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*J DENT RES* 1972; 51; 1678

DOI: 10.1177/00220345720510063401

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# Pulp Stones in the Rat Incisor

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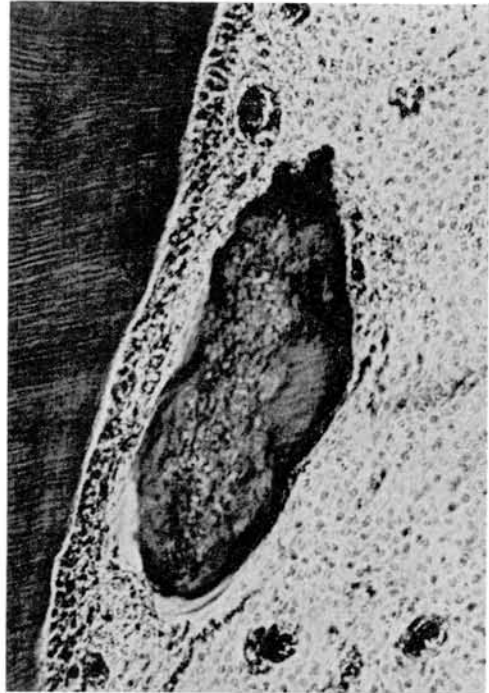
The dental pulp of the rat incisor differs substantially from the pulp of completely developed teeth; nevertheless, under certain conditions it may respond in a similar way. One of the reactions resembling that of the pulp of completely developed teeth is the formation of pulp stones. Pulp stones have not been found in the pulp of the rat incisor with normal or enhanced eruption.

In investigations of histological preparations of rat incisors with eruption arrested after 90 days, we found an oval pulp stone in transverse sections, near the basal end. Serial sections revealed that the pulp stone was not connected to the dentin wall (Illustration). The center of the stone contained cell remnants and occasional cavities. Layers of tubular dentin of different thickness were observed around this nucleus. On the periphery there was an irregular margin of pink predentin. In a few sections of this calcified formation, there was a major accumulation of low cuboidal odontoblasts.

The formation of a pulp stone in the rat incisor is rare and its appearance permits the following observations. If the pulp stone can develop only when eruption has stopped, are the conditions for its formation created by the "aging" pulp or the diminishing pulpal chamber? Sayegh and Reed (*Oral Surg* 25:878-882, 1968) maintain that calcification in the pulp increases with age. Thus, changes in the aging pulp may be the factor that promotes formation of the stones. On the other hand, Sundel, Stanley, and White (*Oral Surg* 25:579-589, 1968) consider disorders of circulation and hyalinization of damaged cells a predisposition for formation of pulp stones.

Both factors may play a part in the rat incisor when eruption is stopped. Aging of pulp occurs when movement of cell elements of the pulp is eliminated, and development without movement of cell elements results in formation of dentin that gradually reduces the pulpal chamber. Thus, pressure is exerted on the pulp. Moreover, the folding of the dentin wall on the enamel side may render the circulation of blood more difficult and thus interfere with metabolic processes. Both these changes as a result of arrested eruption cause degenerative changes in the pulp, and thus formation of pulp stone. This also is suggested by histological observations, in particular, the finding of cell remnants

Additional information available on request to authors.  
Received for publication December 14, 1971.



Pulp stone in section of rat incisor.

in the nucleus and lymphocytes in the periphery.

The structure of the detected pulp stone confirms the view of Johnson and Bevelander (*J Dent Res* 35:714-722, 1956) that pulp stones begin as false stones and later their peripheral odontoblasts form a layer of tubular dentin. If the presence of a calcified formation can stimulate fibroblasts of the pulp to differentiate in the odontoblasts, it remains unexplained why there is an unevenly thick layer of predentin on the surface of the pulp stone and why the density of cells resembling odontoblasts is different. It is possible that the different intensity of biochemical processes that take place on the periphery of the pulp stone affects the differentiation and function of odontoblasts lining the pulp stone.

These reflections on the etiology of the pulp stone during arrested eruption of the rat incisor do not rule out other mechanisms of formation.