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Model of myosin recruitment to the cell equator for cytokinesis: feedback mechanisms and dynamical regimes ALEXANDER VEKSLER, Rice University, DIMITRIOS VAVYLONIS, Lehigh University — The formation and constriction of the contractile ring during cytokinesis, the final step of cell division, depends on the recruitment of motor protein myosin to the cell's equatorial region. During animal cell cytokinesis, cortical myosin filaments (MF) disassemble at the flanking regions and concentrate in the equator [1]. This recruitment depends on myosin motor activity and the Rho proteins that regulate MF assembly and disassembly. Central spindle and astral microtubules help establish a spatial pattern of differential Rho activity [2]. We propose a reaction-diffusion model for the dynamics of MF recruitment to the equatorial region. In the model, the central spindle and mechanical stress [3] promote self-reinforcing MF assembly. Negative feedback is introduced by MF-induced recruitment of inhibitor myosin phosphatase. Our model yields various dynamical regimes and explains both the recruitment of MF to the cleavage furrow and the observed damped MF oscillations in the flanking regions [1], as well as steady MF assembly [4]. Space and time parameters of MF oscillations are calculated. We predict oscillatory relaxation of cortical MF upon removal of locally-applied external stress. [1] Zhou & Wang, Mol. Biol. Cell **19**:318 (2008); [2] Murthy & Wadsworth, J. Cell Sci. **121**:2350 (2008); [3] Ren et al., Curr. Biol. **19**:1421 (2009); [4] Vale et al., J. Cell Biol. **186**:727 (2009)

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