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General session notes

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*Notes from* Hwang, Wonmuk, Ju Li, and Roger Kamm. General session. Lecture series, GEM4 session at MIT, Cambridge, MA, August 17, 2006.

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KINESIN  $\Rightarrow$  MOLECULAR TRANSPORTER

1 ATP/STEP, STEP SIZE = 8.3nm

HAND-OVER-HAND?

HOW DOES IT GENERATE A STEP FROM ATP HYDROLYSIS?

KINESIN DILEMMA

- SMALL CONFORMATIONAL CHANGE ( $\sim \text{\AA}$ )  $\rightarrow$  LARGE MOTION ( $\sim \text{nm}$ )
- NECK LINKER - MOTOR HEAD BINDING

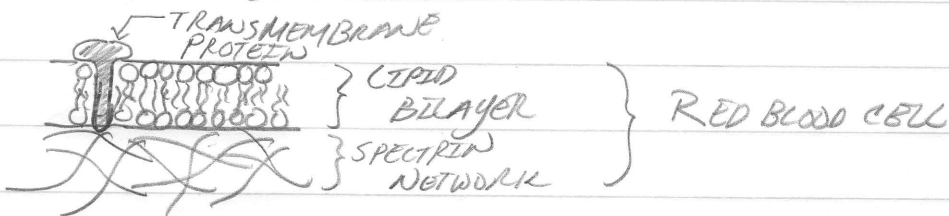
ATP BINDING INDUCES CONFORMATIONAL CHANGE

THAT PROPAGATES THROUGH MOLECULE LEADING TO STEP.

IT IS NOT ATP HYDROLYSIS WHAT PROVIDES THE ENERGY.

CYTOSKELETON DYNAMICS SIMULATION OF RED BLOOD CELL

- DR. JULI



THE SPECTRIN NETWORK STABILIZES THE SHAPE OF RBC INTO THE BI-CONCAVE GEOMETRY.

UNDER CERTAIN CONDITIONS (ENERGY), A SIMULATED SPECTRIN NETWORK WILL FORM A STABLE BI-CONCAVE GEOMETRY

## MECHANICS OF NEUTROPHIL RESPONSE TO DEFORMATION:

### AN EXAMPLE OF MULTI-SCALE MODELING

- DR. ROGER KAMM (MIT)

ORGANISM → ORGANS → CELL → MOLECULE.

PULMONARY CIRCULATION → MANY DISEASES RELATED TO IT  
MODEL BUILT ON "REAL" MORPHOLOGICAL AND PHYSIOLOGICAL  
DATA.

→ MODELED NEUTROPHIL WITH MAXWELL MODEL ⇒ SIMPLISTIC  
COMPARED TO RECENT DATA, BUT CAN CAPTURE THE  
DESIRED BEHAVIOR

ACTUAL EXPERIMENTS LOOKING AT NEUTROPHILS ENTERING  
A NARROW CHANNEL ⇒ BEHAVIOR INDEPENDENT OF TEMPERATURE  
NEUTROPHILS LOSE SOME OF ITS ELASTICITY RIGHT AFTER  
ENTERING THE CHANNEL BUT RECOVERS AFTER ~30sec  
THIS RESULT CORRELATED WITH FACTIN CONTENT

SCALING UP → MOLECULES → NETWORK MODELING → CELL LEVEL