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The effects of viscoelastic polymer substrates on adult stem cell differentiation CHUNGCHUEH CHANG, ADAM FIELDS, ALEX RAMEK, VLADIMIR JURUKOVSKI, MARCIA SIMON, MIRIAM RAFAILOVICH — Dental Pulp Stem Cells (DPSCs) are known to differentiate in either bone, dentine, or nerve tissue by different environment signals. In this study, we have determined whether differentiation could only through modification of the substrate mechanics. Atomic Force Microscopy (AFM) on Shear Modulation Force Microscopy (SMFM) mode indicated that the spun-cast polybutadiene (PB) thin films could be used to provide different stiffness substrates by changing the thicknesses of thin films. DPSCs were then plated on these substrates and cultured in standard media. After 28 days incubation, Lasar Scanning Confocal Microscopy (LSCM) with mercury lamp indicated that the crystals were observed only on hard surfaces. The Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray analysis (EDX analysis) indicated that the crystals are calcium phosphates. The Glancing Incidence Diffraction (GID) was also used to determine the structure of crystals. These results indicate that DPSCs could be differentiated into osteoblasts by mechanical stimuli from substrate mechanics.

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