

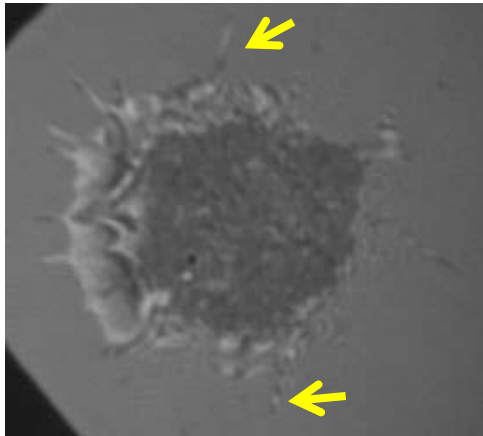
On The Mechanical Stabilization of Filopodia

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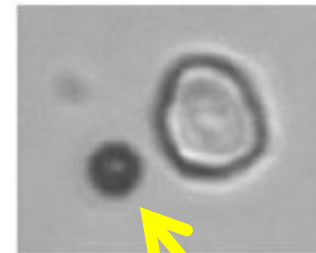
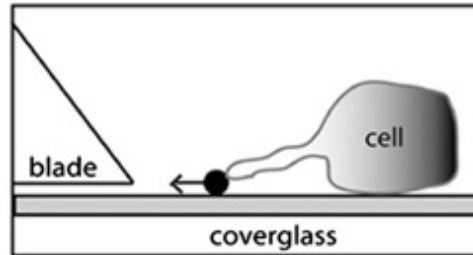
&

Erich Sackmann
Technische Universität, München

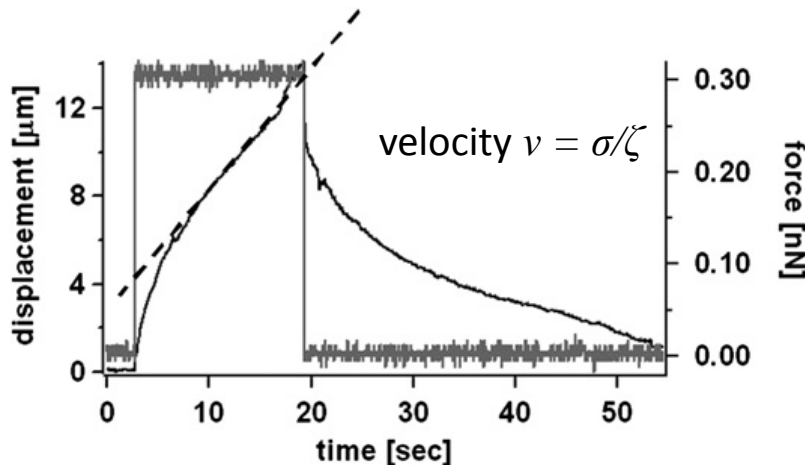
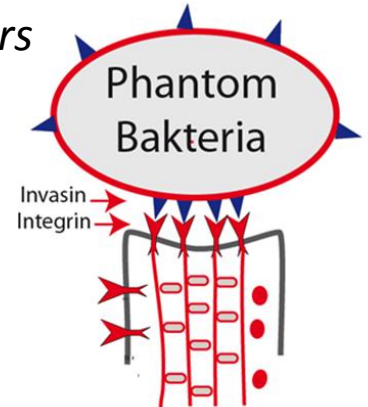
Filopodia = membrane protrusions filled with actin bundles, macrophages use them to catch pathogens



Forces applied to filopodia via magnetic tweezers



invasin-coated bead



$$u(t) = \frac{\sigma}{\mu}L(1 - \exp(-t/\tau)) + \frac{t}{\zeta}\sigma.$$

viscoelastic response

σ , tension, ζ , friction coefficient
 τ , relaxation time, μ , viscosity

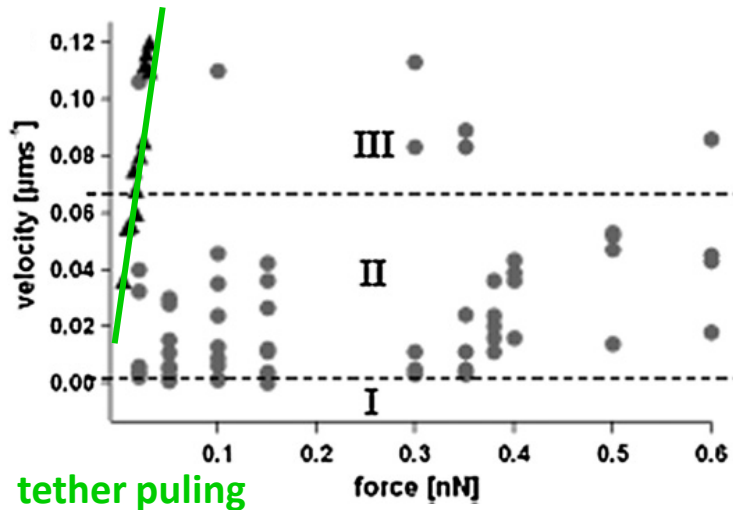


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Velocity homeostasis



Velocity is force independent!

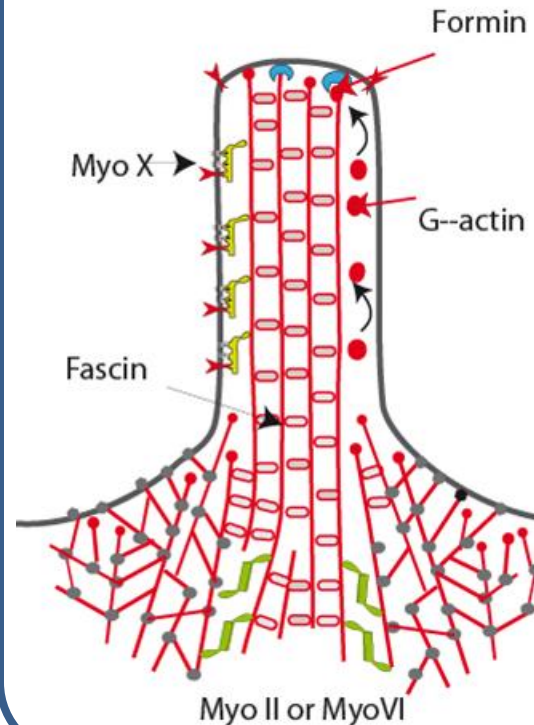


Filopodia grow to a stationary length (steady-state)

if the elongation in the steady-state length is blocked, retraction follows

Proposed Model:

Steady-state Length



Blocked Elongation (Retraction)

