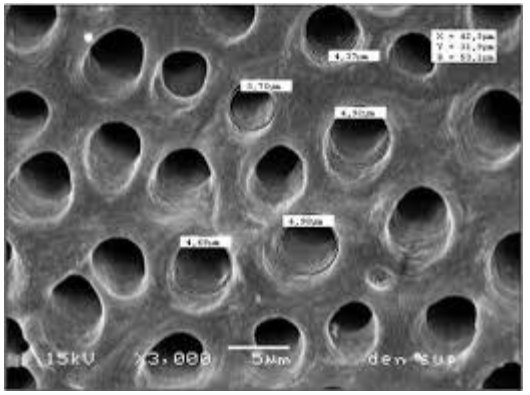
Lec 6,7

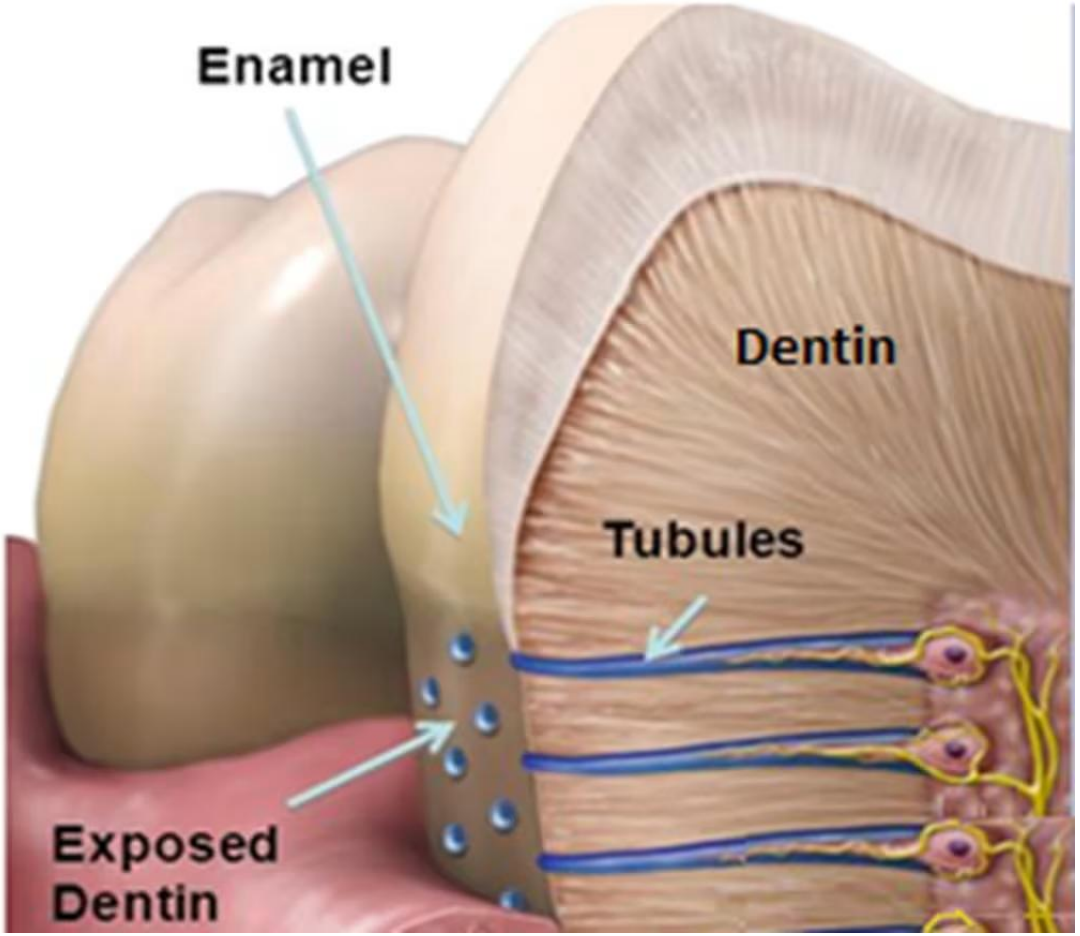
Dentin

- **General features:**



- **Dentin** form the bulk and general form of the tooth, it is present in both the crown and root.
- It is characterized by presence of dentinal tubules.
- **The dentinal tubules** have an extension from odontoblasts called odontoblastic processes.
- The odontoblasts (the cells forming the dentin) are Odontoblasts are found in the pulp and not in the dentin

The dentinal tubules

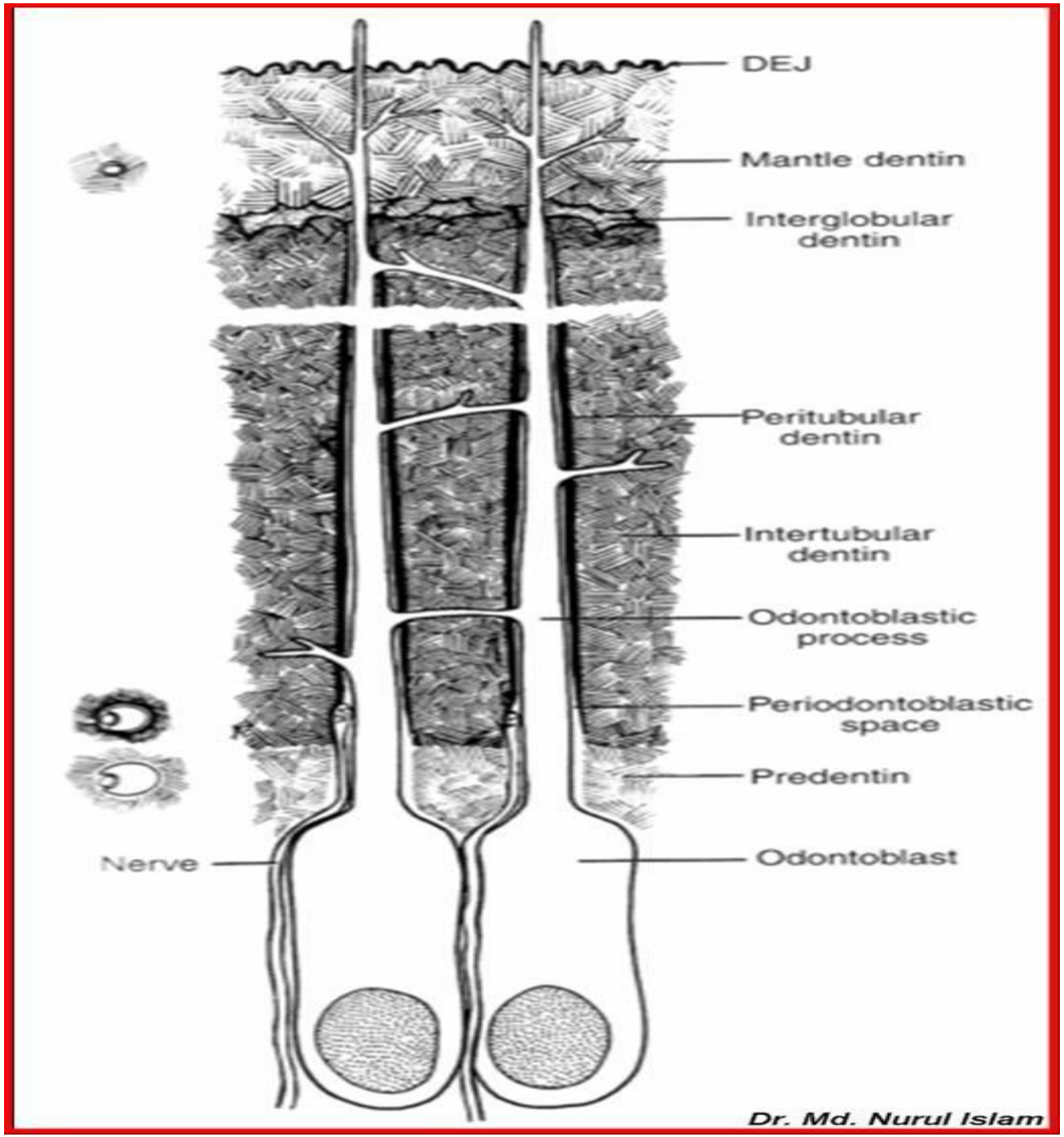


- Dentin is laid down throughout the life of the tooth.
- The dentin is the first hard tissue to be formed during the period of tooth development.
- It is ectomesenchymal in origin developed from the cells of the dental papilla.
- Dentin is enclosing the pulp with which it shares a common origin from the dental papilla.
- The dentin of primary teeth is less hard than that of permanent teeth.

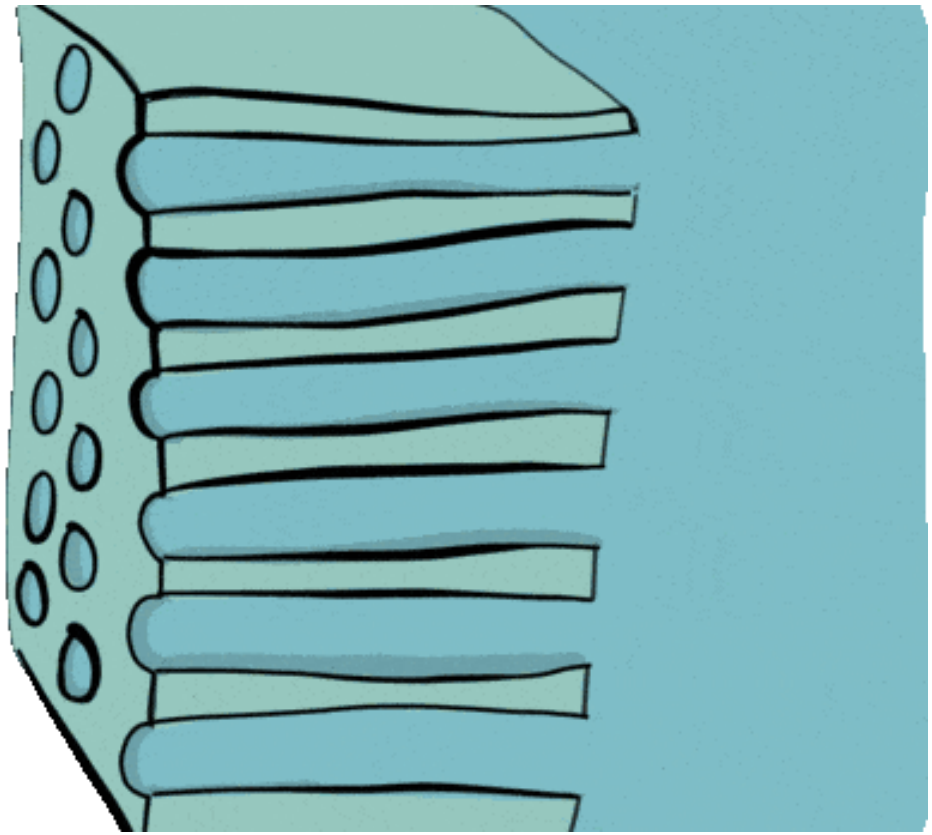
- **The dentin ranges in thickness from 3-10 mm.**


Crown
Neck
Root
Bone
Enamel
Dentin
Gums
Pulp
Cementum
Blood Vessels
& Nerves

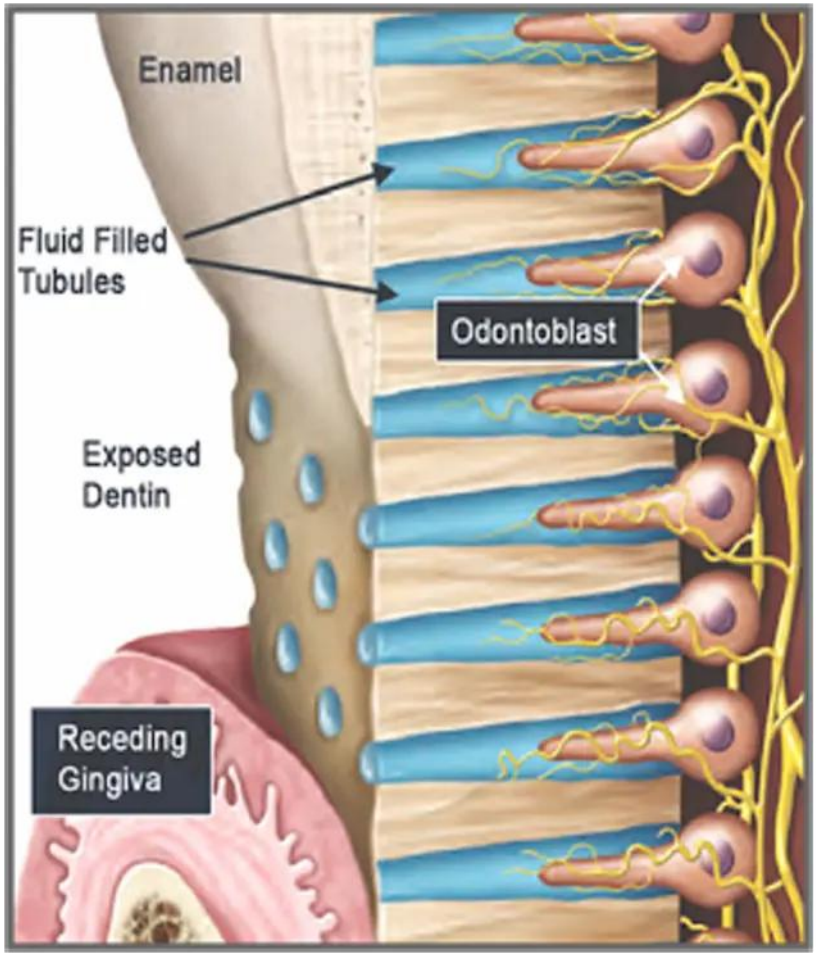
- **Physical properties:**
- It is pale yellow in color. Because the enamel is translucent, the dentin gives the crown of the tooth its color. It is less hard than enamel but harder than either cementum or bone.
- **Chemical properties:**
- Dentin consists of **20%** organic matter and **10%** water; and **70%** inorganic material.
- The organic material consists of:
- Collagen fibril (type I)

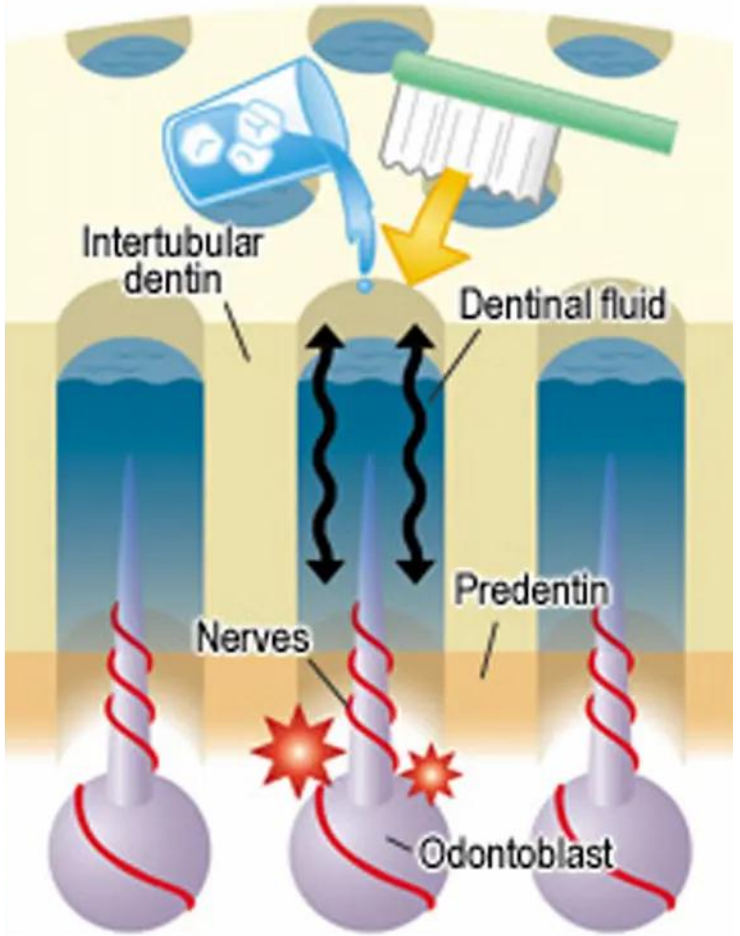

DEJ
Mantle dentin
Interglobular dentin
Peritubular dentin
Intertubular dentin
Odontoblastic process
Periodontoblastic space
Predentin
Odontoblast
Nerve
Dr. Md. Nurul Islam

- **The content of dentinal tubules:**
- **1.** Odontoblastic process.
- 2. Unmyelinated nerve fiber which does not extends along the full length of the tubules for up to 0.2 mm only.
- 3. Circulating extracellular fluid.
- 4. collagen fibers.
- 5. Hydroxyapatite crystals.



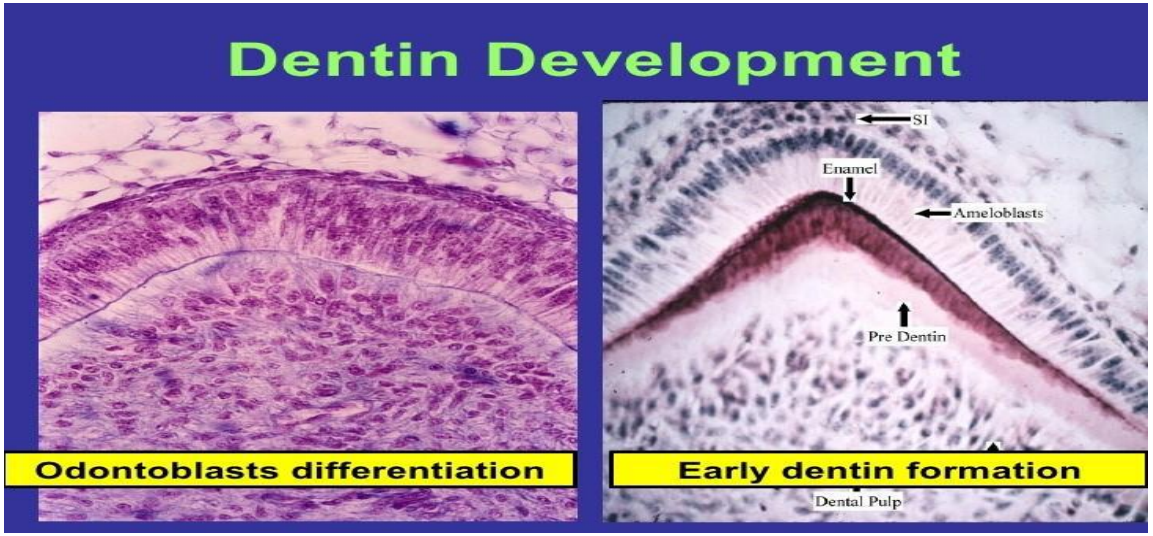
- **The presence** of patent (open) dentinal tubules renders the dentin to be permeable to:
- 1. Microorganisms and their products.
- 2. Cell debris from degenerated odontoblastic process.
- 3. Various dental restorative materials, which can permeate to the pulp and thus produce pulpal injury.


Enamel
Fluid Filled Tubules
Odontoblast
Exposed Dentin
Receding Gingiva


Intertubular dentin
Dentinal fluid
Predentin
Nerves
Odontoblast

Dentinogenesis

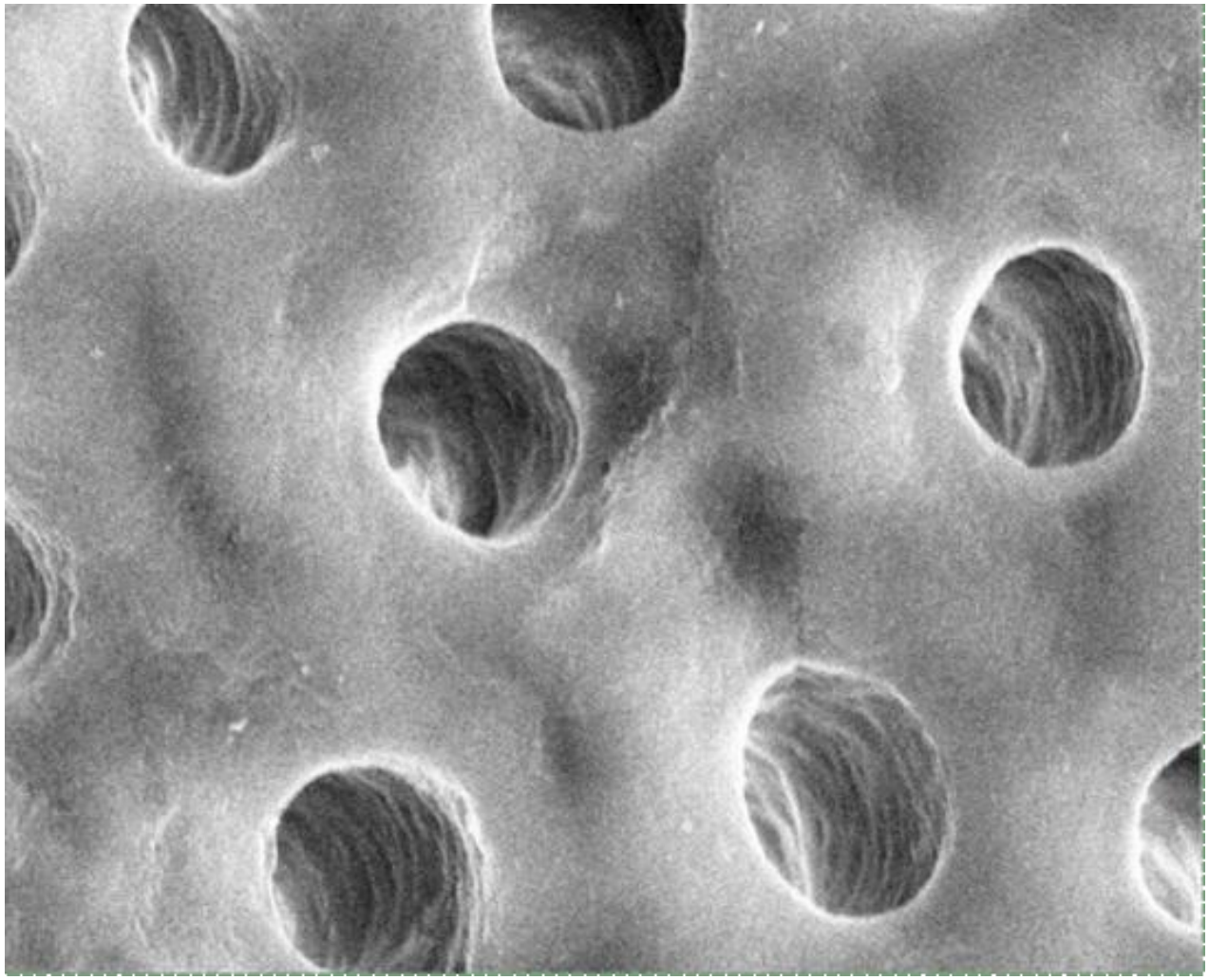
- Dentinogenesis begins at the cusp tips after the odontoblasts have differentiated and begin collagen production. Dentinogenesis is a two-phase sequence in that collagen matrix is first formed and then calcified. As each increment of predentin is formed along the pulp border, it remains a day before it is calcified and the next increment of predent
- in forms .

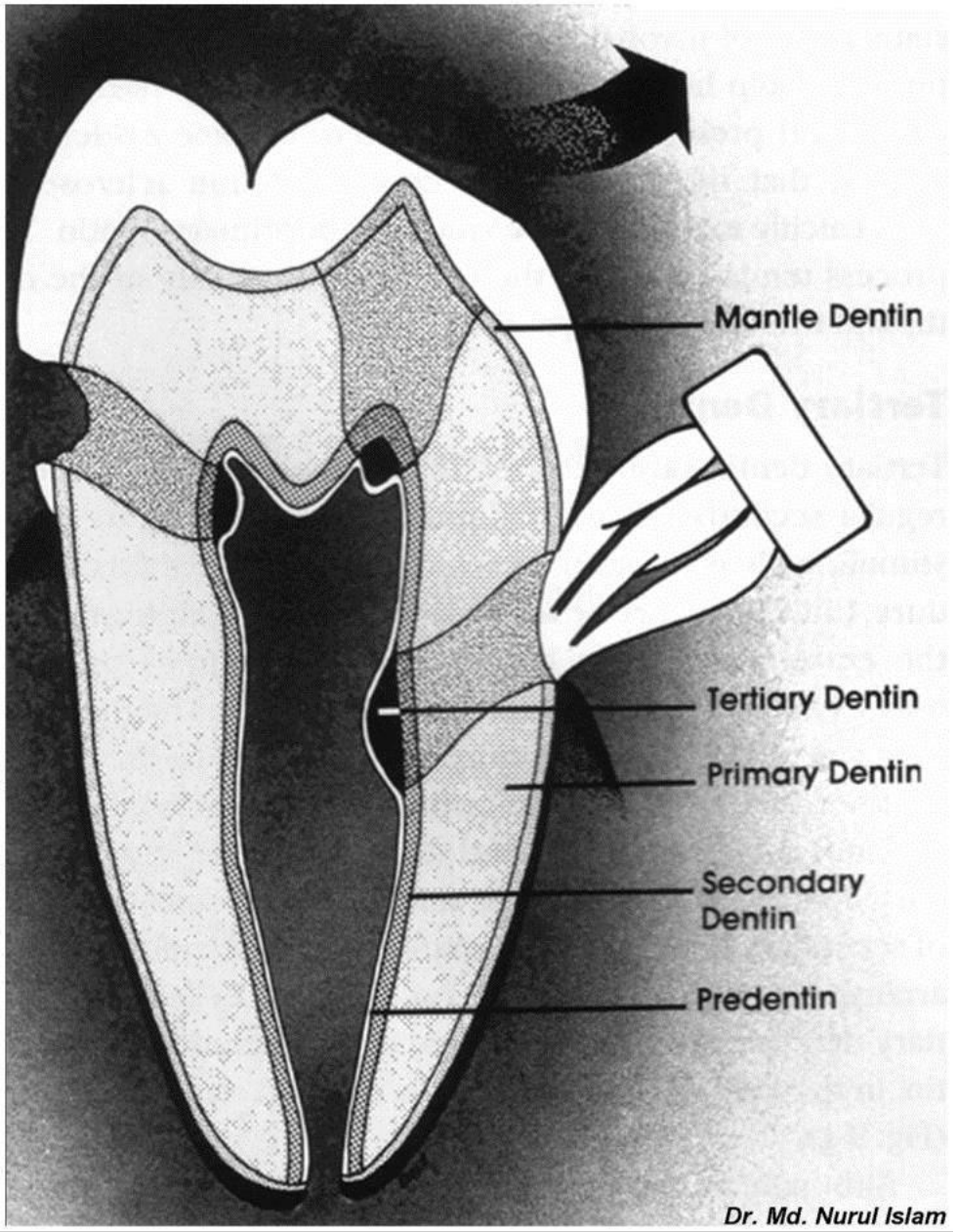


- Thus, dentin formation proceeds toward the inside of the tooth. The odontoblast process causes the secretion of hydroxyapatite crystals and mineralization of the matrix . This area of mineralization is known as mantle dentin and is a layer usually about 20-150 µm thick..

- **Types of dentin:**
- **There are** three types of dentin:
- **1. The primary dentin**: it is the dentin which is formed when the tooth has reached functional occlusion, and before root completion.
- **2. Secondary dentin:** Is the dentin which is forming a narrow band bordering the entire pulp and representing that dentin which is formed after root completion.

- **3. Reparative dentin:** The dentin which is formed in response to tooth caries.
- **Predentin : it is uncalcified dentin, consisting of organic matter and water only.**
- It is a layer of 10-47 um thickness that lines the pulpal portion of dentin.




Mantle Dentin
Tertiary Dentin
Primary Dentin
Secondary Dentin
Predentin
Dr. Md. Nurul Islam

- **Hypocalcified areas in the dentin**:
- **1. Interglobular dentin:**
- It is one type **of hypocalcified** areas in dentin. It is located **in the crown only**.
- **2.Granular layer of Tome's:**
- **It** is located **in the root dentin only** close to cementum