## **Supplemental Information**

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Figure 1: Encapsulated EBs extend axons throughout the entire gel after 168 hours. This Z-stack was taken several millimeters from the nearest EB.







Figure 3: MALDI of peptides. Expected masses are 697.82 for CYIGSR, 536.57 for CRGDS, 992.3 (1015.2 w/ Na+ ion) for CKKKKKKC, and 1304.55 for KCGPQGIWGQCK.



Figure 4: <sup>1</sup>H NMR of 4-arm PEG-norbornene. The ratio of the integral of the norbornene ene peaks to the PEG backbone peaks shows 88% functionalization after automatic phase and baseline correction.



Figure 5: SEM images of soft (left) and stiff (right) hydrogels.



Figure 6: Demonstration of quantification of ESMN phenotype. Stacks are loaded into Simple Neurite Tracer (Longair 2011), a plugin for Fiji, and axon length and branching are quantified. Overlay of z-projection (20% opacity), GFP channel (current z-position), and axon tracks (current z-position) showing high fidelity.