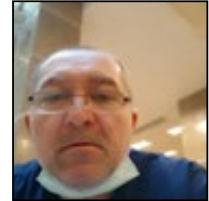


Raman spectroscopy, a sensitive method for bone quality evaluation: Alternative to histology



Abstract

Our days it has been involved a large number of surgical techniques involving the implantation of various types of bone graft and /or bone substitutes in order to achieve periodontal regeneration. Despite positive observations in animal models and successful outcomes reported for many of the available regenerative techniques and materials in patients, including histologic evidence, robust information on the degree to which reported clinical improvements reflect true periodontal regeneration remains just limited. Bone quality is a matter of mineral content (mature / immature bone ratio) and of structure as well. Regarding bone quality before and after healing period (sinus lift bone augmentation), investigation was performed by RAMAN technique. There were evaluated following peaks:

- 430 – 450 cm^{-1} (ν_2 , PO_4^{3-});
- 955 – 960 cm^{-1} (HPO_4^{2-} , immature bone);
- 960 – 965 cm^{-1} (mineral bone, mature bone);
- 1023 cm^{-1} ($\text{P}_2\text{O}_7^{4-}$; P_i , inorganic pyrophosphate)

The normalized peak intensity values, are related to the compounds concentration. Octacalcium phosphate (OCP, $\text{Ca}_8(\text{HPO}_4)_2(\text{PO}_4)_4 \cdot 5\text{H}_2\text{O}$) is considered very important because it is regarded as an *in vivo* precursor of HA. [2] Trying to find traces of transformation of OCP to HA, the presence of HA nano rods and plate-like HA particles can be utilized as signs of bone augmentation process and a good quality future bone. The goal of our future study is that a correlation must be established between RAMAN spectra and bone main organic / inorganic fractions value in order to obtain a one-step complete investigation. Method easily can be adapted for “*in vivo*” bone quality evaluation, being much less invasive method then the well-known CT (Computer tomography) or CBCT (con beam computer tomography) already used and more accurate.

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Biography

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