AI in Dental Radiography

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Evolving Role of Artificial Intelligence in Radiological Imaging
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Dentistry is defined as the **evaluation, diagnosis, prevention and/or treatment** (nonsurgical, surgical or related procedures) of diseases, disorders and/or conditions of the oral cavity, maxillofacial area and/or the adjacent and associated structures and their impact on the human body; provided by a dentist\(^1\).

Most Common dental diseases are tooth decay (caries) and gum diseases (periodontal diseases). Infections, cysts, granulomas and tumors are also observed as radiolucencies in dental radiographic images.
Why does it matter?

Compared to radiologists, dentists have less training, acquired during their dental studies. At the same time dentists evaluate, diagnose, prevent or treat which is also a comprehensive workflow.

Dentists may;

- Miss 28 to 49 percent of periapical radiolucencies (depending on experience) in their visual assessment of dental radiographic images\(^2\).
- Misdiagnose in determining the depth of cavities up to 40 percent\(^3,4\).
- Misdiagnose teeth as diseased up to 20 percent\(^3,4\).
How can AI help?

- Improve Dentist Diagnostic Accuracy
- Promote Early Detection
- Reduce the Rate of Missed Treatable Diseases
- Reduce Misdiagnosis and Unnecessary Treatments
- Improve Patient Quality of Life
Challenges and recent regulatory updates

Challenges:
Significant Clinical Decision Variability Between Dentists
  ● Larger Training Datasets for Superior Model Performance
    ○ Cost and Time Burden
  ● Designing Robust Clinical Studies
    ○ Ground Truthing
    ○ Clinical Reader Performance
  ● Developing Models for Wider Range of Pathologies

Recent Regulatory Updates:
Down-classification on Medical Image Analyzers (MYN) from Class III to Class II
  ● Important regulatory update (21 CFR 892.2070) published on 01/22/2020
    ○ Allows a feasible regulatory pathway for dental (CADe) devices
References


