

INTEGRATION OF PREDICTIVE ARTIFICIAL INTELLIGENCE MODELS IN PROSTHODONTICS: ENHANCING DIAGNOSTIC ACCURACY AND CLINICAL PROGNOSIS

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Aim: To critically assess the clinical efficacy of AI-driven systems in enhancing the accuracy of marginal fit, occlusal scheme design, and long-term prognosis of implant-supported prostheses comparison with conventional digital workflows.

Methods: A systematic analytical review of clinical trials and comparative studies (2019–2026) was conducted. The analysis focused on Convolutional Neural Networks (CNNs) for bone density assessment, Generative Adversarial Networks (GANs) for tooth morphology, and Random Forest algorithms for predicting mechanical failures in zirconia and hybrid restorations.

Results: Evidence demonstrates that AI-assisted marginal line detection achieves a 25-30% higher consistency among operators. Furthermore, AI-driven virtual articulators show superior accuracy in dynamic occlusal mapping compared to manual digital settings. Predictive models for implant success rates showed an AUC (Area Under Curve) of 0.88, significantly improving risk stratification during the planning phase.

Conclusions: AI is no longer an emerging trend but a clinical necessity for achieving high-precision results in prosthodontics. By quantifying biological and technical risks, AI-driven planning ensures superior clinical outcomes and longevity of prosthetic rehabilitations.

Keywords: Artificial Intelligence, Prosthodontics, Digital Workflow, Treatment Planning, Predictive Analytics.