

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

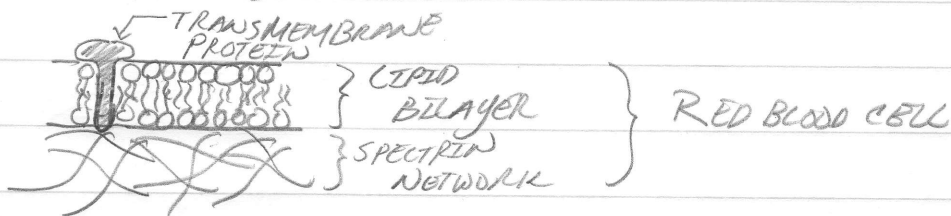
ATP BINDING INDUCES CONFORMATIONAL CHANGE

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