The combined effects of growth factor and stem cells on the cellular viability and osteogenic potential with bone graft materials

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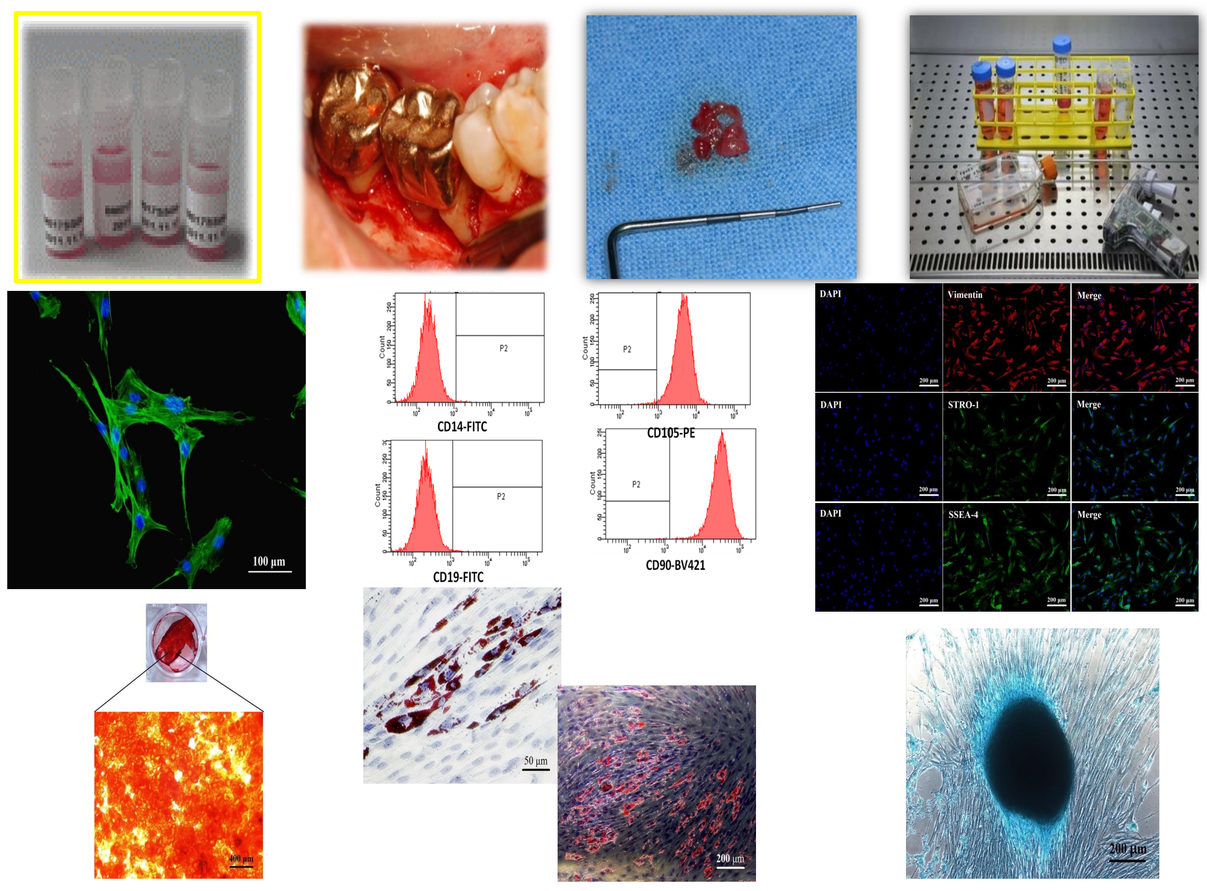
INTRODUCTION

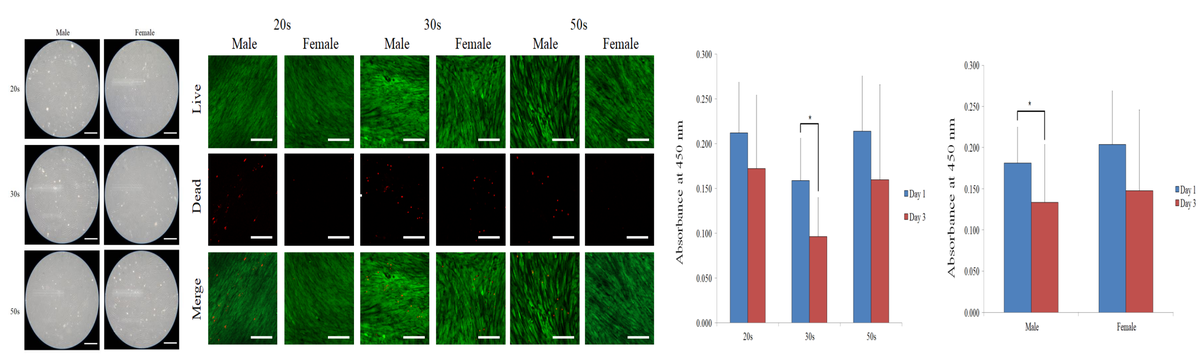
Growth factor is reported to have various functions and is considered a key human mesenchymal stem cell mitogen, often supplemented to increase human mesenchymal stem cell growth rates. The purpose of this study was to evaluate the combined effects growth factor and stem cells on cellular viability and osteogenic differentiation with bone graft materials



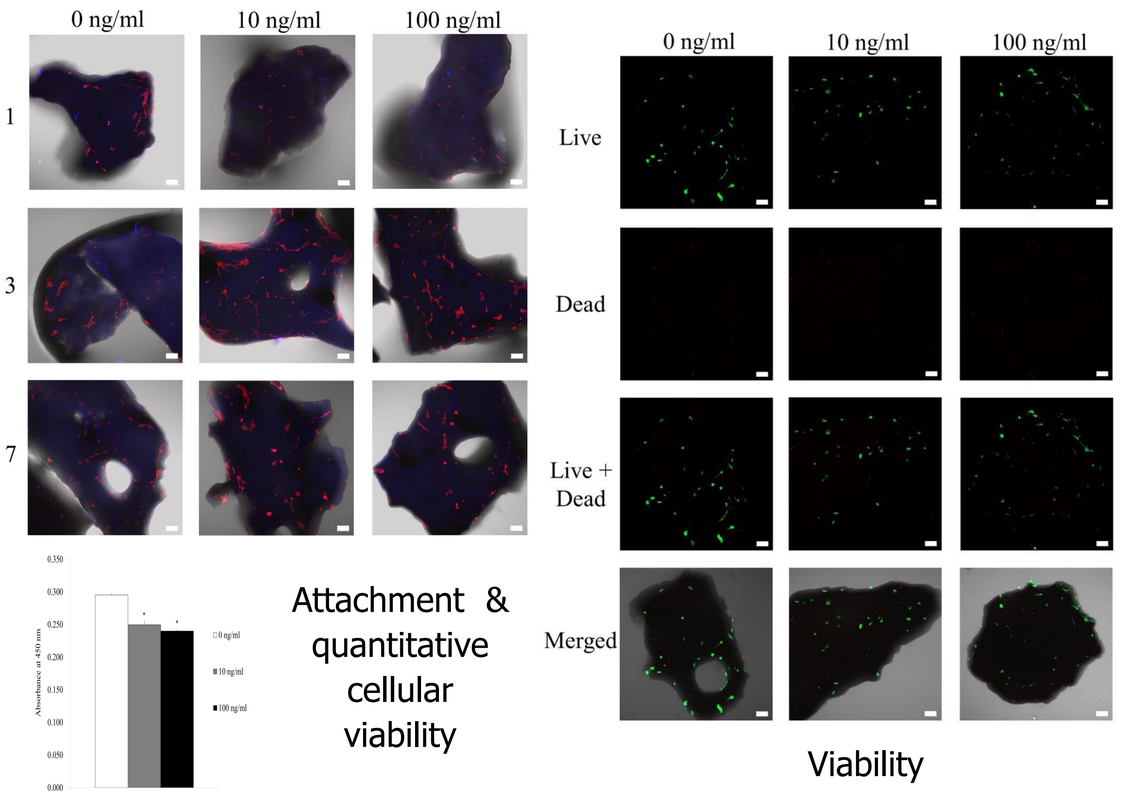
MATERIALS & METHODS

Stem cells were isolated from human bone marrow and were loaded onto the deproteinized bovine bone particle. After the stem cells were loaded onto the bone graft material, their morphology was observed. Viability assays based on the application of fluorescent stains were used for qualitative analyses. Alkaline phosphatase activity assays and Alizarin red staining were used for the assessment of osteogenic differentiation.

The morphology and cellular viability



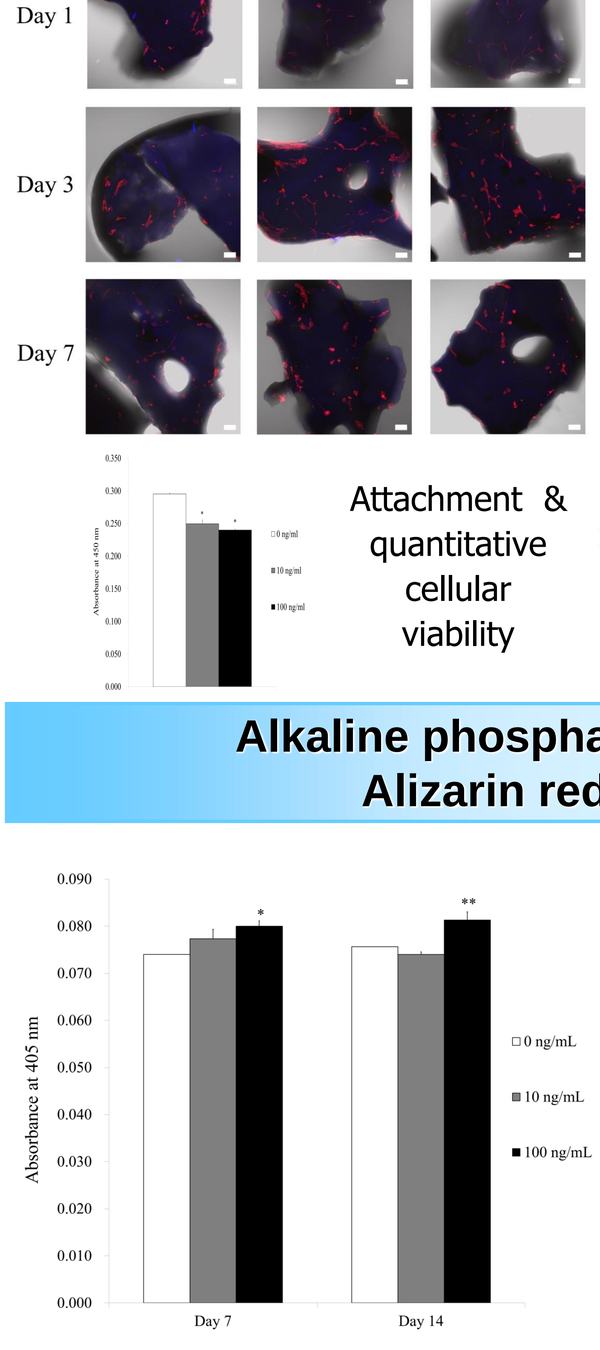
Individual characteristics



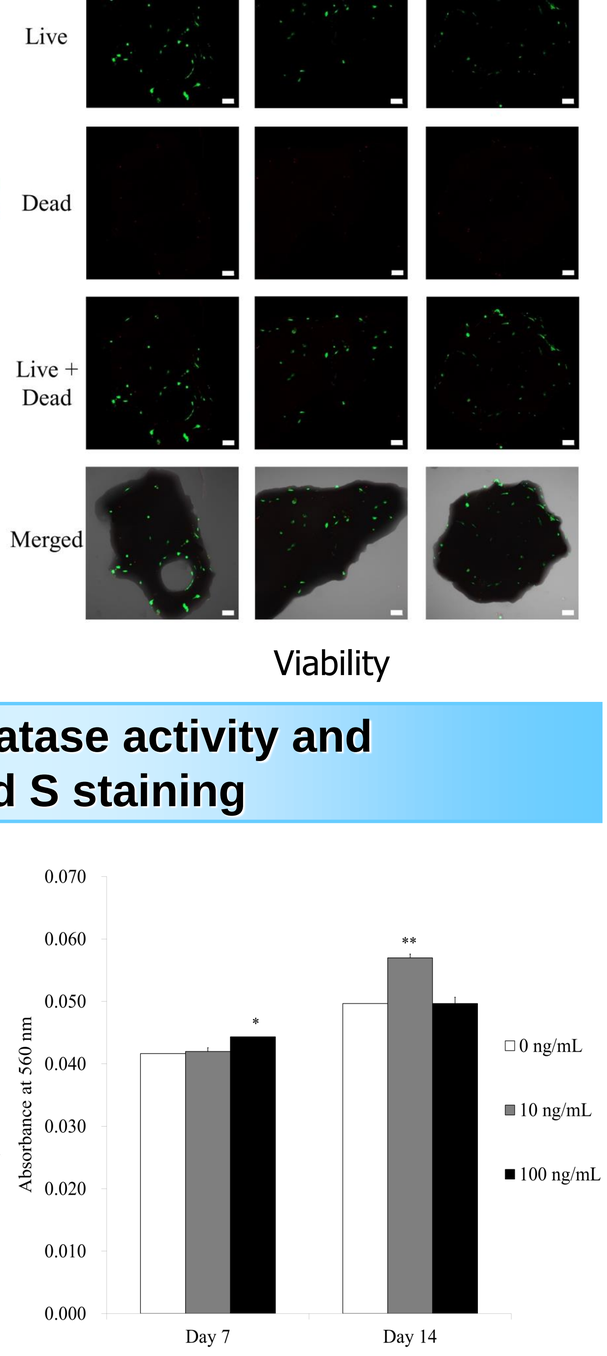
Attachment & quantitative cellular viability

Viability

Alkaline phosphatase activity and Alizarin red S staining

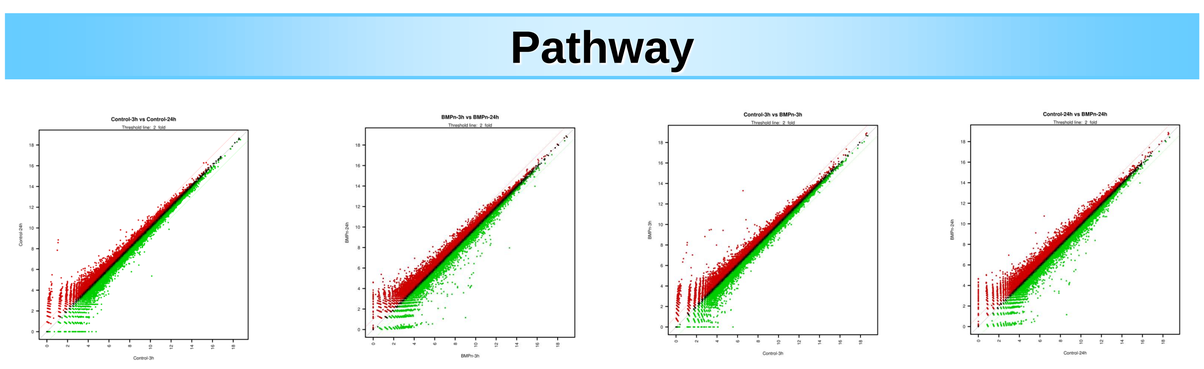


Alkaline phosphatase activity

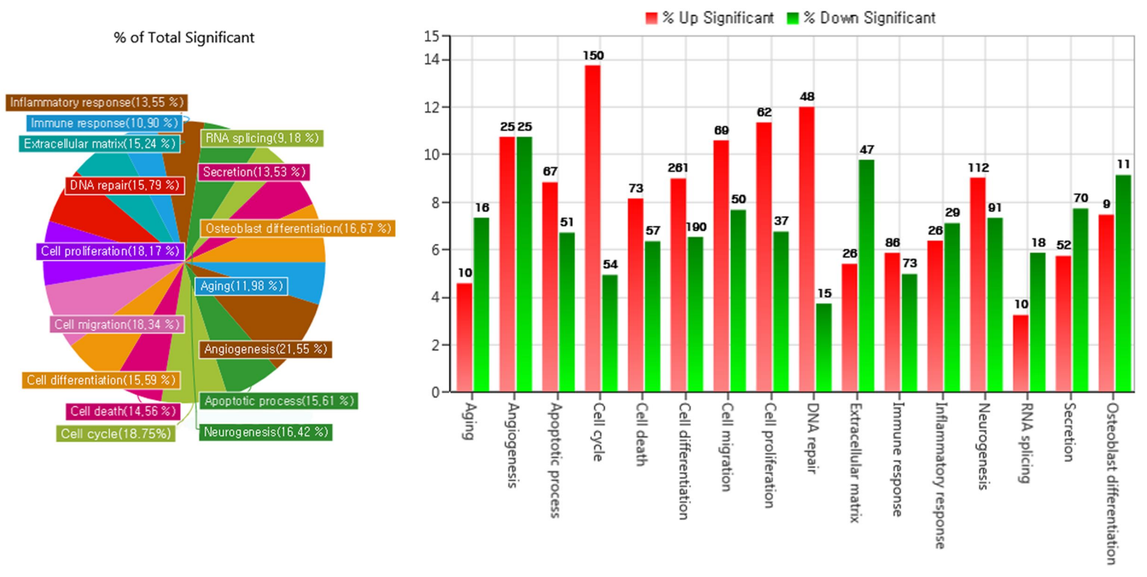


Alizarin red S staining

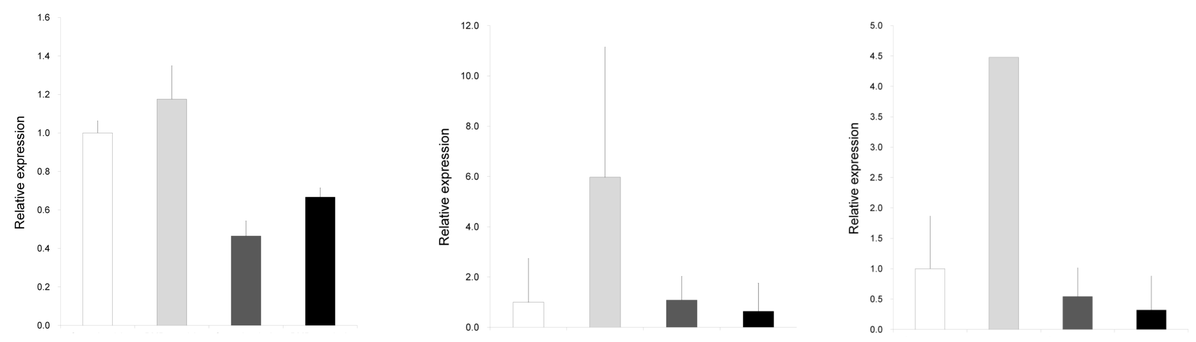
Pathway



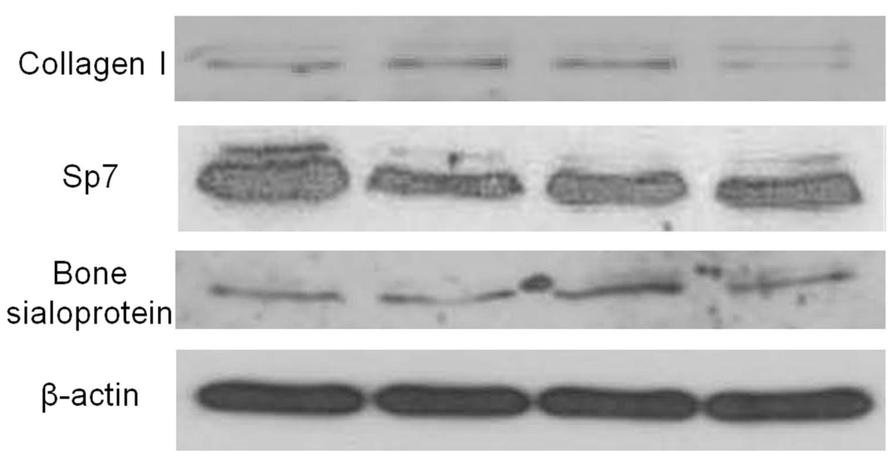
Scatter plot

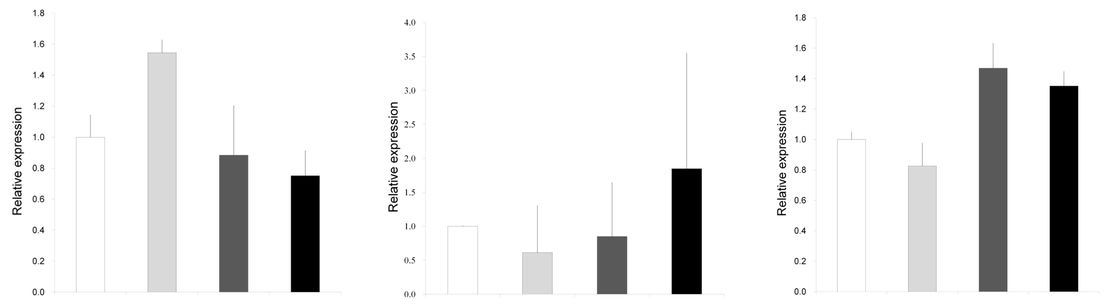


Gene ontology analysis of mRNA expression

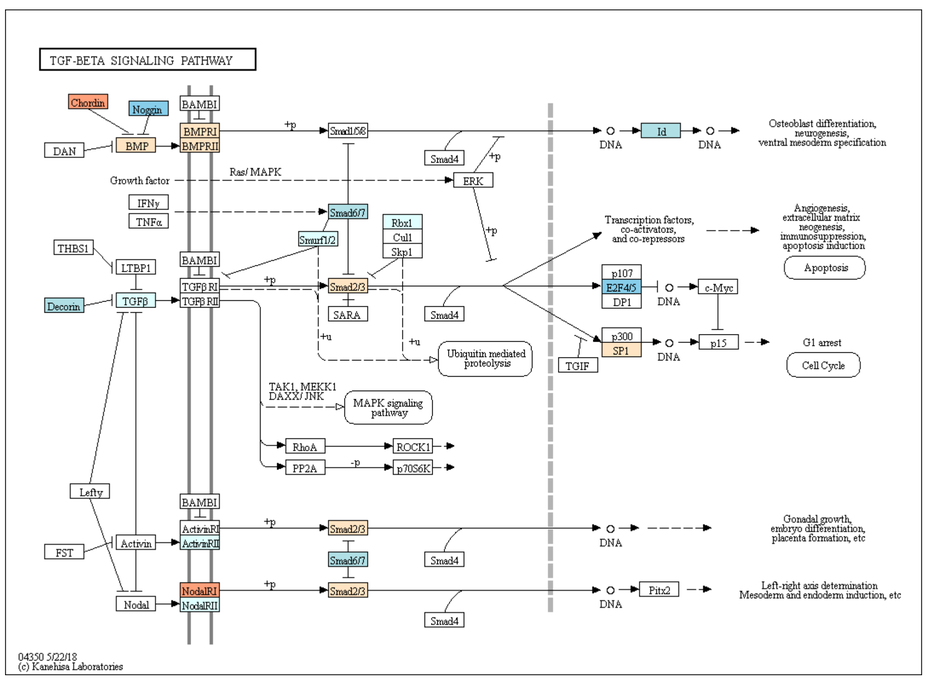


Real-time polymerase chain reaction





Western blot analysis



Pathway

CONCLUSION

Overall, this study shows that in vitro application of growth factor increased alkaline phosphorylase activity and mineralization of stem cells culture on deproteinized bovine bone mineral. The report suggests that combining stem cells with osteoinductive growth factors with scaffolds can have a synergy effect on osteogenic differentiation.