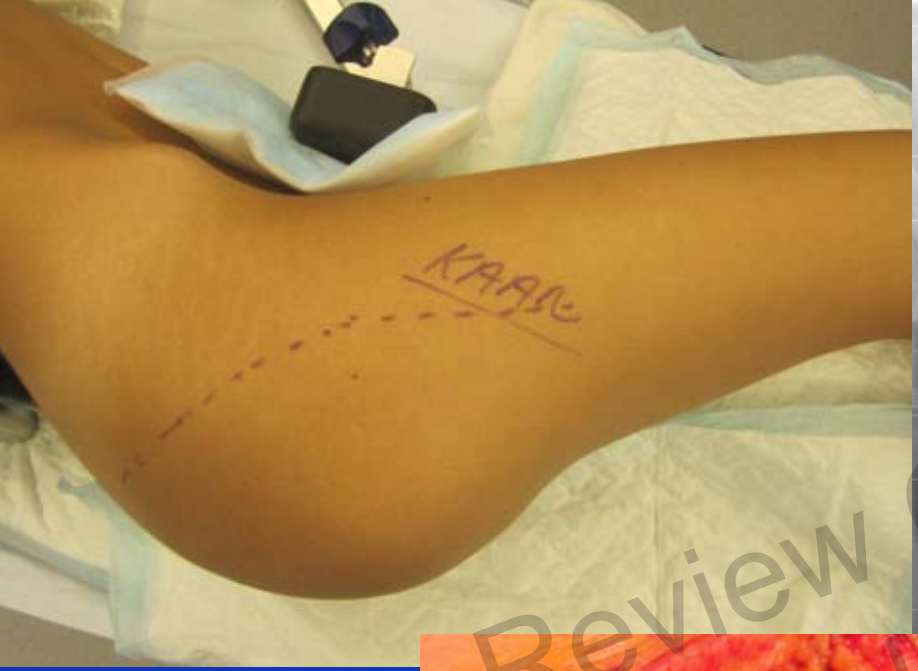
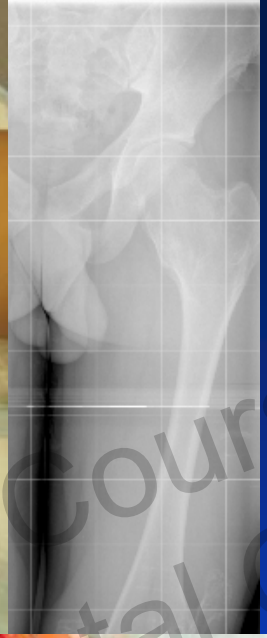
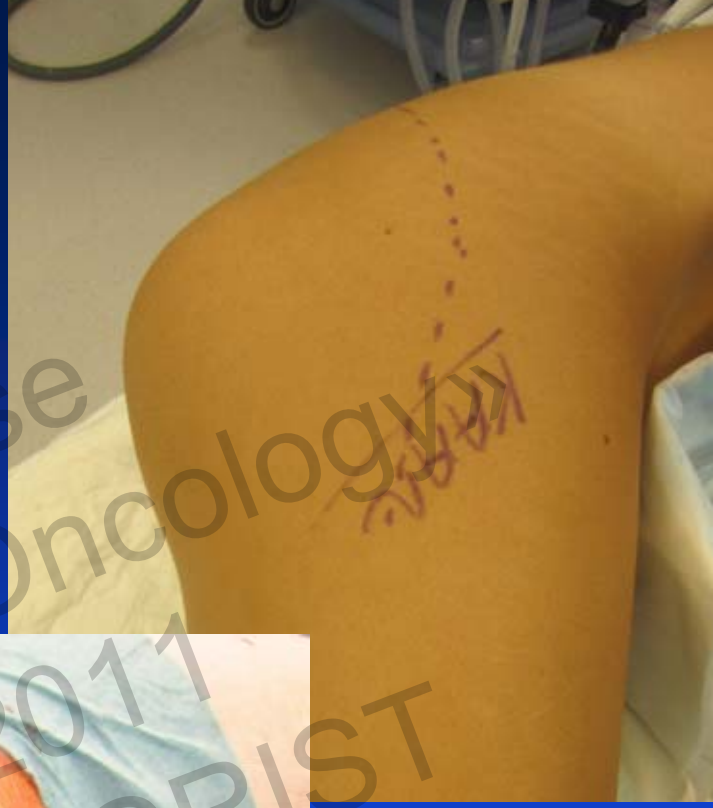
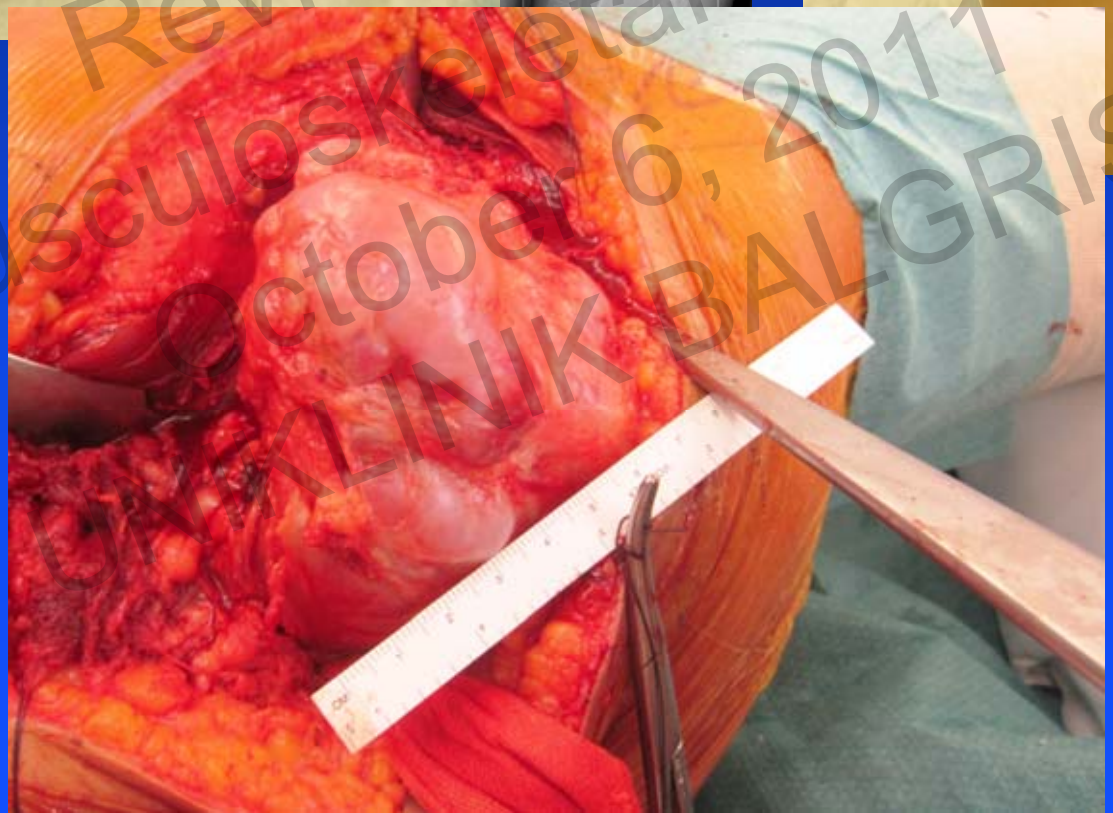








BONE TUMOR COURSE, ZURICH OCT 6TH 2011

COMMON PRINCIPLES OF PRIMARY BONE TUMORS

ANDRE J KAELIN
PEDIATRIC ORTHOPEDICS
GENEVA

- **AS PRIMARY BONE TUMORS OCCURS MAINLY IN CHILDHOOD AND DURING GROWTH PERIOD, I WILL MAINLY SPEAK ABOUT MY PEDIATRIC ORTHOPEDIC EXPERIENCES**

GLOBAL TREATMENT

SUSPICION

COMPLAINS, HISTORY, STATUS

CONFIRMATION

IMAGING, BIOPSY, BIOLOGIC TESTS

ACTION

CURETTAGE, EXCISION, RESECTION, RECONSTRUCTION, CHEMO, X-RAY TH

SUSPICION

FOLLOW-UP, REGULAR CHECK

RECURRENCE

CLINICAL SUSPICION

- PAIN (EXERCISE, REST, NIGHT)
- SOLID MASS
- SWELLING AND/OR INFLAMMATION
- PATHOLOGIC FRACTURE
- INCIDENTAL FINDING
- LOCALIZATION, AGE

HISTORY

- DURATION
- EFFECT ON FUNCTION
- EFFECT ON GENERAL CONDITION
- INFLUENCE OF PRIOR TREATMENTS
- FAMILY

CLINICAL EXAMINATION

- INSPECTION
- PALPATION, POINT OF MAXIMUM PAIN
- FALSE MOBILITY (FRACTURE)
- MOBILITY (ACTIVE, PASSIVE)
- NEUROLOGY
- FEVER
- GENERAL HEALTH

THE MOST COMMON BONE PRIMARY TUMORS (LESIONS)

TRUE BONE TUMORS

- OSTEOID OSTEOMA
- OSTEOBLASTOMA
- OSTEOSARCOMA
- EWING SARCOMA

BONE LESIONS, DYSPLASIA, CARTILAGE

- UBC, ABC
- NONOSSIFYING FIB.
- FIBROUS DYSPLAISA
- OSTEOCHONDROMA
- ENCONDROMA (OLLIER)
- CHONDROBLASTOMA
- EOSINOPHILIAC GRAN.
- GIANT CELL TUMOR
- NF
- LEUKEMIA
- NEUROBLASTOMA

Rib
Osteochondroma
Enchondroma
Fibrous dysplasia
Eosinophilic granuloma
Ewing sarcoma*
(Fibrous dysplasia)
(Aneurysmal bone cyst)
(Osteoid osteoma)

Clavicle
Eosinophilic granuloma
Ewing sarcoma*
Osteosarcoma*

Scapula
Osteochondroma
Eosinophilic granuloma
Aneurysmal bone cyst
Fibrous dysplasia
Ewing sarcoma*
Osteosarcoma*

Vertebra
Eosinophilic granuloma
Osteoid osteoma
Osteoblastoma
Aneurysmal bone cyst
Ewing sarcoma*
(Enchondroma)
(Osteosarcoma*)
(Lymphoma*)
(Chordoma)

Pelvis
Eosinophilic granuloma
Aneurysmal bone cyst
Osteochondroma
Fibrous dysplasia
Ewing sarcoma*
(Enchondroma)
(Osteoid osteoma)
(Simple bone cyst)
(Chondroblastoma)
(Osteosarcoma*)
(Lymphoma*)

Humerus
Simple bone cyst
Osteochondroma
Osteosarcoma*
Ewing sarcoma*
Chondroblastoma

Sacrum
Aneurysmal bone cyst
Osteoid osteoma
Osteoblastoma
Chondroblastoma
Eosinophilic granuloma
Giant cell tumor
Ewing sarcoma*
(Osteosarcoma*)
(Lymphoma*)

Femoral neck
Fibrous dysplasia
Osteochondroma
Simple bone cysts
Osteoid osteoma
Chondroblastoma
Aneurysmal bone cyst

Hand
Enchondroma
Aneurysmal bone cyst
Osteoid osteoma
Ewing sarcoma*
(Epidermoid cysts)
(Osteoblastoma)
(Chondromyxoid fibroma)
(Osteosarcoma*)
(Malignant vascular tumors*)

Midshaft femur
Eosinophilic granuloma
Osteoid osteoma
Ewing sarcoma*
(Osteosarcoma*)

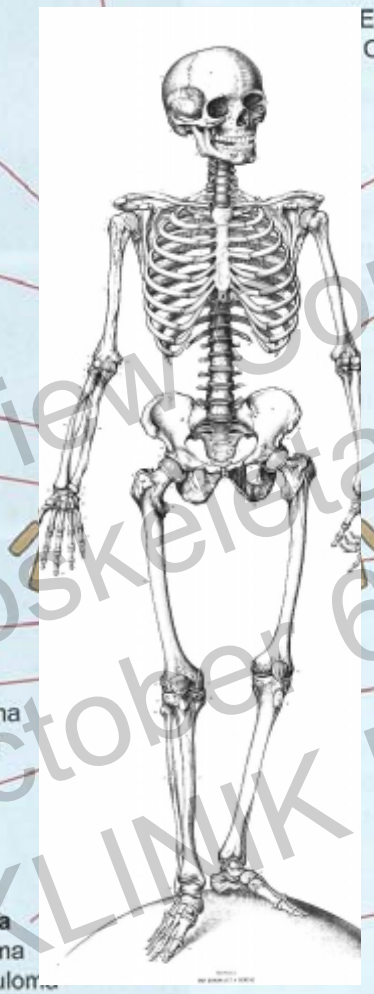
Distal femur
Nonossifying fibroma
Osteochondroma
Osteosarcoma*

Epiphysis
Enchondroma
Chondroblastoma
Osteoid osteoma
Eosinophilic granuloma
Fibrous dysplasia

Foot
Enchondroma
Simple bone cysts
Aneurysmal bone cyst
Osteoid osteoma
Osteoblastoma
Ewing sarcoma*
(Chondroblastoma)
(Chondromyxoid fibroma)
(Giant cell tumor)
(Osteosarcoma*)
(Malignant vascular tumors*)

Proximal tibia
Nonossifying fibroma
Osteochondroma
Osteosarcoma*

Midshaft tibia
Osteoid osteoma
Eosinophilic granuloma
Neurofibromatosis
Fibrous dysplasia
Adamantinoma
Osteosarcoma*
Ewing sarcoma*



AGE AND TUMORS

- OSTEOID OSTEOMA
- OSTEOBLASTOMA
- OSTEOSARCOMA
- EWING SARCOMA

1ST DECADE
2ND DECADE
3RD DECADE/ADULT

- UBC, ABC
- NONOSSIFYING FIB.
- FIBROUS DYSPLASIA
- OSTEOCHONDROMA
- ENCHONDROMA (OLLIER)
- CHONDROBLASTOMA
- EOSINOPHILIAC GRAN.
- GIANT CELL TUMOR
- NF
- LEUKEMIA
- NEUROBLASTOMA

IMAGING

X-RAY

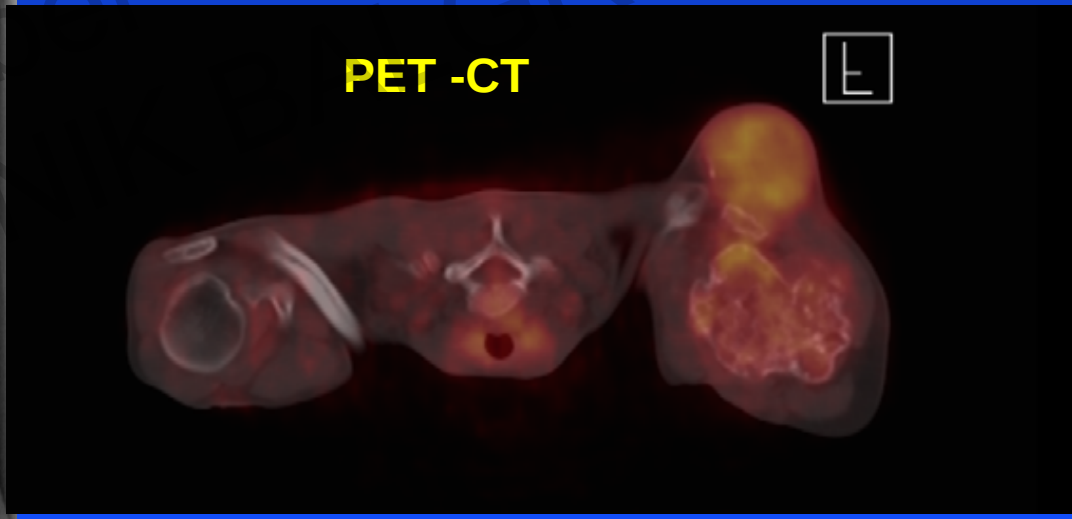
G

LLIER DISEASE

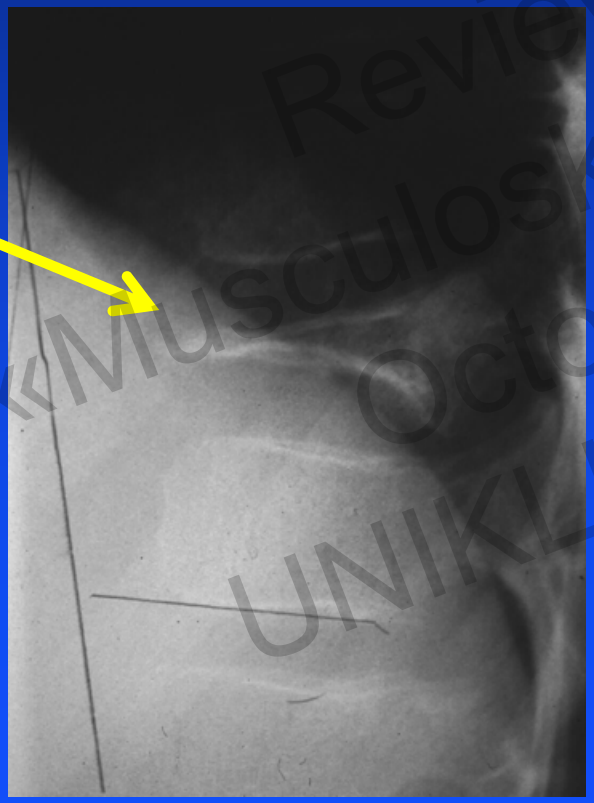
At Detector
20 cm

INJECTED MRI

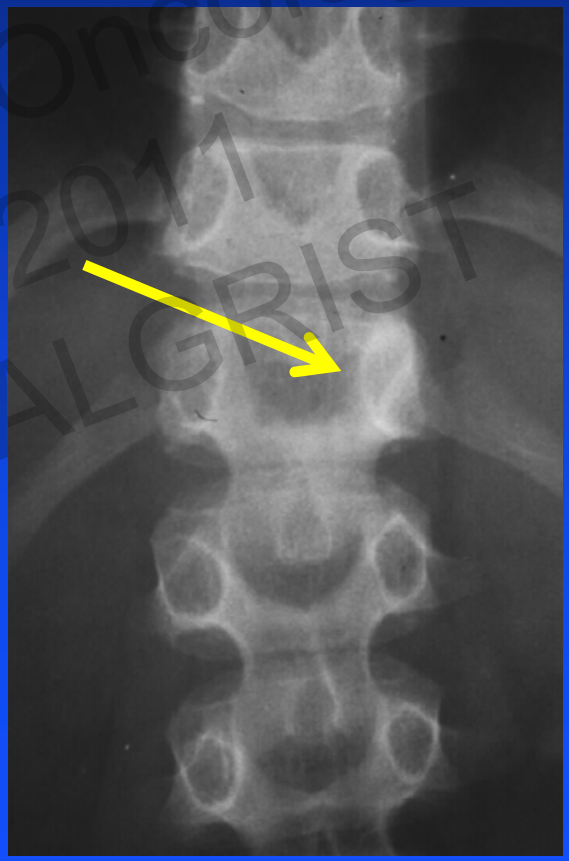
PET -CT



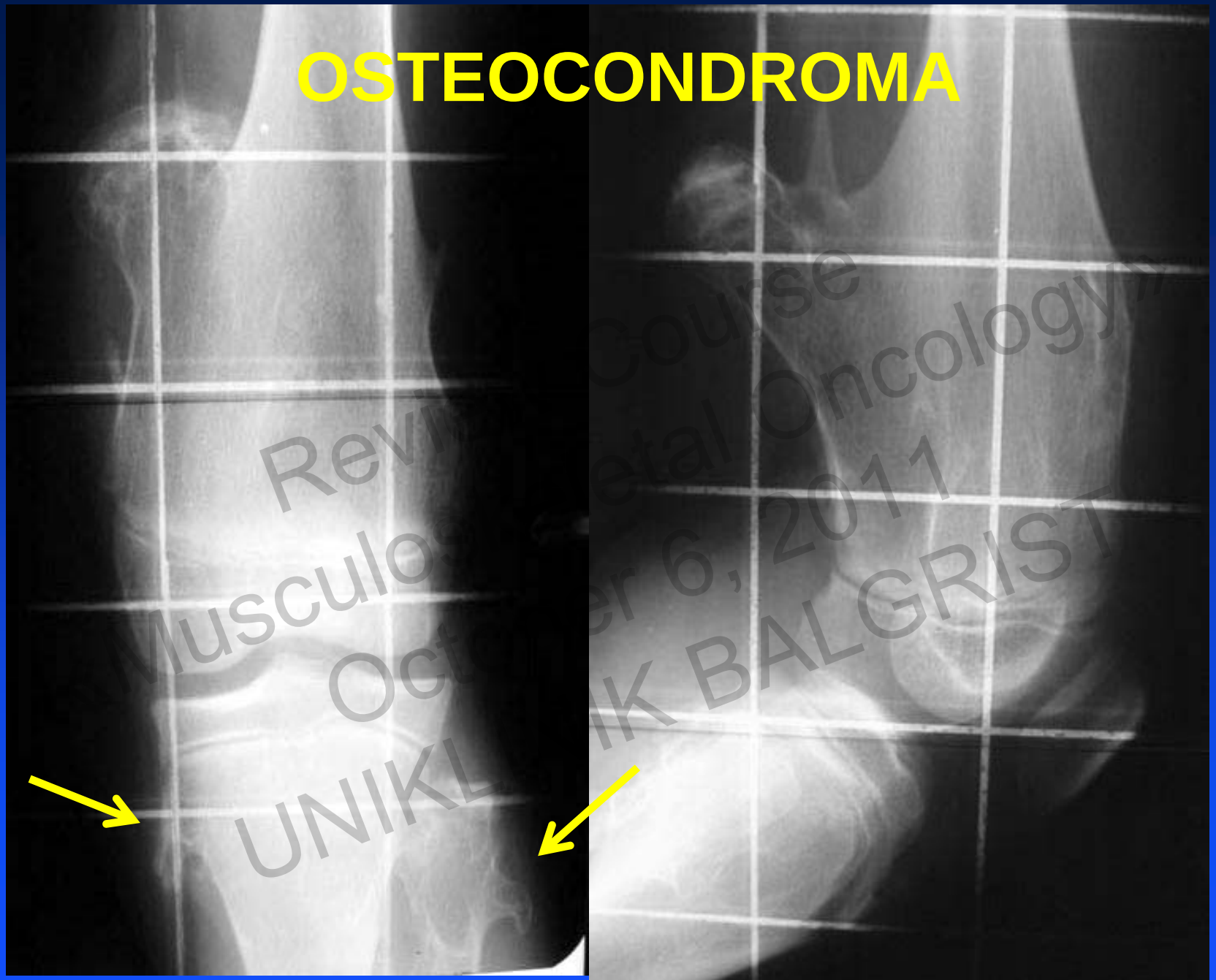
EOSINOPHYLIAC GRANULOMA



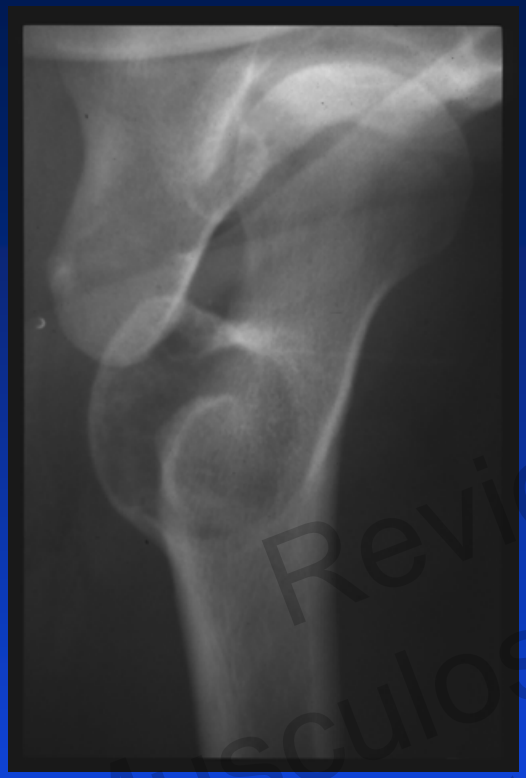
OSTEOID OETEOMA



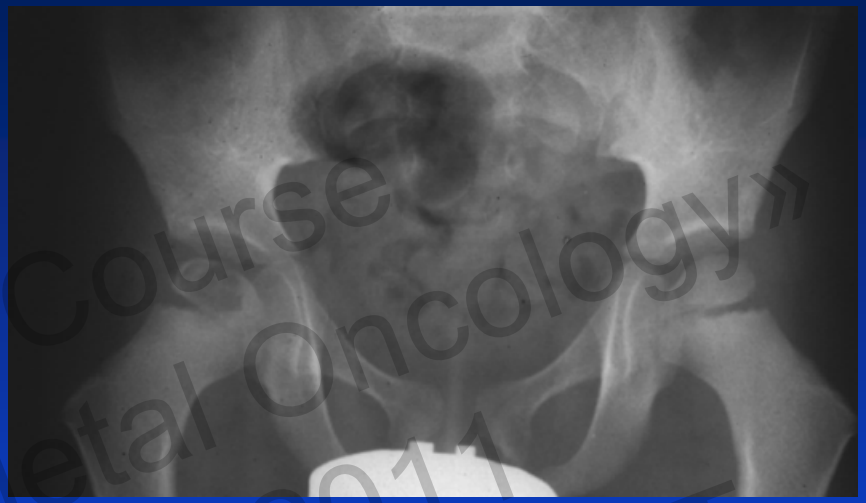
OSTEOCONDROMA



BENIGN TUMOR



CHONDROBLASTOMA



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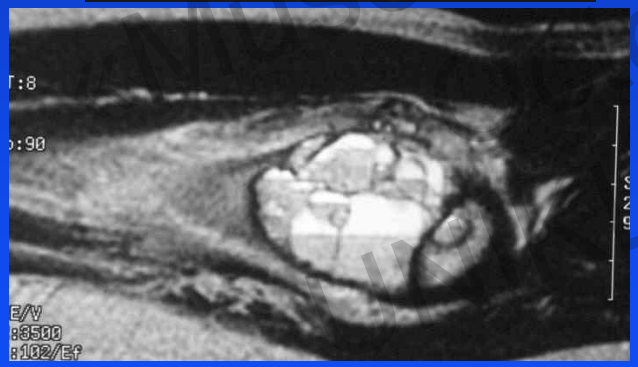
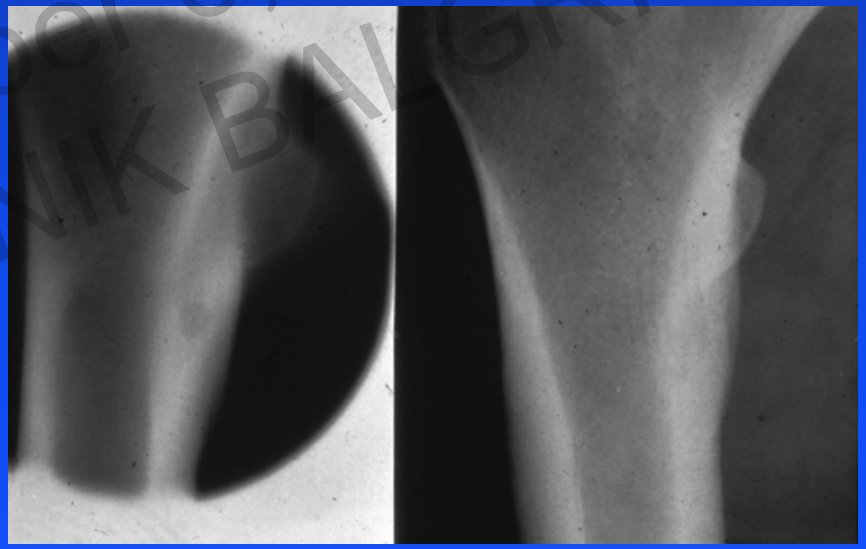
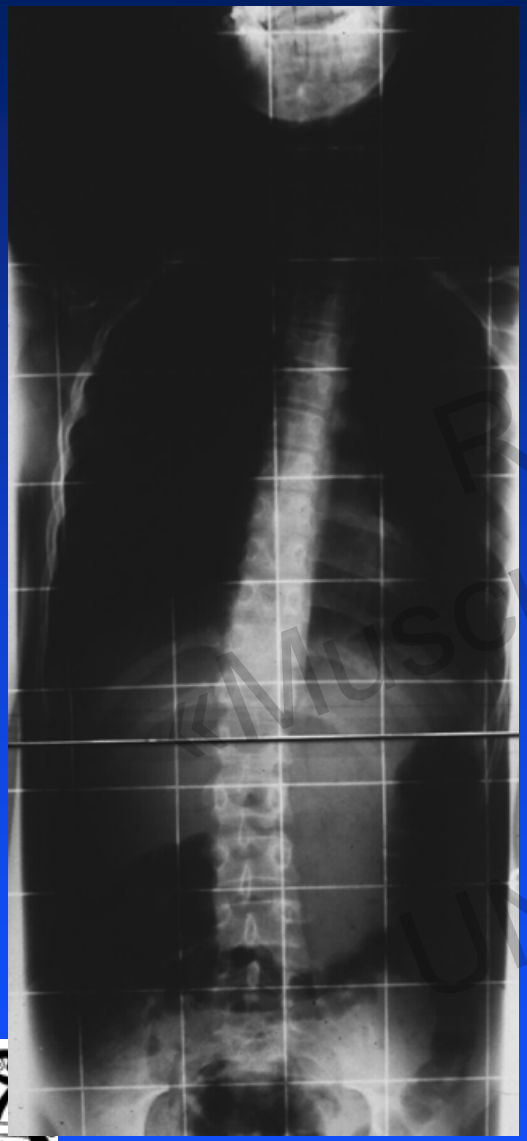
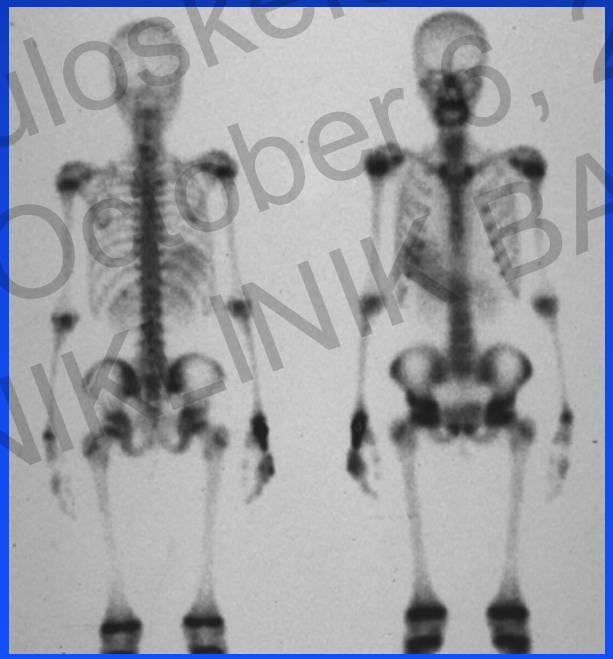


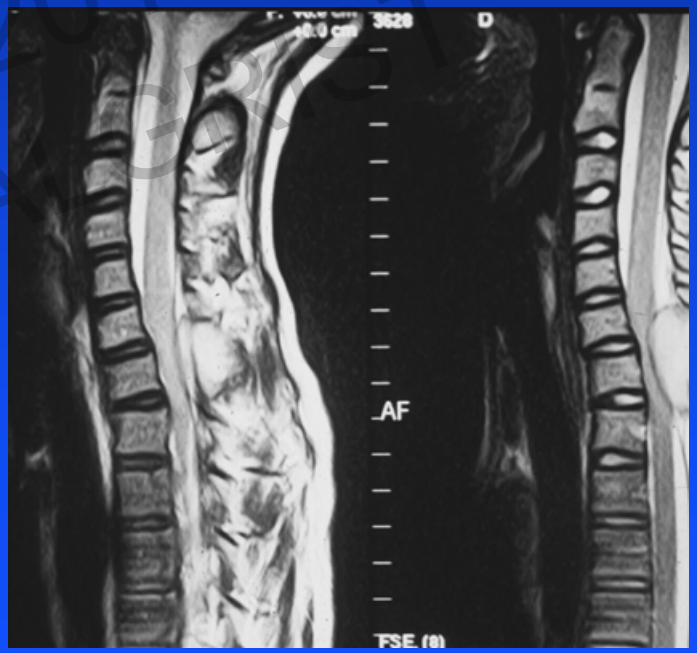


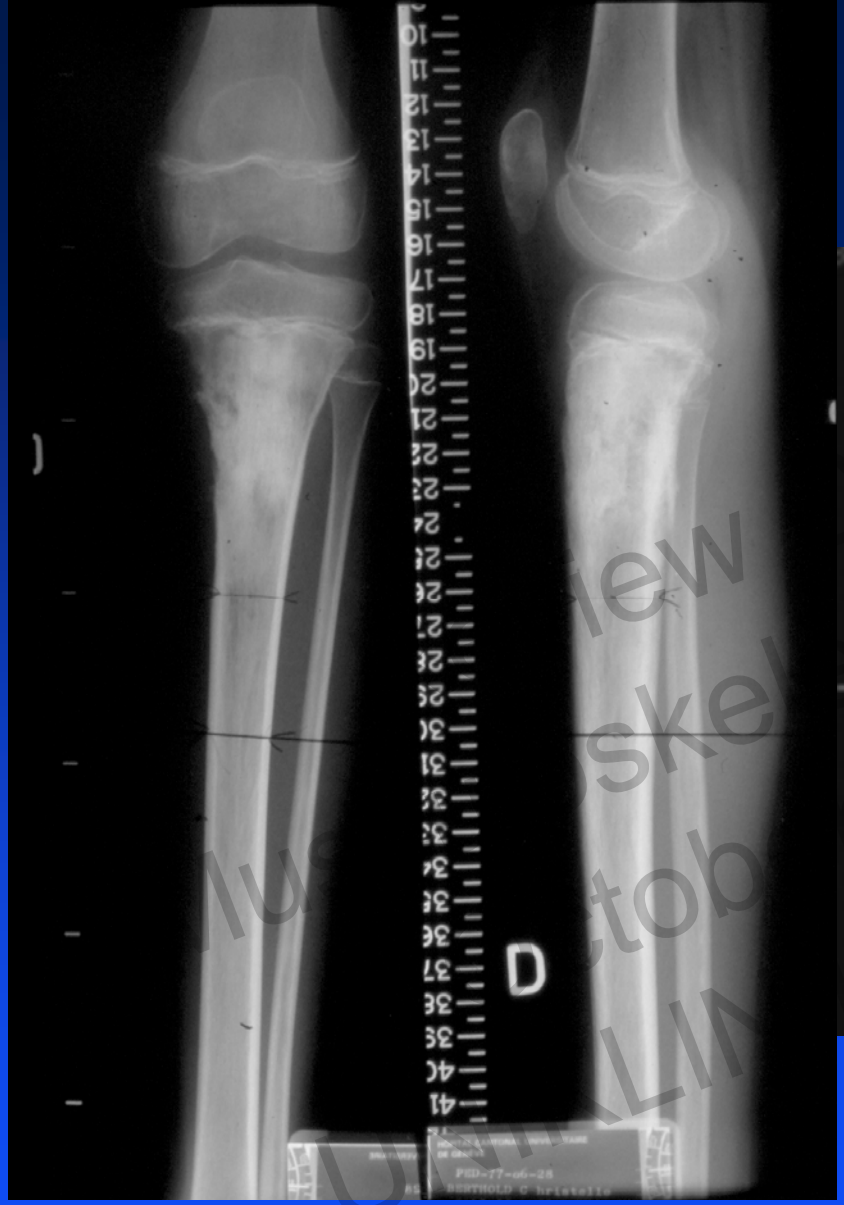
ABC

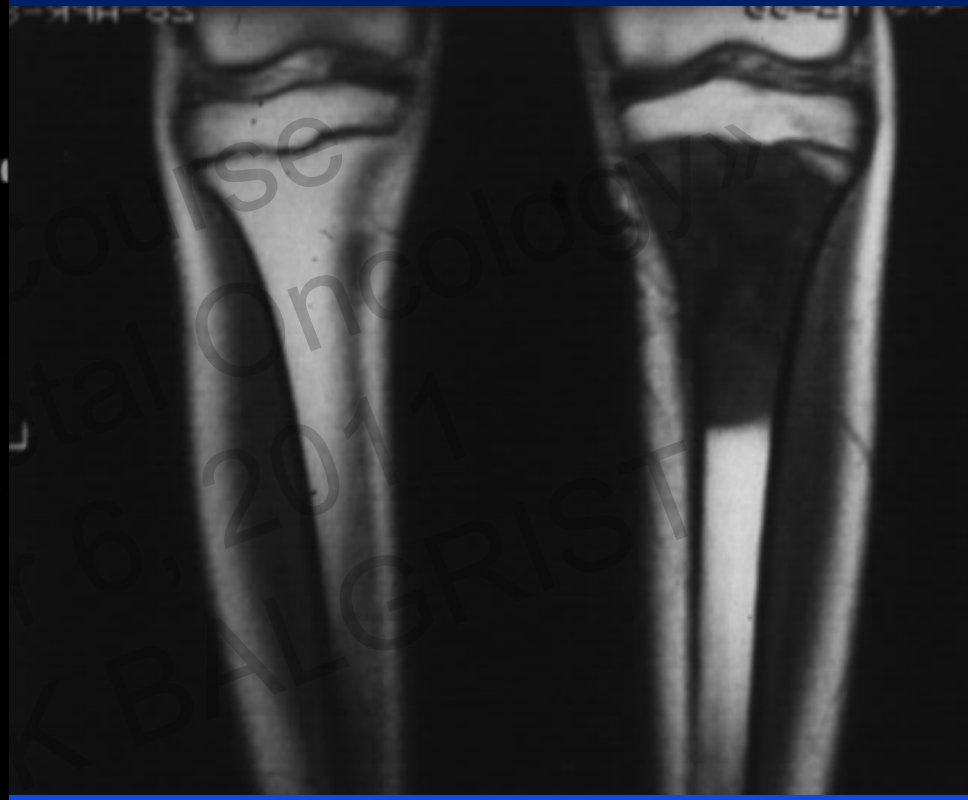
SPINAL TUMOR
OSTEOBLASTOM : C6



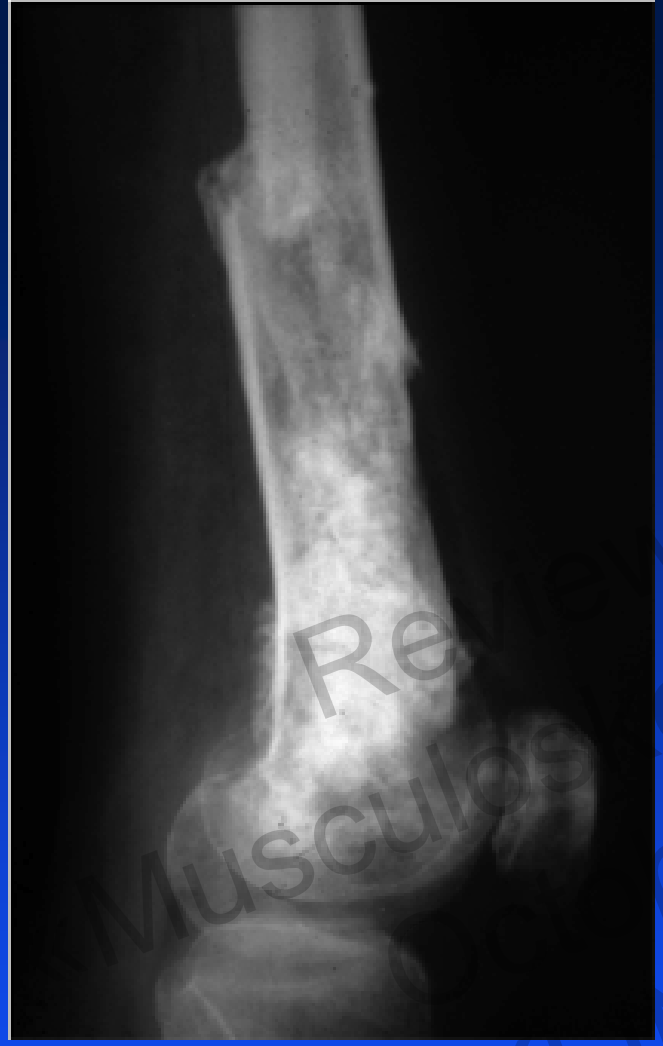


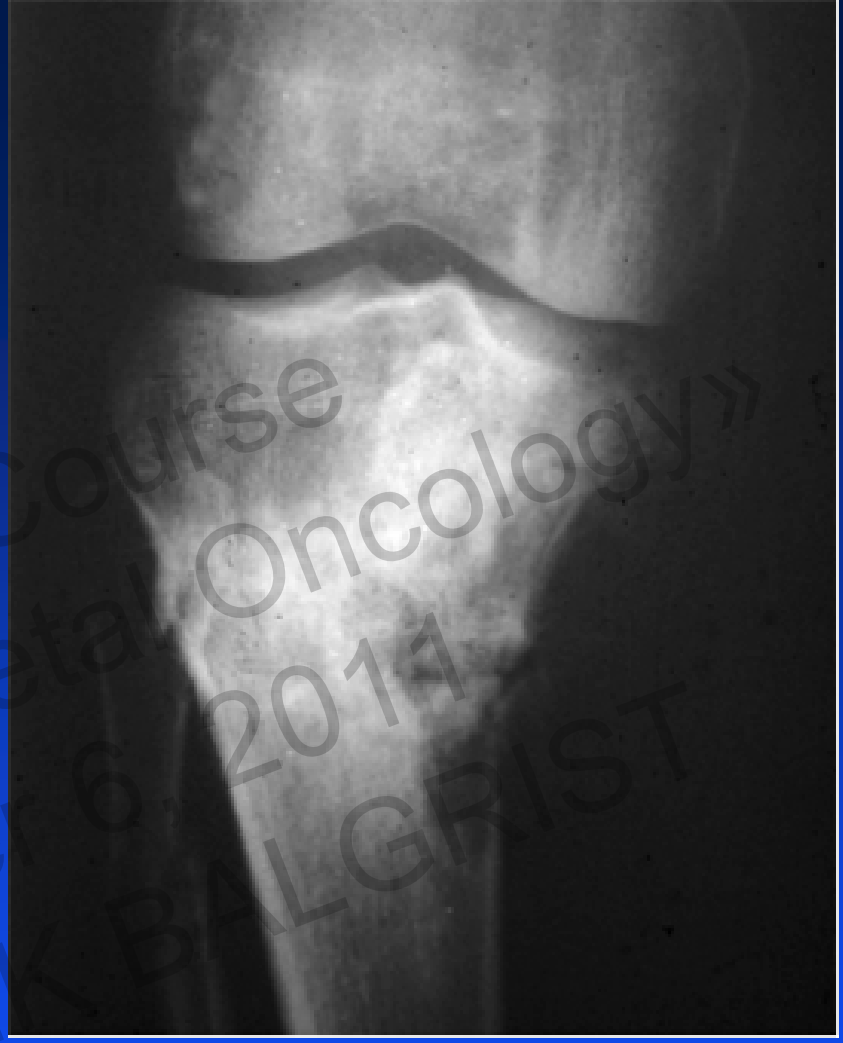






12 Y OLD GIRL
OSTEOGENIC SARCOMA TREATED 5 MONTHS
FOR " TENDINITIS"





OSTEOGENIC SARCOMA DISCOVERRD AFTER PATHOLOGIC FRACTURES

BIOLOGIC TEST

- CBC (INFECTION, LEUKEMIA, INFLAMMATION)
- CRP (INFLAMMATION, INFECTION)
- ESR (EWING, INFECTION, LYMPHOMA, EOSINOPHILIAC GRAN.)
- ALK. PHOSP. (INCREASED VALUE IN RAPID OSTEODESTRUCTIVE LESIONS)
- CATECHOLAMINES (NEUROBLASTOMA)

BIOPSY

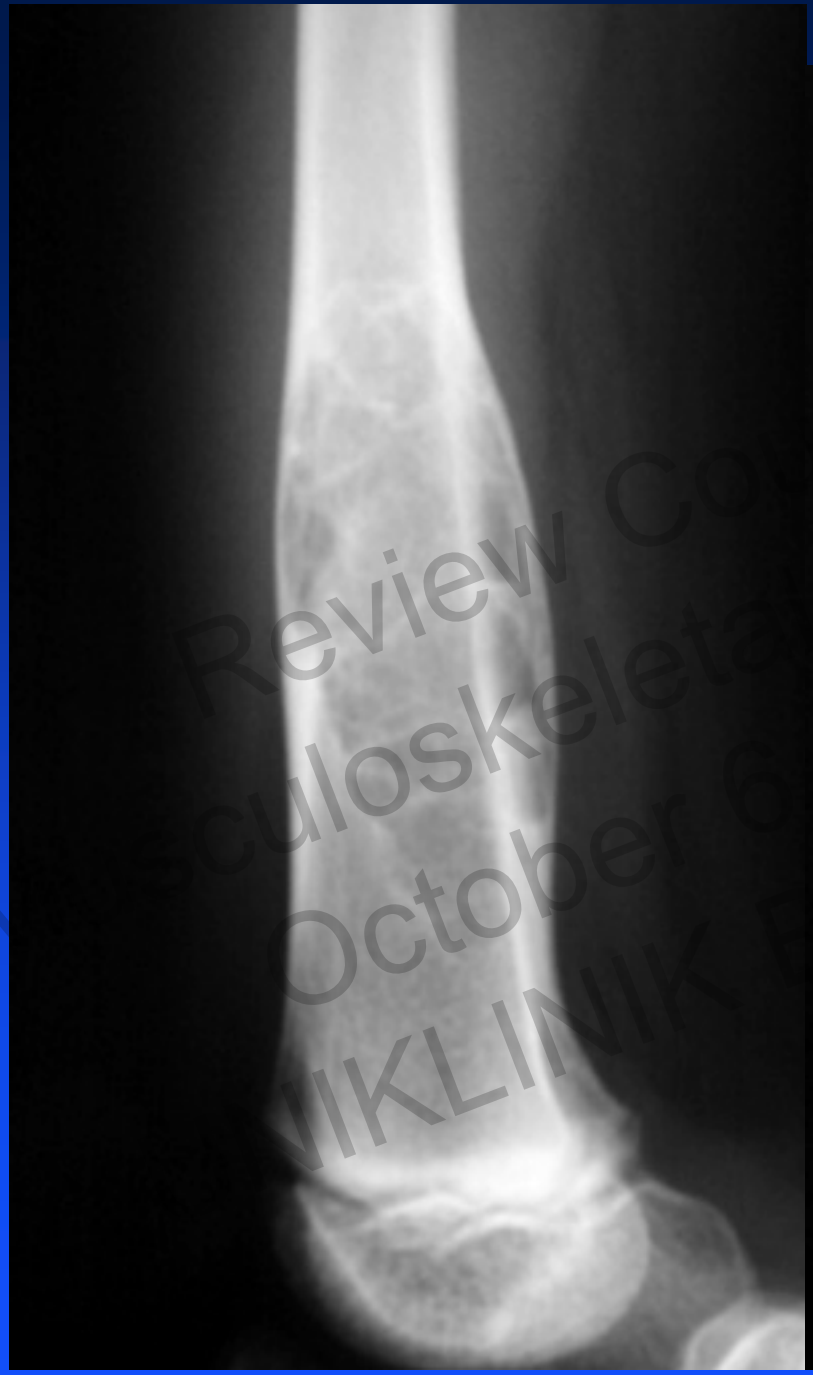
MUST BE PERFORMED BY A SPECIALIZED CENTER

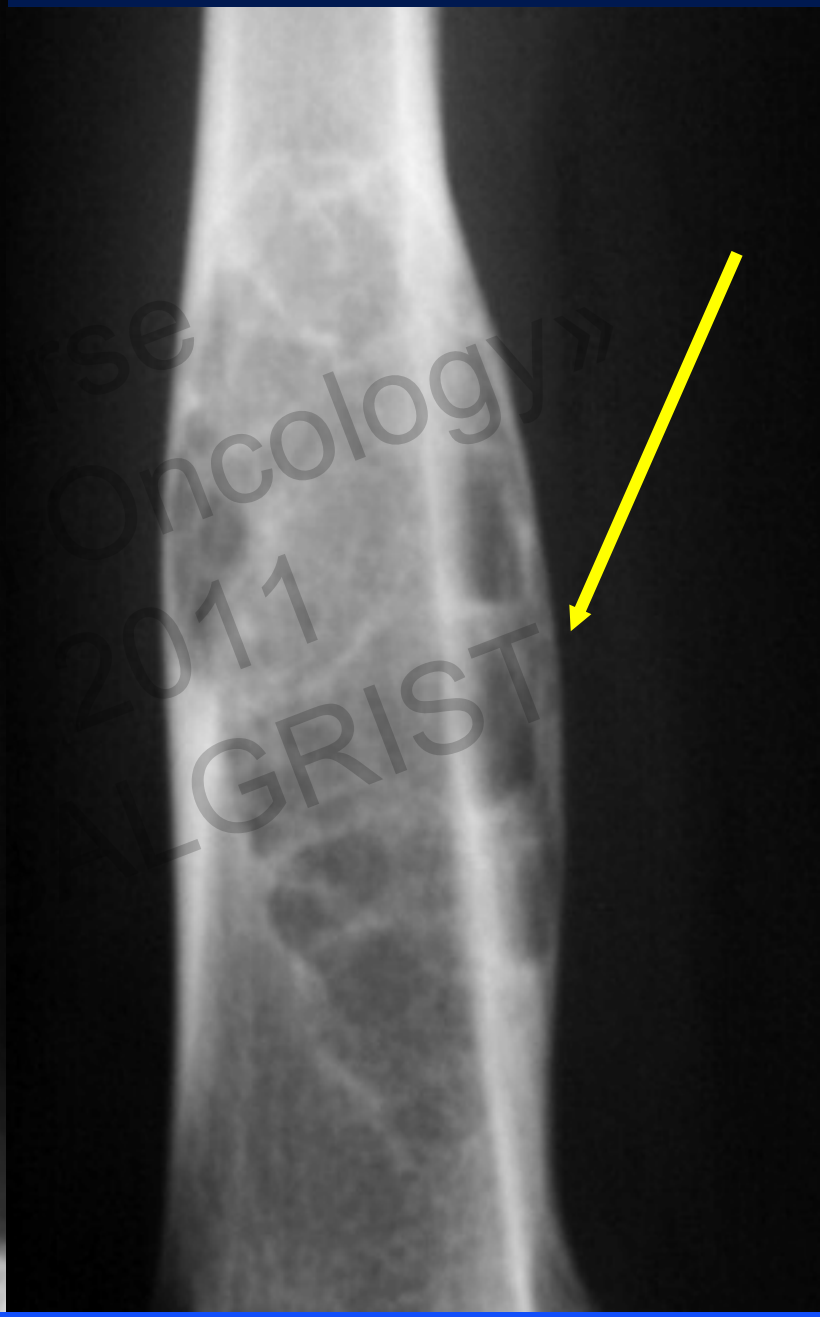
- MULTIDISCIPLINARY DECISION

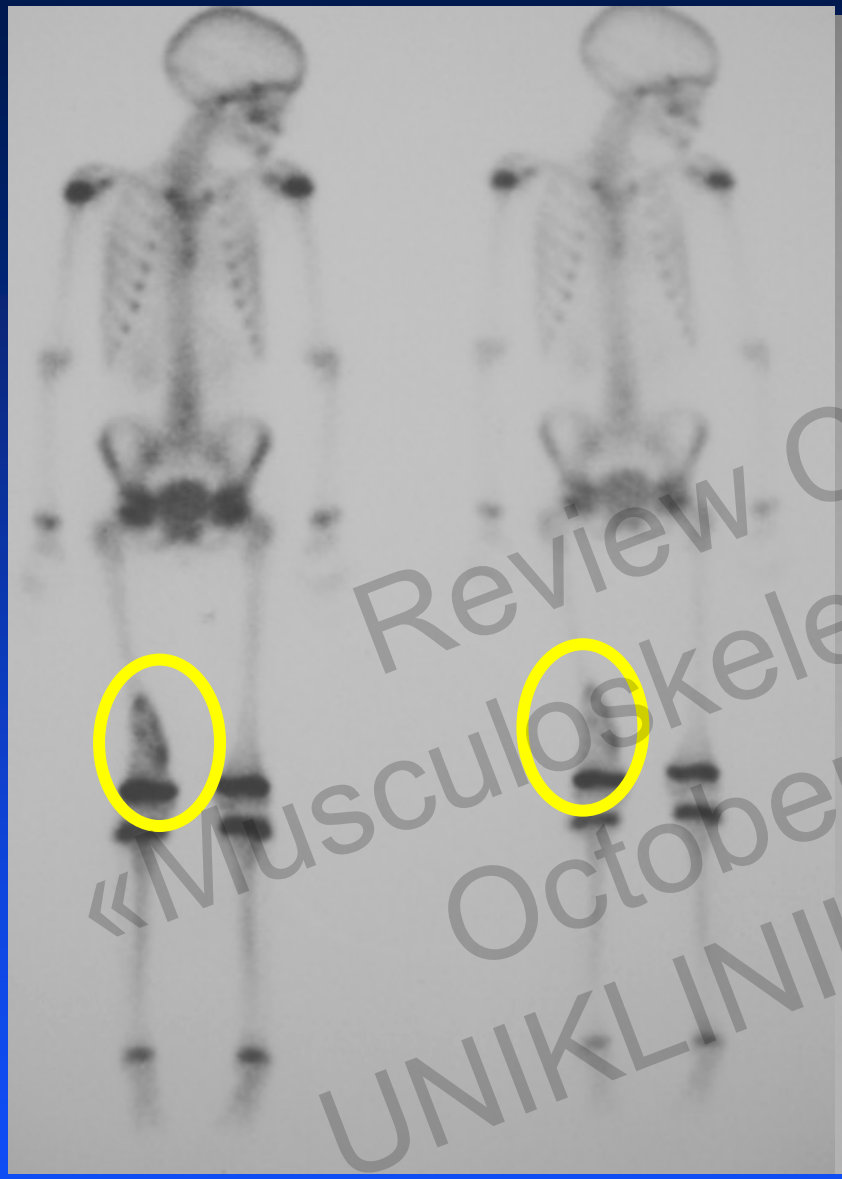
- LOCATION
- APPROACH
- TECHNIQUE
- QUANTITY OF TISSUE
- TYPE OF ANALYSIS
  - COLORATION
  - ELECTRONIC MICROSCOPY
  - GENETIC
  - RECEPTORS

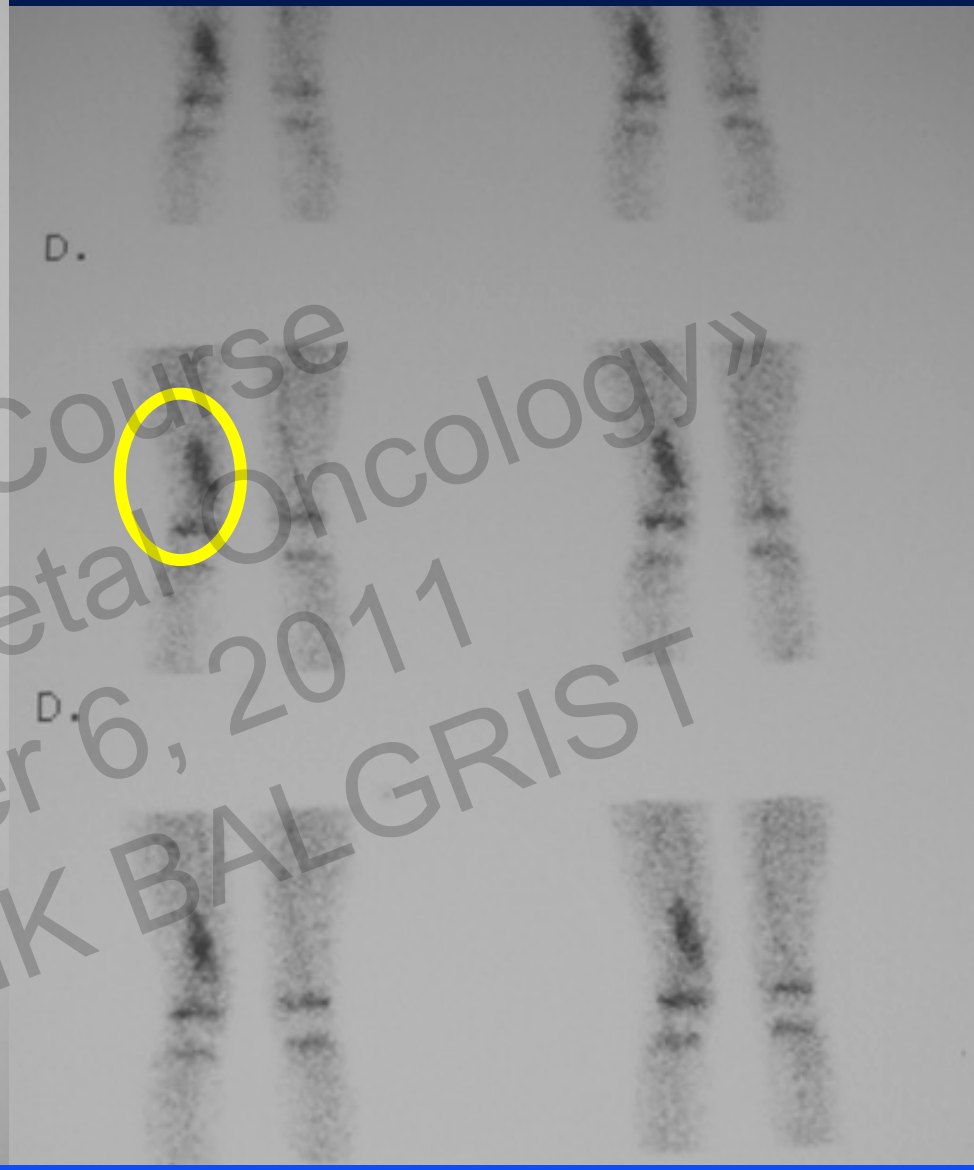
MELISSA 1990

- VERY GOOD GENERAL CONDITION
- AFTER A TRAINING CAMP IN APRIL 2001 (11 Y OLD)
  - RIGHT DISTAL FEMUR PAIN
  - SOFT TISSUES SWELLING ON THE MEDIAL SIDE OF THE DISTAL FEMUR

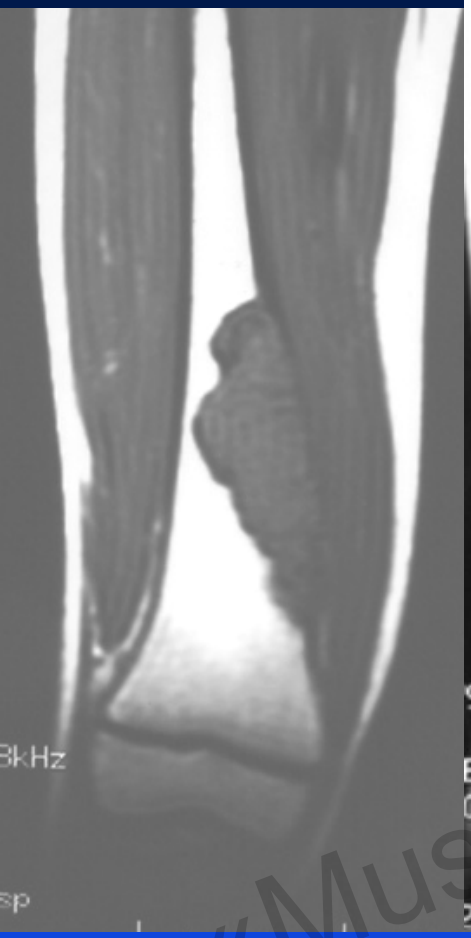


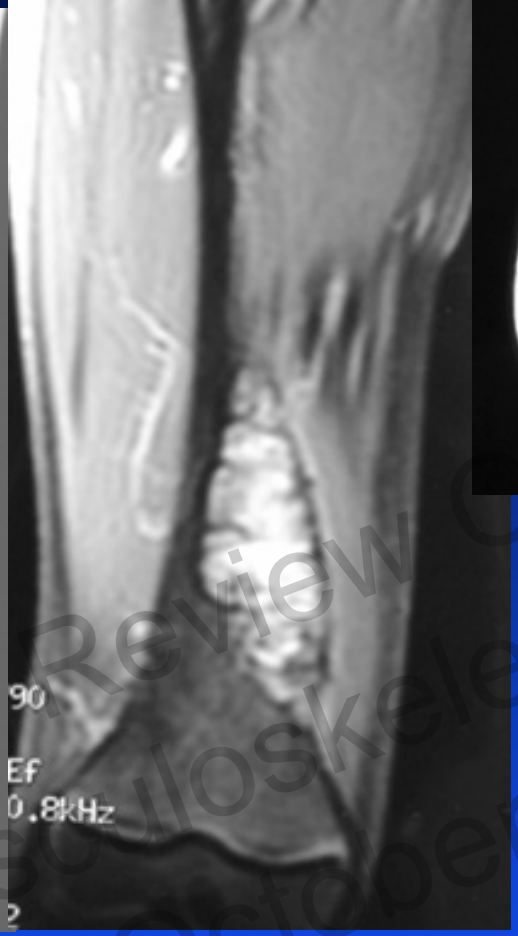


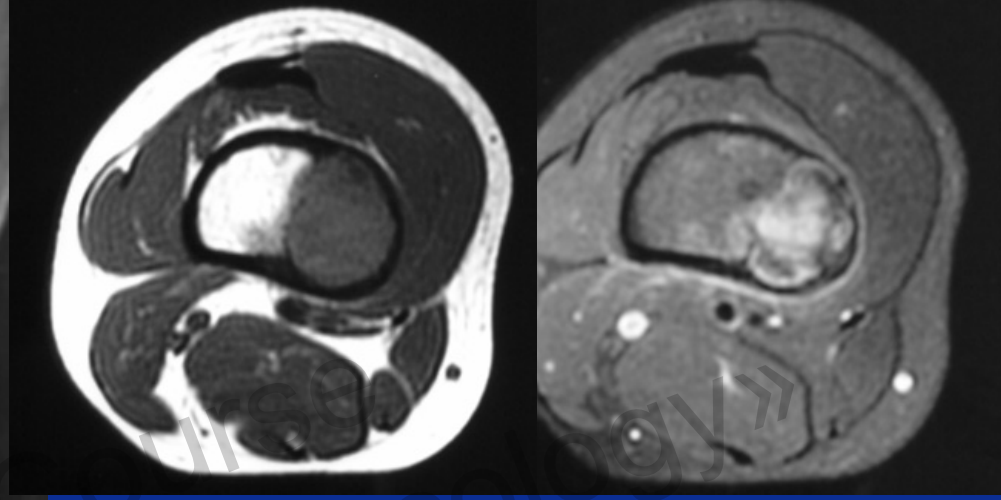


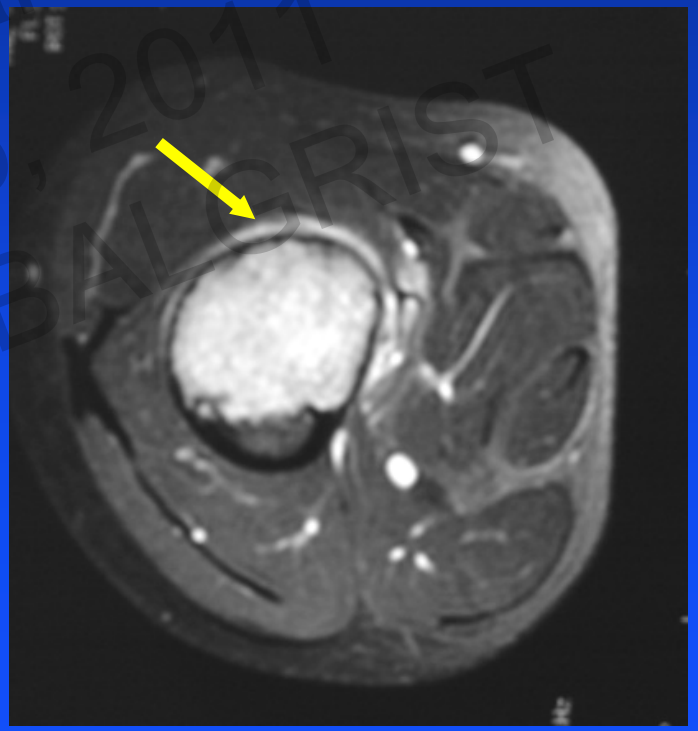


MEL BONE SCINT 5 2001 POOL VASC









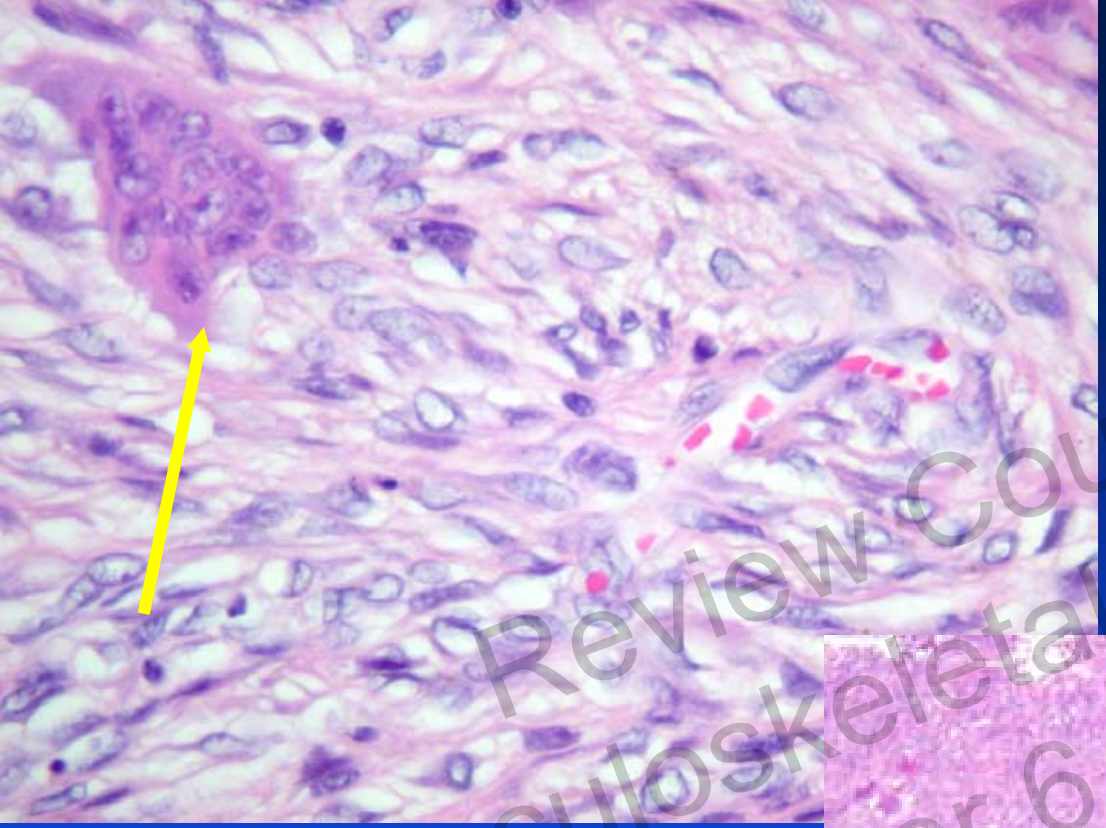
MEL IRM 5 2001

DIFF DIAG

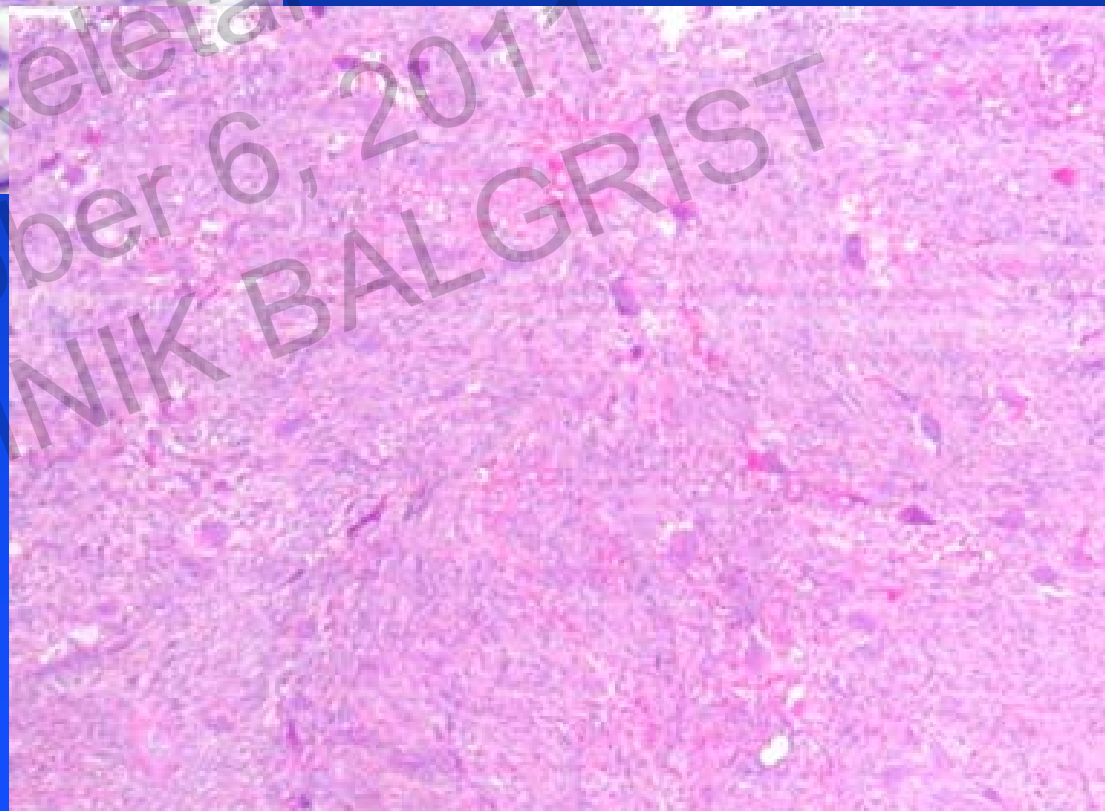
- NON-OSSIFYING FIBROMA
- CHONDROMYXOID FIBROMA
- GIANT CELL TUMOR
- SOLID FORM OF ANEURISMAL BONE CYST
- (FIBROUS DYSPLASIA)
- (HISTIOCYTOSIS X)

BIOPSY

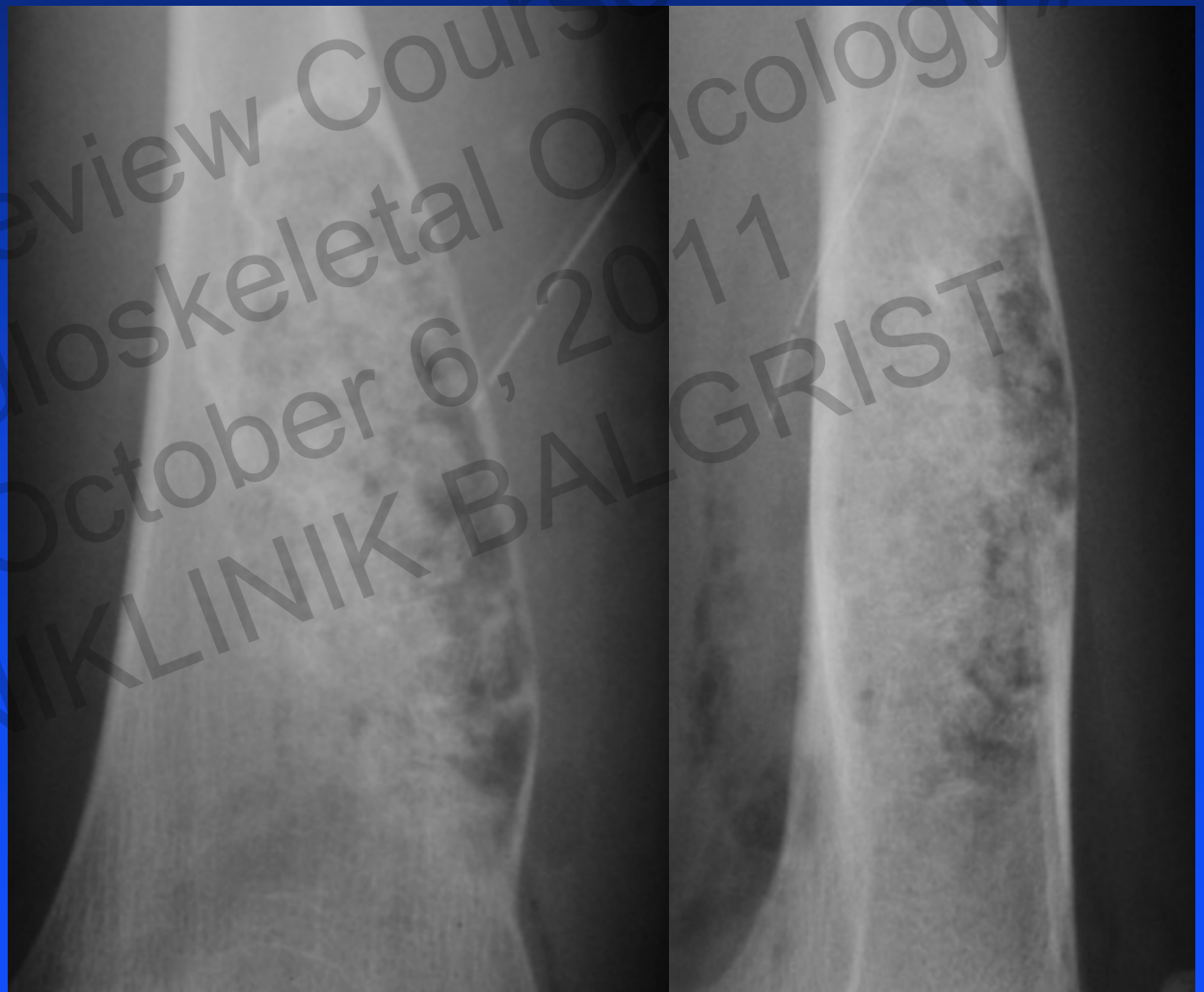
- FROZEN — GIANT CELL TUMOR
- DEFINITIVE — NON-OSSIFYING FIBROMA

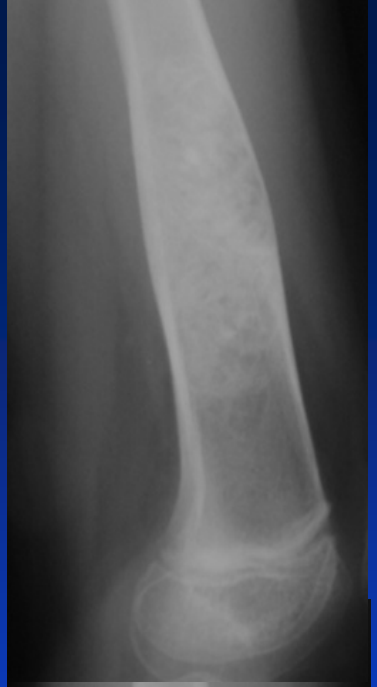


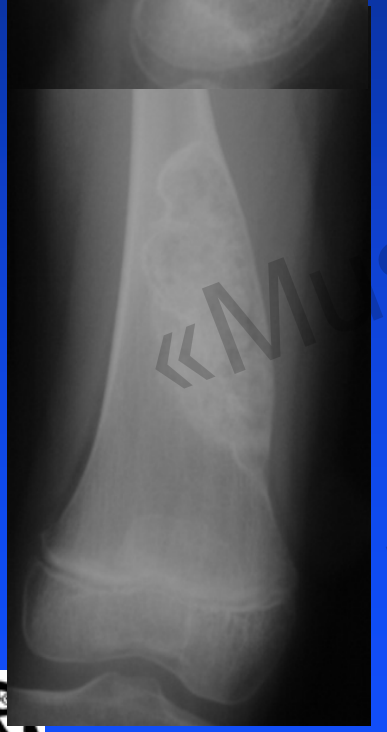
FUSIFORM CELLS
NUCLEI OVAL AND REGULAR
SMALL NUCLEOLI
SOME GIANT CELLS



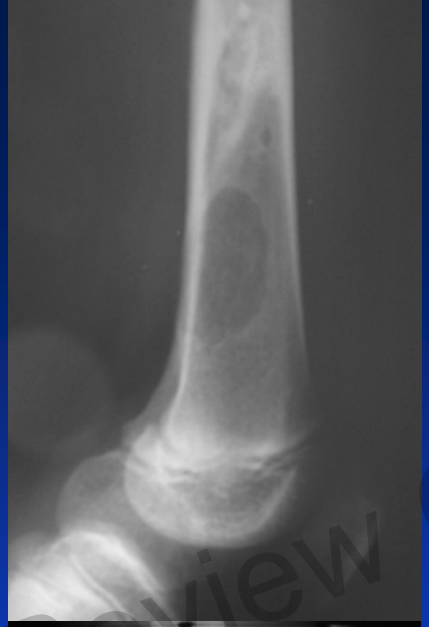
SURGERY: DEEP CURETTAGE
ORTHOLAVE
BURR
CORTICO- CANCELLOUS ALLOGRAFT

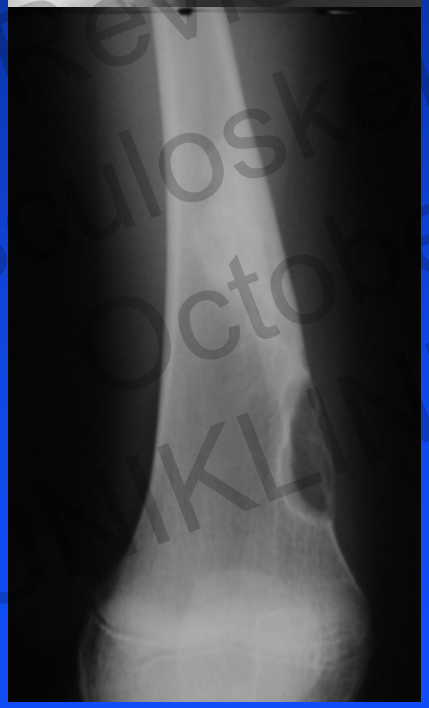






MEL RX 8 2001





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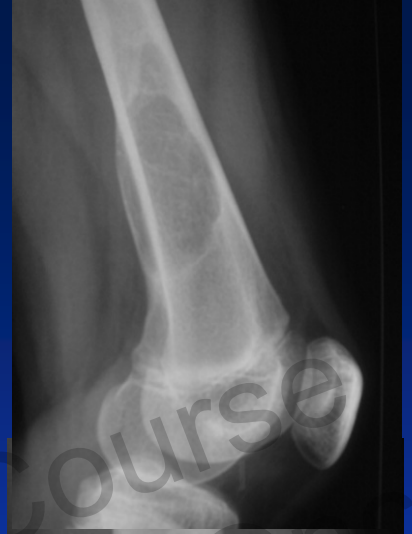

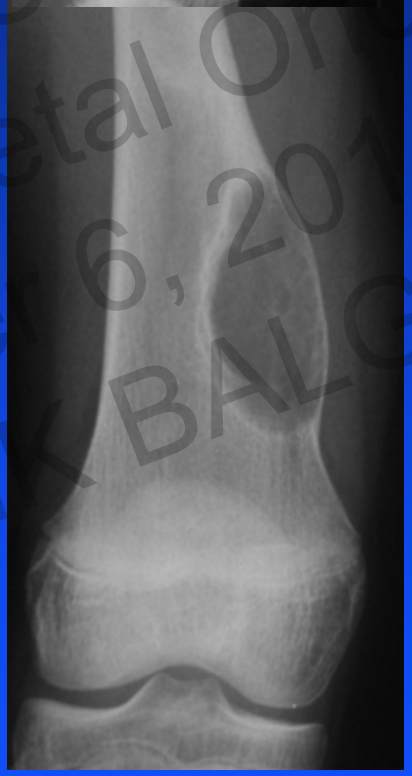

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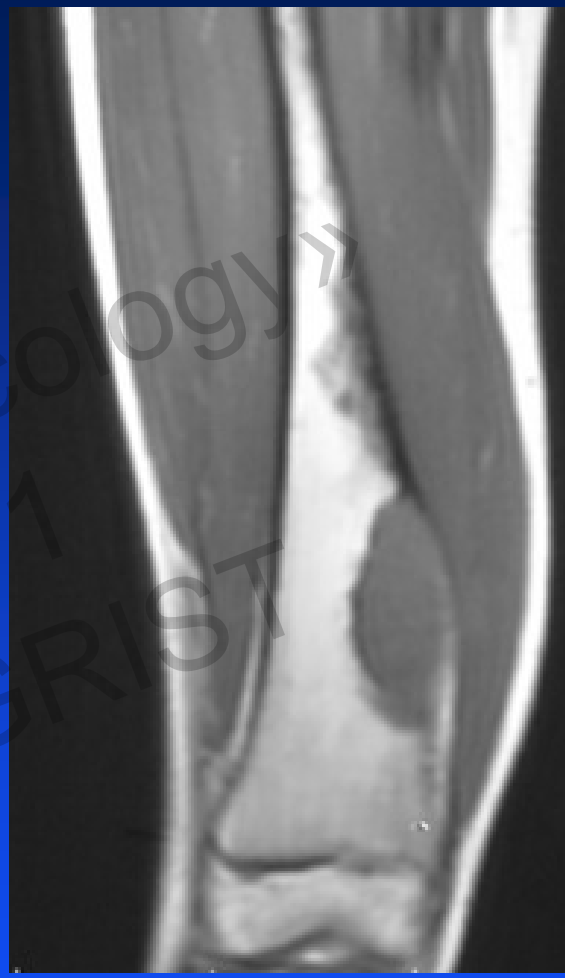
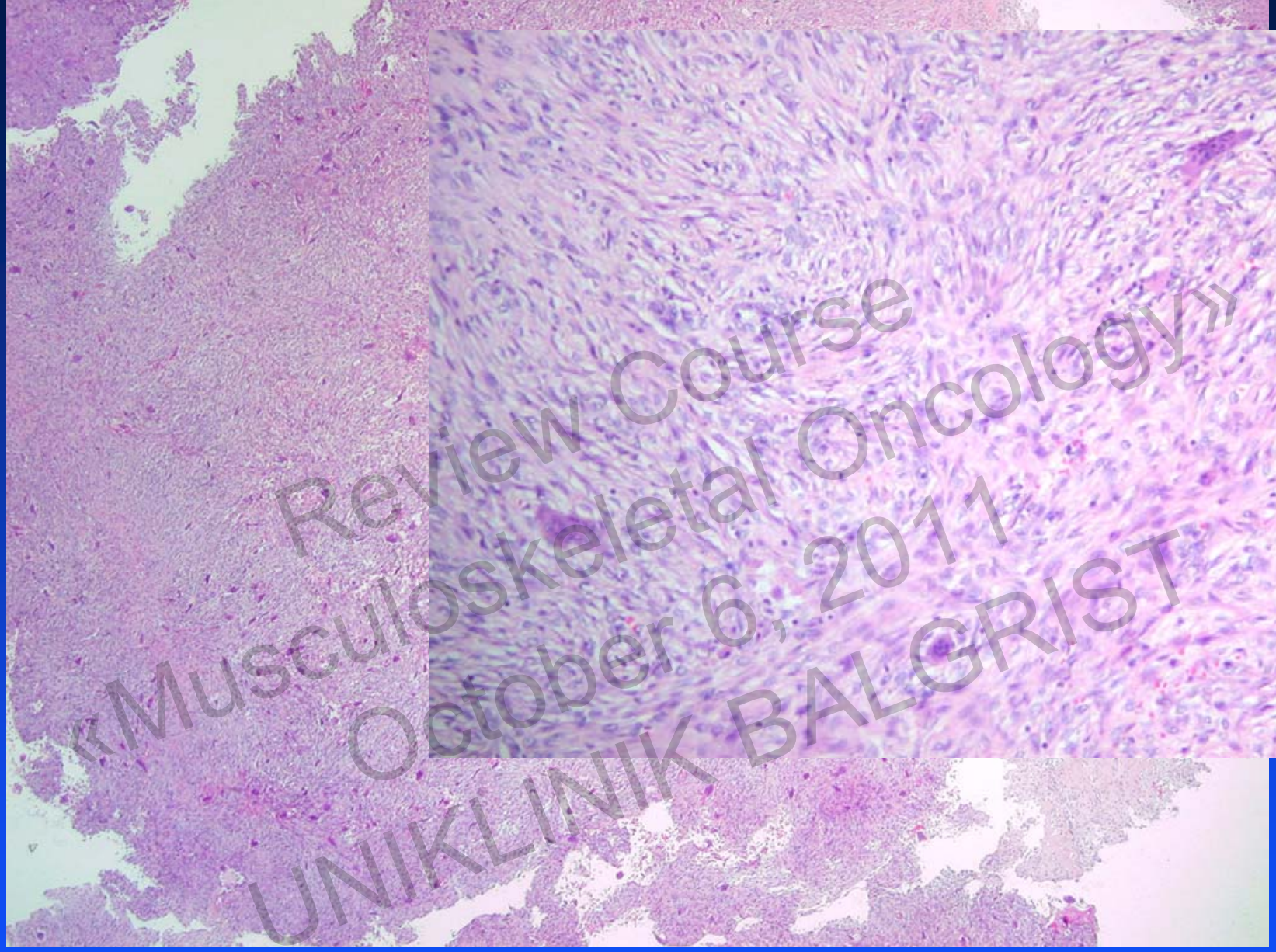


MEL IRM 11
2004

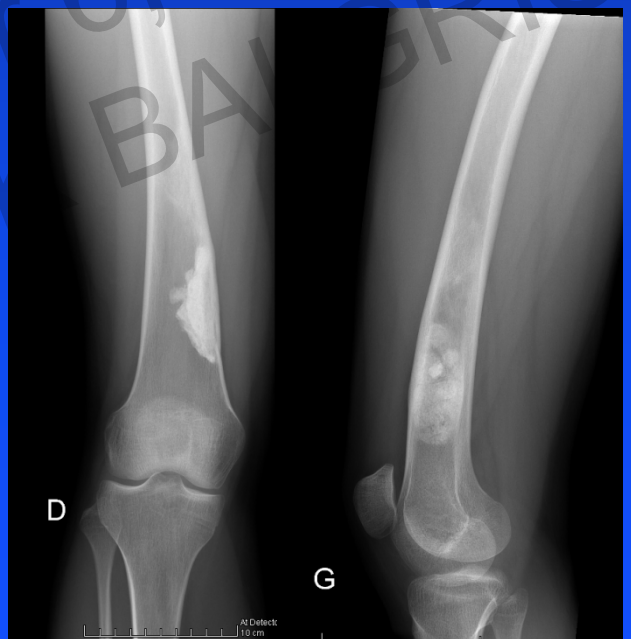


FIBRILAR BONE TRABECULAE, SOME GIANT CELLS,
FUSIFORM CELLS IN STRORIFORM PATTERN

BIOPSY

- FROZEN
- DEFINITIVE

GIANT CELL TUMOR
BENIGN FIBROUS HISTIOCYTOMA



10 Y F-U

7 AFTER 2ND SURG

SOFIA TAYLOR +
RIZZOLI BOLOGNA

FINAL DIAGNOSIS

- LOCAL IMAGING
- BIOPSY RESULTS
- TUMOR EXTENSION

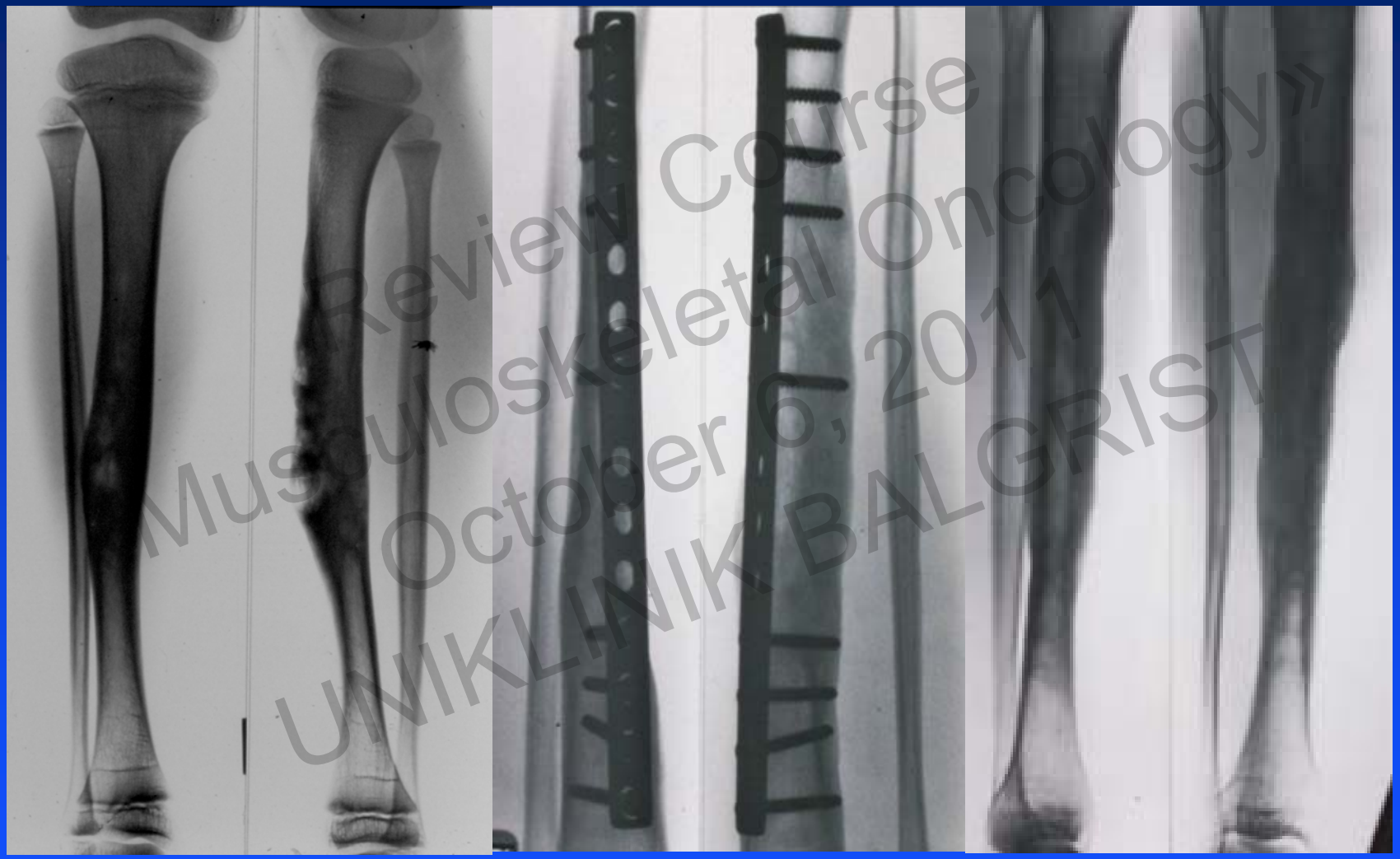
=

DIAGNOSIS + STAGING = THERAPY PROGRAM

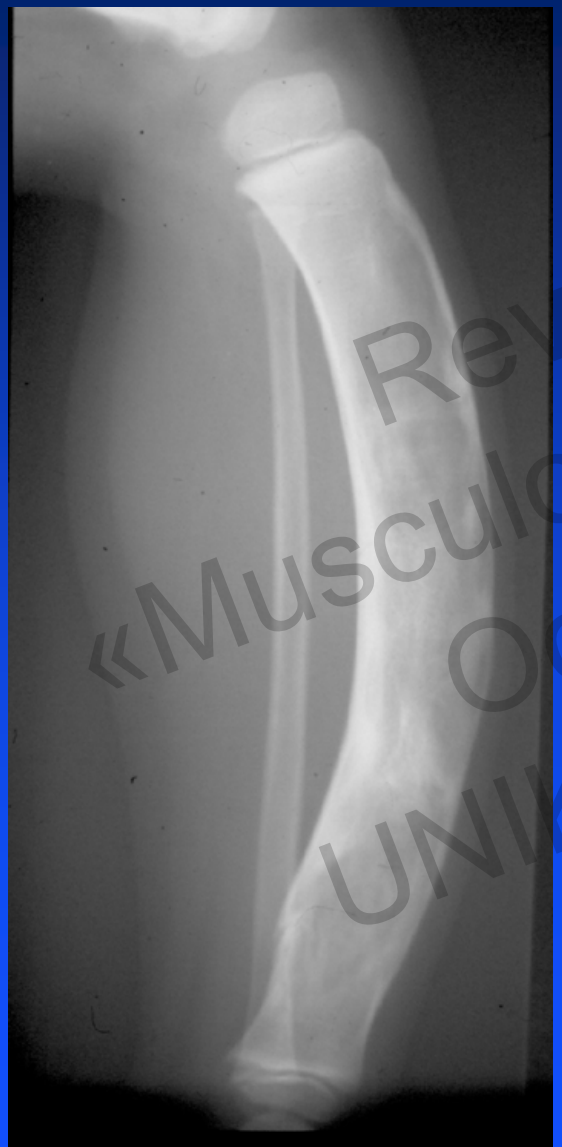
SURGERY / CHEMO / X-RAY/ OTHERS
AND FOLLOW-UP PROGRAM

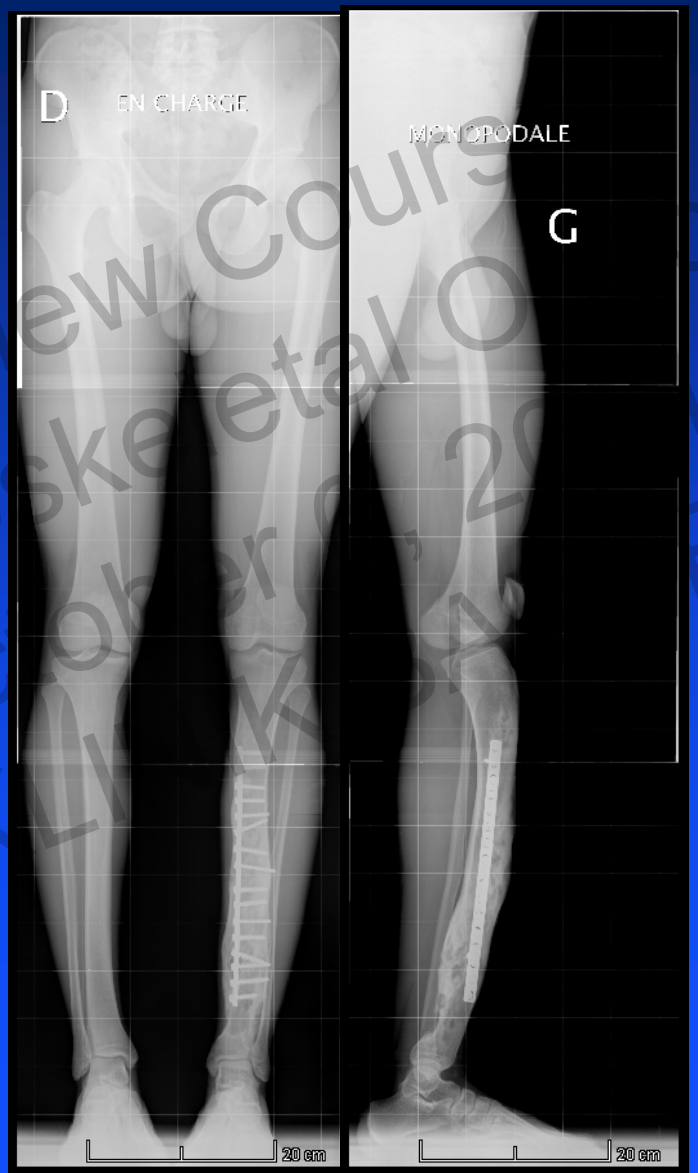
ADAMANDINOMA
LOCAL RESECTION, BONE GRAFT

OSSIFYING FIBROMA (CAMPANACCI)
SEGMENTAL RESECTION
AT 7 YEARS POST-OP : STRESS FRACTURE



3 YEARS OLD BOY
FIBROUS DYSPLASIA



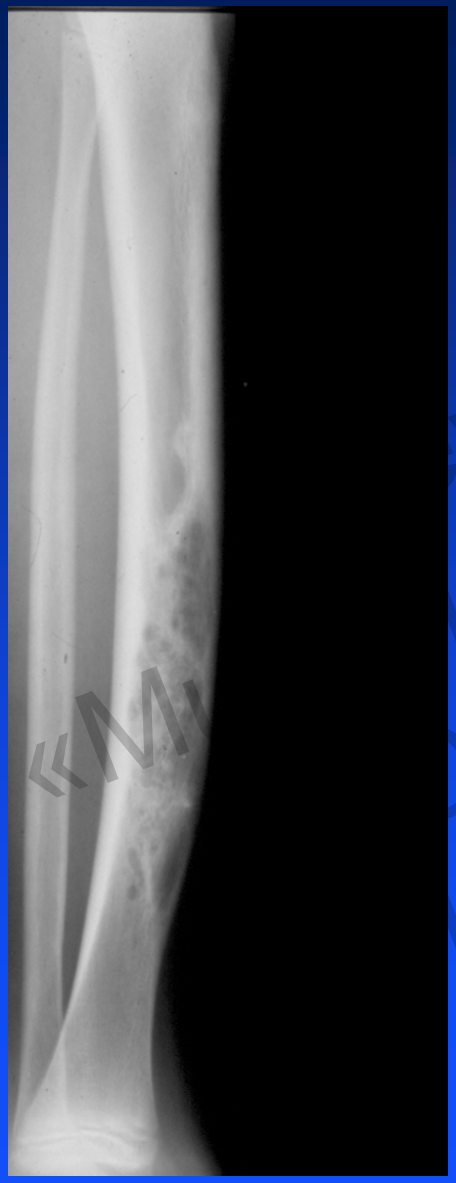


22 YEARS OLD

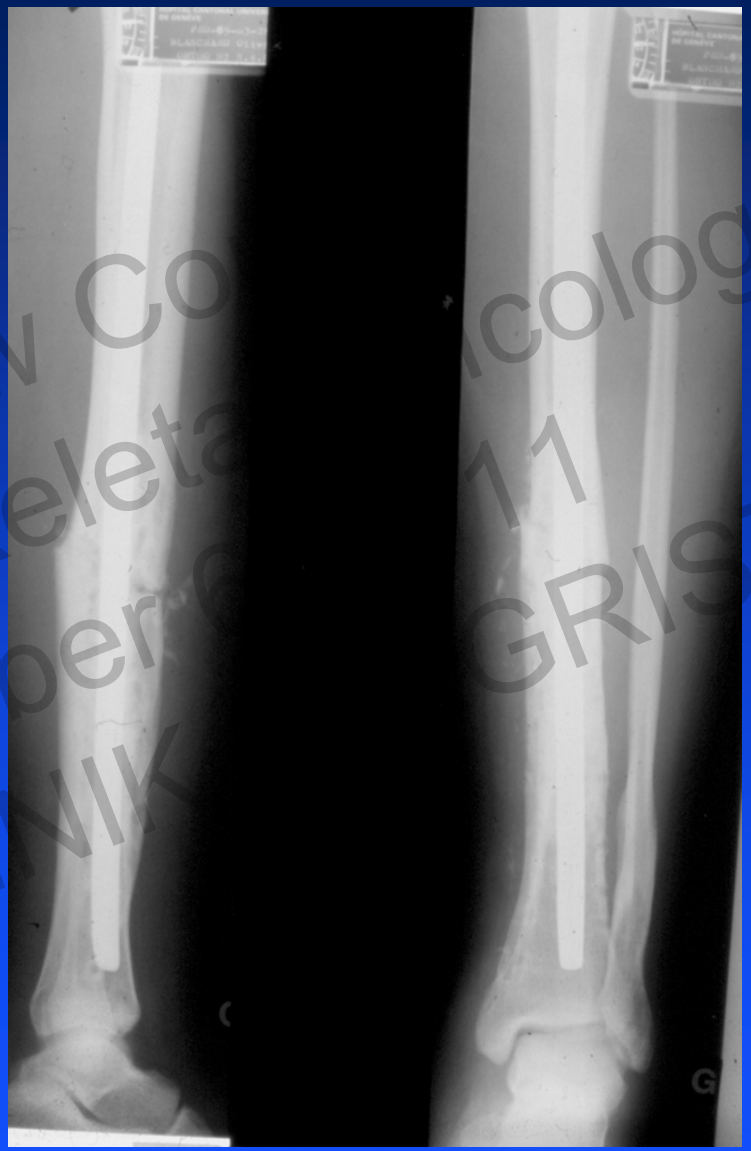
PLAY BASKETBALL

B LIGUE TEAM

FIRST DG, FD THEN OSSIFYING FIBROMA

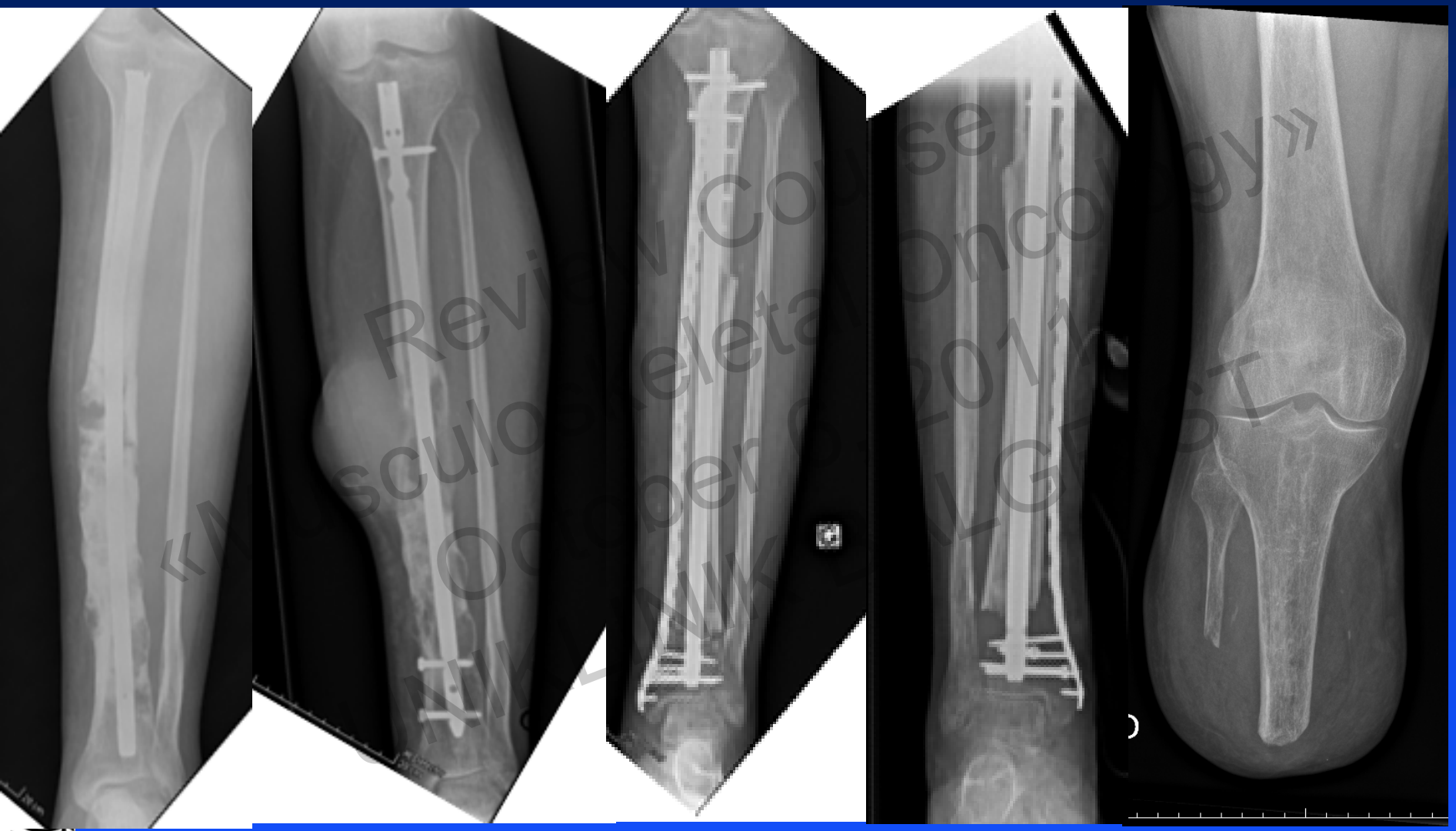


1980 FD



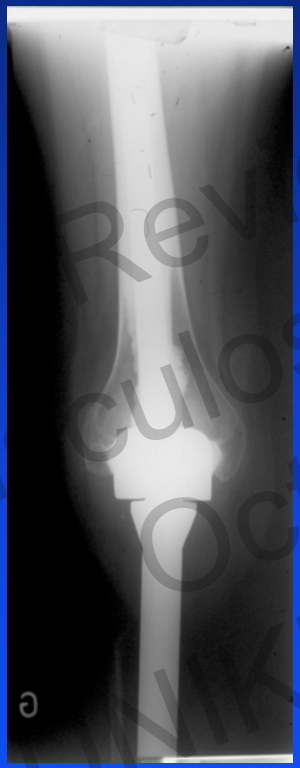
1989 OF

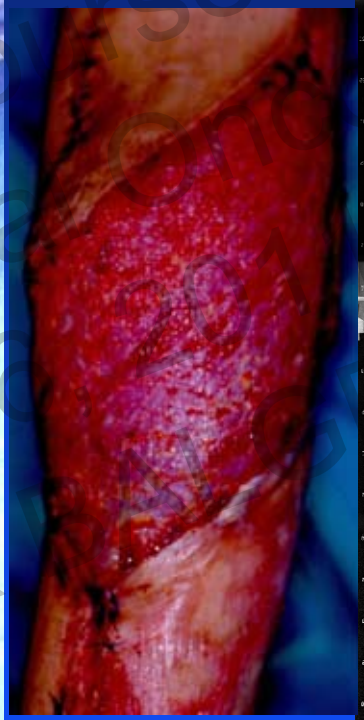
FIRST DG, FD THEN OSSIFYING FIBROMA , AT THE END ADAMANTINOMA

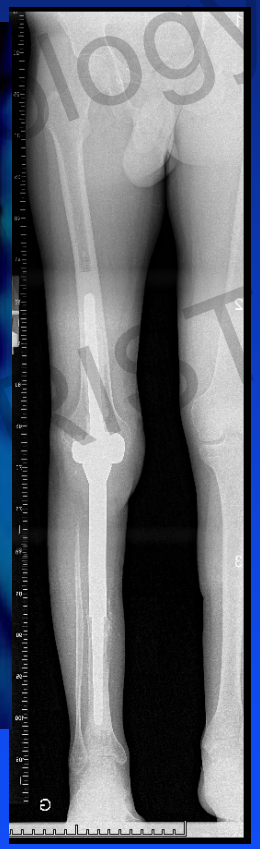


1999 OF 2009 AD 2009 2010 2011

BE READY
COMPLICATIONS







OS-SARCOMA SKIN NECROSIS INFECTION

18 Y POST-OP

KEYS FOR BETTER RESULTS

- TAKE NO CHANCE, SAFETY FIRST, SPECIALISTS
- MULTIDISCIPLINARITY AT EVERY STEPS
- ALWAYS HAVE QUESTIONS AND DOUBTS
- HAVE A GOOD KNOWLEDGE OF PATHOLOGY AND NATURAL HISTORY
- LONG FOLLOW-UP