Supporting Information

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SI Text

Effect of Systematic Perturbation of the 14.34-nm Axial Repeat of Myosin Heads in Resting Muscle on the Estimate of Axial Mass Distribution. The calculation of the average center of mass (z_R = −0.80 + 7.17n nm, where n is an integer) and SD (σ_R = 3.5 nm) of the axial mass distribution of myosin heads in resting muscle presented in the main text did not take into account the systematic perturbation of the three layers of myosin heads in each approximately 43-nm helical repeat. Such a perturbation is required to explain the presence of a strong M2 meridional reflection in resting muscle, which would not be produced by a perfectly helical arrangement of the heads with three layers of heads in each helical repeat. The effect is conveniently modeled by reducing the distance between two of the three layers of heads from the perfect-helix value 14.34 nm to some smaller distance, Δ. Because this type of perturbation would also reduce the intensity of the M3 reflection in resting muscle, and is not present at the plateau of an isometric tetanus, it introduces a systematic error into our calculation of the SD (σ_R) of the axial mass distribution of myosin heads in resting muscle. The magnitude of the effect was estimated by calculating the relative intensity of the M2 and M3 reflections as a function of Δ. The observed ratio in resting muscle was reproduced with an Δ of 12.5 nm, which reduces the intensity of the M3 reflection by approximately one third compared with that produced by a perfectly helical arrangement. When this effect is taken into account, the SD (σ_R) of the axial mass distribution of myosin heads in resting muscle becomes 3.2 nm.

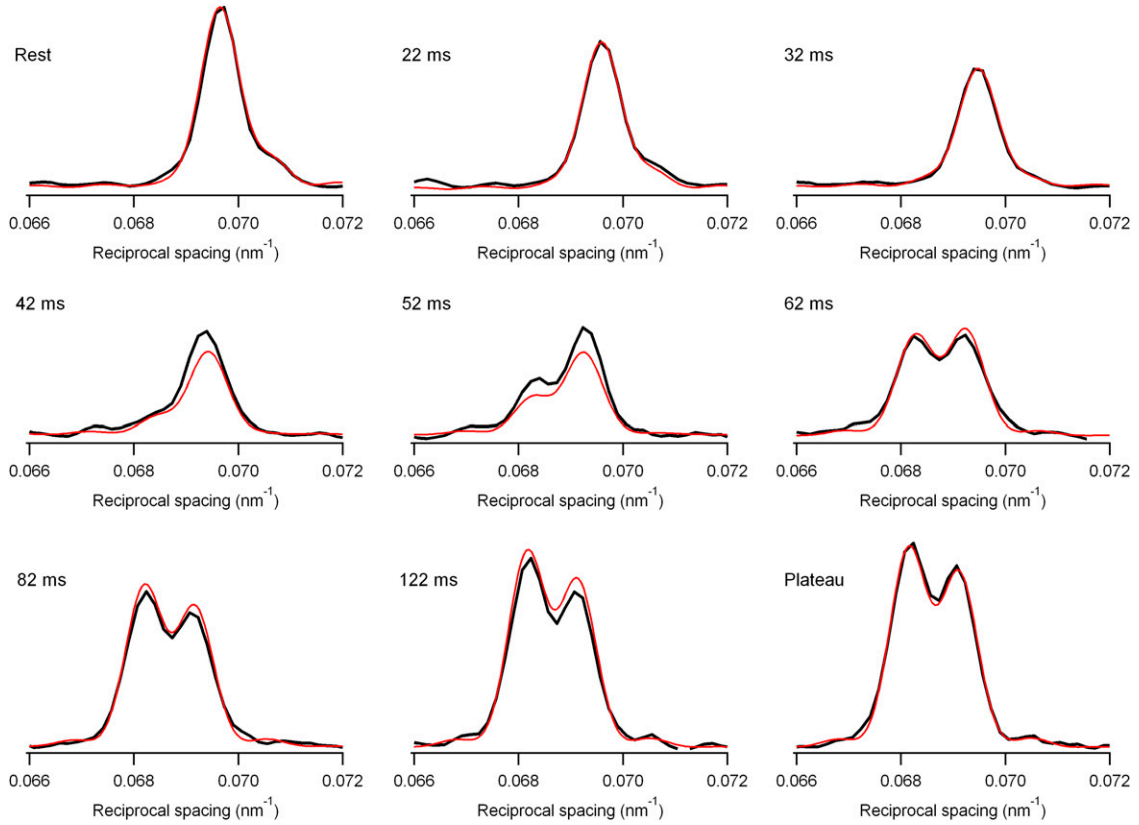

Fig. S1. Observed (black) and calculated (red) profiles of the M3 reflection at different times following the start of electrical stimulation. The profiles calculated from the model for the axial mass distribution of the myosin heads described in the main text (Fig. 3) were normalized to the experimental profile summed from five fibers by using the total intensity at the tetanus plateau.