

Supplementary Data:

On-line Video 1: Low magnification video showing bioreactor platform stretching the PDMS microtissue wells

On-line Video 2: High magnification video showing bioreactor platform stretching the PDMS wells containing cardiac microtissues

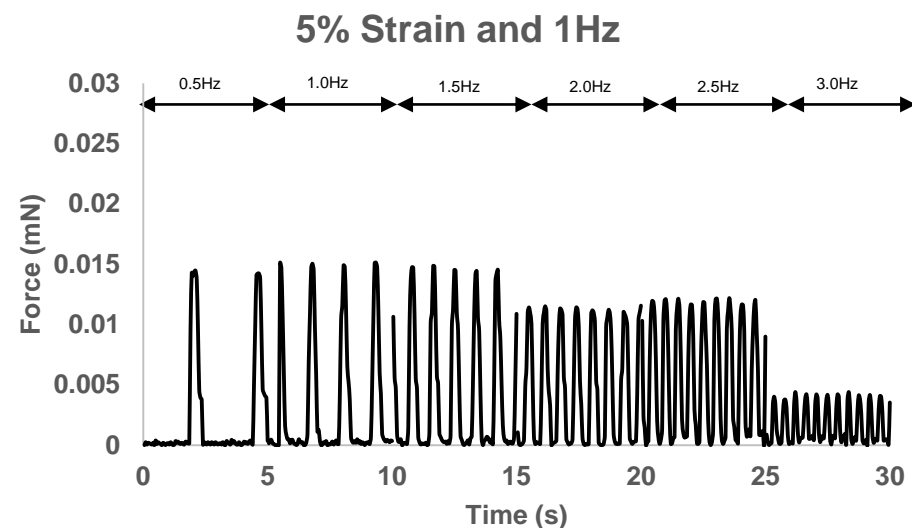
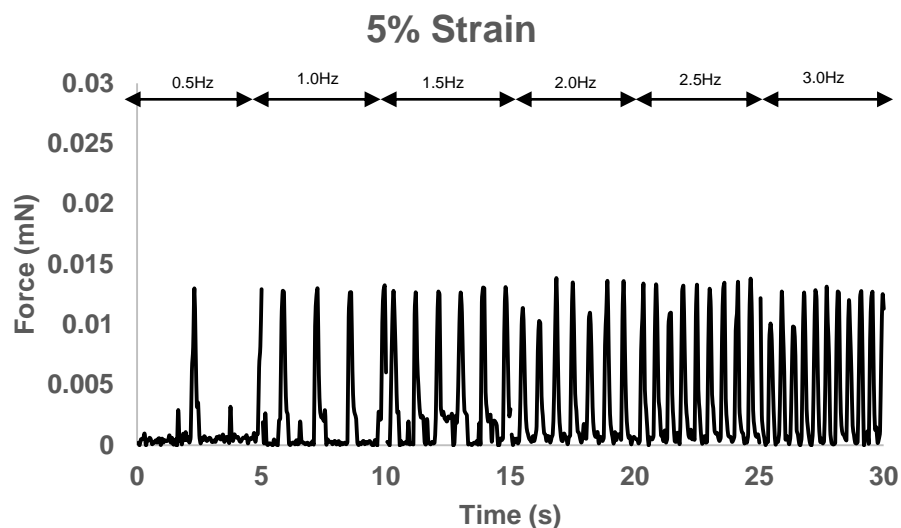
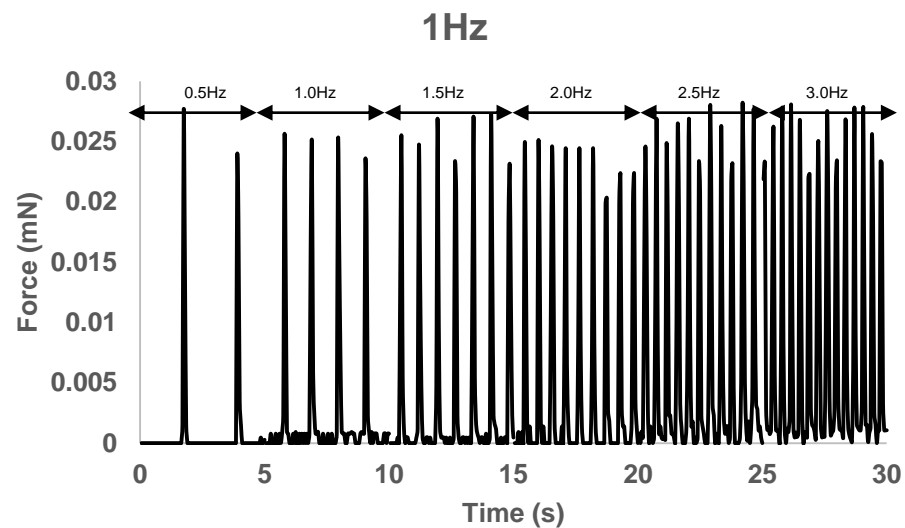
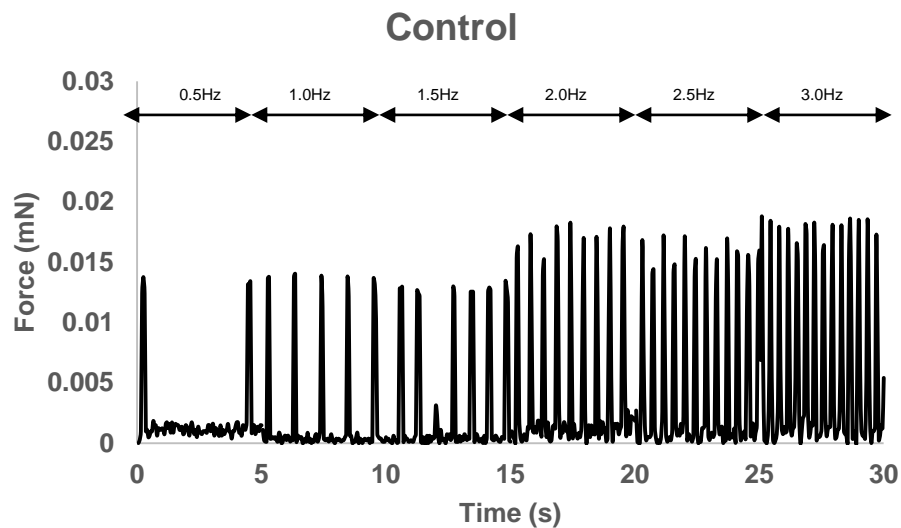
Supplemental Table 1: Oligonucleotide sequences used

Gene	Forward	Reverse
GAPDH	ACGGGAAACCCATCACCATC	CTCGTGGTTCACACCCATCA
BAX	TCCAGGATCGAGCAGA	AAGTAGAAGAGGGCAACC
BCL2	CTGGTGGACAACATCGCTCTG	GGTCTGCTGACCTCACTTGTG
αMHC	TGATGACTCCGAGGAGCTTT	TGACACAGACCCTTGAGCAG
βMHC	CCTCGCAATATCAAGGGAAA	TACAGGTGCATCAGCTCCAG
ANF	GAGTGAGCCGAGACAGCAAA	TTGCTCCAATATGGCCTGGG
BNP	GACGGGCTGAGGTTGTTTTA	ACTGTGGCAAGTTTGTGCTG
SERCA	TGCTGGAACCTGTGATCGAG	AGCGTTTCTCTCCTGCCATA

Supplemental Table 2: Average force and cross sectional area measurements

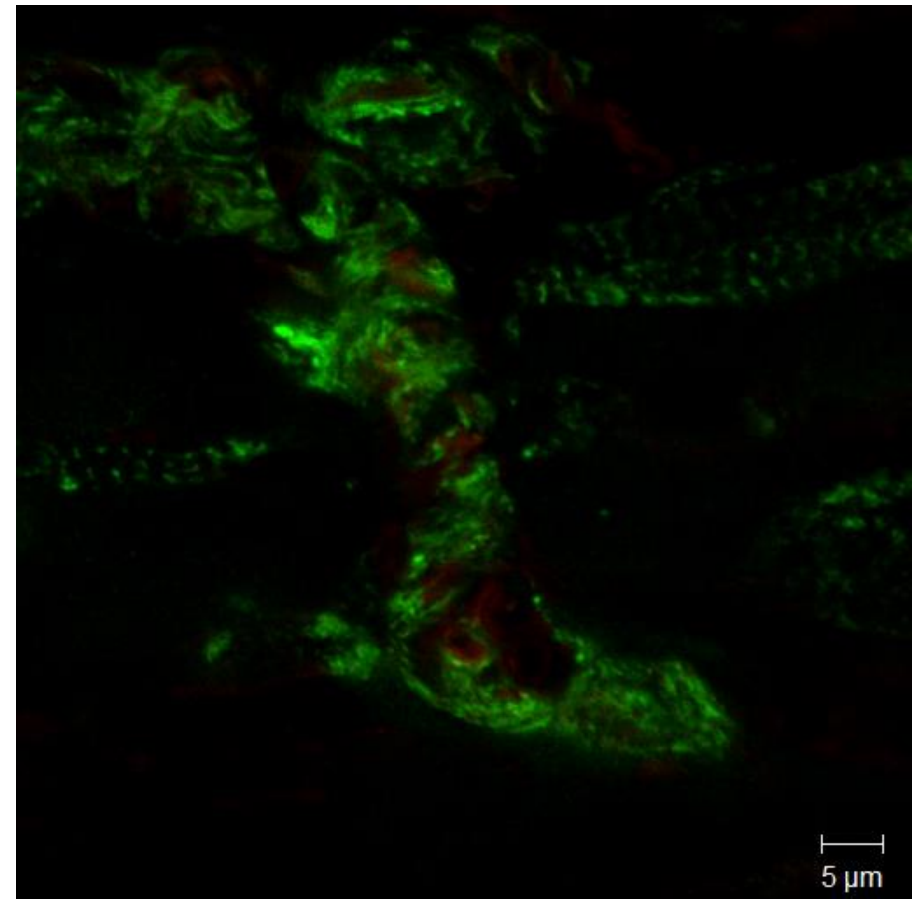
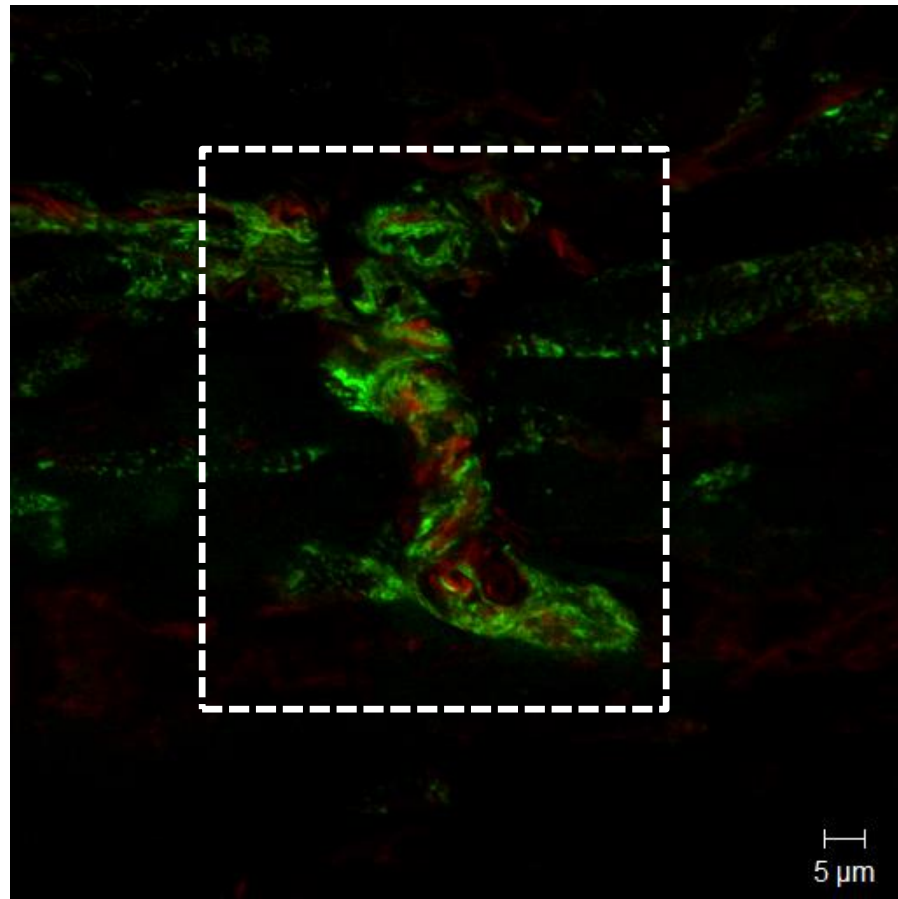
	Force (mN)	Cross Sectional Area (mm²)
Control	0.021±0.004	0.073±0.002
1Hz	0.021±0.003	0.080±0.016
5% Strain	0.009±0.004	0.064±0.012
5% Strain + 1Hz	0.063±0.058	0.066±0.015

Supplemental Figure 1



Supplemental Figure 1: Representative post deflection traces of the four conditions at increasing pacing frequency starting at 0.5Hz and increasing to 3.0Hz in 0.5Hz increments. Each pacing frequency is shown for 5 seconds.

Supplemental Figure 2



Supplemental Figure 2: Regions of myofibrils running perpendicular to the applied 5% static strain (strain applied left to right). Double staining for sarcomeric α -actinin (green) and actin (red). White box region enlarged in right image.