

ARTIFICIAL INTELLIGENCE IN DENTAL RADIOLOGY: BETWEEN TECHNOLOGICAL INNOVATION AND CLINICAL RESPONSIBILITY

INTELIGENCIA ARTIFICIAL EN RADIOLOGÍA DENTAL: ENTRE LA
INNOVACIÓN TECNOLÓGICA Y LA RESPONSABILIDAD CLÍNICA

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The integration of artificial intelligence (AI) within oral radiology signifies a fundamental shift in the interpretation of images and their subsequent application in clinical judgment. Algorithms leveraging deep learning have shown reliable efficacy in identifying caries, periapical lesions, root resorptions, and periodontal bone changes, frequently achieving sensitivity and specificity metrics that are either on par with, or in some instances, exceed those of human practitioners⁽¹⁻³⁾.

The rapid dissemination of these technologies demands a critical analysis that transcends mere performance validation. Radiological practice is not limited to identifying patterns in images, but involves clinical contextualization and the integration of multiple variables, which still represents a limitation of automated systems⁽⁴⁾. In this sense, the risk of uncritical automation of diagnosis cannot be neglected.

Another relevant point concerns the origin of the data that feed the algorithms. AI models are highly dependent on the quality, diversity, and representativeness of their training datasets. The presence of biases can compromise the extrapolation of results, leading to diagnostic discrepancies in different populations⁽⁵⁾. This limitation raises important ethical questions in healthcare.

Additionally, the incorporation of AI imposes regulatory and legal concerns that are still being consolidated. The definition of responsibility in cases of diagnostic error mediated by automated systems remains diffuse, requiring the construction of clear normative guidelines⁽⁶⁾. The transparency of algorithms—often described as "black boxes" also presents an obstacle to their full clinical acceptance⁽⁷⁾.

In the context of professional training, the emergence of these technologies demands a curricular reconfiguration that includes competencies in the critical interpretation of AI systems, understanding their limitations, potential biases, and ethical implications⁽⁴⁾. Digital literacy, therefore, becomes essential to contemporary dental practice.

From a pragmatic perspective, AI should be understood as an instrument for expanding diagnostic capacity, capable of optimizing workflows and also reducing

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inter-examiner variability ⁽⁸⁾. However, its integration into clinical practice must occur judiciously, supported by robust evidence and aligned with the principles of evidence-based dentistry.

Consequently, the core concern transcends a binary acceptance or rejection of artificial intelligence; it centers

on delineating the boundaries of its practical deployment. The trajectory of dental radiology will be determined by the capacity to judiciously and ethically merge human proficiency with technological capabilities. While innovation is a foregone conclusion, the imperative of responsibility is paramount.

REFERENCES

1. Hung K, Montalvao C, Tanaka R, et al. The use and performance of artificial intelligence applications in dental and maxillofacial radiology: a systematic review. *Dentomaxillofac Radiol.* 2022;51(1):20210107.
2. Schwendicke F, Samek W, Krois J. Artificial intelligence in dentistry: chances and challenges. *J Dent Res.* 2020;99(7):769-74.
3. Lee JH, Kim DH, Jeong SN, Choi SH. Detection and diagnosis of dental caries using a deep learning-based convolutional neural network algorithm. *J Dent.* 2018;77:106-11.
4. Kühnisch J, Meyer O, Ziebolz D. Artificial intelligence in dentistry: chances and challenges. *J Dent Res.* 2021;100(7):769-74.
5. Obermeyer Z, Powers B, Vogeli C, Mullainathan S. Dissecting racial bias in an algorithm used to manage the health of populations. *Science.* 2019;366(6464):447-53.
6. Samek W, Wiegand T, Müller KR. Explainable artificial intelligence: understanding, visualizing and interpreting deep learning models. *arXiv.* 2017;1708.08296.
7. European Commission. Proposal for a regulation laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). Brussels: European Commission; 2021.
8. Topol EJ. *Deep medicine: how artificial intelligence can make healthcare human again.* New York: Basic Books; 2019.