Supplemental Materials for

Myocardial relaxation is accelerated by fast stretch, not reduced afterload

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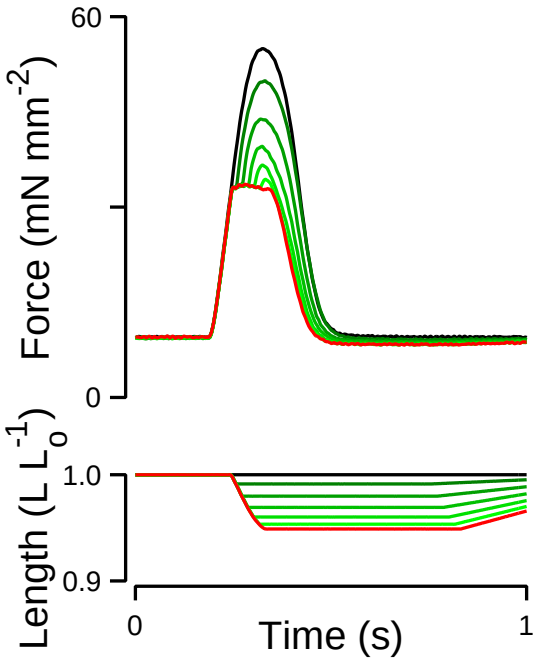
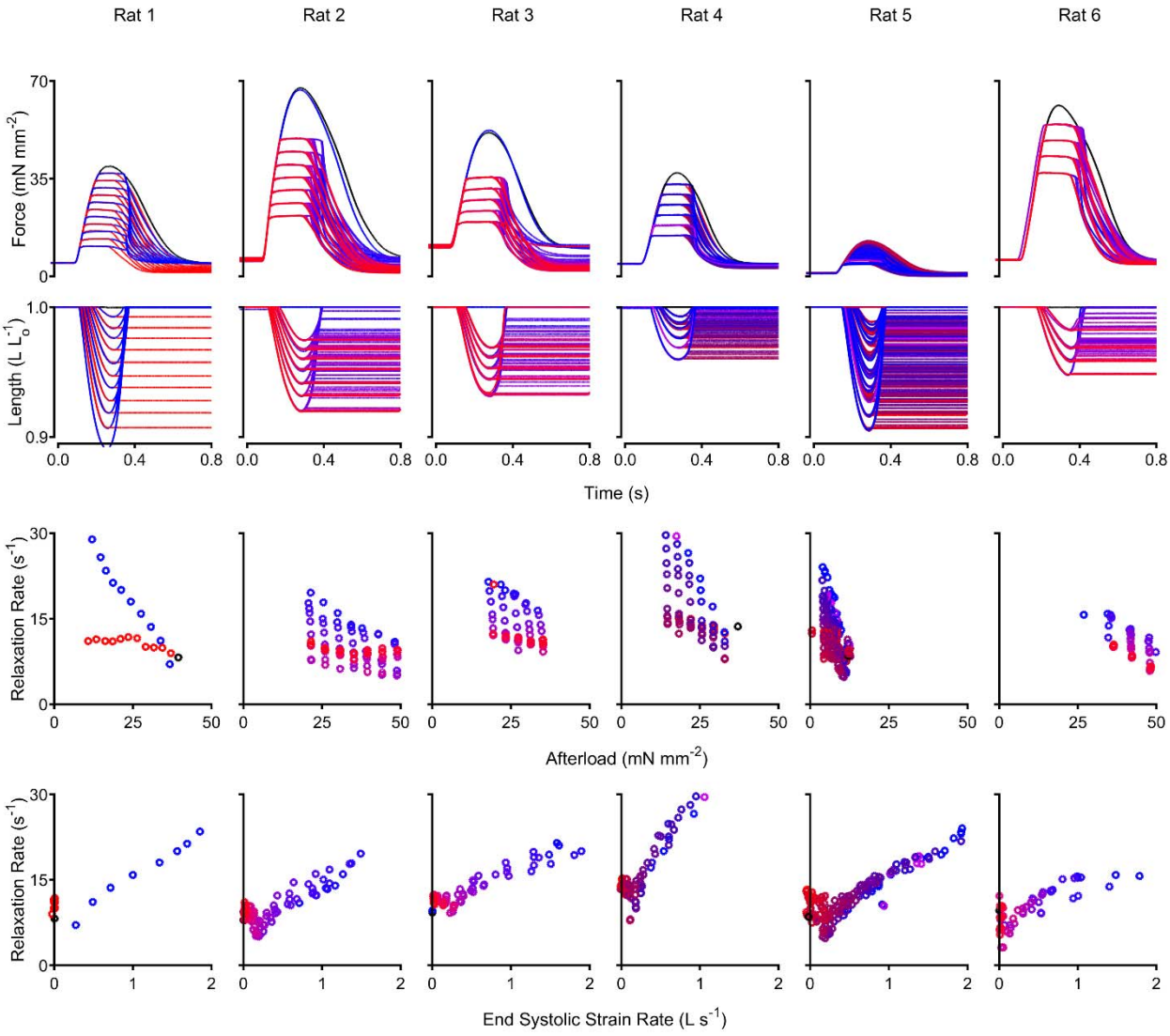
SUPPLEMENTAL MATERIALS FILE INCLUDES:

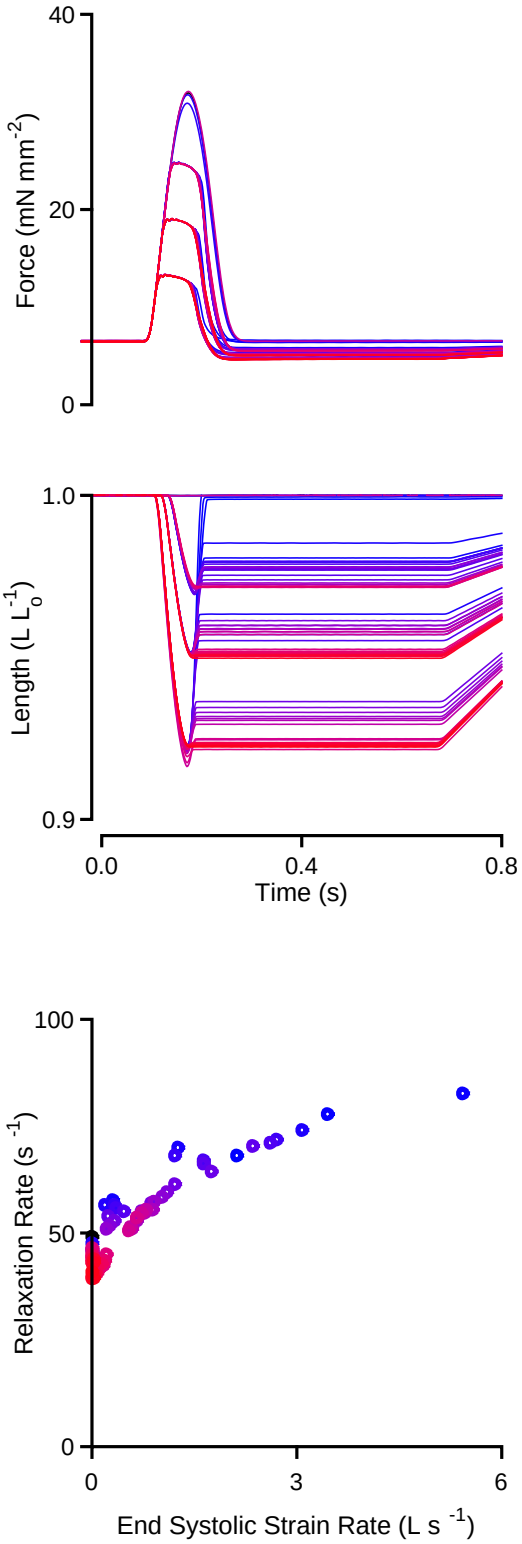
SUPPLEMENTAL FIGURES



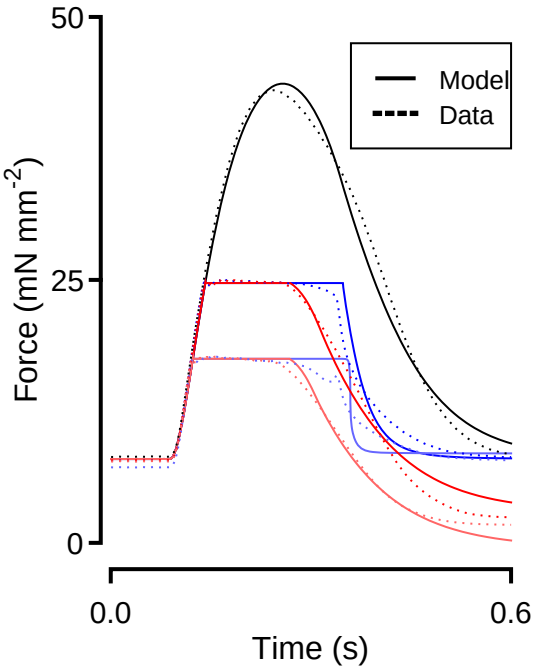
Supplemental Figure S1. Myocardial activation continues if a load-clamp is stopped prior to achieving its minimum length at a fixed afterload. Overlay of force (top) and myocardial length (bottom) versus time from 7 twitches. Green data show active force continues to develop if the load-clamp is stopped before minimum length is achieved. After the minimum length is achieved, active forces will decline.



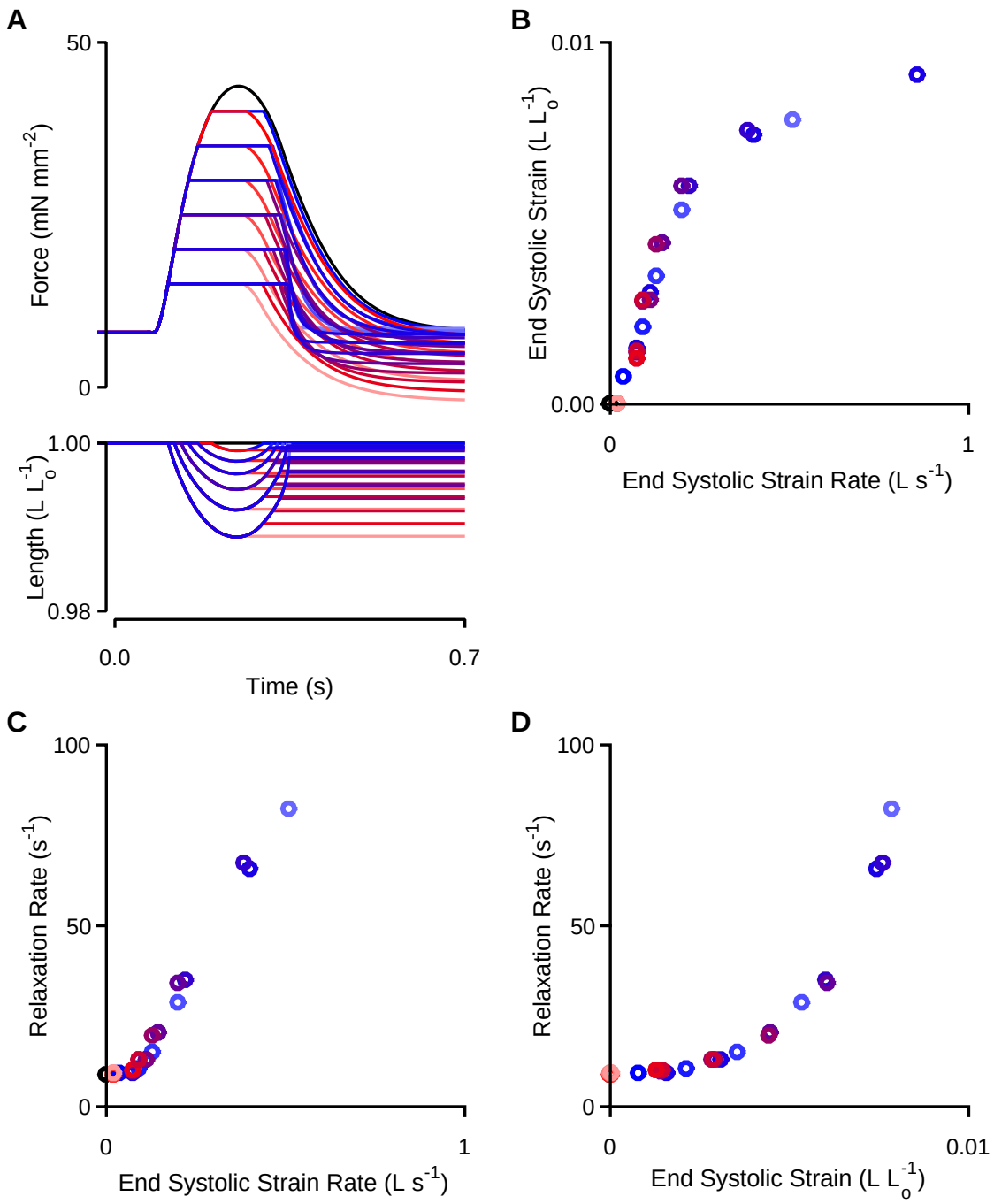
Supplemental Figure S2. Relaxation rate is dependent on end systolic strain rate in 6 additional rat trabeculae. Top: Force and length versus time traces. Bottom: Relationship between relaxation rate and end systolic strain rate. Each column shows multiple load-clamped twitches from an individual rat trabecula.



Supplemental Figure S3. Relaxation rate is dependent on end systolic strain rate at physiologic temperature. Top: Force and length versus time traces. Bottom: Relationship between relaxation rate and end systolic strain rate. These data were acquired at 37ºC, while most other data reported in this study were acquired at 25ºC.



Supplemental Fig. S4. Model fit to experimental force versus time traces. The model imitates the load-clamp and force relaxation. Specifically, relaxation is faster during twitches in which the muscle is relengthend back to its starting length after a load-clamp (blue) than during twitches in which the muscle is held isometric (black) or held at the minimum length after a load-clamp (red).



Supplemental Figure S5. A) Computational simulations imitate the force and length response of load-clamped twitches. B) Relationship between the magnitude (strain) and speed (strain rate) of relenghtening at end systole (the end of the load-clamp). C) Relationship between relaxation rate and end systolic strain rate. D) Relationship between relaxation rate and end systolic strain. The strain rate provides a better predictor of relaxation rate at low magnitudes.

DESCRIPTION OF ADDITIONAL SUPPLEMENTAL FILES

Additional files are included to recreate the data in Supplemental Fig. S4 and S5. Source data for Fig. 3 are the same as for Supplemental Fig. S4). The files may be opened in MyoSim version 2.2, a muscle simulation environment (www.myosim.org). (MyoSim currently runs only on the Windows Operating System.)

After downloading and installing Myosim, download the supplemental files and save them into an easily accessible location such as: C:\MyoSim\MyoSim_instructions.

To reproduce the fits or simulation, run the MyoSim.exe, via the shortcut in the Windows Start menu or here: C:\MyoSim\MyoSim_program\Myosim.exe. To load the downloaded files, select “File>Load complete instruction file” and select one of the instruction files (i.e. “fitting_instruction_file.txt”). Then press “Run Myosim”.

To evaluate the fit in Supplemental Fig. S4, as described here: http://www.myosim.org/tutorials/fitting-simulations-to-data. Briefly, first open the fitting instruction file as noted above. Then select the “Fit>Fit Window” menu option. A new window will open. Insert the correct file path for the downloaded “fitting_target_file.txt”. Then click the “Fit” button.

Files for Supplemental Fig. S4 and Fig. 3:

- fitting_instruction_file.txt
- fitting_target_file.txt

File for Supplemental Fig. S5:

- simulation_instruction_file.txt