



## Can Optical Coherence Tomography Technique become the 6<sup>th</sup> Generation of Periodontal Probes?

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### Editorial

Optical Coherence Tomography (OCT) is already one of the most important imaging modalities in biophotonics [1], widely used in Ophthalmology, providing optical biopsies with micrometer spatial resolution. Penetration depth of up to 3mm is typical and tissue dependent. Imaging speed of 107-109 voxels/s can be achieved, and OCT is capable of multimodality integration [2]. Although the recent review in reference [1] shows the fantastic advances of OCT in several biomedical areas, in Dentistry a lot more research is required before clinical/commercial impact becomes beneficial for the society.

Among oral cavity diseases, Periodontal Diseases (PD) is chronic multi factorial conditions, characterized by the destruction of periodontal tissues. Periodontal health depends on the balanced relationship between the dental biofilm and the immune inflammatory response of the host [3].

Traditionally, PD diagnosis is performed through clinical examination to detect signs of inflammation, presence of supragingival and subgingival calculus, as well as evaluation of clinical insertion and loss of bone through periodontal probing. Despite the low cost, wide use and acceptance in the scientific and clinical environment, traditional periodontal probing is prone to errors during its execution, in addition to not identifying PD in the subclinical phase [4].

The search for an early diagnosis method, as well as the monitoring of periodontal tissues with greater precision and sensitivity allied to noninvasiveness, has triggered interest in the use of alternative techniques such as OCT [5,6].

Following the work of [5,6], besides other literature studies, our group has performed a clinical study by following-up patients treated from periodontal disease with OCT, and comparing the results with traditional periodontal probes. 14 patients aged 18-65 years old diagnosed with periodontal disease were evaluated prior and after treatment, and a total of 147 labial sites from 49 anterior teeth were analyzed. Preliminary results were already reported [7]. Our conclusions from the longitudinal study clearly point out to the importance of using optical coherence tomography in the identification of periodontal structures in follow-up of treatments. Despite some present technical limitations, such as light penetration depth and scan window lower than the size of the pockets, OCT presents advantages as noninvasiveness, possibility of 2D and 3D images in real time, which can be assessed at distance by experts, providing a real case for telemedicine. The technique is efficient in monitoring not only periodontal disease, but has also applications in other niches in dentistry, both in soft and hard tissue, as well as dental materials [8]. Particularly to PD, manual periodontal probes have evolved to minimize errors and operator manipulation, and are currently in their fifth generation [9]. When one associate the advantages of OCT as a noninvasive method associated to appearance of low cost OCT systems [10], we as the question whether it would not be the ideal tool for the next – 6<sup>th</sup> generation of periodontal probes, the first one to exploit photonics.

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