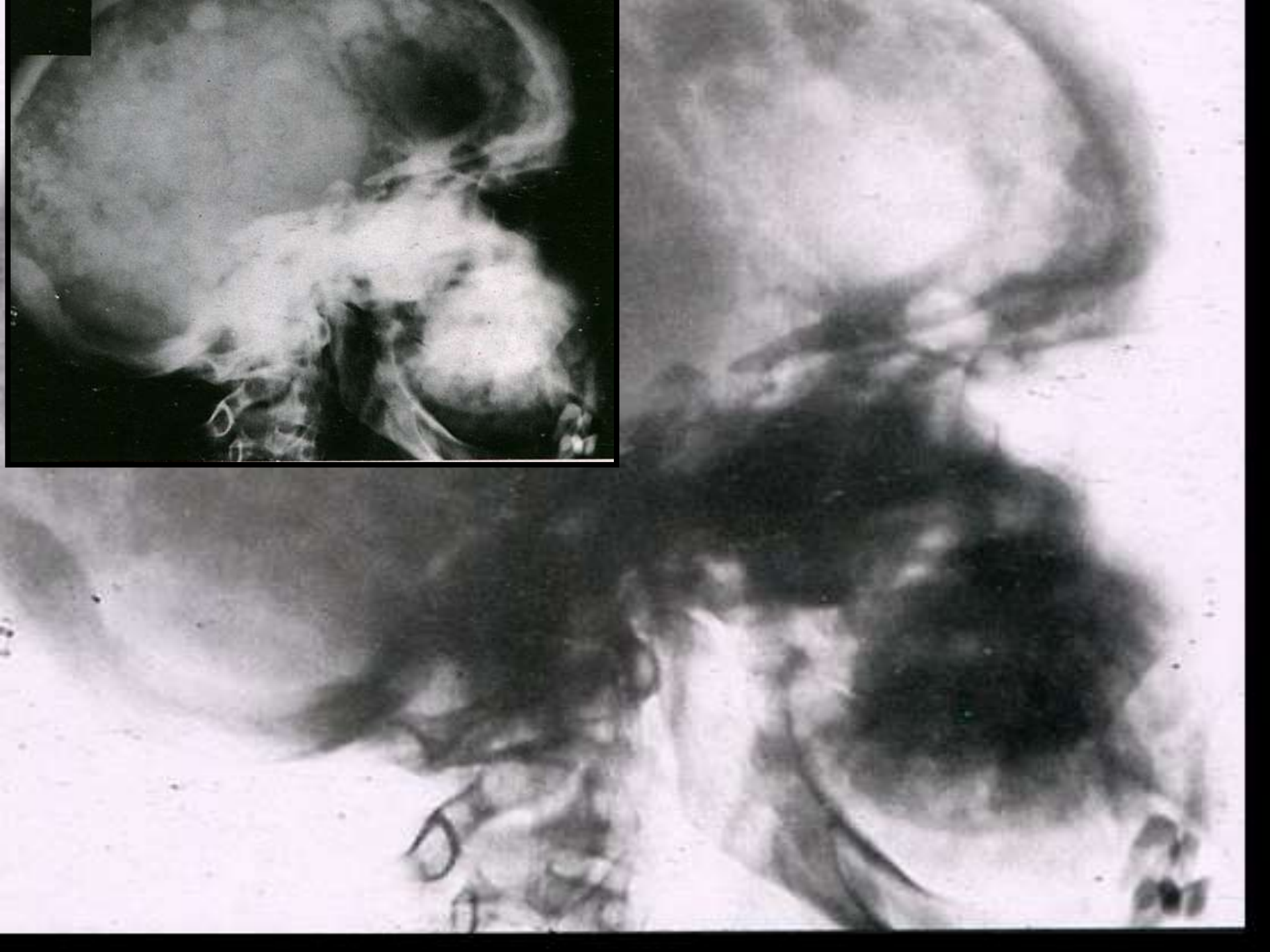
DISEASES OF BONE

Dept.of Oral Pathology

& Microbiology



Learning Objectives

At the end of the lecture student should be able to describe the

- Classification of fibroosseous lesions
- Pathogenesis, types, & clinical features of fibrous dysplasia

INTRODUCTION

- Bone is a dense calcified tissue ,which is specifically affected by a variety of diseases.
- Some of these involve entire body skeleton, others affect only a single bone.
- May arise at all ages, some are congenital & present at birth, others in early childhood, young adulthood, or in later life.

- The diseases of bone constitute a group of generalized skeletal diseases which frequently manifests in maxilla or mandible

- Fibrous Dysplasia
- Osteitis Deformans (Paget's Disease)
- Osteogenesis Imperfecta
- Cherubism
- Cleidocranial Dysplasia
- Osteopetrosis
- Syndromes

-- *Crouzon Syndrome*

-- *Down Syndrome* -- *Marfan Syndrome*

-- *Pierre Robin Syndrome* -- *Treacher Collins Syndrome*

FIBRO OSSEOUS LESIONS OF THE JAWS

- Fibro-osseous jaw lesions are a clinically diverse, but histologically similar group of conditions that are characterized microscopically by a benign fibroblastic stroma in which there is new bone deposition.
- Normal bone is replaced by :
  - Variably collagenous connective tissue matrix
  - Trabeculae of new bone / cementum like material.

- The designation ***Fibro-osseous jaw lesions*** is not a specific diagnosis & describes only a process, which includes developmental lesions ,reactive or dysplastic processes & neoplasms

FIBRO – OSSEOUS LESIONS

Definition- Given by ***Waldron***

- A ***group of pathological changes*** within the jaw – bones in which the normal bone is replaced by fibrous tissue, with or without calcification.

- Charles Waldron -1993 -working classification For fibro-osseous jaw lesions.

1. Fibrous dysplasia
2. Reactive (dysplastic) lesions arising in the tooth bearing areas..
    1. Peri apical cemento osseous dysplasia.
    2. Focal cemento osseous dysplasia.
    3. Florid cemento osseous dysplasia.
3. Fibro osseous neoplasms:

These are widely designated as cementifying fibroma, ossifying fibroma, or cemento-ossifying fibroma.

FIBROUS DYSPLASIA (FD)

- In 1938, American pathologist ***Louis Lichtenstein*** was the first to use the term ***‘‘fibrous dysplasia’’***
- A benign lesion, presumably developmental in nature, characterized by presence of fibrous connective tissue with a characteristic whorled pattern and containing trabeculae of immature bone (WHO definition).

FIBROUS DYSPLASIA

- It is a benign ,non-neoplastic, developmental bone disease of fibro-osseous origin, in which normal medullary bone is gradually replaced by an abnormal fibrous connective tissue proliferation.
- The mesenchymal tissue contains various amounts of osteoid & osseous material that presumably arises through **metaplasia.**

- Pathogenesis
  - Schlumberger – trauma.
  - Greco and Steiner – abnormal osteoblastic maturation of the bone forming mesenchyme .It represents a non neoplastic, hamartomatous growth resulting from altered mesenchymal cell activity.

- Genetic alteration?
  - **FIBROUS DYSPLASIA** is a post zygotic mutation of ***guanine nucleotide binding protein, α- stimulating activity polypeptide 1*** gene.
  - **GNAS1** encodes the α subunit of G proteins. (guanine nucleotide proteins) which on stimulation produce cAMP.

Mutation in GNAS1 gene

↓

Overproduction of cAMP

↓

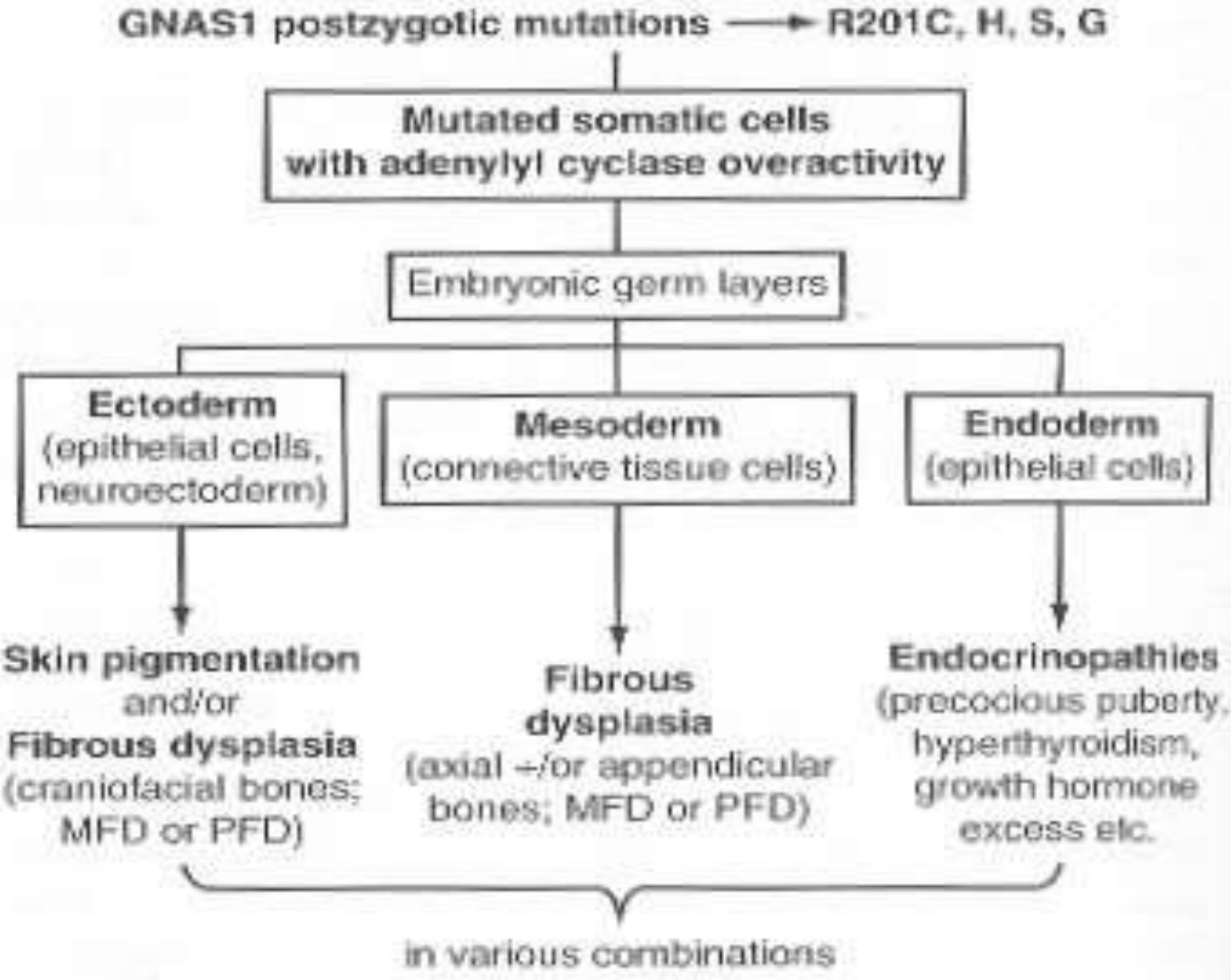
Hyperfunction of affected endocrine organs.

↓

Precocious puberty, Hyperthyroidism, Growth hormone Cortisol overproduction	Increased proliferation of melanocytes --café-au-lait spots with irregular margins	Differenciation of osteoblasts -- Fibrous dysplasia

- Clinical severity of the condition depends on the mutation of GNAS1, during fetal or postnatal life.

Early embryonic life-	Later embryonic life-	Postnatal life –
-Osteoblasts -Melanocytes -Endocrine cells ▪ Multiple bone lesions ▪ Cutaneous pigmentation ▪ Endocrine disturbances	▪ Polyostotic Fibrous dysplasia.	▪ Monostotic Fibrous dysplasia.


GNAS1 postzygotic mutations → R201C, H, S, G
Mutated somatic cells with adenylyl cyclase overactivity
Embryonic germ layers
Ectoderm (epithelial cells, neuroectoderm)
Mesoderm (connective tissue cells)
Endoderm (epithelial cells)
Skin pigmentation and/or Fibrous dysplasia (craniofacial bones; MFD or PFD)
Fibrous dysplasia (axial +/or appendicular bones; MFD or PFD)
Endocrinopathies (precocious puberty, hyperthyroidism, growth hormone excess etc.
in various combinations

FIBROUS DYSPLASIA

- MONOSTOTIC FD
  -affecting single bone
- POLYOSTOTIC FD
  -affecting many bones
  - Jaffe-Lichtenstein type
    -multiple bone lesions
    -skin pigmentation(cafe au lait macules)
  - McCune-Albrights type
    -multiple bone lesions
    -skin pigmentation(cafe au lait macules)
    -varoius types of endocrine disorders

CLINICAL FEATURES:

MONOSTOTIC FIBROUS DYSPLASIA

- It is much more common than Polyostotic type (80% of cases)
- Jaws are most commonly affected sites
- Maxilla is affected more than the mandible
- Age: first or second decade of life
- Sex: monostotic fibrous dysplasia exhibits equal gender distribution; polyostotic is commoner among females.

- Nature of growth:
  - Slow progressive enlargement
  - Asymptomatic swelling
  - Commonly there is buccal cortical plate expansion, rarely lingual or palatal aspect.

Intra-oral appearance of the bony swelling which has remained virtually unchanged after five years


Five years later

- Although the mandibular lesions are truly Monostotic, maxillary lesions often involve adjacent bones such as zygoma, sphenoid, occiput & are not strictly monostotic.

Termed as--***Craniofacial fibrous dysplasia***

Summary

- The diseases of bone constitute a group of generalized skeletal diseases which frequently manifests in maxilla or mandible
- Fibrous Dysplasia is a post zygotic mutation of guanine nucleotide binding protein, α- stimulating activity polypeptide 1 gene
- Three types-Monostotic,Polyostotic& Craniofacial
- It clinically manifests as slowly progressive expansive bony swelling in maxilla, in 1^{st}-2^{nd} decade

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Thank You