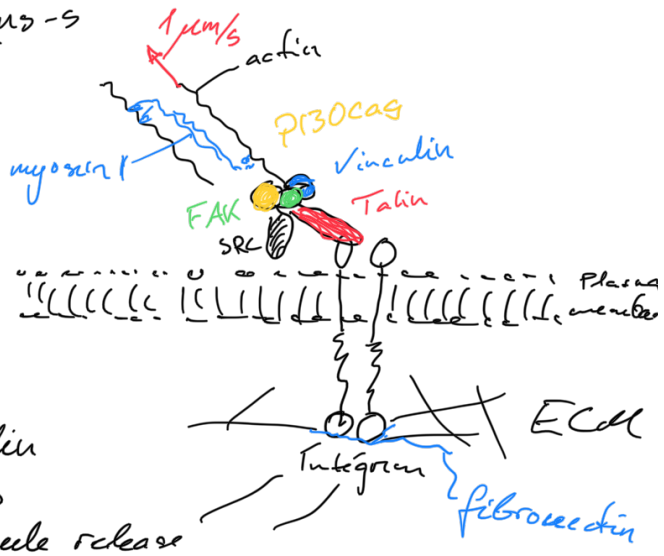
Mechanotransduction Dufort 2011

Mechanotransduction - functional link between sensing of mechanical cues
⇓
Biochemical response

Focal adhesions $\tau = ms - s$

Protein switches conformation change when forced
- Integrin
- P130cas
- Talin



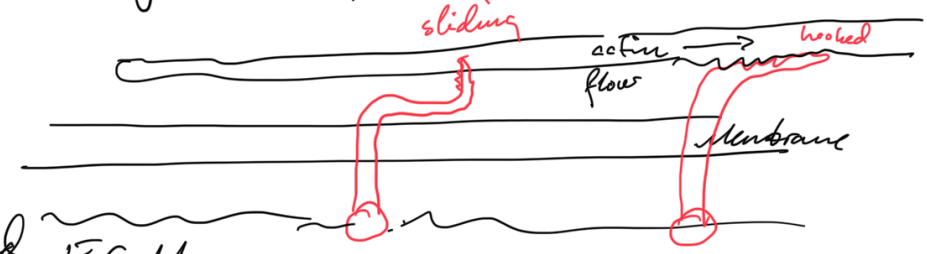
Talin : unfolds ⇒ reveal binding sites
⇒ binds vinculin
⇒ more integrins
⇒ signal molecule release

grow when force increases ⇐

Other mechanisms
Forces → changed intermolecular distances → altered cellular function

Ref to Bershadsky, Kozlov, Geiger 2006 (400 citing articles)

Two state protein unit



stress-induced flip

ECM

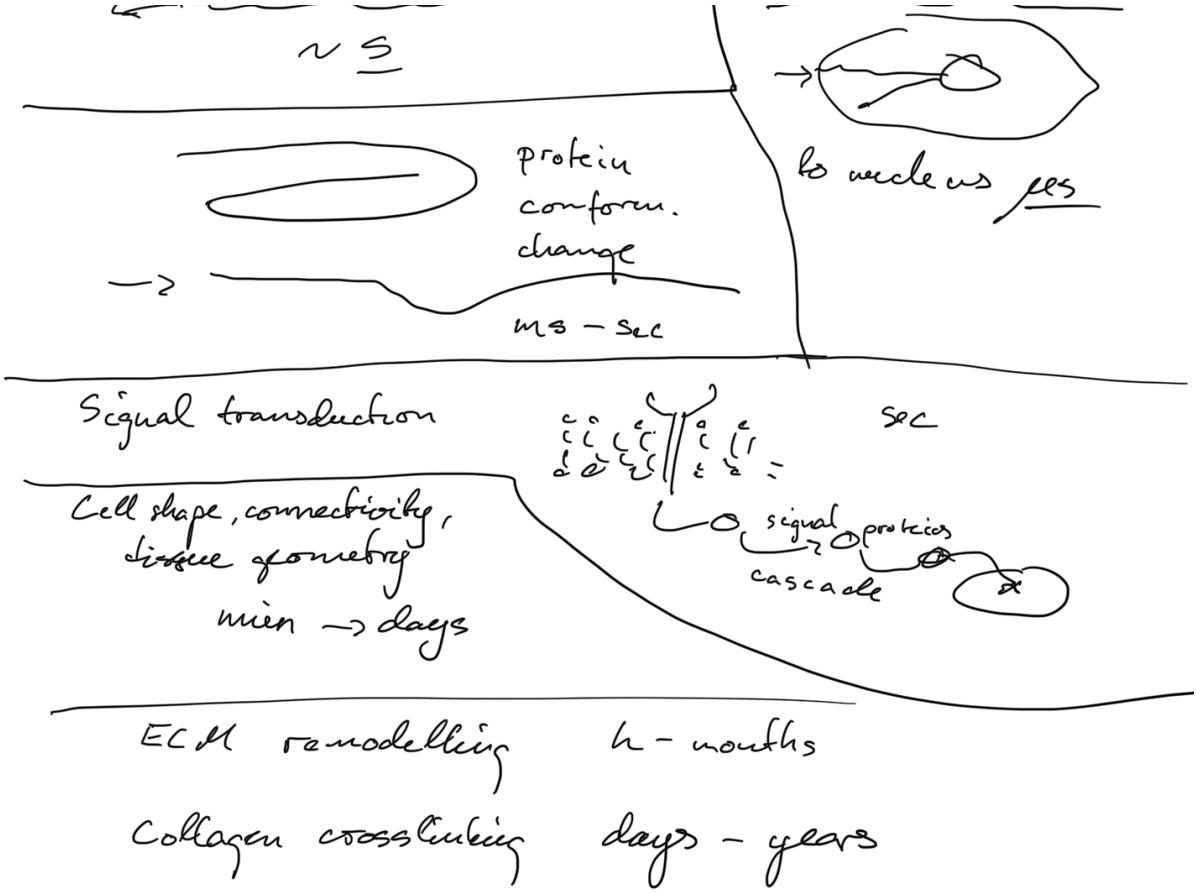
$$\Rightarrow \quad p = \frac{1}{1 + e^{-(F - f\Delta x)/kT}}$$

There is still a Δx !

Time scales

μm/s
actin flow

wave propagation



ECM remodelling h – months

Collagen crosslinking days – years