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Oral Histology

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Early tooth development

The primitive oral cavity, or *stomodeum*, is lined by stratified squamous epithelium called the oral ectoderm or primitive oral epithelium. The oral ectoderm contacts the endoderm of the foregut to form the buccopharyngeal membrane. At about the end of 4 week (twenty-seventh days) of gestation this membrane ruptures and the primitive oral cavity establishes a connection with the foregut. Most of the connective tissue cells underlying the oral ectoderm are of neural crest in origin which begins in the future maxilla and mandible.

Each developing tooth grows as an anatomically distinct unit. The fundamental developmental process is similar for all teeth.

Primary epithelial band:

Two or three weeks after the rupture of the buccopharyngeal membrane, when the embryo is about 6 weeks old, certain areas of basal cells of the oral ectoderm proliferate more rapidly than do the cells of the adjacent areas. This leads to the formation of the *Primary epithelial band* which is a band of epithelium that has invaded the underlying ectomesenchyme along each of the horseshoe-shaped future dental arches .At about 7th week the primary epithelial band divides into an inner (lingual) process called *Dental lamina* and an outer (buccal) process called *Vestibular lamina*.

In the teeth development results from an interaction of the oral epithelial cells and the underlying ectomesenchymal cells. From this interaction, 20 deciduous and 32 permanent teeth developed.

Dental lamina:

The dental laminae serve as the primordium for the ectodermal portion of the deciduous teeth. Later, during the development of the jaws, the permanent molars arise directly from a distal extension of the dental lamina.

In the jaws, the neural crest cells induce the oral epith. to proliferate and form the dental lamina, which is the first sign of tooth development. This lamina then invaginates as a sheet of epith. cells into the underlying mesenchyme around the perimeter of both maxillary and mandibular jaws.

Along the leading edges of the lamina 20 areas of enlargement next appear, which are the forming buds of the 20 primary teeth, and the leading edge of the lamina continues to develop the 32permanent tooth buds.

Successional tooth buds form the permanent dentition lingual to the buds of the primary predecessors. Permanent molars develop posterior to the primary molars, and the general dental lamina grows posteriorly to form the permanent molar buds. The last teeth to arise from dental lamina are the third molars, which developed in about 4-5 years after birth.

The dental lamina is thus functional in developing the 52 teeth from the sixth prenatal week until 4-5 years after birth. So the activity of dental lamina extends over a period of about five to six years and disintegrates completely or remains as remnants in the gingiva and the jaw and they are called *epithelial rests of Serres(Serres'pearls).*

Vestibular lamina:

Labial and buccal to the dental lamina in each dental arch, another epithelial thickening develops independently and somewhat later. It is the vestibular lamina, also termed the *lip furrow band*. It subsequently hollows and forms the oral vestibule between the alveolar portion of the jaws and the lips and cheeks.

Phases in tooth development

There are two types of phases or stages in the development of teeth Physiological and morphological phases .

Physiological phases in tooth development

Tooth development can be divided into :

1-Initiation : During this phase, the sites of the future teeth are established with the appearance of tooth germs along an invagination of the oral epithelium called dental lamina. ((Dental organ or *tooth germ))*: is a term used to constitute the structure that has enamel organ, dental papilla and dental follicle.

2Prolifertion: During this phase, Proliferative growth causes regular changes in the size and proportions of the growing tooth germ (development of bud and cap stage)

3Histodifferentiation: During this phase, differentiation of cell (begun during morphogenesis) proceed to give rise to the fully formed dental tissues, both mineralized (such as enamel, dentin and cementum) and unminaralized (such as pulp and periodontal ligament) which is called (early bell stage).

4Morphodifferentiation : During this phase, the shape of the teeth are determined by a combination of cell proliferation and cell movement. (late bell stage).

5Apposition: During this phase, the deposition of dental hard tissue occur in the tooth like dentin and enamel.

Morphological stages of tooth development

For descriptive purposes, tooth germs are classified into bud, cap and bell stages according to the degree of morphodifferentiation and histodifferentiation of their epith. components (enamel organs). Leading up to the late bell stage, the tooth germ changes rapidly both in its size and shape, the cells are dividing and morphogenetic processes are taking place.

