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In vivo imaging of enamel by reflectance confocal microscopy (RCM): non-invasive analysis of dental surface.

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ABSTRACT

The aim is to establish the feasibility to image in vivo microscopic dental surface by non-invasive, real-time, en face Reflectance Confocal Microscopy (RCM). Fifteen healthy volunteers referred at the Multidisciplinary Department of Medical-Surgical and Odontostomatological Specialties, Second University of Naples, Naples, Italy, were enrolled. A commercially available hand-held RCM (Vivascope®3000, Lucid, Rochester, NY, USA) was used to image in vivo the dental surface of the upper right and left central incisors of each volunteer. Totally, thirty vestibular surfaces of upper central incisors were imaged in vivo by RCM to preliminary image the dental surface and assess the feasibility of a more extended study on teeth. In vivo RCM was able to image the dental surface within the enamel, at a maximum depth imaging of 300 μ m, with images good in quality and the capability to detect enamel structures such as enamel lamellae and enamel damages, such as unevenness and cracks. In conclusion, enamel "optical biopsy", gained by RCM imaging, revealed to be a non-invasive real-time tool valid to obtain architectural details of the dental surface with no need for extraction or processing the samples. RCM appears to be an optimum auxiliary device for investigating the architectural pattern of superficial enamel, therefore inviting further experiments aimed to define our knowledge about damages after etching treatments or bracket removal and the responsiveness to fluoride seals and the morphology of the tooth/restoration interface. Moreover, this device could also be used to detect relevant diseases like caries, or to assess surface properties to evaluate lesion activity.