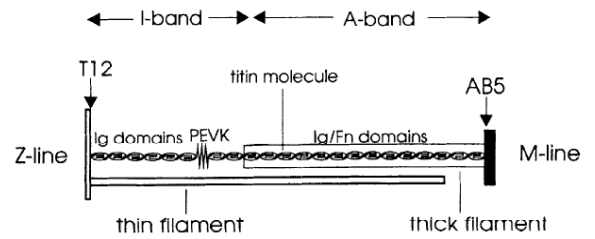


Note: see lecture 21 for the discrete conformational change theory

Elasticity and Unfolding of Single Molecules of the Giant Muscle Protein Titin

- Tskhovrebova, Trinick, Sleep and Simmons
- Nature 387, May 1997
- One of three papers in Nature and Science simultaneously showing the mechanical behavior of single titin molecules.

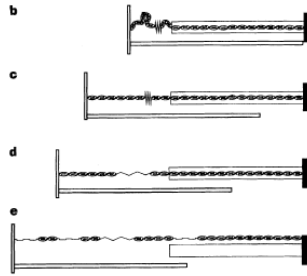
What is Titin?



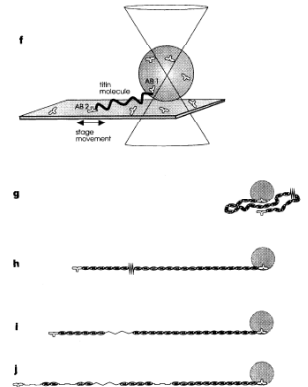
- Thick (myosin) and thin (actin) filaments slide along each other when muscle contracts
- Titin connects M-line with Z-line within muscle cells, parallel to filaments. This gives muscle passive elasticity

What was already known

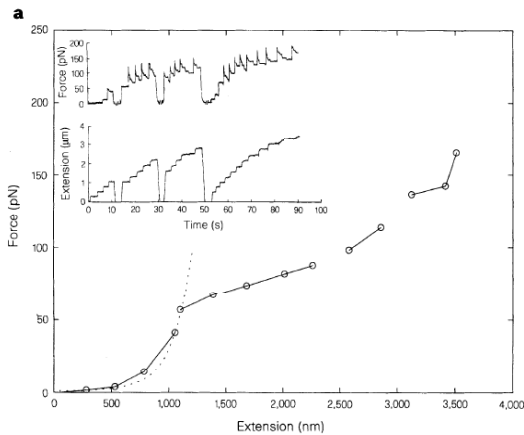
- Relaxed muscle gives NONLINEAR viscoelastic properties, including stress relaxation and hysteresis. :
- Titin is 3000KDa protein
 - 150 Ig domains
 - 130 FnIII domains
 - 1000-2000 residue PEVK region
- Antibody Staining of stretched muscles suggests this model



Method: Optical Tweezers



Stress relaxation Expt



Hysteresis

