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Beating of early embryonic cardiomyocytes: definitive modulation and possible induction by matrix elasticity STEPHANIE MAJKUT, Physics and Astronomy, University of Pennsylvania, CHRISTINE KRIEGER, DENNIS DISCHER, Chemical and Biomolecular Engineering, University of Pennsylvania — Previous studies on the effects of matrix elasticity on chicken cardiomyocyte beating physiology have focused on 10 day embryo cells[1]. In this study we investigated the effects of matrix elasticity on cardiomyocyte development at earlier stages. At these stages, it is known that matrix proteins like collagen and fibronectin (FN) are expressed, and there is definite differentiation. Cardiomyocytes were isolated from 2-4 day chicken embryos, cultured on collagen- or FN-coated PA gels of varying stiffness, and observed for spontaneous beating and morphology. 4 day embryo cells adhered to both matrix ligands, although cells cultured on FN had more frequent and pronounced protrusions than those cultured on collagen. After 18 hours in culture, cardiomyocyte beating magnitude was larger on softer 1 kPa gels than on stiffer 34 kPa gels. Thus, early embryonic cells showed matrix-dependent morphology and differentiated function. Beating heart tubes are seen in embryos as early as 2 days, while there are no beating cells at 1 day, so the physical system used in this study seems ideal for assessing microenvironment effects on early embryonic development of heart cells. [1] A. Engler, et al. ***Journal of Cell Science*** 121: 3794-3802 (2008).

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