

Intraoral Ultrasound

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Abstract

The periodontium is a complex tooth-supporting structure consisting of alveolar bone, cementum, gingiva, and periodontal ligament. Gingivitis is a common oral infection caused by the inflammation of the gingiva and if left untreated, will progress to periodontitis, resulting in bone loss and subsequent loss of teeth. The disease affects 20-50% of the global population and its severity increases with age. Alveolar bone level, a distance between alveolar bone crest and the cementum-enamel junction is an important parameter for periodontal diagnosis. Cone-beam computer radiography (CBCT) can provide 3D visualization of craniofacial structures without tissue superimposition, allowing clinicians to evaluate the alveolar bone level more accurately. However, the use of CBCT is not considered a standard imaging method due to high radiation dose particularly for pediatric patients. Intraoral ultrasonography is an emerging intraoral imaging modality with the benefit of noninvasiveness, absence of ionizing radiation, portability, and relatively low cost. Intraoral ultrasound can image soft tissue (gingiva) and hard tissue (alveolar bone crest). In this talk, I will present some of the research effort and development in this field, particularly from my group during the past 10 years.

Biosketch



Dr. Lawrence H. Le received his PhD in earth physics from the University of Alberta, Edmonton, Canada. He held a NSERC (Natural Sciences and Engineering Research Council of Canada) postdoctoral fellowship in Schlumberger-Doll Research Lab, Ridgefield, Connecticut to study wave scattering in stratified microstructures. He started his medical physics training in the Department of Radiology and Diagnostic Imaging (DRDI), University of Alberta. Subsequently, he completed a MBA degree in Finance and Technology commercialization at the University of Alberta. He joined the DRDI at the University of Alberta as a clinical academic staff and Capital Health as a clinical medical physicist in 2000. He is currently a clinical professor leading the graduate program in DRDI and a senior medical physicist in Alberta Health Services. His research interests are in ultrasound imaging, signal and image processing, wave propagation modeling and inversion, and machine learning. He is a member of AAPM (The American Association of Physicists in Medicine) and COMP (The Canadian Organization of Medical Physicists).