بسم الله الرحمن الرحيم

(قالوا سبحانك لا علم
لنا إلا ما علمتنا إنك
أنت العليم الحكيم ﴿٣٢﴾)

صدق الله العظيم

آية ٣٢ من سورة البقرة

Regenerative potentials of post natal stem cells in non vital immature teeth (An Animal study)

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Dedication

To the soul of my Great Father

To my Dearest Mother

To my Sweet wife

To my Lovely brothers and sister

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Recent progress in tissue engineering technology has led to a growing interest in the development of regenerative endodontic procedures. Although current root canal treatment modalities offer high levels of success for many conditions, an ideal form of therapy might consist of regenerative approaches in which diseased or necrotic pulp tissues are removed and replaced with healthy pulp tissues to revitalize the teeth. The creation and delivery of new tissues to replace diseased, missing, or traumatized pulp is referred to as regenerative endodontics. This approach provides an innovative and novel range of biologically-based clinical treatments for endodontic disease.

Pulp necrosis of an immature permanent tooth from caries or trauma arrests further development and leaves the tooth with thin, weak walls that are prone to fracture. Endodontic treatment of such a tooth is difficult because the thin walls do not forgive much mechanical instrumentation , and the open apex is difficult or impossible to seal with conventional methods of lateral condensation or thermoplasticized techniques. The traditional treatment for these teeth is long-term calcium hydroxide application to induce apexification (an apical hard tissue barrier). More recent treatments have used an artificial barrier of mineral trioxide aggregate (MTA). Both of these techniques are followed by a traditional root filling, but they do not increase the fracture resistance of the walls. In fact, the long-term calcium hydroxide

therapy for apexification may leave the thin walls even more prone to fracture. Root-wall–strengthening methods with composite resin have been advocated, but they may limit the possibility of root canal retreatment if the need arises in the future.

Revascularization is a regenerative treatment and a biologically based alternative approach to treat necrotic immature teeth that, unlike apexification and artificial apical barrier techniques, allows continuation of root development. In this situation, the necrotic uninfected pulp acts as a scaffold for the in-growth of new tissue from the periapical area. The absence of bacteria is important for successful revascularization because the new tissue will stop at the level it meets bacteria in the canal space.

One potential use of regenerative endodontic therapy may be the treatment of immature teeth with necrotic pulp which are based on the basic tissue engineering principles that include a triad of stem cells, morphogens or growth factors, and an extracellular matrix scaffold. Dental Pulp Stem Cells (DPSCs) were isolated for the first time in 2000 by Gronthos et al[(1)]. DPSCs can develop odontogenic/osteogenic, chondrogenic, or adipogenic phenotypes, depending on their exposure to different cocktails of growth factors and morphogens.

The role played by BMP-2 is reportedly crucial as a biological tool for dentin regeneration. Recombinant human BMP-2 stimulates the differentiation of adult pulp stem cells into