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Elasticity of developing cardiac tissue STEPHANIE MAJKUT, JOE SWIFT, CHRISTINE KRIEGER, DENNIS DISCHER, University of Pennsylvania — Proper development and function of the heart from the tissue to cellular scale depends on a compliant ECM. Here we study the maturation of embryonic cardiac tissue mechanics in parallel with the effects of extracellular mechanics on individual cardiomyocyte function throughout early development. We used micropipette aspiration to measure local and bulk elastic moduli (E) of embryonic avian heart tissue from days 2-12. We observe stiffening of the early heart tube from E = 1 kPa at day 1 to E = 2 kPa at day 4, reaching neonatal values by day 12. Treating heart tubes with blebbistatin led to 30% decrease in E, indicating a significant but partial actomyosin contribution to mechanics at these stages. We performed a proteomic analysis of intact and decellularized 2-4 day heart tubes by mass spectrometry to quantify the ECM present at these stages. Isolated cardiomyocytes from 2-4 day chick embryos were cultured on collagen-coated PA gels of various stiffnesses. Beating magnitude was modulated by substrates with E = 1-2 kPa, similar to physiological E at those stages.

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