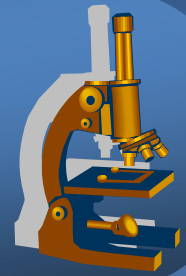


***Soft tissue tumors  
and lesions.  
Bone pathology.***



Oral pathology

# *Soft tissue tumors and lesions*

---



- x mesenchymal tumor-like lesions
- x true neoplasms
- x majority are rare in oral cavity
- x Diff. dg : hyperplastic lesions

# ***Fibrous lesion of the oral mucosa***

---



## **Hyperplastic lesions:**

- epulides (fibrous, vascular, giant cell);
- pyogenic granuloma;
- fibroepithelial polyp;
- denture irritation and papillary hyperplasia

## **Neoplastic and neoplastic-like lesions:**

- peripheral odontogenic fibroma
- fibrosarcoma
- fibrous histiocytoma
- nodular fasciitis
- fibromatosis

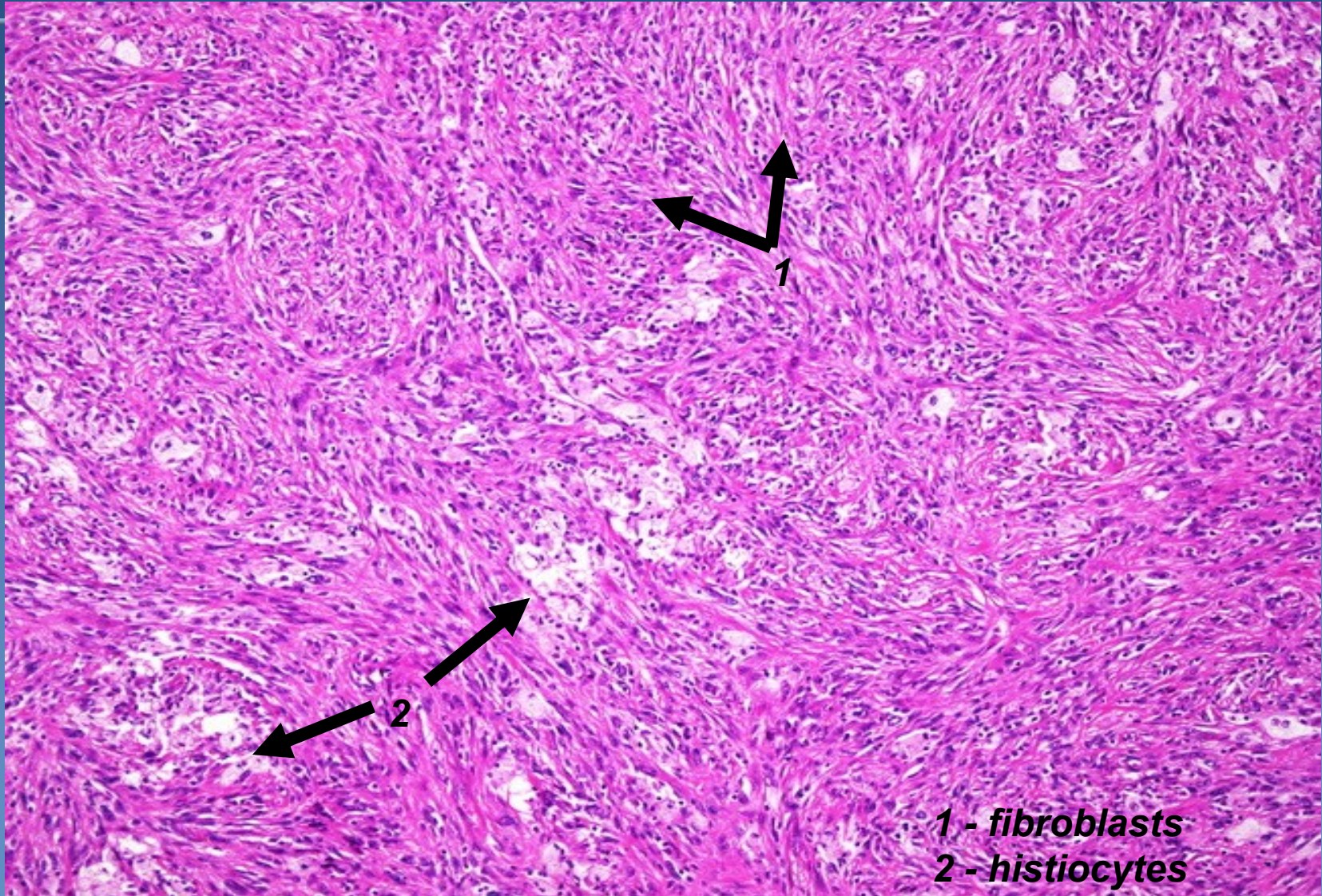
# *Fibrous histiocytoma*

---



- x show both fibroblastic + histiocytic differentiation
- x middle-aged and older adult
- x buccal mucosa and vestibule
- x nodular mass vary in size

# ***Fibrous histiocytoma***



**1 - fibroblasts**  
**2 - histiocytes**

# ***Nodular fasciitis***

---



- ✗ rare in oral cavity, superficial
- ✗ rapidly growing pseudosarcomatous lesion
- ✗ self-limiting growth of a clone of neoplastic cells that contain a fusion gene (*USP6* rearrangement)
- ✗ painfull, tenderness
- ✗ histologically may resemble fibrosarcoma

# *Fibromatosis*



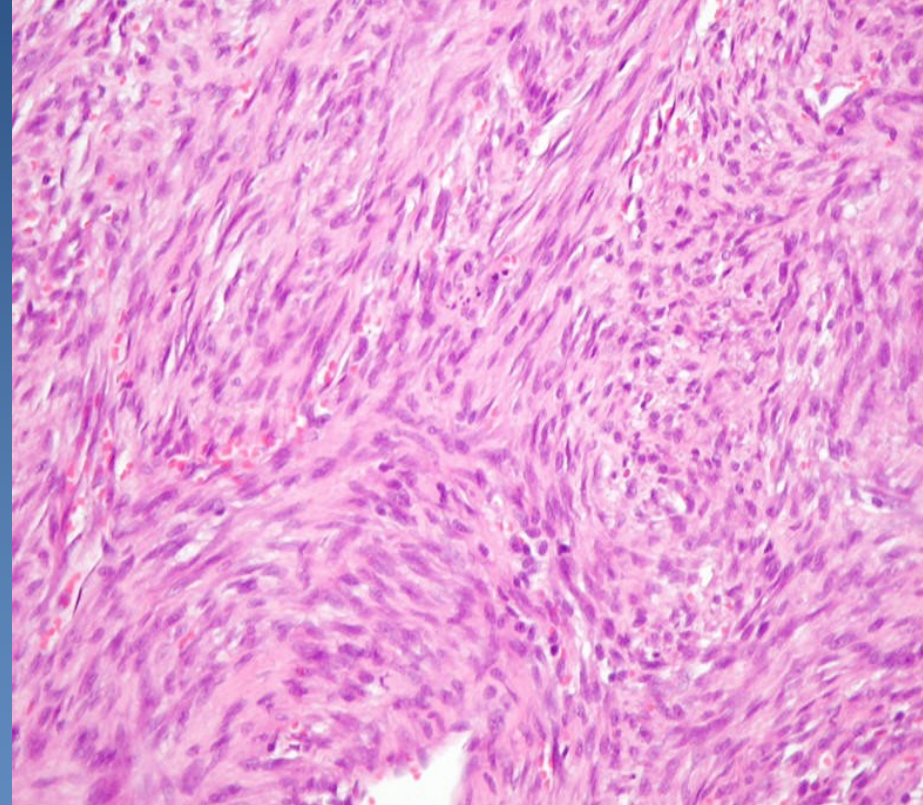
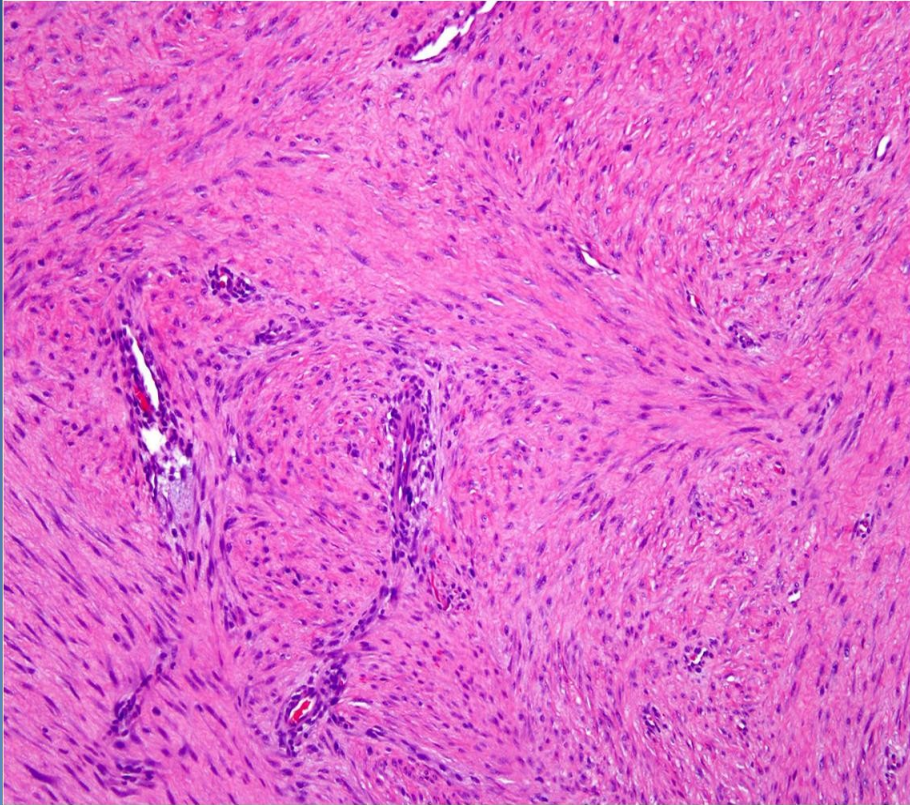
- × non-neoplastic but infiltrative fibrous lesion  
**do not metastasize!!!**
- × children or young adults (juvenile fibromatosis)
- × paramandibular soft tissue region
- × vary in size → facial disfigurement
- × firm mass with rapid growth + destruction adjacent bone

Micro: *proliferation of spindle-shaped cells, no cytonuclear atypia*

Treatment: *wild excision*

*recurrence rate 23%*

# *Fibromatosis*



**proliferation of spindle-shaped cells, without cytonuclear atypia**



# *Fibrosarcoma*



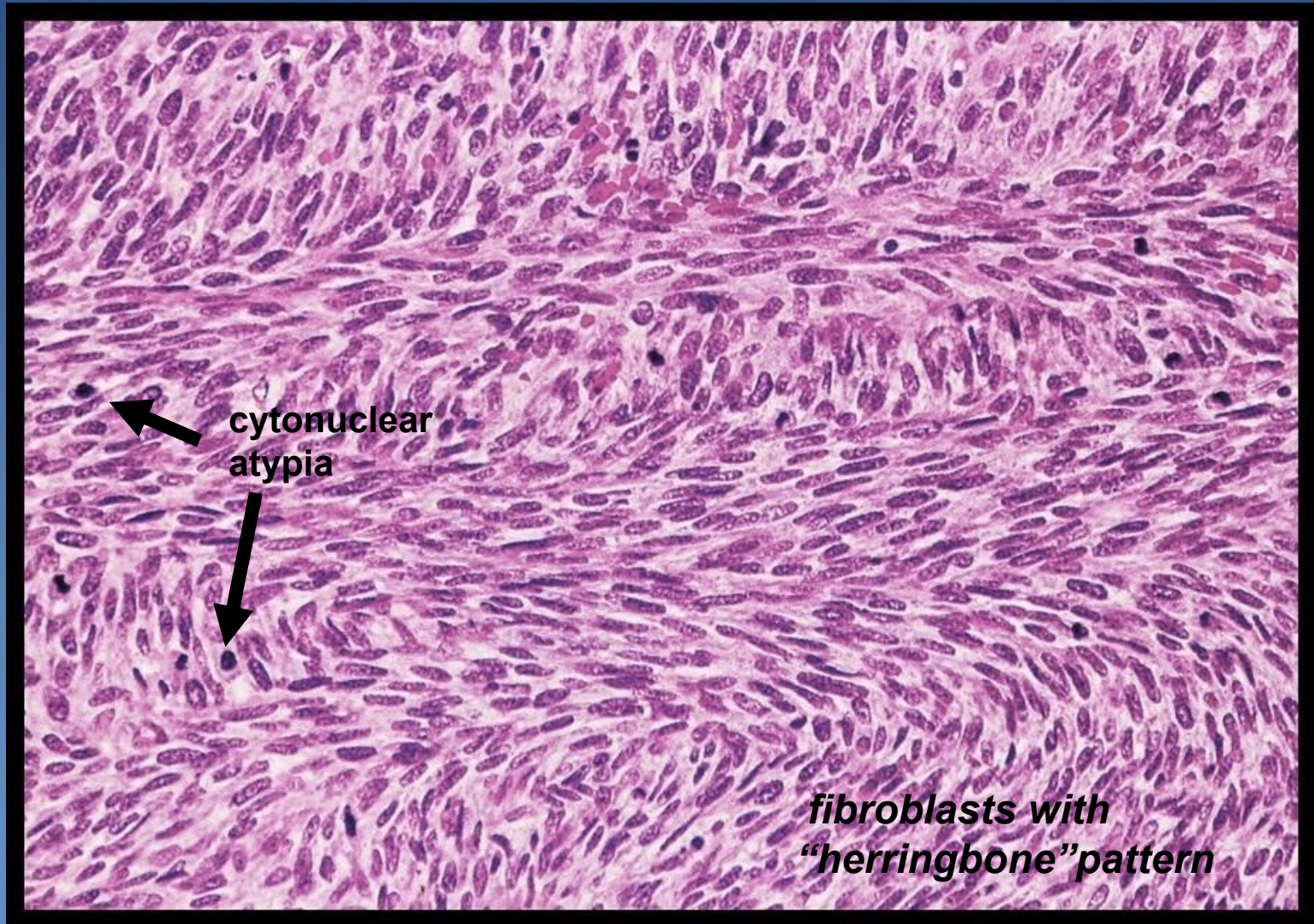
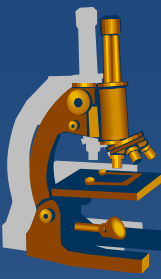
- x malignant tumor of fibroblasts
- x rare in oral cavity

*have good prognosis*

- x young adults and children

**Micro:** *fascicles of fibroblasts that forms “herringbone” pattern*

# ***Fibrosarcoma***



**cytonuclear  
atypia**

**fibroblasts with  
"herringbone" pattern**

# ***Tumors of adipose tissue***



**Lipoma** – benign tumor of adipose tissue

- 40 yrs or older

- mucosa of cheeks and tongue

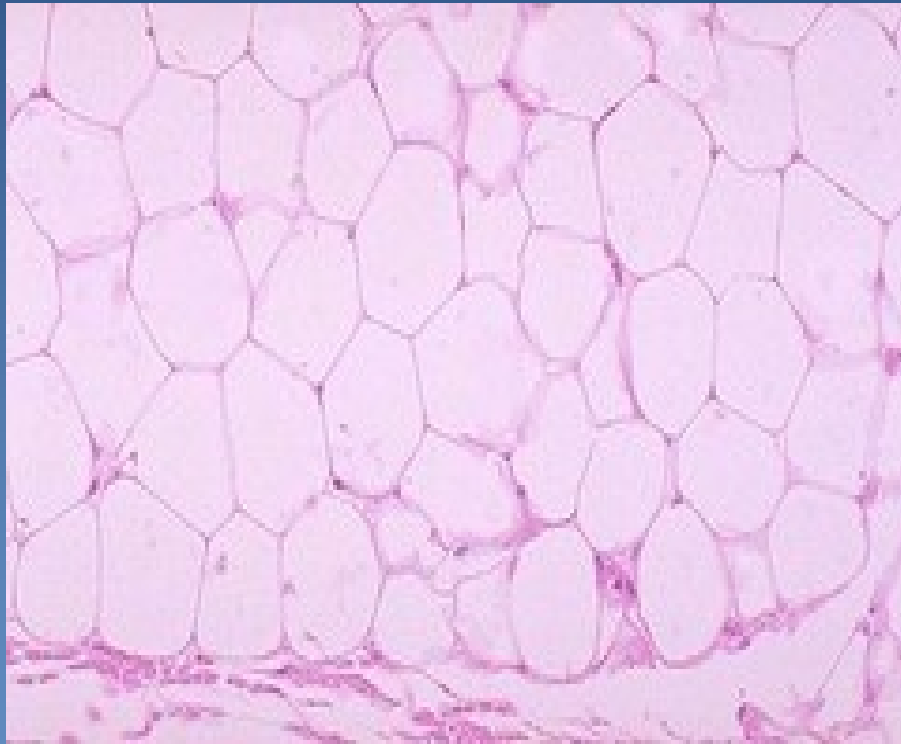
*!!! ulcerated tumor-like masses of partly necrotic fat in very young children - the result of traumatic herniation of cheek's mucosa*

**Gross:** *soft, yellowish-colored swelling*

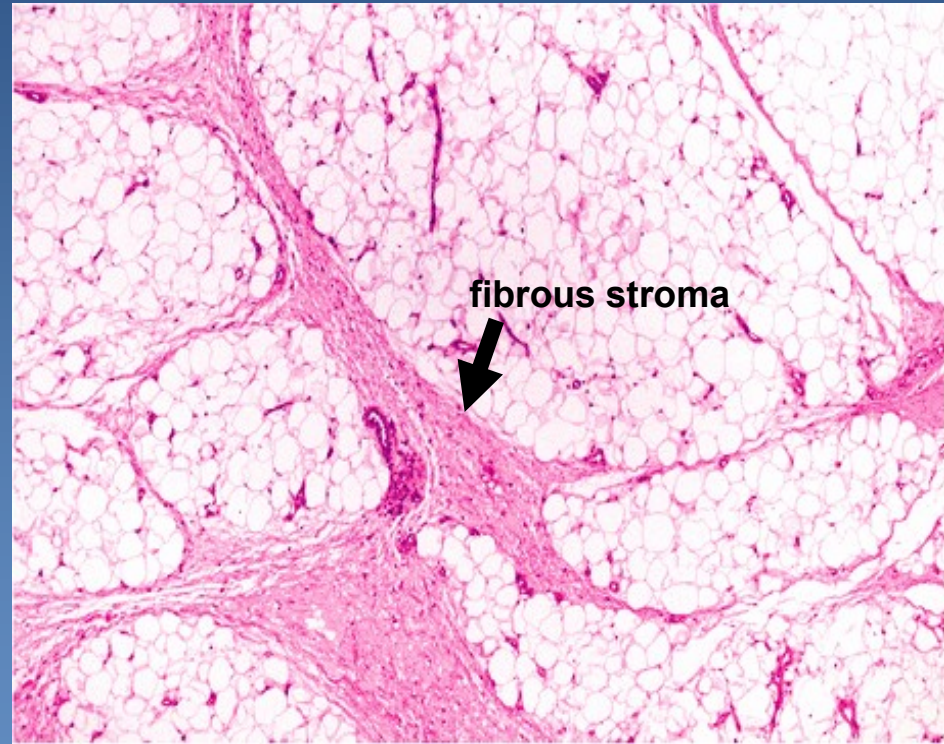
**Micro:** *mature adipose tissue, thin fibrous capsule*

**Fibrolipoma** – *lipoma with increasing amount of fibrous stroma*

# *Tumors of adipose tissue*



**lipoma**



**fibrolipoma**

# *Tumors of adipose tissue*

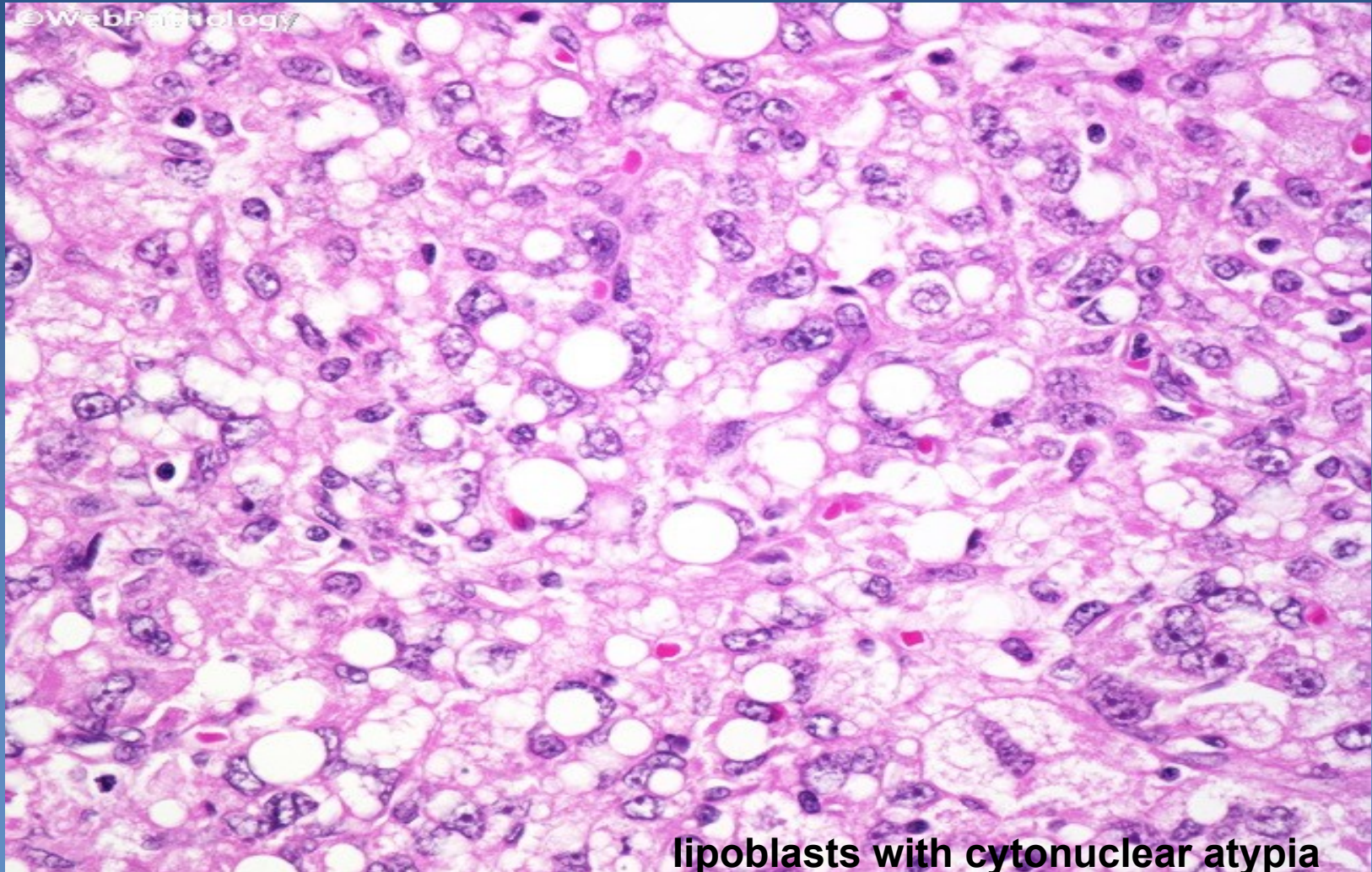
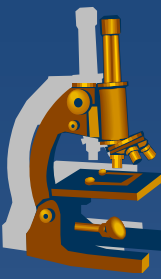


**Liposarcoma** – malignant tumor of adipose tissue

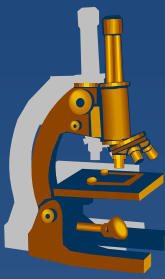
- peak 40-60 yrs
- cheeks, floor of the mouth, tongue
- resemble benign lipoma + atypical hyperchromatic nuclear
- *myxoid, round-cell, well-differentiated, pleomorphic, dedifferentiated*

Have a good prognosis in oral cavity

# *Liposarcoma*



**lipoblasts with cytonuclear atypia**



# ***Tumors of vascular tissue***

---

**Hemangioma** — benign hamartomatous tumor

- 1-year-old children, F:M 3:1
- lips, tongue, cheeks or palate

**Gross:** *solitary, flat or raised, dark reddish-purple in color typically blanch on pressure*

**Hereditary haemorrhagic telangiectasia** – AD, multiple telangiectases in skin, mucous membrane, internal organs

**Sturge-Weber syndrome** – haemangiomatous lesions of the face (n. trigeminus) + haemangiomas and calcification of leptomeninges + limbs affecting

# ***Hemangioma***



**Histological types:** *capillary, cavernous, mixed*

**Complications:** *ulceration*  
*thrombosis*  
*organization*  
*calcification*

**Treatment:** *“watchful neglect”, occur regression*

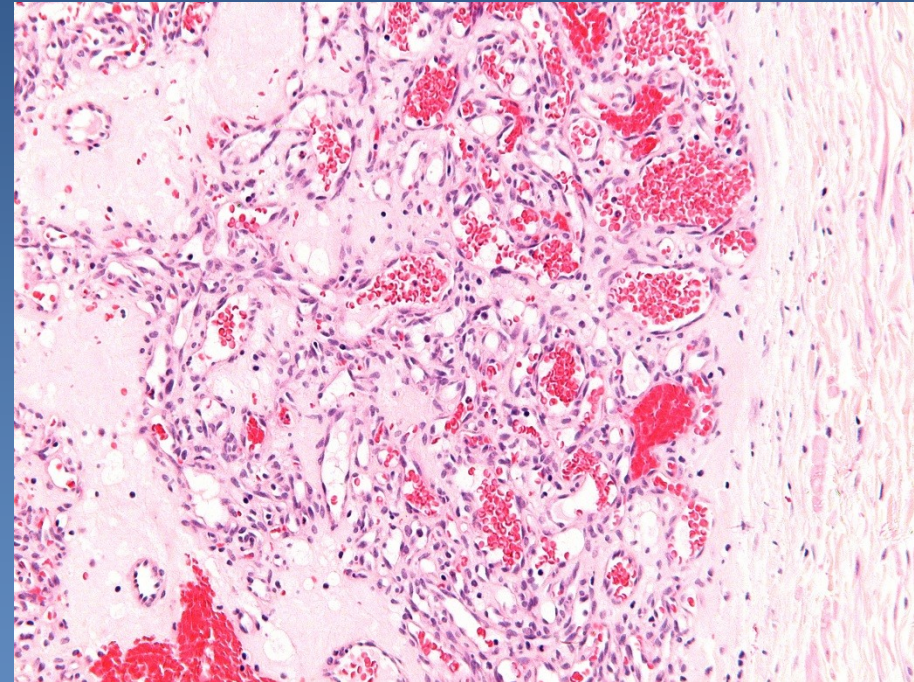
**Sublingual varicosities** - *purplish venous ectasia on the ventral (undersurface) of the tongue after the age of fifty.*



# *Hemangioma*



*sublingual hemangioma*



*capillary type – proliferation of capillary-sized vessels*



# ***Tumors of vascular tissue***

---

**Lymphangioma** - benign hamartomatous tumor  
lymphatic vessels

- early childhood
- anterior 2/3 of the tongue (macroglossia)  
trauma → sudden increase in size

**Gross:** *pebbly surface*

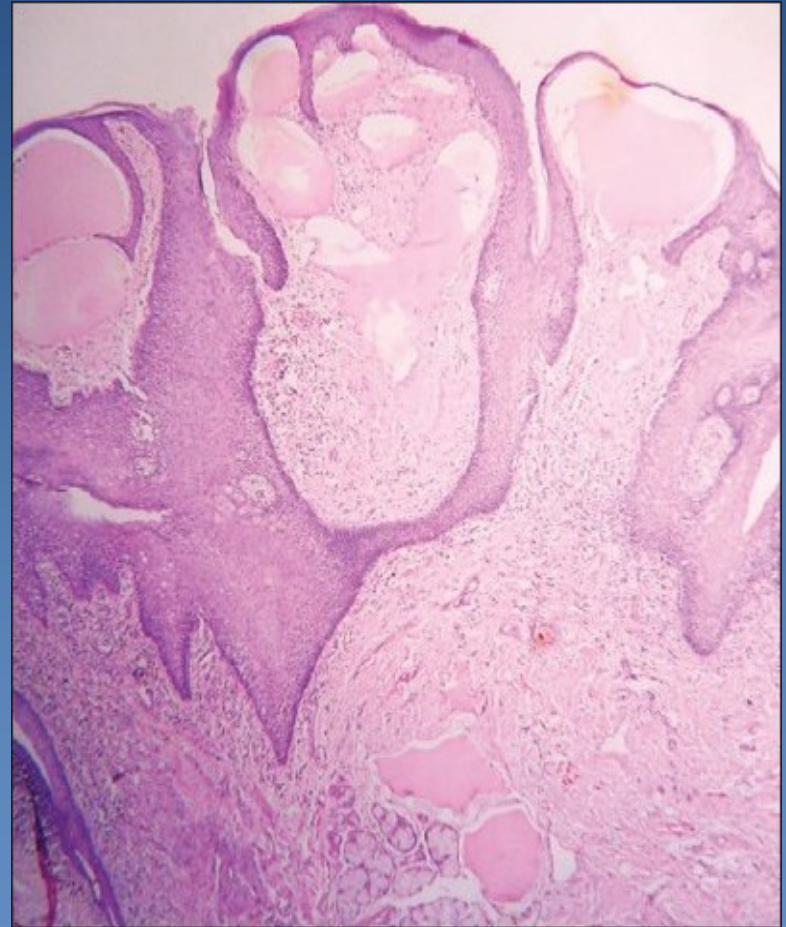
**Micro:** *endothelial-lined spaces containing lymph*

**Cystic hygroma** – *large, fluctuant swelling (>10 cm) of the head and neck region, may extend to oral cavity.*

# *Lymphangioma*



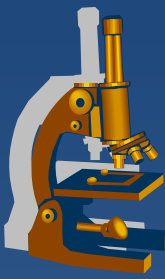
*pebbly surface of the tongue*



*dilated lymphatic vessels beneath the epithelium*

# *Tumors of peripheral nerves*

---



1. Neurofibroma
  - solitary
  - multiple
2. Neurinoma (Schwannoma)
3. Multiple mucosal neuromas (MEN sy)
4. Traumatic neuroma
5. Granular cell tumor

# *Tumors of peripheral nerves*



**Neurofibroma** – mixture proliferation of Schwann cell and fibroblasts

- young adults, children

Solitary lesion – *tongue, buccal mucosa, well-circumscribed nodules*

Multiple lesions associated with neurofibromatosis (**von Recklinhouse's disease of nerves**) – AD, mutations in NF1 gene, located 17q11.2

skin pigmentation (coffee and milk) + involving of cutaneous nerves + axillary freckling + **oral lesions**

!!! May be associated with tumors of CNS, leukemia, RMS, WT...

# *Tumors of peripheral nerves*



## **Oral lesions:**

- ✗ mucosal swelling of the tongue, gingiva
- ✗ enlargement of the fungiform papilla
- ✗ enlargement of mandibular foramen
- ✗ increased bone density

Risk of malignization ⇒ MPNST (neurofibrosarcoma) 5-15%

**Treatment:** *no specific therapy*

# Neurofibromatosis



*Involving of cutaneous nerves + mucous swelling of the tongue, gingiva*

# ***Tumors of peripheral nerves***



**Neurinoma (Schwannoma)** - benign neoplasm of Schwann cell origin

- young and middle-aged adults
- tongue, intraosseous in the posterior mandible

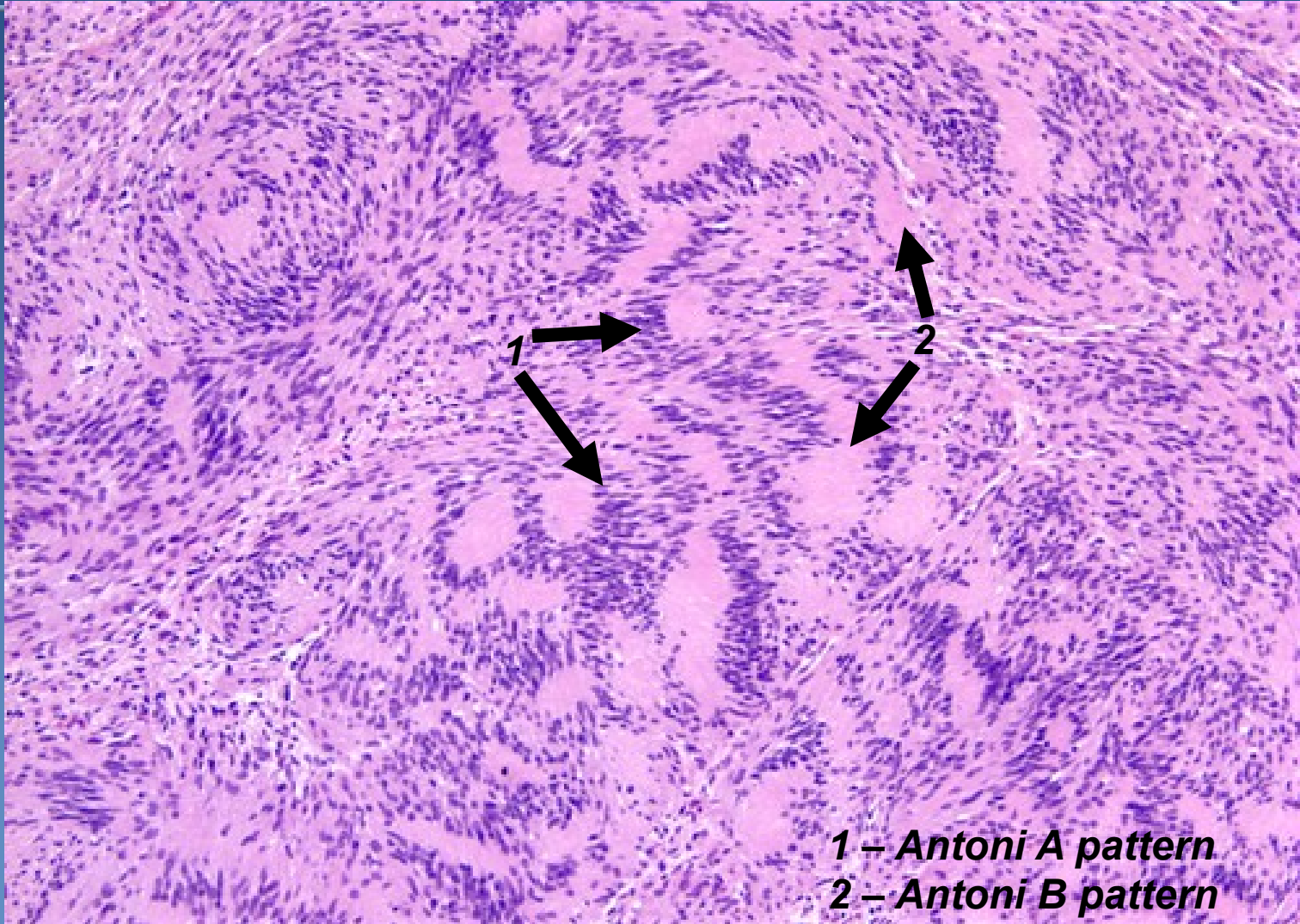
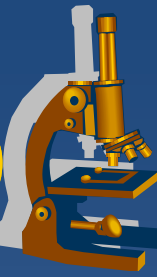
**Gross:** *vary in size, encapsulated tumor*

**Micro:** *2 patterns – Antoni A (palisaded nuclei, Verocay bodies)  
Antoni B (less cellular fields)*

**Treatment:** *surgical excision*



# Neurinoma (Schwannoma)



1 – Antoni A pattern  
2 – Antoni B pattern

# Traumatic neuroma



**Traumatic neuroma** (amputation neuroma) – tumor-like reactive proliferation of Schwann cells

- × cause: transection or other damage of a nerve bundle
- × middle-age adults, F>M
- × mental foramen area, tongue, lower lip
- × painful lesion!!!

**Gross:** *small nodule*

**Micro:** *proliferation of mature nerve bundles, fibrotic stroma, mild chronic inflammation*

**Treatment:** *surgical excision (incl. involved nerve bundle)*

# *Granular cell tumor*



**Granular cell tumor** — tumor of unknown origin  
(in the past was called the granular cell myoblastoma)

- wide age range
- dorsal surface of the tongue

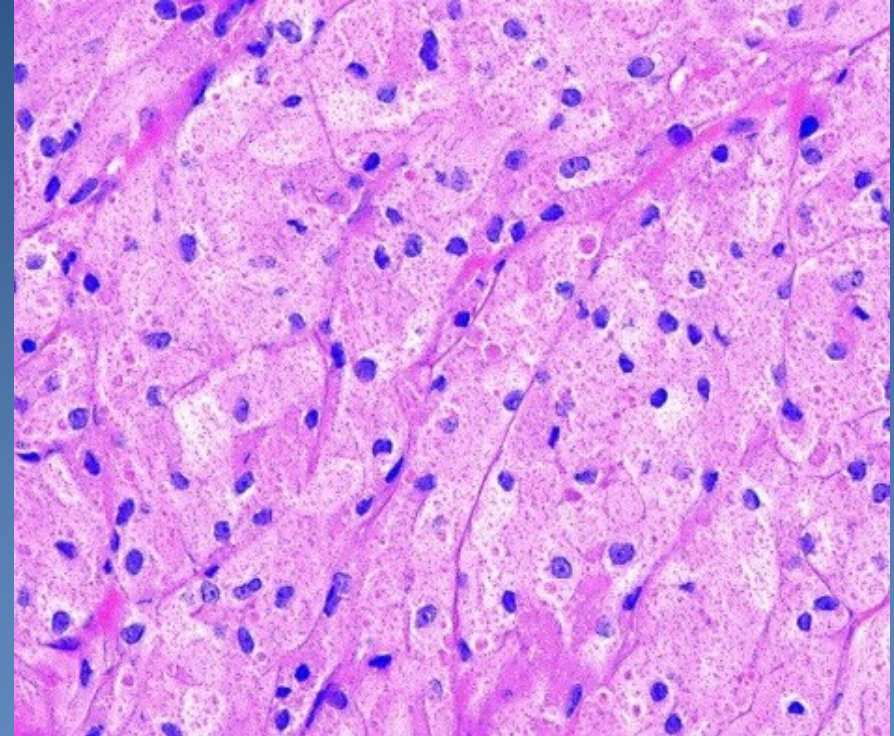
**Gross:** *non-encapsulated lesion*

**Micro:** *large cells with granular cytoplasm,  
pseudoepitheliomatous hyperplasia of the overlying epithelium*

# ***Granular cell tumor***



***non-encapsulated lesion of  
tongue's mucosa***



***large cells with granular cytoplasm***

# *Tumors of muscle*

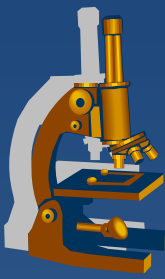
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**Leiomyoma** – benign smooth muscle tumors

*probably, leiomyomas of the oral cavity have their origin from vascular smooth muscle*

Leiomyosarcoma and rhabdomyosarcoma are both very rare in oral cavity



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# ***Bone pathology***

# *Inherited and development disorders of bone*

---



- x1. Osteogenesis imperfecta
- x2. Osteopetrosis
- x3. Cleidocranial dysplasia
- x4. Achondroplasia
- x5. Fibro-osseous lesions
- x6. Cherubism

# *Inherited disorders of bone*

---



- ✗ uncommon diseases
- ✗ jaw involvement variable
- ✗ orofacial manifestations include:
  - abnormalities in number, form, structure of teeth
  - malocclusion
  - abnormal facial appearances



# Osteogenesis imperfecta



- × AD, mutations in the genes that code for type-1 collagen (80-90%)
- × generalized osteoporosis (slender bones)  
Clinically 4 main type:
  - × Type I (classic type) – *AD, blue sclera, deafness, +/- dentinogenesis imperfecta*
  - × Type II (perinatal lethal) – *AD*
  - × Type III (progressively deforming) – *AD/AR, severe osteoporosis, progressive deformities, dentinogenesis imperfecta*
  - × Type IV – *AD, similar to type I, but more severe*

**Micro:** *immature, woven bones of cortex*

# *Osteogenesis imperfecta*



**Dentinogenesis imperfecta:**  
**note delicate bone trabeculae**  
**+ obliteration of pulp**  
**chambers**

# ***Osteopetrosis (marble bone disease)***

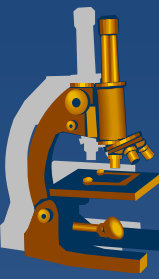


- ✗ excessive density of all bones
- ✗ obliteration of marrow cavities → secondary anemia
- ✗ defect in osteoclastic activity, failure in the remodeling of the developing bone
- ✗ bones mechanically weak, common fractures!!!

**Symptoms:** *delayed eruption of teeth, osteomyelitis (after tooth extraction)*

**Radiography:** *mandible >> maxilla, invisible roots of the teeth*

# ***Cleidocranial dysplasia (cleidocranial dysostosis)***



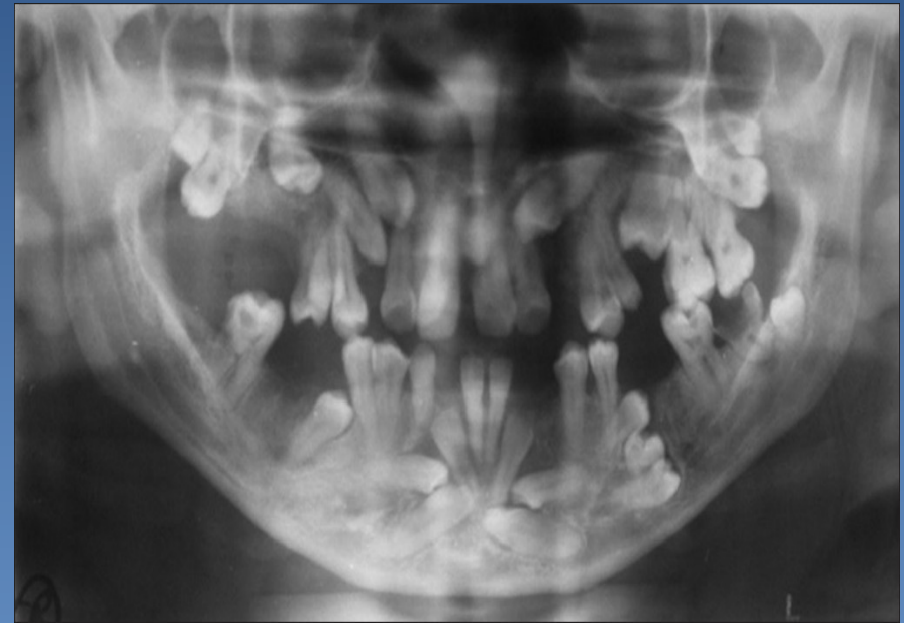
- ✗ AD, mutations to the RUNX2 gene
- ✗ disturbance of differentiation of osteoblasts from precursor cells
- ✗ abnormalities of the skull, jaws, clavicle (partial/complete absence)
- ✗ maxilla with a high, narrow arched palate
- ✗ delayed or non-eruption of the permanent dentition, supernumerary teeth

Radiography: *thin teeth's roots*

# *Cleidocranial dysplasia*



*Complete absence of clavicles*



*Retention of deciduous teeth + multiple impactions of permanent teeth*

# *Fibro-osseous lesions*



Divided into:

## I. Osseous dysplasia

1. Fibrous dysplasia (monostotic/polyostotic)
2. Cemento-osseous dysplasia

## II. Benign neoplasia (ossifying fibroma)

- ✗ replacement of normal bone by cellular fibrotic tissue
- ✗ contain woven bone + acellular islands of mineralized tissue develop

# Fibrous dysplasia (FD)



× development disorder, but not inherited

**Monostotic FD:** *much more common!*

× childhood, adolescence

reactivation of quiescent lesion during pregnancy

× affected 1 bone: limb, skull bones, **particularly the jaws**

maxilla >> mandible

**Craniofacial fibrous dysplasia** – 1 bone is affected (maxilla) + involvement of adjacent bones

Symptoms: *painless swelling of the maxilla (buccal)* → *facial asymmetry*  
*rapid and extensive growth* → *exophthalmos*  
*mandibular lesion* → *fusiform expansion + displacement of teeth*

Gross: *ill-defined smooth enlargement*

Radiography: *ground-glass/orange-peel-stippling effect*  
*displaced teeth, separated roots*

# *Fibrous dysplasia (FD)*



## **Fibrous dysplasia**

- Monostotic form more common in the craniofacial region
- Ground glass change with areas of sclerosis (arrows)
- More ill-defined border compared to ossifying fibroma



# *Fibrous dysplasia (FD)*



## Polyostotic FD

- ✗ affected several bones, segmentally lesions
- ✗ affected sites: limb (lower), **skull bones**, vertebrae, ribs, pelvis
- ✗ childhood, F:M 2-3:1

*expansion usually stops with skeletal maturation*

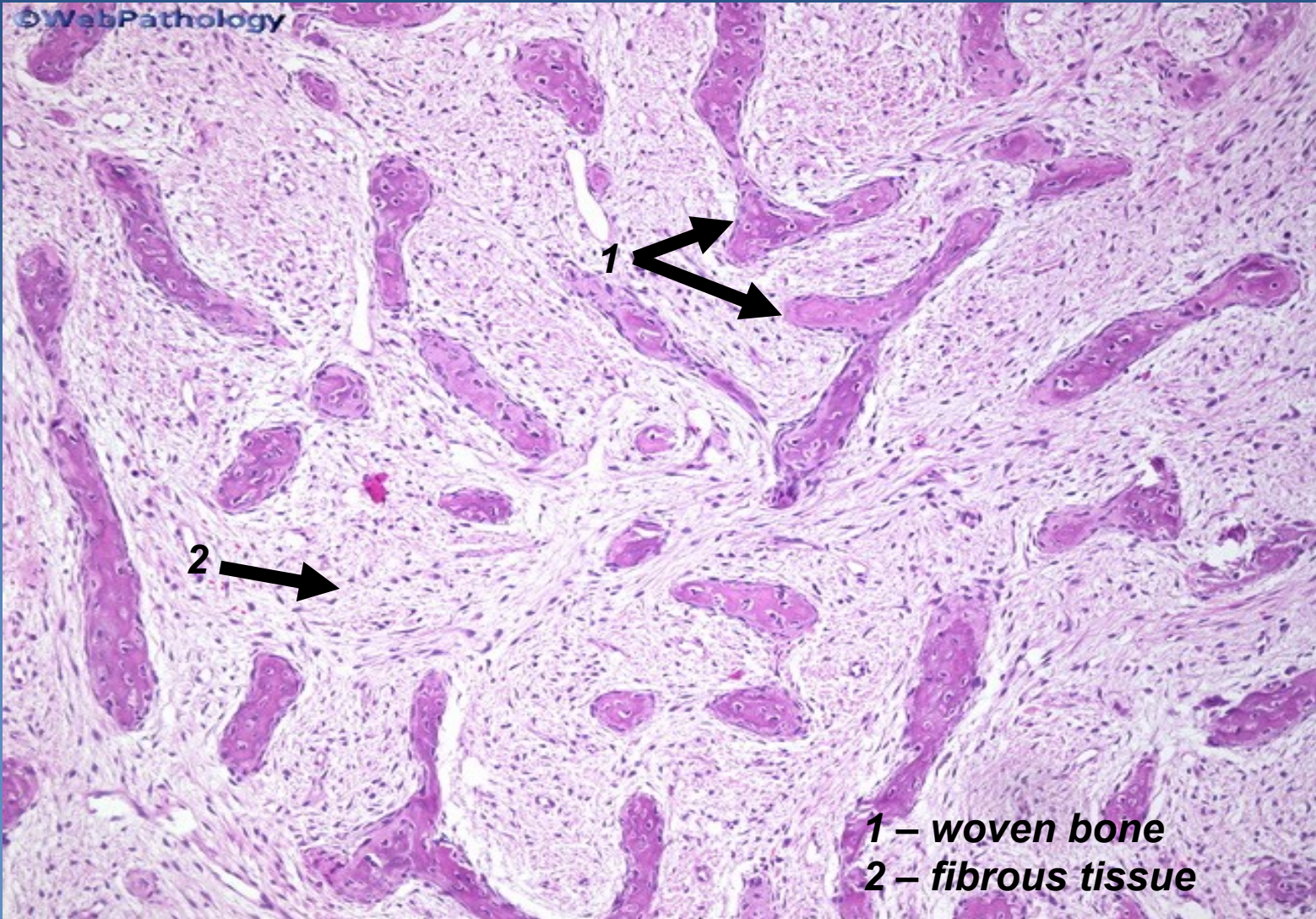
**McCune-Albright syndrome** – bone lesions are accompanied by skin pigmentation, sexual precocity, endocrine abnormalities

Micro: *delicate trabeculae of woven bone + fibrous tissue*

Remodelling of woven to lamellar bone may occur with increasing age!!!

Treatment: **not radiosensitive !!!** (risk of malignant transformation to *fibrosarcoma*)

# *Fibrous dysplasia (FD)*



# Cemento-osseous dysplasia



- × osseous dysplasia of jaws, which involves the tooth-bearing areas
- × F>>M, over 30 yrs old, mandible>>maxilla

Based on the clinical and radiographic features:

*periapical, focal and florid cemento-osseous dysplasia*

Clinically:

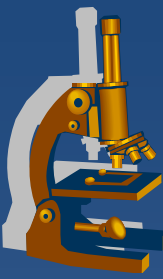
multiple and small <1 cm	multiple and large >1 cm
associated with apical areas of the mandibular incisors	involve 1 or more quadrants in one or both jaws

Micro: *fibrous tissue + bone/calcified acellular tissue develop*

Radiography: *radiolucent/mixed/radiopaque*

# *Inflammatory diseases of bone*

---



- x1. Alveolar osteitis (dry socket)
- x2. Focal sclerosing (condensing) osteitis
- x3. Osteomyelitis
- x4. Chronic periostitis
- x5. Radiation injury and osteoradionecrosis

# Osteomyelitis



- now is a rare disease
- polymicrobial infection

## Predisposing factors:

### Local factors

- × trauma
- × radiation injury
- × Paget's disease
- × osteopetrosis
- × major vessel disease

### Systemic factors

- × immune deficiency states
- × immunosuppression
- × DM
- × malnutrition
- × extremes of ages

# Suppurative osteomyelitis



- × clinically: acute, chronic (>1 month)
- × mandible > maxilla
- × source of the infection – *dental abscess, fractures, penetrating wounds, extractions*

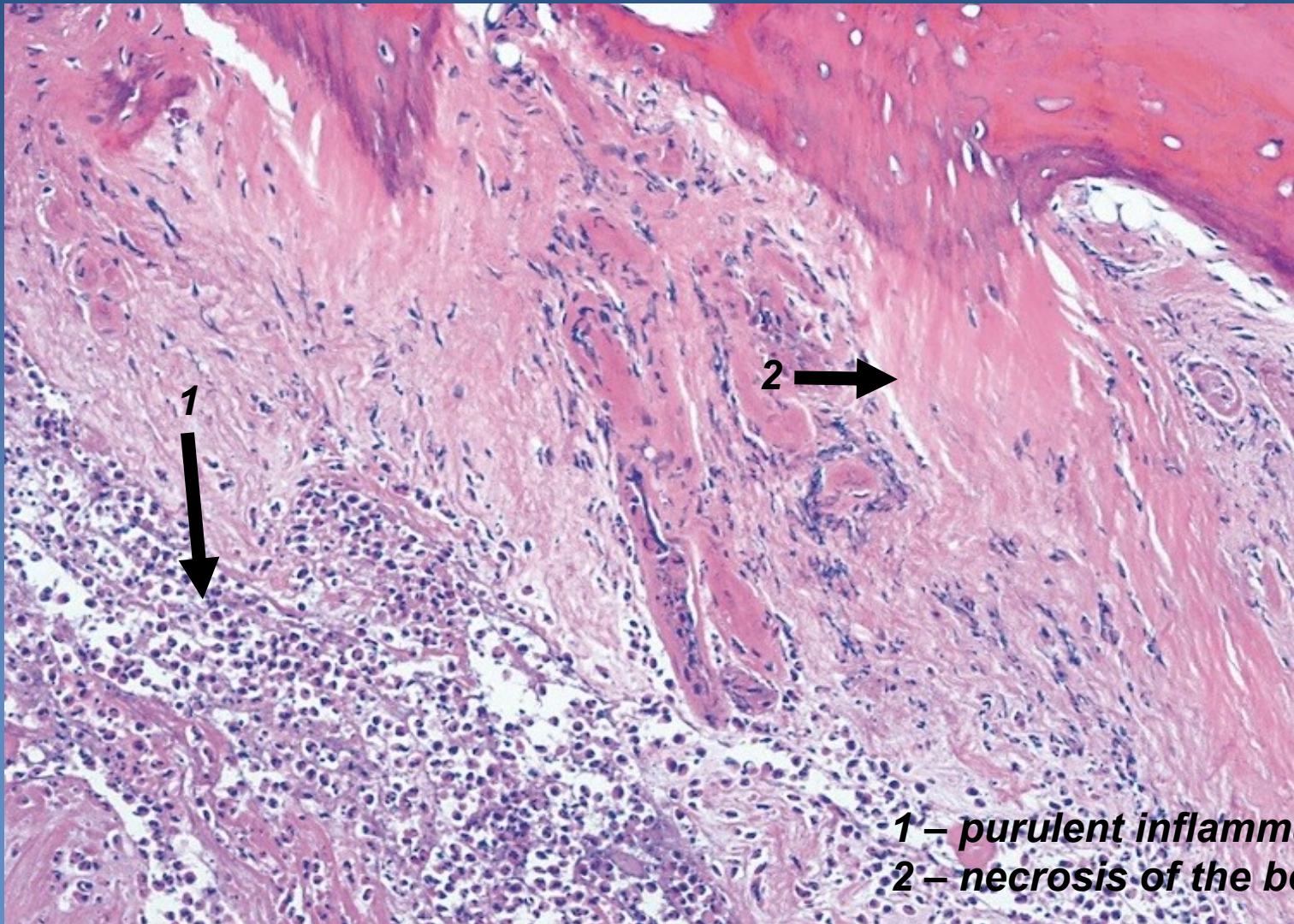
## Symptoms:

**acute lesion** - *pain, swelling, pyrexia, malaise, mobility of teeth*  
**chronic** – *discharge of pus through 1 or more sinuses*

**Micro:** *suppurative inflammation, necrosis of the bones, pus within marrow spaces, vascular thrombosis*

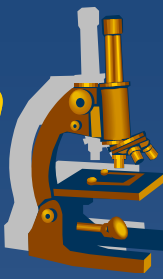
**Complication:** *sequestrum (exfoliated through a sinus)*  
*surgical removing*

# *Suppurative osteomyelitis*



**1 – purulent inflammation**  
**2 – necrosis of the bone**

# ***Chronic osteomyelitis with proliferative periostitis***



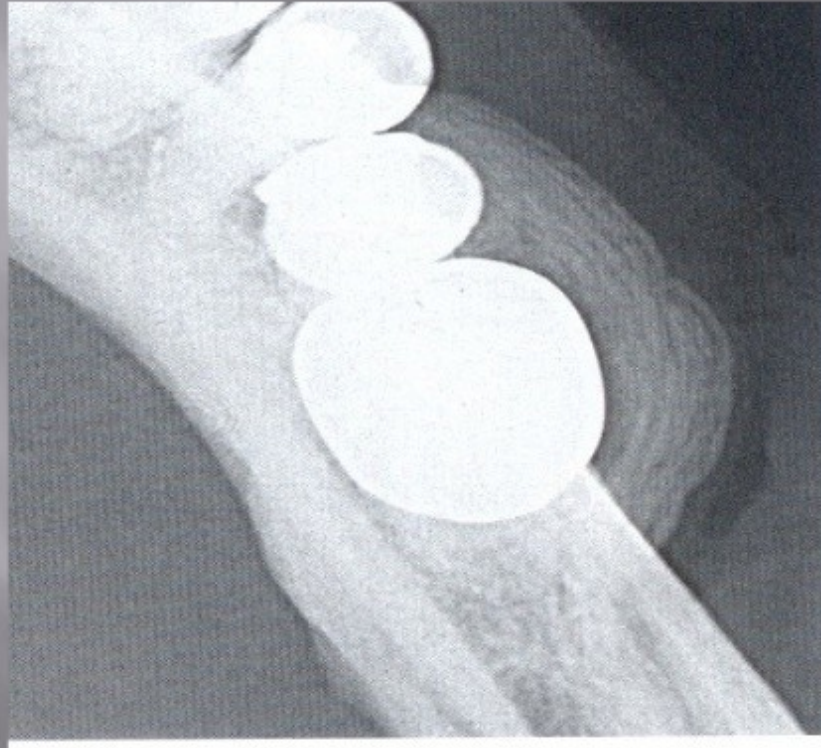
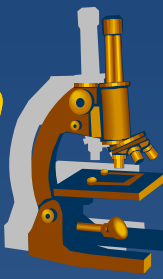
- x** syn. Garré's osteomyelitis, periostitis ossificans
- x** type of sclerosing osteomyelitis
- x** mandible, children and young adults

**Gross:** *swelling on the outer surface of the mandible*

**Micro:** *subperiosteal mass of trabeculae of woven bone + chronic inflammation in fibrous marrow*



# ***Chronic osteomyelitis with proliferative periostitis***



Garre's osteomyelitis

***Subperiosteal mass in mandible***

# *Metabolic and endocrine disorders of bone*

---



- x1. Osteoporosis
- x2. Primary hyperparathyroidism
- x3. Secondary hyperparathyroidism
- x4. Rickets and osteomalacia
- x5. Acromegaly

# Osteoporosis



- × excessive bone loss/when the apposition of bone is reduced
- × F:M 2:1
- × postmenopausal women (rate of bone's loss 1-8% per year)
- × edentulous patients (mandible)
- × accentuated in Cushing syndrome, thyrotoxicosis, primary hyperparathyroidism
- × osteoporotic bone is reduced in quantity

**Radiography:** *increased radiolucency, thin cortex*

# Hyperparathyroidism



## Primary

- × ↑ secretion of parathormone (adenoma/Ca, hyperplasia PG)
- × hypercalciemia, hypercalciuria + pathological metastatic calcification

**Micro:** *brown tumor (haemosiderin + fibrotic tissue + multinucleated, osteoclast-like giant cells)*

## Secondary

- × response to chronic hypocalciemia (CRI)
- × may associated with rickets and osteomalacia

**Micro:** *uncalcified osteoid + brown tumor*

may affect jaws

# Paget's disease of bone



- ✗ form of osteodystrophy, disorganized formation and remodeling of bone

- ✗ aetiology - unclear

*genetic and environmental factors, paramyxovirus infection*

- ✗ >40 yrs, more common in maxilla

Phases:

1. Osteolytic
2. Mixed osteolytic and osteogenesis
3. Osteoblastic

# Paget's disease of bone

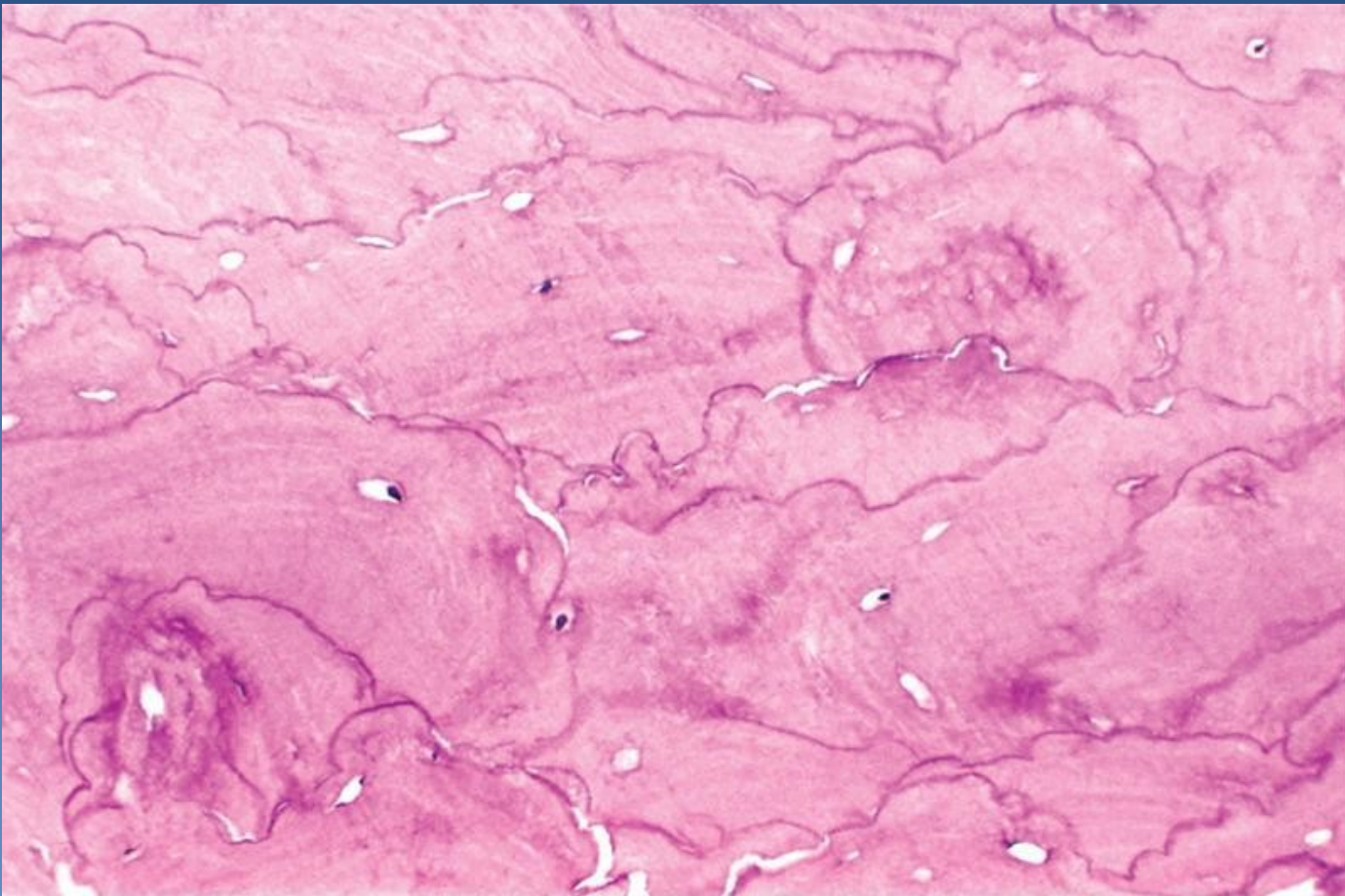


**Symptoms:** *bone pain, cranial nerve compression, facial deformity, difficulties in wearing dentures  
hypercementosis, ankylosis → difficulty in extraction  
root resorption (1 phase)  
increased alkaline phosphatase*

**Micro:** *criss-crossing reversal lines, mosaic bone*

**Complication:** *risk of malignant transformation (osteosarcoma)*

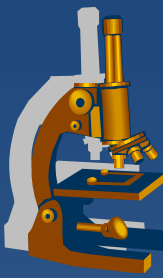
# *Paget's disease of bone*



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***criss-crossing reversal lines, mosaic bone***

# ***Tumors of bone***



## **1. Bone-forming tumors**

---

Benign:	Osteoma Osteoblastoma
Malignant:	Osteosarcoma

## **2. Cartilage-forming tumors**

Benign:	Chondroma
Malignant:	Chondrosarcoma

## **3. Marrow tumors:**

Myeloma

## **4. Histiocytic and dendritic cell neoplasms**

Langerhans cell histiocytosis

## **5. Vascular tumors:**

Haemangioma of bone

## **6. Fibrous tumors:**

Ossifying (cemento-ossifying) fibroma

## **7. Metastatic tumors**



# Bone-forming tumors



**Osteoma** – benign, slow-growing tumor

×adults, mandible>maxilla

**GROSS:** *solitary, well-circumscribe lesion*

*multiple osteomas of the jaws occur as a feature of Gardner sy*

**MICRO:** *compact type: dense lamellar bone*

*cancellous type: interconnecting trabeculae + fibrous marrow*

**Osteoblastoma** – rare tumor in the jaws

**MICRO:** *cementoblastoma (!!!not related to the roots of the teeth)*

# ***Bone-forming tumors***



**Osteosarcoma** – primary malignant Tu of bone

- × 30 yrs and older
- × relatively rare in jaws

**Intramedullary type** - *arise centrally within the jaws*

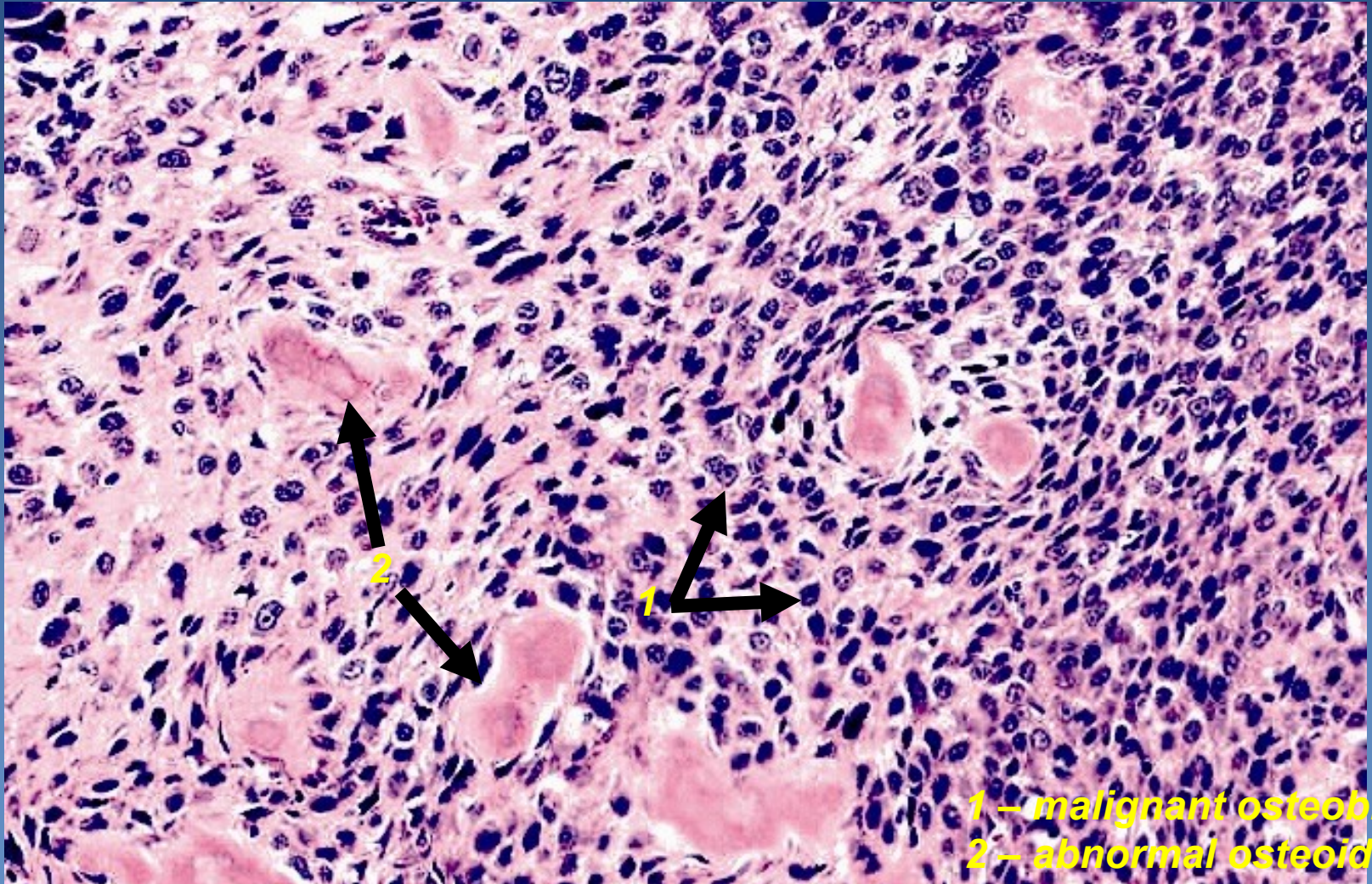
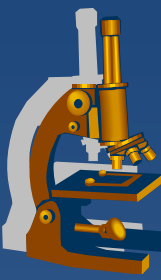
**Juxtacortical type** – *peripherally in the relation to the periosteum, better prognosis*

**Micro:** *malignant osteoblasts + abnormal osteoid*

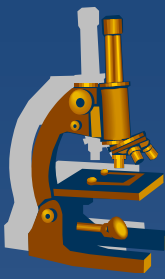
**Metastasis:** *RLN, lungs, brain*

**Treatment:** *neoadjuvant CT+ surgical removal + adjuvant CT*

# Osteosarcoma



1 – malignant osteoblasts  
2 – abnormal osteoid



# ***Cartilage-forming tumors***

**Chondroma** – rare benign Tu in the jaws

**x** 3-4 decades

**x** **Mandible** (*condylar process, posterior part*)

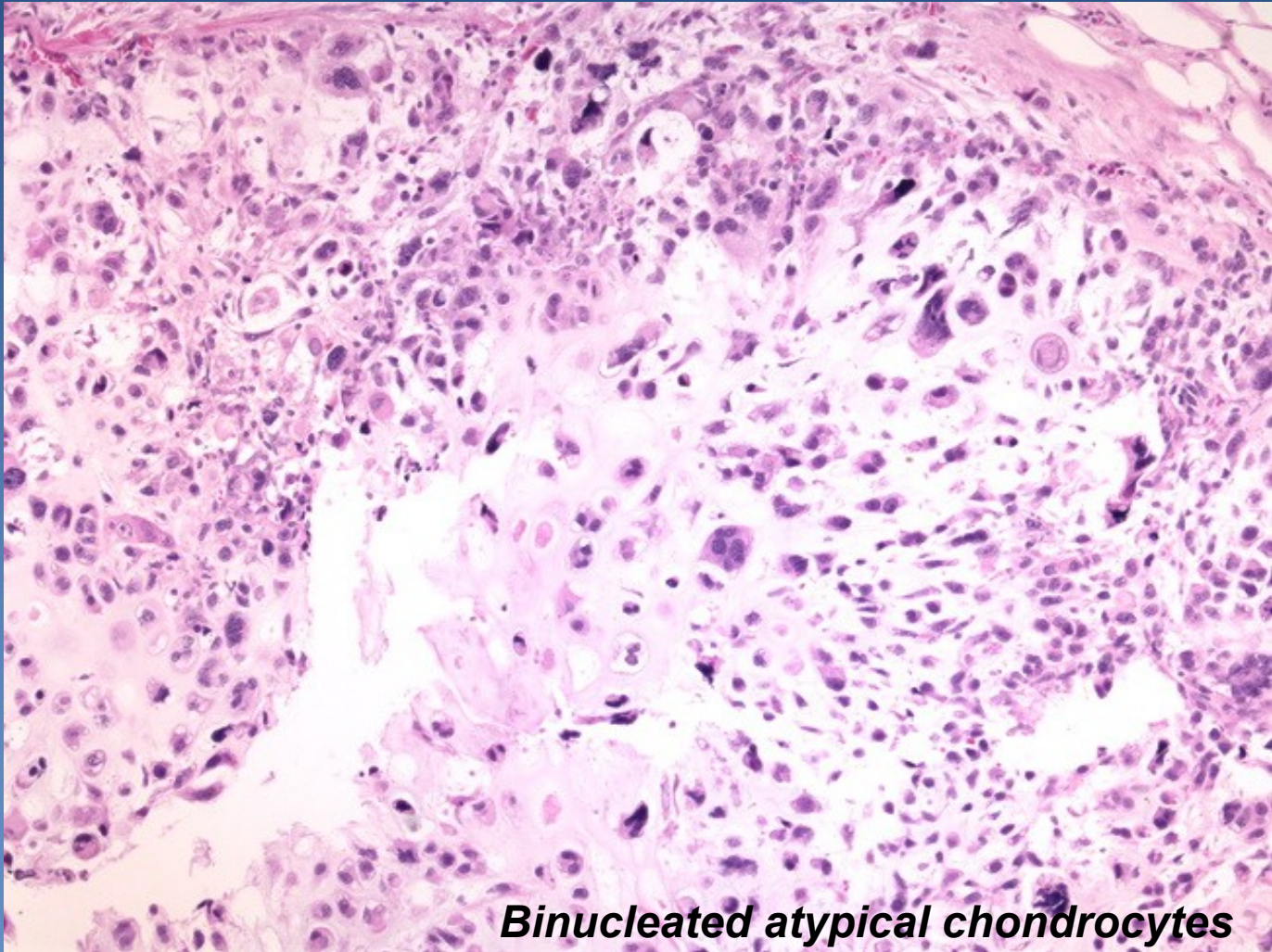
**Maxilla** (*anterior part*)

**Micro:** *circumscribed mass of mature hyaline cartilage*

**↑ cellularity, binucleated cells** ⇒ **susp well-differentiate chondrosarcoma !!!**

**Prognosis:** *better for mandibular lesions*

# ***Chondrosarcoma***



***Binucleated atypical chondrocytes***

# Marrow tumors



## Myeloma – plasma cells neoplasm

**Multiple myeloma** – *disseminated disease involving many bones*

**Solitary myeloma (plasmocytoma)** – *solitary lesion*

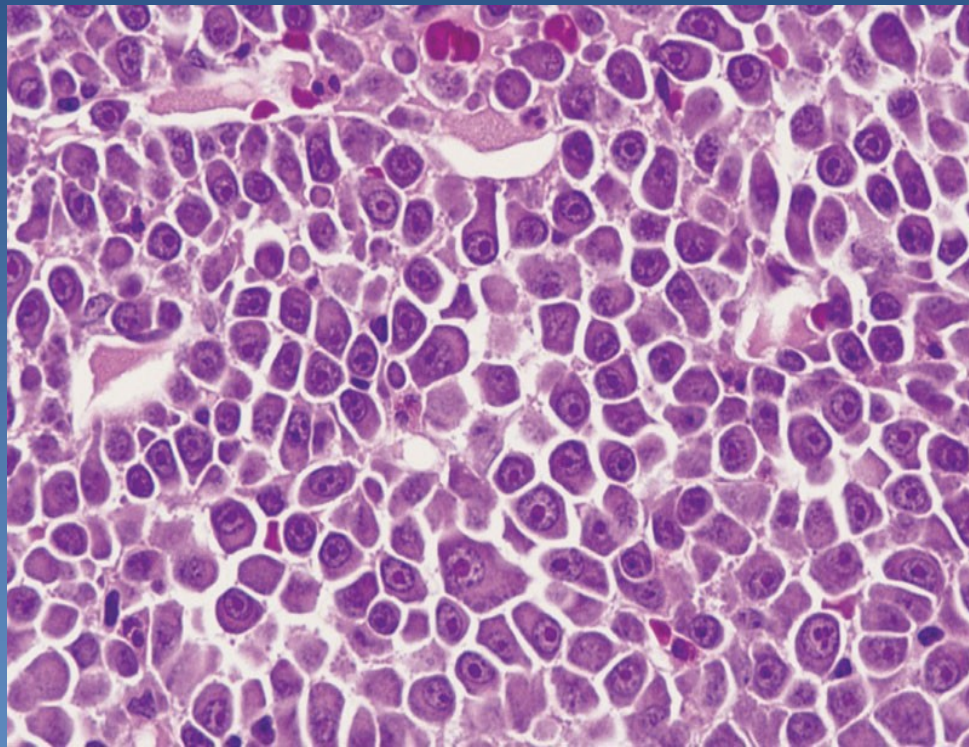
- × 50-70 yrs
- × **skull**, vertebrae, sternum...(sites with red marrow)
- × abnormally high levels of single homogenous type **Ig** in serum (paraprotein)

**Radiography:** *osteolytic lesions (punched-out radiolucencies)*

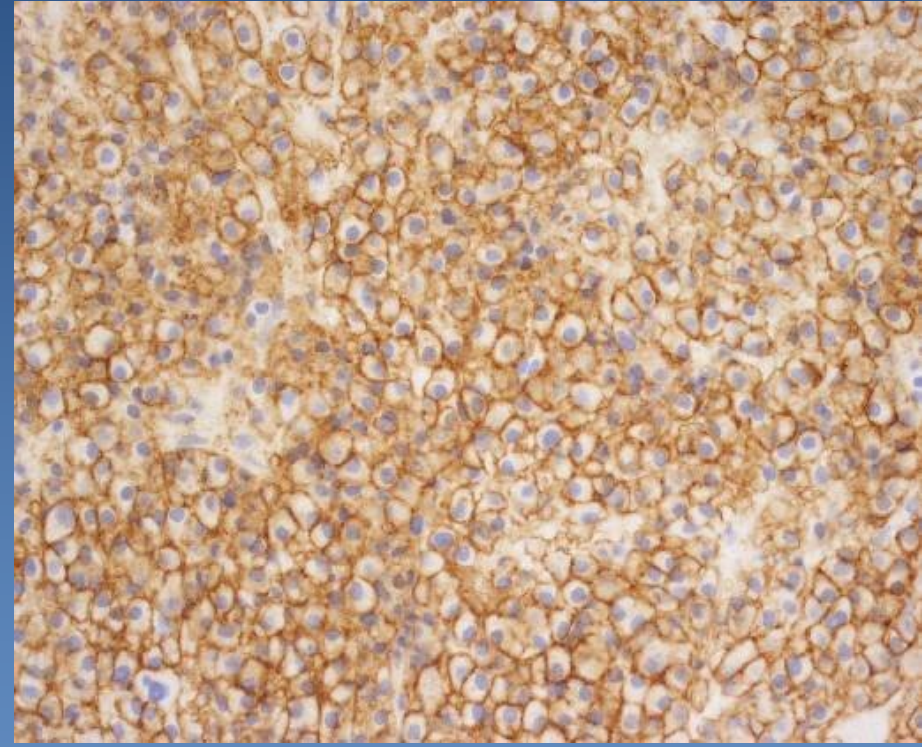
**Micro:** *cellular sheets of Tu cells resemblance to plasma cells*

**IHC:** *positivity of CD20, CD138, kappa, lambda*

# Myeloma



***Tumour's cells resemblance to plasma cells***



***IHC: positivity of CD138***

# ***Histiocytic and dendritic cell neoplasms***



**Langerhans cell histiocytosis** – clonal proliferation of Langerhans-type cells

**Solitary lesion in bone** (unifocal eosinophilic granuloma)

**Multifocal eosinophilic granuloma** (bone + other organs)

**Disseminated multiorgan disease** (Litterer-Siwe disease)

***Unifocal/multifocal eosinophilic granulomas:***

- <20 yrs, M:F 2:1
- cranium and jaws (mandible)

**Radiography:** *solitary/multiple osteolytic lesions*

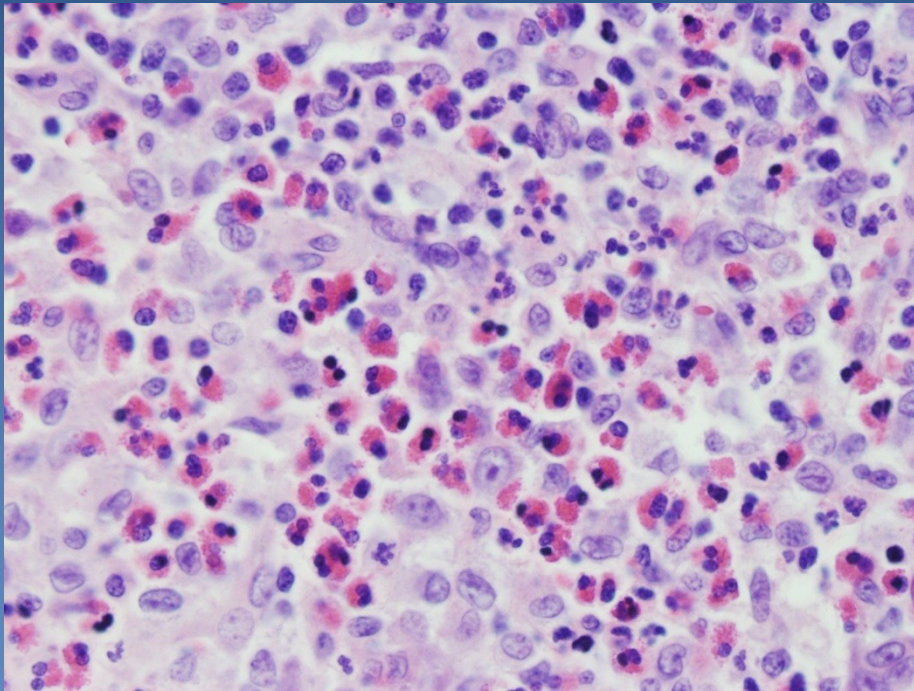
**Micro:** *histiocytes + variable numbers of eosinophils*

**EM:** *Birbeck granules*

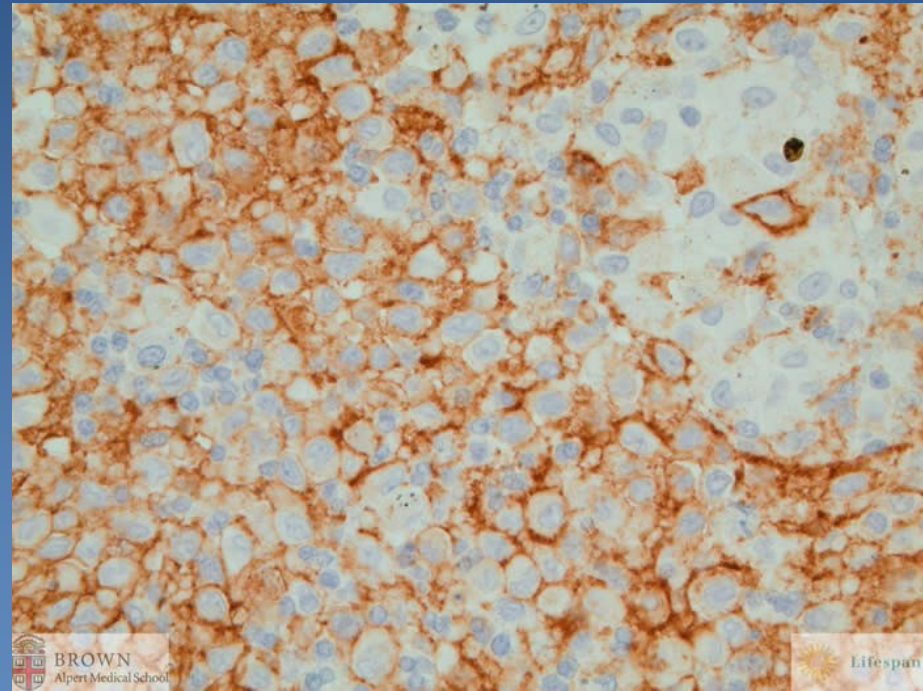
**IHC:** *positivity of CD1 $\alpha$ , S100*



# *Langerhans cell histiocytosis*



***Histiocytes + variable numbers of  
eosinophils***



***IHC: positivity of CD1a***

# *Fibrous tumors*



**Ossifying (cemento-ossifying) fibroma** – benign  
**well-demarcated !!!** neoplasm

× wide age range, F>M

*rapid growth in children/adolescence - **juvenile ossifying fibroma***

**Micro:** *well circumscribed cellular fibrous tissue + trabeculae of bone*

**Diff.dg:** *fibrous dysplasia*

**Juvenile ossifying fibroma** – *richly cellular + high mitotic activity + immature-looking woven bone (recc. rate 30-60%)*

**Diff. dg:** *osteosarcoma*

# *Metastatic tumors*



- ✗ 1% of malignant Tu of oral cavity
- ✗ Mandible >> maxilla
  - gingiva, alveolar mucosa, tongue
- ✗ Ca of breast, bronchus, kidney...
- ✗ Mts may cause: osteolytic changes  
osteoblastic changes



***Thank you  
for your attention...***