DEVELOPMENT OF BIPHASIC CALCIUM PHOSPHATE SCAFFOLD DECORATED WITH HYALURONIC ACID-CHITOSAN MICROSPHERES HYDROGEL FOR BONE REGENERATION

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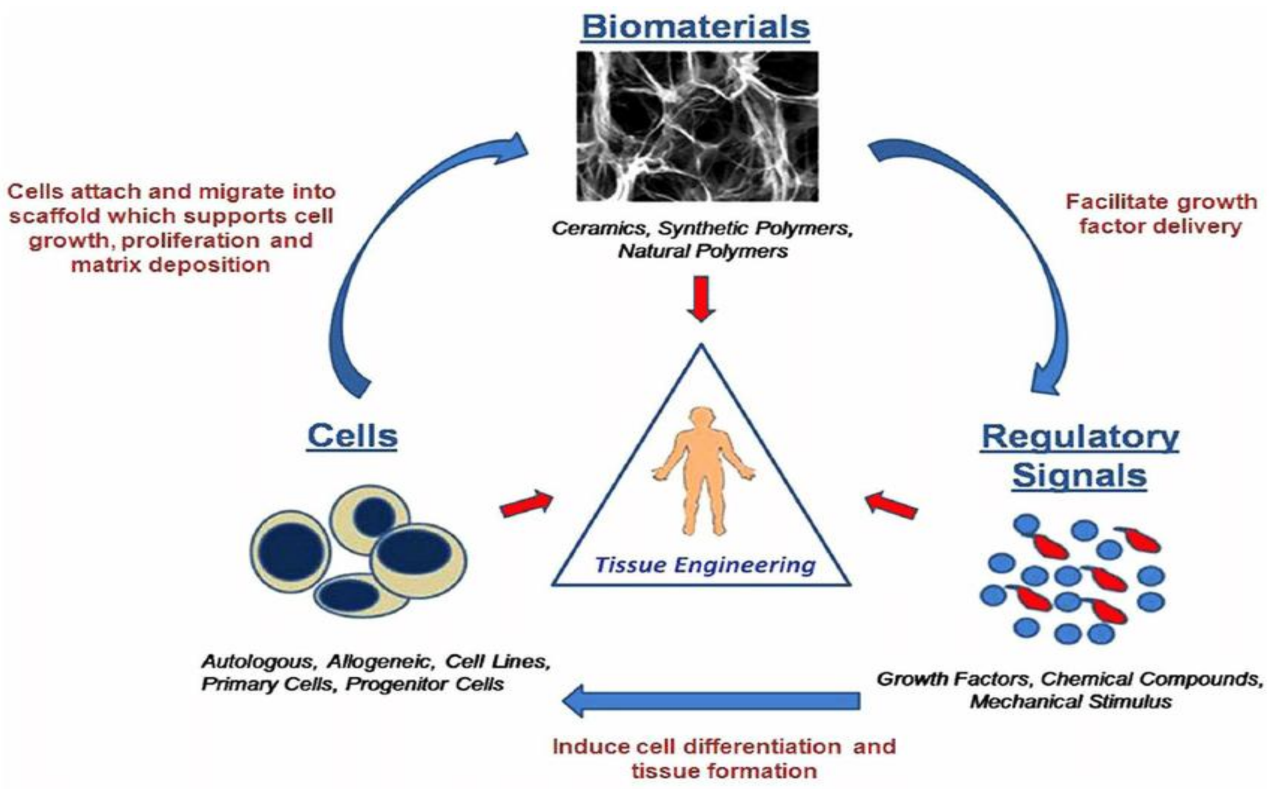


Bone Tissue Engineering Triad

INTRODUCTION

Background Bone related problems such as **osteomyelitis, trauma, and tumor** cause significant damage to the skeletal structure and require replacement procedures to restore the normal morphology and function as approximating as possible

Objectives: The aim of present study is to develop a novel Biphasic calcium phosphate scaffold decorated with hyaluronic acid-chitosan microspheres hydrogel for improved bone regeneration.

Scope:Bone tissue engineering is a state of art and science involved in Regeneration of bone with natural form and function. To achieve Tissue Engineering goal i.e. to generate diseased/damaged tissue and to attach body cells to ECM, there should be a balance between the rate at which the scaffold resorbs and the rate at which the cells are depositing the new native extracellular matrix. Use of nanoparticles will help to achieve this goal by controlling the release rate of hyaluronic acid.

METHOD

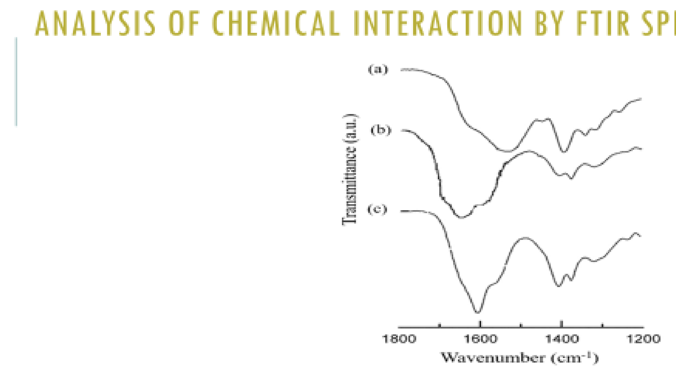
- Biphasic calcium phosphate (BCP) Scaffolds were prepared by Sponge Replica Method
- Hyaluronic acid Chitosan microspheres (HA-CH-MS) were prepared using ionic gelation technique
- BCP Scaffold was then immersed in the HA-CS-MS hydrogel and frozen at – 80⁰C for 6 h, and freeze-dried for 48 h at -80⁰C

CHARACTERIZATION

- Element composition
- Morphology
- Porosity and pore size distribution
- In vitro bioactivity
- Cell cytotoxicity using MTT assay
- Scaffold swelling and degradation rates
- Osteogenic differentiation

RESULTS AND DISCUSSION

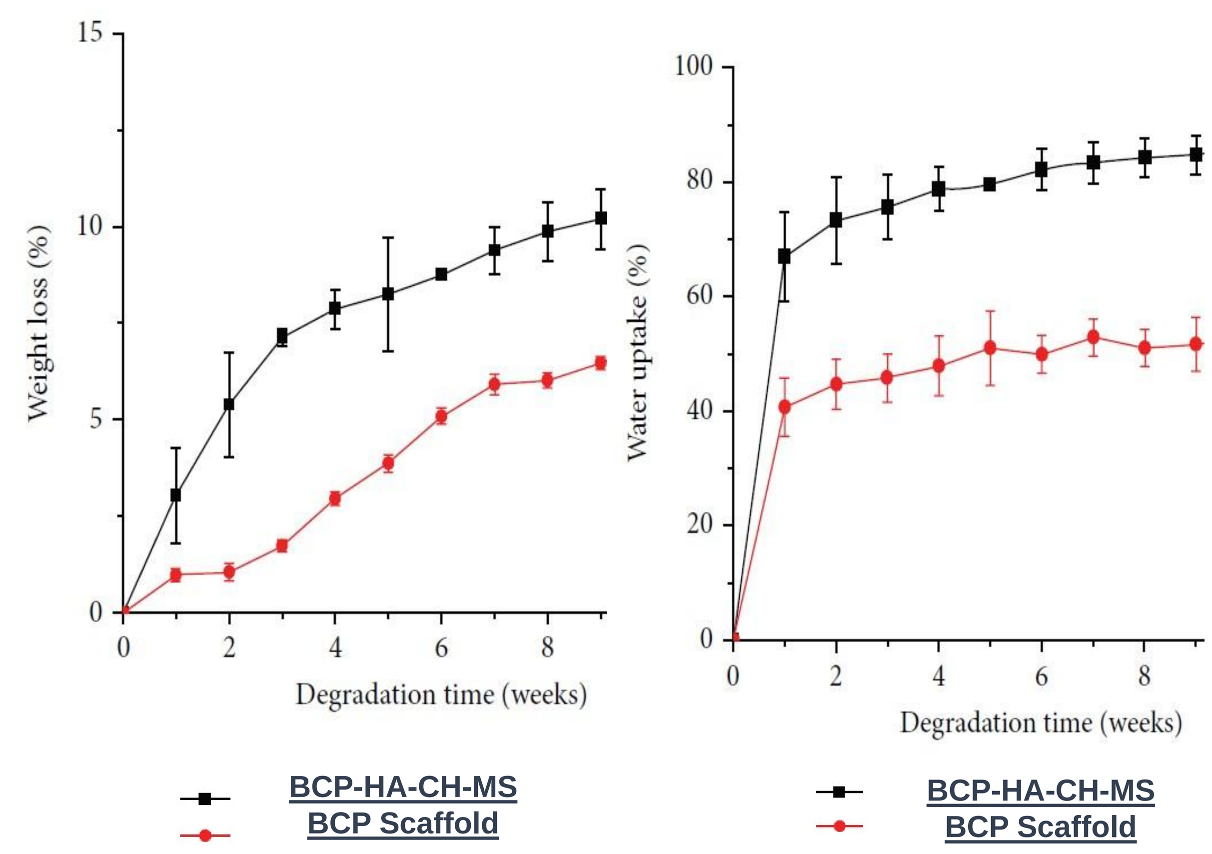
ANALYSIS OF CHEMICAL INTERACTION BY FTIR SPECTRA



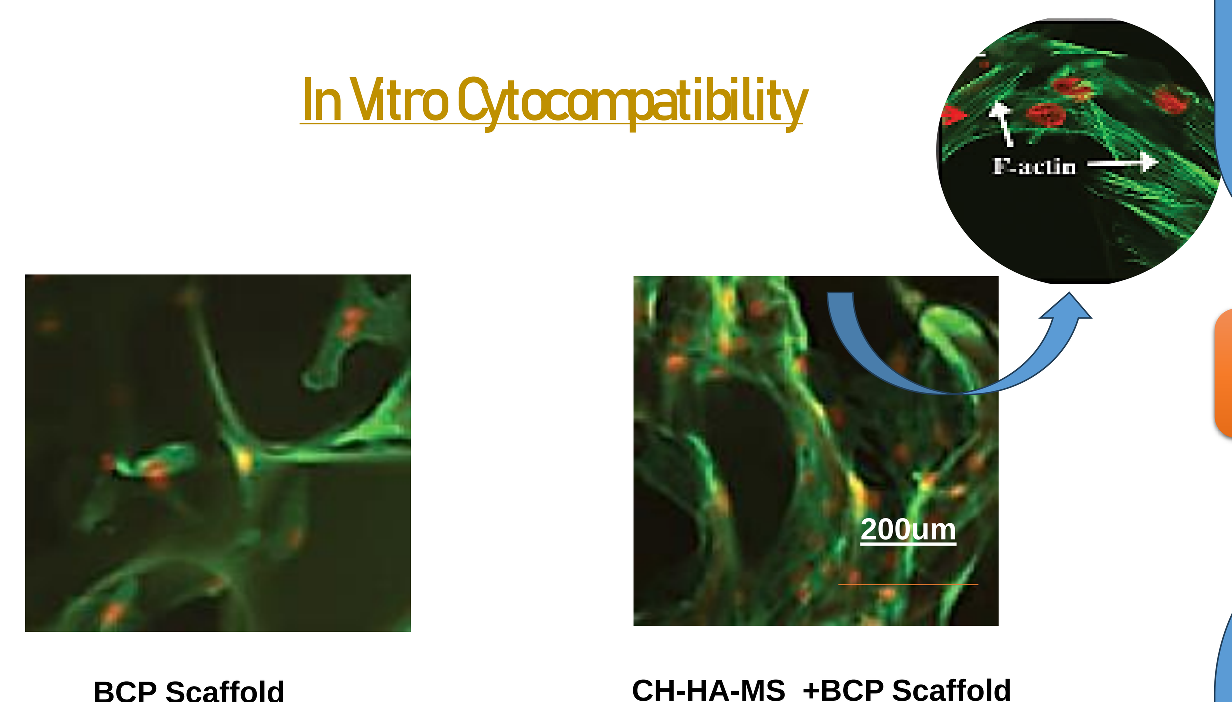
FTIR spectra of a) Chitosan b) mixture of Chitosan and Hyaluronic acid c) Hyaluronic acid

Surface Morphology

Degradation properties In Vitro



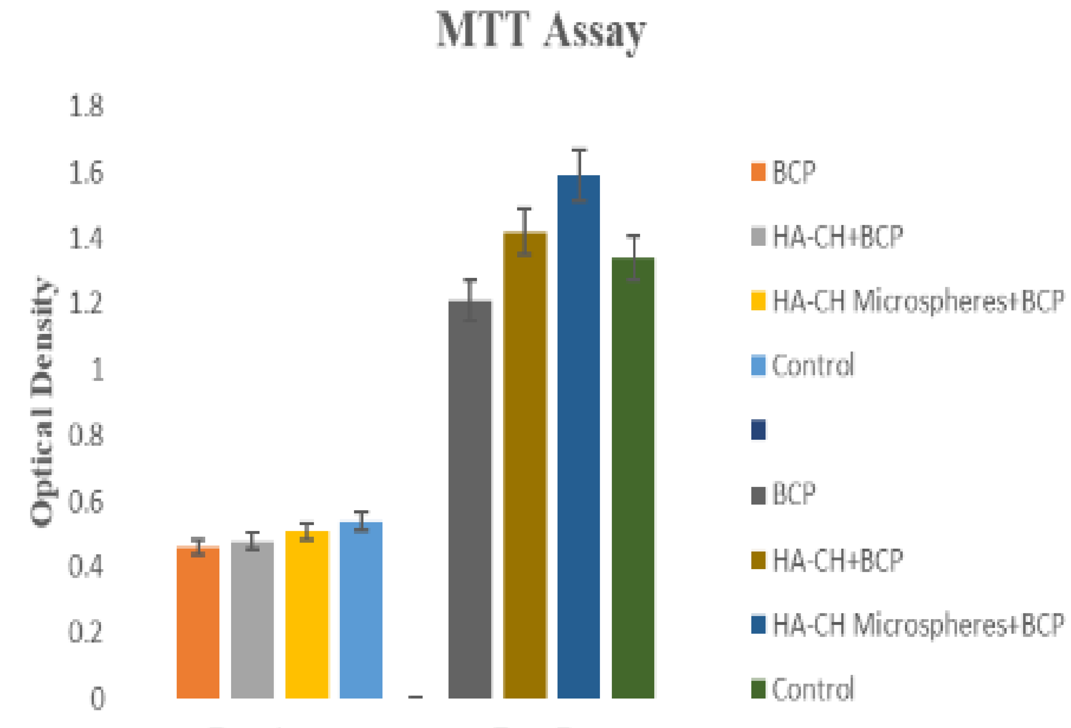
In Vitro Cytocompatibility



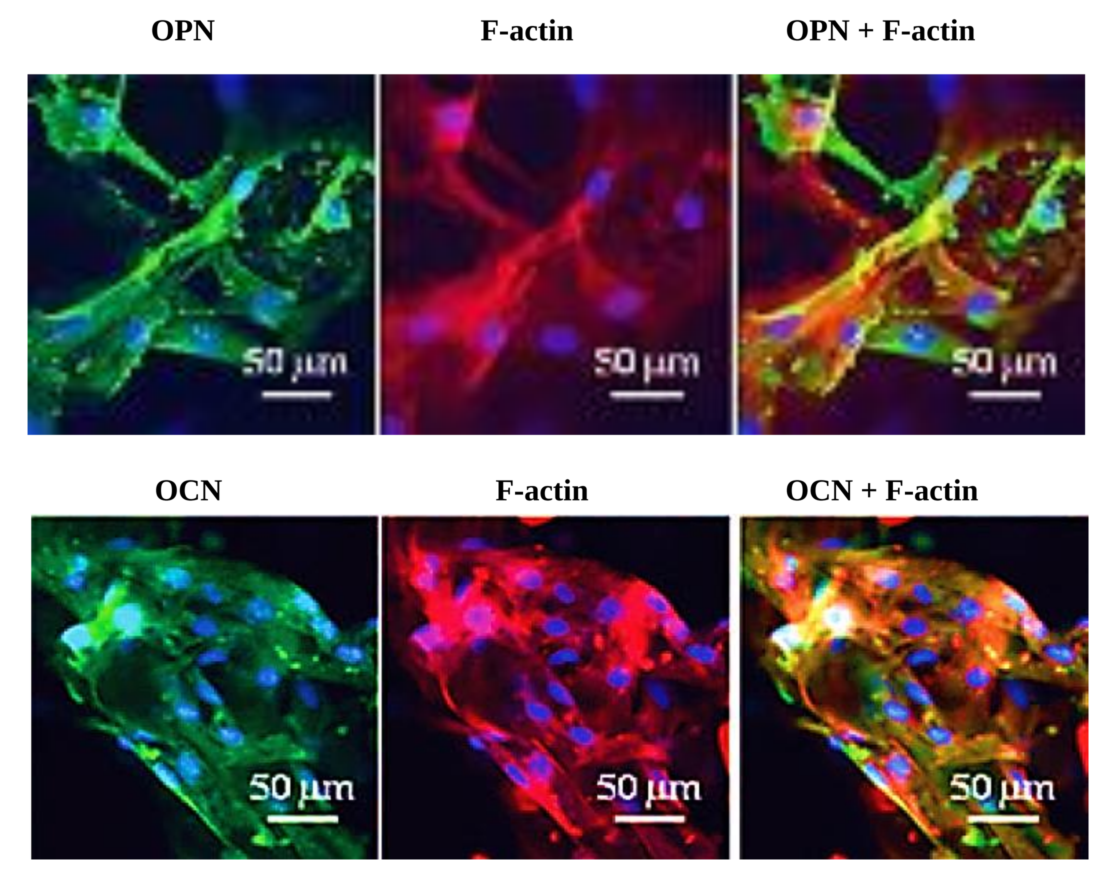
BCP Scaffold

CH-HA-MS +BCP Scaffold

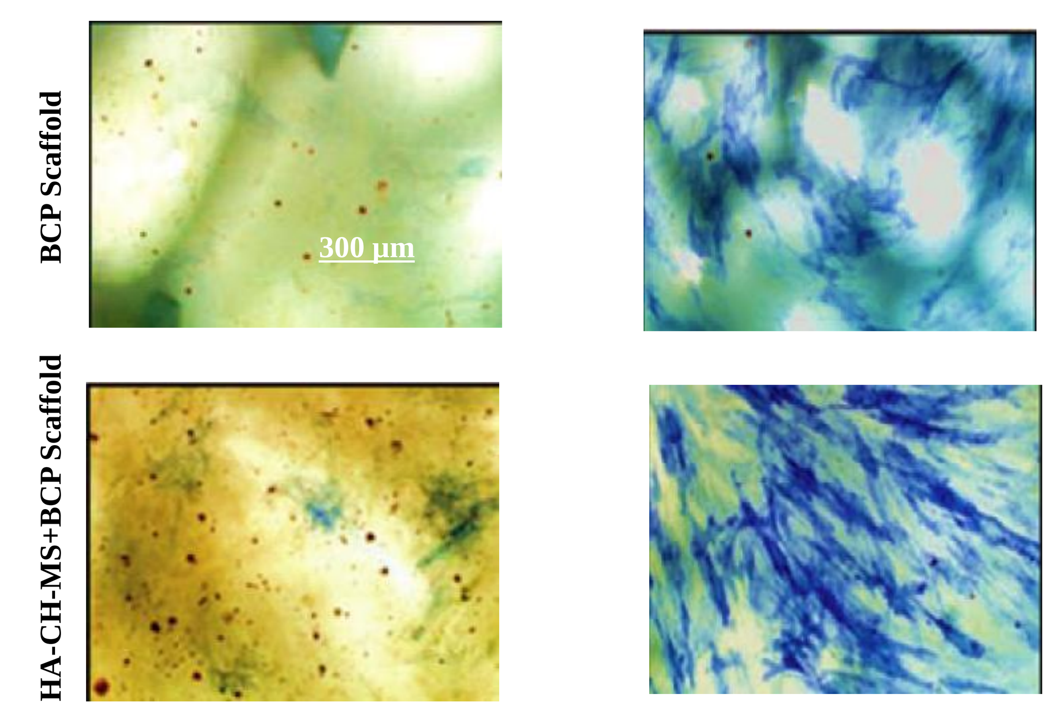
MTT assay for cell proliferation



Cell Proliferation and Viability assay



Osteogenic differentiation



CONCLUSION

•**Key Findings: The HA-CS-MS decorated BCP scaffold shows enhanced mechanical properties, biocompatibility, and osteogenic potential.**

•**Future Directions: Focus on optimization of scaffold properties and long-term in vivo studies for clinical applications.**

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