

(select) MALIGNANT BONE TUMOURS

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Osteosarcoma

Chondrosarcoma

Metastatic

Ewing's

Chordoma

Lymphoma

Myeloma

Pleomorphic Sarcoma

Angiosarcoma

Etc etc etc





OSTEOSARCOMA (High-Grade)

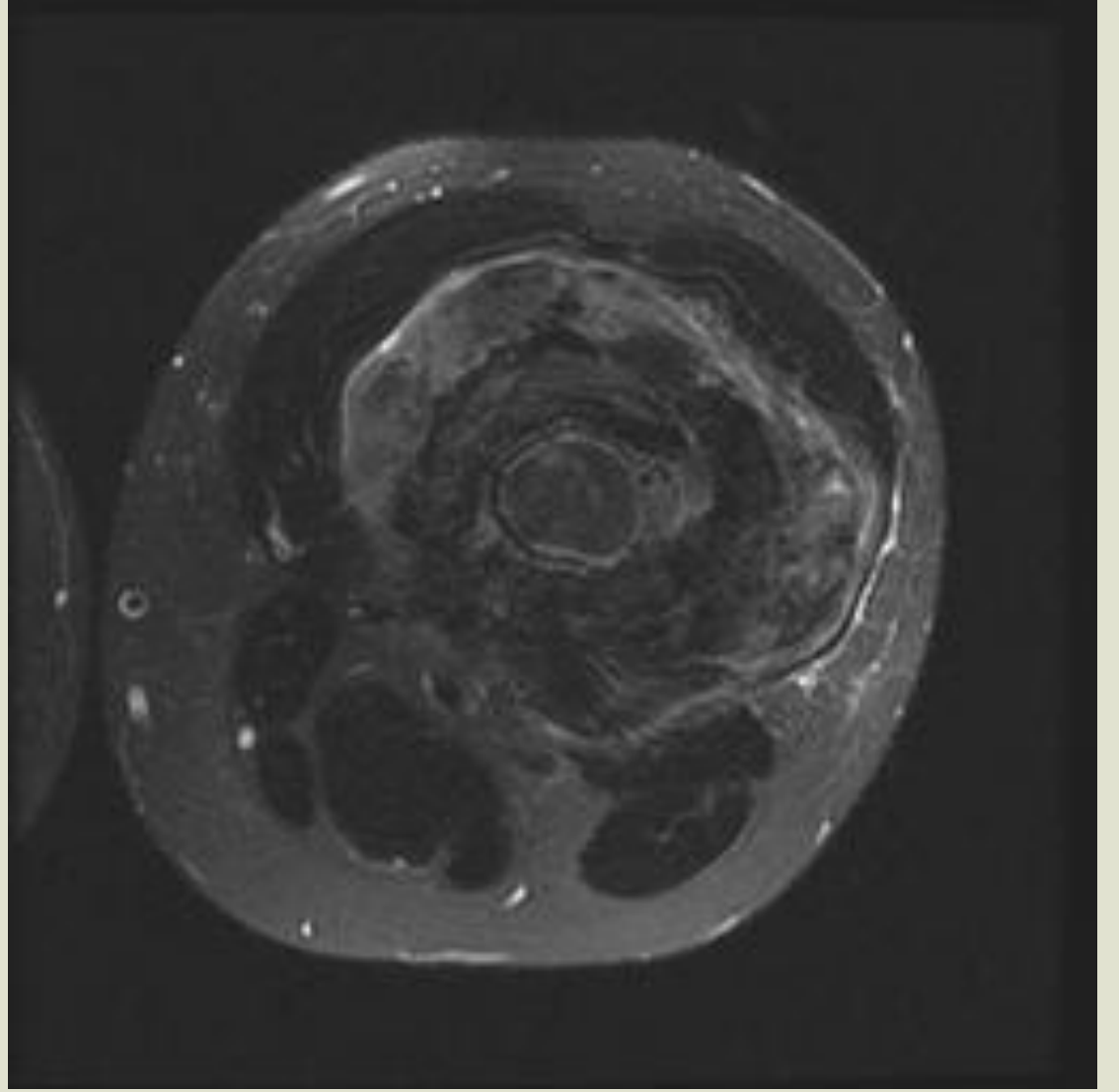
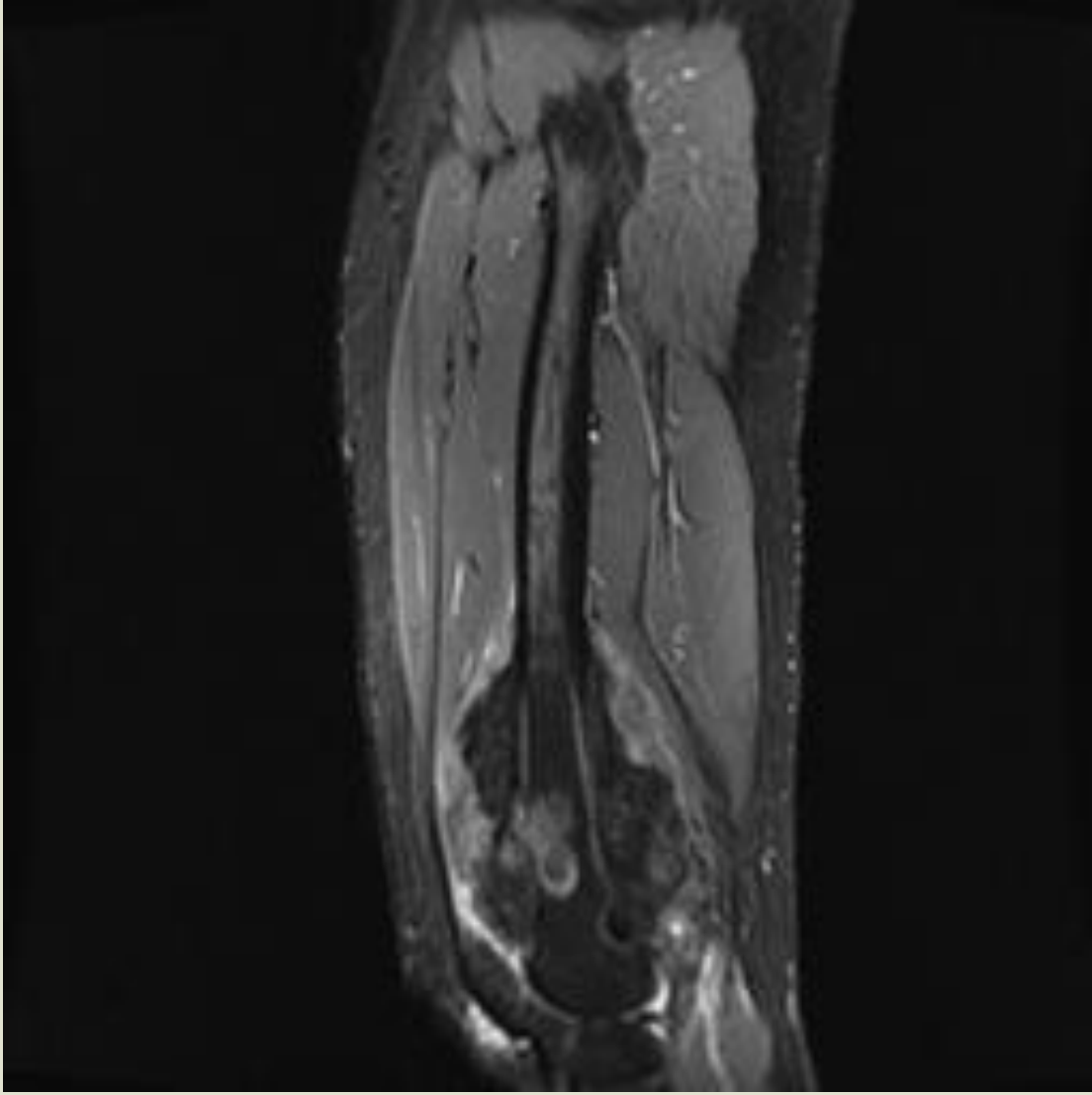
- **Bone forming malignancy**
- **10-25 years old**
- **Location: Long bones (can happen anywhere, though)**
- **5 year survival rate: 50%**
- **If spread to lungs or other locations: 25%**
- **Most common sites of metastasis: Lung, other bones**
- **Hematogenous spread (not through lymphatics)**
- **Malignant osteoblasts produce abnormal bone**
- **High-grade morphology and behaviour; aggressive**

MOST cases are sporadic. 10% or less of cases linked to RB (Retinoblastoma) or TP53 gene (Li-Fraumeni) mutations

- **Conventional:** Osteoblastic
- **Variants:** Chondroblastic, Telangiectatic, Fibroblastic
- **Core biopsy to diagnose**
- **Fracture: worse prognosis (spreads to blood)**
- **Following biopsy confirmation: *Chemotherapy***
- **Surgical resection (or amputation) follows Chemo**
- **More chemo following resection**

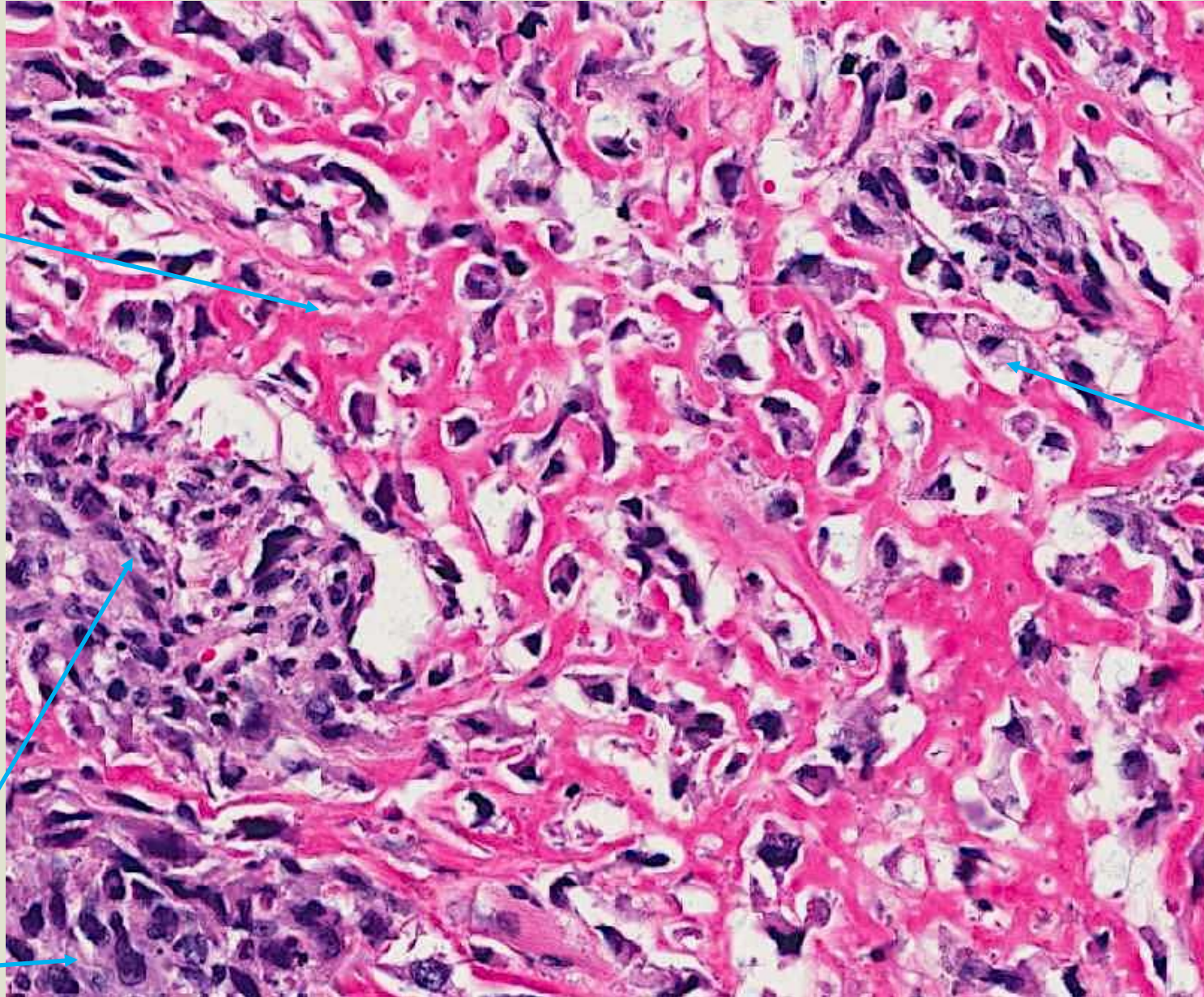
Pathology of resection/amputation: determines prognosis post-Chemo





**“lace-like”
malignant
osteoid**

**Solid aggregate
of malignant
osteoblasts**

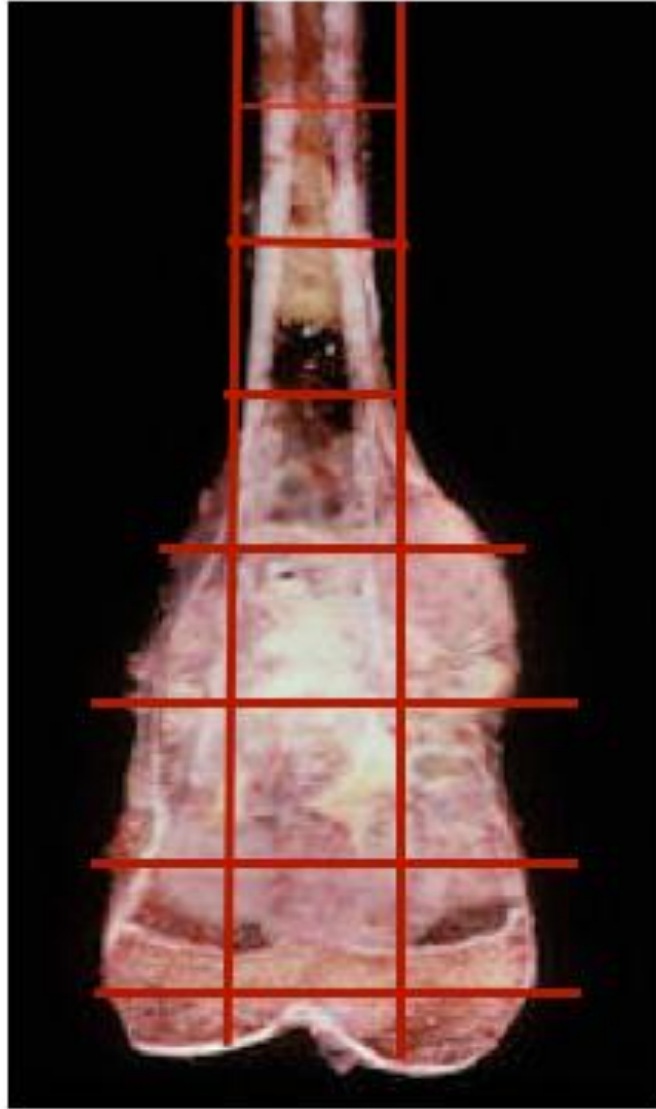


**Individual
malignant
osteoblasts**

Treatment for Osteosarcoma:

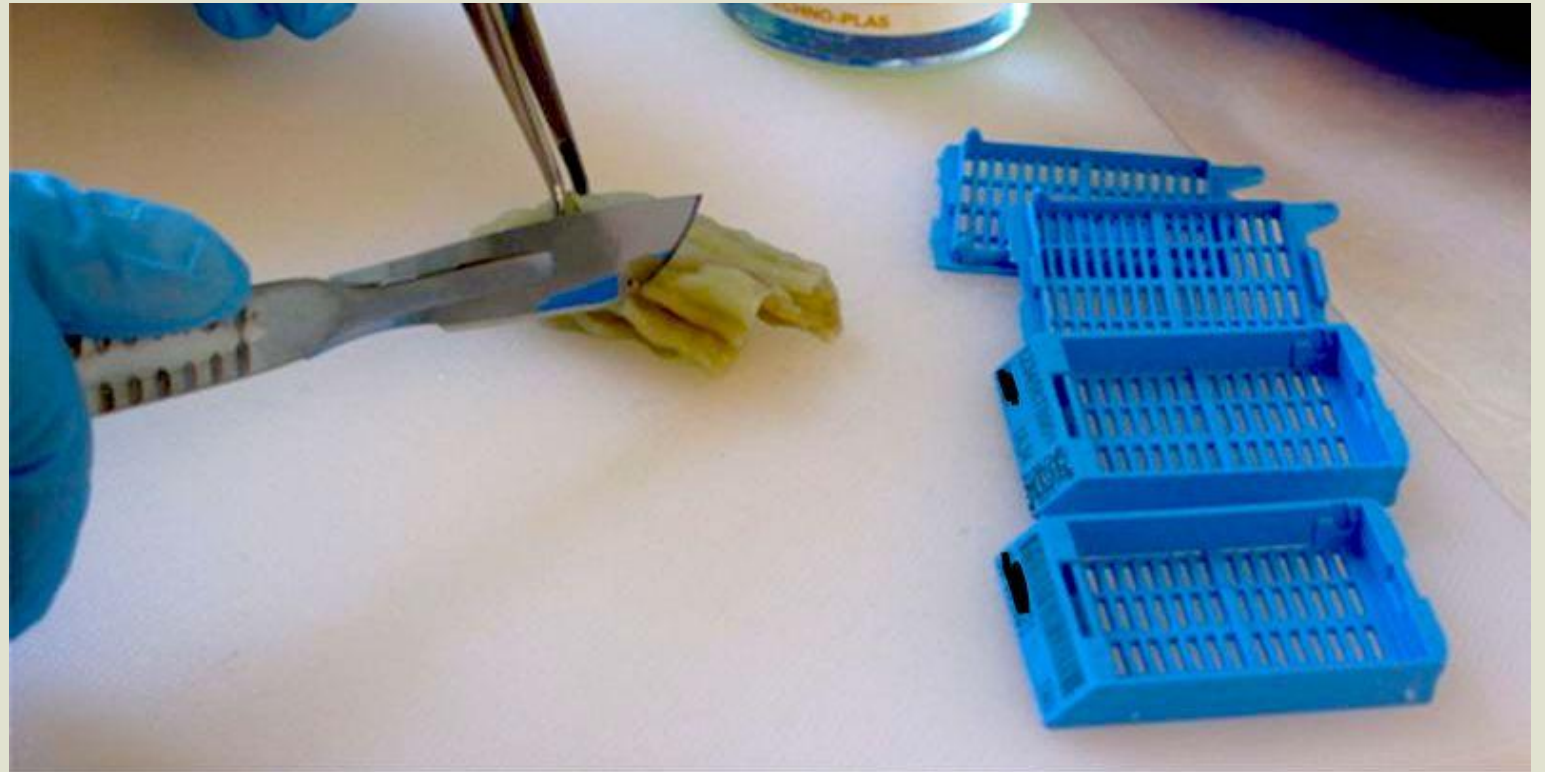
- 1. Chemotherapy**
- 2. Surgery**
- 3. More Chemotherapy**

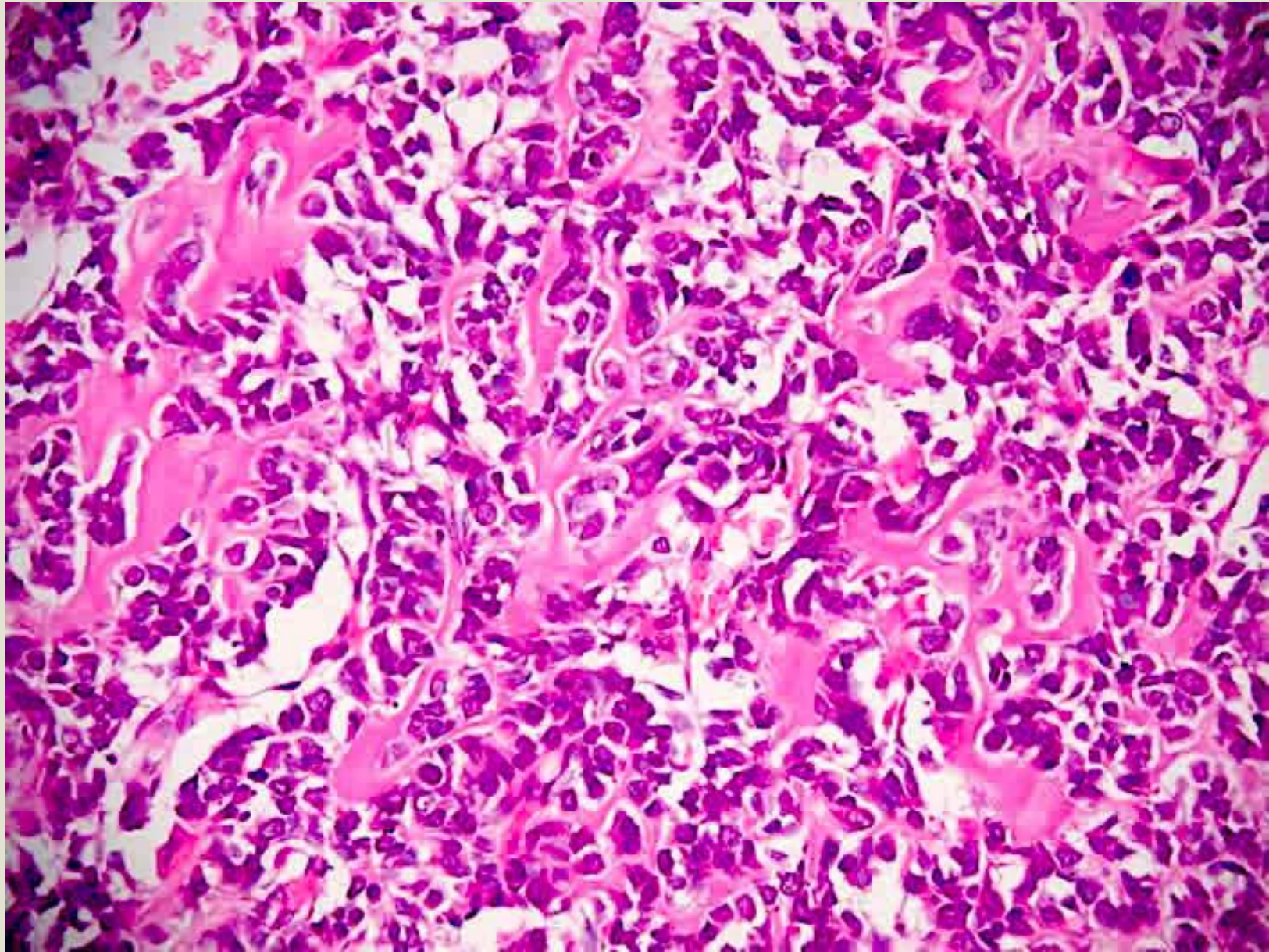
Survival rates are dependent upon response to chemotherapy (assessing percent necrosis on gross specimen).

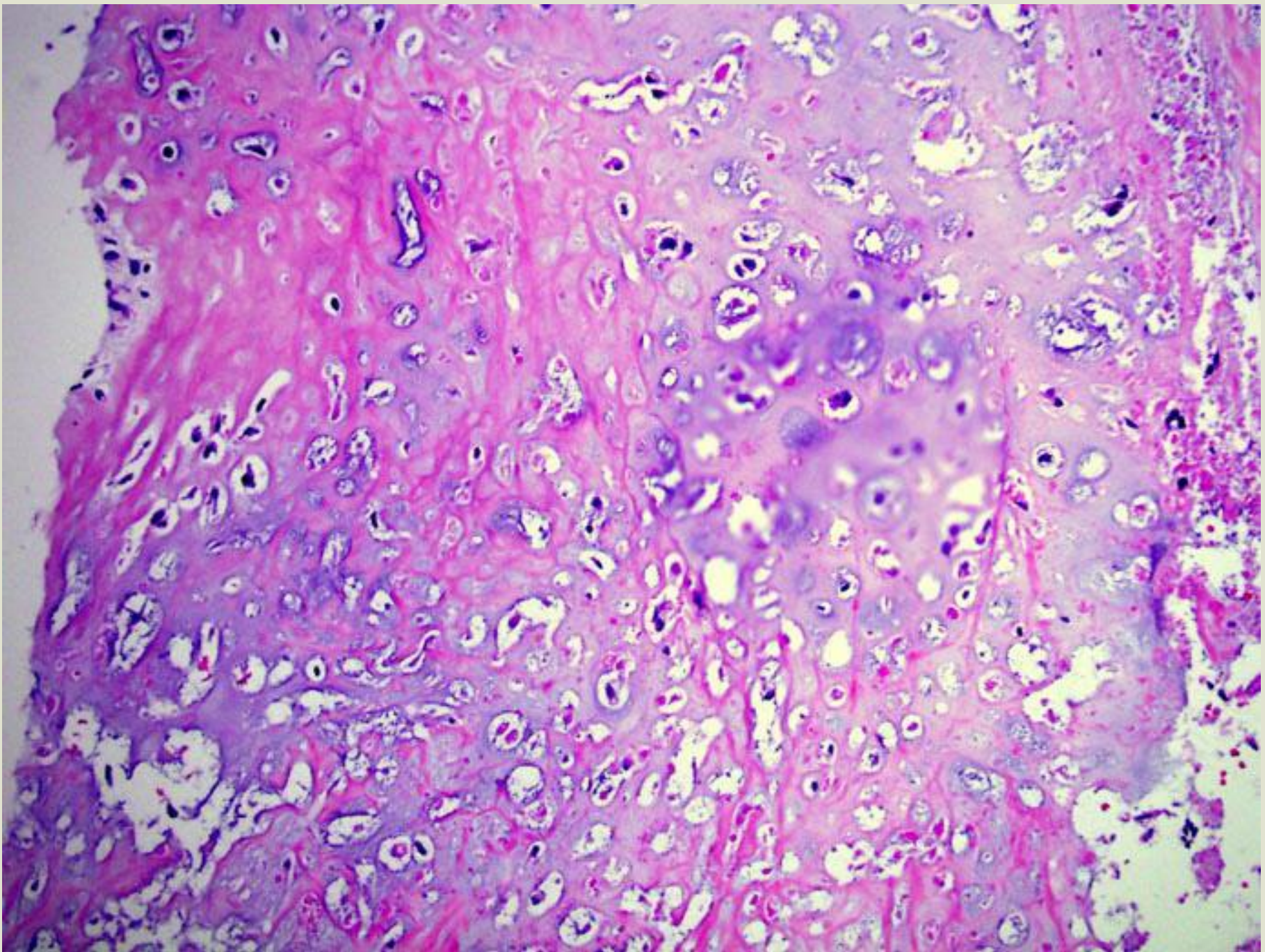


Cross section of an Osteosarcoma resection specimen

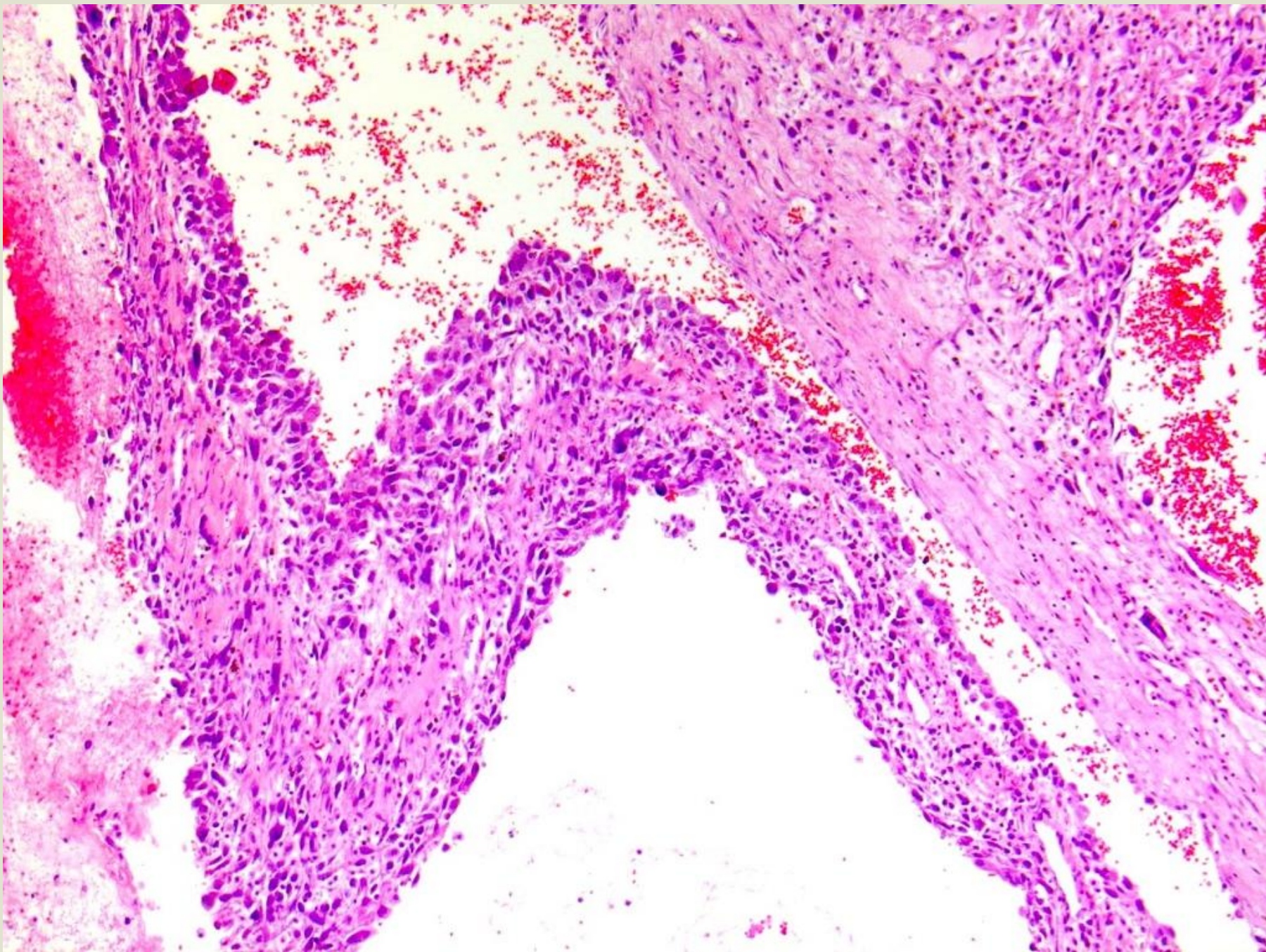
- Divided by grid; for submission into cassettes for paraffin embedding
- Full cross section of a tumour evaluated
- Percent of tumour which has undergone necrosis evaluated
- Greater than 90% necrosis due to chemo: better prognosis



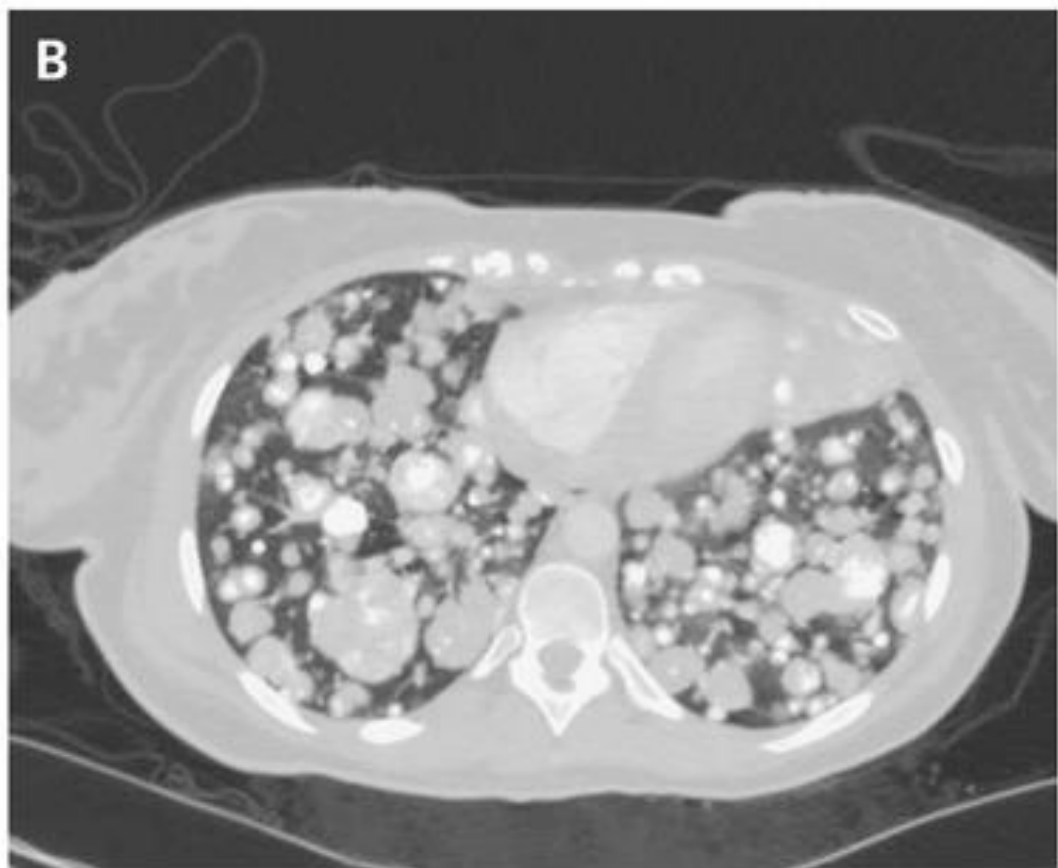
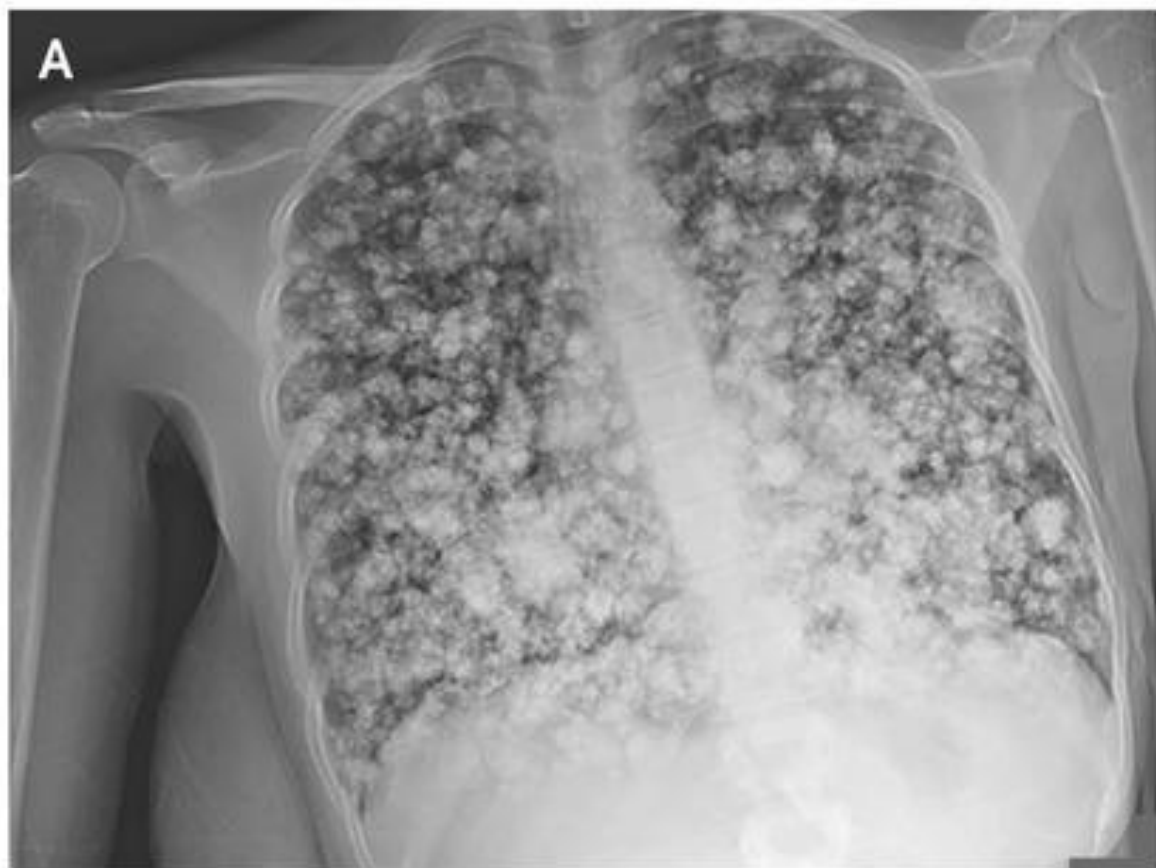




chondroblastic

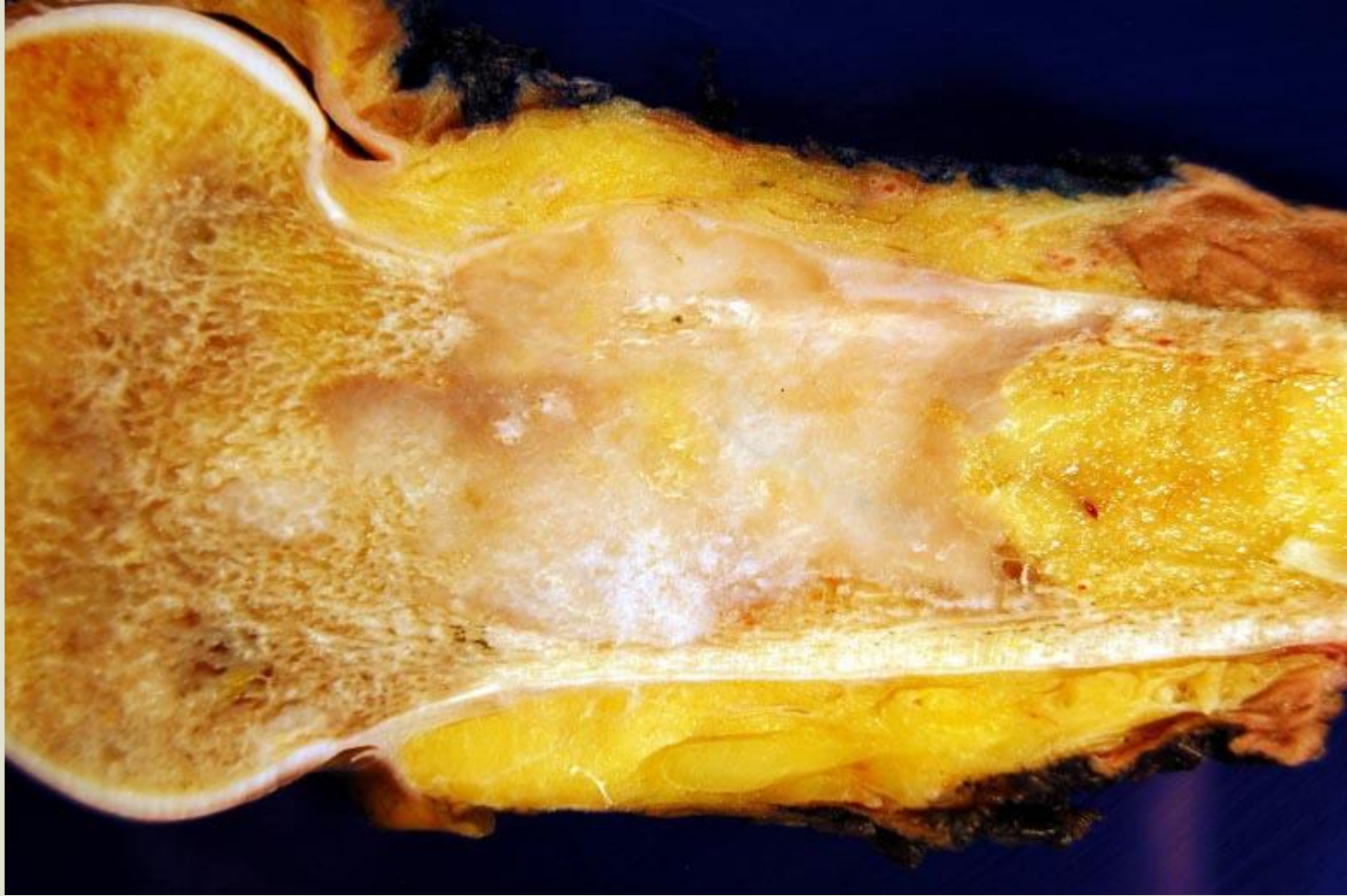


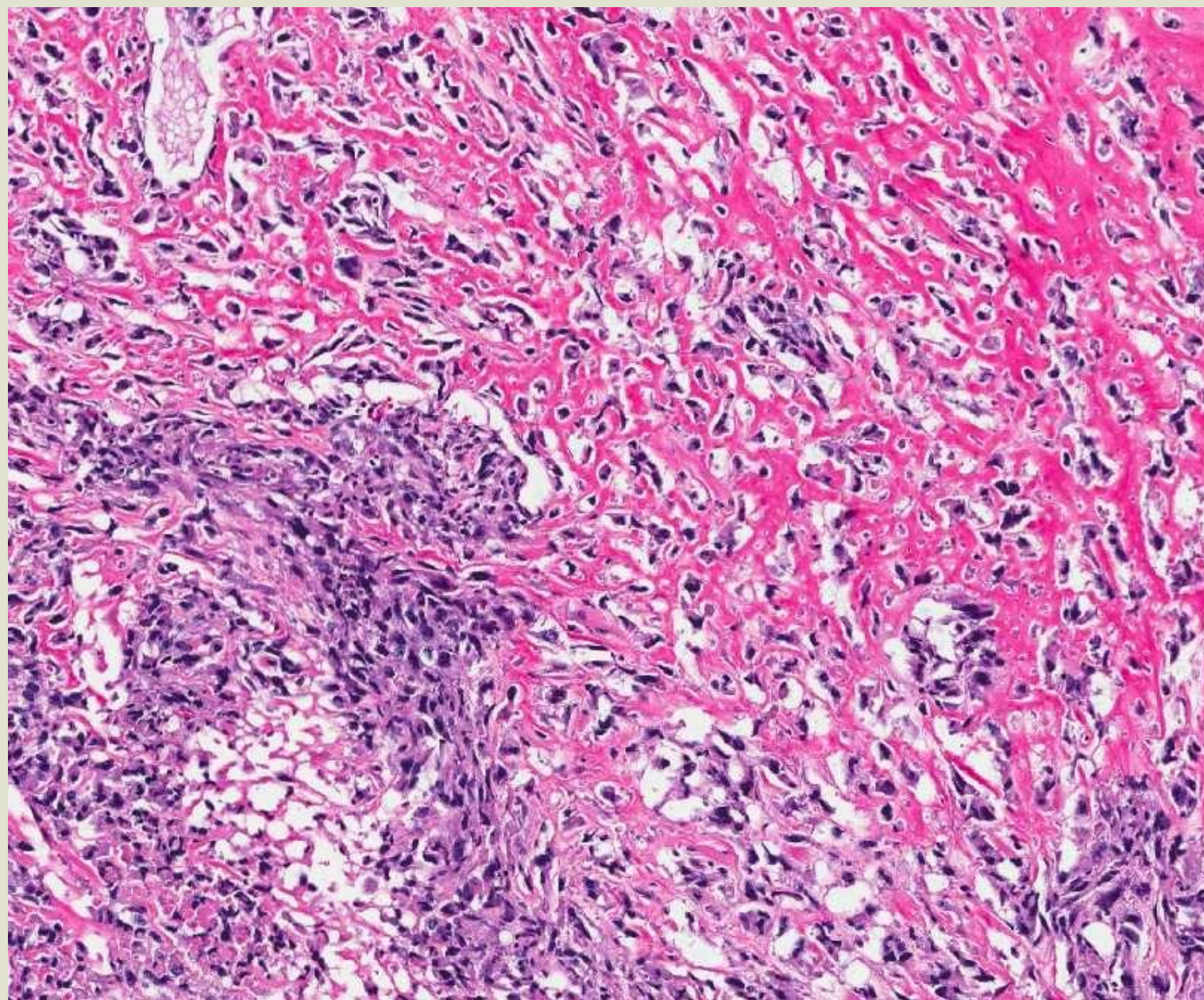
telangiectatic

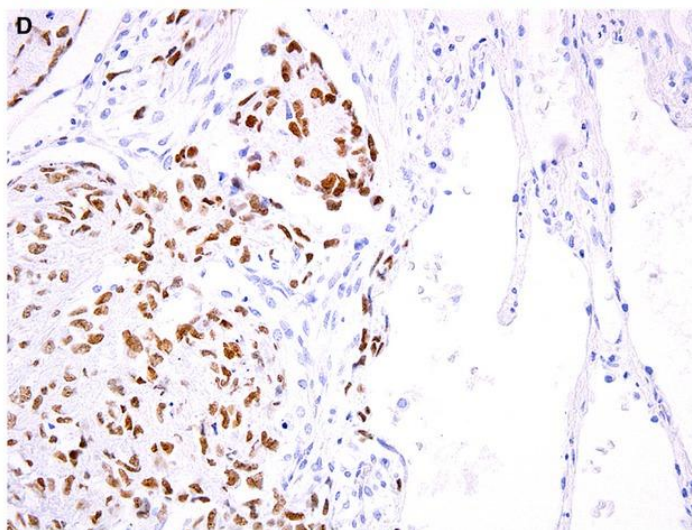
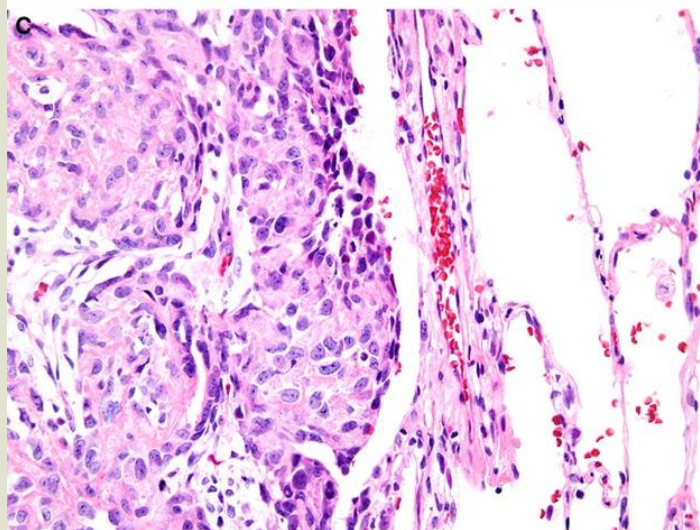
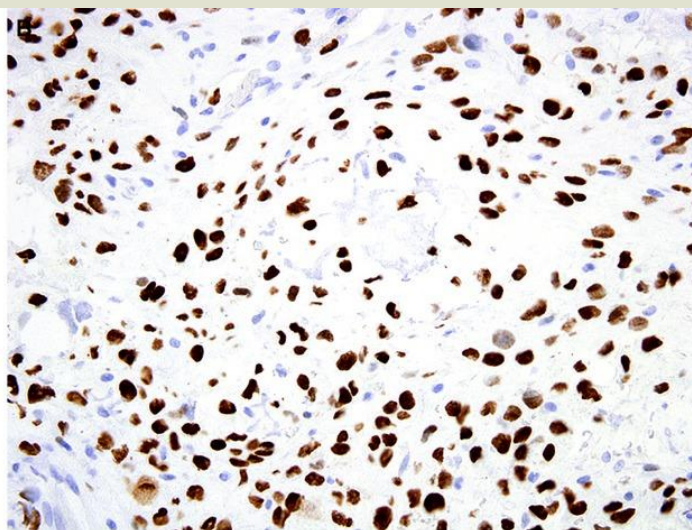
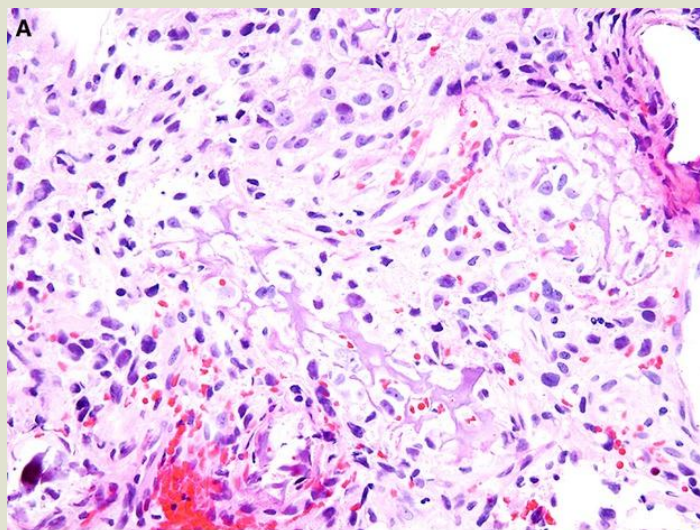


More photos of Osteosarcoma









SatB2 IHC highlighting osteoblasts
In low-osteoid sampling

Other variants of Osteosarcoma

Low-grade Central Osteosarcoma

Parosteal Osteosarcoma

Periosteal Osteosarcoma

Low-grade Central & Parosteal Osteosarcoma

These are both effectively the same—histologically and behavior-wise

LOW-GRADE malignant fibro-osseous tumors.

Low-grade Central: Arises from medullary canal of bone

Parosteal: Arises at or around periosteum with focal/minimal intramedullary component

Low-grade Central & Parosteal Osteosarcoma

Only 10-15% of these metastasize
NO high-grade osteoblast differentiation
Primary local management & recurrence
NO chemotherapy (see further)

Location: LONG BONES but Central has
some propensity for the mandible/maxilla

Ages: younger (10-30), like other Osteosarcomas

MDM2 (and CDK4) Amplified (IHC or FISH)

Slow growing
90% 5-year survival

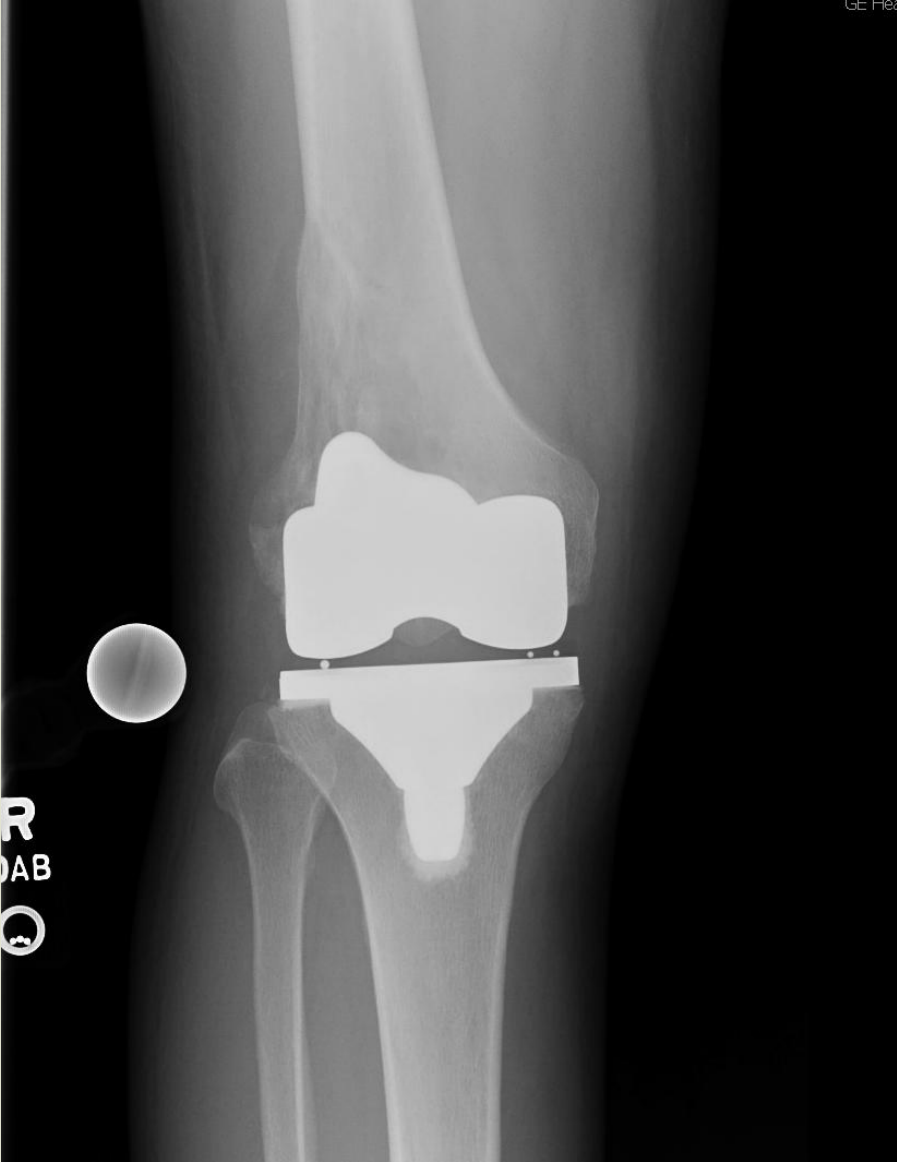
NO CHEMO---just resection

60 y/o male was experiencing bilateral knee pain for about 3-4 years, right worse than left.

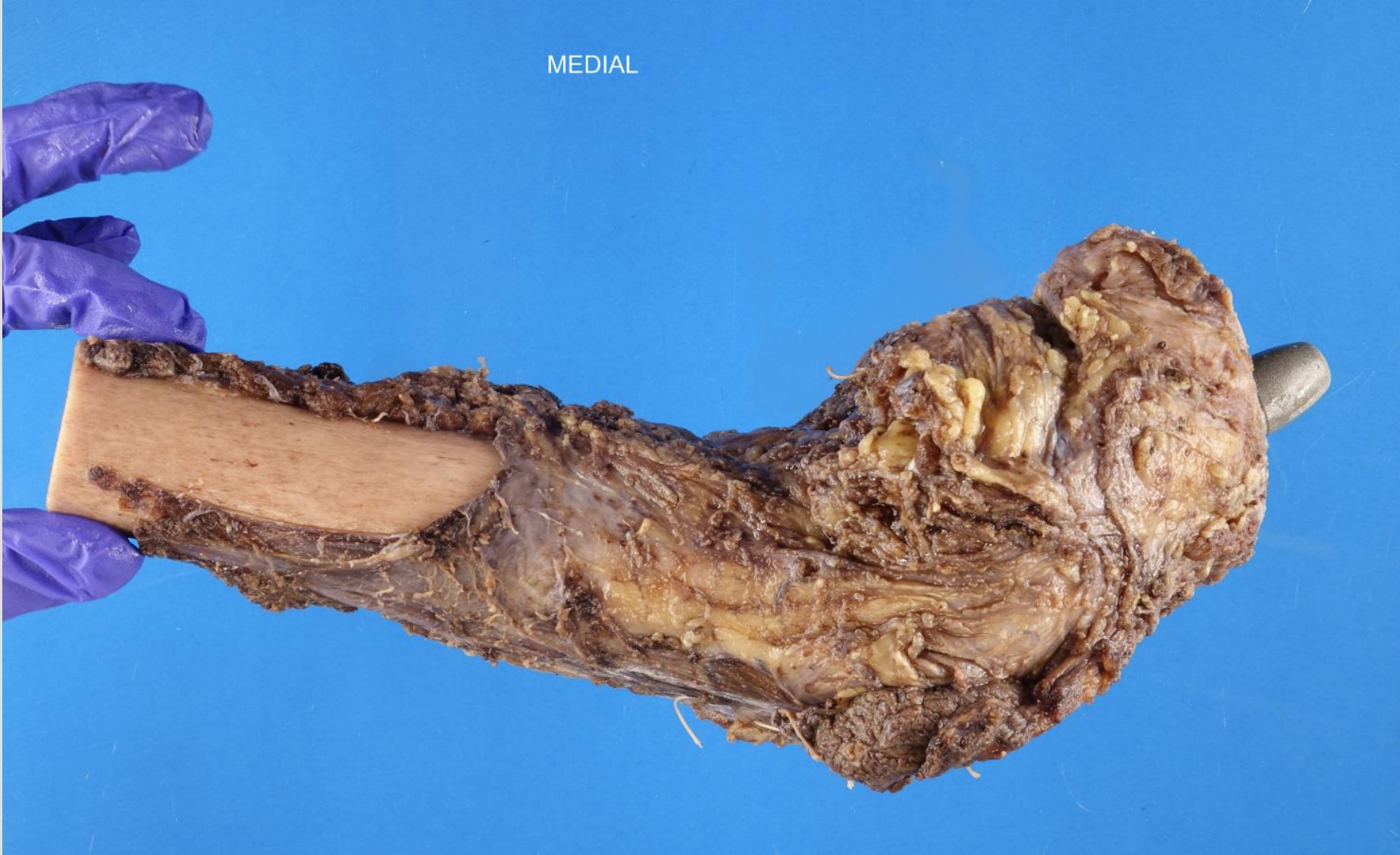
He underwent right knee total knee replacement in 2025.

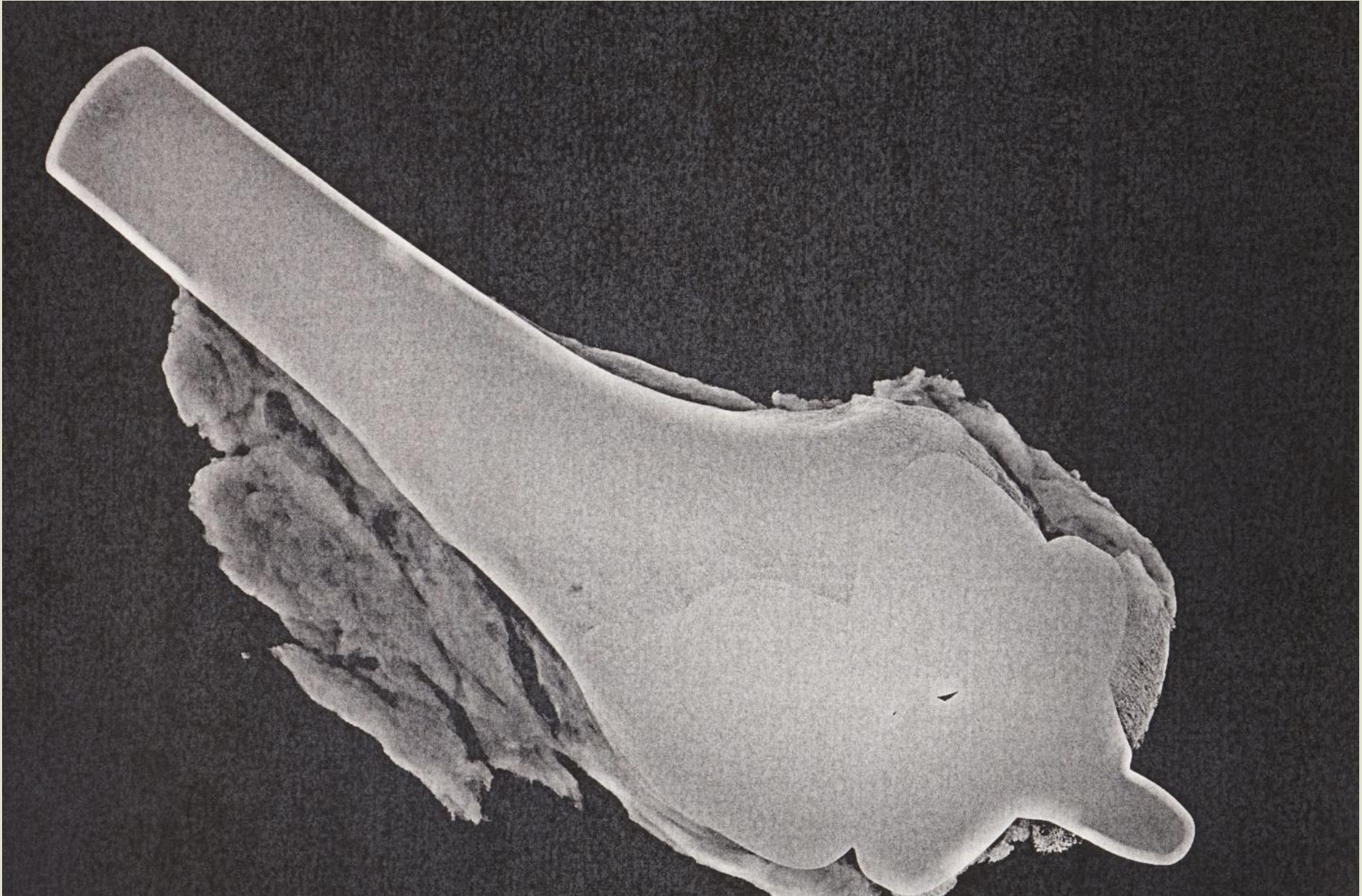
At the time of surgery, specimen was obtained for pathology and findings were inconclusive.

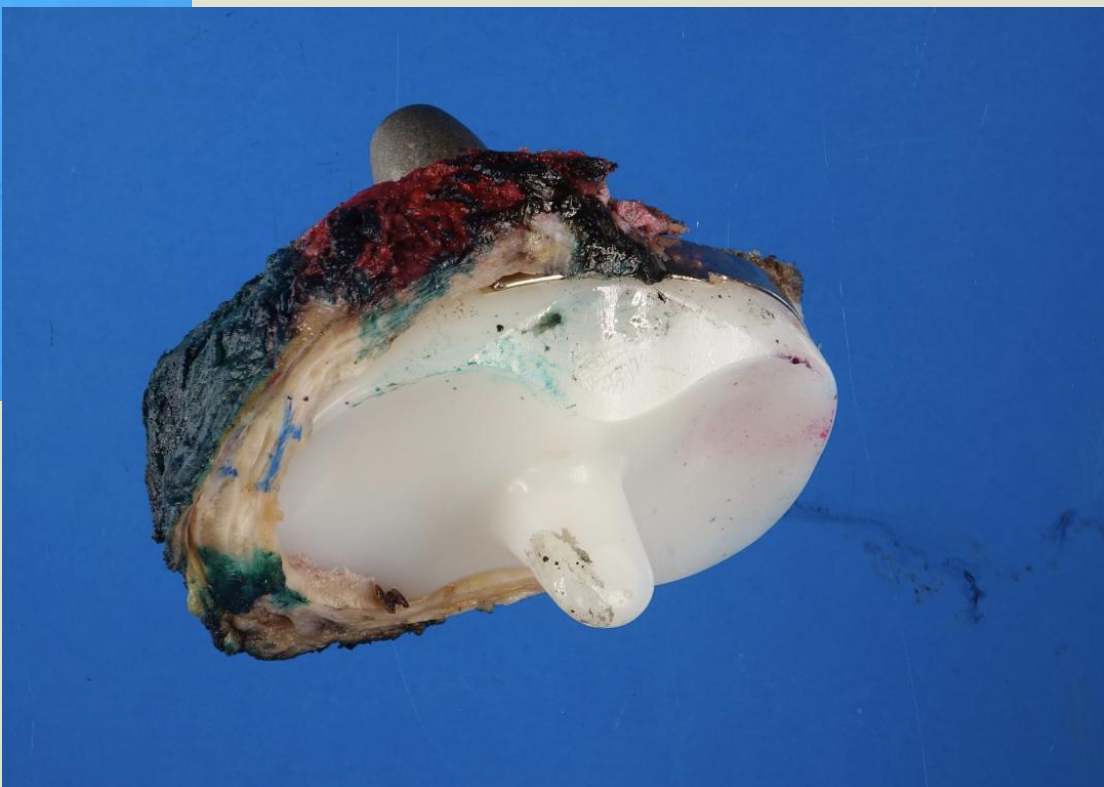
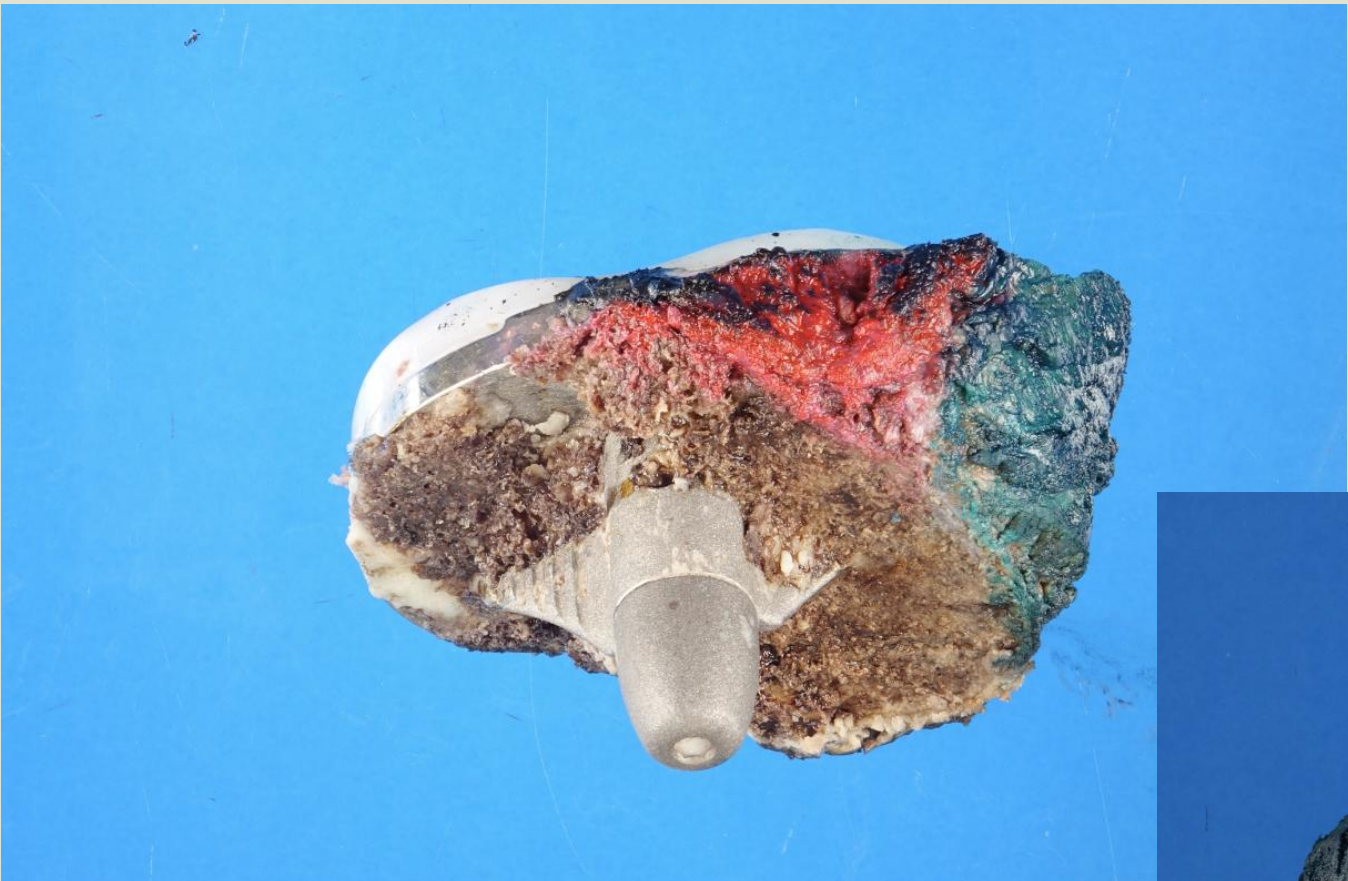
Patient began having worsening proximal right knee pain, imaging done that demonstrated lesion so biopsy conducted that came back as low grade osteosarcoma.



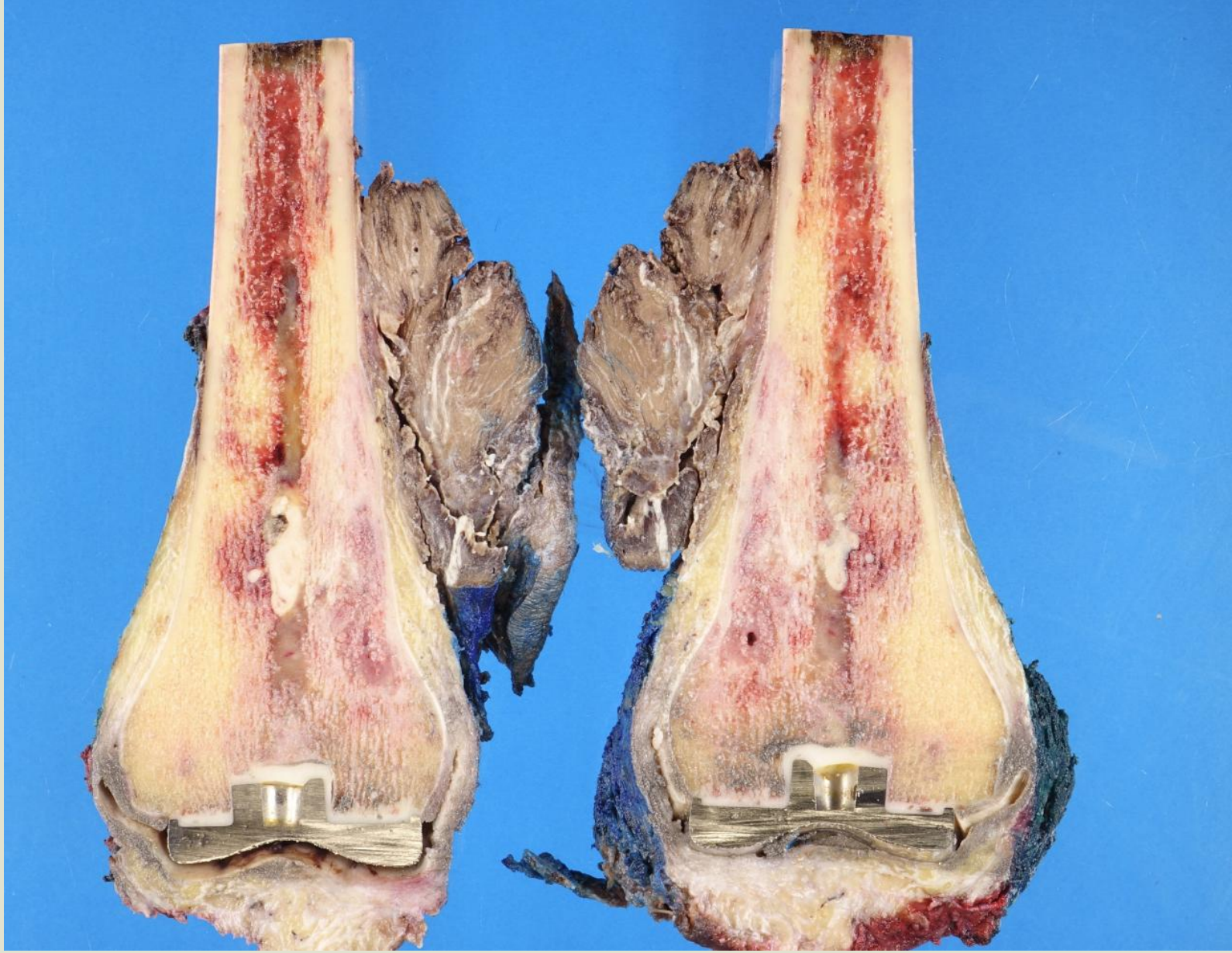
MEDIAL

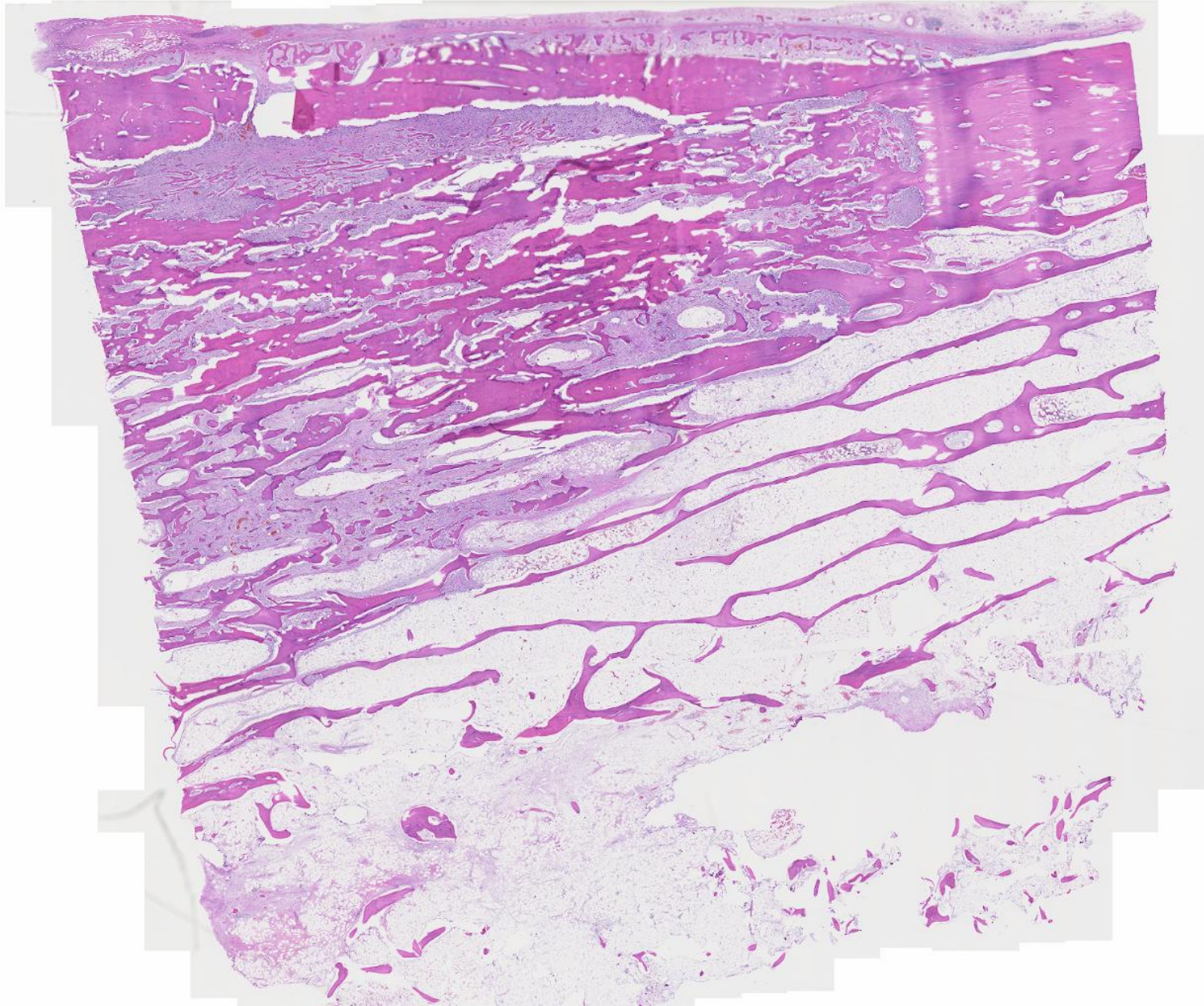


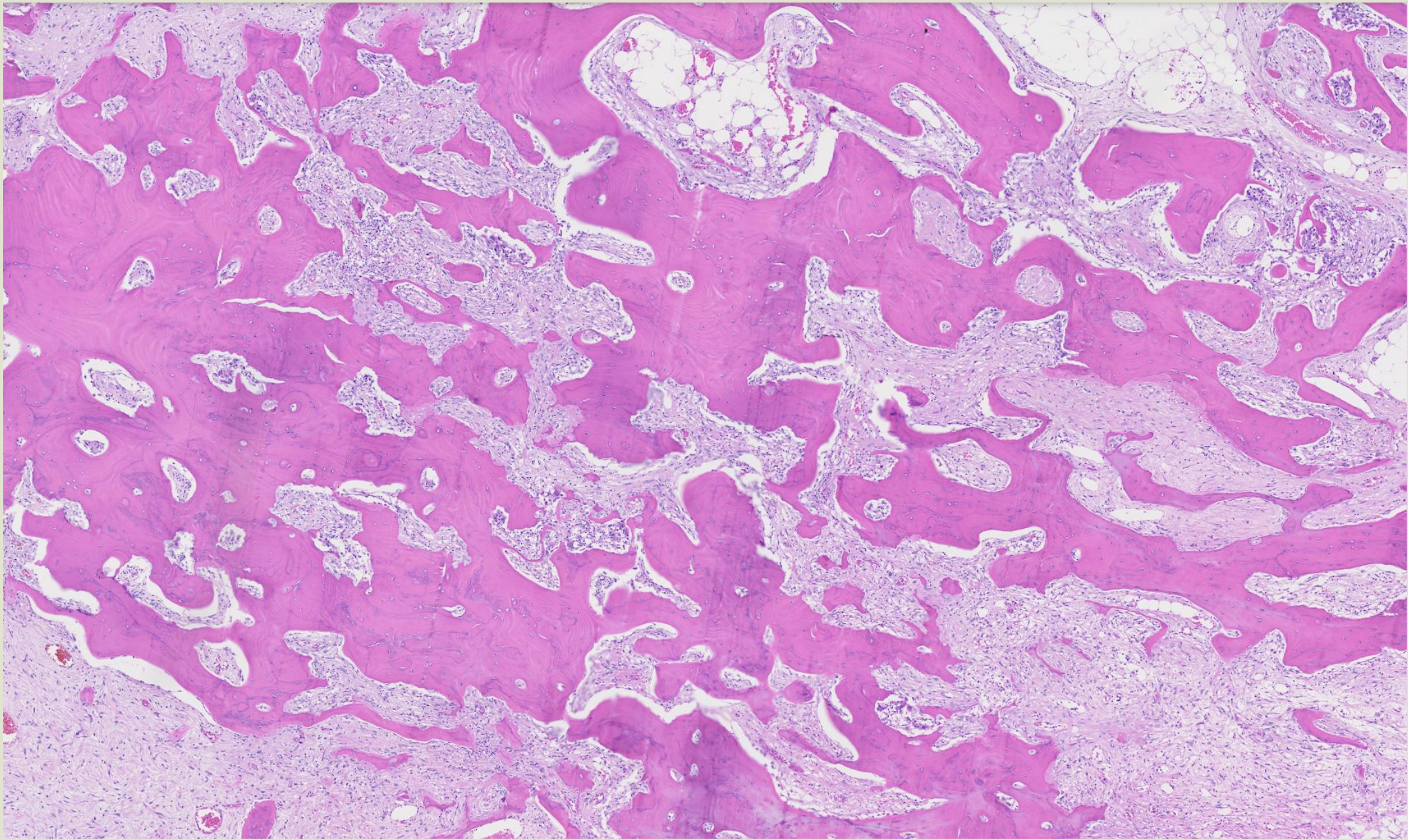


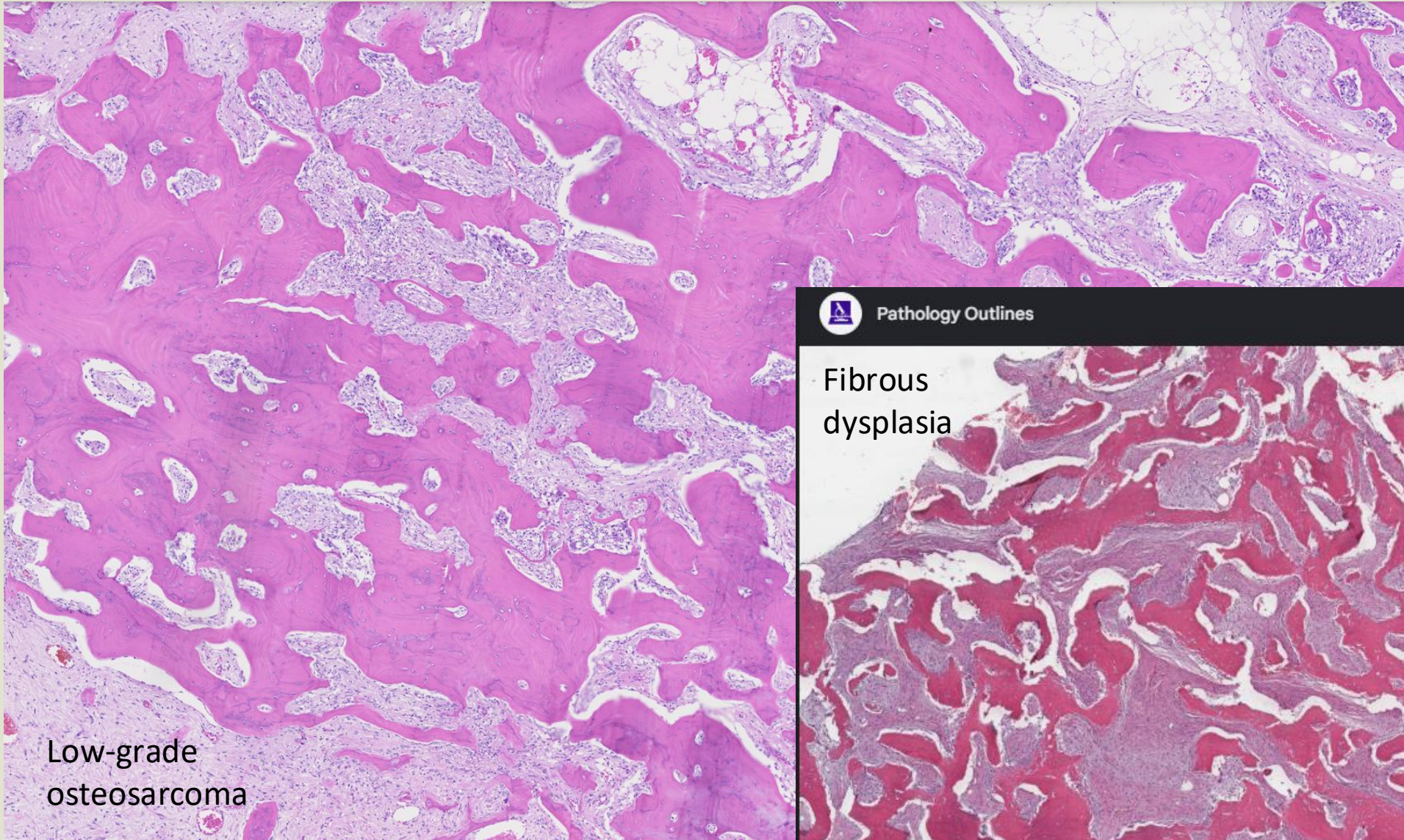




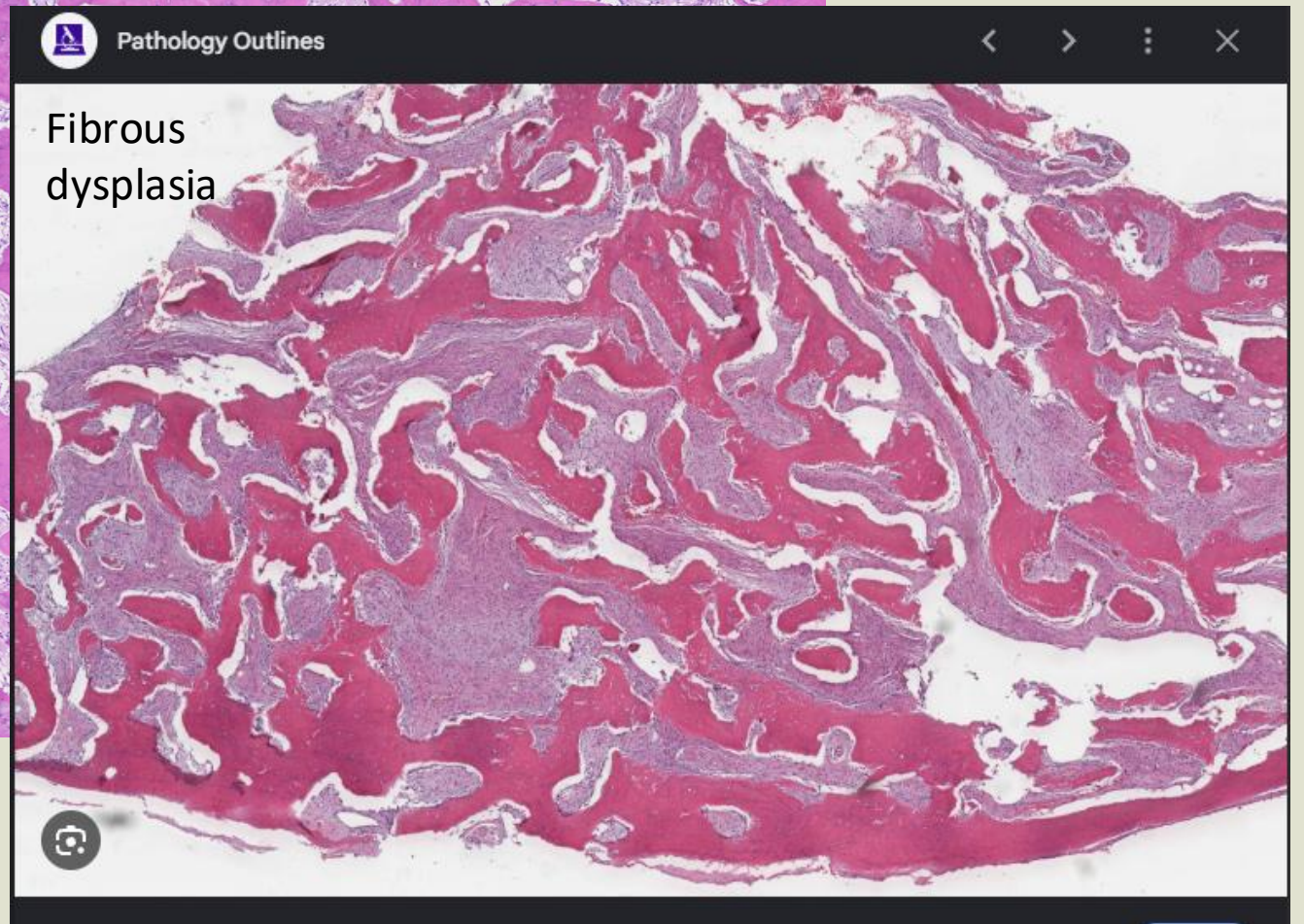




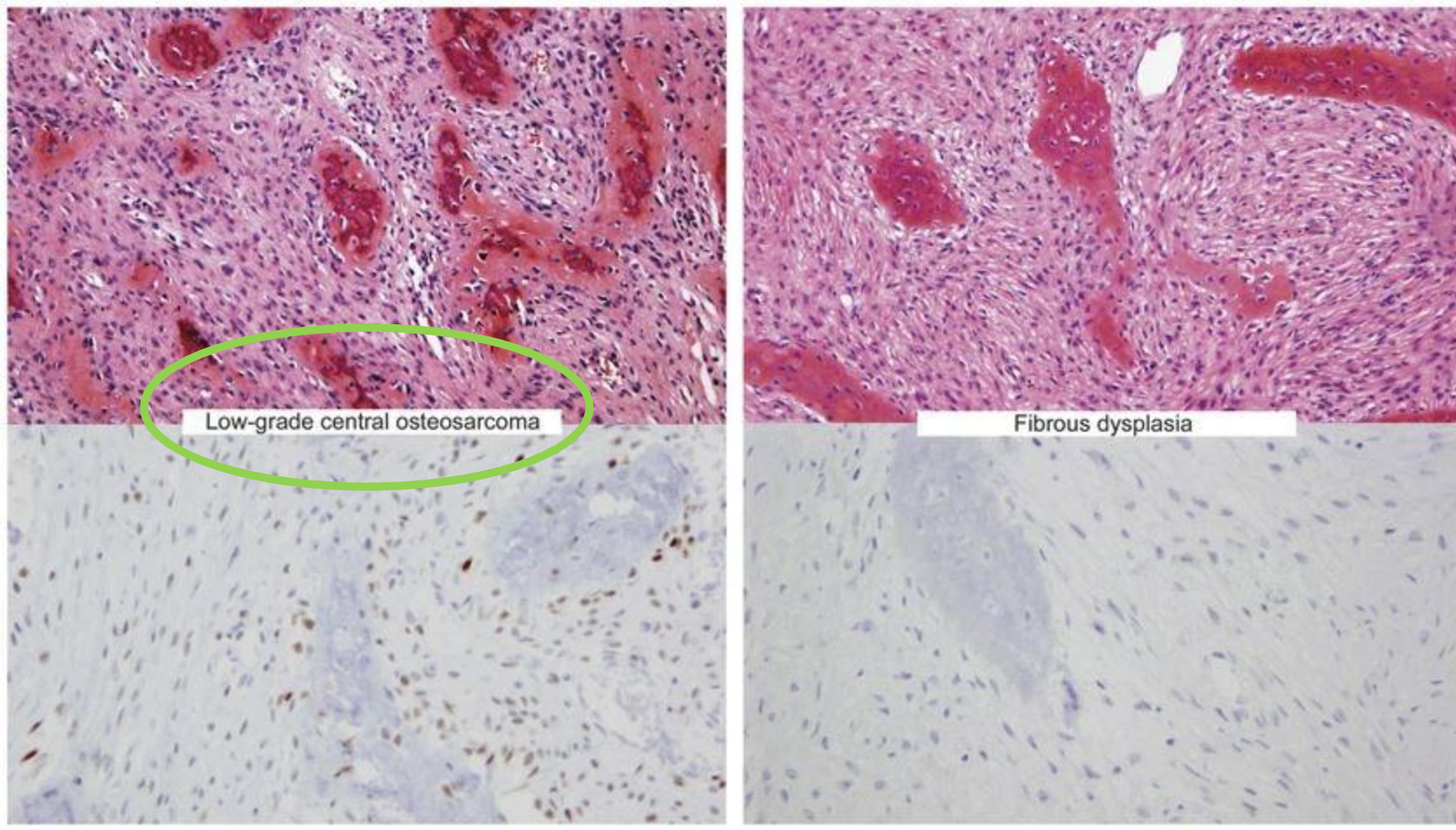




Low-grade
osteosarcoma

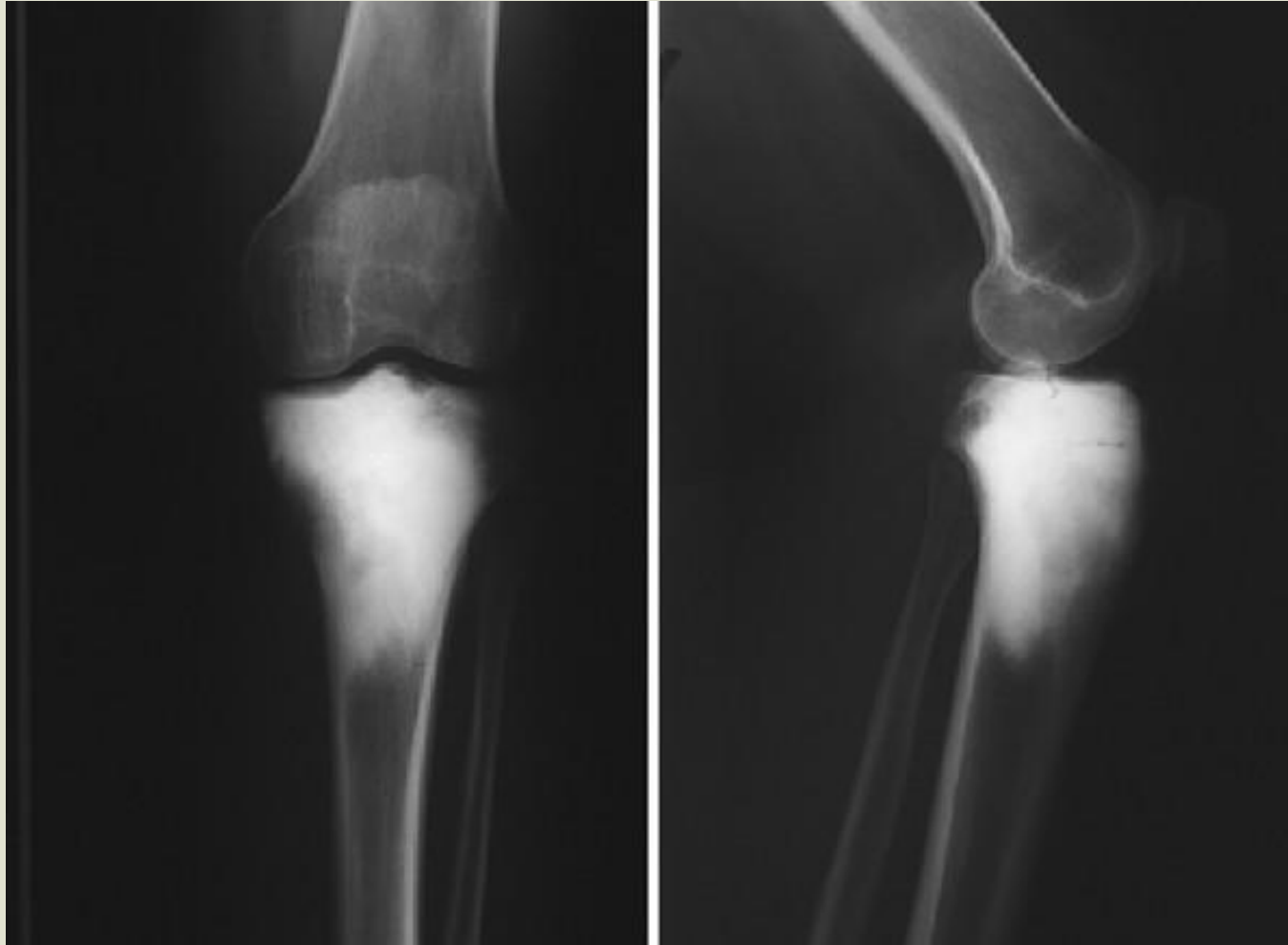


Fibrous
dysplasia



MDM2 + IHC on left.

OTHER CASES of Low-grade central osteosarcoma, tibia



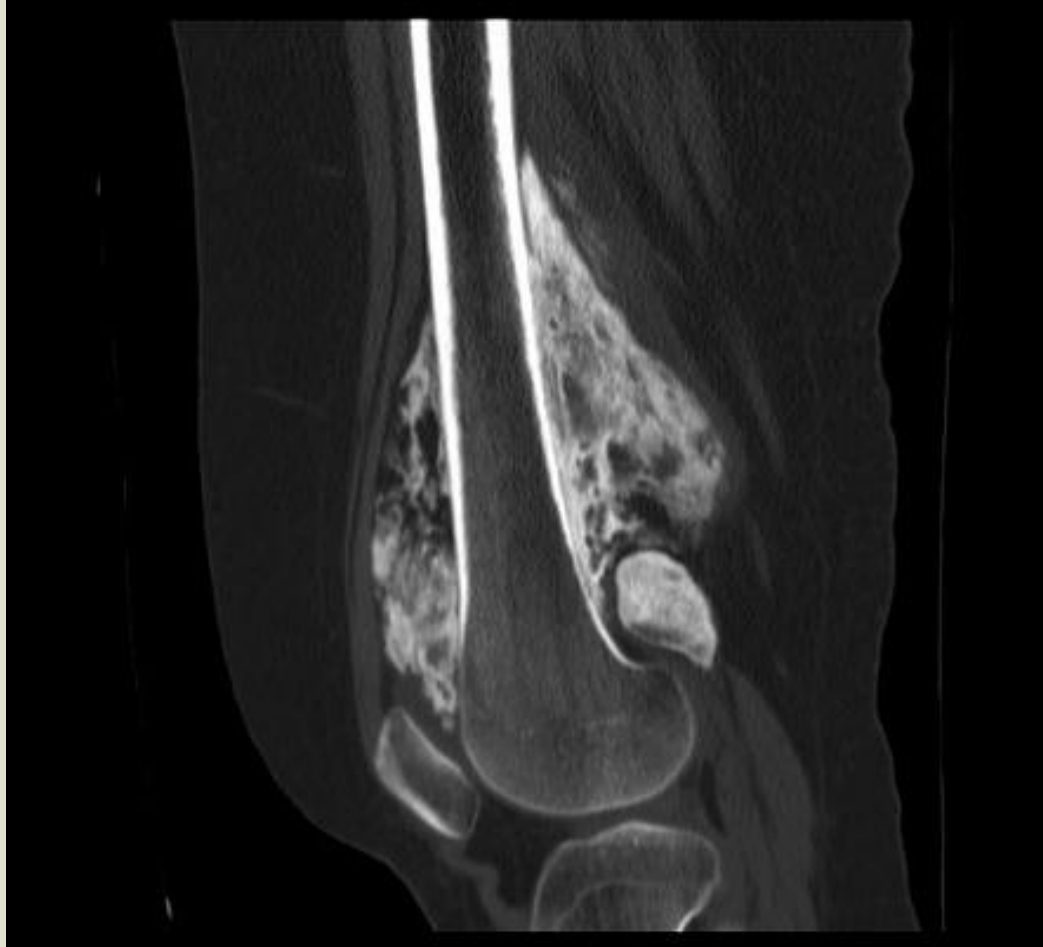
Low-grade central osteosarcoma, early, to later, to post-resection



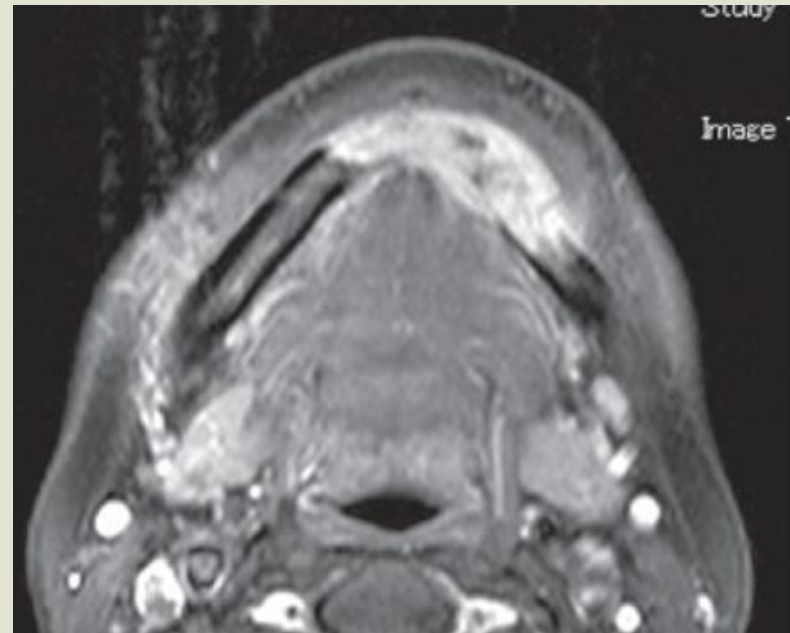
Parosteal Osteosarcoma (low-grade) X-rays



Parosteal Osteosarcoma MRIs



mandible



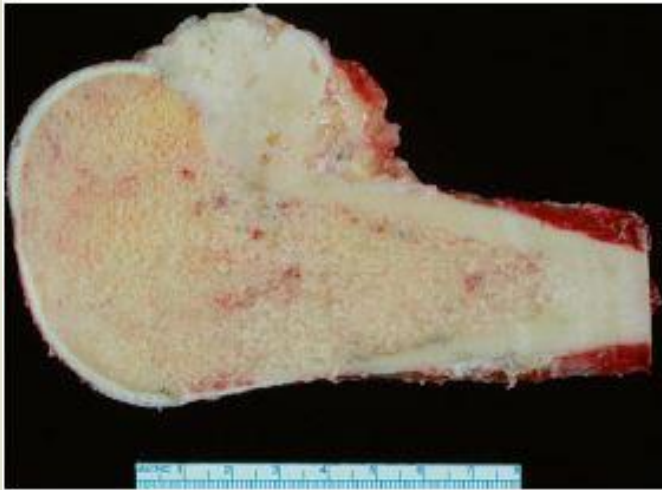


Fig. 13.4 Parosteal osteosarcoma forming a tan-white solid mass attached to the posterior surface of the distal femur

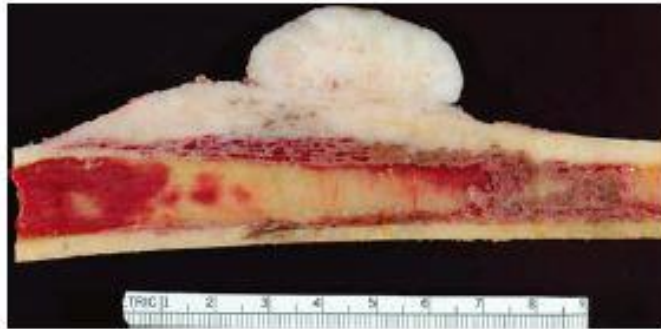
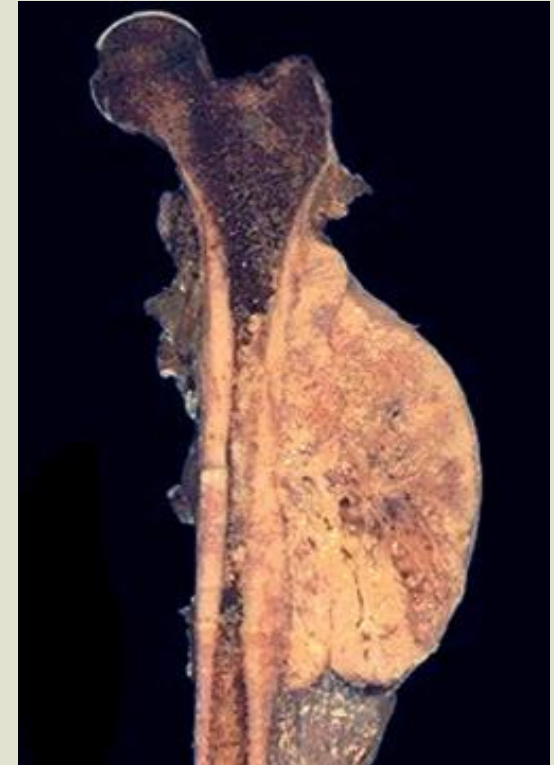
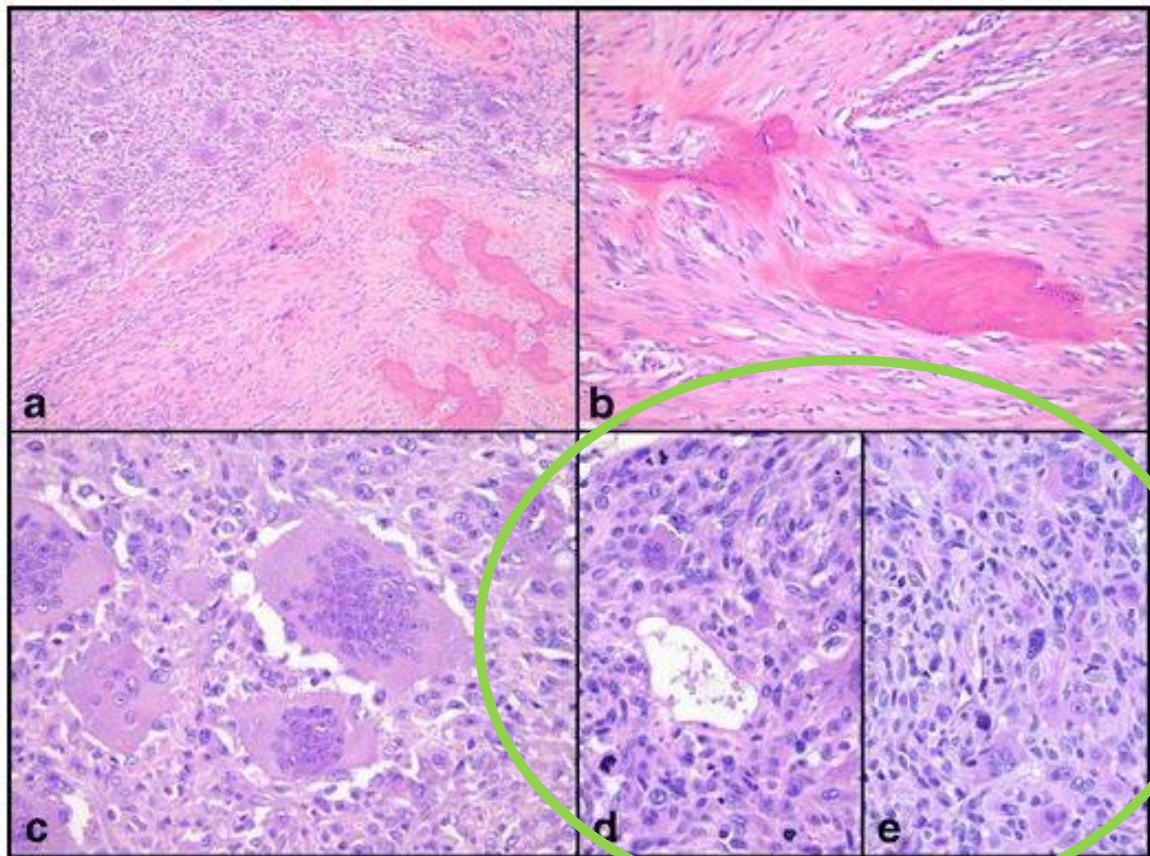


Fig. 13.5 Parosteal osteosarcoma forming a broad-based attachment to the surface of the distal femur. A *gray-white* area peripherally represents a hyaline cartilaginous cap. The thickened underlying cortical bone is associated with periosteal new bone formation





“dedifferentiated” osteosarcoma
(arising out of a low-grade osteosarcoma)

This one with a giant cell-rich sarcomatous morphology

Secondary component is intermediate to high grade

These patients **DO usually need chemo** after diagnosis

Dedifferentiated component will still be MDM2+

CREATORDESTRUCTOR

Cartilage "The Deader the Better" Longsleeve T-shirt

\$30.00 USD

Size

Small

Medium

Quantity

-

1

+

Add to cart

Buy with shopify

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4 Sided Longsleeve!

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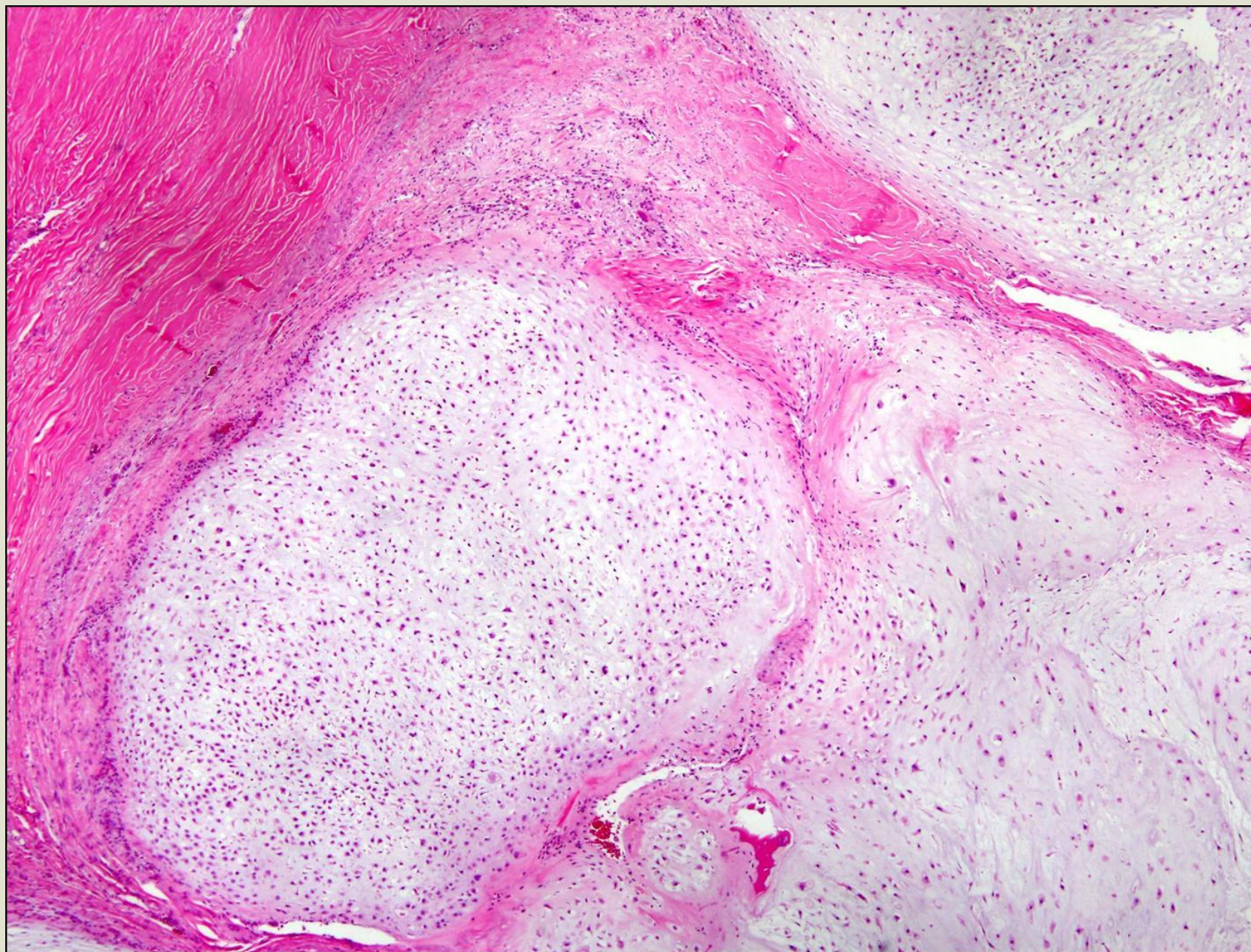
Chondrosarcoma:

- Malignant cartilage tumour
- 30-60 year olds
- Most common: long bone extremities
- May also involve flat bones (pelvis, scapula)
- *3 tier grading*
 - Low-grade: similar to enchondroma but aggressive
 - Intermediate grade: moderate cellularity/atypia
 - High-grade: High cellularity/atypia
- Low-grade tumours: RARELY metastasize
- Intermediate/High-Grade: CAN metastasize to lungs and other sites in bone
- Low-grade: 5 year survival rate: 90%
- High-grade: 5 year survival rate: 25%

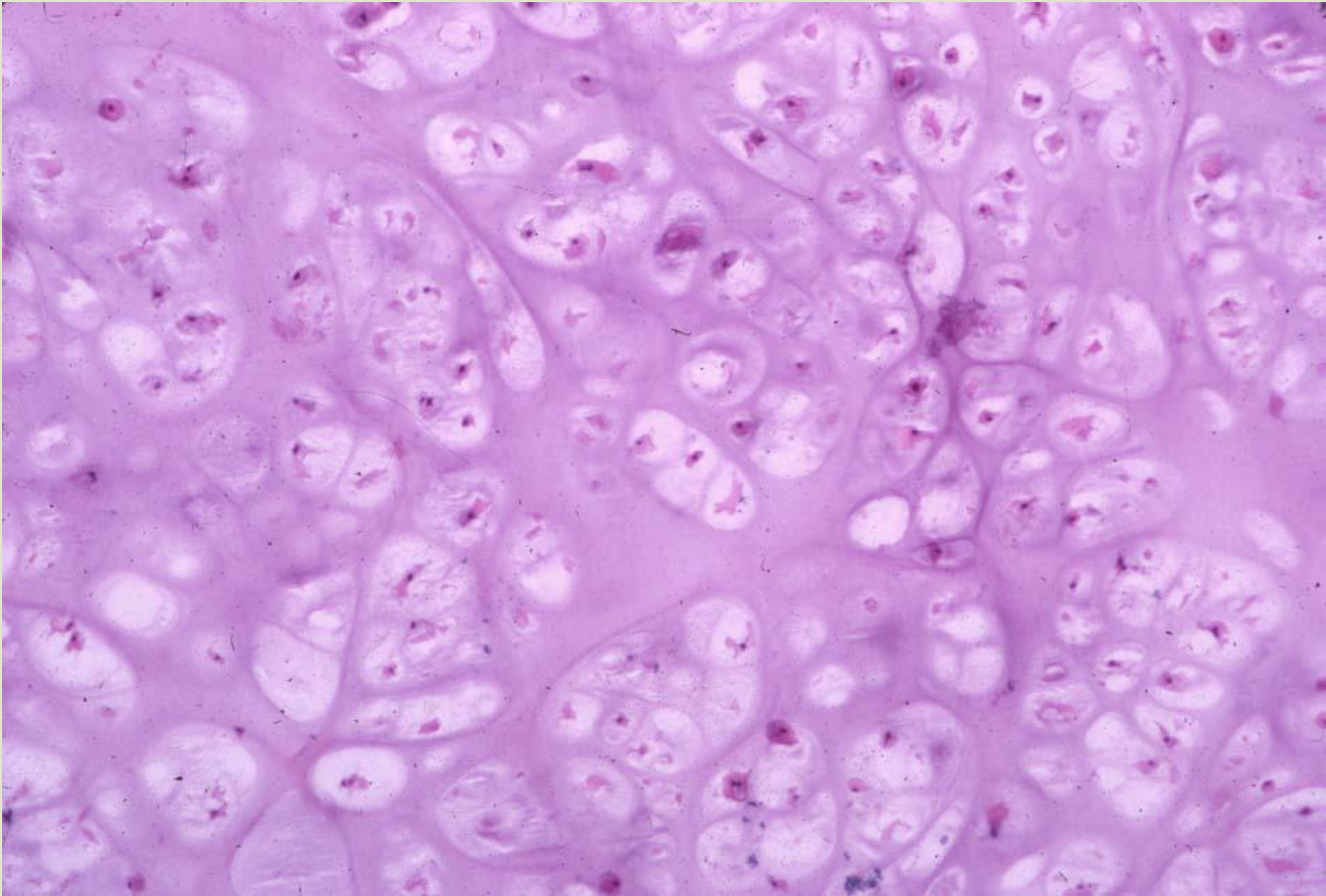


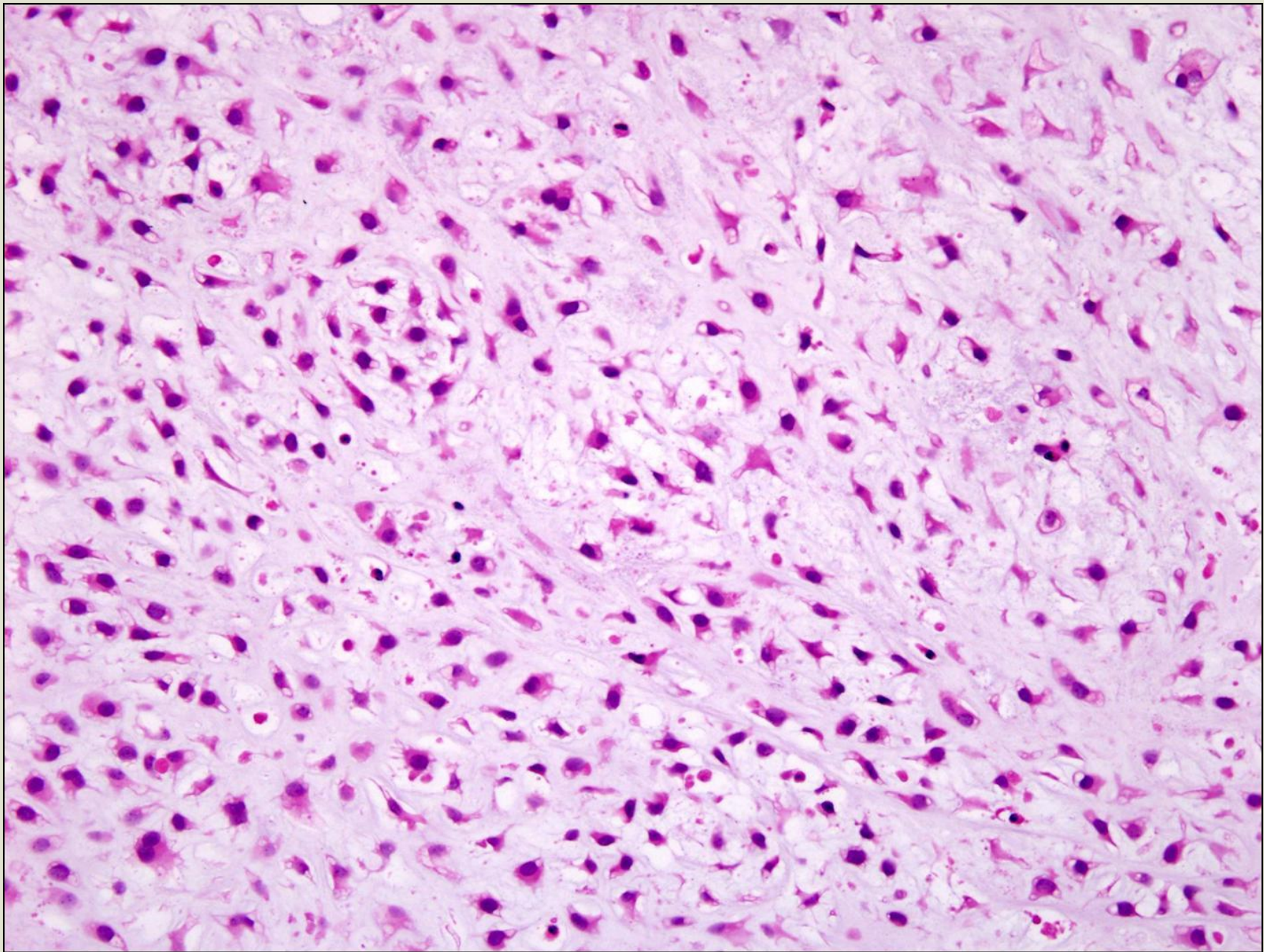




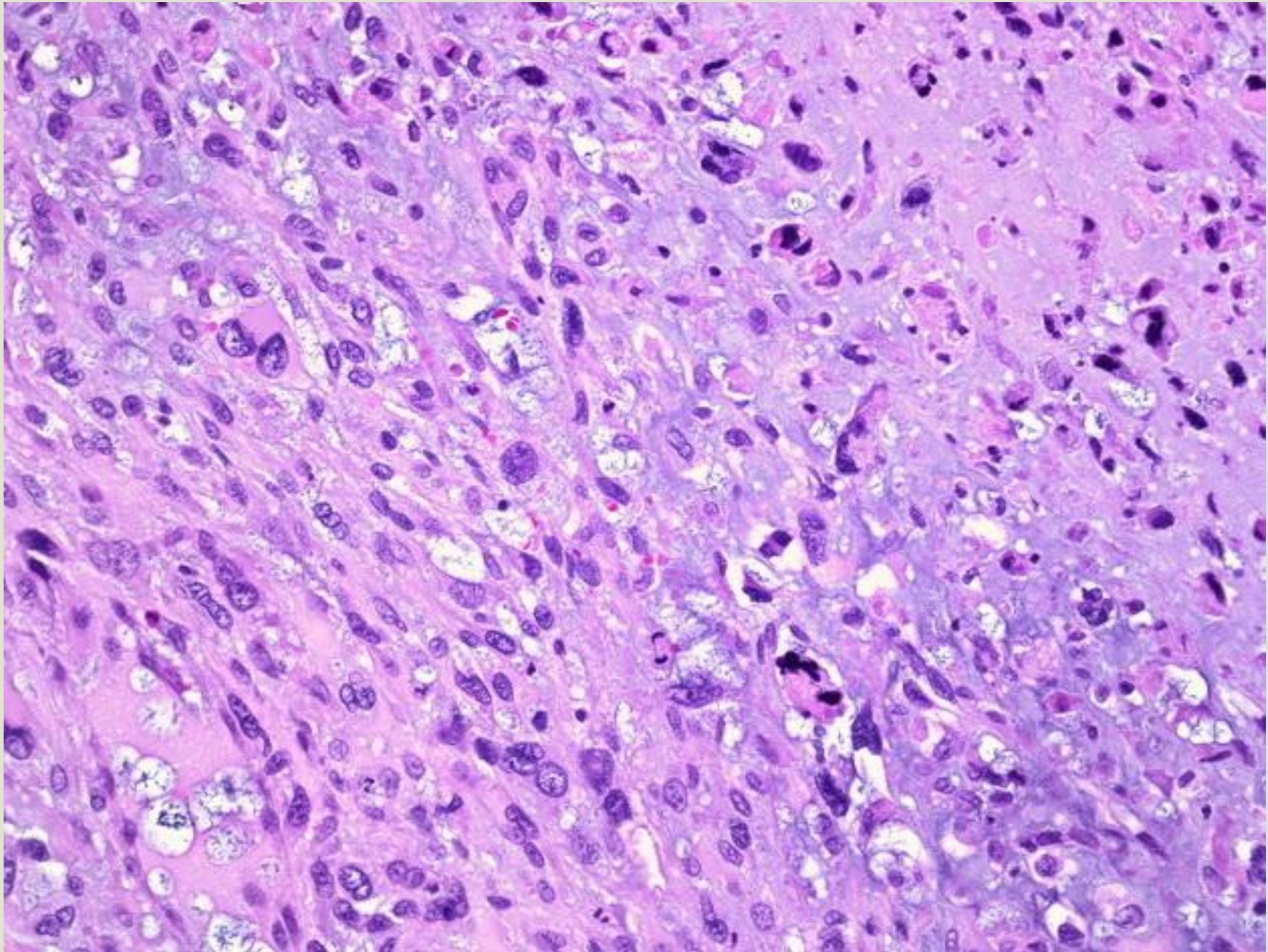


low





intermediate



high

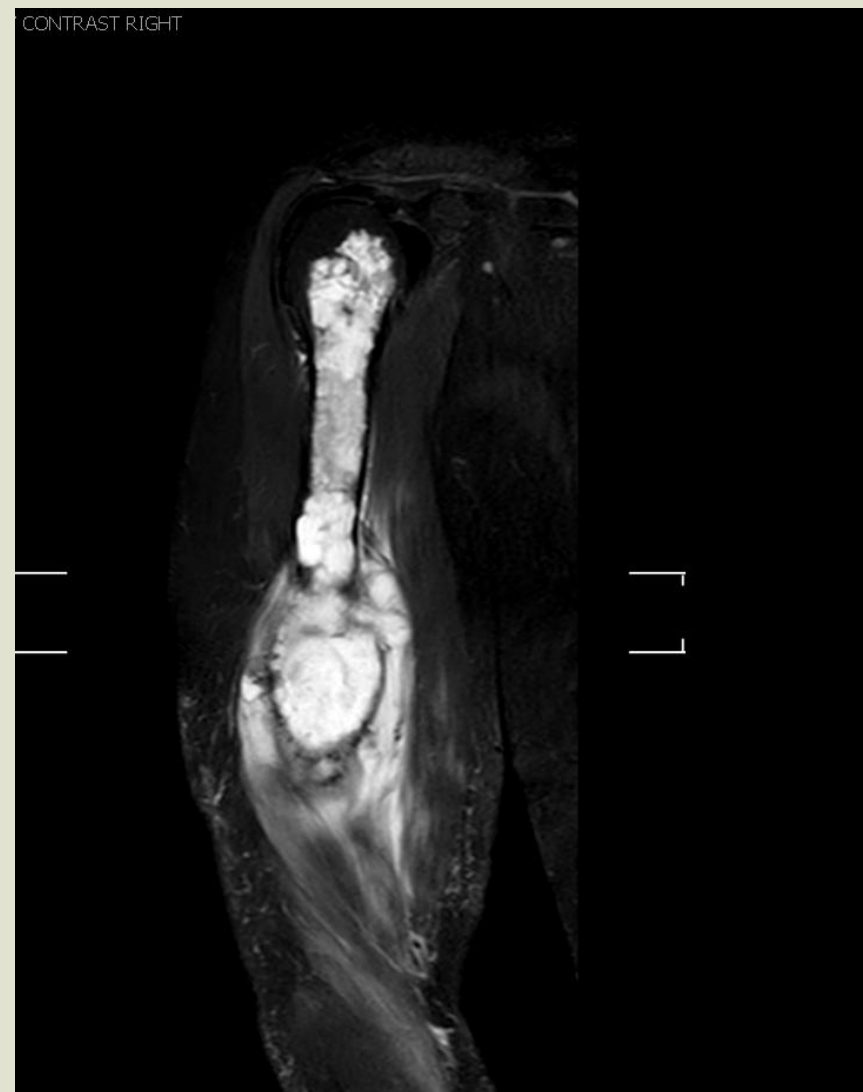
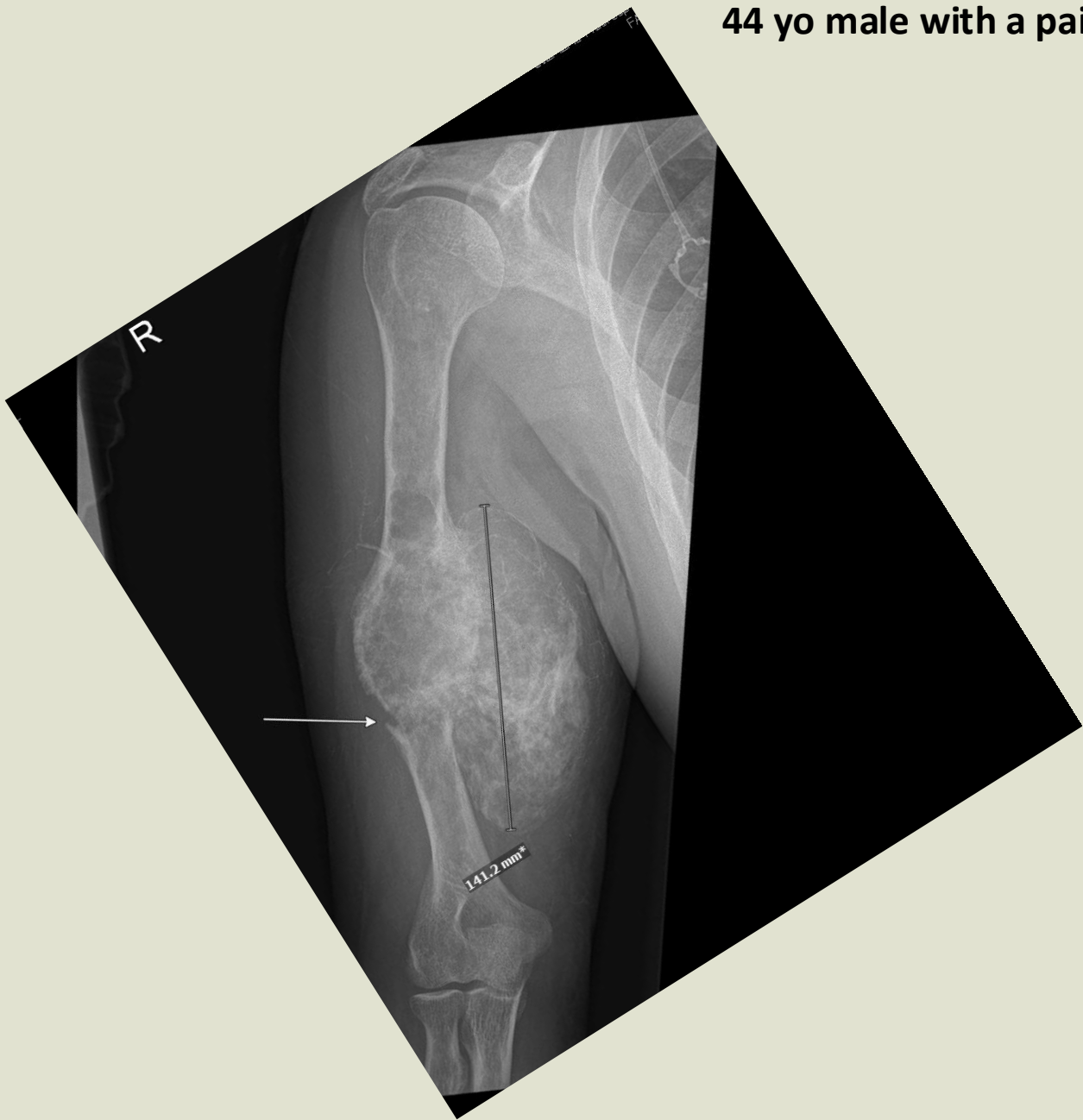
Other variations:

Dedifferentiated Chondrosarcoma

Mesenchymal Chondrosarcoma

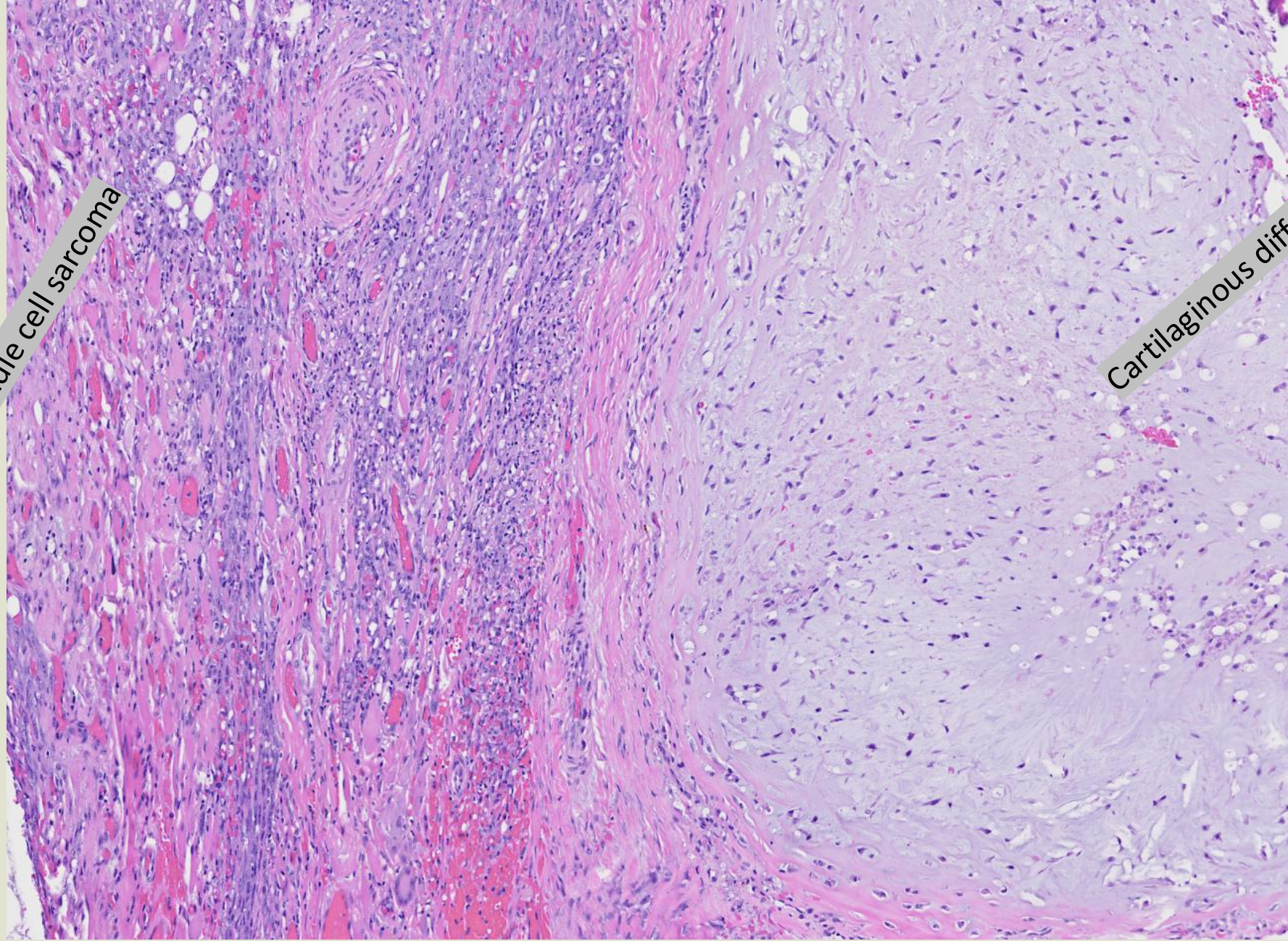
Clear cell Chondrosarcoma

44 yo male with a painful right arm and mass

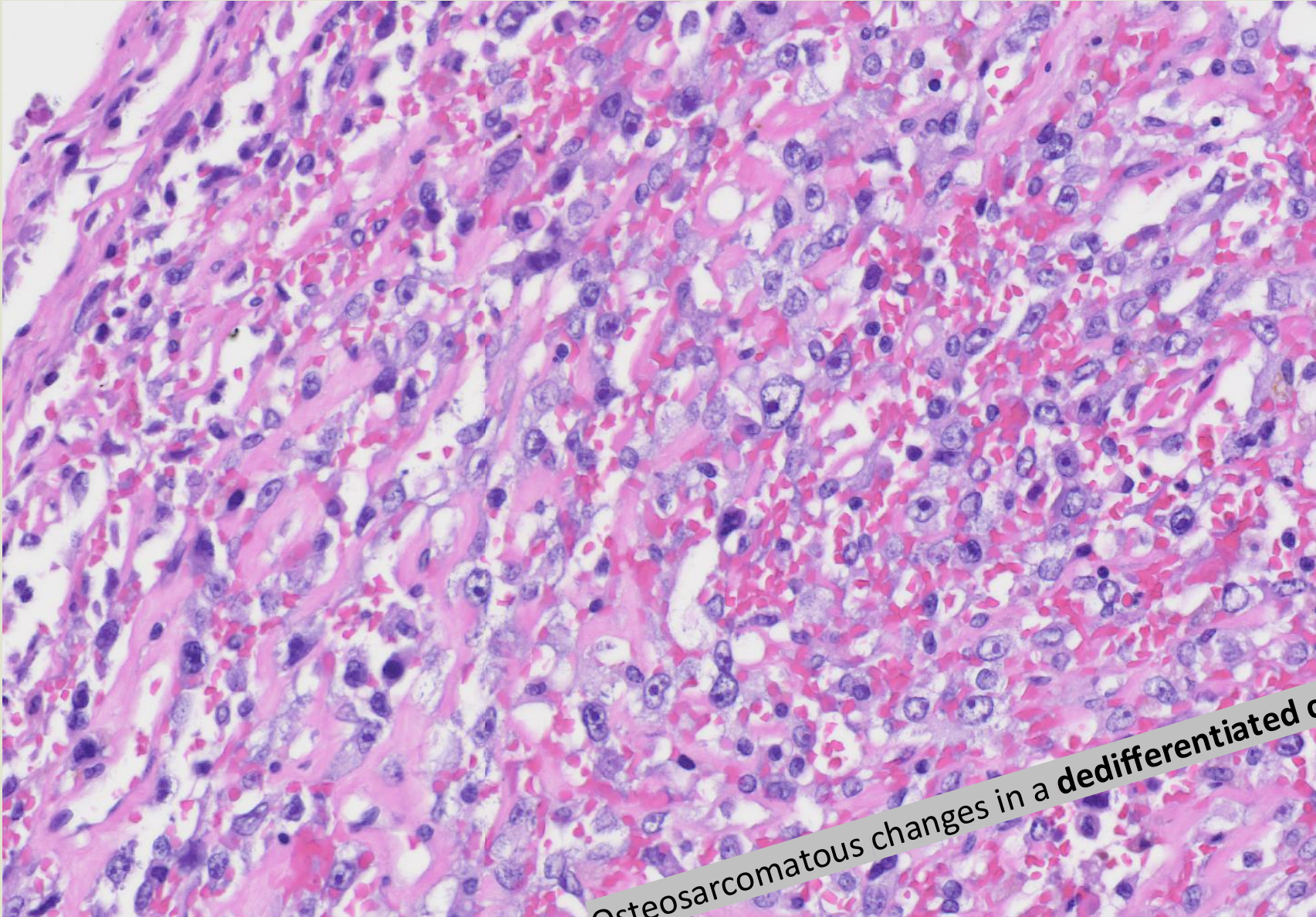




Non-cartilaginous spindle cell sarcoma



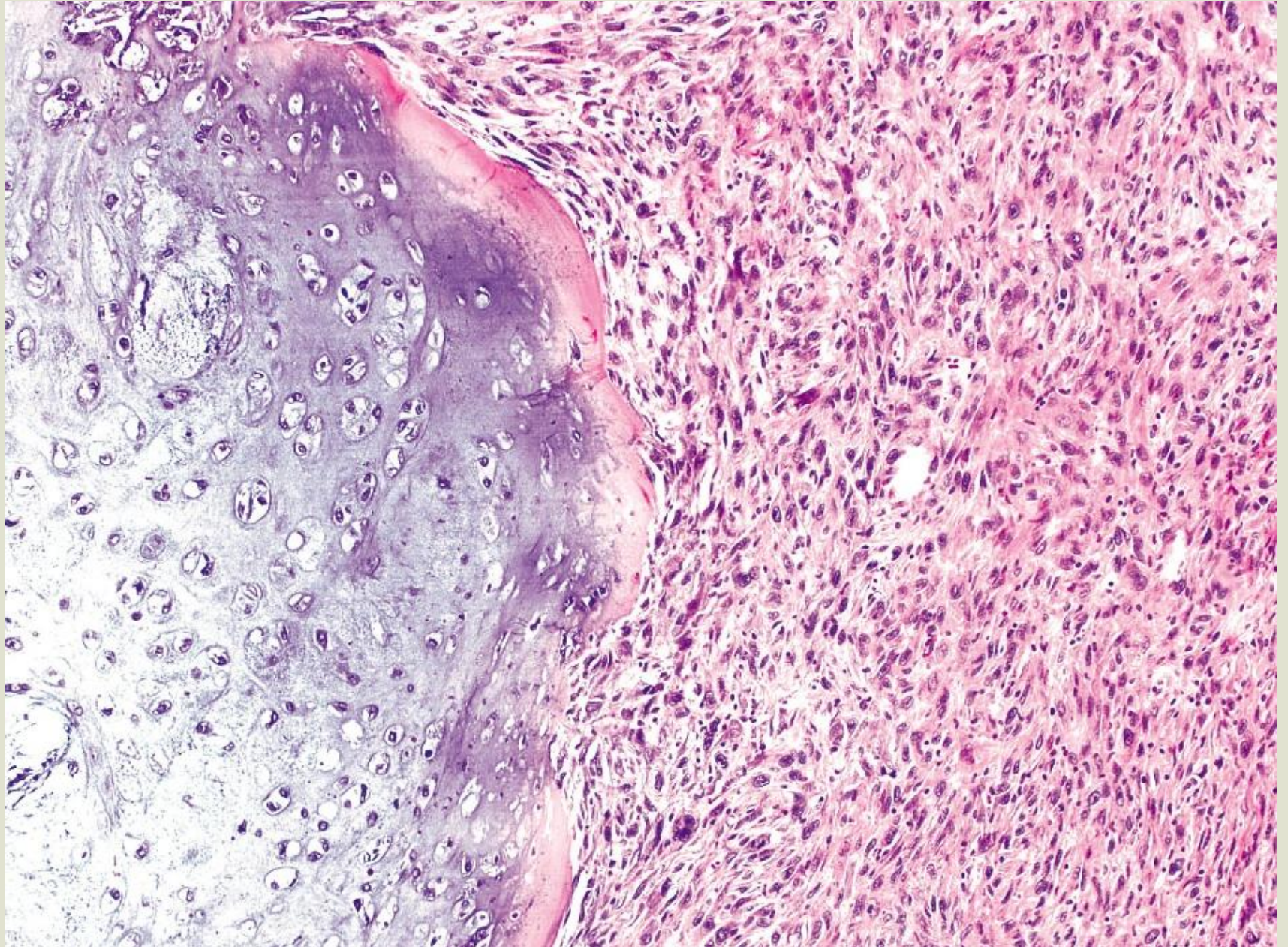
Cartilaginous differentiation



Osteosarcomatous changes in a dedifferentiated chondrosarcoma

low grade

high grade



**dedifferentiated
chondrosarcoma**

Dedifferentiated Chondrosarcoma

- **LOW-GRADE component (+) HIGH-GRADE component**
- **Aggressive tumour with high-grade component most active**
- **Low survival – 25% (5 year survival rate)**
- **IDH1/IDH2 mutation (helps to distinguish from Chondroblastic Osteosarcoma)**

- **SOMETIMES IDH staining can help confirm---if biopsy shows only dediff component.**

Thank you

