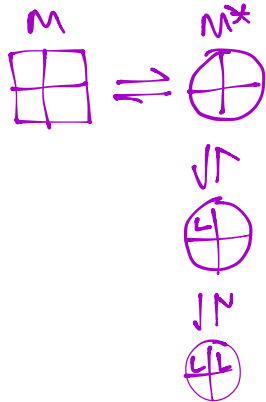
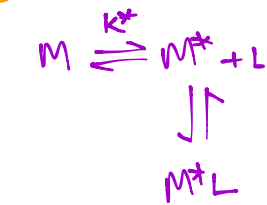


LECTURE 15: CASCADES

REVIEW:



WHAT HAPPENS WHEN WE ADD [L]?

→ DEPENDS ON K^* ...

→ DEPENDS ON K_D ...



→ SHARPENS TRANSITION

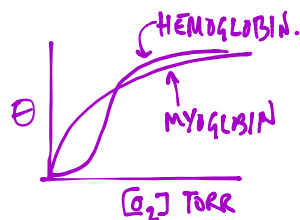
→ FIRST BINDING PAYS K^* , REMAINING BINDING EASIER

CLEAN UP

1. M_b AND N_D .
2. CURVE SHAPE
3. K_D BOUND

↑

MIXTURE OF 1,2,3,4... HEMOGLOBIN EITHER IN \square OR \oplus



- TWO REPS FOR SAME DATA.

- LAB SHOWS THIS.

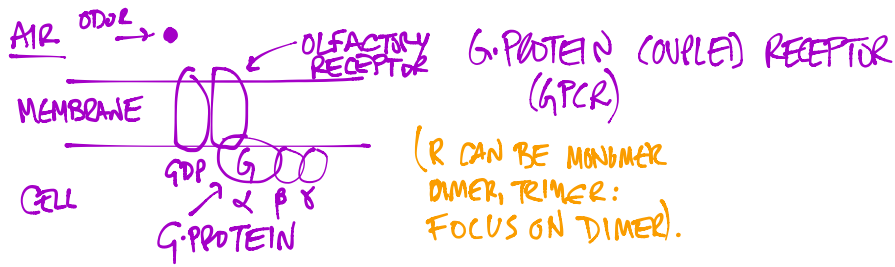
HOW CAN WE PUT TOGETHER?

HOW DO OUR BODIES DETECT ENVIRONMENT?

SHOW OLFACTORY EPITHELIUM

X \rightarrow \rightarrow NERVE IMPULSE

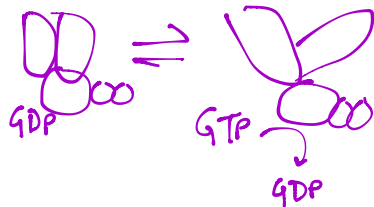
CASCADES



(R CAN BE MONOMER
DIMER, TRIMER:
FOCUS ON DIMER).

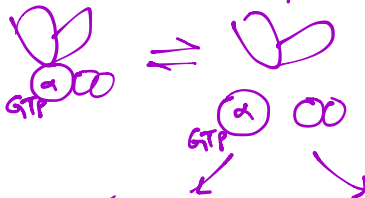


(MOVE LEFT TO RIGHT ACROSS BOARD)



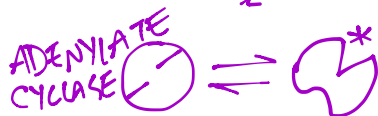
- CONFORMATIONAL CHANGE MAKES G α PREFER GTP TO GDP.

WHAT IS THIS?
ALLOSTERY.

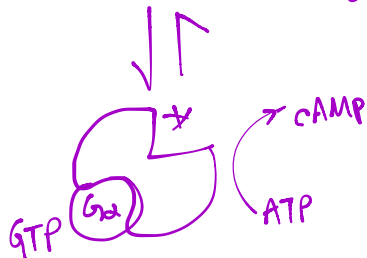


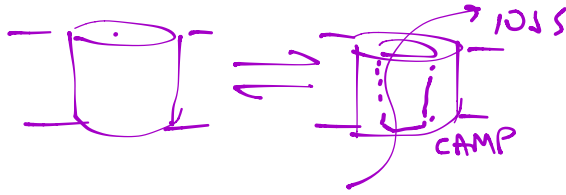
- GTP BINDING ALTERS AFFINITY FOR OR...
"ANTAGONISTIC" ALLOSTERY

JUST FOCUS ON α ...

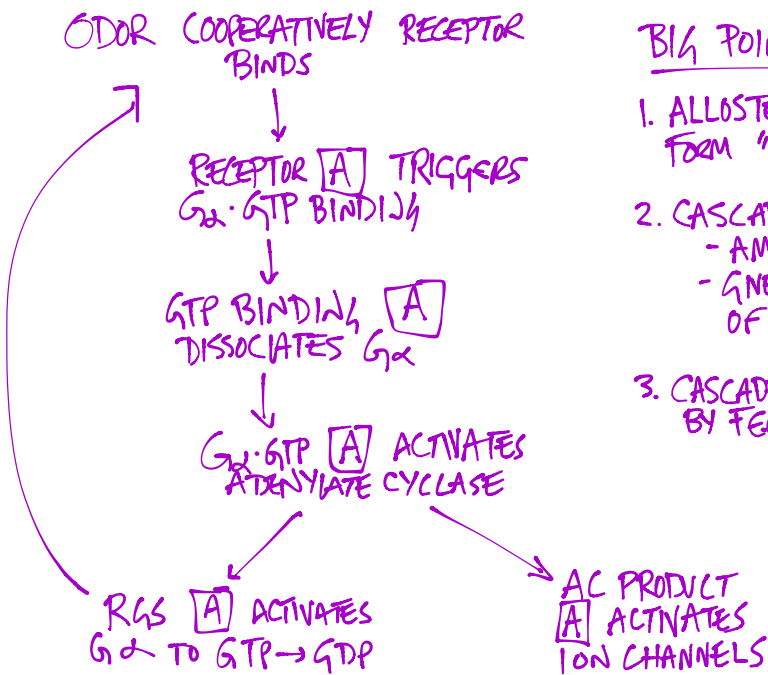
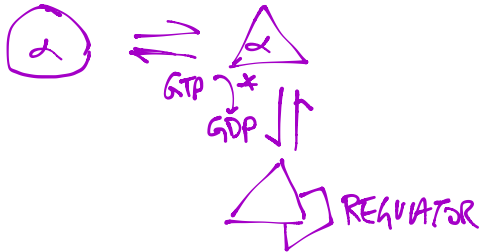


- ALLOSTERIC ACTIVATION OF ENZYME





ALLOSTERIC
ACTIVATION
ION CHANNELS \rightsquigarrow NERVES



BIG POINTS:

1. ALLOSTERIC PROTEINS OFTEN FORM "CASCADES"
2. CASCADES:
 - AMPLIFY SIGNAL
 - GIVE MULTIPLE POINTS OF REGULATION
3. CASCADES TURNED OFF BY FEEDBACK

- 1) ALLOSTERY OFTEN ARRANGED
IN CASCADES
- 2) MULTIPLE POINTS OF REGULATION
- 3) AMPLIFIES
- 4) ROBUST
- 4) MULTI-ALLOSTERY VERY COMMON
- 5) MODULAR!

$$M^X = K^* M$$

$$M^* X = K_D \cdot X \cdot K^* \cdot M$$

$$M^* X_2 = K_D \cdot (K_D \cdot X \cdot K^* \cdot M) \cdot X$$

$$\overline{X} = \frac{M^* X + 2 M^* X_2}{M + M^* + M^* X + 2 M^* X_2}$$

$$\overline{X} = \frac{K_D \cdot X \cdot K^* M + 2 (K_D^2 M X^2) K^*}{M + K^* M + K_D X K^* M + 2 K_D^2 M X^2 K^*}$$

$$\frac{K^* K_D X (1 + 2 K_D X)}{1 + K^* (1 + K_D X (1 + K_D X))}$$