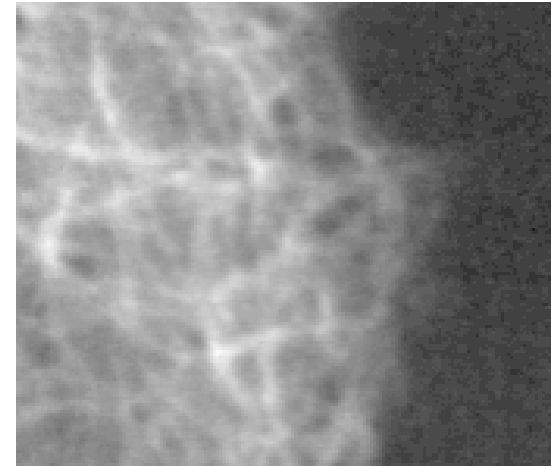


# Statistical Mechanics of a Living Cell

Result:

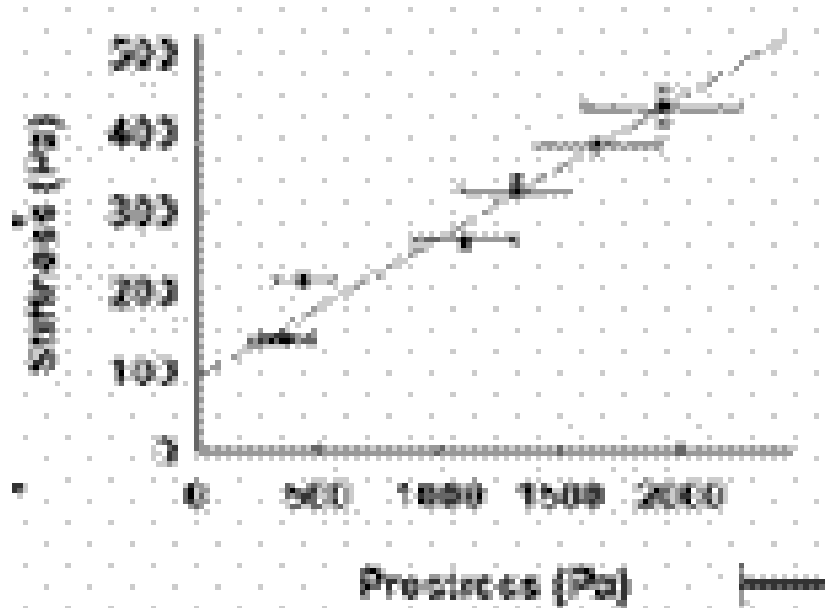
- Microtubules fluctuate in time
- Effective temperature is  $\sim 300 k_B T$



Question:

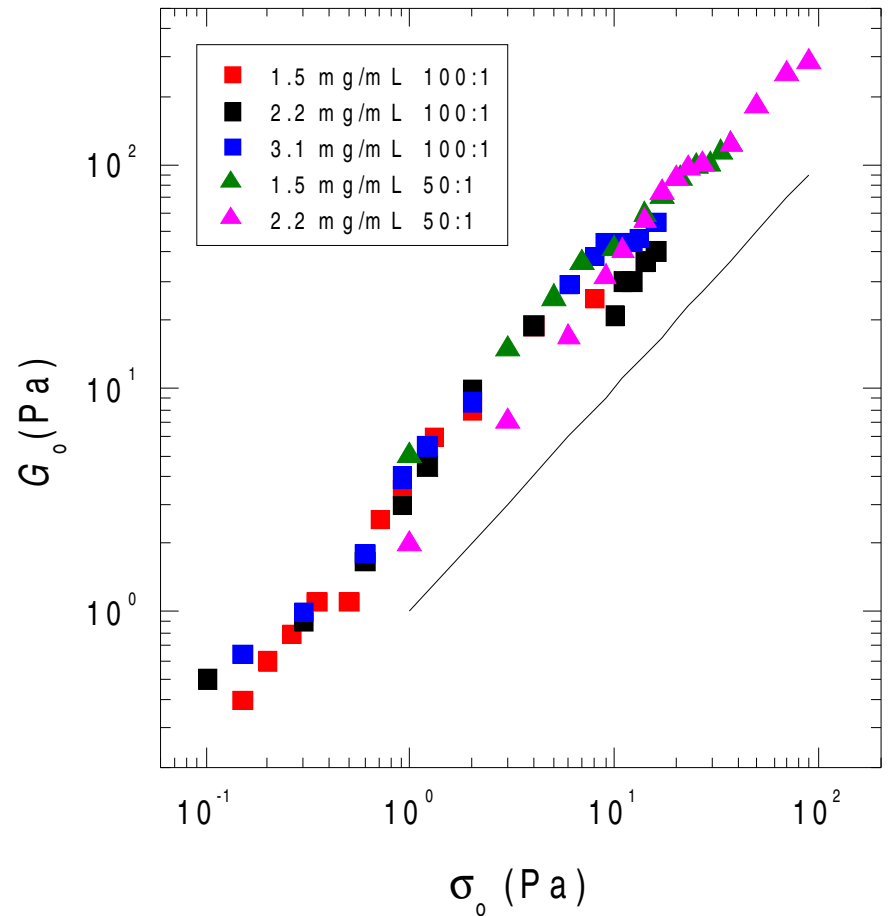
- Can statistical mechanics be applied to a complex system such as a living cell?
- Can we use non-equilibrium statistical mechanics to describe complex systems such as a living cell?
- Is this of any value to scientists other than physicists?

# G' vs. Prestress



(Wang 2002) Cell stiffness as a function of internal prestress

Elastic Modulus (at 0.1 Hz) vs. Steady Stress  
1  $\mu$ m actin: Filamin



# Mechanics of a Living Cell

## Result:

- Gels from actin, filamin, gelsolin exhibit same mechanical behavior as live cells.
- Significant increase in elastic modulus upon shear stress

## Question:

- What is minimum requirement to mimic behavior of living cell?
- Is this reductionist approach of any value to biology?