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Differentiation and Behavior of Dental Pulp Stem Cells in Hydrogel Scaffolds of Various Stiffnesses DIVYA BHATNAGAR, VLADIMIR JURUKOVSKI, MIRIAM RAFAILOVICH, MARCIA SIMON, Stony Brook University — Dental Pulp Stem Cells (DPSCs) are known to differentiate in bone, dentine, or nerve tissue through different environment signals. This work investigates whether differentiation could occur in the absence of chemical induction and through mechanical stimuli only. For this study, we chose enzymatically cross-linked gelatin hydrogels as our substrates. Rheological studies carried out by oscillatory shear rheometry indicated that the modulus of the hardest hydrogel was of the order of 8kPa where as the medium and the softest hydrogel had modulus of the order of 1kPa and 100Pa respectively. DPSC were then plated on all three substrates and cultured with and without dexamethasone induction media. After 21 days of incubation, SEM analysis indicated that the cells cultured in the induction media produced biomineralized deposits on hard, medium as well as soft hydrogels. On the other hand, the cells cultured without the induction media also produced large amounts of biomineralized deposits. The modulus of the cells was also measured using AFM. En mass cell migration was also studied to determine the average velocity of migration of DPSCs. We also investigated whether stem cells that are induced to differentiate by their scaffold environment would continue to differentiate and biomineralize when removed from the inducing scaffold.

Divya Bhatnagar

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