Using Fluorescent Hydrogel Scaffolds for Stem Cell Culture

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Introduction

We are exploring the use of a fluorescent hydrogel to examine changes to the microenvironment induced during embryonic stem cells (ESCs) differentiation, with a specific interest in osteogenesis, a process requiring matrix secretion and mineralization. We have begun an initial investigation testing the capacity of this material to maintain ESC growth and support osteogenic differentiation.

Methodology

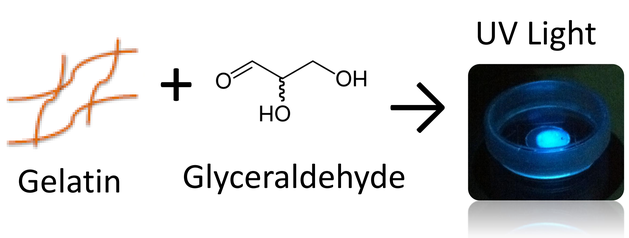

Figure 1: Schematic illustration of material components.

- Validate Occurrence of Osteogenesis
- Characterize Material

Results

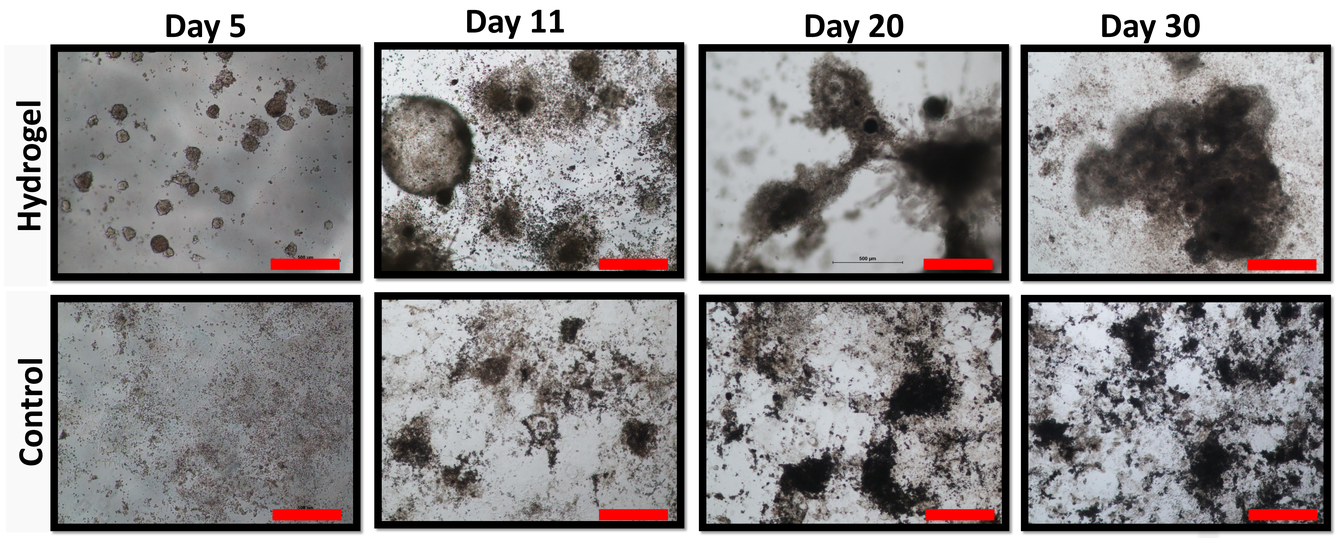

Figure 2: (A) Phenotypic appearance of mESC cultures during Osteogenic Differentiation. Scale bars = 500 µm

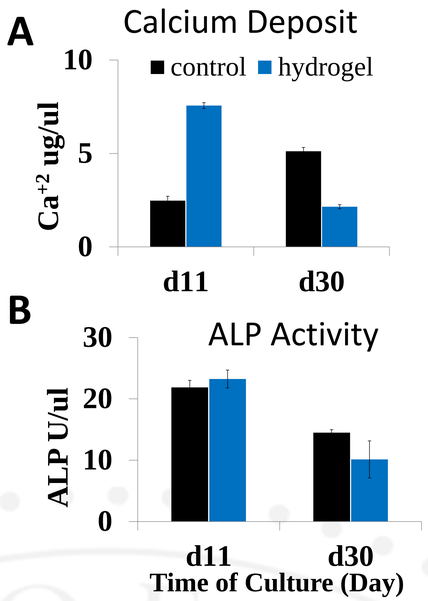

Figure 3: (A) Calcium Assay (B) Alkaline Phosphatase activity

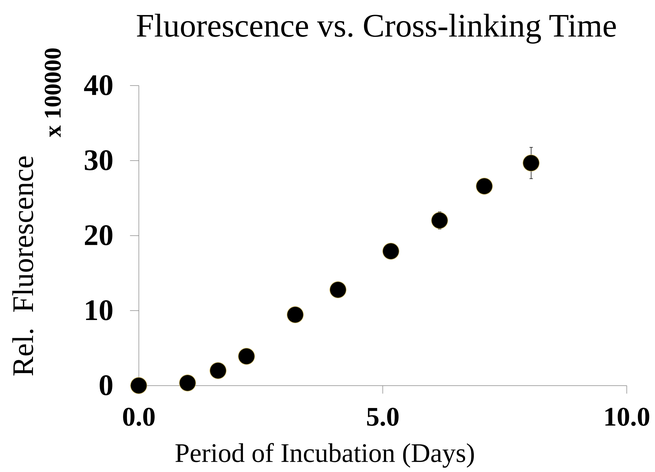

Figure 4: Fluorescence emission of hydrogel as a function of cross-linking time at 4 C with 0.1M glyceraldehyde ($\lambda_{Ex}/\lambda_{Em}$= 350 nm/440 nm)

Conclusion

- Cross-linking reaction precedes for over 10 days in 4 C
- Glyceraldehyde modified hydrogel induced cell clusters compared to the flat lawn of cells in the control
- Current culturing methods must be adapted to suit 3D culturing systems

References

[1] Hwang, Granelli, Lyubovitsky (2011). Analytical Chemistry 83:200-6

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Acknowledgements

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