11/14/12

Gene Regulation

1. Transcription
2. ~~post-translational~~ post-transcription
3. Translational
4. post-translational (phosphorylation, ubiquitin, acetylation, methylation, etc.)

Transcription Factors

Functional Domains

1. DNA-binding domain
2. Transactivation domain
3. Ligand-binding domain

Interactions (of TF's)

1. DNA-Protein Interactions

2. Protein-Protein Interactions

Prokaryotic Gene Regulation

~~genes always~~ genes are always "On"

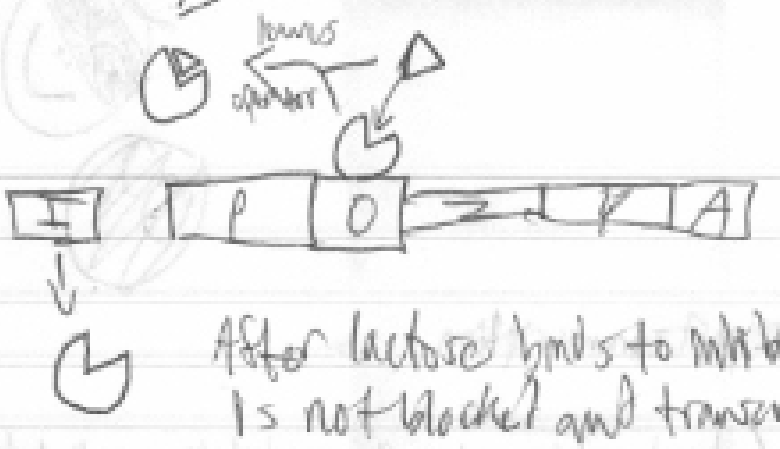
Operon - set of functional genes controlled by a single regulatory region

ex. Lac Operon

Z = B-Galactosidase
Y = Permease
A = Transacetylase

P = Promoter
O = Operator
I = inhibitor protein gene

Δ = lactose (allosteric effector)



After lactose binds to inhibitory protein, the operator is not blocked and transcription can begin.

cis-acting = control things near them (DNA sequence)

trans-acting - typically proteins, that can move freely around the cell.

Partial diploids

	Z (no lac / lac)	Y (no lac / lac)	
$I^+P^+O^+Z^+Y^+$			
$I^+P^+O^+Z^+Y^+ / I^+P^+O^+Z^-Y^+$	no / yes	no / yes	shows cis activity of operator
$I^+P^+O^cZ^+Y^+$	yes / yes	yes / yes	
$I^+P^+O^+Z^-Y^+ / I^+P^+O^+Z^+Y^-$	yes / yes	no / yes	

O^c - Inducer protein cannot bind to O

	Z (no L / L)	Y (no L / L)	
$I^+P^+O^+Z^+Y^+$	yes / yes	yes / yes	shows trans activity of I-protein
$I^+P^+O^+Z^-Y^+ / I^-P^+O^+Z^+Y^+$	no / yes	no / yes	
$I^-P^+O^+Z^+Y^- / I^+P^+O^+Z^+Y^-$	no / yes	no / yes	

	Z		Y	
	no	L	no	L
$I^-P^+O^+Z^+Y^+$	no	no	no	no
$I^-P^+O^+Z^+Y^+/I^+P^+O^+Z^+Y^+$	no	no	no	no

CAP = Catabolite activator protein
- binds to lac operon promoter when glucose is not present
- when glucose is not present ~~less~~ ATP is made, ATP -> ADP -> AMP -> cAMP
- cAMP binds to CAP which then binds to promoter to boost RNApol activity.

Trp Operon