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Editorial Open Access

Contemporary Advances in Qualitative and Quantitative Analysis of Dental Hard Tissues Using Noncontact Three-Dimensional Optical Profilometry

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Editorial

Tooth surface loss is an increasingly recognized problem. Therefore, it has been observed increase in the number of in vitro studies investigating factors that modify effects at the tooth surface.

But times are changing fast. And, in a three-dimensional world, should all complexity assigned to the in vitro studies on changes in dental hard tissue surface have already been overcome? The answer is "yes"!

In the last years, the great development of new software-assisted computer-based technologies linked to techniques involving white light interferometry has favored precise surface topography characterization of hard dental tissues.

Moreover, data disclosed by recent and ongoing researches, addresses non-contact three-dimensional optical profilometer as an efficient and accurate method for the complete qualitative and quantitative nanoscale assessment of small or large surface areas irrespective of their topographic features. It provides repeated measurements of similar areas in different periods of tests with high precision [1].

Previously, it had been reported that tooth surface changes could be measured in a variety of ways and no single technique provided a comprehensive assessment of the remaining tooth surface because each technique suffered with its own limitations [2].

To date, many scientists continue mainly employing techniques that are not suitable to reliable qualify or quantify the hard tissue surface, the Scanning Electron Microscopy and the Atomic Force Microscopy.

The main problems reported to the use of SEM include sample destruction caused by the preparation process, the need for specific environmental conditions during the measuring and analysis and the inability to assess quantitatively surface characteristics [2].

Three-dimensional techniques for the investigation of dental surfaces using AFM, requires an ultra-flat and rigid surface so that the scanning probe does not cause deformations on the surface, enabling accurate true atomic resolution images to be obtained [3]. In this case, the question is: How to obtain "flat" enamel surfaces without pre-processing the samples? Another problem is that analysis must be performed using very small areas of the surface reducing the representativeness of measurements and preventing the mapping of large surface areas [4].

In this line, if now we "have in hands" a valuable tool for mapping three-dimensionally and at nanoscale dental hard tissue surfaces and interfaces, definitely, what would be in trouble for future investigations on the issue?

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