

Biocompatibility of three Pulp-capping Materials on Human Deciduous Dental Pulp Stem Cells

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INTRODUCTION

Direct pulp capping procedures involve the application of a medicament, dressing, or dental material to the exposed pulp in cases of pin-point pulp exposure, in an attempt to preserve its vitality. Calcium silicate cements, like Biodentine and mineral trioxide aggregate (MTA), are dental biomaterials with the ability to raise the number and odontogenic differentiation of human dental pulp cells *in vitro*. Standard MTA cement had some drawbacks due to the poor handling characteristics, potential discoloration of dental tissue and the long material setting time. Therefore, all future developed MTA-based materials are designed to overcome these weaknesses.

OBJECTIVES

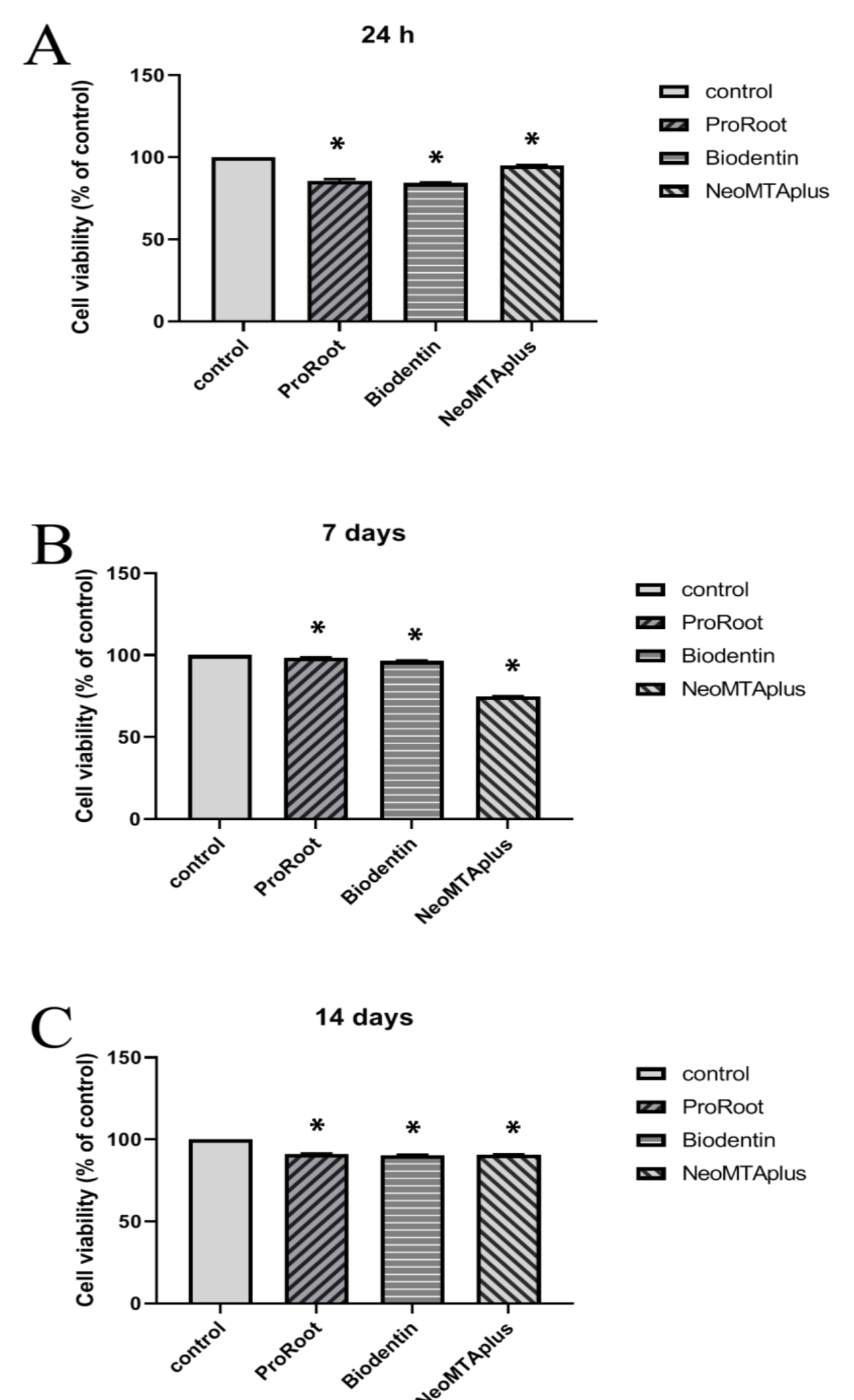
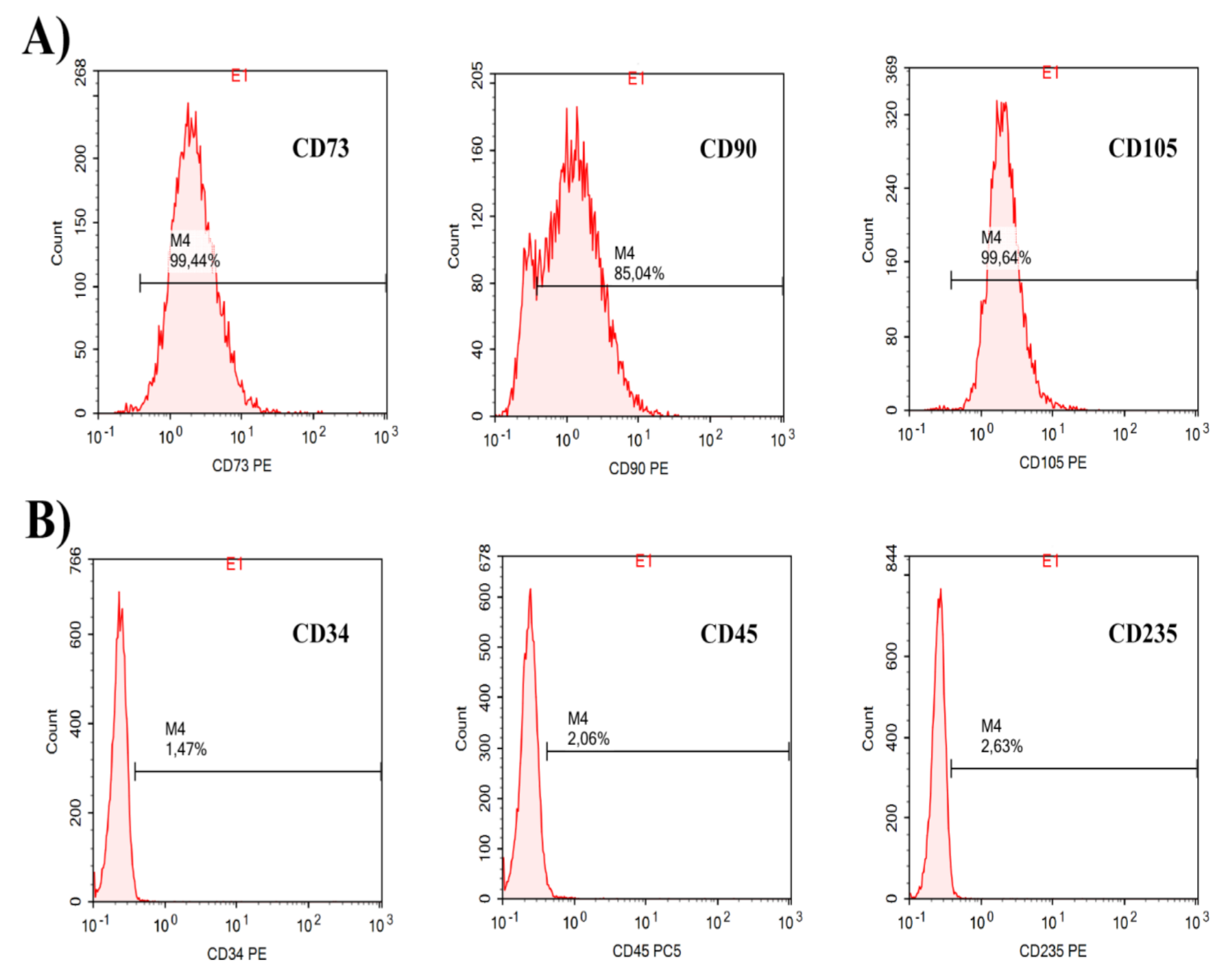
Here we assessed and compared the biocompatibility of various pulp capping materials- NeoMTA Plus (Avalon Biomed), ProRoot MTA (Dentsply Tulsa Dental Specialties), and Biodentine (Septodont) on human deciduous dental pulp stem cells (SHEDs).

METHOD / DESIGN

SHEDs were isolated and their phenotypes were evaluated by flow cytometry. Subsequently, they were cultured in the eluates of the above-mentioned pulpotomy materials (aged 24h, 7 and 14 days) for 24h. Cell viability was determined by Thiazolyl Blue Tetrazolium bromide assay (MTT).

RESULTS

The appearance of the first adherent cells from explant tissue were observed after four days of cell culture. The analysis of characteristic surface antigens CD73, CD105, CD90, CD34, CD45, and CD235a showed that SHEDs were negative for hematopoietic stem cell markers and positive for mesenchymal stem cell markers. All tested materials and groups showed cell viability mathematically similar to the control group, at all time points. Generally, the materials displayed excellent biocompatibility on SHEDs, indicating that all three materials could potentially serve as a suitable substrate for bone regeneration.



CONCLUSIONS

Our present results indicated that all studied materials showed low cytotoxicity on SHED. Furthermore, looking at long-term results (extracts aged 14 days) all tested materials showed similar biocompatibility. Overall, future *in vitro* and *in vivo* studies should be conducted to add more information about ProRoot MTA, Biodentine and NeoMTA plus.