

DESCRIPTIVE STUDY BY ELECTRON MICROSCOPY OF THE INTERFACE OR UNION ZONE BETWEEN ENAMEL AND DENTIN OF HUMAN TEETH.

Ivet Gil-Chavarría¹, Ramiro García², José Reyes Gasga². ¹ División de Estudios de Posgrado e Investigación de la Facultad de Odontología E-mail: ivet@fisica.unam.mx.

² Instituto de Física, Departamento de Materia Condensada. UNAM, Mexico.

INTRODUCTION: The study of biological tissues is very complex, since genesis, differentiation, growth, morphology and function. In the case of the dental tissues, the union of enamel with dentin has an ideal organization for the mechanical work that execute. For the study of this zone is necessary to have present the biological processes like amelogenesis and dentinogenesis, besides know: ¿What is the enamel?, ¿What is the dentin?, ¿How and what materials allow that the enamel and dentin are together?. Before was named amelodentin-junction (ADJ) in the book of Ten Cate (1) and described like festoon zone; but at 2001, Marshall (2) report that “The Dentin-Enamel Junction (DEJ) is an structure poorly defined” or Gallagher at 2003 (3) say that “the DEJ is an critical interface of two hard tissues. With this antecedents, we developed an experimental process for characterizer the DEJ that is important for materials and deontological areas.

OBJECTIVE: The mean objective of this investigation is to characterize the elements presents in the junction, as well as the chemical composition and structural organization.

MATERIALS AND METHODS: The samples were fixed with glutaraldehyde 2.5 percent in pH between 7.3 and 7.4, and prepared immediately after extraction, using different methods for a correct characterization of its zone. The observations were made by Light Microscopy, this technique was not sufficient to note the differences of both tissues and understand how they are maintained together and the special role in this junction. The results were obtained principally by SEM and the identification of elements were made with EDS and their distribution by chemical maps. For molecular information of the DEJ we used Infra-Red Spectroscopy of the samples.

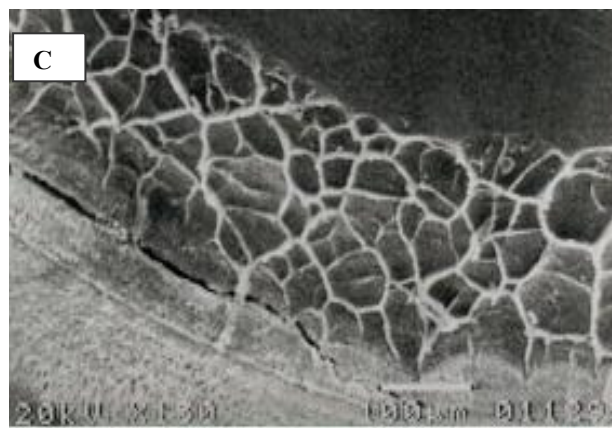
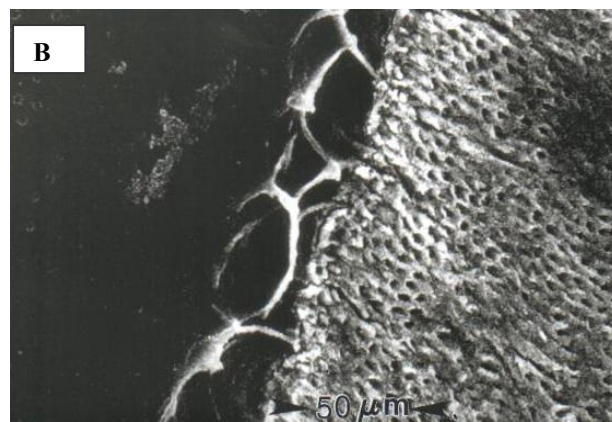
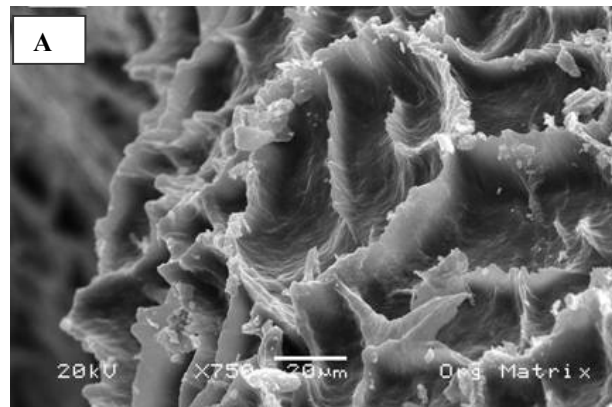
-Light Microscopy: Microscopic Light “Zeiss” model Axiotech and Microscopic Inverted “Zeiss” model Axiovert 25, with system photographical (IFUNAM).

-Scanning Electron Microscopy: Jeol 5200 with resolution of 3 nm. (IFUNAM).

- X Ray and Spectroscopy IR: Bruker X-Ray (IFUNAM) and for IR Nicolet FT-IR 710.

RESULTS: The results obtained determine that the material of junction presents a reticular structure showing an organic extensions from the dentin until the interprismatic spaces of enamel. The network of reticular has variable structure determined by the function of the fibrous aspect for the support which provides absorption of the occlusal forces. By EDS we found that the DEJ is constituted principally of C, N and O and the distribution of these elements in the prolongation of network of the DEJ are presented. However the signal of Ca and P is detected due to the analysis was made on surface of the dentin. By Spectroscopy IR we concluded that the enamel, DEJ, and dentin have the

same components but different concentration in the bands OH of water and protein. Finally we unified the results in a biological diagram of the design of the DEJ.



Images of Scanning Electron Microscopy

- A).*** Organic Material of Dentin Enamel Junction in occlusal zone.
- B).*** Organic extensions from the dentin until the interprismatic spaces of enamel.
- C).*** Reticular structure of the Dentin-Enamel Junction.

REFERENCES

1. Ten Cate, Arnold R. HISTOLOGIA ORAL, Buenos Aires. Páginas 536.
2. Marshall GW. MECHANICAL PROPERTIES OF THE DENTINOENAMEL JUNCTION: AFM STUDIES OF NANOHARDNESS, ELASTIC MODULUS, AND FRACTURE. *Journal Biomed. Material Research Jan. 54 (1) 87-95. 2001*
3. R.R. Gallagher. OPTICAL SPECTROSCOPY AND IMAGING OF THE DENTIN-ENAMEL JUNCTION IN HUMAN THIRD MOLARS. *J. Biomed. Mater Res. Vol. 1;64(2) Págs. 372-7 2003.*