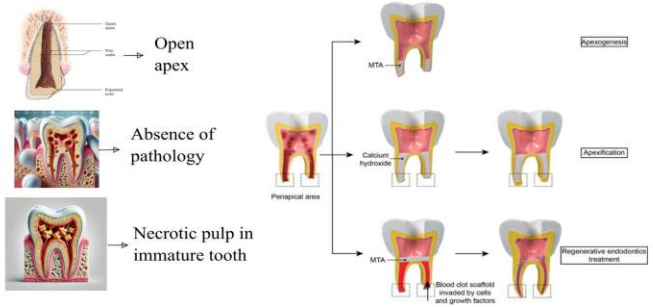
39th IACDE National Conference

REGENERATIVE ENDODONTICS

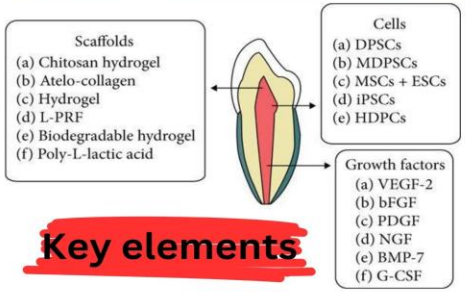
INTRODUCTION:

Regenerative endodontics are biologically based procedures designed to replace damaged structures including dentin and root structures, as well as cells of pulp-dentin complex.
Concept :Normal, sterile granulation tissue developed in the root canal for revascularization will stimulate the cementoblasts/ unamerontatod mesenchymal cons pentapex, and lod to calcie material formation at periapex or lateral dentinal walls.

INDICATIONS

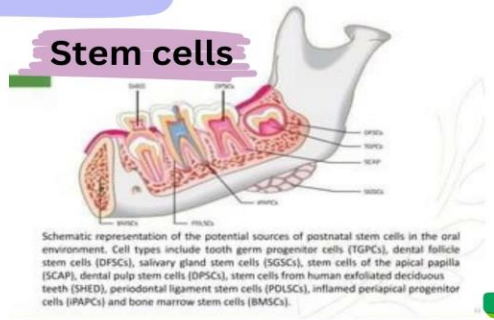


CELL BASED REGENERATION

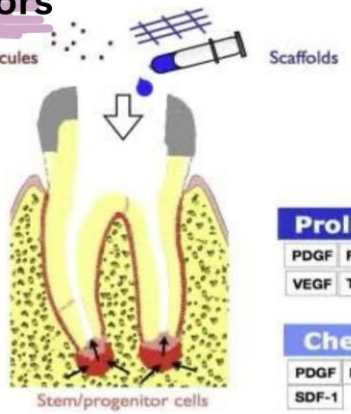


Key elements

Stem cells


Schematic representation of the potential sources of postnatal stem cells in the oral environment. Cell types include tooth germ progenitor cells (TGPCs), dental follicle stem cells (DFSCs), salivary gland stem cells (SGSCs), stem cells of the apical papilla (SCAP), dental pulp stem cells (DPSCs), stem cells from human exfoliated deciduous teeth (SHED), periodontal ligament stem cells (PDLSCs), inflamed periapical progenitor cells (iPAPCs) and bone marrow stem cells (BMSCs).

Growth Factors



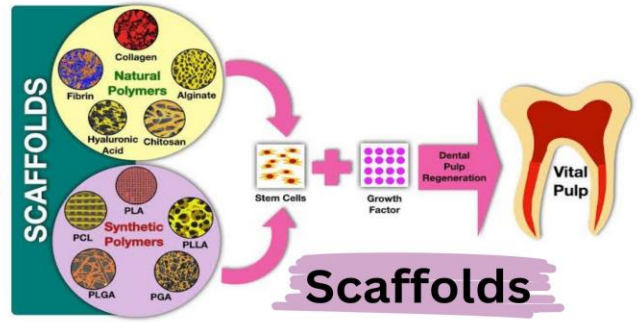
Angiogenesis
FGF2 | PDGF | VEGF | NGF

Neuronal growth
NGF

Differentiation
TGFβ1 | PDGF | FGF2
BMP2, 4, 7, 11 | IGF | NGF

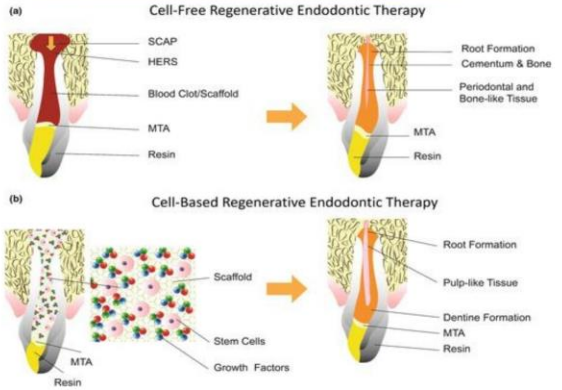
Proliferation
PDGF | FGF2 | IGF
VEGF | TGFβ1 | SDF-1

Chemotaxis
PDGF | FGF2 | TGFβ1
SDF-1



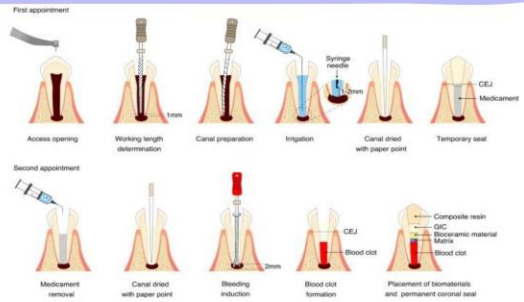
The cell-based approach relies on mesenchymal stem cell (MSC) transplantation]]. For the cell-based approach, pulp tissue is harvested (e.g., from a healthy immature tooth of the patient) and expanded in vitro The most common procedure requires collecting fresh pulp tissue from a healthy deciduous tooth of the same patient (autologous tissue) and bringing it to the lab to culture the cells. After expansion of the (stem) cells in the lab, they are brought back to the clinic to be transplanted into the disinfected necrotic tooth, together with an organic/synthetic scaffold and also combined with growth factors

STRATEGIES



Two main approaches have been described within RET: (1) the cell-based (cell transplantation) and (2) the cell-free (cell homing) approaches

CELL FREE REGENERATION



the cell-free approach relies on a process called 'cell homing' or 'cell migration' of endogenous stem cells . This happens through the induction of a blood clot (e.g., by provoking bleeding with an endodontic file over the apex of the tooth. By doing this, stem cells (SCAPs or MSCs in periapical tissues) are expected to migrate to the site of injury and potentially regenerate pulp and dentin

CONCLUSION

Regenerative endodontics presents a new era in biological and clinical endodontics. Currently, this biologically based treatment is being recognized as the first treatment choice for immature teeth with pulp necrosis based on the success of many published cases in the literature. Our understanding of the clinical protocols has evolved to eliminate pulp infection and to also allow for stem cell potential to be induced in the canal and for the release of growth factors fossilized in the dentine walls. While repair rather than true regeneration is achieved with current protocols, it is hoped that further research in the area of stem cell-based pulp engineering will allow for true regeneration and improved treatment outcomes.eading

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