Short Communication

OPEN ACCESS Freely available online

Journal of Molecular Biology

Genes, jaws & genomics: Personalizing prosthodontics and implantology through the lens of human genetics

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Received: June 27, 2025; **Manuscript No:** JMBC-25-4639; **Editor Assigned:** June 30, 2025; **PreQc No:** JMBC-25-4639(PQ); **Reviewed:** July 14, 2025; **Revised:** July 21, 2025; **Manuscript No:** JMBC-25-4639(R); **Published:** July 30, 2025

Citation: Sikri A (2025). Genes, jaws & genomics: Personalizing prosthodontics and implantology through the lens of human genetics. J. Mol. Biol. Vol.1 Iss.1, July (2025), pp:1-2.

DESCRIPTION

The integration of human genetics into prosthodontics and implantology marks a paradigm shift toward precision oral healthcare. This keynote highlights how individual genetic profiles influence implant success, bone metabolism, soft tissue healing, and susceptibility to peri-implant diseases [1]. By exploring the roles of single nucleotide polymorphisms (SNPs), epigenetic modulators, and gene-environment interactions, the session unveils how modern genomic insights can guide prosthodontic decision-making. Case-based evidence and literature-backed outcomes will be discussed, offering a translational roadmap for clinicians to embrace genetic screening and risk profiling [2]. The ultimate goal is to pave the way for truly personalized oral rehabilitation protocols that enhance predictability, longevity, and patient satisfaction. Prosthodontics and implantology have evolved significantly, yet variability in clinical outcomes continues to challenge practitioners. Recent advances in human genetics offer valuable insights into the biological foundations of oral rehabilitation success. This presentation explores how genetic data can inform clinical choices and improve patient outcomes. A narrative review was conducted by analyzing recent studies from genomic medicine, prosthodontics, and implantology domains [3]. Data sources included PubMed, Scopus, and Embase, with particular focus on studies examining the correlation between genetic markers and oral rehabilitation outcomes. Selected clinical cases with genetic profiling were also evaluated [4]. Genetic variants such as IL-1 polymorphisms, TNF-α mutations, and variations in the RANK/RANKL/OPG pathway significantly influence osseointegration, peri-implant bone resorption, and soft tissue healing. Additionally, pharmacogenomic responses to anesthetics and antibiotics vary across genetic backgrounds. These findings emphasize the need for genotype-informed treatment planning in prosthodontic care [5].

CONCLUSION

Understanding the genetic foundation of individual patients can dramatically improve the predictability and longevity of prosthodontic and implant treatments. Future recommendations include integrating genetic screening tools into dental curricula, developing chairside genetic kits, and fostering interdisciplinary collaboration with geneticists for holistic patient care. Recognizing the genetic makeup of each patient has the potential to revolutionize prosthodontic and implant dentistry by enabling more precise treatment planning and improving long-term outcomes. Genetic variations can influence factors such as bone metabolism, soft tissue healing, inflammatory response, and susceptibility to periodontal disease—all of which are critical to the success of dental implants and prosthetic restorations. Looking ahead, incorporating genetic literacy into dental education is essential to prepare future clinicians for personalized treatment approaches. Equipping dental professionals with the knowledge to interpret genetic data will enhance their ability to make informed clinical decisions. The development of rapid, chairside genetic testing tools could further streamline this process, allowing for real-time adjustments to treatment strategies based on individual risk profiles.

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