TECHNOLOGICAL INNOVATIONS AND EXPERIMENTAL PROTOCOLS IN PERIODONTOLOGY, ORAL SURGERY AND ORTHODONTICS.
Use of Growth Factors, Clinical Relevance and Prospectives

OSTEOINDUCTIVE EFFECT OF NOVEL DENTAL CEMENTS

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INTRODUCTION: Soft developing dental tissue called apical papilla, located at the end of not fully formed root, contains a great amount of stem cells (SCAP- stem cells from apical papilla). In the presence of endodontic dental cements, SCAP could commence osteodifferentiation and bone regeneration, as well as dentinogenesis, thus are having an important role in the success of therapeutical procedures.

AIMS: The aim of the study was to assess and compare the influence of novel calcium aluminate and calcium silicate-based dental cements on the osteodifferentiation of SCAP.

MATERIALS AND METHODS: The study included pure calcium aluminate cement (CA), CA with the addition of zirconium dioxide (CA+ZrO2), as well as calcium silicate cements - mineral trioxide aggregate (MTA) and Portland cement (PC). The cements were individually mixed and molded into half-disc-shaped samples, and placed in wells seeded with SCAP. Osteogenic differentiation medium (ODM) was added to each well, and SCAP cultured with and without ODM were used as a control (K and K+). After 21 days, staining with Alizarin Red S was performed to confirm osteodifferentiation, and colour binding was quantified and analyzed using spectrophotometry. The gene expression of osteodifferentiation markers was analyzed by the qPCR method.

RESULTS: **Significantly stronger Alizarin Red S binding was in case of novel cements** (Figure 1A and 1B). Relative gene expression of early osteogenic markers (alkaline phosphatase and osteocalcin) was significantly higher in the presence of MTA and CA+ZrO2 than in other groups (**p<0.05**) (Figure 2).

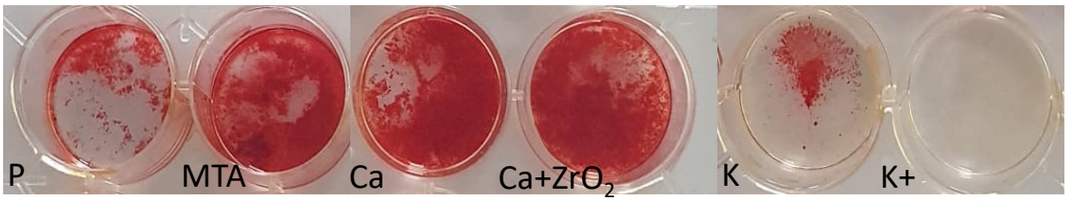

Figure 1A: Alizarin Red S staining

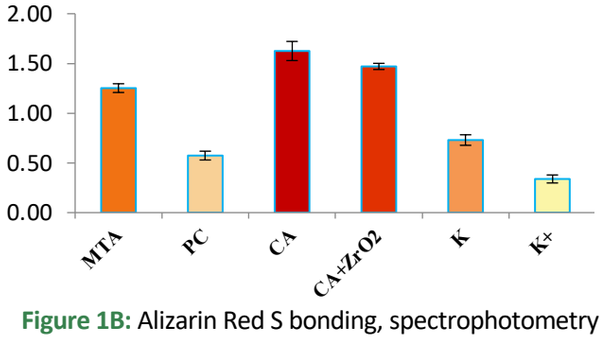

Figure 1B: Alizarin Red S bonding, spectrophotometry

	MTA	PC	CA	Ca+ZrO2
OCN	43	5.5	9.5	669
ALP	102	0.2	9	61

Figure 2: Relative gene expression of osteogenic markers OCN and ALP

CONCLUSION: In spite of their osteoinductive characteristics, novel CA cements could represent the cements of choice in regenerative endodontic therapy in the future, although further research is needed.