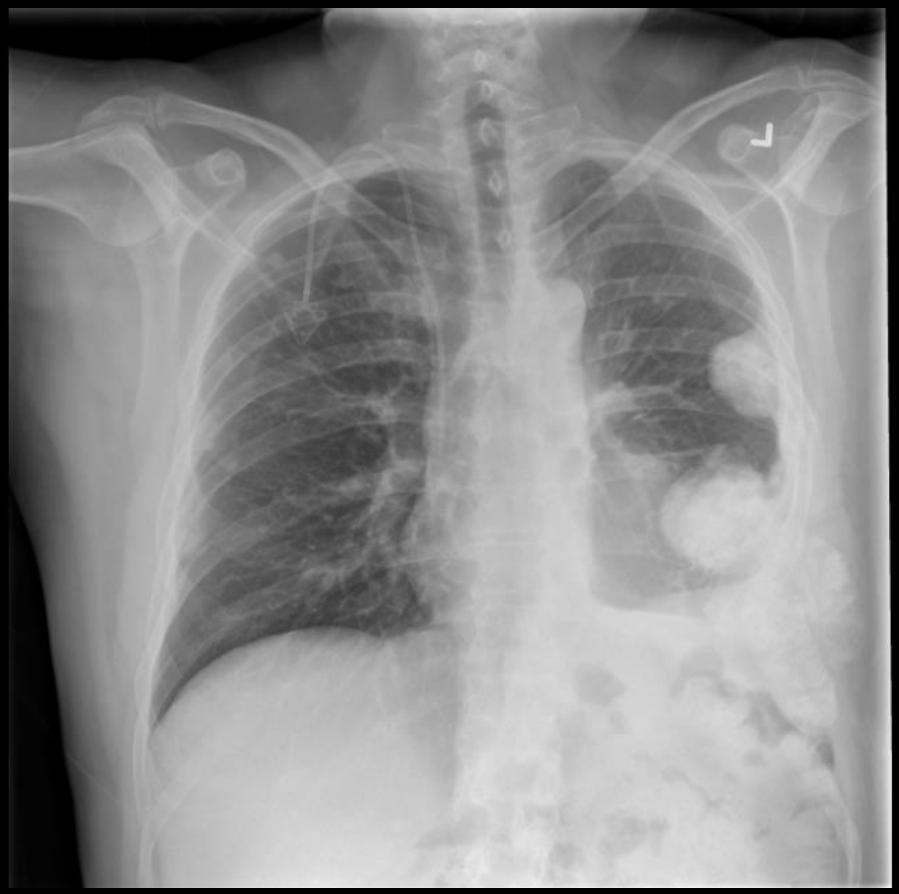


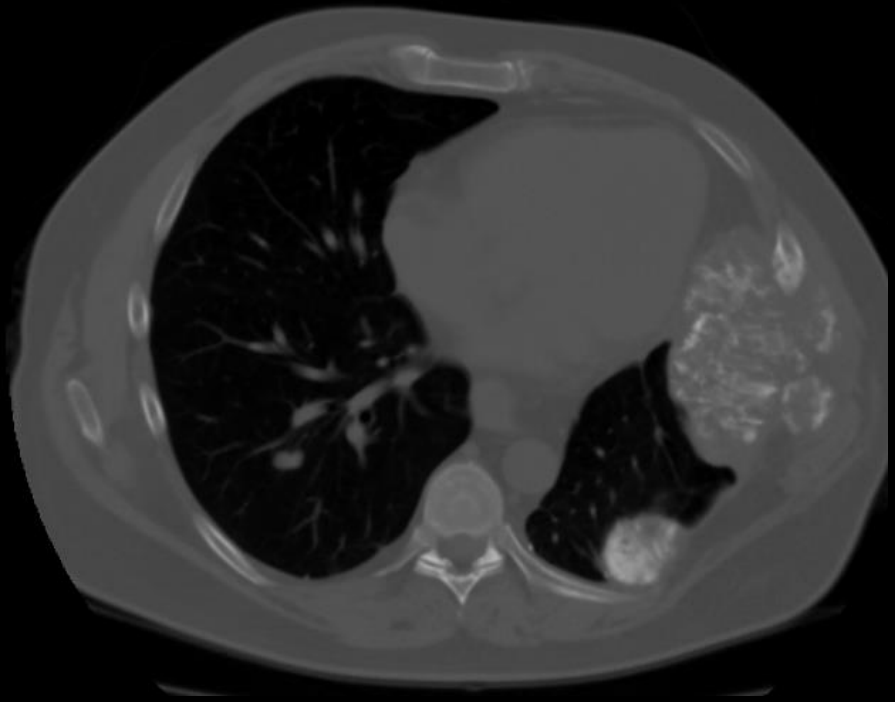
- 1st and 2nd decades of life
- Most common at metaphysis of femur
- Cystic spaces with fluid-fluid levels
- Mimics ABC

What is the most common site of metastases for osteosarcoma?

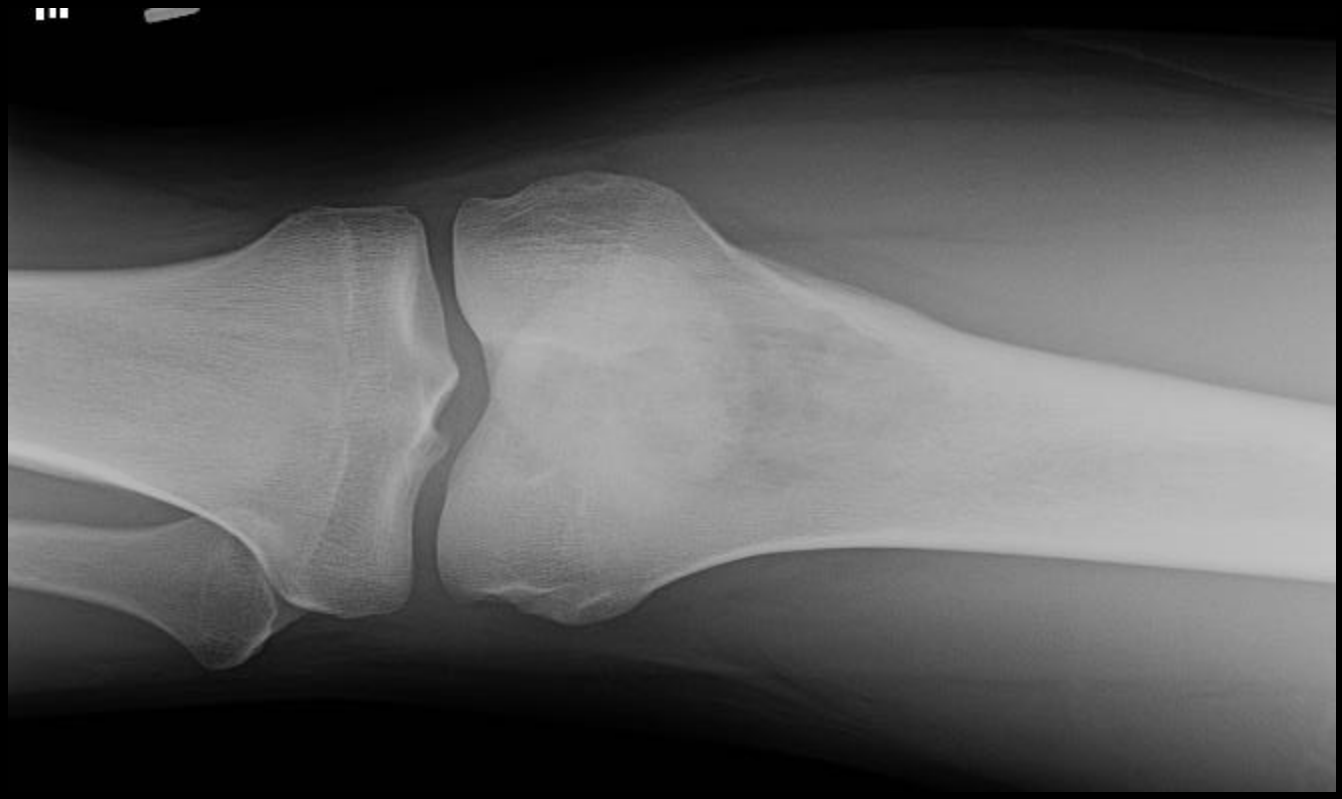
A. Liver
B. Brain
C. Lungs
D. Lymph nodes

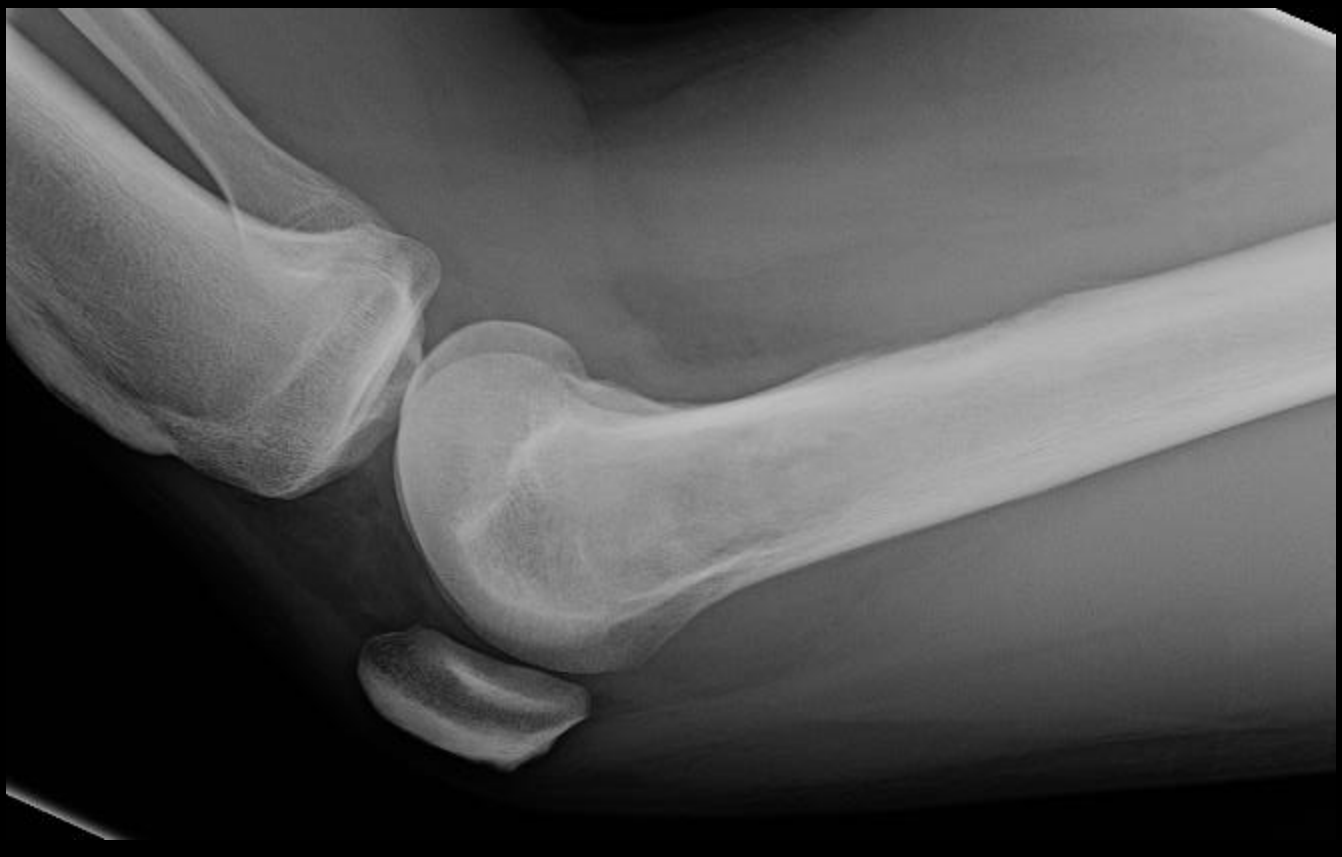


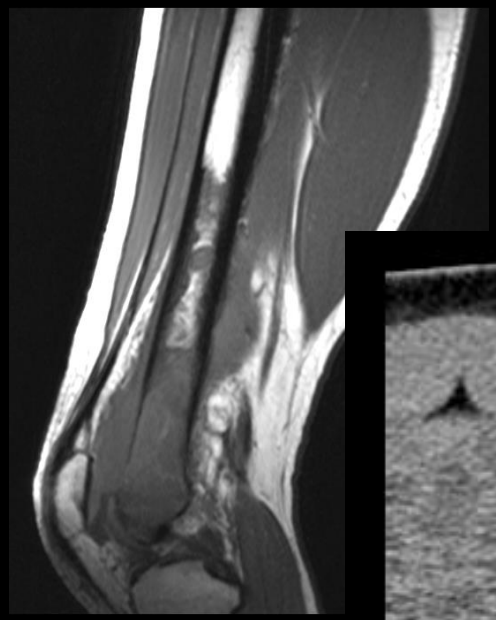


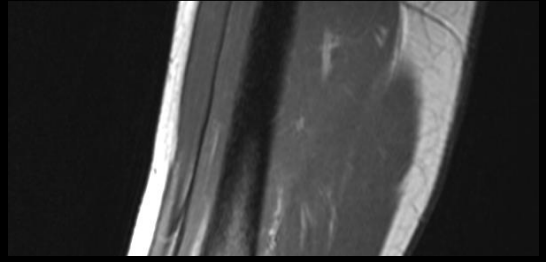


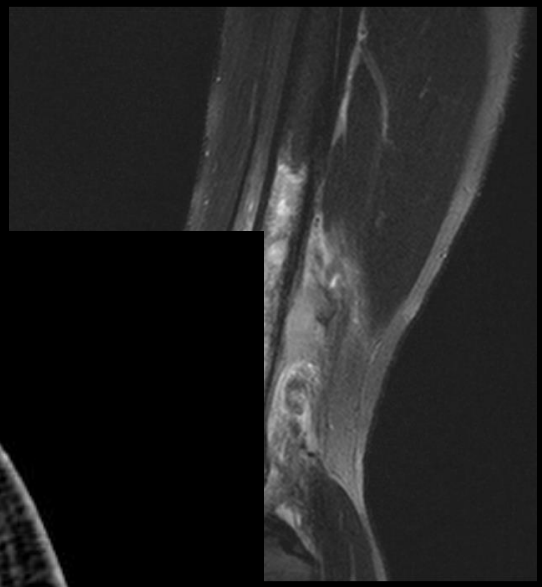
Rad Path Case #2



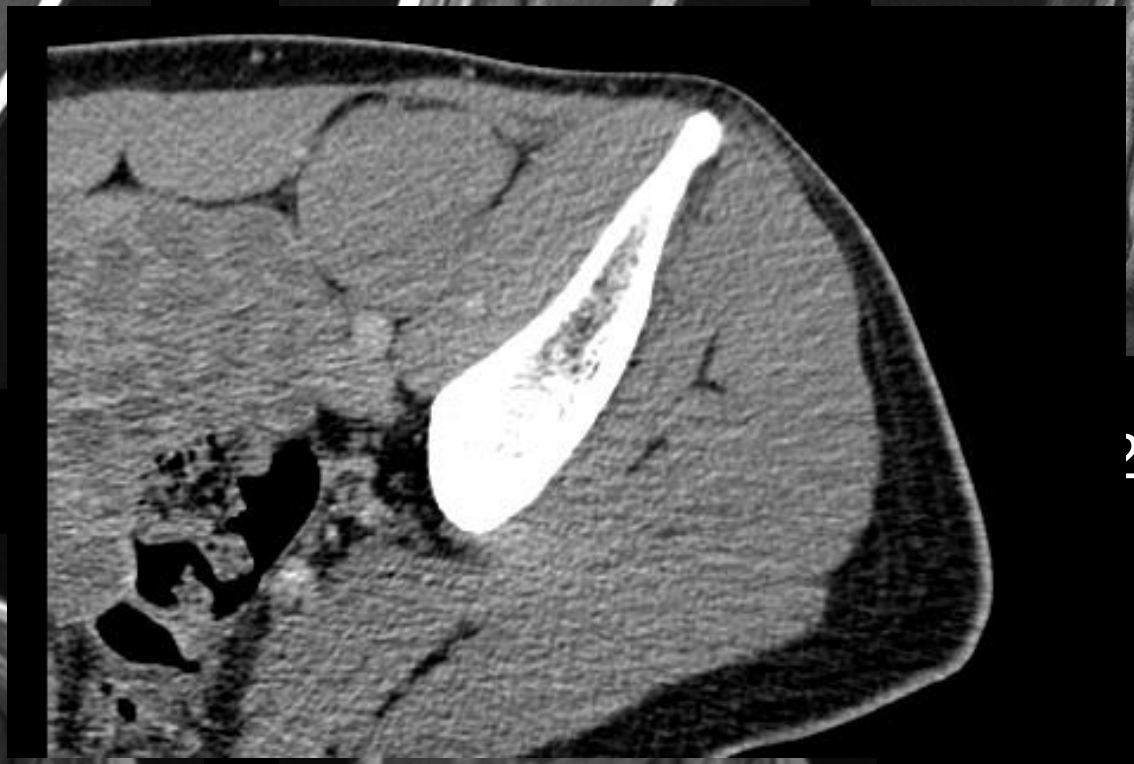


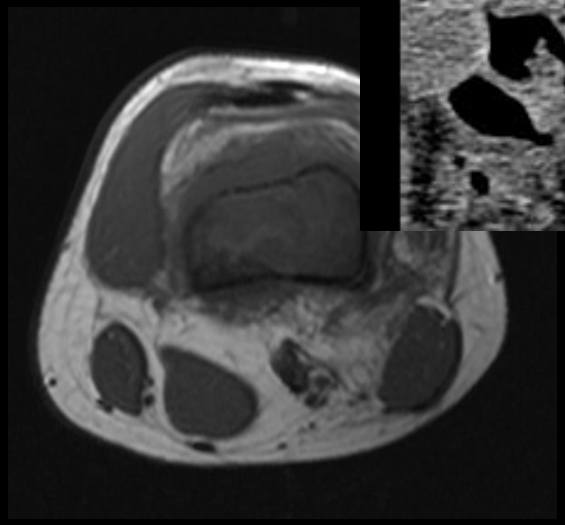






T1 pre





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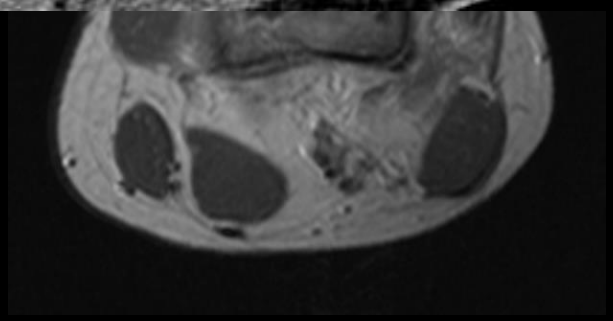
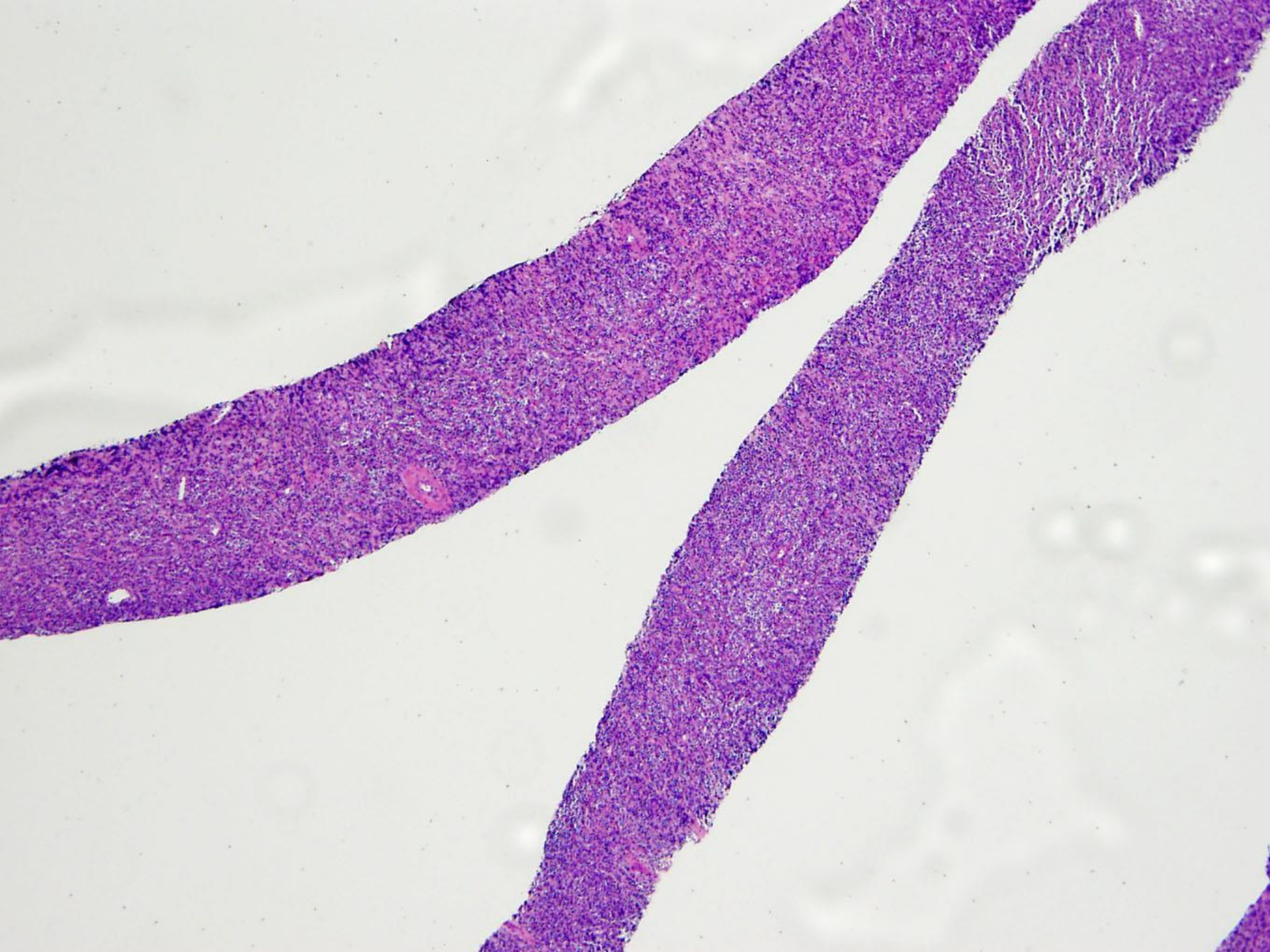
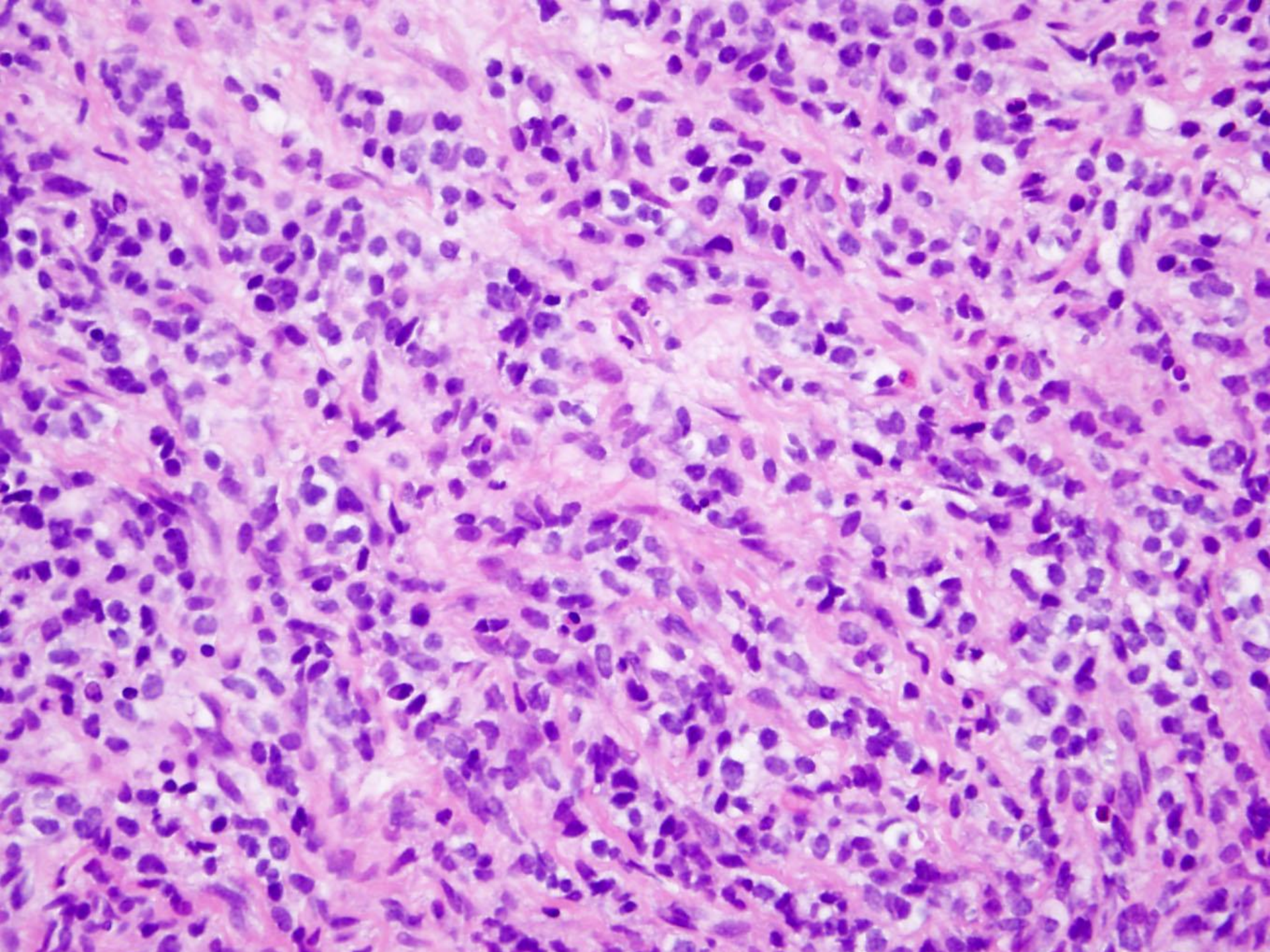
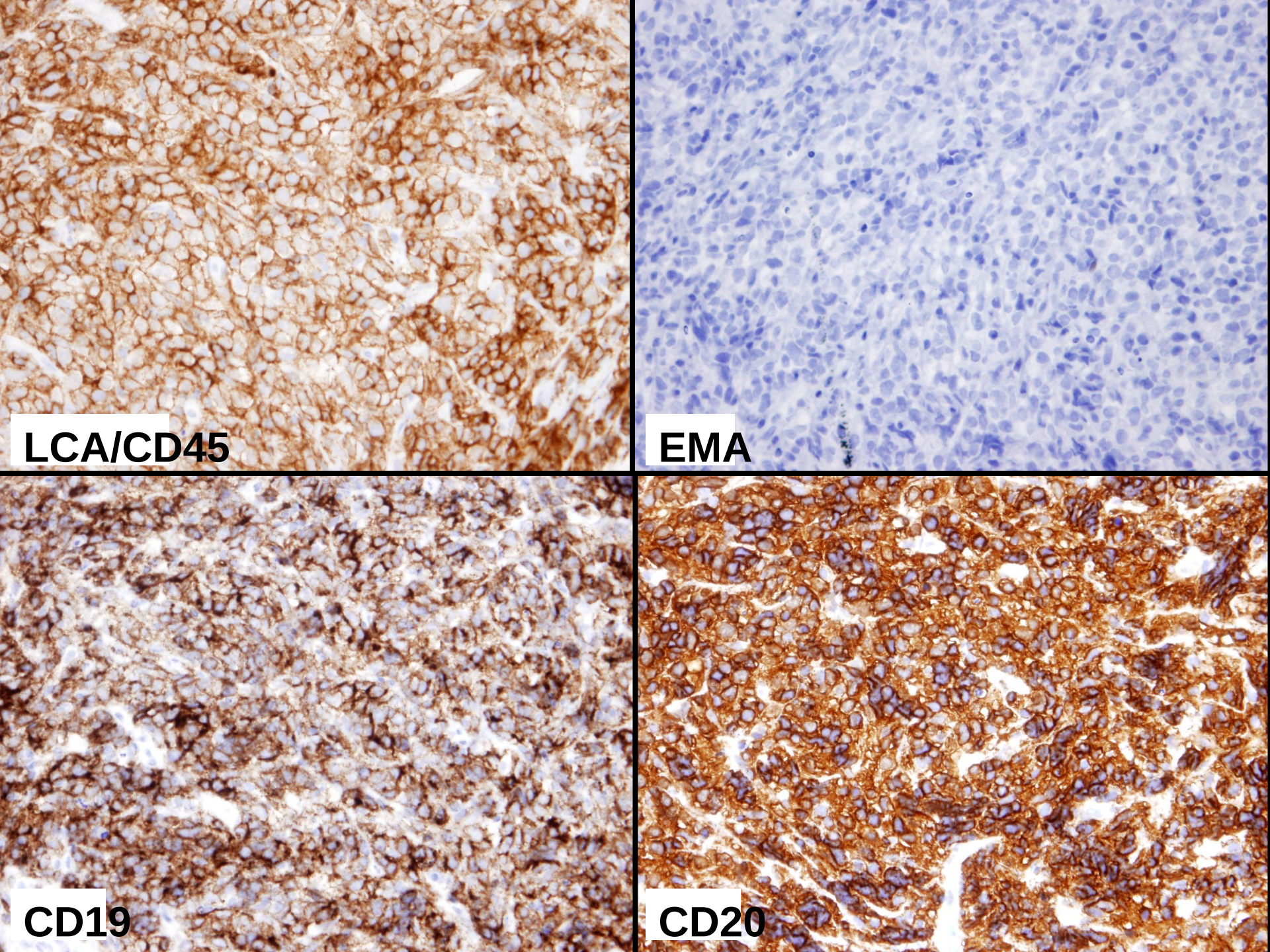


T1 post

Pathology






LCA/CD45
EMA
CD19
CD20

DIFFUSE LARGE B-CELL LYMPHOMA (see NOTE).

Fibrous tissue involved by a diffuse lymphoid infiltrate composed of intermediate- to large-sized cells with irregular to cleaved nuclear contours, slightly dispersed chromatin, indistinct nucleoli and abundant amounts of pale cytoplasm…

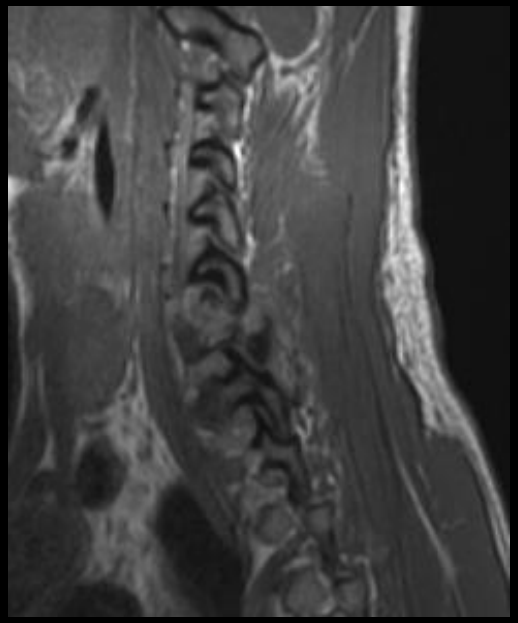
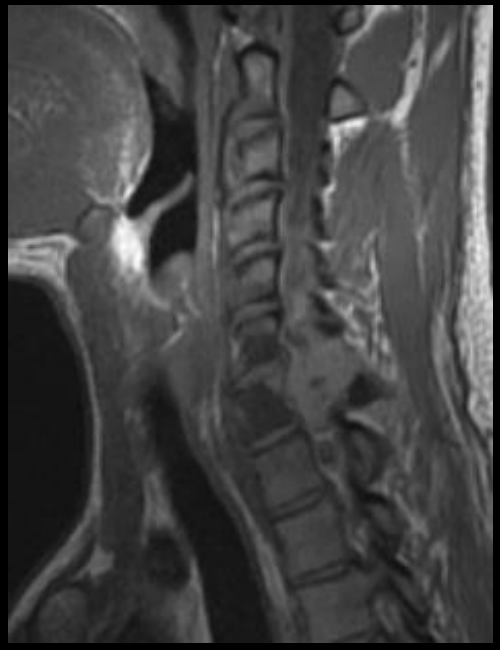
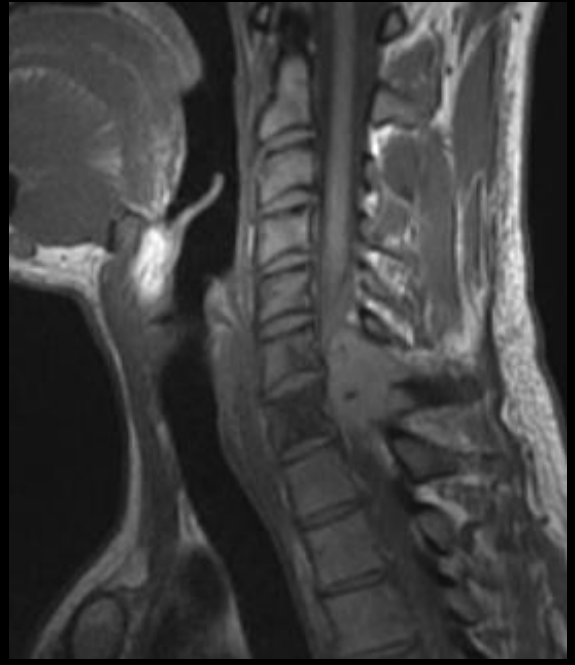
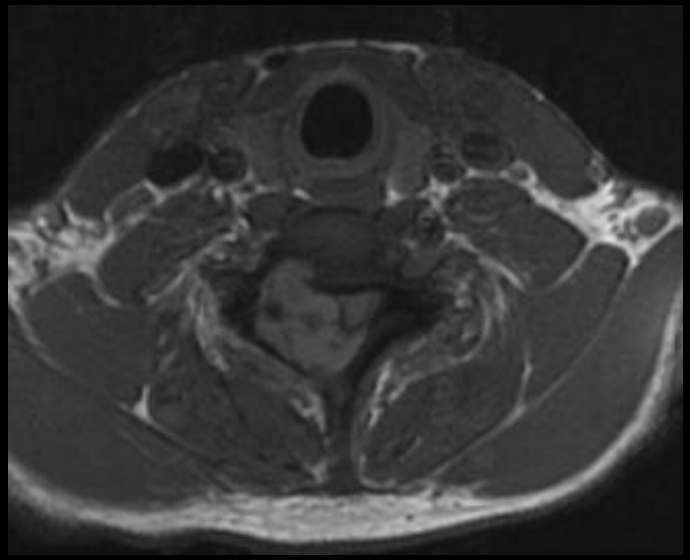
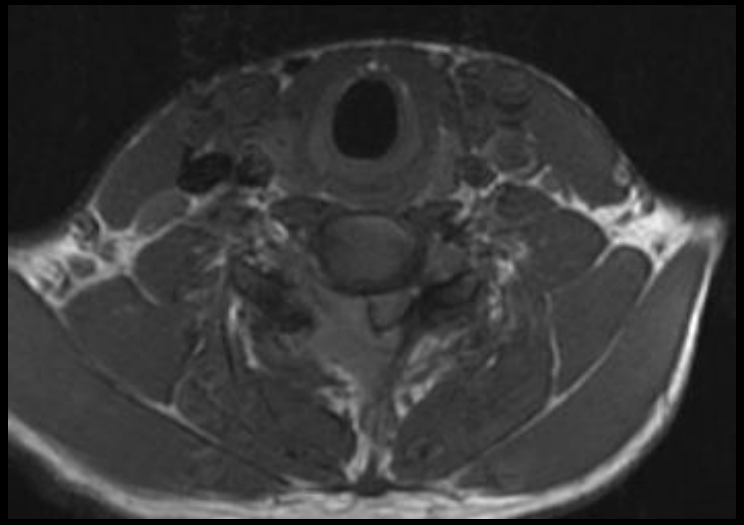
…The lymphoid infiltrate is composed of CD19-positive/CD20-positive B cells…

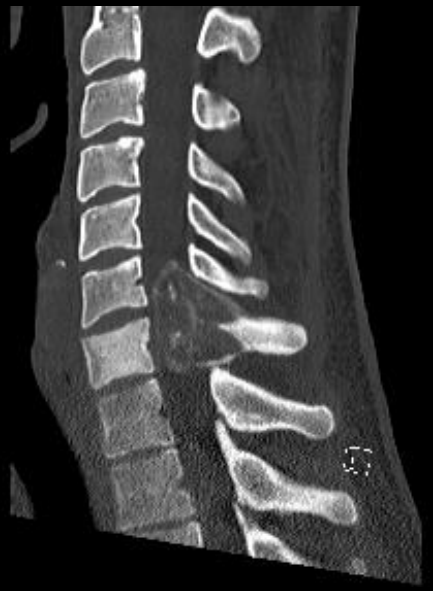
NOTE: …Given the radiologic features, the findings raise the possibility of a primary lymphoma of bone with local extension into adjacent soft tissue.

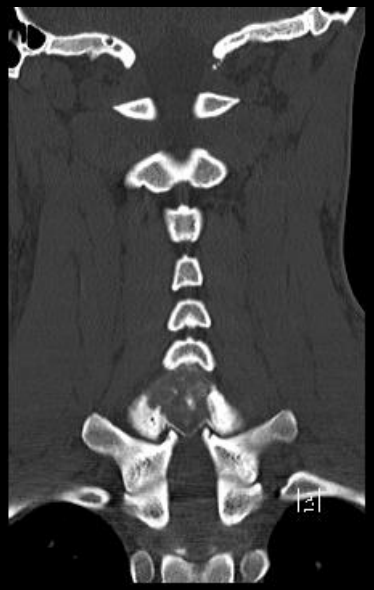
Lymphoma

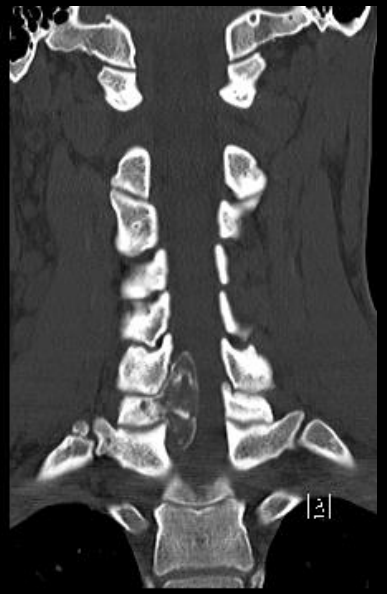
- Occurs in regions of persistent red marrow in adults – long bones 70%
- Most common location – metadiaphysis of femur
- Permeative, destructive lesion with largely intact cortex and soft tissue mass
- Usually lytic (70%) or mixed density (28%)

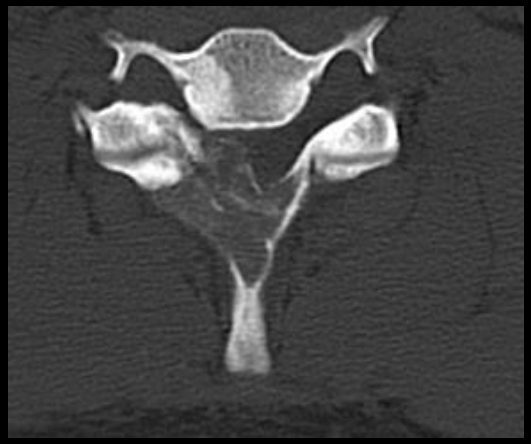
Radpath case #3

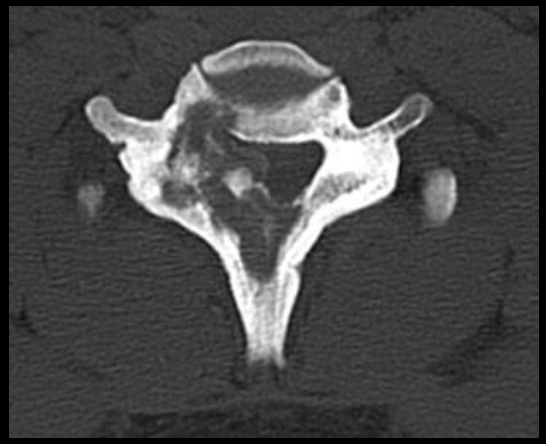








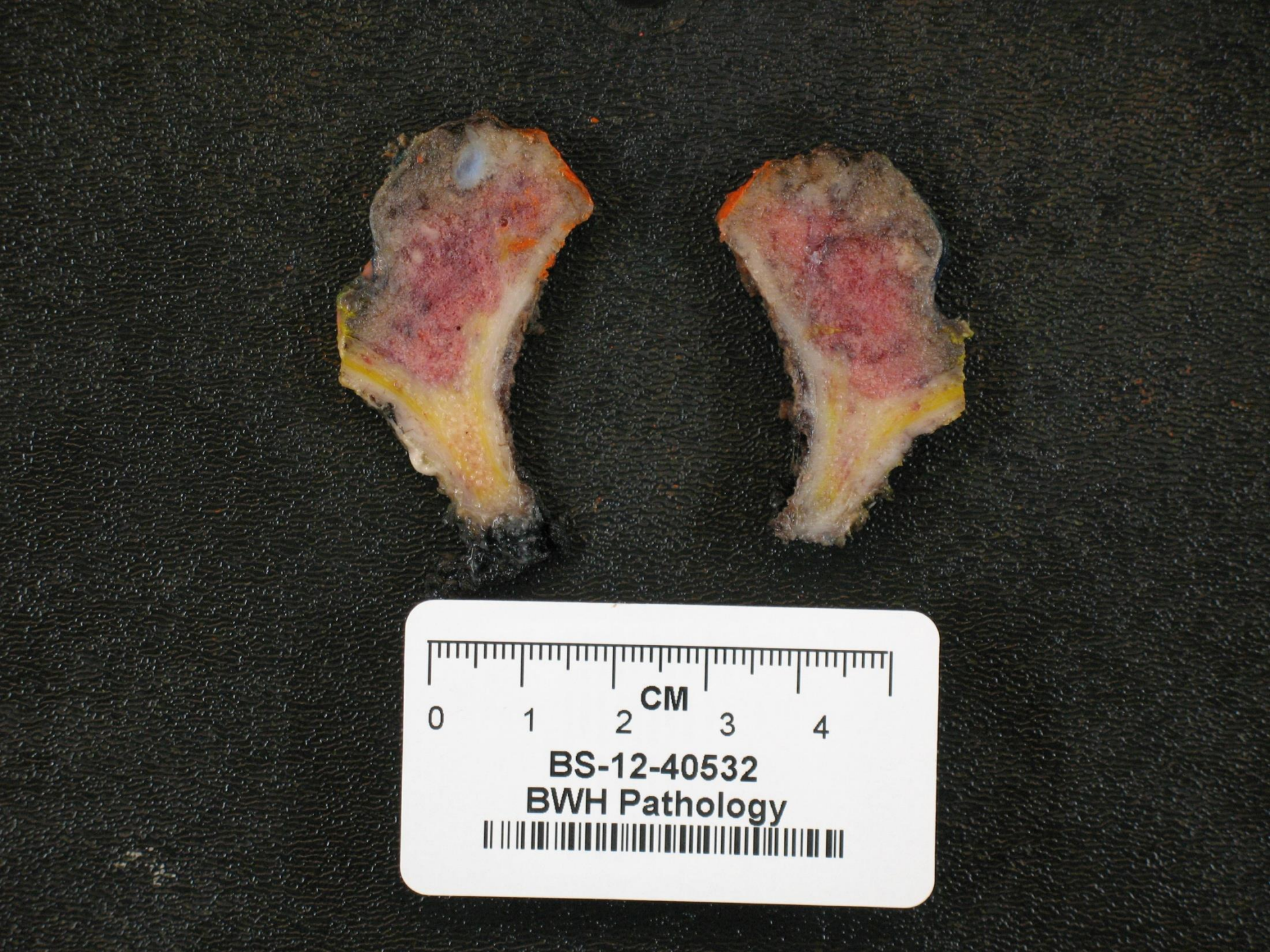








Pathology


CM
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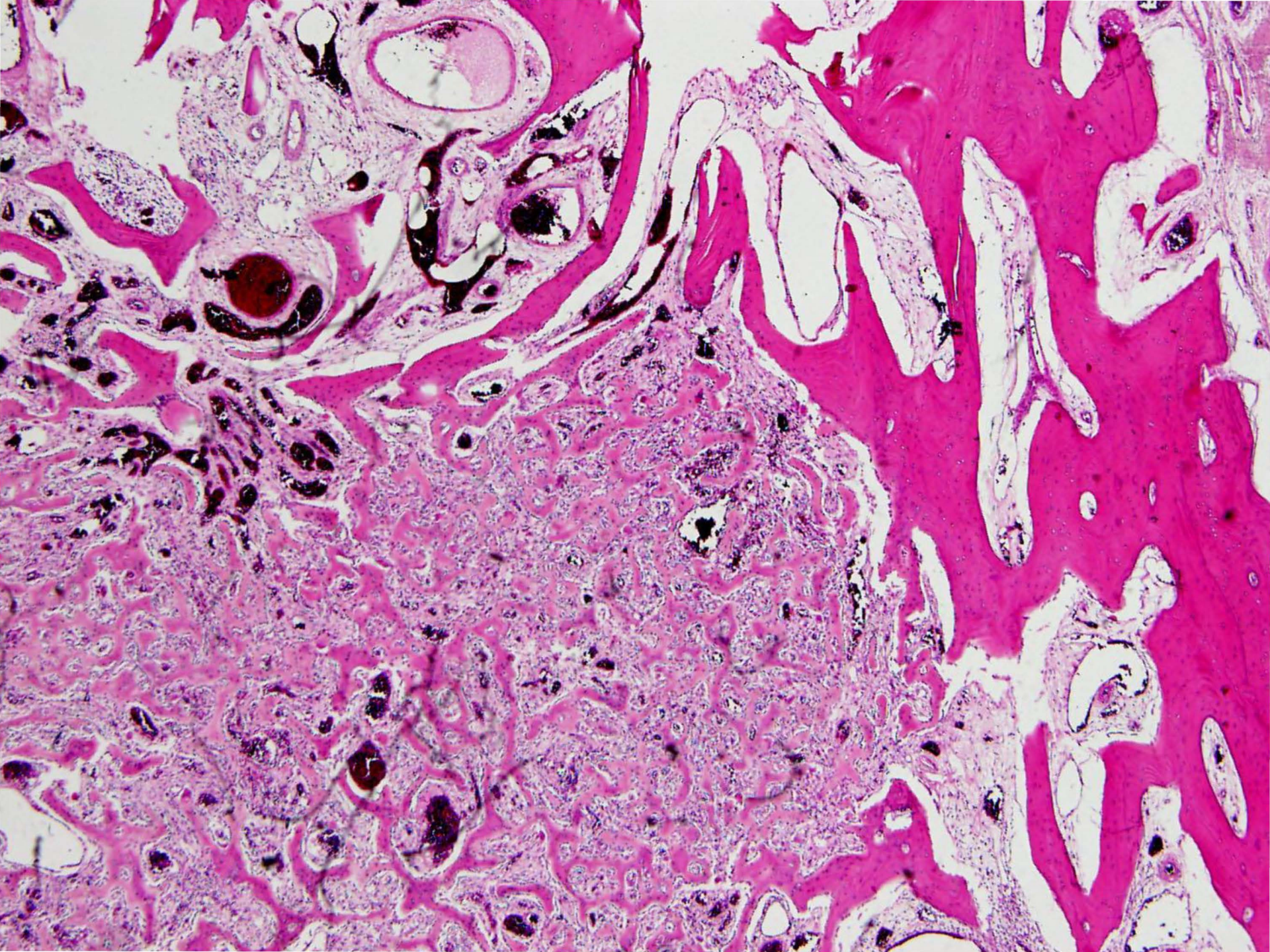
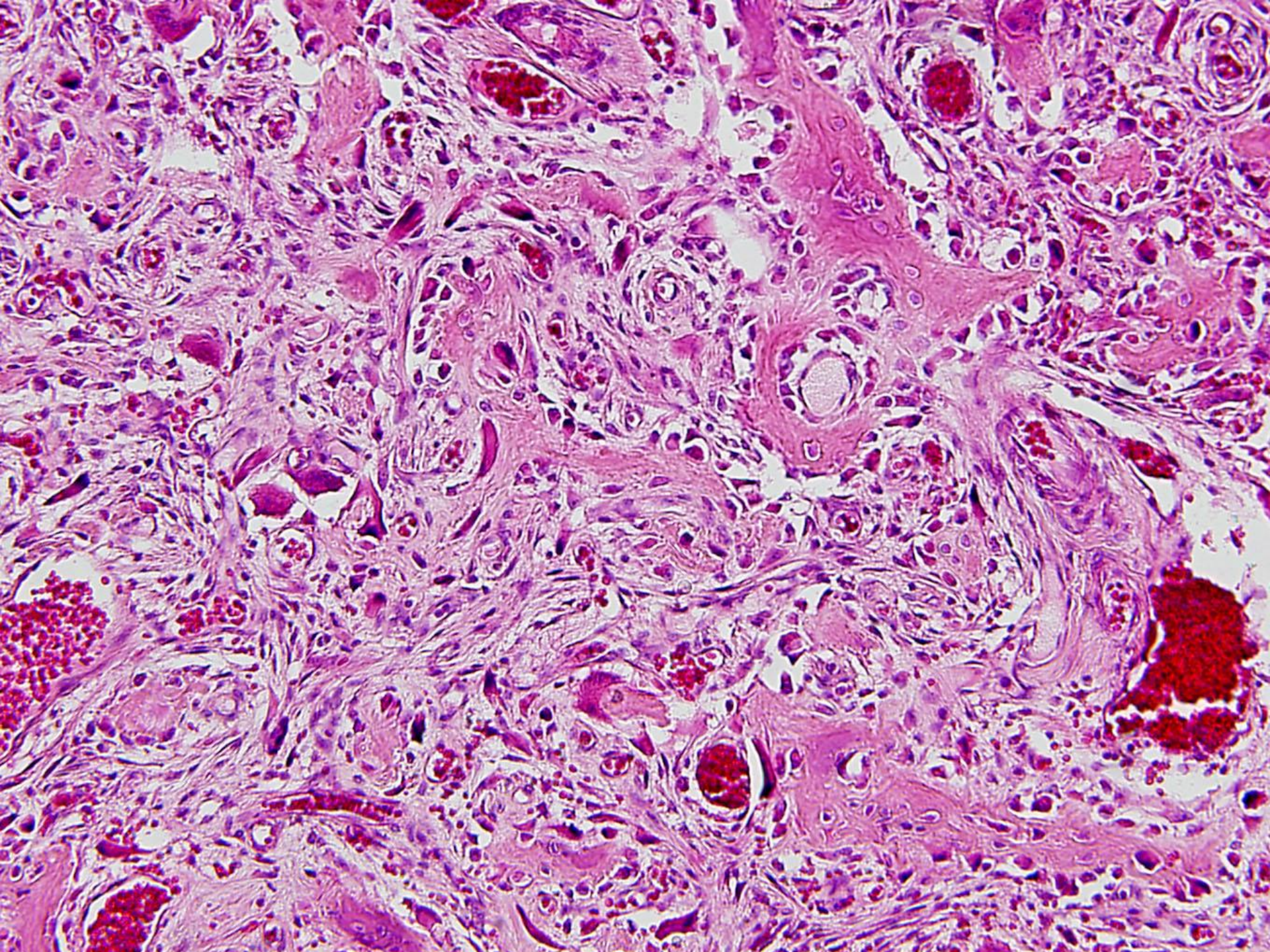
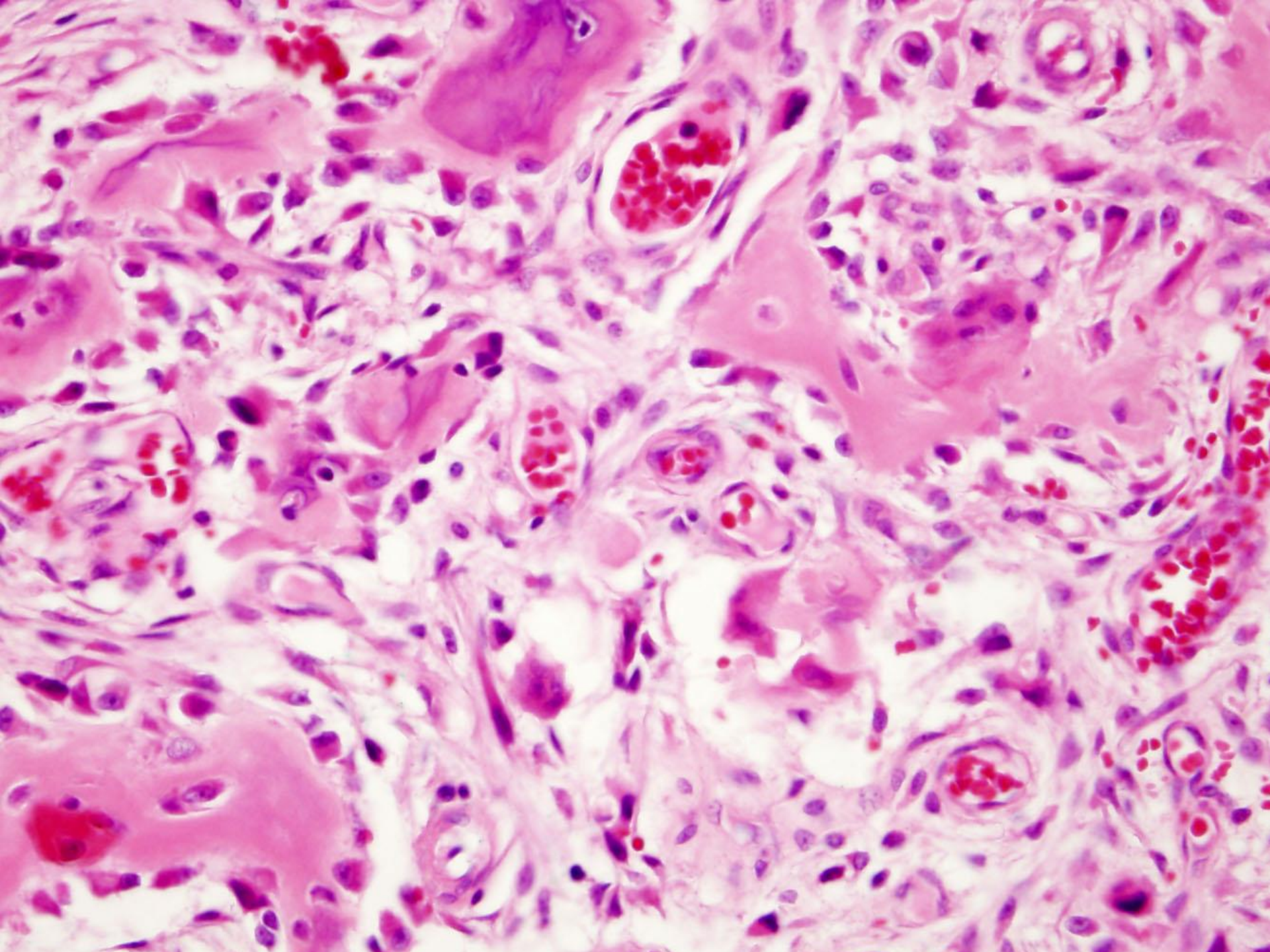
BWH Pathology





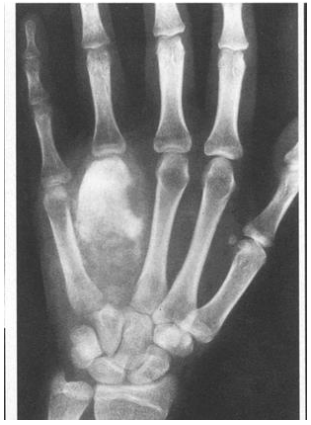


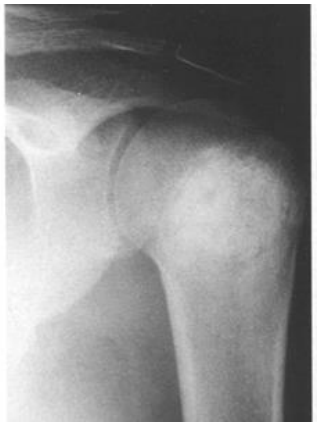
OSTEOBLASTOMA (3.5 cm).

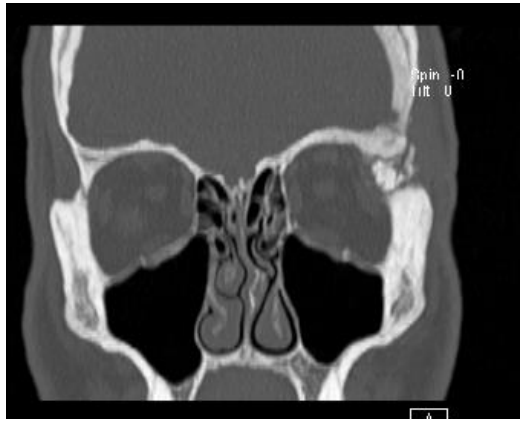
- Tumor appears confined to bone.
- Tumor is present focally at the left bone margin (A6), is 0.1 cm from the superior and anterior surfaces, 0.25 cm from the right bone margin, 0.45 cm from the inferior bone margin and 1.9 cm from the posterior bone and soft tissue margins.

Osteoblastoma

- Rare, benign bone forming tumor
- "Giant osteoid osteoma" (> 2 cm)
- Location – 50% spine or flat bones, 25% long tubular bones, 10-20% face/mandible
- May be entirely lytic (~50%)



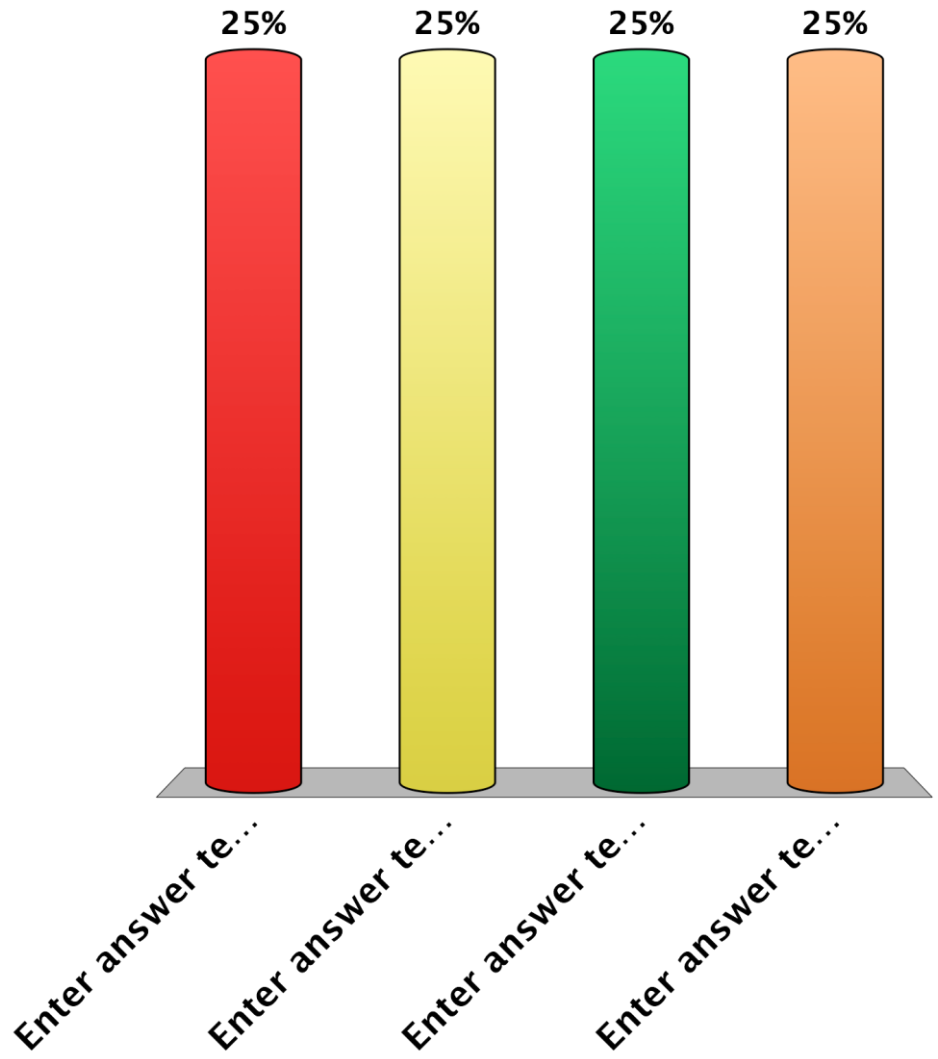


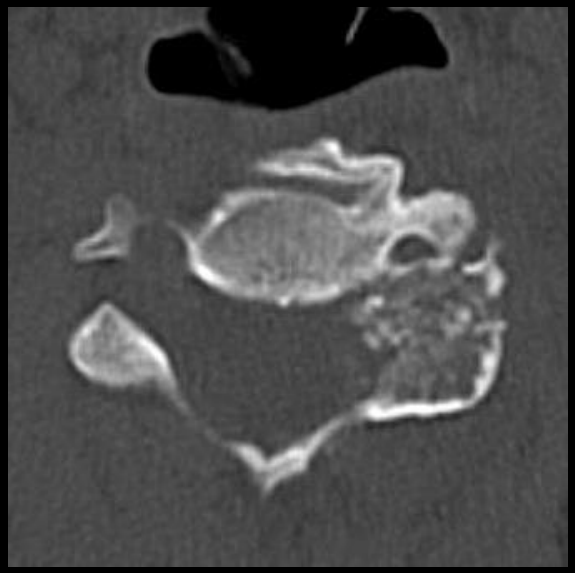


Greenspan 1983

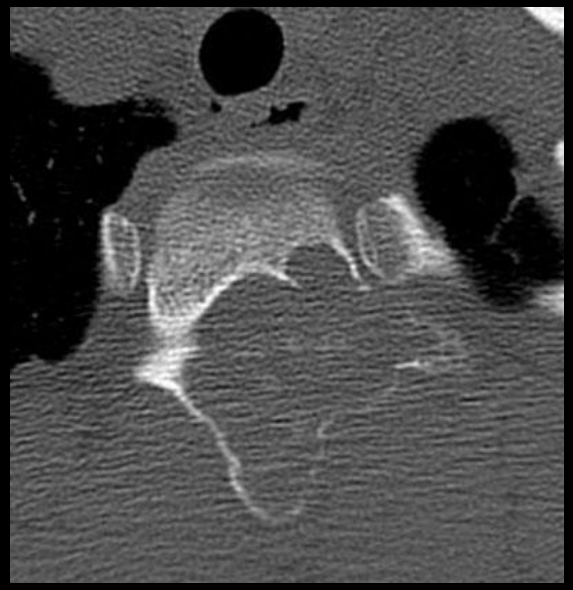
Which of the following is NOT in the differential for a lytic lesion in the posterior elements?

A. Osteoblastoma
B. Metastases
C. Chondroblastoma
D. Aneurysmal bone cyst
E. Giant cell tumor

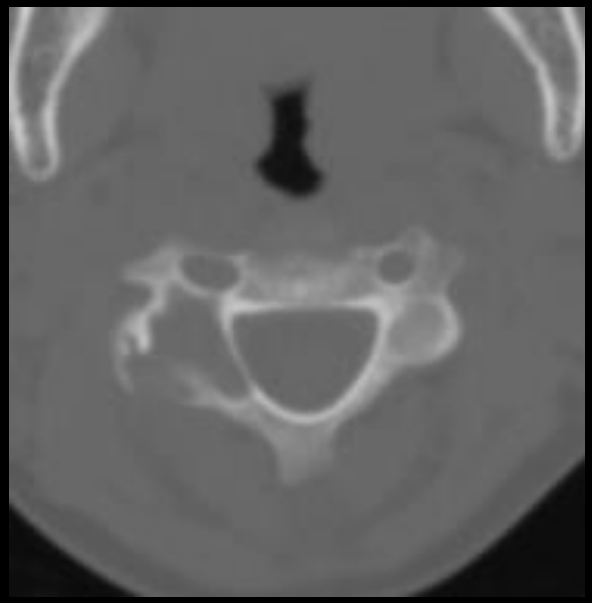




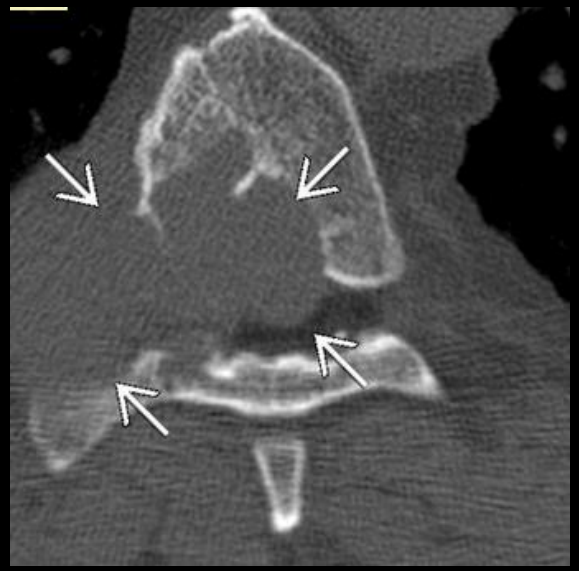
Osteoblastoma



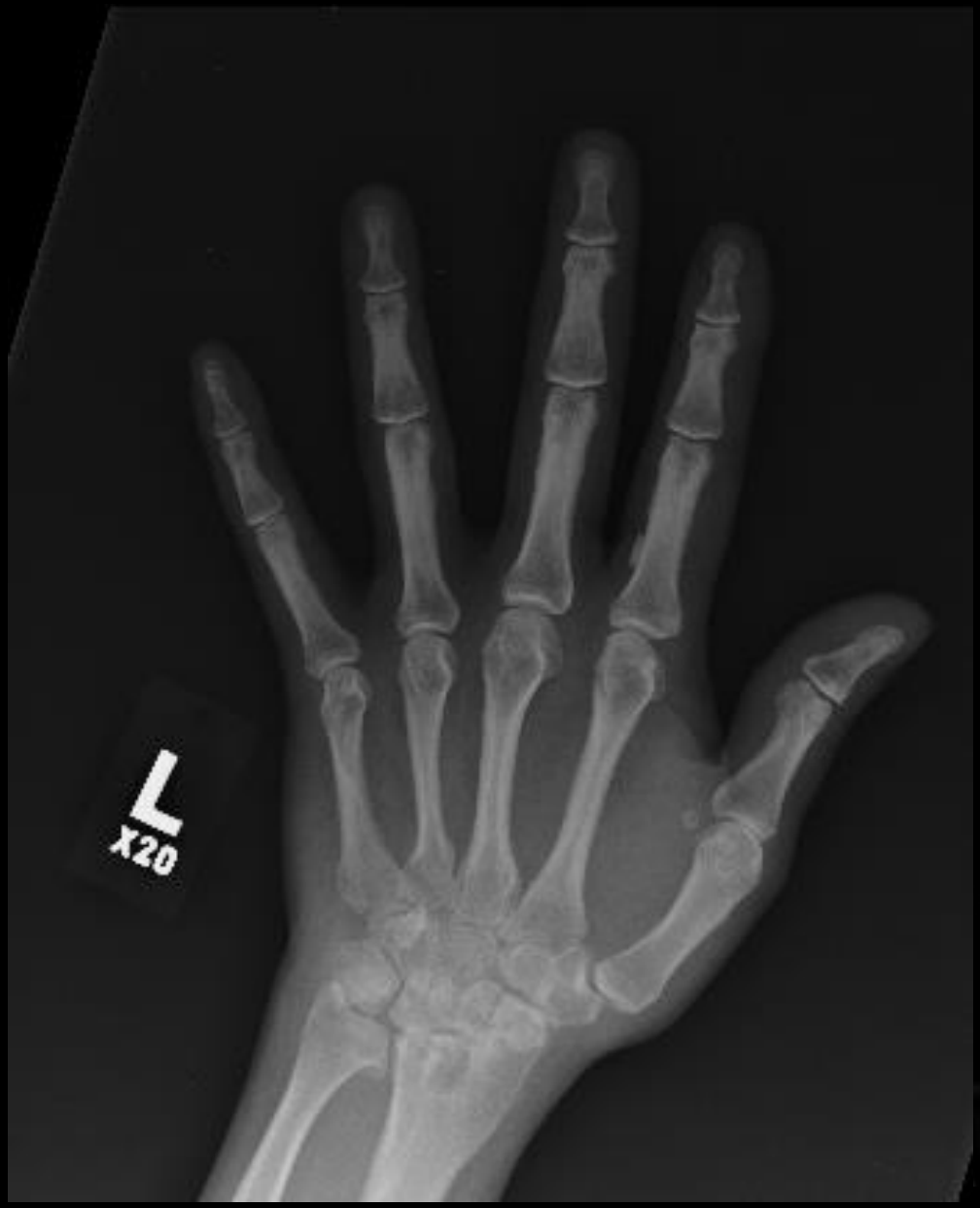
ABC



GCT



Metastasis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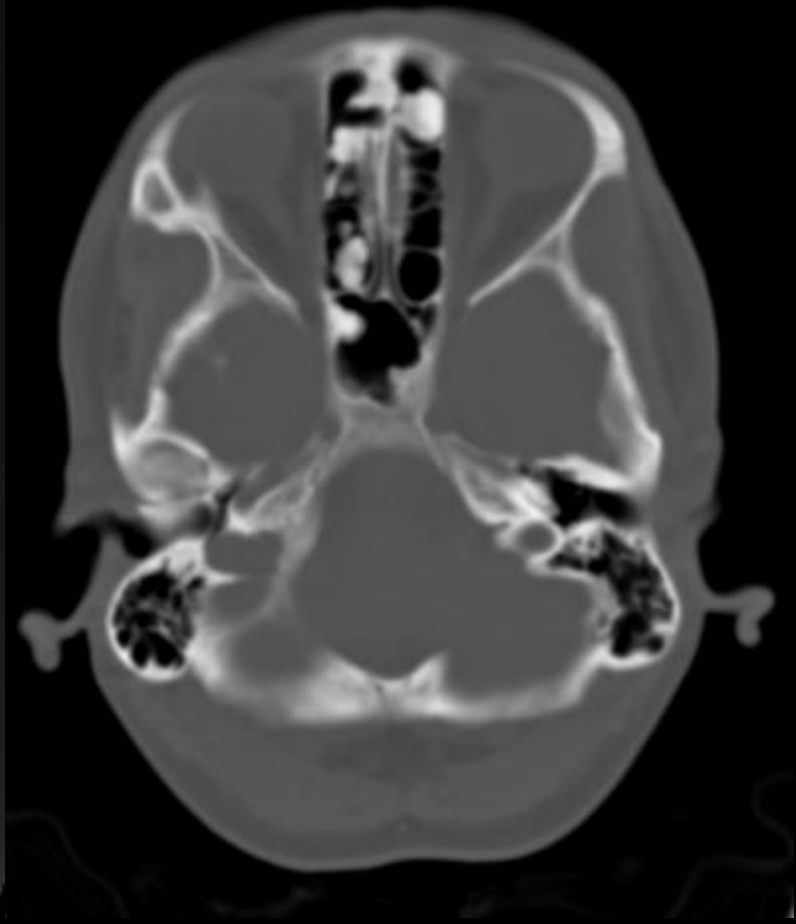
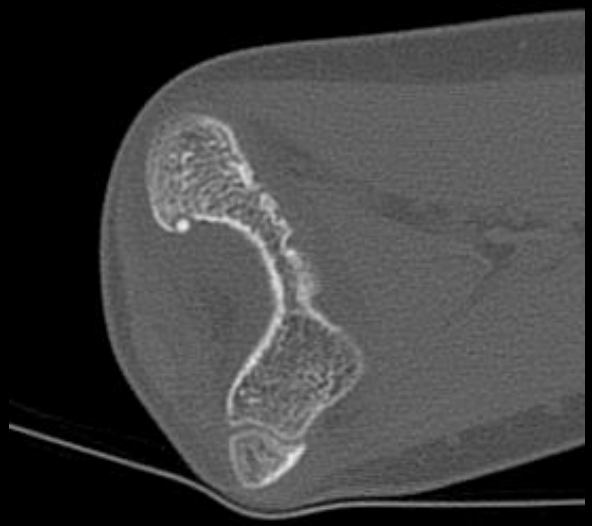
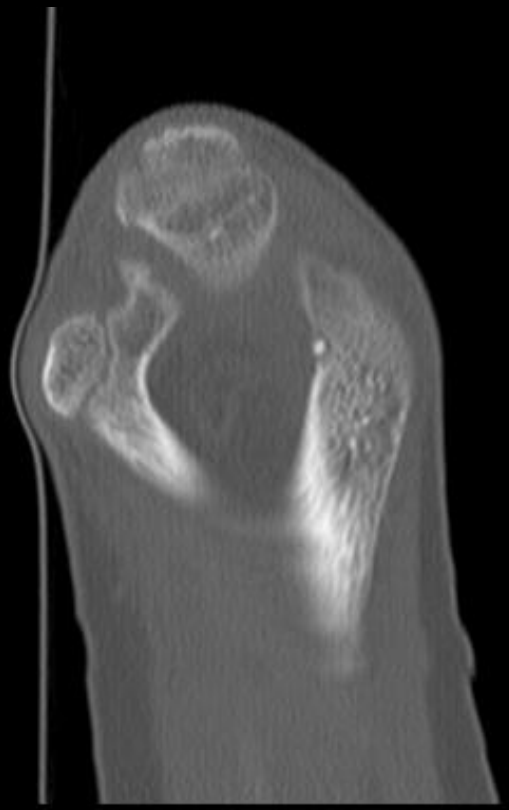
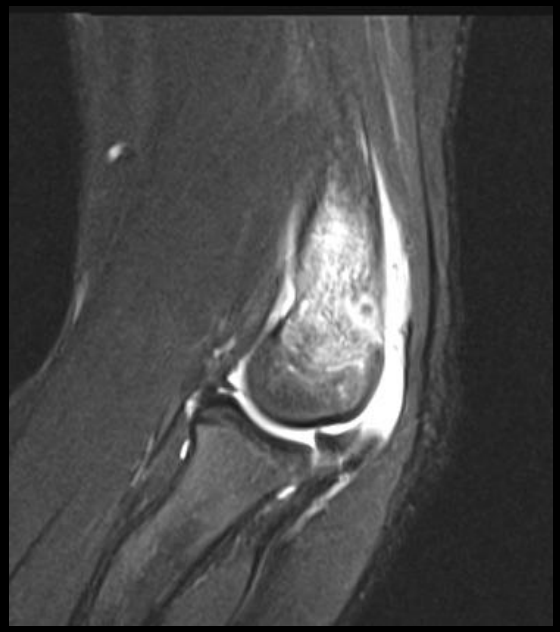


Osteomas in a patient with Gardner syndrome

- Benign tumor that forms mature bone
- 75% in paranasal sinuses
- Gardner syndrome
  - Autosomal dominant
  - Osteomas of sinuses and tubular bones
  - Desmoid tumors (superficial or deep)
  - Multiple colonic polyps and subcutaneous cysts

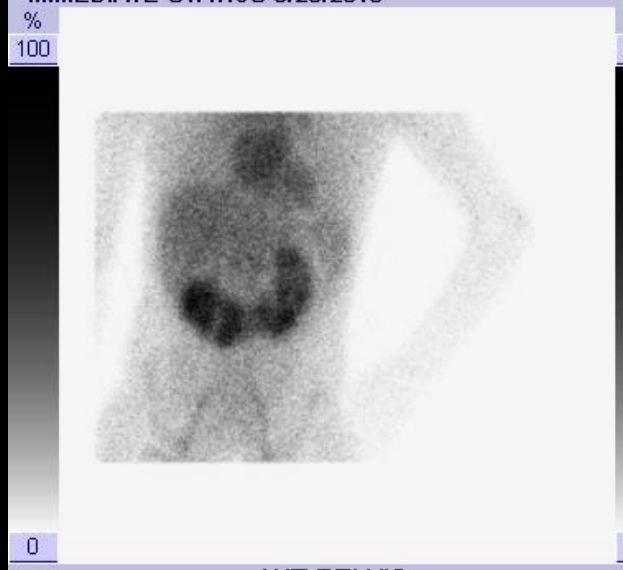




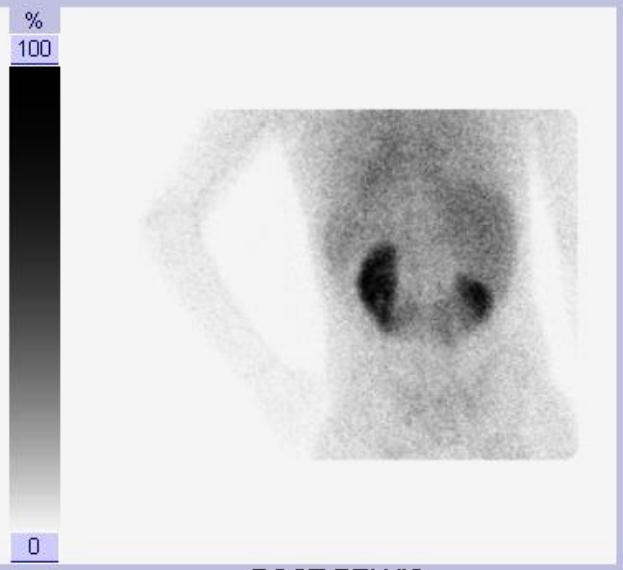


STIR

IMMEDIATE STATICS 6/28/2013



ANT PELVIS



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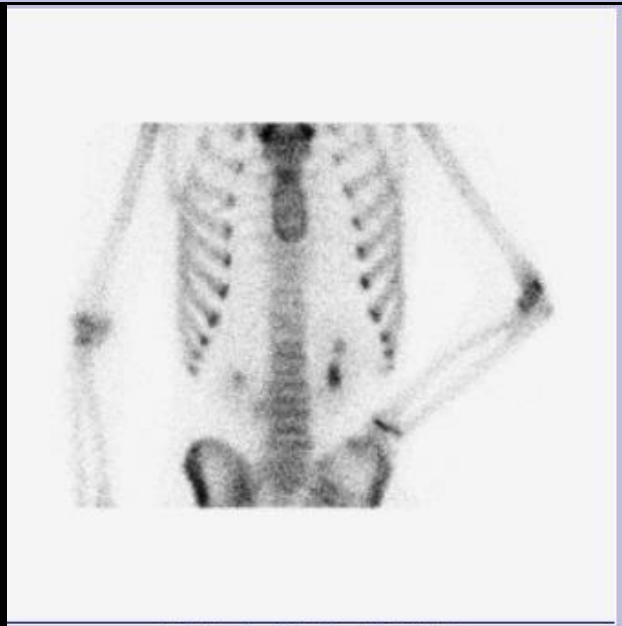
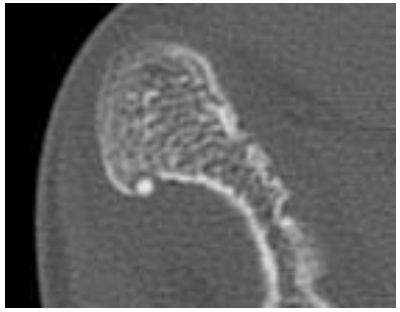
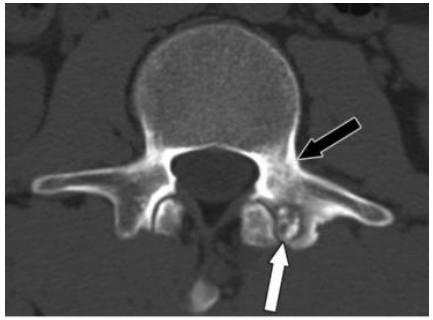


LEFT ARM ANTERIOR

Osteoid osteoma

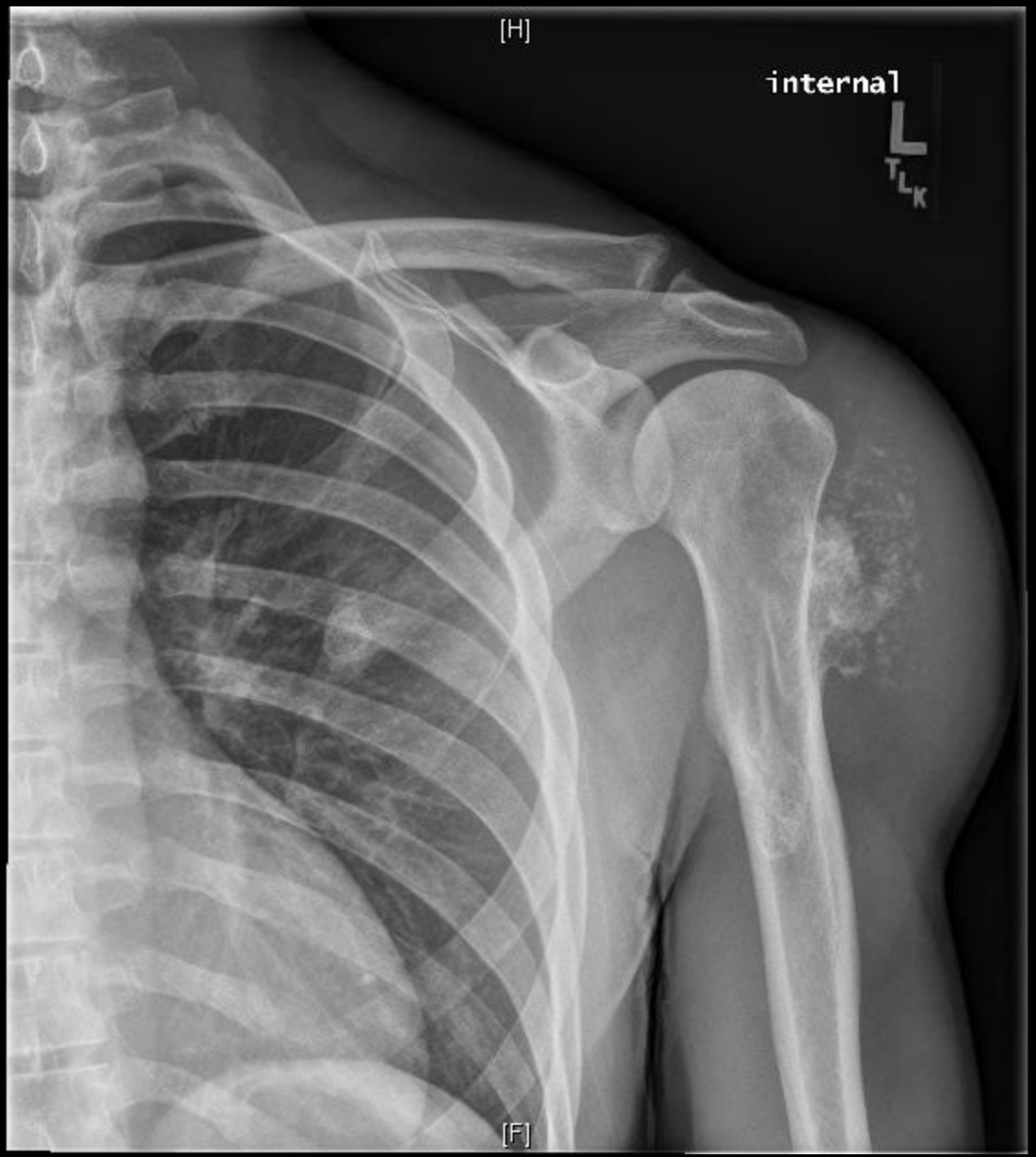
- Benign bone forming tumor
- Most common in males age 10-25
- Appearance
  - Oval lytic lesion within dense cortical bone
    - Typically long bone
    - Adjacent cortical thickening and sclerosis
  - +/- central sclerotic focus





Chan 2010

Rad Path Case #4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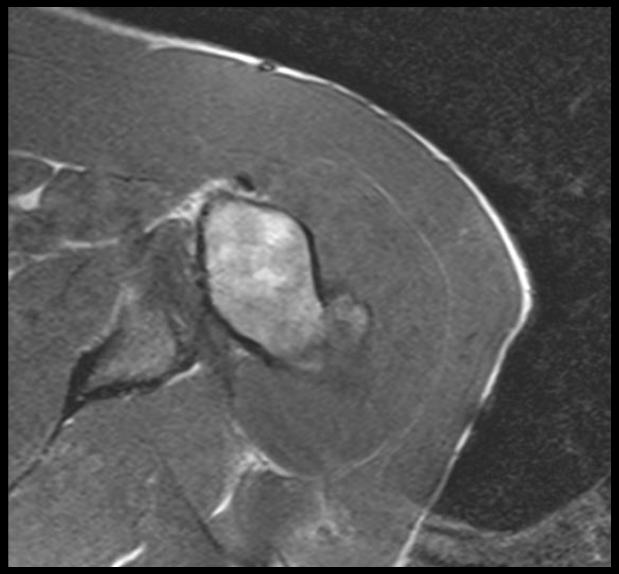
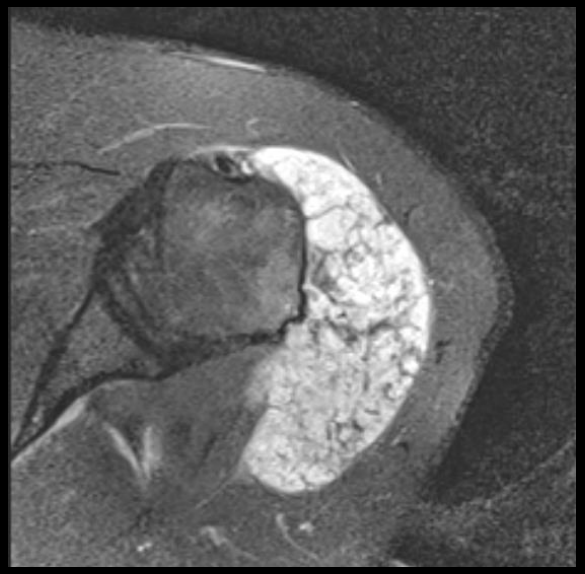
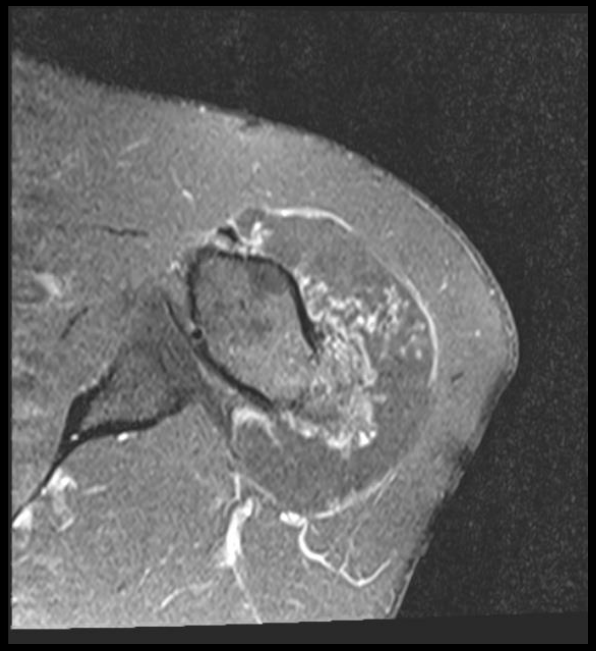


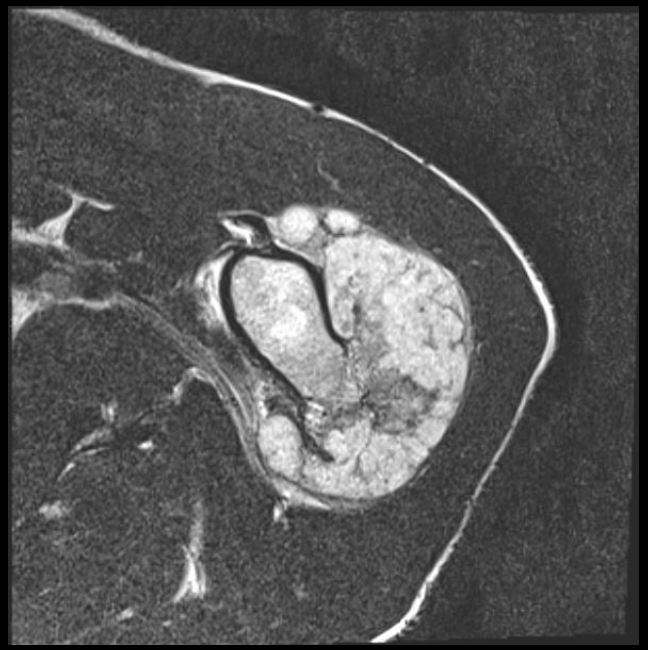
T1



PD FS

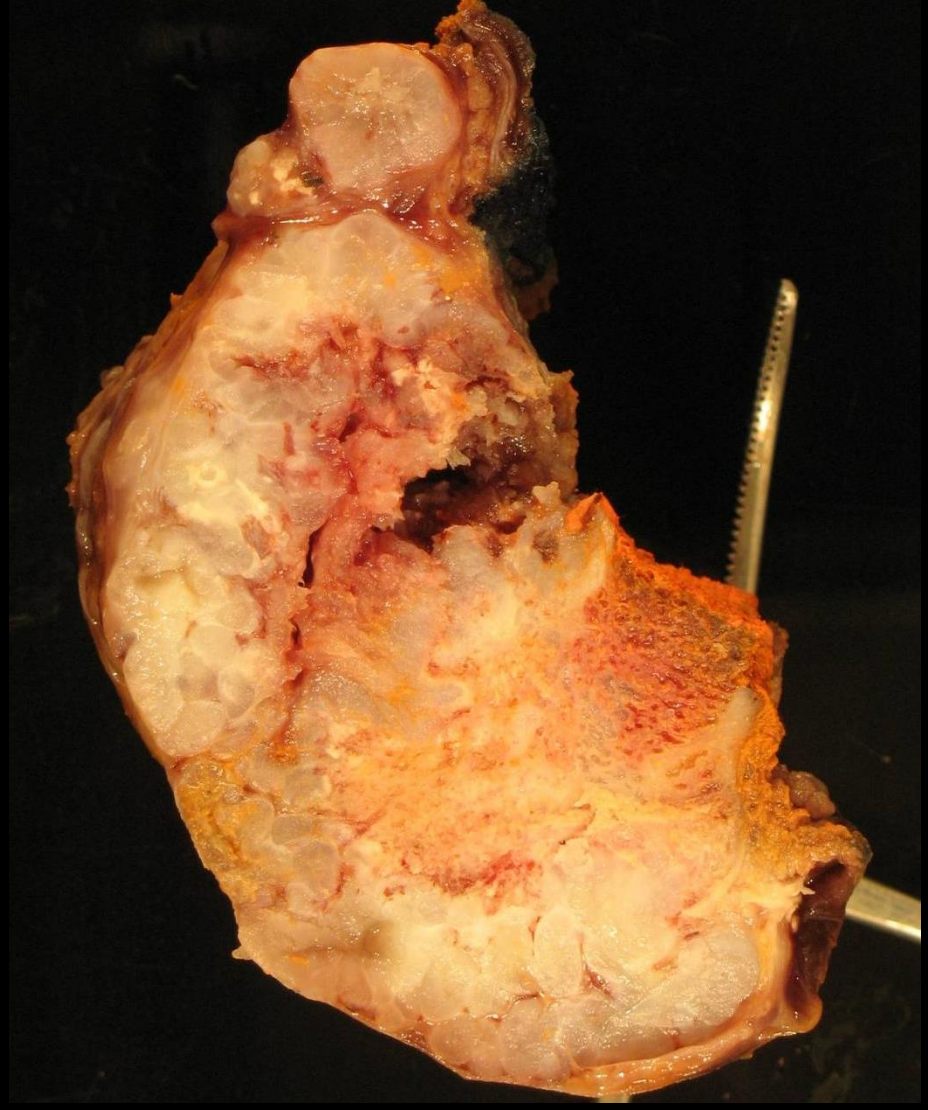


T1 post



T2

Pathology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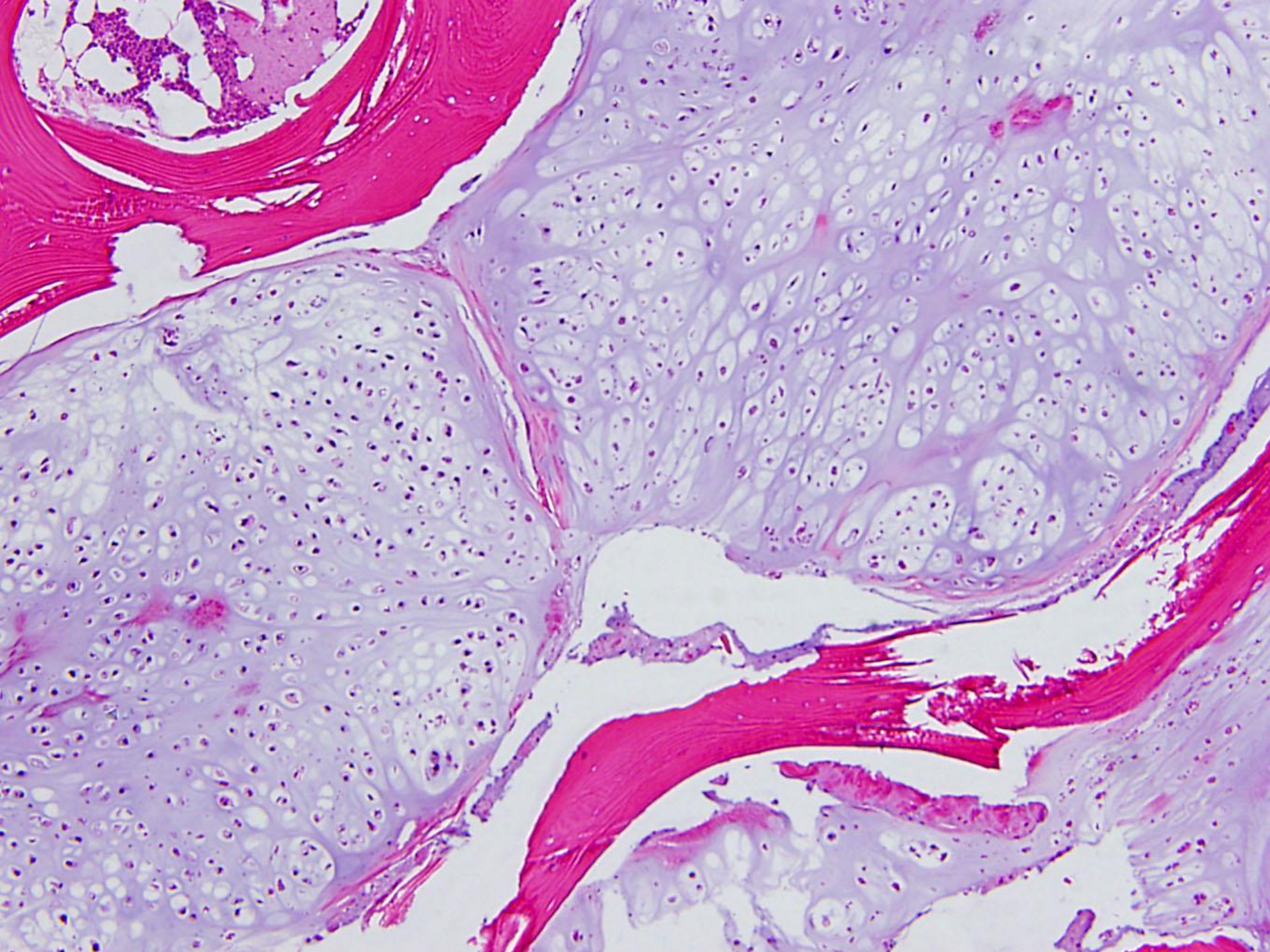
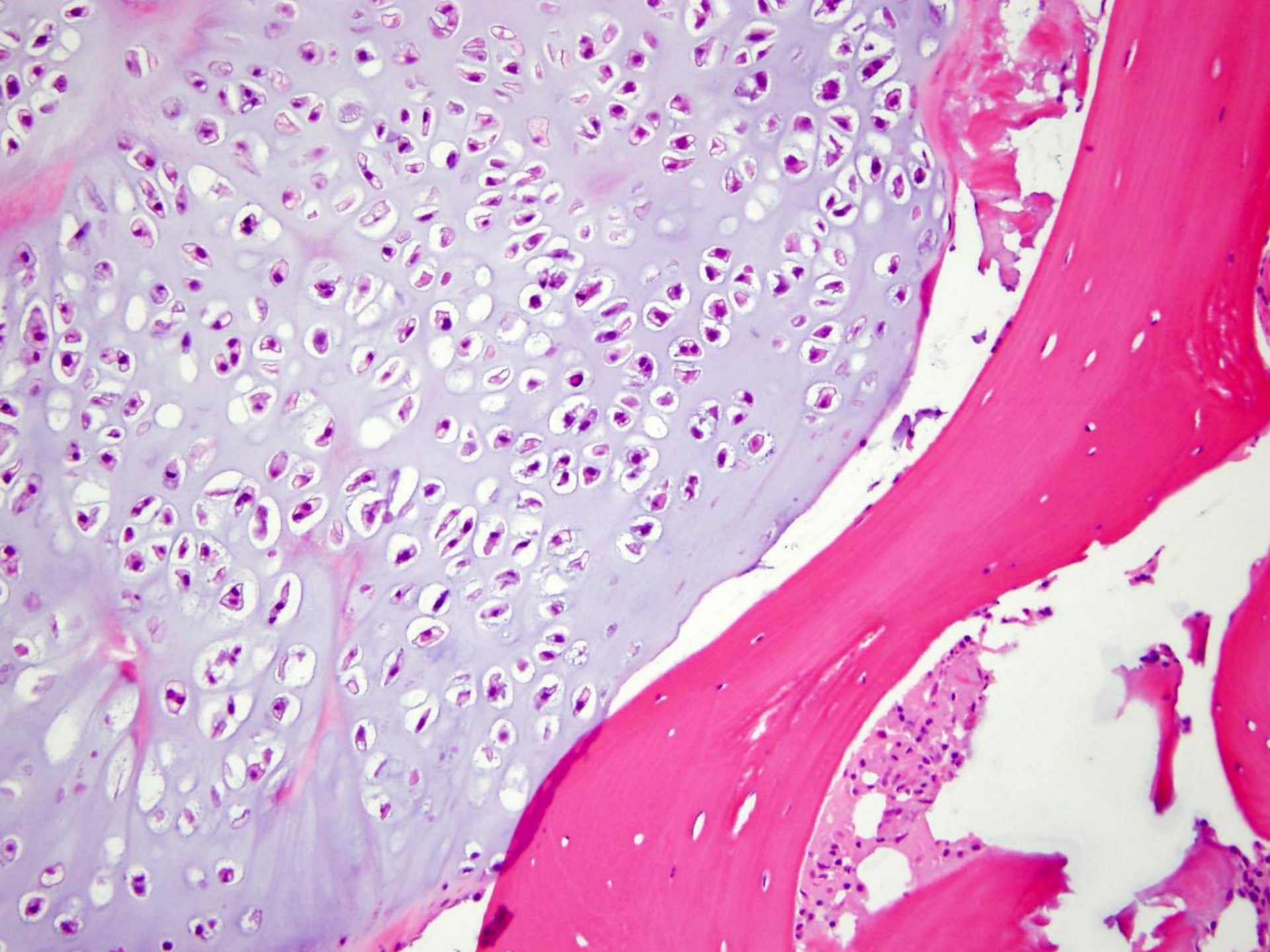
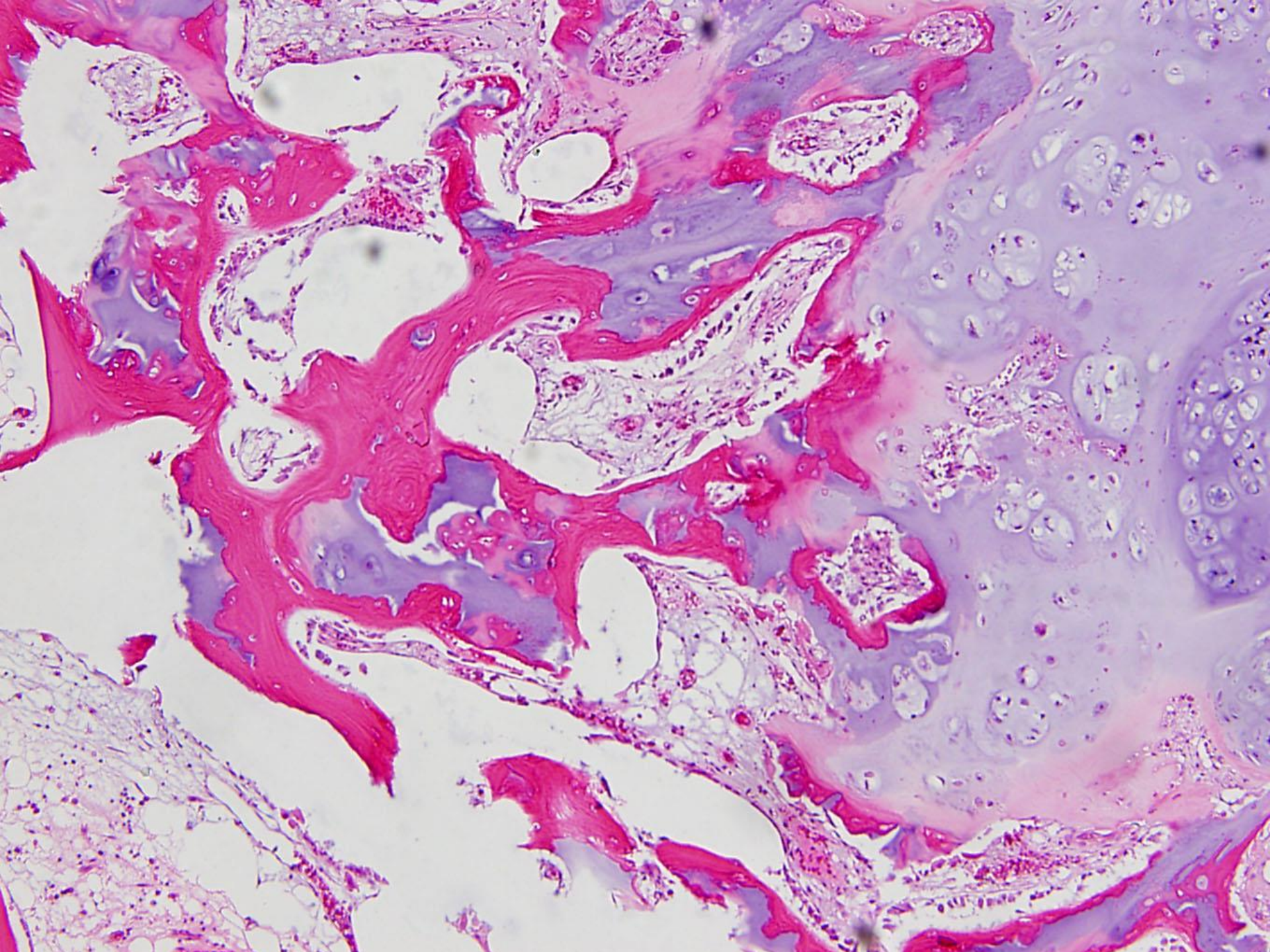
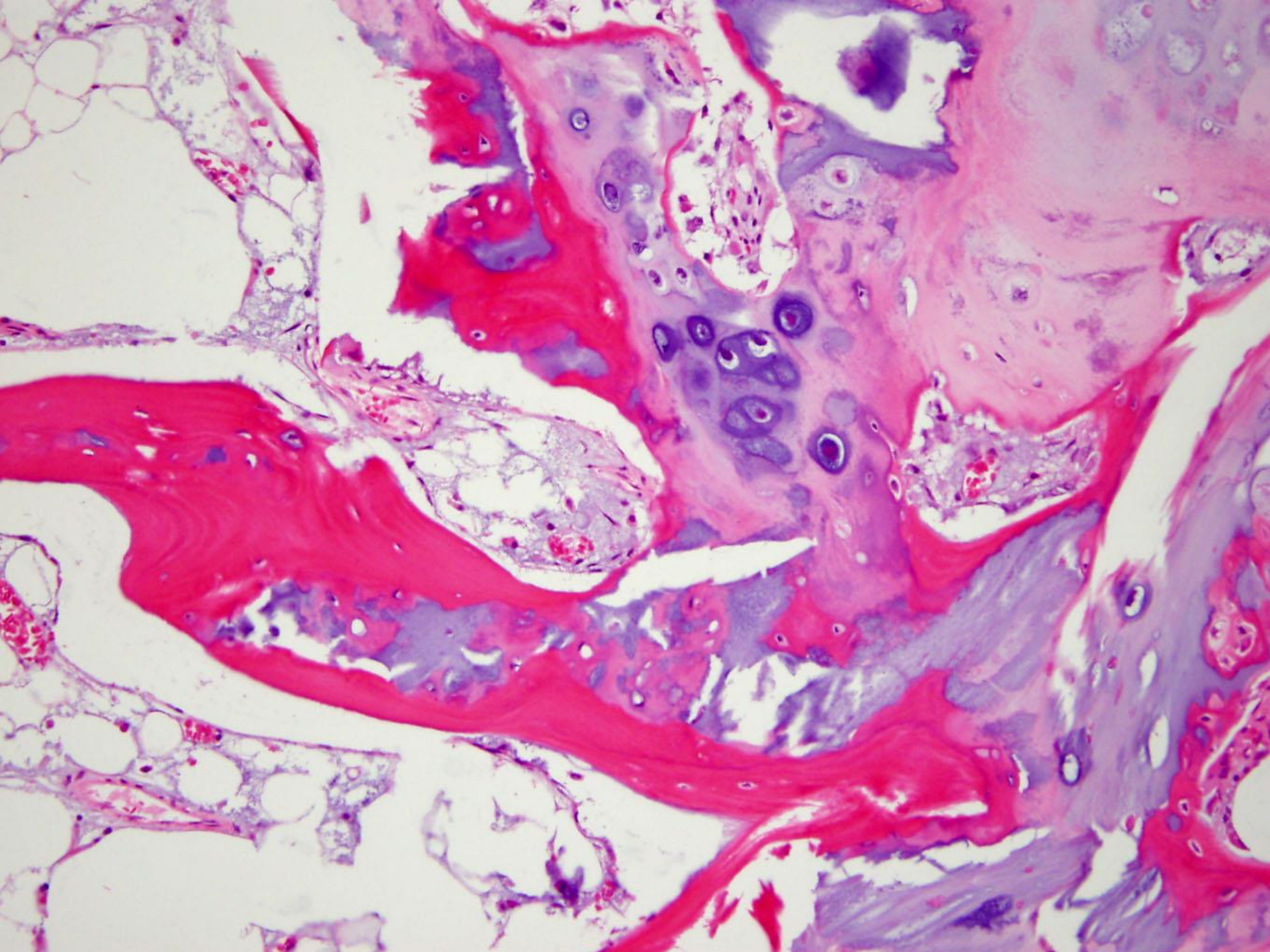
BS-09-58658
BWH Pathology







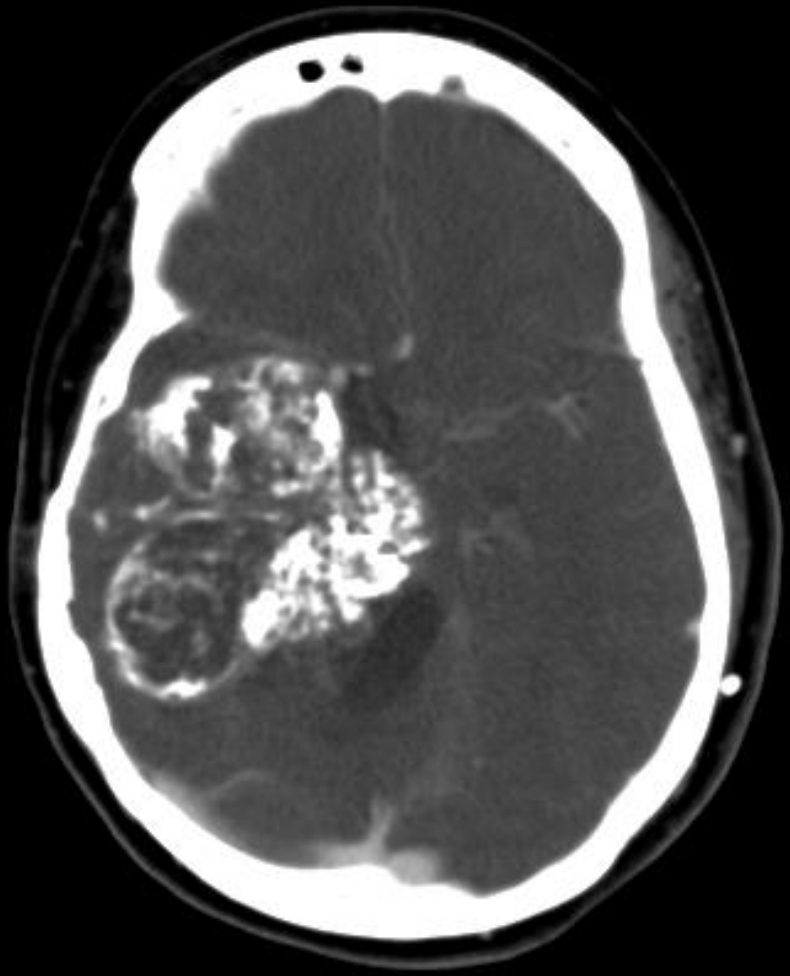


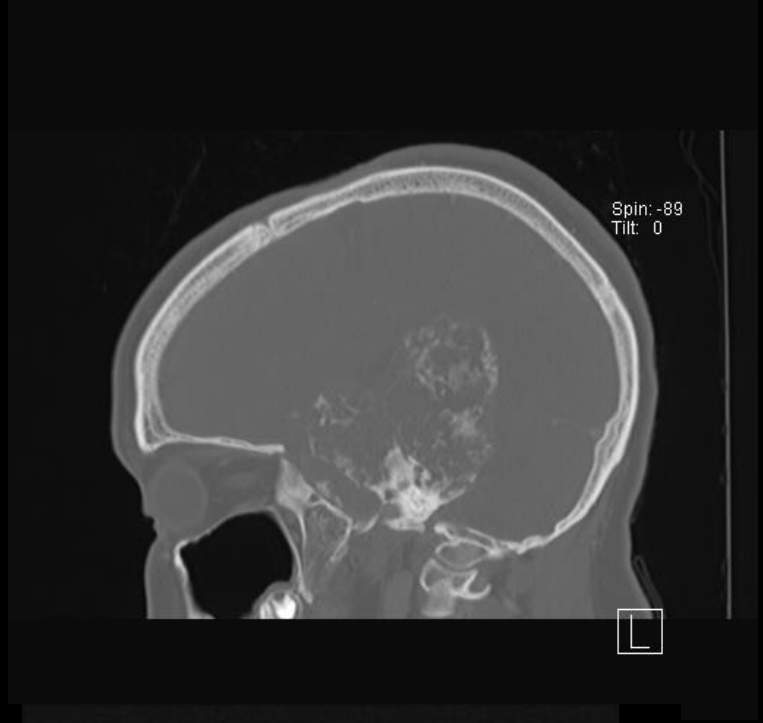
CHONDROSARCOMA, grade 1 (10.8 cm).

- Tumor is 0.2 cm from the bone resection margin, 0.3 cm from the posterior/inferior soft tissue resection margin, and 0.3 cm from the anterior/medial soft tissue resection margin.
- Mitotic count: < 1 per 10 HPF.
- Focal sclerosis.

Chondrosarcoma

- Malignant tumor of hyaline cartilage
- Can be primary or secondary
- Common in iliac wing, proximal femur, proximal humerus
- Chondroid matrix in 80% of cases
- Can be intramedullary or exophytic

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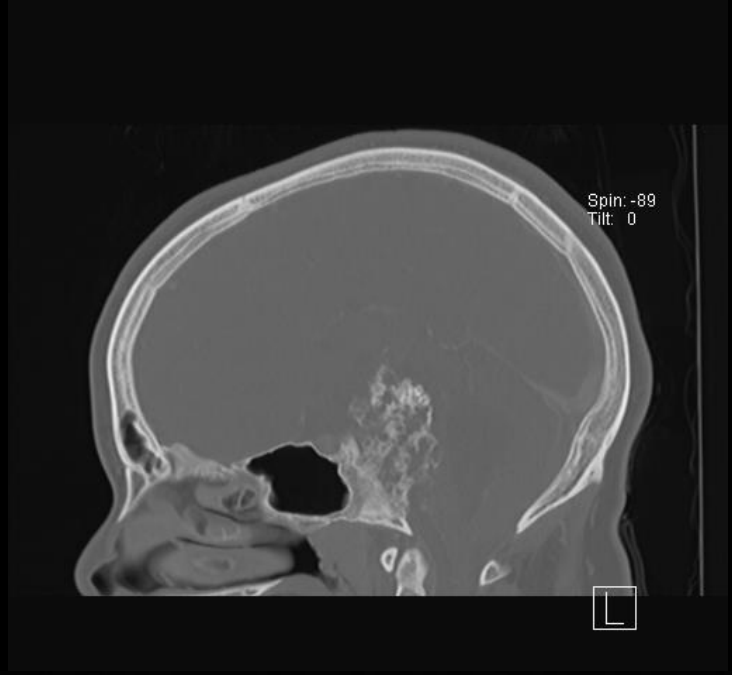
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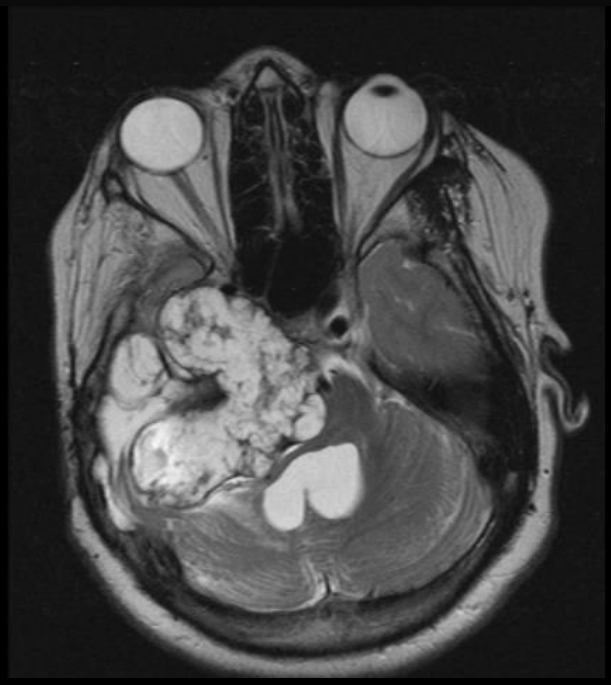
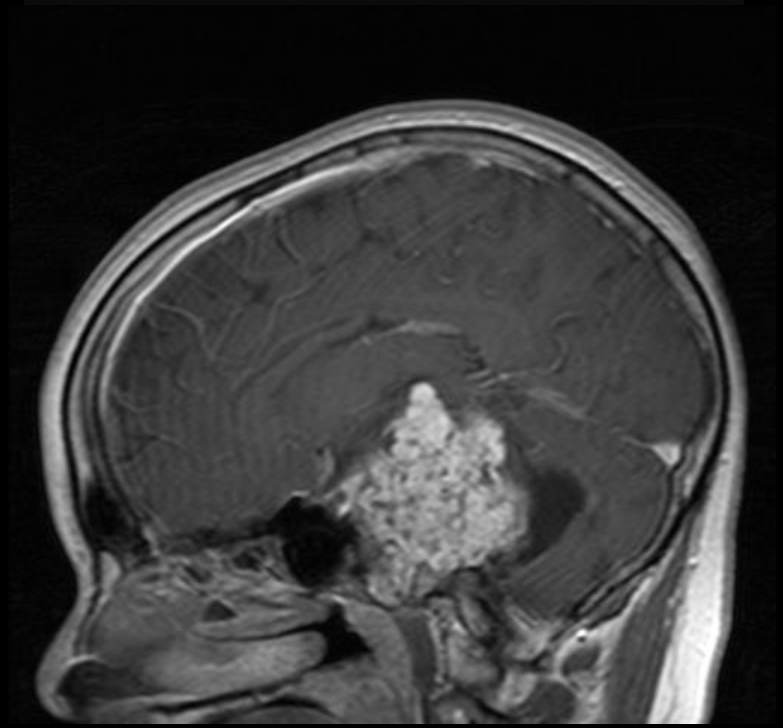
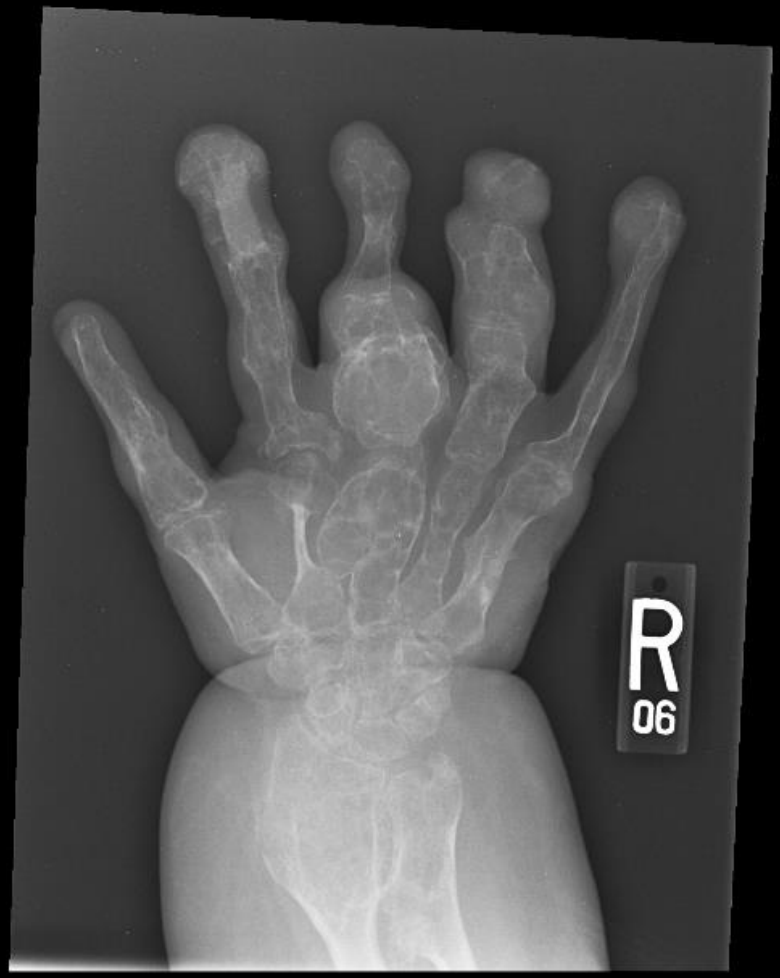




Companion Case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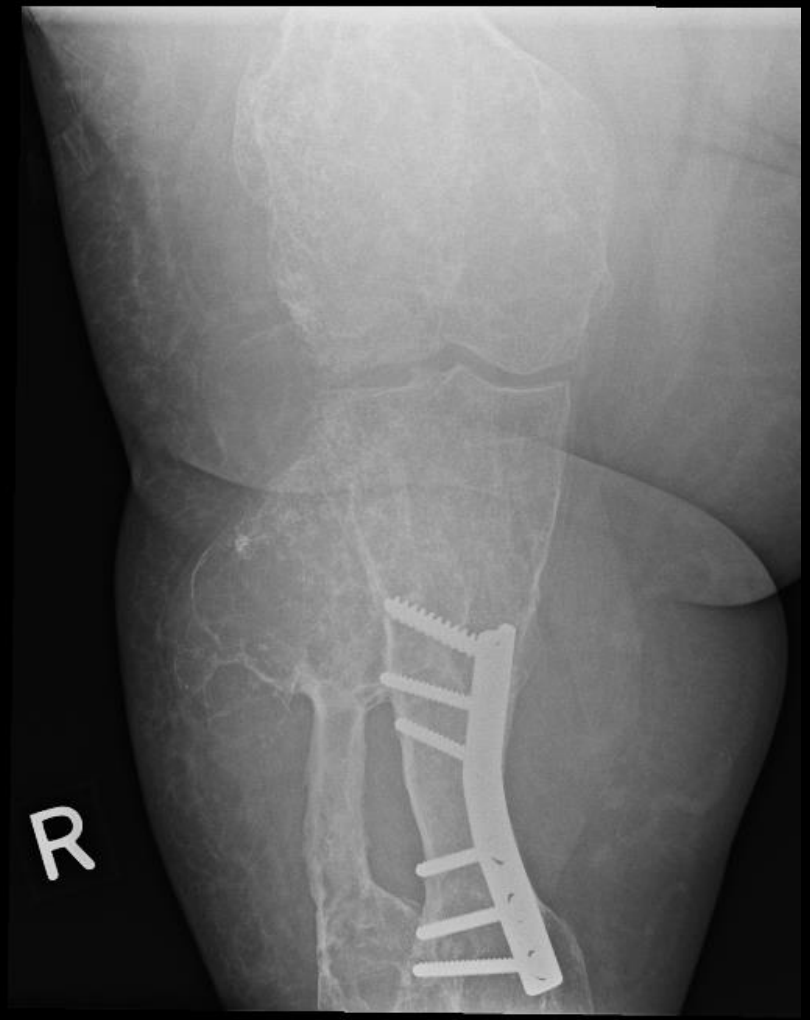
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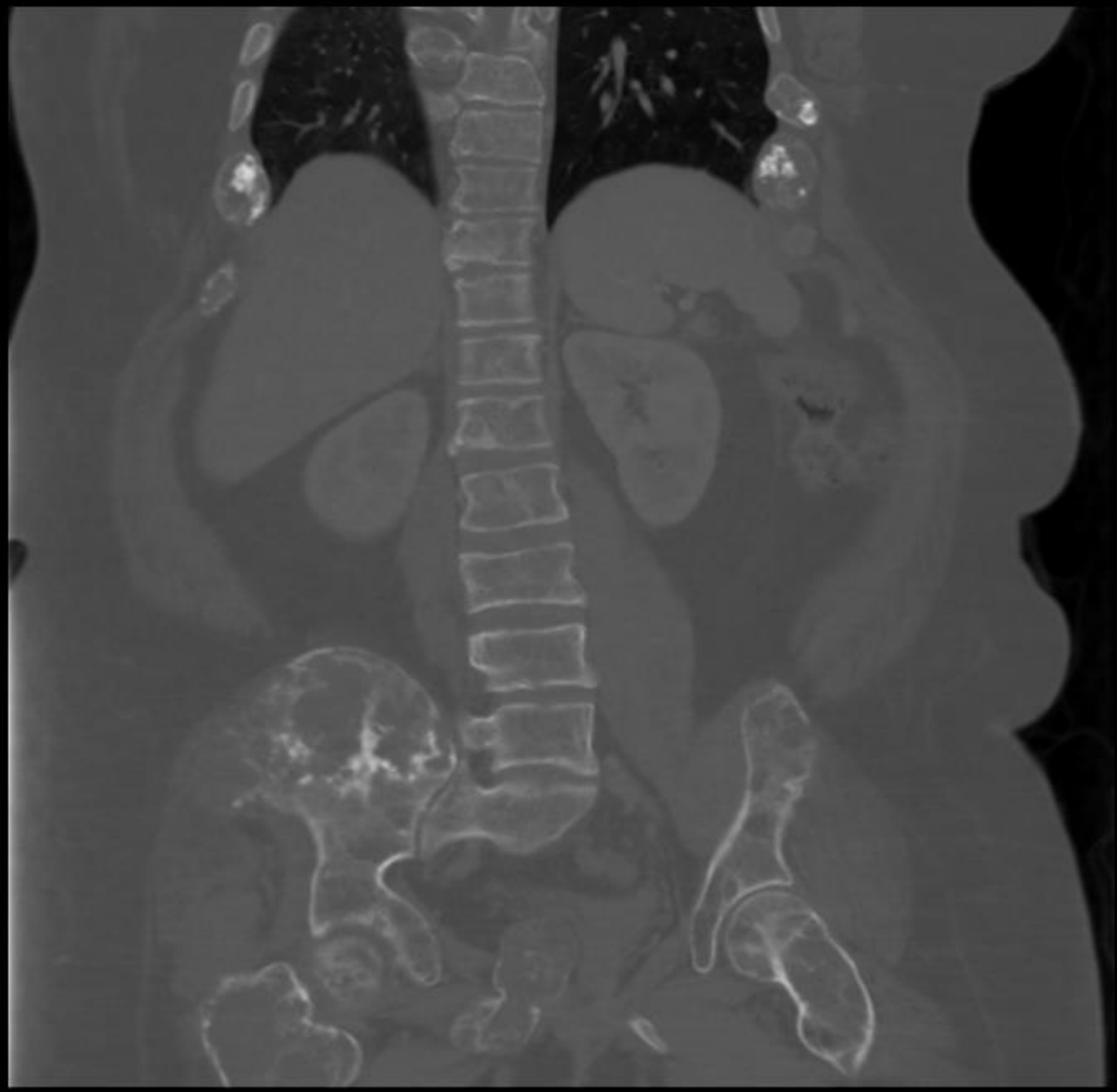
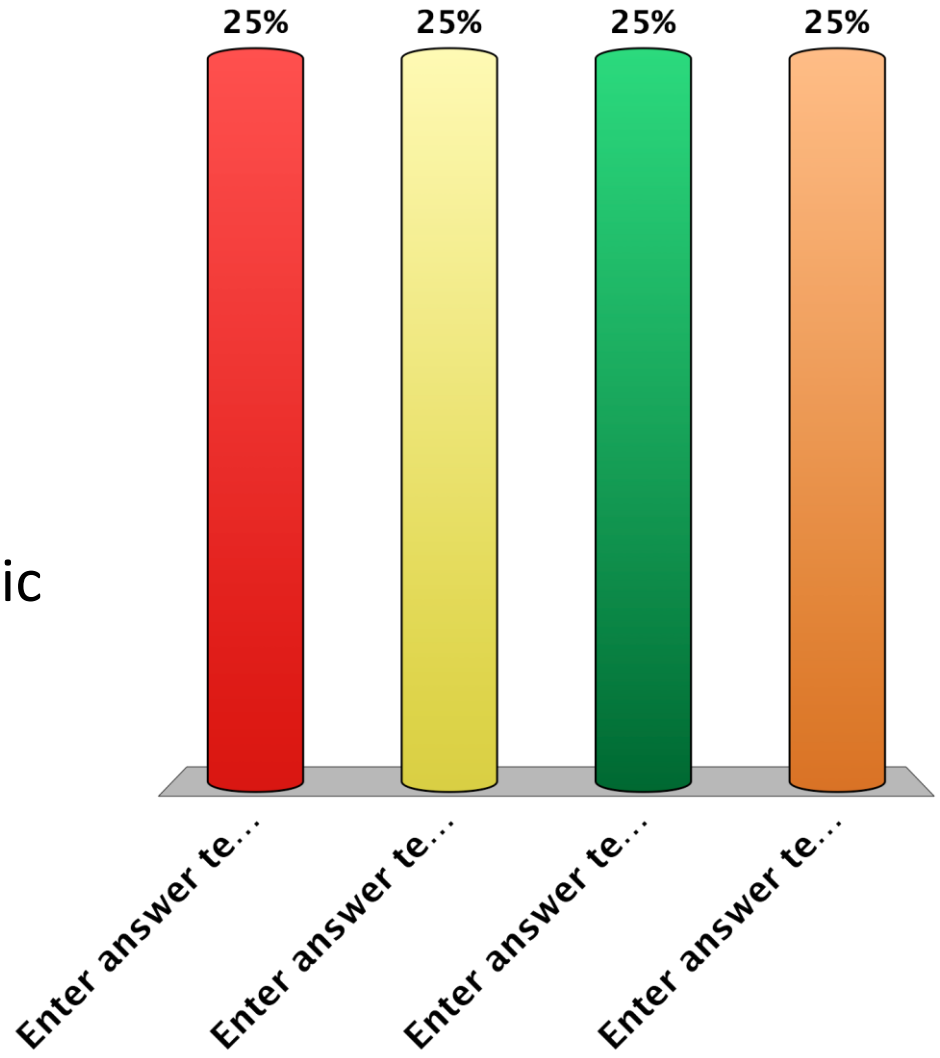
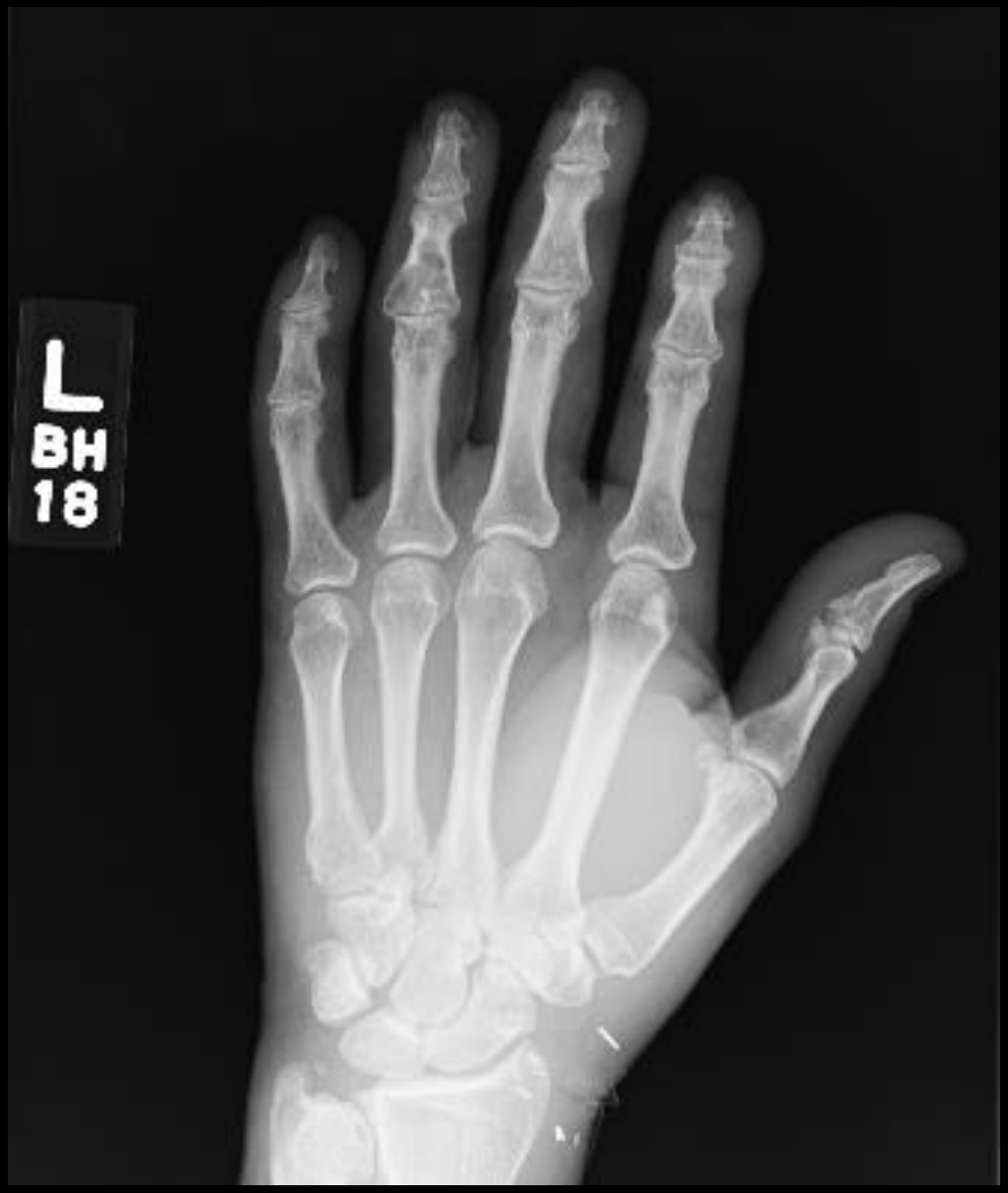


Which of the following is FALSE about Mafucci syndrome and Olliers disease?

A. Mafucci syndrome is associated with soft tissue hemangiomas
B. Both are associated with multiple enchondromas
C. Olliers disease has a higher risk for chondrosacoma
D. Both are at risk for pathologic fractures

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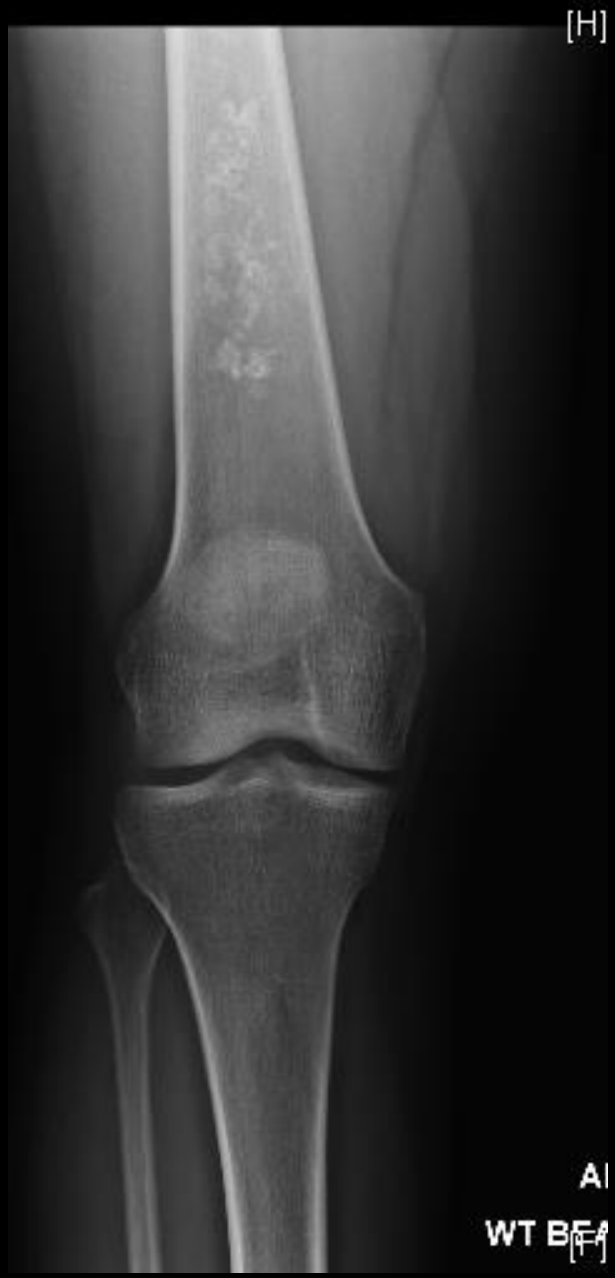
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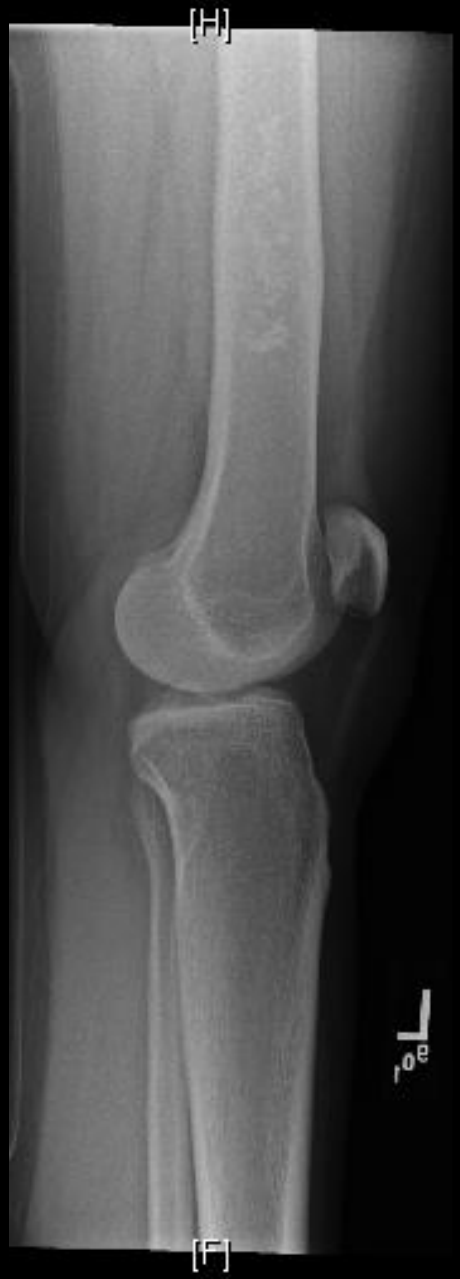
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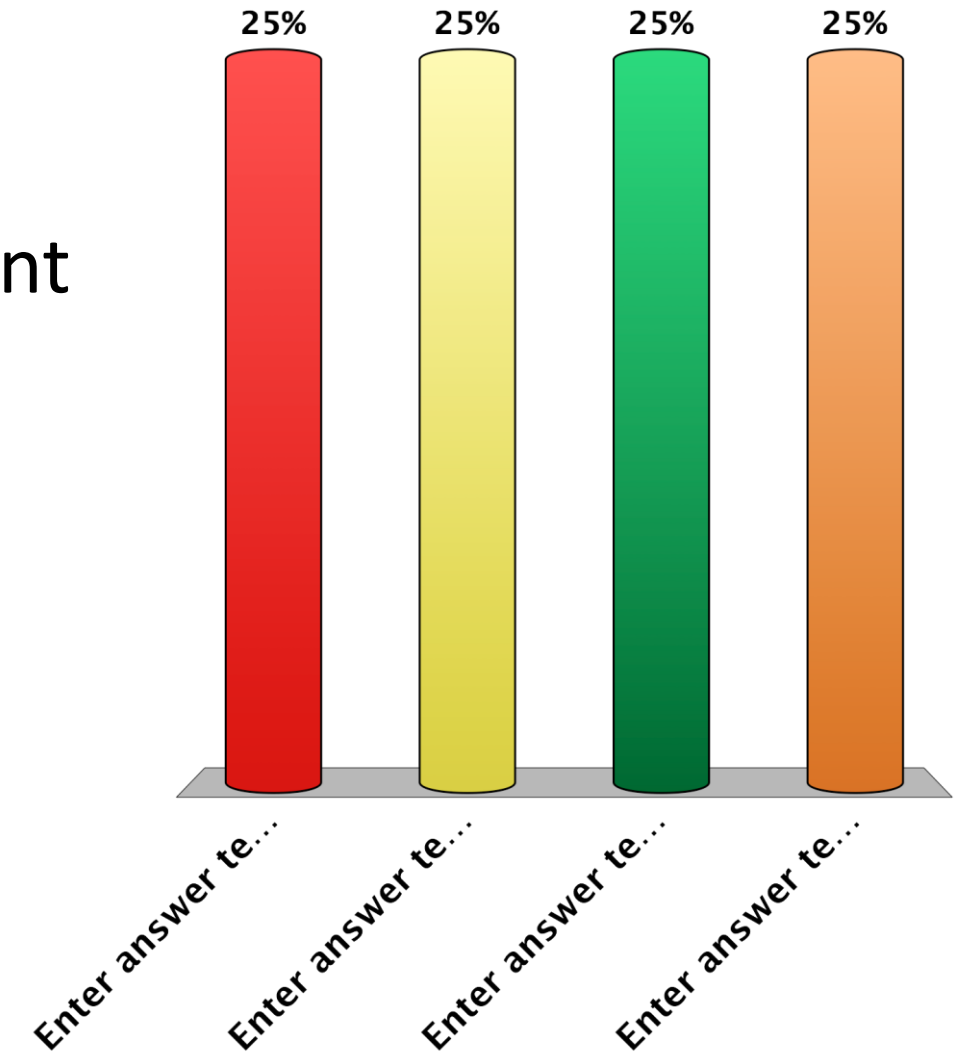
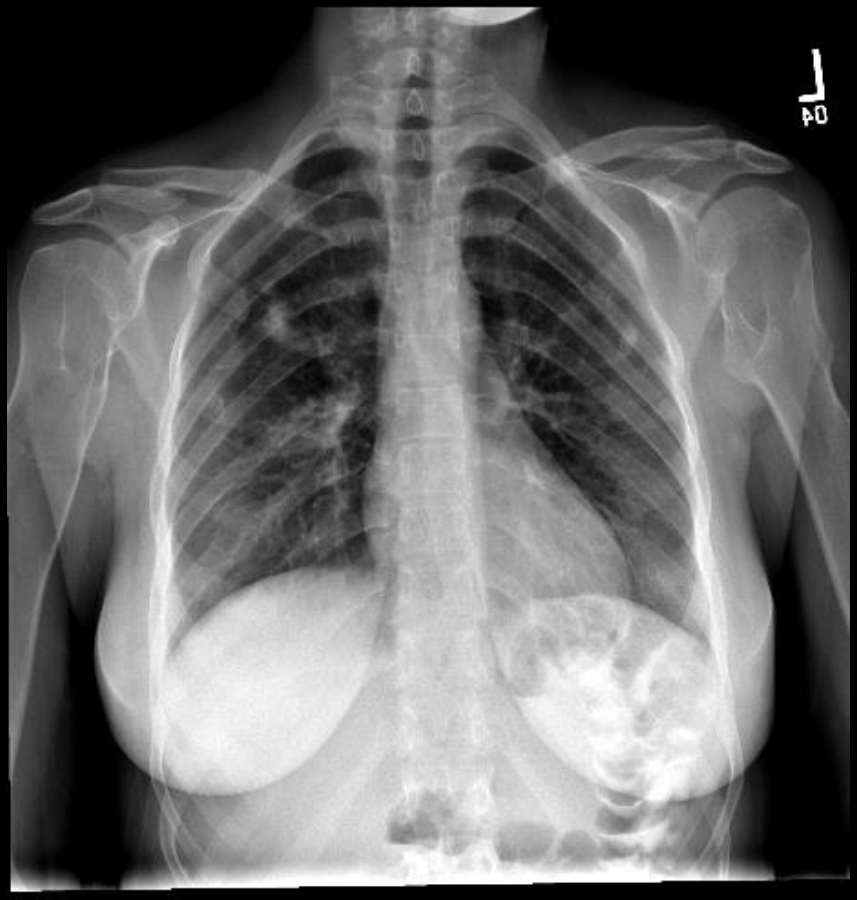
Which of the following is NOT a sign that an enchondroma has degenerated into a chondrosarcama?

A. Endosteal scalloping
B. Soft tissue component
C. Size > 4 cm
D. Cortical destruction
E. Pain

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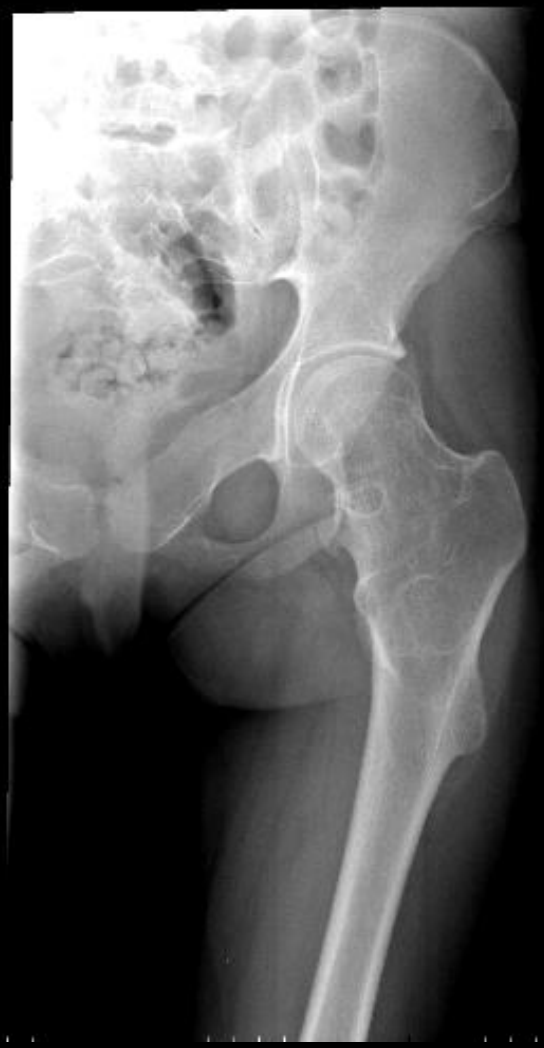
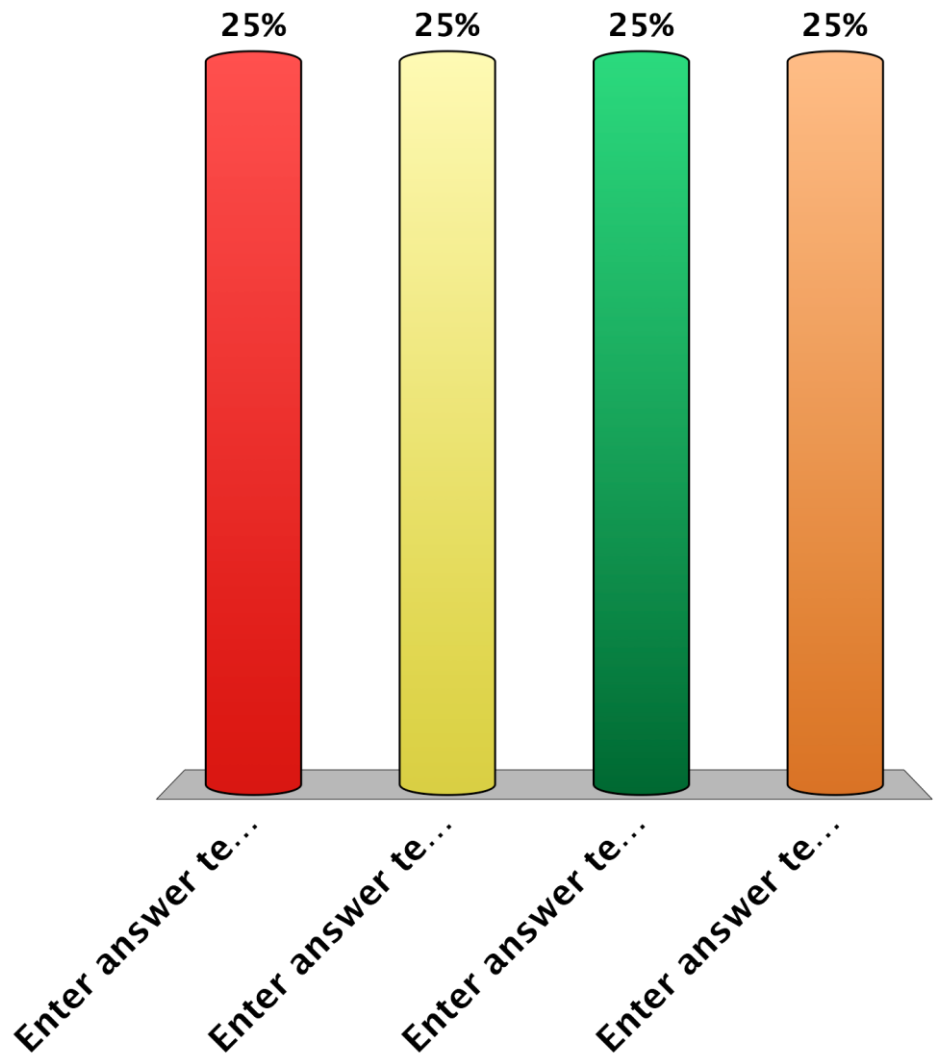
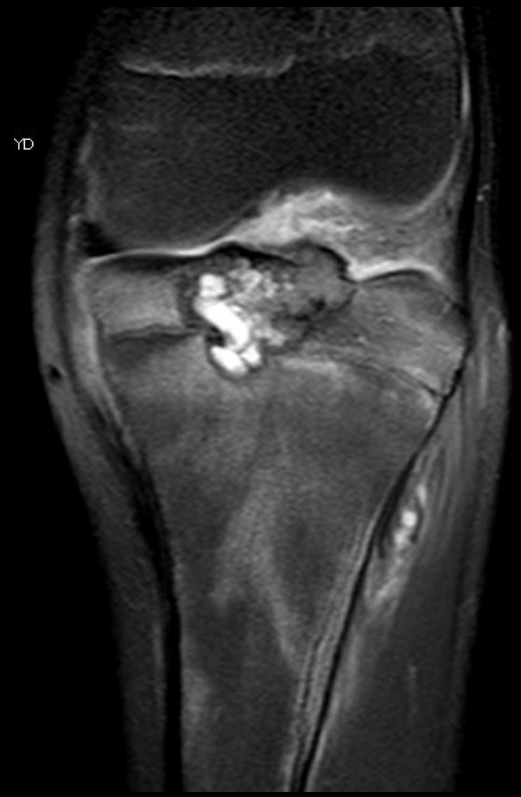


This patient is at highest risk for which of the following?

A. Osteosarcoma
B. Chondrosarcoma
C. Osteoblastoma
D. Malignant fibrous histiocytoma

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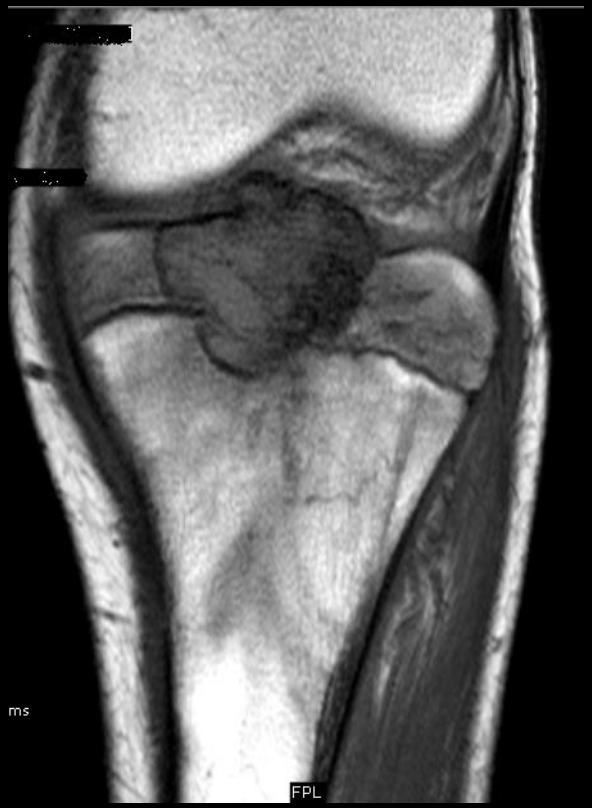
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Chondroblastoma

- Benign, cartilagenous tumor
- Always occurs in the *epiphysis* in skeletally immature patients
- Geographic lytic lesion with sclerotic margin
- Low signal on T1, high on fluid sensitive sequences
- Adjacent periosteal reaction

Thanks!