

Intermediate cementum The intermediate cementum has confused dental histologists since it first appeared in the literature and its origin is still controversial in the dental histological field. In 1927, Bencze first used the term "intermediate cementum (intermediäre Zementschicht)" to indicate a narrow part containing cellular elements and/or lacunae between dentin and CMSC. Earlier, Hopewell-Smith had found a homogeneous layer between AEFC and the granular layer of Tomes. The homogeneous layer is now referred to as the hyaline layer of Hopewell-Smith. On the basis of elaborate histological observations, it is now established that the two tissues are homologous. The structure in question is referred to as the hyaline layer of Hopewell-Smith in the AEFC region and as the intermediate cementum in the CMSC region. With regard to its origin, the two investigators proposed different views. Hopewell-Smith described the homogenous layer as a peripheral part of dentin. In contrast, Bencze insisted that the intermediate cementum was a part of cementum, although he had earlier assumed it to be a part of dentin. The origin of the intermediate cementum has been a focus of many dental histologists. In histological sections where the cemento-dentinal junction is clearly differentiated, the intermediate cementum exists on the dentin side of the junction and there is no boundary between the intermediate cementum and dentin. This fact proves that the intermediate cementum is definitely a part of dentin. Nevertheless some investigators have still emphasized that the intermediate cementum is not dentin, and further, that it is a particular tissue produced by Hertwig's epithelial root sheath. An external file that holds a picture, illustration, etc. The investigators who studied the origin of the intermediate cementum can be divided into two groups. The first group believes that it is a part of dentin. Owens observed the intermediate cementum in human premolars and molars and found the continuity of dentinal tubules between the intermediate cementum and dentin. Hence, he concluded that the intermediate cementum was a surface layer of dentin (= mantle dentin or a part of mantle dentin). Schroeder and Yamamoto agreed with this conclusion. In addition, Owens and subsequently, Kawasaki elucidated that the hyaline layer of Hopewell-Smith started to be mineralized later than the deep part of dentin (= circumpulpal dentin). Afterwards, this finding became a significant key for another hypothesis of the second group. The second group believes that the intermediate cementum is not a part of dentin, but an enameloid-like tissue produced by the epithelial root sheath. This hypothesis will be referred to as an epithelial origin hypothesis in this section. In brief, the epithelial origin hypothesis is based on the following logic. (1) The cemento-dentinal junction or the innermost cementum layer in rodent teeth corresponds to the intermediate cementum in human teeth. (2) The cemento-dentinal junction is an epithelial sheath product in rodent teeth. (3) Hence, the intermediate cementum in human teeth is of epithelial sheath origin. Regarding the premise (1), approximately 1 μ m thick superficial dentin layer shows delayed mineralization in initial acellular cementogenesis of rat molars. Thereafter, an intensely hematoxylin-stainable, PAS-positive matrix appears in the superficial dentin layer and forms the cemento-dentinal junction. In addition, many epithelial sheath cells are embedded near the cemento-dentinal junction in rat cellular cementogenesis. The cemento-dentinal junction of human teeth, like that of rat teeth, is intensely hematoxylin-stainable and PAS-positive (10). Nevertheless, based on the delayed mineralization and cell inclusion, the second group considers the cemento-dentinal junction in rat teeth to correspond to the intermediate cementum in human teeth. The superficial dentin layer in rat

molars is a very narrow, fibril-poor tissue and obviously different from the mantle dentin which consists of densely packed dentin matrix fibers. Further, it is established that the epithelial sheath cells are never embedded in the cementum in human cementogenesis. Hence, the premise (1) of the epithelial origin hypothesis is lacking supportive evidence. The premise (2) is still controversial, whether the hematoxylin-stainable matrix is a cementoblast product or epithelial sheath cell product is not yet determined. Even though the matrix is an epithelial product, this does not relate to the origin of the intermediate cementum. For these reasons, the epithelial origin hypothesis is questionable, based on uncertain premises. Fujita regarded the intermediate cementum as a peripheral part of dentin and added, "Most of the lacunae in the intermediate cementum are considered to be swollen dentinal tubules, and thus the cellular elements would be swollen processes of odontoblasts. Hence, the intermediate cementum will be re-examined here