DISEASES OF THE PULP

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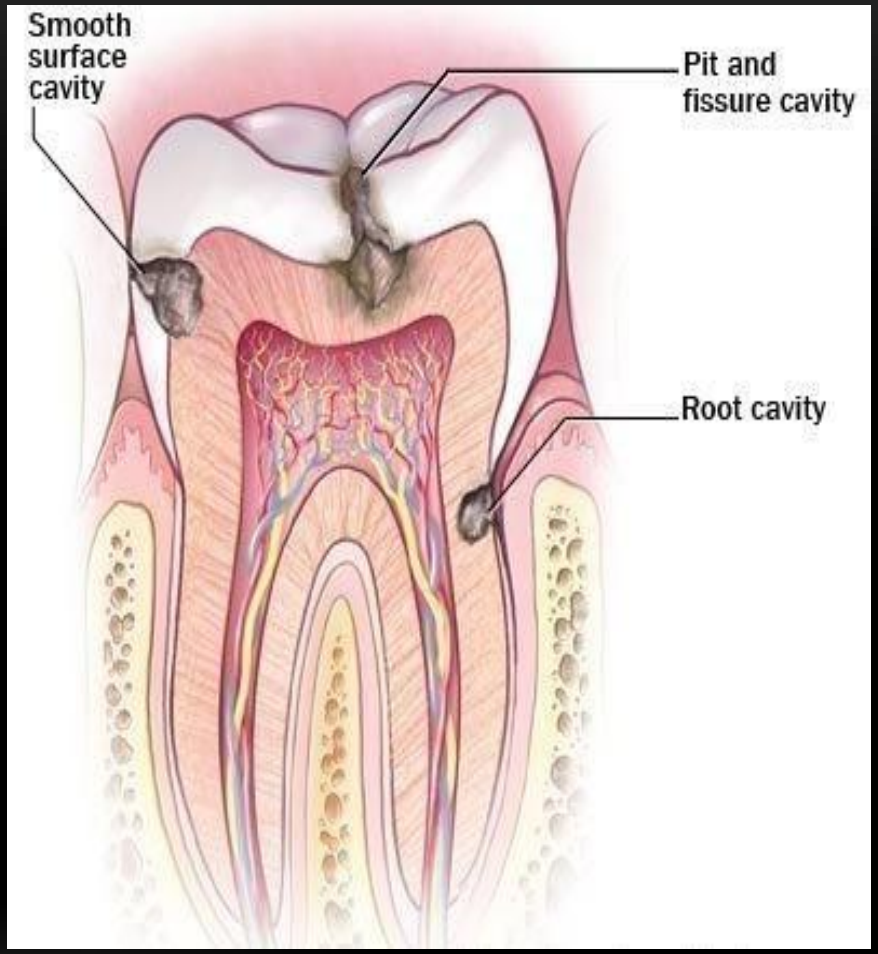
- The response of pulp to injury is different from other tissues because of the rigid dentinal walls of the pulp chamber



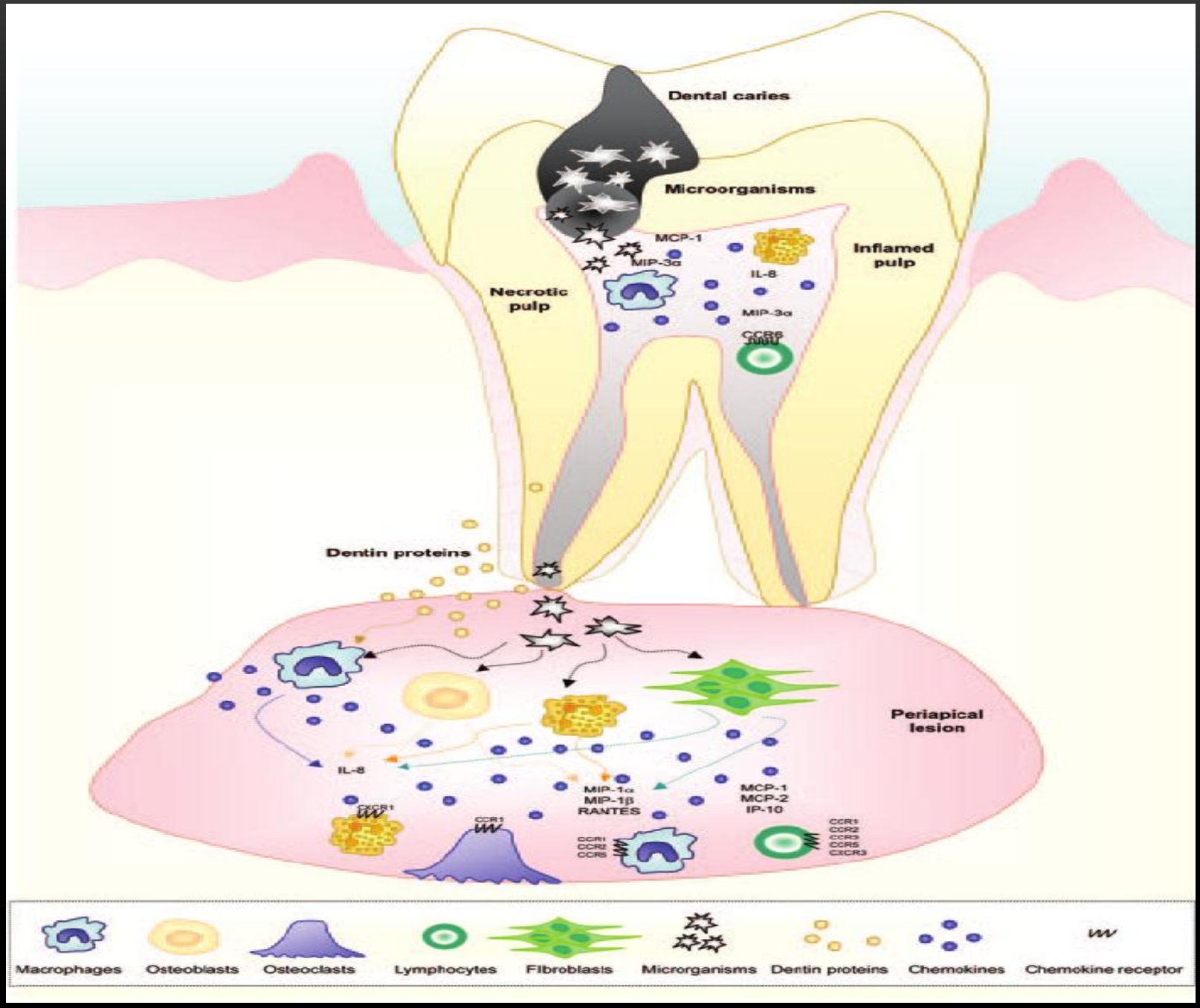
TYPES OF STIMULI THAT CAUSE PULP INFLAMMATION:

- **Mechanical damage:** accidents, iatrogenic damage, attrition, abrasion.
- **Thermal injury:** Severe thermal stimuli can be transmitted through large unisolated metallic restorations or as a result of frictional heat generation during cavity and exothermic chemical reactions of dental materials.

- **Chemical irritation: inappropriate use of acidic dental materials.**
- **Bacterial effects: bacterial toxins**
- **Barotrauma (aero-dontalgia): it is dental pain at high altitudes in unpressurized aircraft and in deep-sea diving due to formation of nitrogen bubbles in the pulp tissues or vessels.**

PATHOGENESIS OF PULPITIS

- Injured stimuli degranulated mast cells (histamine, bradykinin, neurokinins, prostaglandins) released causing vasodilation, increased blood inflow and edema that exist in very confined area trying to eliminate invading organisms, increase vascular pulpal pressures that compress venous return leading to pulp necrosis.


Dental caries
Microorganisms
MCP-1
MIP-3α
IL-8
Inflamed pulp
Necrotic pulp
MIP-3α
CCR6
Dentin proteins
Periapical lesion
IL-8
CXCR1
CCR1
MIP-1α
MIP-1β
RANTES
CCR1
CCR2
CCR5
MCP-1
MCP-2
IP-10
CCR1
CCR2
CCR3
CCR5
CXCR3
Macrophages
Osteoblasts
Osteoclasts
Lymphocytes
Fibroblasts
Microorganisms
Dentin proteins
Chemokines
Chemokine receptor

CLASSIFICATION OF PULPITIS

Acute pulpitis	Chronic pulpitis
The patient complains of a severe throbbing pain radiating into the face, the ear or the neck.	The patient complains of dull aching pain
Precipitated by hot or cold stimuli or in lying down keeps the patient awake	Spontaneous attacks
The pain lasts for about 10-15 min	The pain last for an hour or more

ACCORDANCE TO THE APPROPRIATE TREATMENT GUIDANCE

Reversible pulpitis	Irreversible pulpitis
the tissue is capable of returning to a normal state of health if the stimuli is removed.	dental pulp has been damaged beyond the point of recovery.
sudden mild to moderate pain of short duration and it doesn't occur without stimuli and subside within seconds after stimuli removal	the pain is sharp, sever upon thermal stimulation and continues after the stimulus is removed

Pain initiated with cold, sometimes heat, sweet or sour foods and beverages	Heat, cold, sweet and acid can initiate pain which is localized but with increasing discomfort the patient is unable to identify the offending tooth within a quadrant and has a throbbing pressure that can keep patient awake at night.

Mobility and sensitivity to percussion are absent. The tooth responds to electric pulp testing at lower levels of current	Mobility and sensitivity absent but it is found if inflammation spread into the apical area.Tooth respond to electric pulp testing at higher current or demonstrate no response

Histopathological features shows hyperemia, edema, Tertiary dentin may be noted in the adjacent dentinal wall with scattered acute inflammatory cells.	Histopathological features demonstrates congestion of the venules resulting in necrosis that contains chronic inflammatory cells with fibrosis.
treatment conservative treatment, medications sometimes are desirable. The prognosis is good if action is taken early enough.	Treatment: extraction of the tooth or root canal therapy.

THE DECISION THAT WHETHER PULPITIS IS REVERSIBLE OR IRREVERSIBLE IS BASED ON FACTORS SUCH AS:

- The age of the patient.
- The size of the carious lesion.
- The presence or absence of symptoms.
- Pulp vitality test.
- Radiographic evidence.
- Direct observation during operative procedures.

CHRONIC HYPERPLASTIC PULPITIS:

- sub-acute inflamed hyperplastic granulation tissue fills the pulp chamber occur in open tooth apex in children and young adults asymptomatic except for feeling pressure in mastication.

PULPAL CALCIFICATIONS

- calcified bodies within an organic matrix in the radicular and coronal portions.
- increase with long-standing chronic pulpitis and with age and with a familial tendency.
- True pulp stones calcified material contain tubules and odontoblasts while False pulp stones are composed of concentric layers of calcified material with no tubular structure.
- The three types of pulpal calcifications are: Denticles, Pulp stones, Diffuse linear calcifications

DENTICLES:

- occur in root canal and pulp chamber of multi rooted teeth. Form during the period of root development by odontoblasts that deposit tubular dentin as they move away from the central epithelium therefor most denticles become attached to or embedded in the dentin.

PULP STONES:

- occured within the coronal portions of the pulp developed after tooth formation is completed and are usually free or attached. They develop around a central nidus of pulp tissue (e.g., collagen fibril, ground substance, necrotic cell remnants) extend outward.

DIFFUSE LINEAR CALCIFICATIONS

- they are present in the pulp chamber or canals parallel the vasculature and the frequency increases with age.

- **Clinical significance of pulp calcifications:**
- **They interfere with root canal endodontic procedure**
- **They lead to periodontal destruction and tooth loss.**
- **Treatment and prognosis: no treatment is required and is not associated with any significant clinical alterations.**

AGE CHANGES IN TEETH:

- **Pulp:** The volume of the pulp gradually decreases with age due to the continued production of secondary dentine, decrease in vascularity, cellularity with increase prevalence of pulp calcification. These changes may impair the response of tissue to injury and its healing potential

- **Enamel:** it tends to become more brittle, less permeable and darker which may be due to absorption of organic material.
- **Dentine:** Formation of dentin proceeds throughout life. **primary dentin** formed before completion of the crown **secondary dentin** with ageing (increase after 35-40 years). Dentinal sclerosis leading to brittle roots and fracture during extraction, increase the susceptibility of caries and tooth wear.

- **Tertiary dentin**
  is irregular dentin formed in response to an irrita nt, such ascaries, disease, or drilling to prepare a cavity for filling called also irregular dentin and reparative dentin .
- **Cementum:** continues formation throughout the life especially in the apical half of the root to compensate for interproximal and occlussal attrition.

Suggestive Reading

Brad W Neville, Douglas D Damm, Carl M. Allen, Jerry E Bonguot. Oral And Maxillofacial Pathology, 4th Edition, Elsevier, 2015


Thank
You!