



Lec 1

Endodontics



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**Endodontics:** is the branch of clinical dentistry which is concerned with the morphology, physiology, pathology of human dental pulp and periradicular tissue, it also concerned with diagnosis and treatment of the diseases and injuries of these tissues.

### Objective Of Endodontic Treatment :

The objective of endodontic therapy is to treat the affected tooth to become symptom free (biologically acceptable) without diagnosable pathology and functional.

This objective can be achieved by eliminating the bacteria (source of infection) from the root canal system, and sealing the root canal and tooth to prevent re-infection.

When the dental pulp is diseased or injured, treatment is aimed at preserving normal peri-radicular tissues. When apical periodontitis has occurred treatment is aimed at restoring the peri-radicular tissues to health: this is usually carried out by root canal treatment, occasionally in combination with surgical endodontics.

#### ▪ **Indications For Root Canal Treatment:**

1. An irreversibly damaged or necrotic pulp with or without clinical and/or radiological findings of apical periodontitis.
2. Elective devitalization, e.g. to provide post space, prior to construction of an overdenture, doubtful pulp health prior to restorative procedures, likelihood of pulpal exposure when restoring a (misaligned) tooth and prior to root resection or hemisection.

#### ▪ **Contraindications For Root Canal Treatment:**

1. Teeth that cannot be made functional nor restored.
2. Teeth with insufficient periodontal support.
3. Teeth with poor prognosis, uncooperative patients or patients where dental treatment procedures cannot be undertaken.
4. Teeth of patients with poor oral condition that cannot be improved within a reasonable period.

## The pulp

The pulp is connective tissue system composed of cells, ground substances, collagen fibres, interstitial fluid, odontoblasts, fibroblasts and other cellular components. Embedded in this stroma, blood vessels, lymphatics and nerve fibers are present.

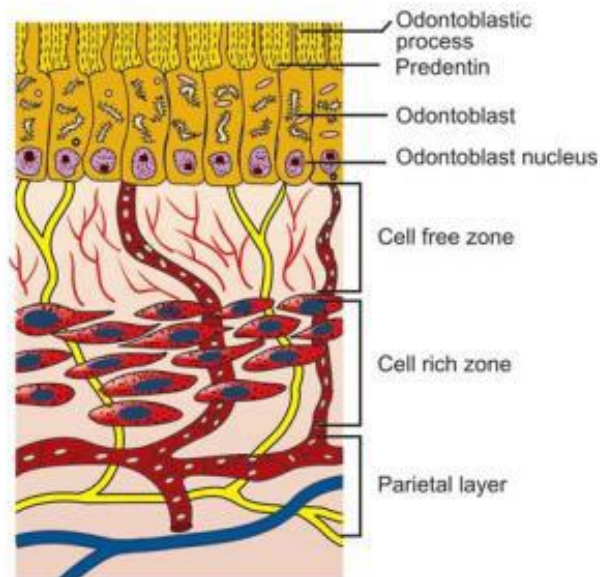
When pulp is examined histologically, it can be distinguished into four distinct zones from periphery to center of the pulp as shown in Figure below. The zones are as following:

**A. Odontoblastic layer at the pulp periphery:** Odontoblasts consists of cell bodies and cytoplasmic processes.

**B. Cell free zone of Weil:** Central to odontoblasts is sub-odontoblastic layer, it contains plexuses of capillaries and small nerve fibres.

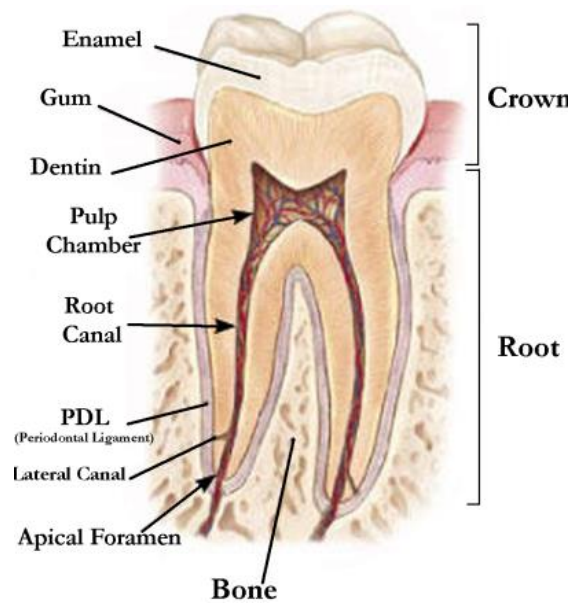
**C. Cell rich zone:** It contains fibroblasts, undifferentiated cells which maintain number of odontoblasts by proliferation and differentiation.

**D. Pulp core:** It contains large vessels and nerves from which branches extend to peripheral layers.



## Anatomy Of Dental Pulp

- Pulp lies in the center of tooth and shapes itself to miniature form of tooth.
- This space is called pulp cavity which is divided into a pulp chamber and root canal/s starting from the orifice to the apical foramen.
- There are also accessory and lateral canals.
- The shape of root canal varies with size, shape, number of the roots in different teeth.



### ❖ Functions Of Pulp

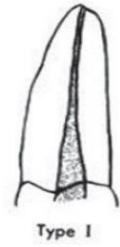
Pulp performs four basic functions:

1. Formation of dentine.
2. Nutrition of dentine.
3. Innervation of tooth.
4. Defense of tooth.

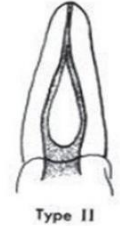
## Root Canal Configuration

The shape of root canals is divided into four types:

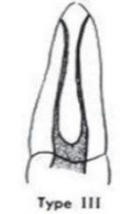
**Type 1:** A single canal leaving the pulp chamber and continuing as a single canal to the root apex and opens in a single apical foramen. It refers to **1-1-1**



**Type 2:** Two canals leave the pulp chamber then join each other at the apical third to open in a single apical foramen. It refers to **2-1-1**



**Type 3:** Two canals leave the pulp chamber and continue as two canals to be opened in two separate apical foramina. It refers to **2-2-2**



**Type 4:** A single canal leaving the pulp chamber, and bifurcating at the apical third into two canals and open in two apical foramina. It refers to **1-2-2**



## Basic Phases Of Treatment

There are three basic phases of treatment:

**1- The Diagnostic phase** in which the disease to be treated is “determined “and the treatment plan developed.

**2- The Preparatory phase** in which the contents of the root canal are removed and the canal is prepared to receive a filling material.

**3- The obliteration Phase** in which the canal is filled or obliterated with an inert material to obtain an adequate seal as close as possible to C.D.J. (cementodentinal junction).

If there is a defect in any phase, the endodontic treatment will not be succeeded.

## **Pulp And Peri-Radicular Pathology:**

Etiology of pulpal diseases can be broadly classified into:

### **I. Bacterial irritant:**

Bacteria, usually from dental caries, are the main source of injury to the pulpal and periradicular tissues and they enter either directly or through dentine tubules.

Modes of entry for bacteria to the pulp are as follows:

- 1- Through the carious cavity.
- 2- Through the dentinal tubules as in contamination during cavity preparation, through exposed root surface, and surfaces with erosion, abrasion and attrition.
- 3- Through the apical foramen as in advanced periodontitis where microorganisms reach the apical foramen and then the pulp.
- 4- Through the blood stream (anachoresis: it is a process by which microorganisms get carried by the bloodstream from another source localize on inflamed tissue). Following trauma or inflammation to the pulp any bacteria in the blood might be attracted to the pulp causing pulpitis.
- 5- Through faulty tooth restoration.
- 6- Through extension of a periapical infection from adjacent infected tooth.

### **II. Mechanical irritants:**

Examples of mechanical irritation include trauma, operative procedures, excessive orthodontic forces, subgingival scaling and over instrumentation using root canal instruments.

### **III. Chemical irritants:**

Pulpal irritation may result from bacterial toxins or some restorative materials/conditioning agents. Peri-radicular irritation may occur from irrigating solutions, phenol-based intra-canal medicaments or extrusion of root canal filling materials.