

Soft Tissue Calcification and Ossification

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Soft-tissue Calcification

Metastatic Calcification

=deposit of calcium salts in previously normal tissue

- (1) as a result of elevation of Ca x P product above 60-70
- (2) with normal Ca x P product after renal transplant

Location:lung (alveolar septa, bronchial wall, vessel wall), kidney, gastric mucosa, heart, peripheral vessels

Cause:

(a)Skeletal deossification

- 1.1° HPT
- 2.Ectopic HPT production (lung / kidney tumor)
- 3.Renal osteodystrophy + 2° HPT
- 4.Hypoparathyroidism

(b)Massive bone destruction

- 1.Widespread bone metastases
- 2.Plasma cell myeloma
- 3.Leukemia

(c)Increased intestinal absorption

- 1.Hypervitaminosis D
- 2.Milk-alkali syndrome
- 3.Excess ingestion / IV administration of calcium salts
- 4.Prolonged immobilization
- 5.Sarcoidosis

(d)Idiopathic hypercalcemia

Generalized Calcinosis

(a)Collagen vascular disorders

- 1.Scleroderma
- 2.Dermatomyositis

(b)Idiopathic tumoral calcinosis

(c)Idiopathic calcinosis universalis

Dystrophic Calcification

=in presence of normal serum Ca + P levels secondary to local electrolyte / enzyme alterations in areas of tissue injury

Cause:

(a)Metabolic disorder without hypercalcemia

- 1.Renal osteodystrophy with 2° HPT
- 2.Hypoparathyroidism
- 3.Pseudohypoparathyroidism
- 4.Pseudopseudohypoparathyroidism
- 5.Gout
- 6.Pseudogout = chondrocalcinosis
- 7.Ochronosis = alkaptonuria
- 8.Diabetes mellitus

(b) Connective tissue disorder

- 1.Scleroderma
- 2.Dermatomyositis
- 3.Systemic lupus erythematosus

(c)Trauma

- 1.Neuropathic calcifications
- 2.Frostbite
- 3.Myositis ossificans progressiva
- 4.Calcific tendinitis / bursitis

(d)Infestation

- 1.Cysticercosis
- 2.Dracunculosis (guinea worm)
- 3.Loiasis
- 4.Bancroft filariasis
- 5.Hydatid disease
- 6.Leprosy

(e)Vascular disease

- 1.Atherosclerosis
- 2.Media sclerosis (Mönckeberg)
- 3.Venous calcifications
- 4.Tissue infarction (eg, myocardial infarction)

(f)Miscellaneous

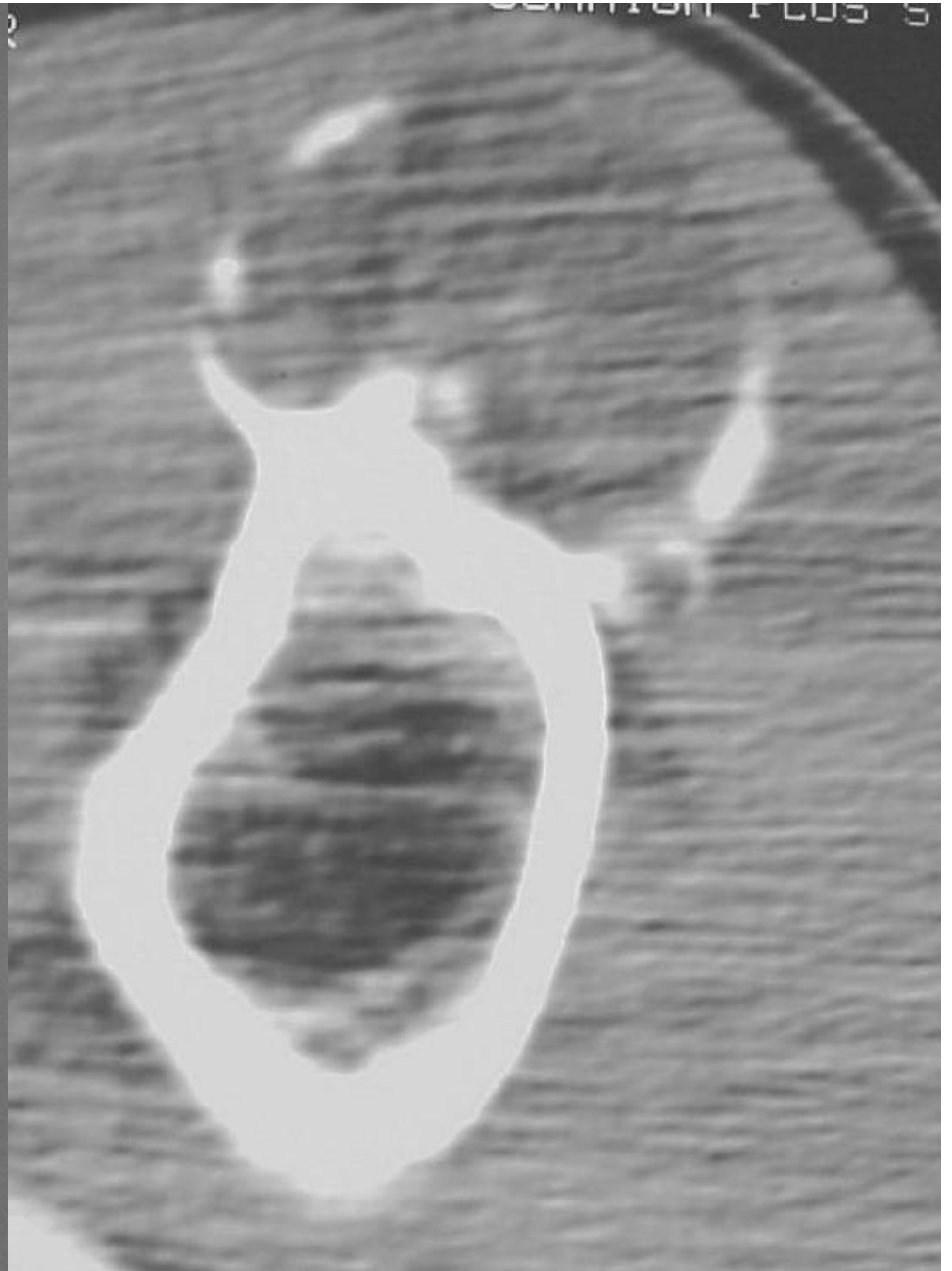
- 1.Ehlers-Danlos syndrome
- 2.Pseudoxanthoma elasticum
- 3.Werner syndrome = progeria
- 4.Calcinosis (circumscripta, universalis, tumoral calcinosis)
- 5.Necrotic tumor

Exclude underlying
bone disease



OM





JCC



DEH



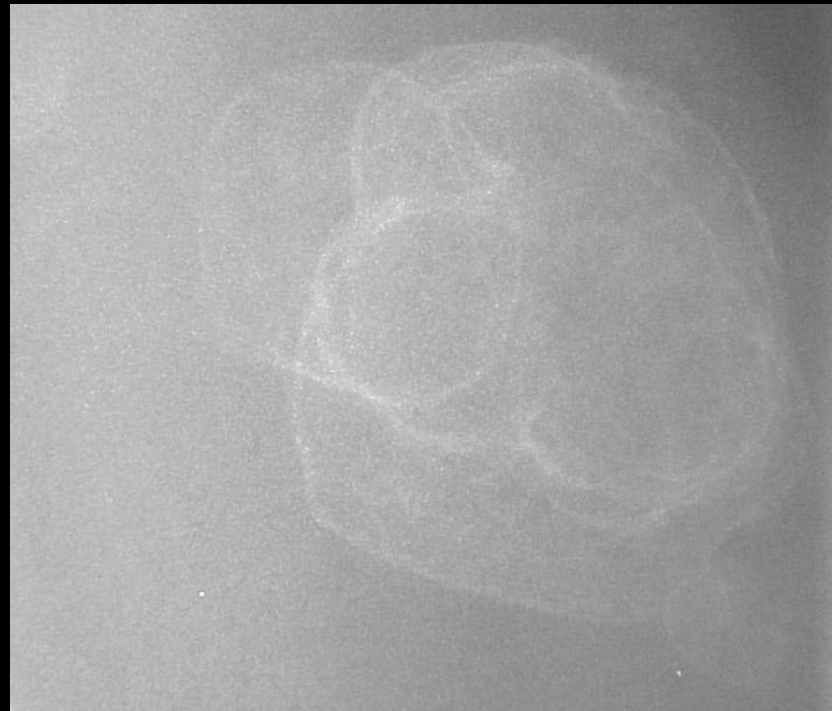
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Exclude
OSSIFICATION

Ossification

Look for:

- Trabeculation
- Cortico-medullary differentiation
- Fat on T1



Soft Tissue Ossification

- Trauma
- Neoplastic
- Congenital

ST Ossification

Traumatic

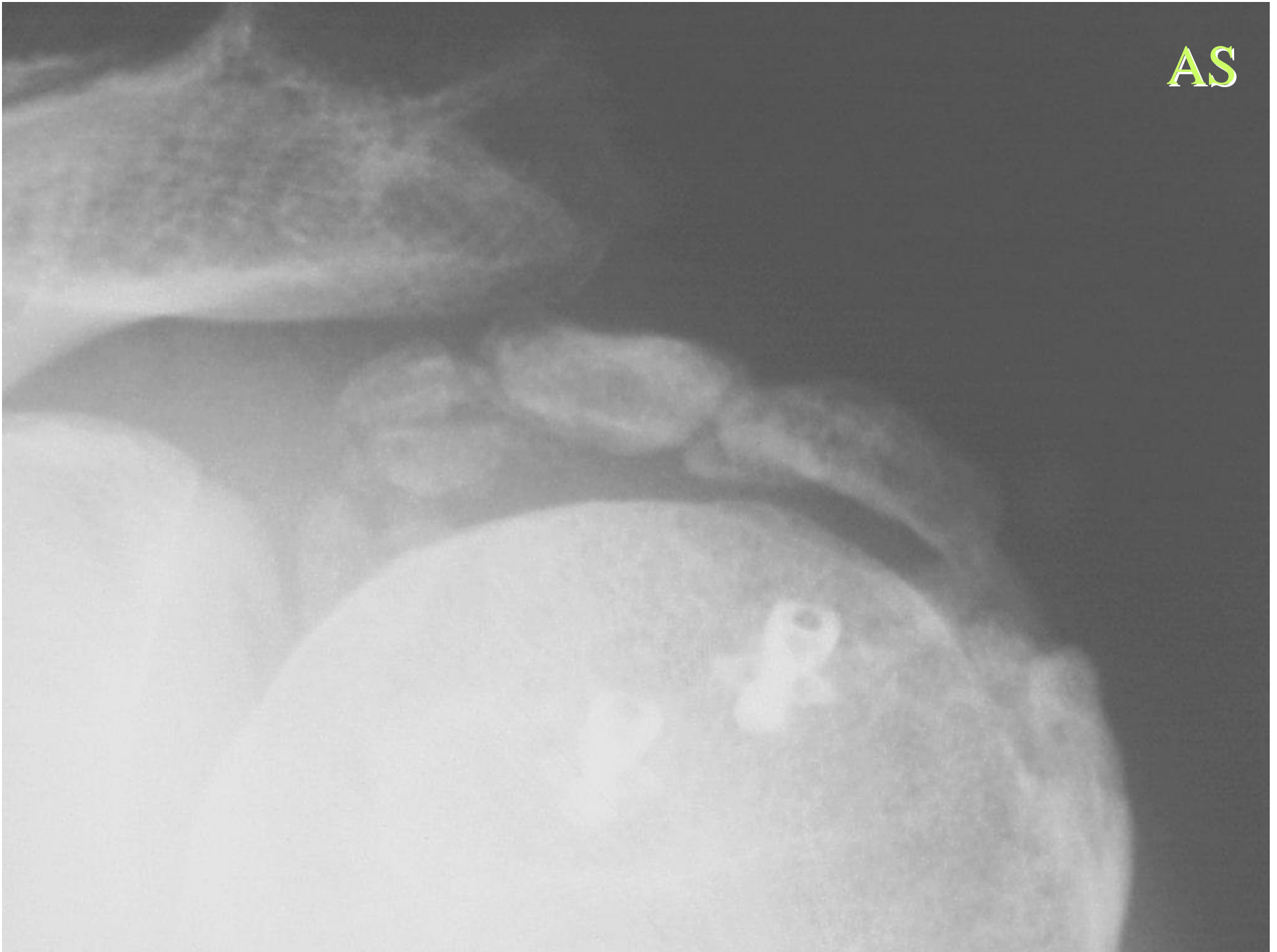
- Post Operative
- Within scars
- Myositis Ossificans
- Burns
- Paraplegia
- Head Injury

Ossification
Traumatic

Post operative

- Following joint arthroplasty-heterotopic
 - Radiation, NSAIDs and Etidronate

AS



Ossification
Traumatic

Myositis Ossificans

- Direct blow
- Adductor longus-Rider's bone
- Brachialis-Fencer's bone
- Soleus-Dancer's bone

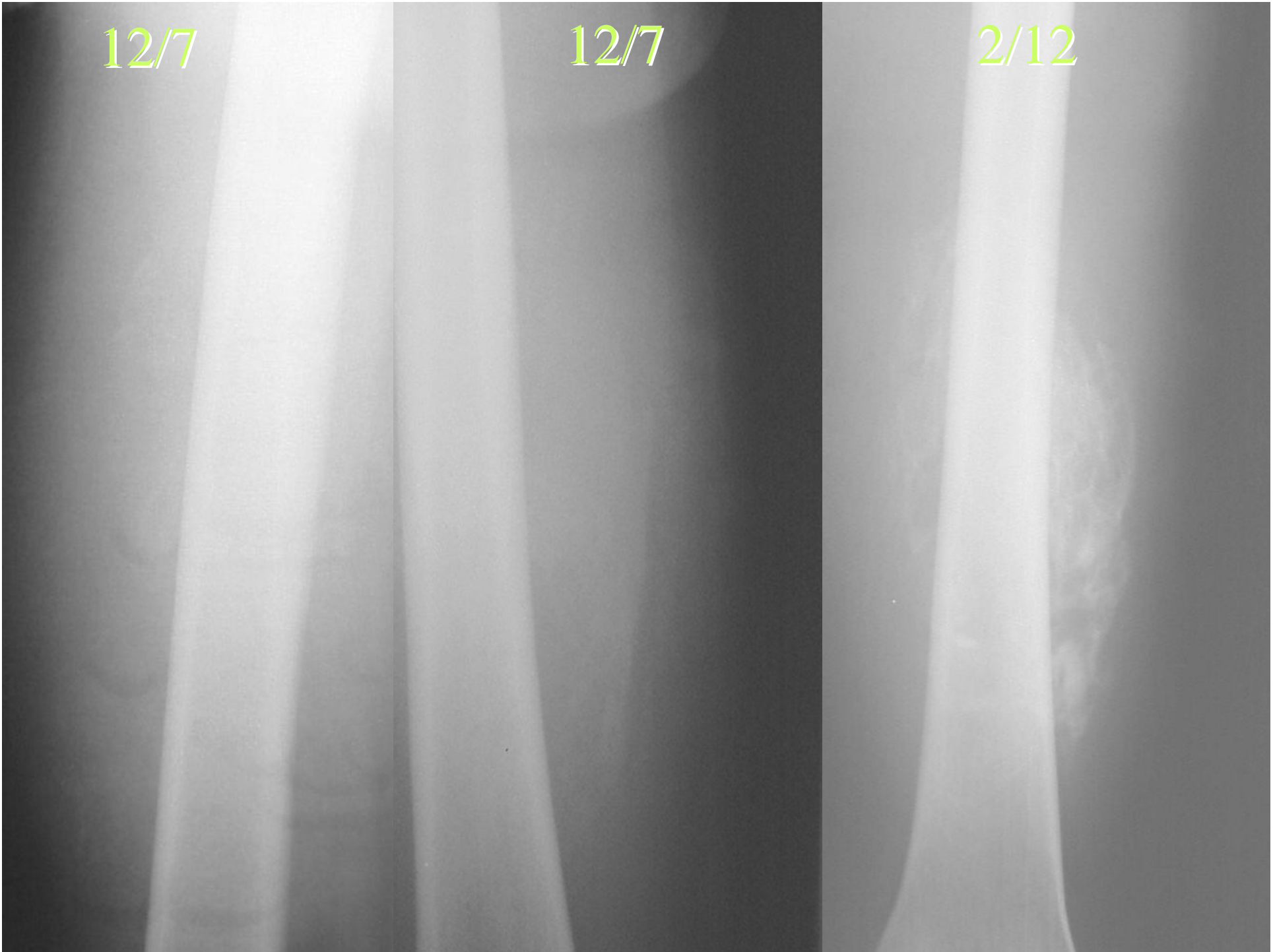
Myositis Ossificans

- 4/52 Faint peripheral Ca
 - Periosteal reaction
- 8/52 Circumscribed cortex
 - Central lacy pattern
- 5/12 Maturity
- >6/12 Regression
 - Separate from bone
- 1 year Usually disappears
 - Periosteal reaction remains

12/7

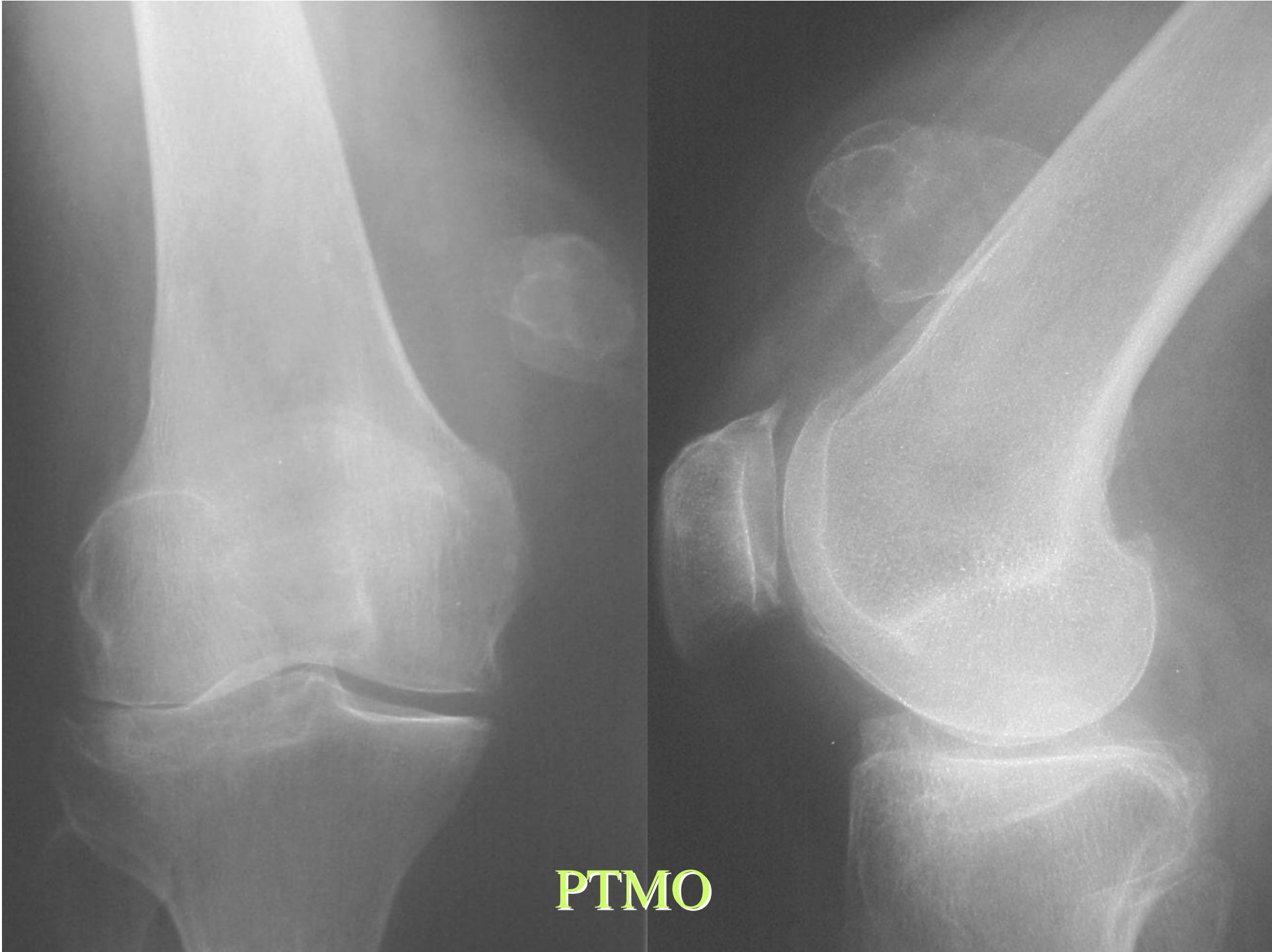
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Post Traumatic Myositis Ossificans
Centrifugal Ossification

Neoplastic Soft Tissue Ossification
Centripetal Ossification

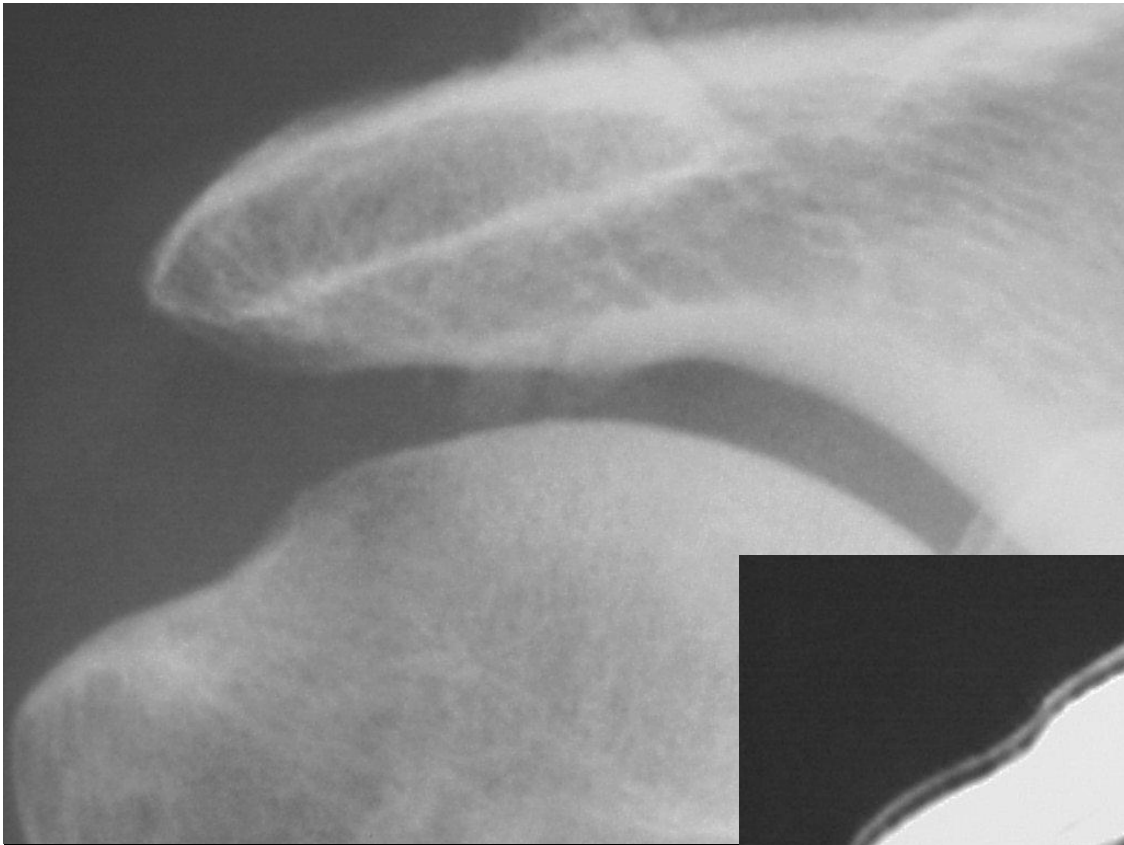


PTMO

Ossification
Traumatic

Tendons and Ligaments

- Calcification common, Ossification rare
- MCL knee - Pellegrini-Stieda
- Coracoclavicular
- Achilles tendon
- Supraspinatus
- Stylohyoid ligament XS - Eagle syn.



SST Oss



Ossification
Traumatic

Burns

- Commonly elbow
- Occurs distal to burn



Burn

Ossification

Traumatic

Paraplegia

- Approx. 40%
- Usually in paralyzed parts
- Muscles, tendons and ligaments
- Large joints
- Often causes ankylosis

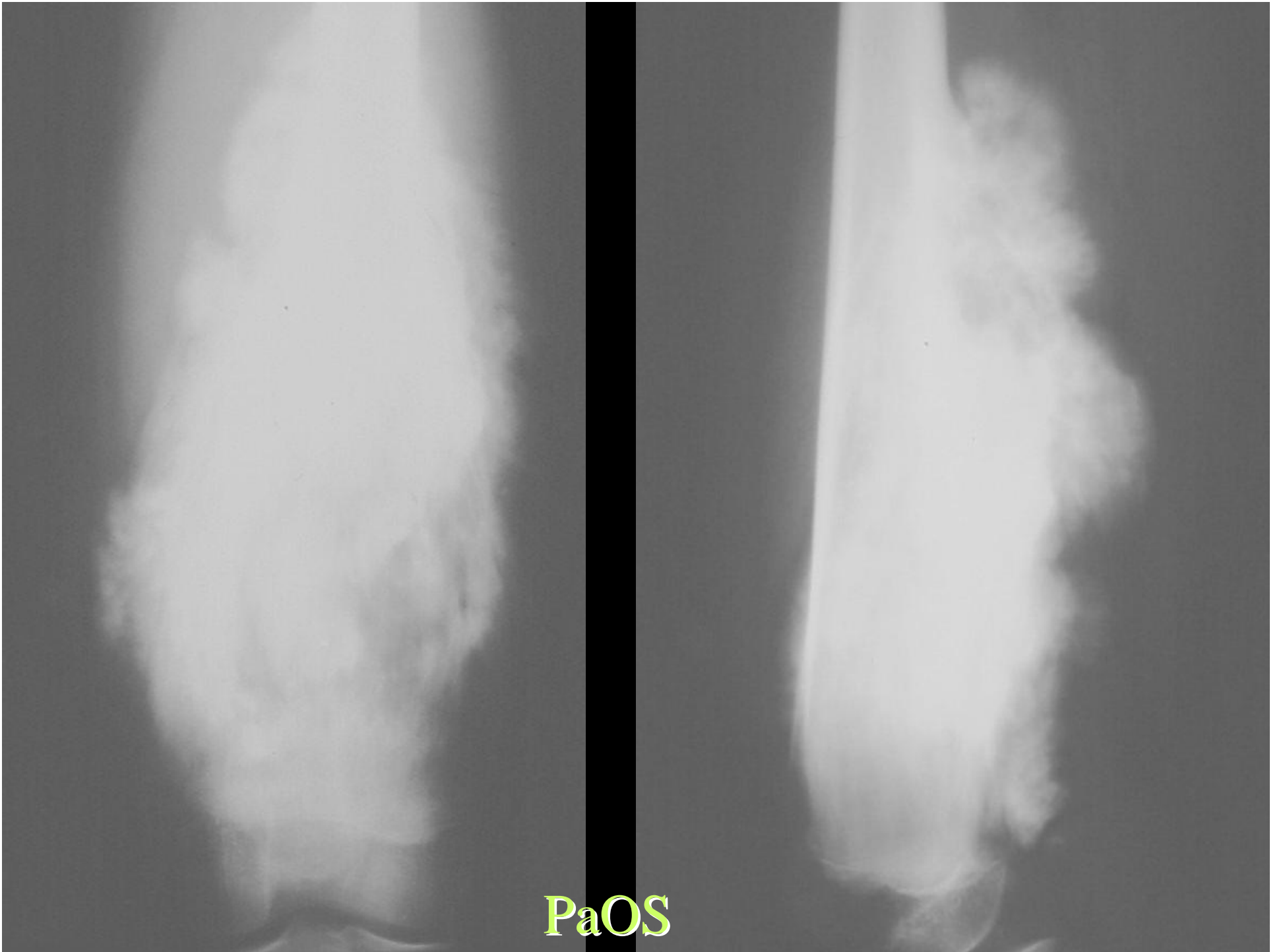


Paraplegia

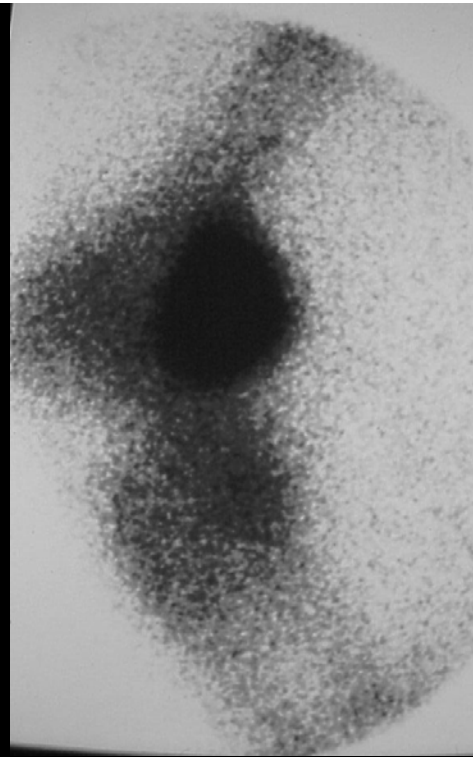
Ossification

Neoplastic

- Parosteal osteosarcoma
- Liposarcoma
- Florid reactive periostitis
- Pseudomalignant osseous tumour of soft tissues
- Cortical desmoid
- Extra skeletal osteosarcoma
- Juxta cortical chondroma

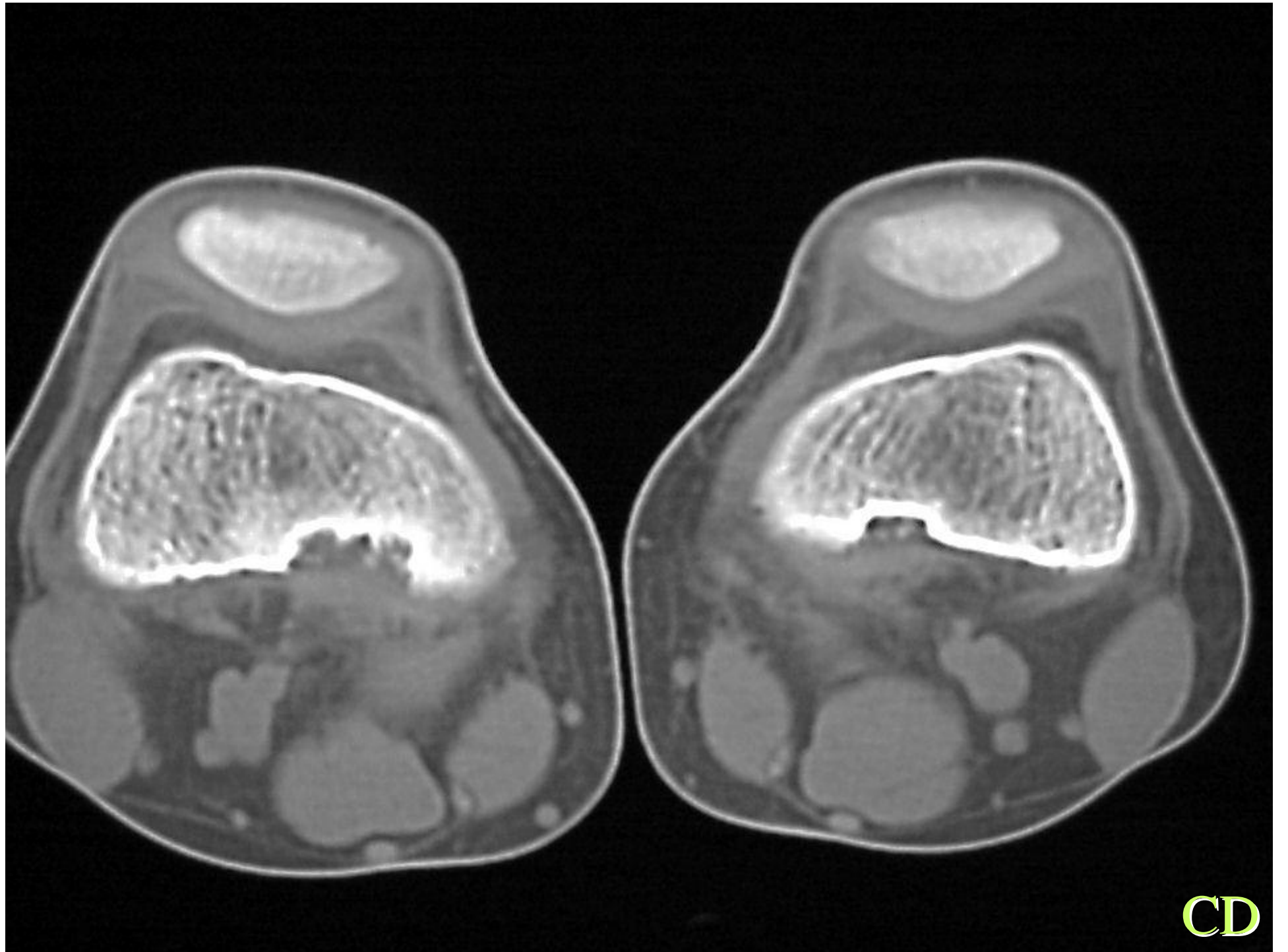


PaOS

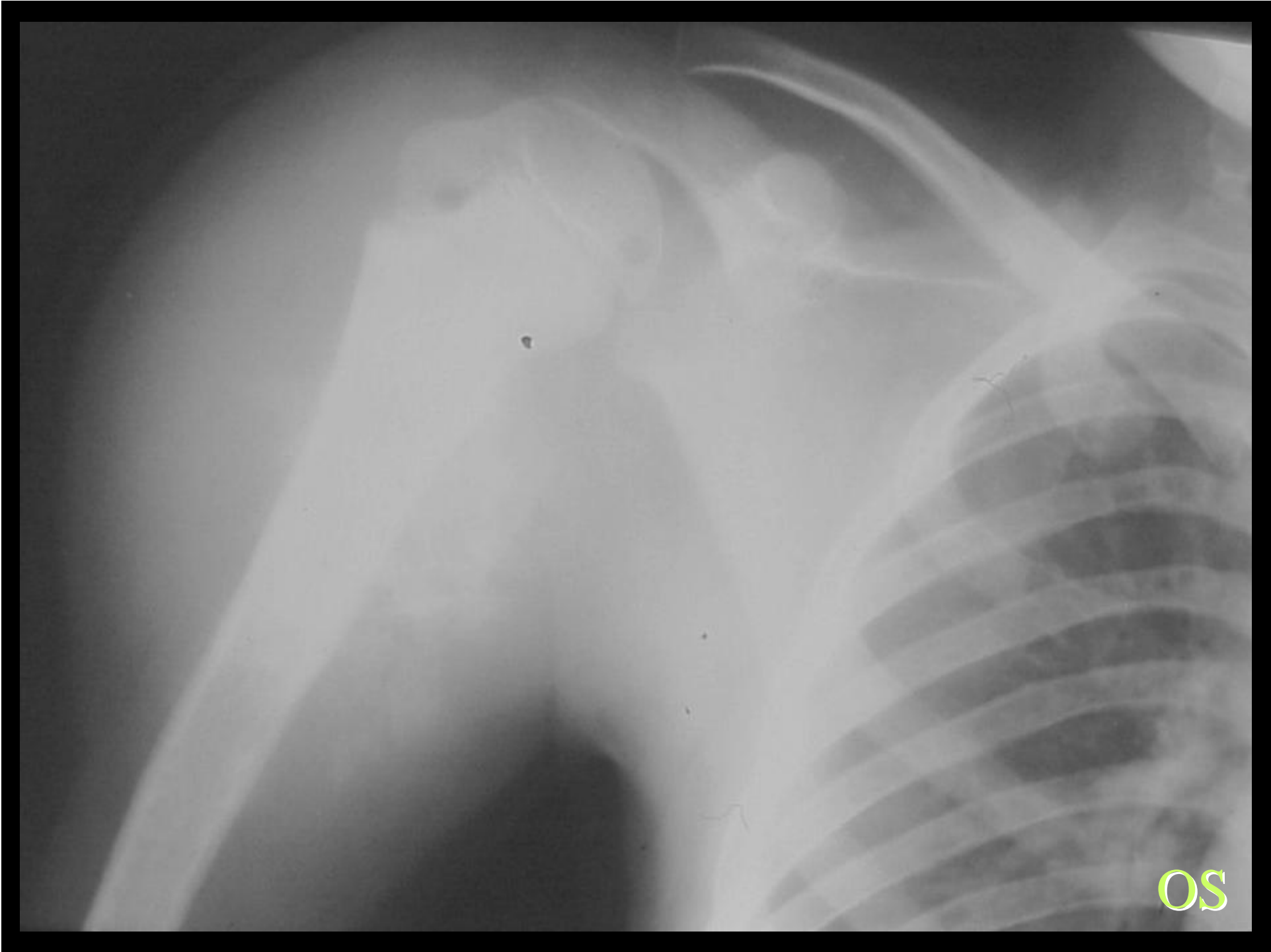


PMOTST





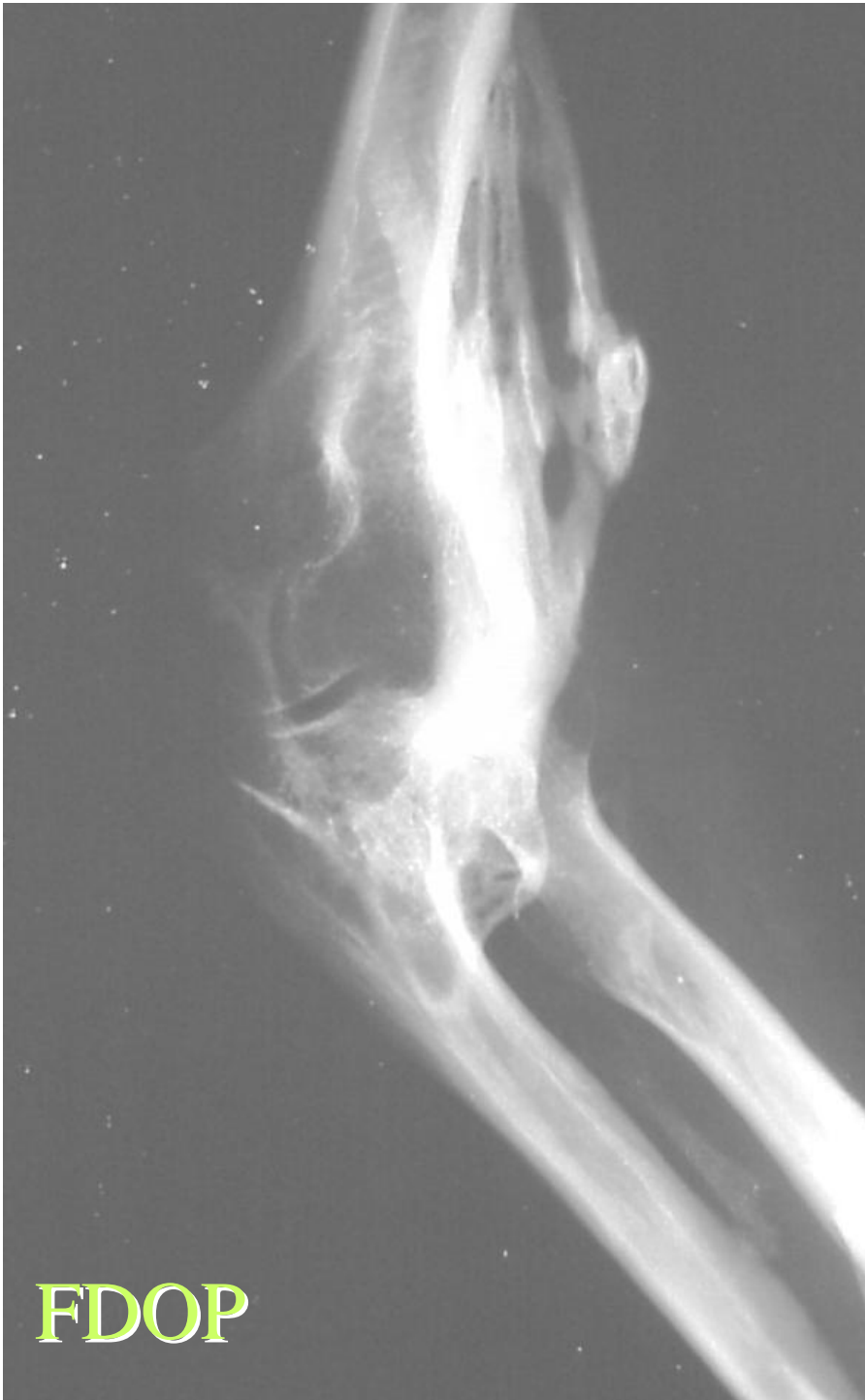
CD



Ossification

Congenital

- Fibrodysplasia ossificans progressiva
 - (Myositis OP)
 - (Fibrositis OP)
- Melorheostosis
- Osteoma cutis



FDOP



CALCIFICATION

Calcification

- By cause
- By shape / morphology
- By site
- By distribution
- By age
- By Aunt Mini

Soft Tissue Calcification

By Cause

- Metastatic
 - Disturbance in Calcium or Phosphate
- Generalized Calcinosis
 - Normal Calcium or Phosphate
- Dystrophic
 - Damaged or devitalized tissue

Soft Tissue Calcification

By Cause

Metastatic Calcification

- Hyperparathyroidism
- Hypoparathyroidism
- Renal Osteodystrophy
- Hypervitaminosis D
- Milk Alkali
- Sarcoidosis
- Massive bone destruction
 - Mets., Myeloma, Leukaemia

HPT





HypoPT

Soft Tissue Calcification

By Cause

Generalized Calcinosis

- Collagen disorders
- Idiopathic tumoral calcinosis
- Idiopathic calcinosis (interstitialis) universalis

Soft Tissue Calcification

By Cause

Generalized Calcinosis

Collagen Disorders

- Systemic Lupus Erythematosus
- Dermatomyositis
- Scleroderma
- Raynauds
- CREST
- Ehlers Danlos

Soft Tissue Calcification

By Cause

Generalized Calcinosis

Collagen Disorders

- Great variety of appearances
- Overlap in diseases and patterns MCTD
- May be local or generalized
- Linear, lacy, tumoral
- Deep or superficial

SLE

- Diffuse
- Linear, Streaky, Nodular
- Subcutaneous or deep
- Uncommon
- Lower limb

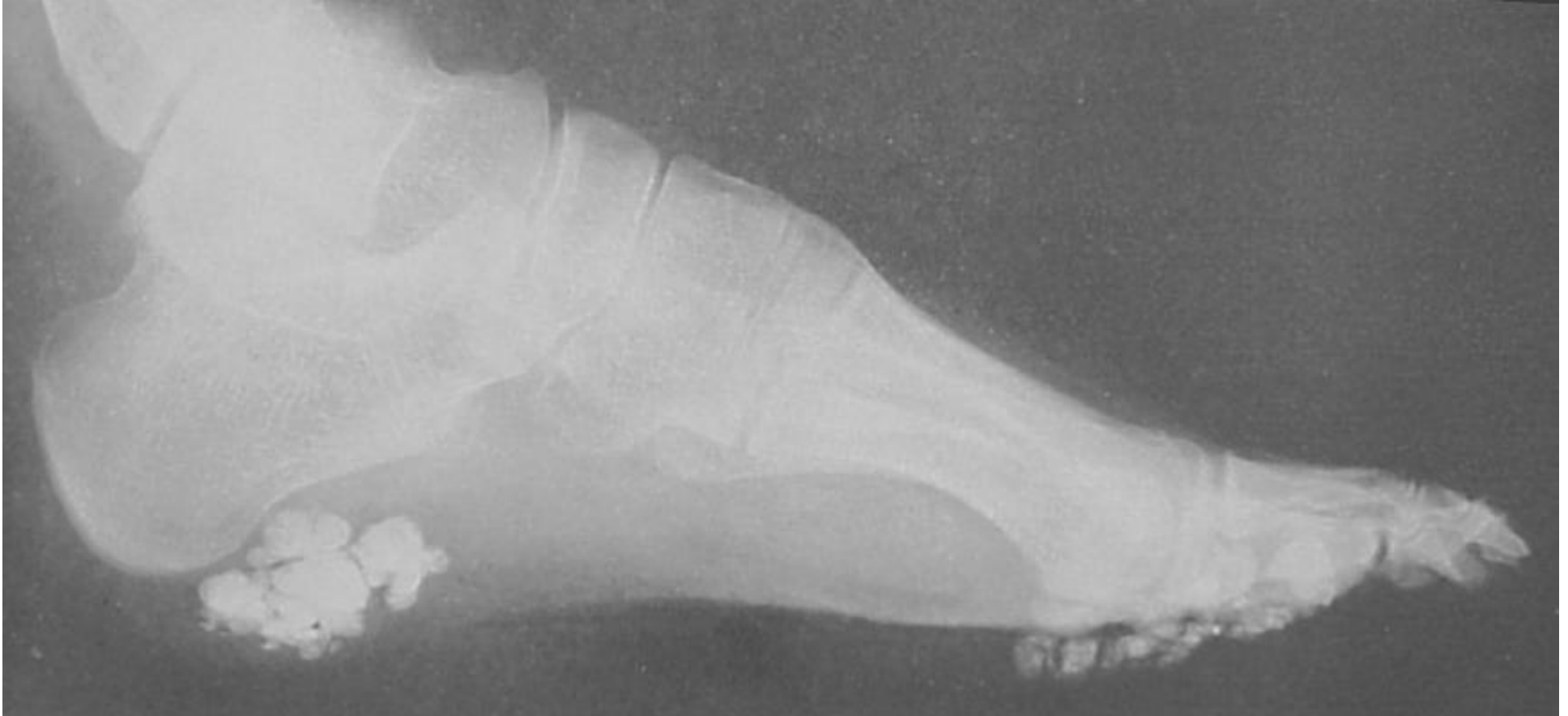
Dermatomyositis

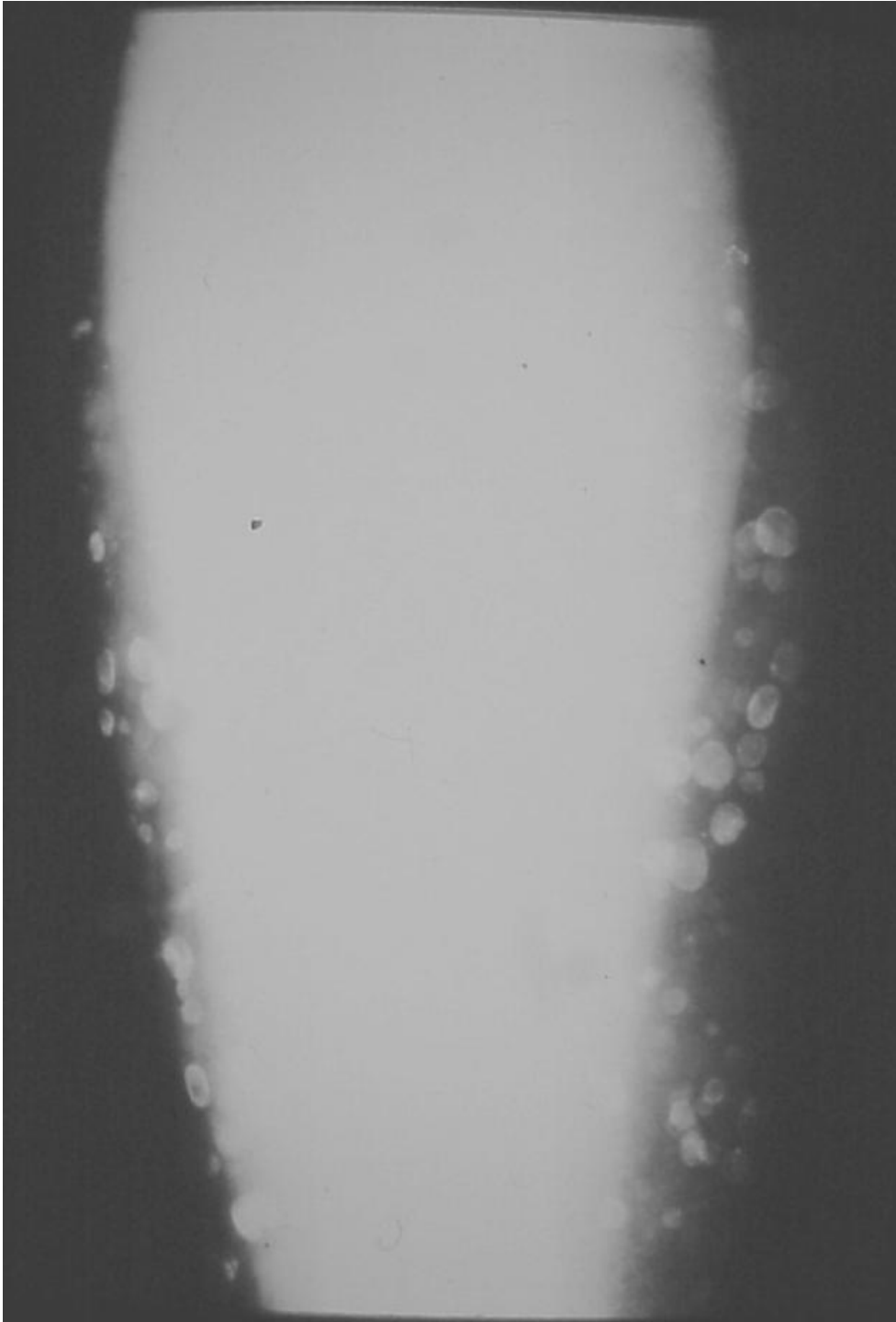
- Childhood
- Muscles and subcutaneous
- Linear or lacy
- Proximal



Scleroderma

- Hands and pressure areas
- Acro-osteolysis
- Soft tissue changes
- Subluxations





Ehlers-Danlos

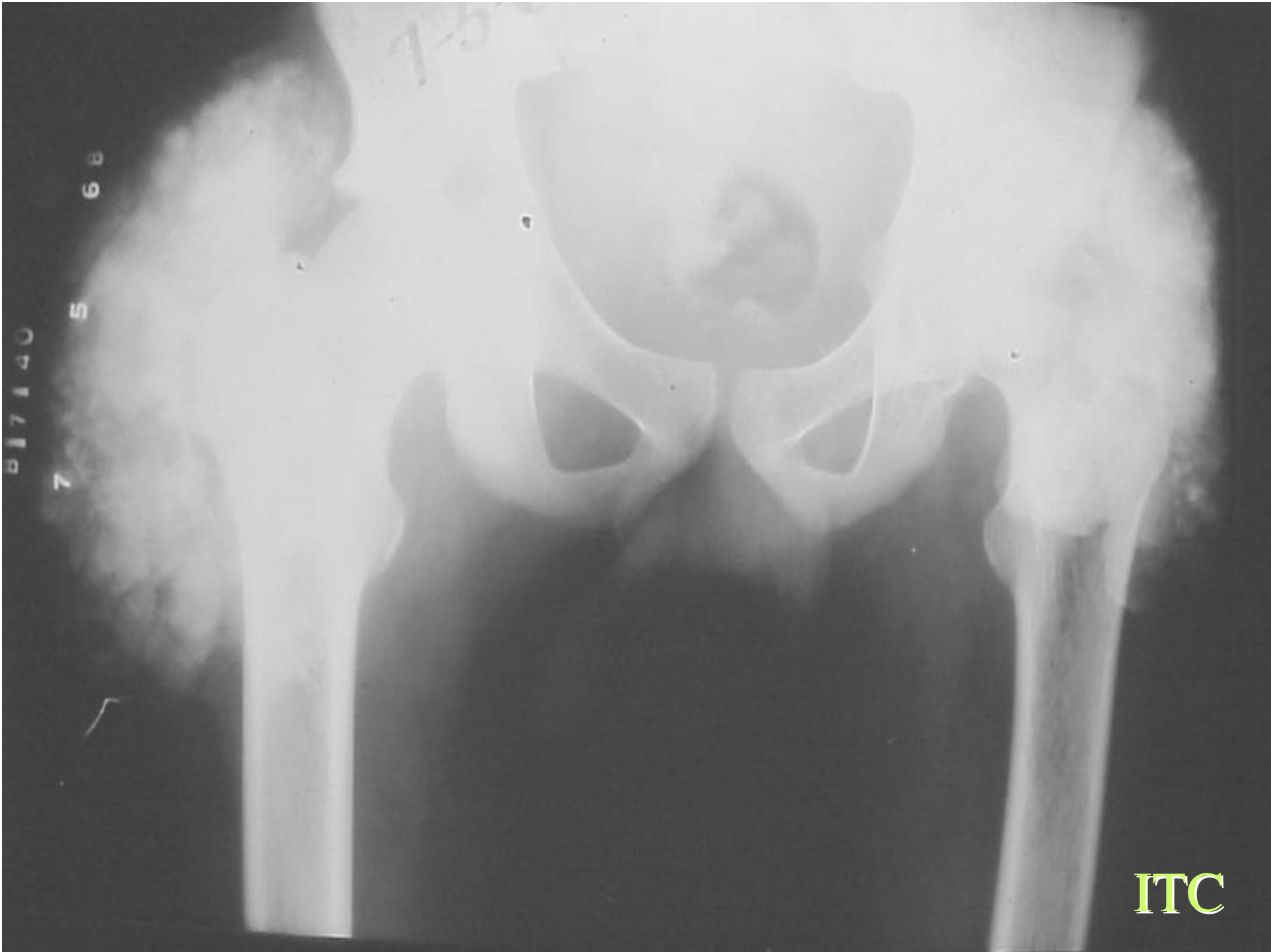
- Subcutaneous
- Spherules
- 2-10mm
- Random orientation
- Distal

Soft Tissue Calcification By Cause

Generalized Calcinosis

Idiopathic Tumoral Calcinosis

- 10-30Yrs, black
- Elevated phosphate
- Single or multiple firm tumour like painless
- Hips, Shoulders, Elbows, Ankles
- Dense, Flocculent, Amorphous,
- 1-20cm, fluid levels
- Dx of exclusion

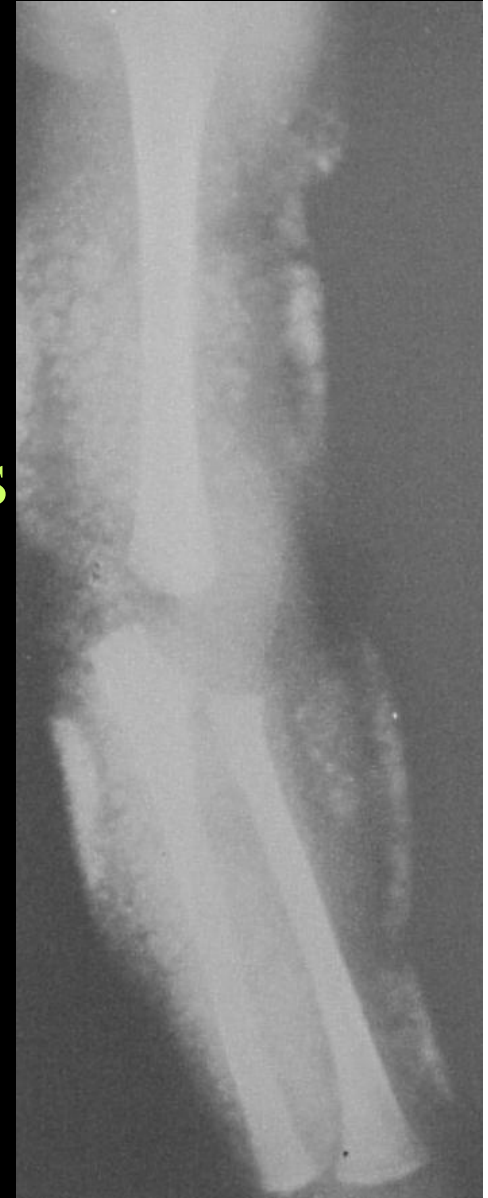


Soft Tissue Calcification By Cause

Generalized Calcinosis

Idiopathic Calcinosis Universalis

- Infants and children, rare
- Initially subcutaneous fat of extremities
- Longitudinal bands
- DDx
 - Hyperparathyroidism
 - Dermatomyositis
 - Fat necrosis
 - Extravasation of Ca gluconate



Soft Tissue Calcification

By Cause

Dystrophic Calcification

- Neoplastic
- Trauma
- Inflammatory

Soft Tissue Calcification

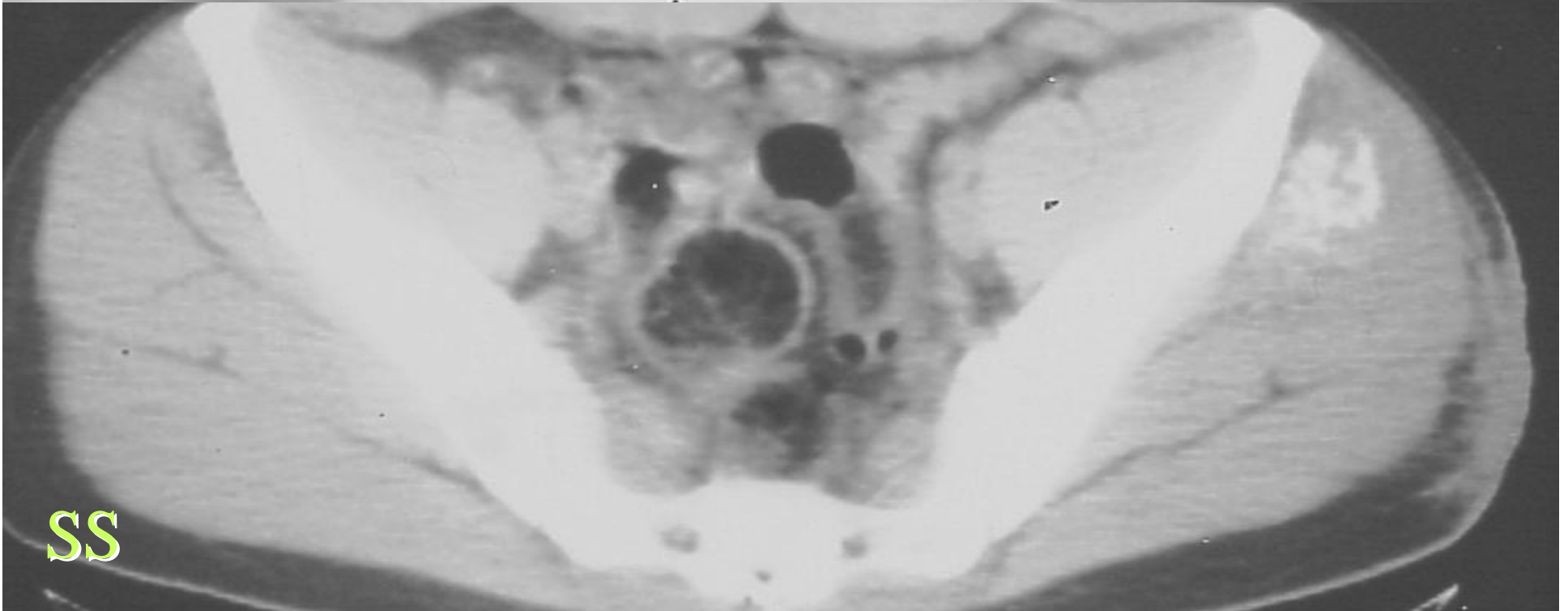
By Cause

Dystrophic Calcification

Neoplastic

- Synovial sarcoma
- Liposarcoma
- Any less commonly

Dystrophic Neoplastic





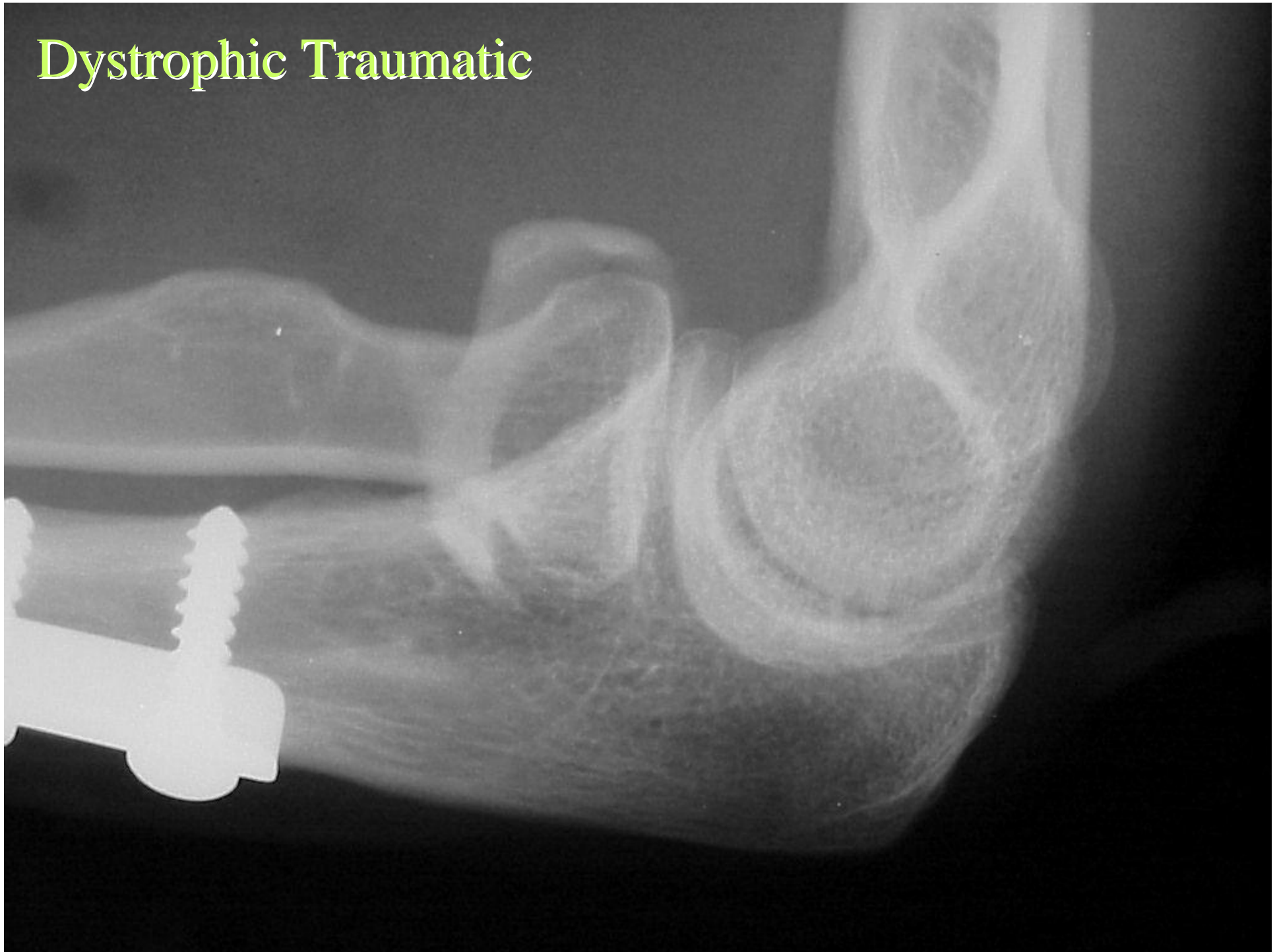
Dystrophic Neoplasmic

CS

Dystrophic Traumatic



Dystrophic Traumatic



Dystrophic Inflammatory



TB



Calcification

By Shape

Morphologic descriptive terms

- Calcinosis universalis
 - Widespread
- Calcinosis circumscripta
 - Localized
- Tumoral calcinosis
 - Mass like
- Add idiopathic prefix for a single disease entity

Calcification

By Shape

Morphology

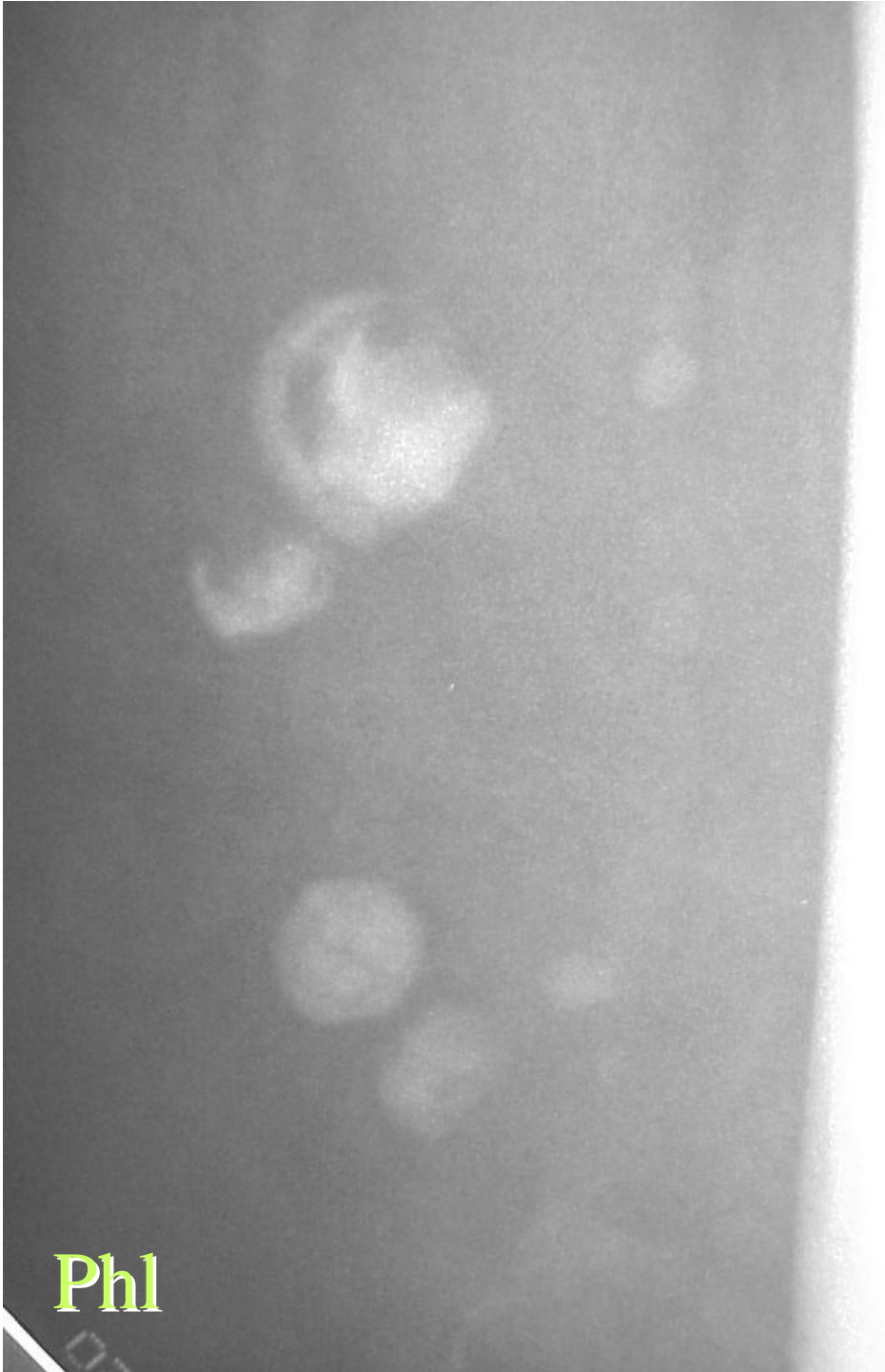
- Linear and Curvilinear
- Conglomerate (Tumoral)
- Sheets

Calcification

By Shape

Linear and Curvilinear

- Arterial
 - Atheroma, Aneurysm, Diabetes, HPT, Progeria, Werner's
- Nerve
 - Leprosy, Neurofibromatosis
- Tendon and Ligament
 - Tendinitis, AS, Ochronosis, Fluorosis, Diabetes
- Injection
 - Bismuth, Arsenic, Quinidine
- Parasite
 - Cysticercosis, Guinea worm, Loa Loa, Armillifer armillatus

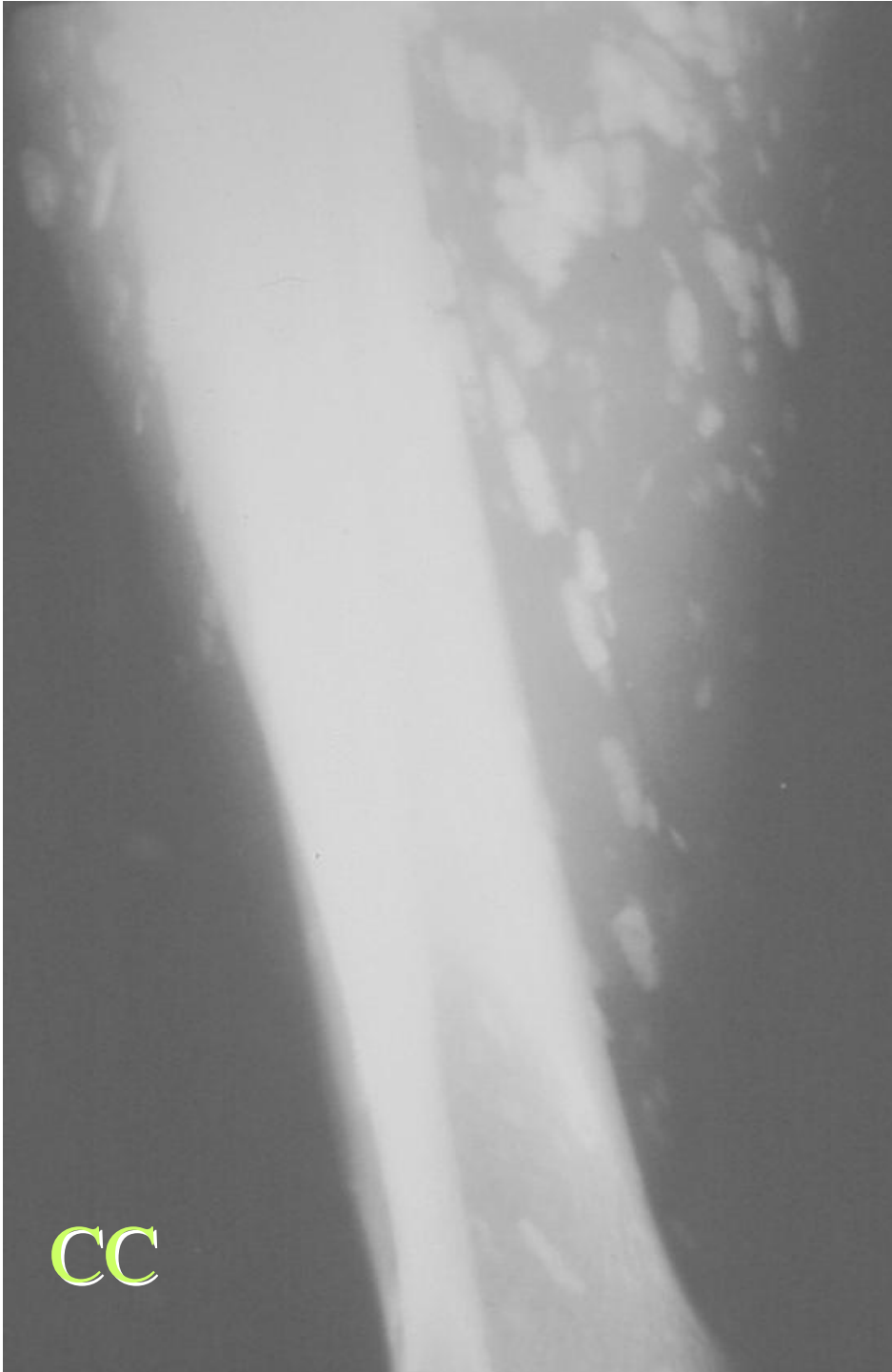




CPPD



Flu

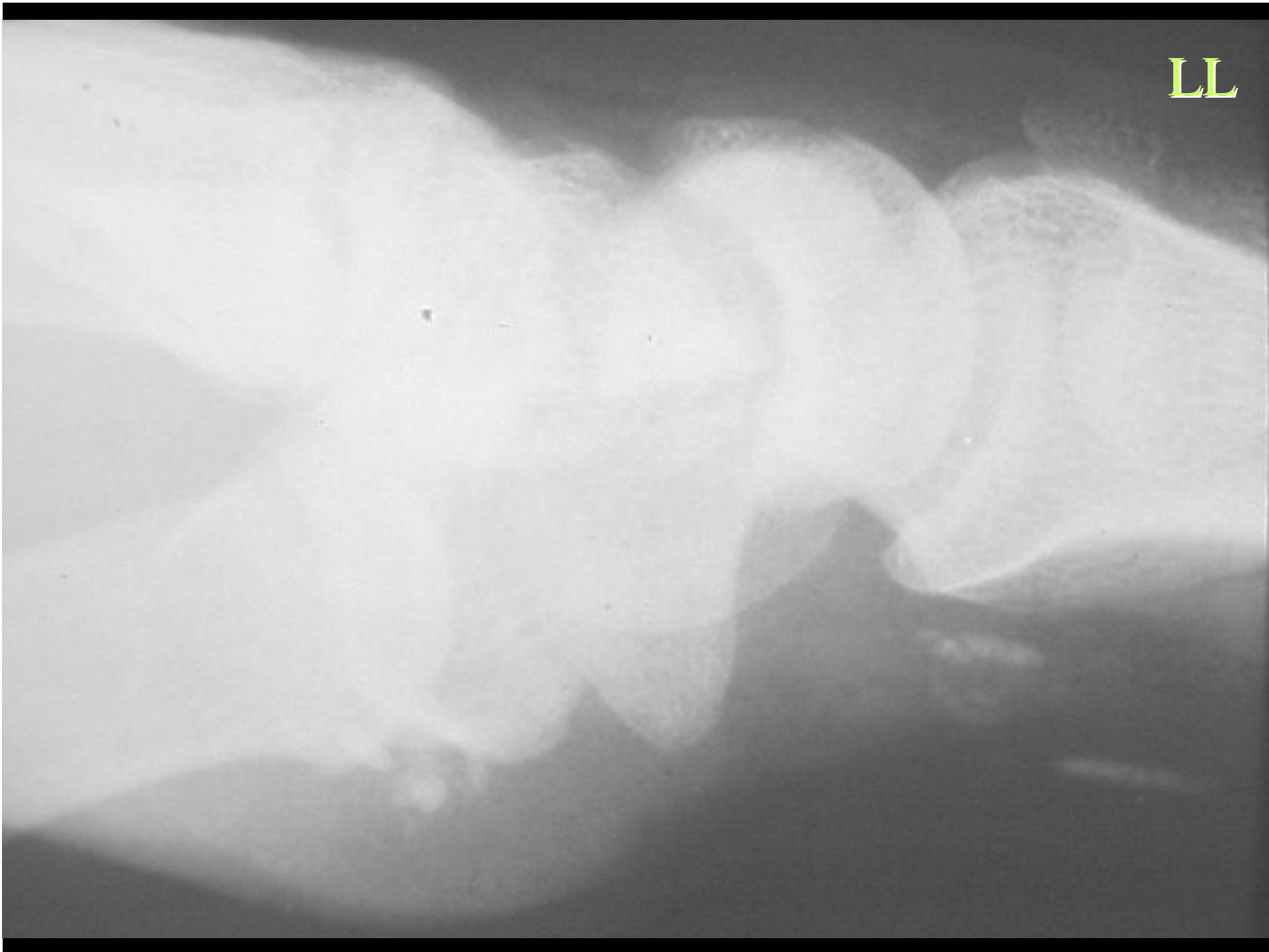


CC



GW

LL



Calcification

By Shape

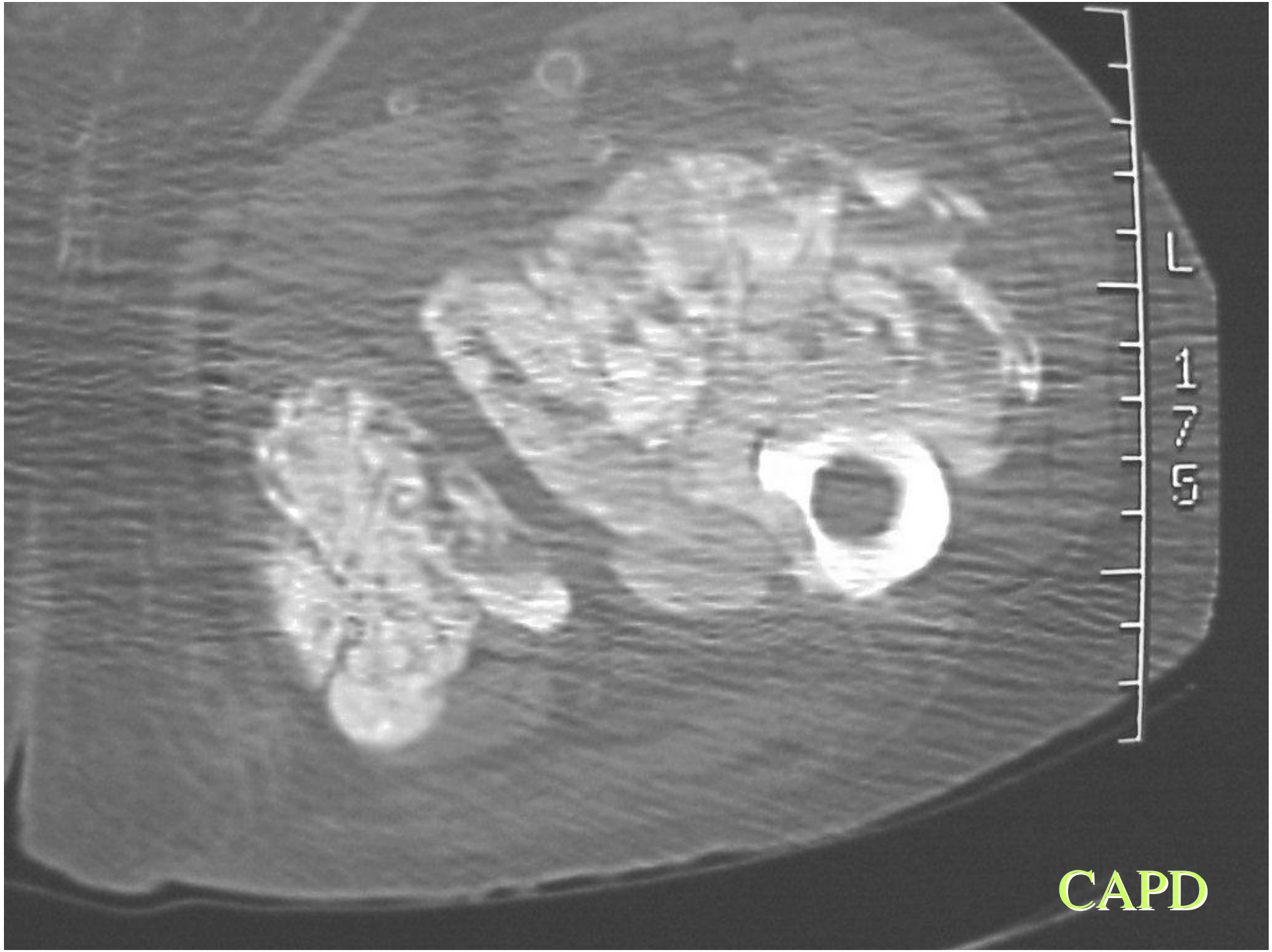
Tumoral calcinosis

DDX

- Idiopathic
- Renal osteodystrophy
- Gout
- Hypervitaminosis D
- Hyperparathyroidism
- Collagen vascular Disease

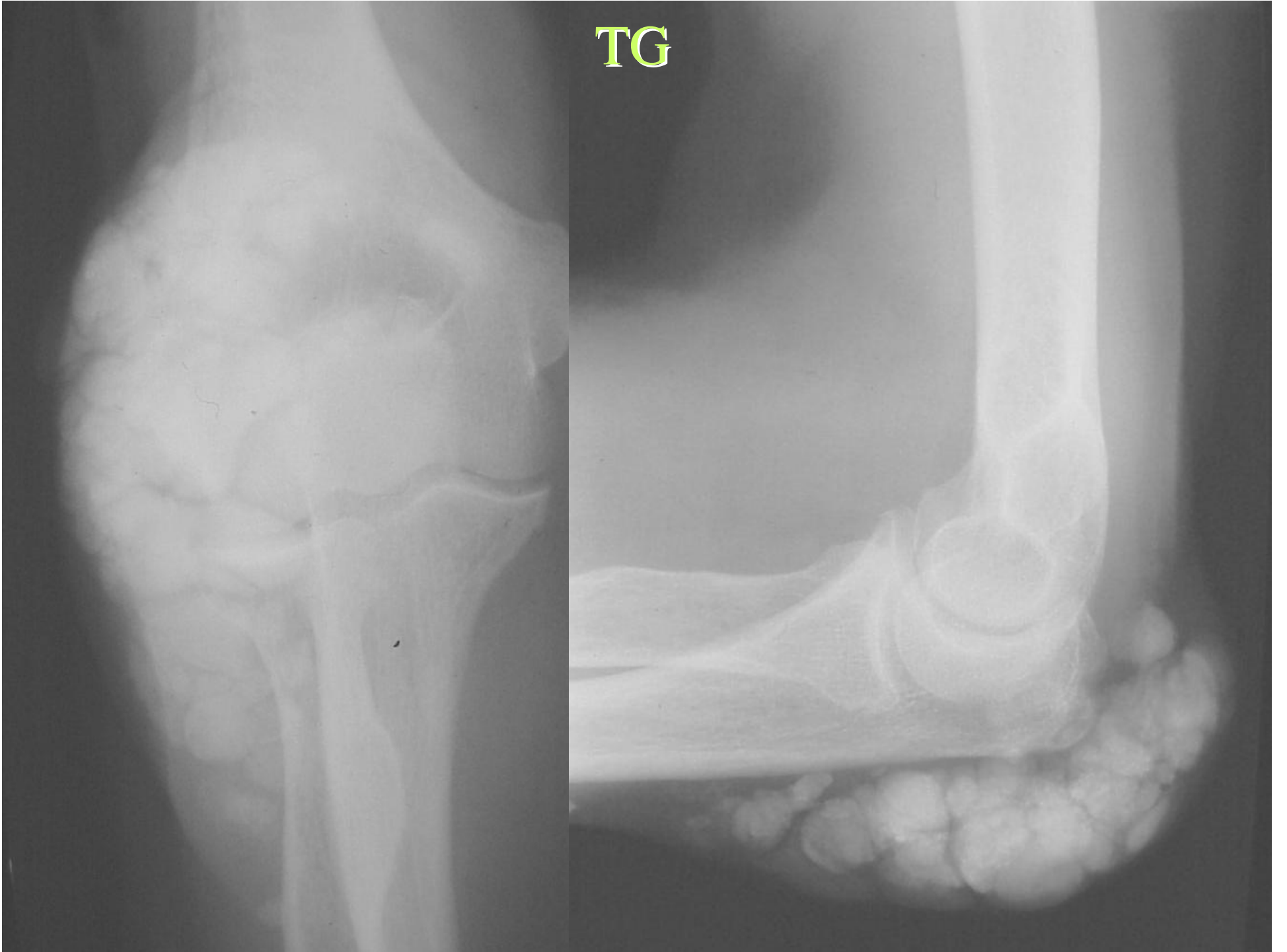


ITC



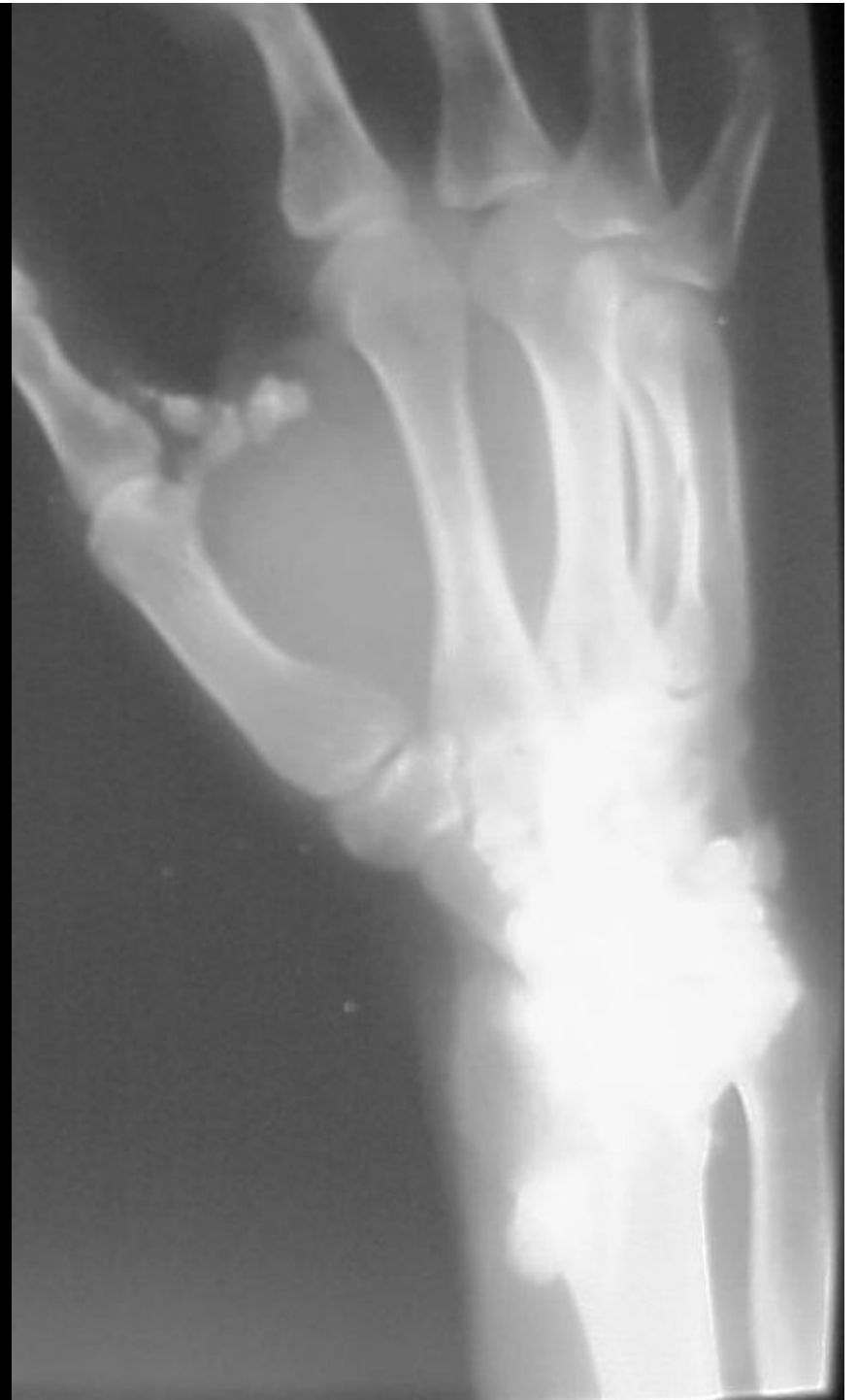
CAPD

TG





Sc1



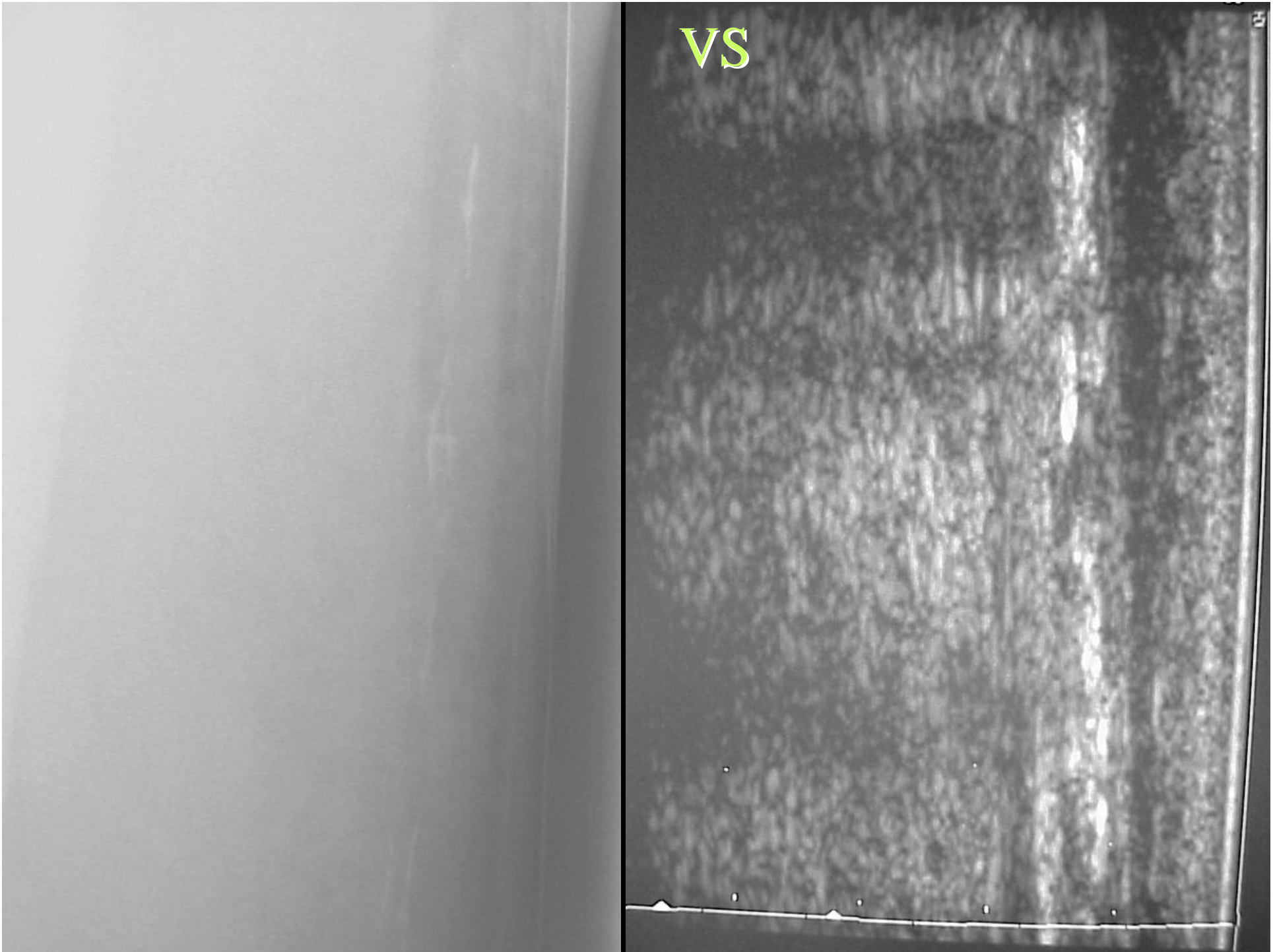
Calcification

By shape

Sheets of Calcification

- Dermatomyositis
- Fibrodysplasia ossificans progressiva
- Venous stasis

VS



Calcification

By shape

Some characteristic shapes

- Circle or oval, lucent centre
 - Phlebolith, Spherule, Cysterci
- Reticulated
 - Dermatomyositis



ED



CC



Phl

Calcification

By site

- Generalized
- Localized
 - Periarticular
 - Tendons and bursa
 - Finger tips
 - Articular cartilage
 - Disc
 - Pinna

Calcification

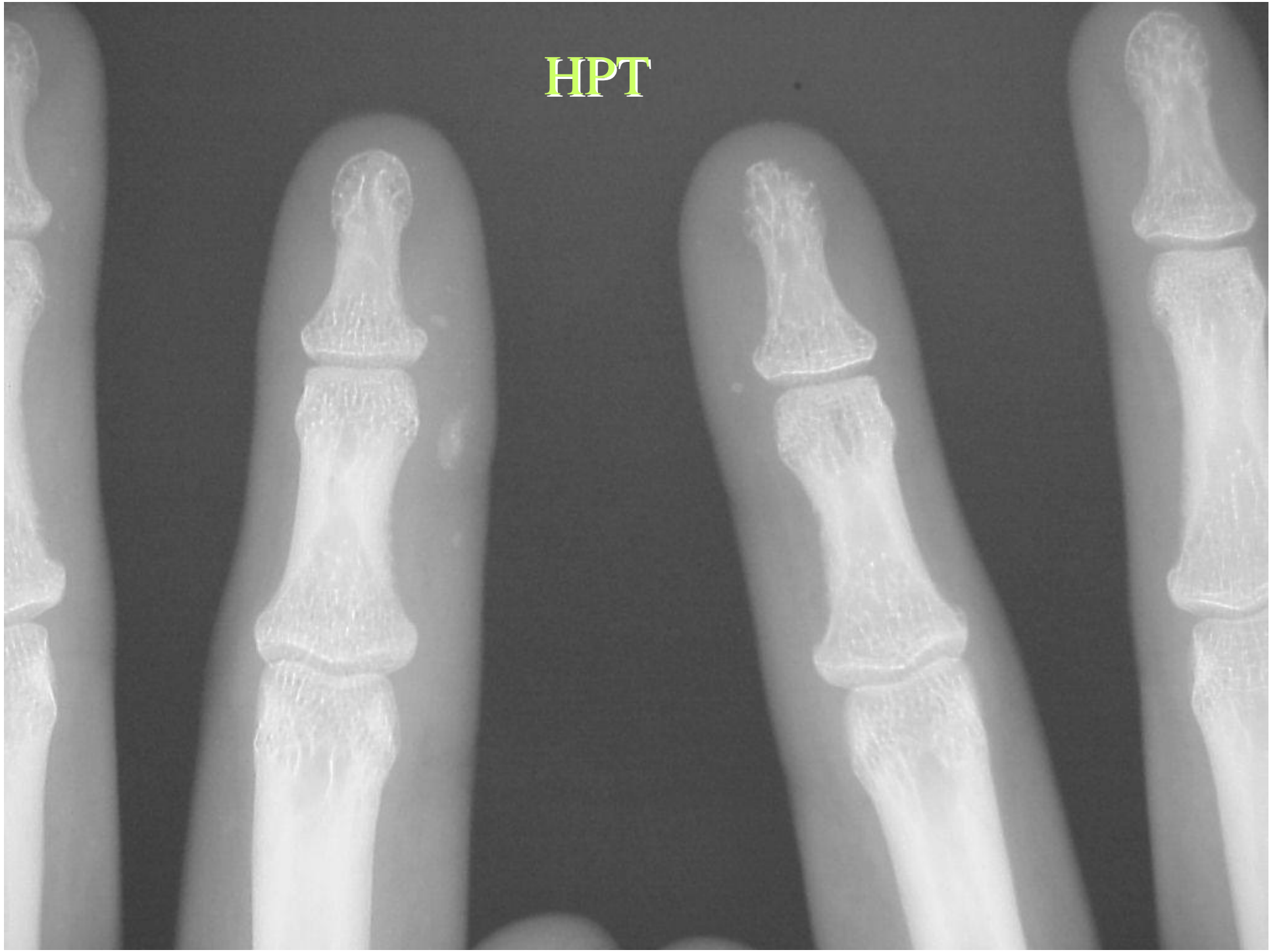
By site

Periarticular

- Hyperparathyroidism
- Renal osteodystrophy
- Milk alkali syndrome
- Hypervitaminosis D
- Collagen vascular disease

- Exclude intraarticular

HPT

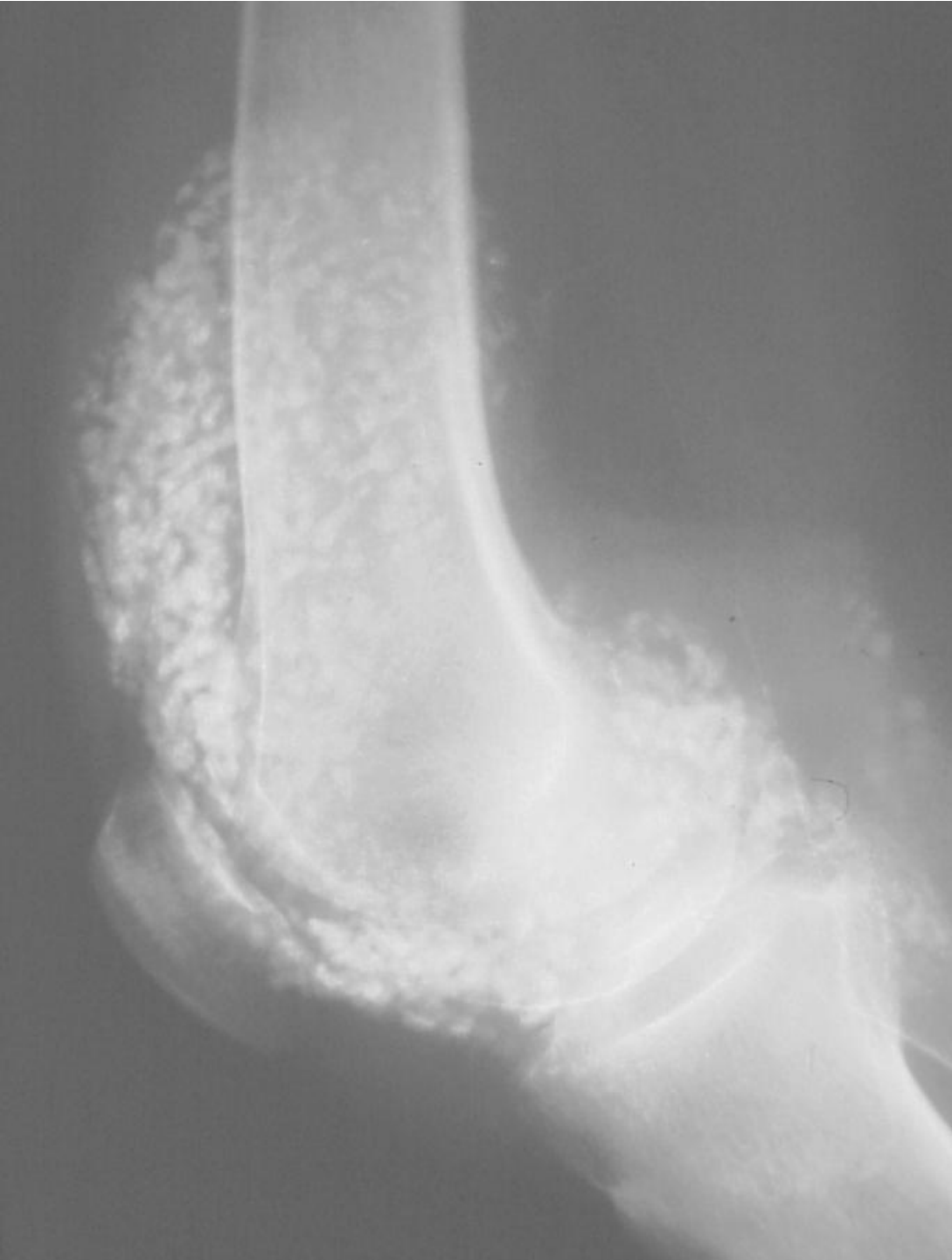




Sc1



IAB



PSOC

Calcification

By site

Tendons and Bursa

- Calcium hydroxyapatite deposition disease
- Calcium pyrophosphate dihydrate deposition disease

Calcification

By site

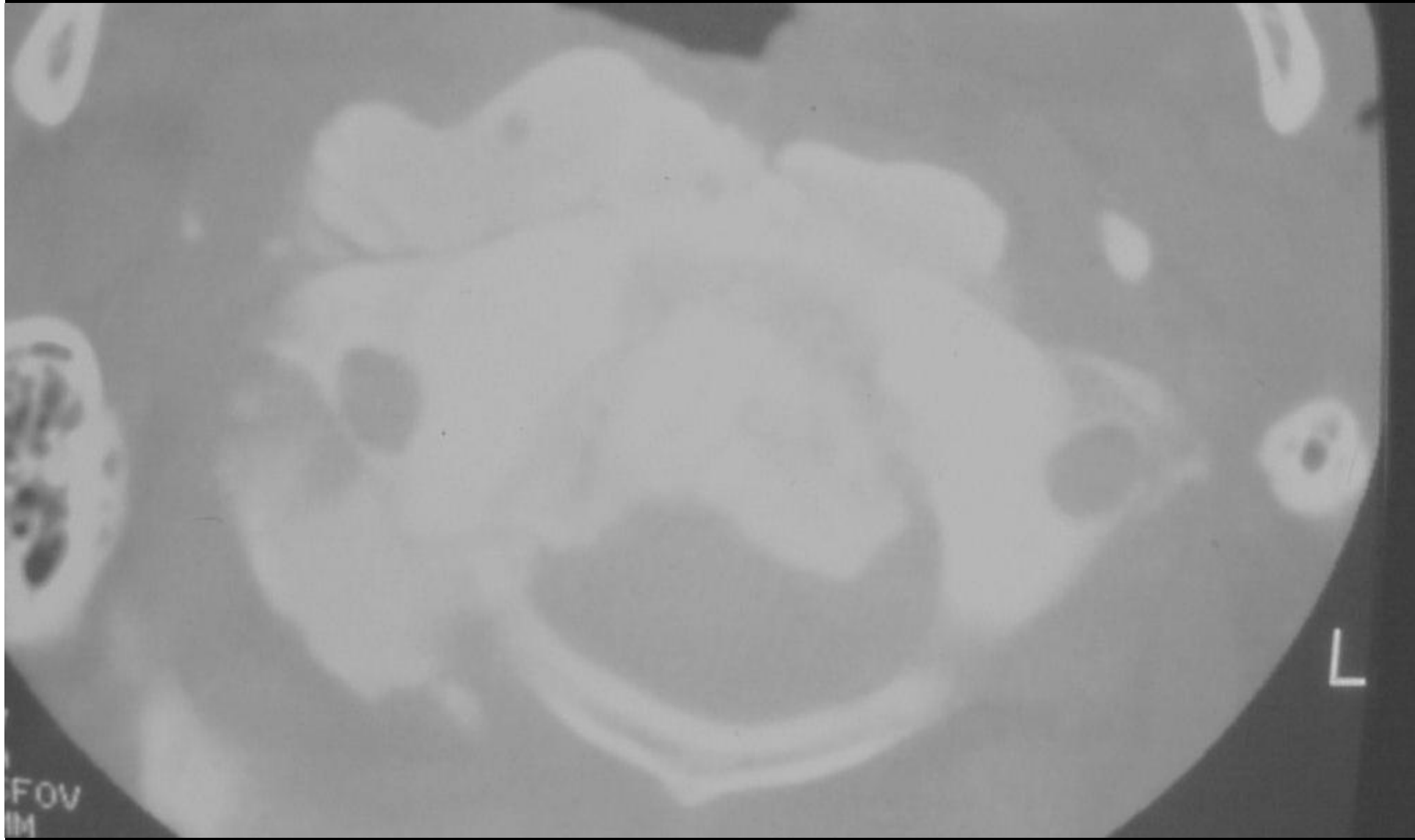
Tendons and Bursa

CPPD

MCPCDD

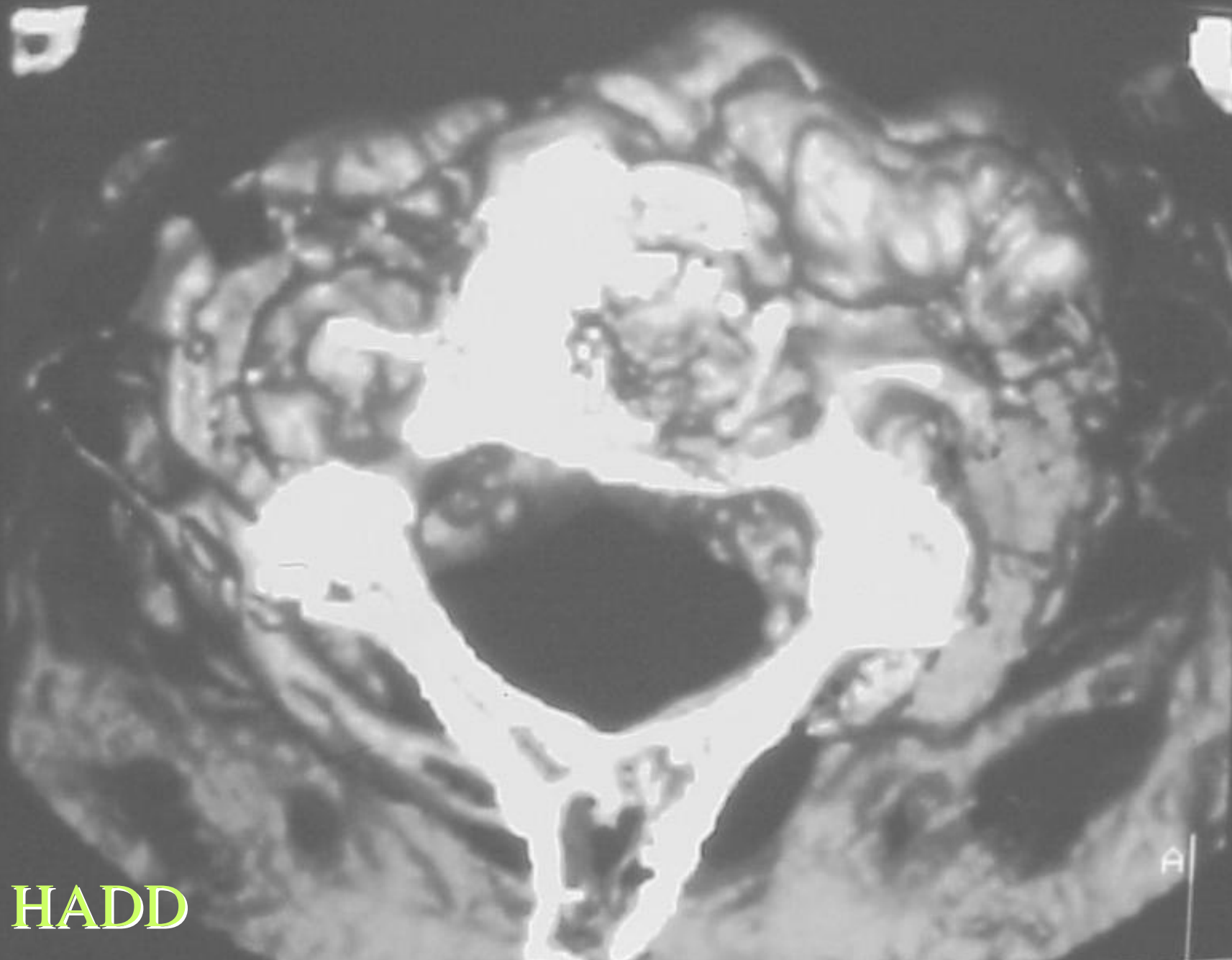
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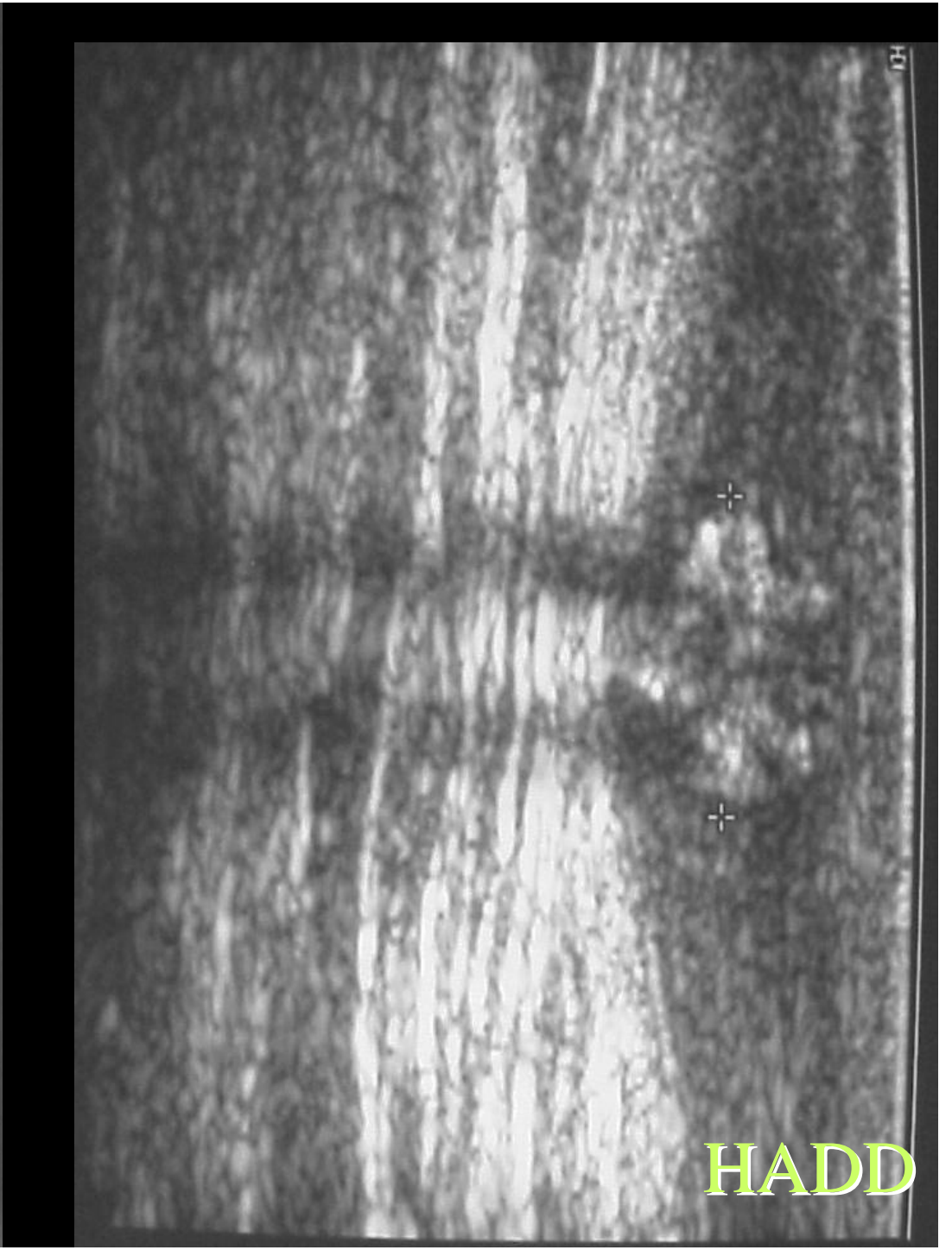
- Linear
 - Articular
 - Achilles, Quads, Tri
 - Ass. arthritis
- Rounded
 - Amorphous
 - Tendons and Bursa
 - Rotator cuff

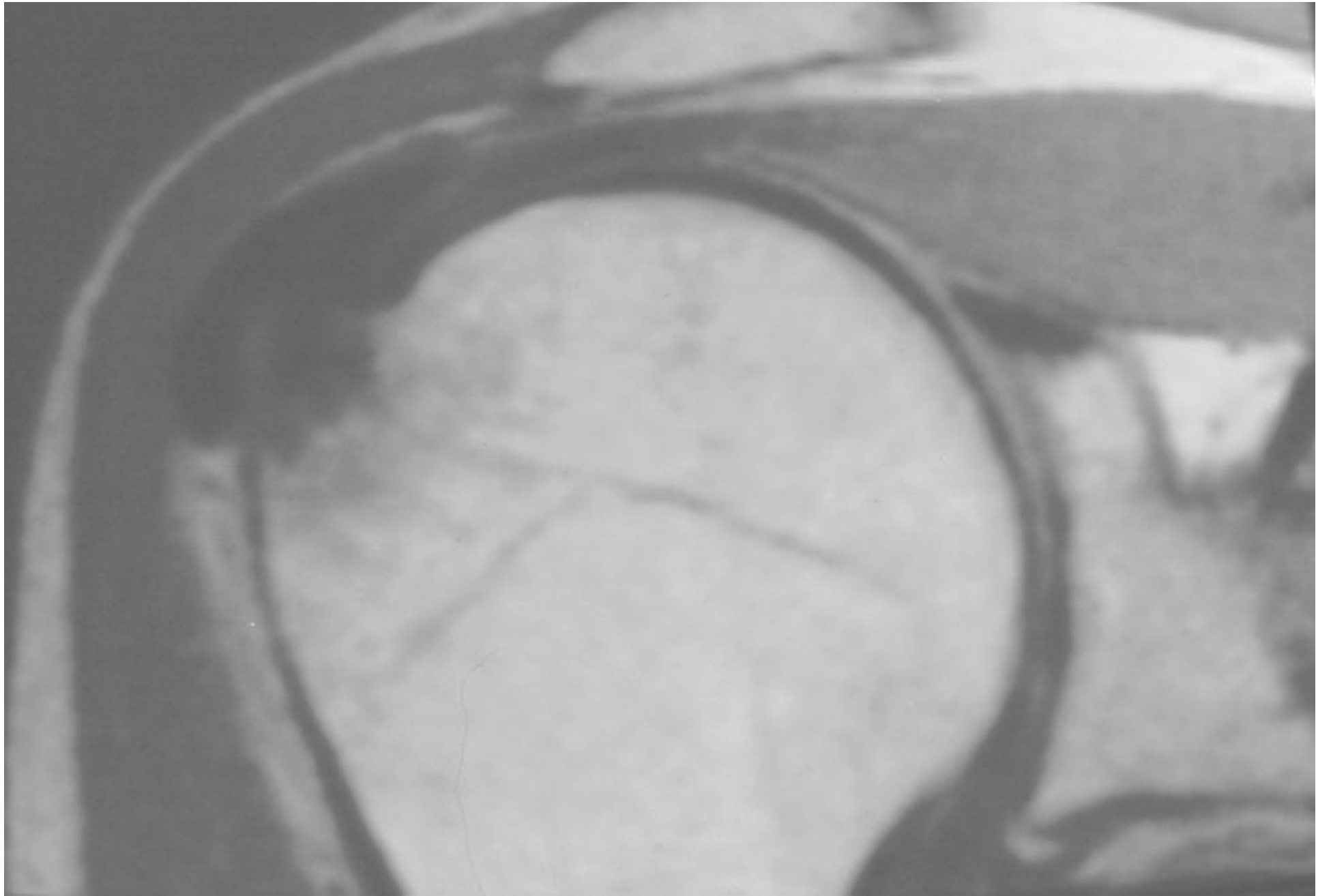


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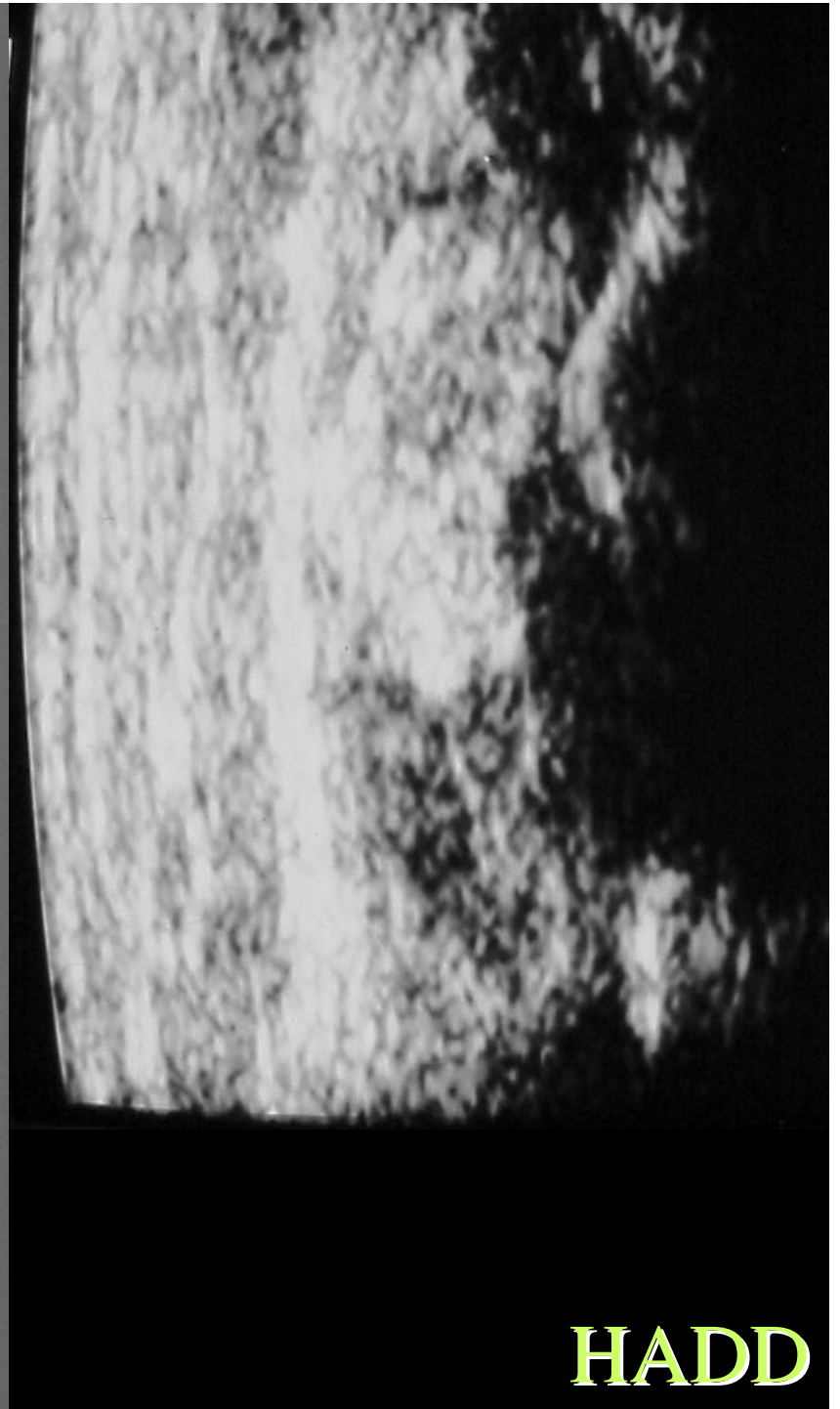
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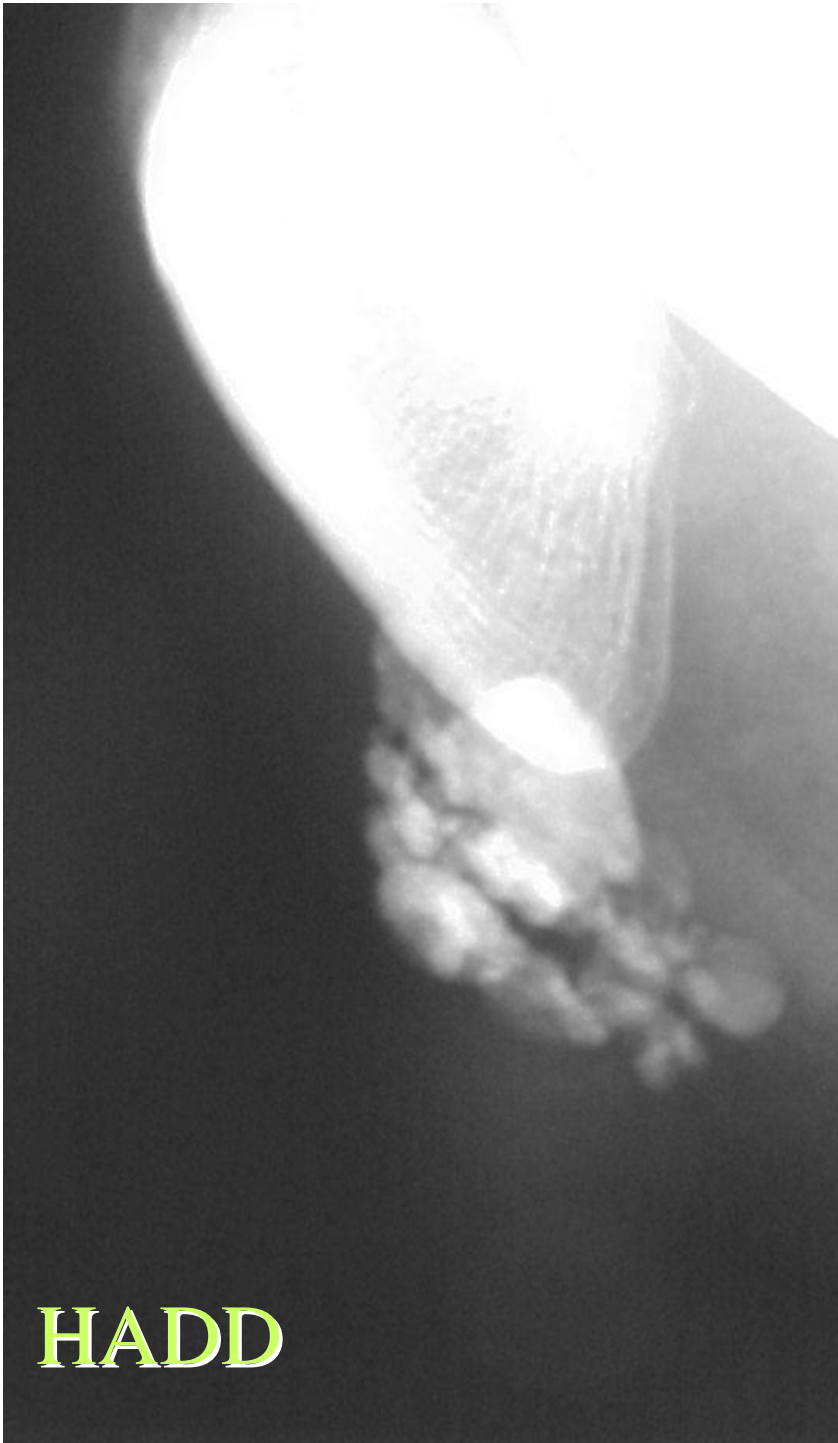




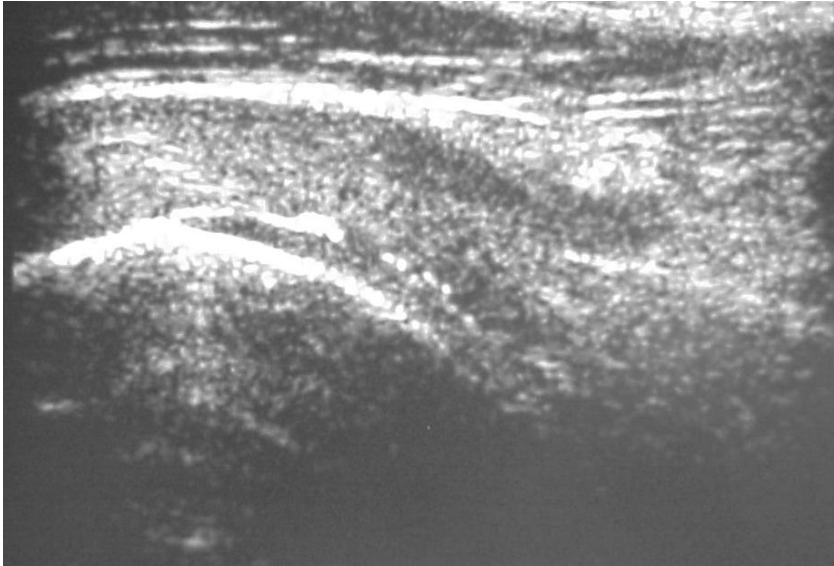
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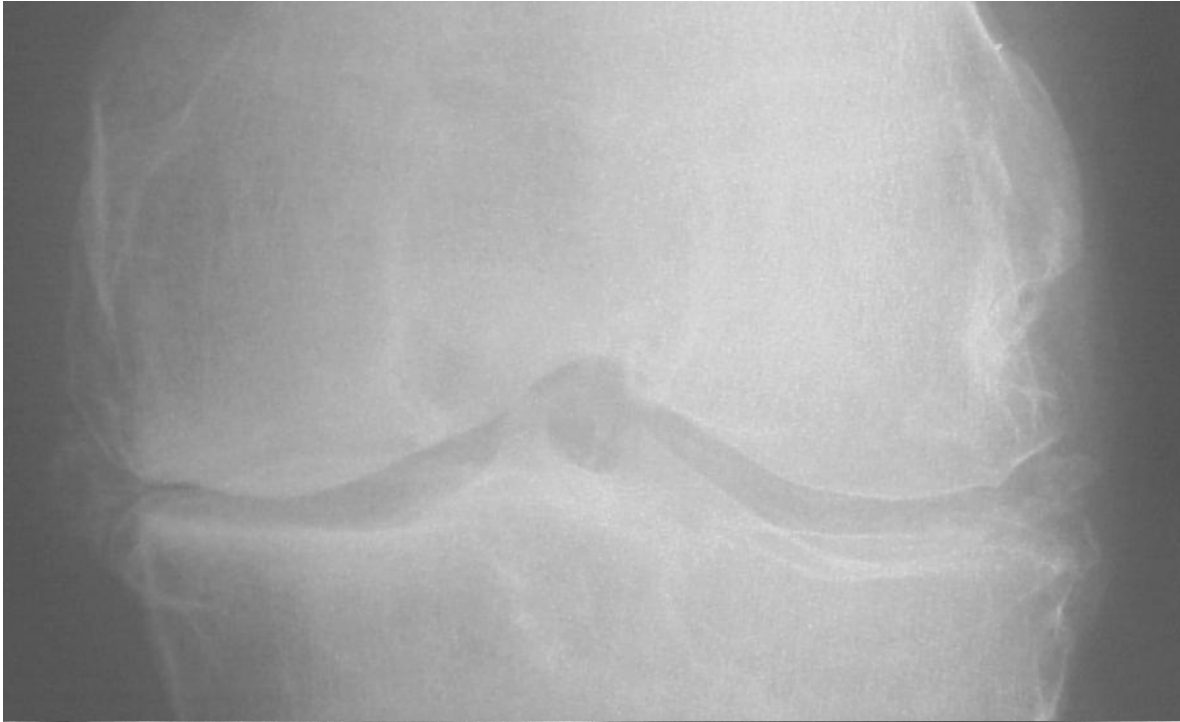
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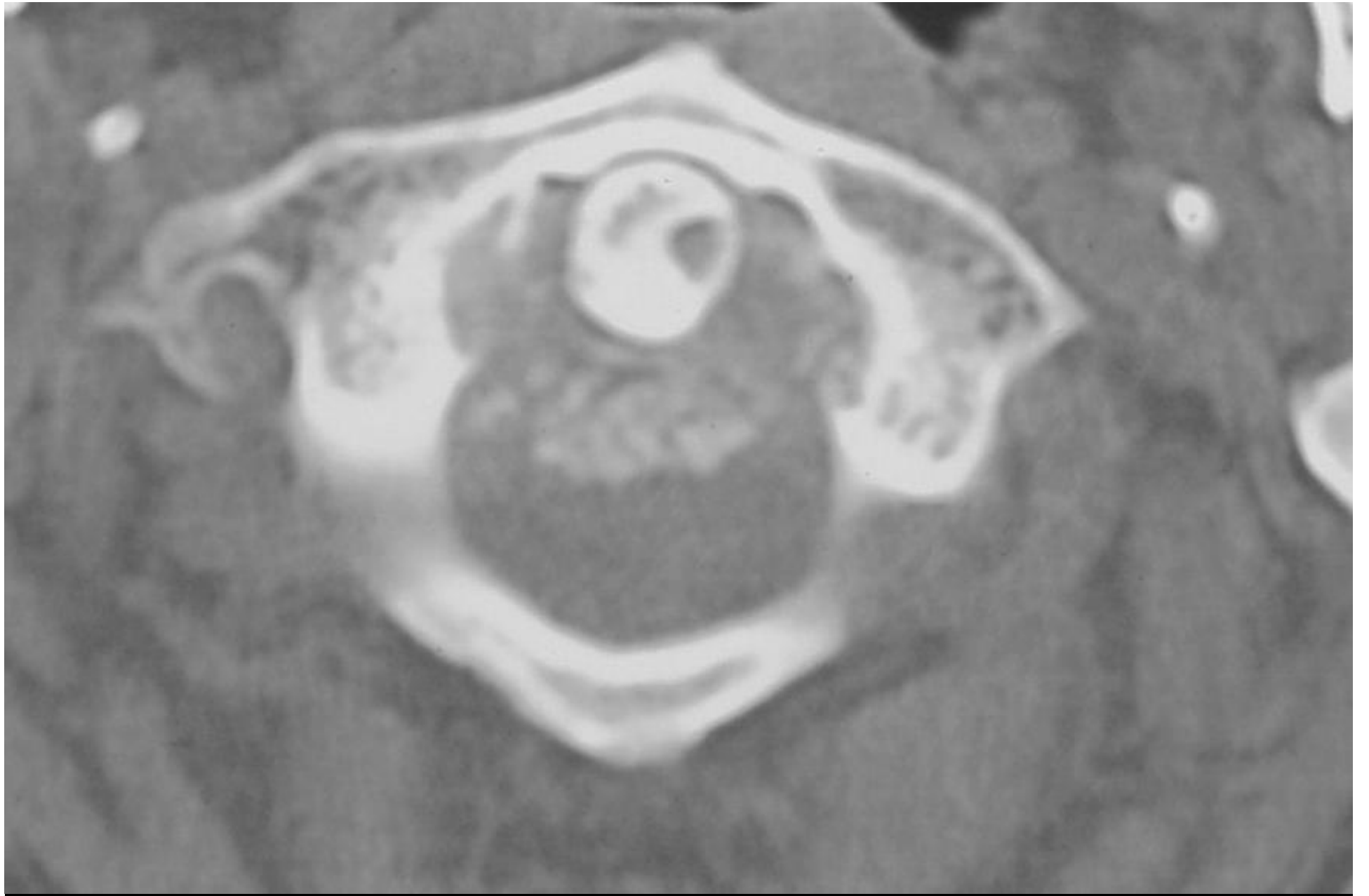
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CPPD



CPPD



CPPD

Calcification

By site

Finger Tips

- Scleroderma
- CREST
- Dermatomyositis
- Trauma



Calcification

By site

Articular cartilage

- Osteoarthritis
- CPPD
- HADD
- Hyperparathyroidism
- Haemochromatosis

CPPD



Calcification

By site

Pinna

- Thermal
- Endocrine
- Perichondritis
- CPPD
Gout
- Dermatomyositis
- Alkaptonuria



Alkap

Calcification

By site

Intervertebral disc

- Trauma
- CPPD
- Hyperparathyroidism
- Immobilization
- Alkaptonuria

Calcification

By site

Intervertebral Disc Calcification

- Nucleus pulposus
- Annulus fibrosus
 - Inner
 - Outer

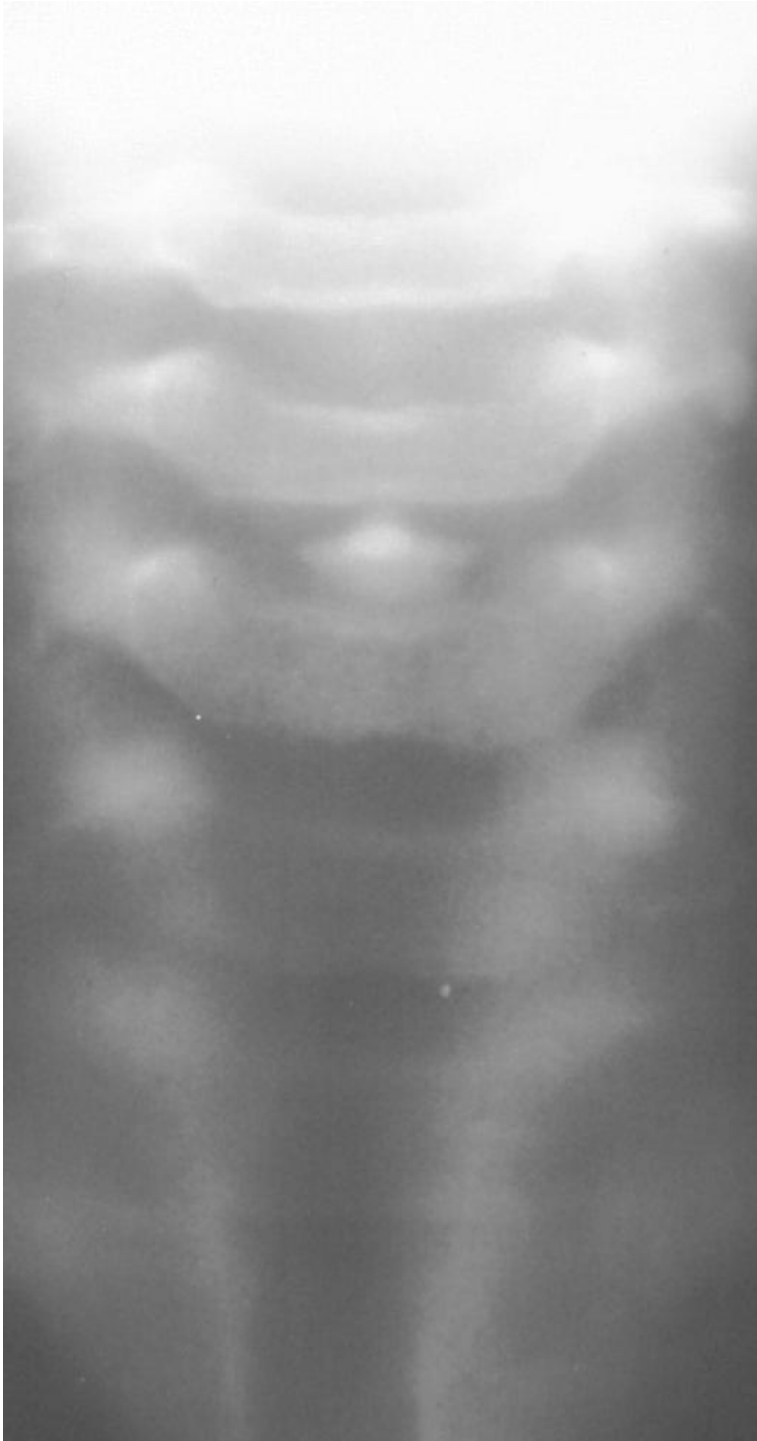
Calcification

By site

Intervertebral Disc Calcification

Nucleus Pulposus

- Degenerative spondylosis (Dorsal)
- Ankylosing spondylitis
- Juvenile chronic arthritis
- DISH
- Gout
- Idiopathic
 - Children - transient
 - Adults - persistent



Idio



Calcification

By site

Intervertebral Disc Calcification

Annulus Fibrosus

- Inner fibres
 - Alkaptonuria (Ochronosis)
- Outer fibres
 - CPPD
 - Haemochromatosis
 - Following spinal fusion

Calcification

By site

Distribution of Collagen Vascular disease

- Proximal
 - Dermatomyositis
- Distal
 - Ehlers Danlos
 - Scleroderma
- Lower limb
 - SLE

Calcification

By age

- Idiopathic calcinosis universalis
- Dermatomyositis
- Hyperparathyroidism
- Osteoma cutis
- Albright's hereditary osteodystrophy

By Aunt Mini

