

## **Biocompatibility and Biomineralization potential of African plant extract (AFE) as a Candidate for Regenerative Endodontics**

Ahmed Mahmoud <sup>1,2</sup>, Ahmed Ali <sup>3</sup>, Thuy Do <sup>1</sup>, Xia Yu <sup>1</sup>, Reem El-Gendy <sup>1,4</sup>

<sup>1</sup>Division of Oral Biology, University of Leeds School of Dentistry, Leeds, UK.

<sup>2</sup>Department of Endodontics, Faculty of Dentistry, Kafr El Sheik university, Egypt

<sup>3</sup>Compton Group, Wychtree Street, Morriston, Swansea, UK

<sup>4</sup>Department of Oral Pathology, Faculty of Dentistry, Suez Canal University, Egypt

### **ABSTRACT**

Dental diseases (such as tooth decay) and dental trauma can lead to pulp and periapical infections, often resulting in tooth loss. Regenerative endodontic procedures (REPs) offer a promising alternative to conventional treatment. However, significant challenges persist regarding the biocompatibility and antimicrobial efficacy of conventional intracanal medicaments, which may compromise dentin integrity and promote bacterial resistance necessitating the search of new antimicrobials or drugs. To evaluate the effect of the effect of Frankincense (African plant extract (AFE)) on cell viability, proliferation and mineralization of Dental Pulp Stem Cells (DPSCs) with a view of future application as an intracanal medicament for REP. DPSCs (Passage 4-8) were seeded in 6 well plate (n=3/ group, under 3 different concentrations of AFE extract (5, 10, 15 µg/ml), and an no treatment control. Confocal microscope was used to image live dead stained DPSCs to evaluate cell viability at 24 hours, 3 and 7 days. DPSCs proliferation was assessed (WST-1 assay) at the same time points. The mineralization capacity of DPSCs in the presence and absence of AFE was assessed using Alizarin Red Stain (ARS) and quantitative assay after 14 and 28 days. High cell viability was observed in all groups with no evidence of cytotoxicity at all 3 timepoints. Cell proliferation rate was similar in all groups at 24 hours. Cell proliferation rates continued to increase at 3 and 7 days. The 15 µg/mL group showed highest proliferation rate. ARS staining showed that DPSCs were able to form mineralized nodules. ARS quantification showed the highest calcium content in the 10 µg/mL group at both 14 and 28 days. A reduction in mineralization was observed across all groups by time, with the 10 µg/mL group remaining to show the highest mineral content. We have confirmed the biocompatibility and ability of AFE to induce mineralization in DPSCs. We still need to assess the antimicrobial properties of AFE and it's the differentiation potential on DPSCs to dentin pulp complex, in an invitro model simulating the endodontic clinical scenario.

