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## REVIEWER'S REPORT

**Manuscript No.: IJAR-57705**

**Title: Growth Factor Enhanced Matrices in Periodontal Regeneration: A Literature Review**

**Recommendation:**

Accept as it is .....
Accept after minor revision.....
Accept after major revision .....
Do not accept (*Reasons below*) .....

| Rating | Excel. | Good | Fair | Poor |
|---|---|---|---|---|
| Originality | … | | | |
| Techn. Quality | | … | | |
| Clarity | … | | | |
| Significance | … | | | |

**Reviewer's ID: JPR- 180**

## *Detailed Reviewer's Report*

The paper "***Growth Factor Enhanced Matrices in Periodontal Regeneration: A Literature Review***" presents a comprehensive and well-structured overview of the emerging role of biologically active regenerative materials in modern periodontology. The authors effectively explain how conventional periodontal therapies mainly achieve repair rather than true regeneration and highlight the importance of growth factor-enhanced matrices (GFEMs) in overcoming these limitations. The introduction successfully establishes the clinical significance of periodontitis and provides a logical transition toward regenerative approaches such as guided tissue regeneration and tissue engineering. One of the major strengths of the review is its detailed explanation of the biological basis of periodontal regeneration. The discussion regarding the role of growth factors such as platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), and vascular endothelial growth factor (VEGF) demonstrates a clear understanding of wound healing mechanisms and tissue regeneration. The authors successfully connect molecular biology with clinical application, making the review scientifically informative while remaining clinically relevant. The review provides strong coverage of various regenerative systems, especially GEM 21S, which is discussed as one of the most clinically validated products in periodontal regeneration. The explanation of recombinant human platelet-derived growth factor-BB (rhPDGF-BB) combined with beta-tricalcium phosphate (β-TCP) is clear and supported by clinical evidence related to probing depth reduction, clinical attachment gain, and radiographic bone fill. The authors also effectively discuss enamel matrix derivatives, bone morphogenetic proteins, fibroblast growth factors, platelet concentrates, and advanced biomaterials such as hydrogels and nanofiber scaffolds. This broad coverage increases the academic value of the review.

Another important strength of the article is its focus on practical clinical applications. The paper explains the use of GFEMs in intrabony defects, furcation defects, gingival recession treatment, ridge preservation, sinus augmentation, and peri-implantitis management. The inclusion of emerging applications in peri-implant defect regeneration reflects the evolving scope of regenerative dentistry and makes the review highly relevant for clinicians and researchers. The authors also critically address the limitations associated with growth factor-enhanced matrices, including high treatment costs, rapid degradation of growth factors, scaffold instability, and patient-related risk factors such as smoking and diabetes. Mentioning these challenges adds balance and credibility to the review rather than presenting regenerative therapy as universally successful. Furthermore, the future directions section discussing stem cells, exosome therapy, nanotechnology, gene-activated matrices, and artificial intelligence demonstrates awareness of current research trends and future possibilities in regenerative periodontology.

Overall, the paper is informative, evidence-based, and clinically significant. The review successfully integrates biological concepts, biomaterials science, and clinical applications into a coherent discussion of periodontal regeneration. Its extensive and updated references further strengthen its reliability and academic quality. However, the review could have been improved by including more comparative analysis between different

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regenerative systems and by discussing long-term clinical outcomes in greater depth. Nevertheless, the article provides valuable insight into the current status and future potential of growth factor-enhanced matrices in regenerative dentistry.