

Old Summary

Tuesday, December 9, 2014
11:10 PM

	Gly		Gly	flex
	Pr		Pro	5
Aliphatic	Al, Le, V, I		Allevi	Ali
Aromatic	Tr, Ph, Ty		Trphty	6
Acidic	Glu, Asp		Gluasp	COO ⁻
Basic	H, Arg, Ly		Hargly	NH ₃ ⁺
Polar	Asn, Gln, Th, S		Asnglnths	H
Sulfur	C, M		CM	S

α-Helix

- counter-clockwise (right-handed)
- 3.6 residues/turn
- H-Bond: between n ... n+4, vertical, parallel to helical axis, all except @ terminal
- side chains point toward N-terminus
- Gly/Pro not used

β-Sheet

- extended, trans peptide chains
- planar, pleated
- amphipathic (alternating hydrophilic/hydrophobic)
- H-Bond: between strands, horizontal, perpendicular (antiparallel) to chain direction
- (right-handed)

SECONDARY - backbone of peptide chain stabilized by H-bonds between amine & carbonyl groups (α-Helix/β-Sheet)

TERTIARY - 3D conformation with loops; inside = nonpolar / outside = polar

QUATERNARY - multi-subunit

M-M Equation

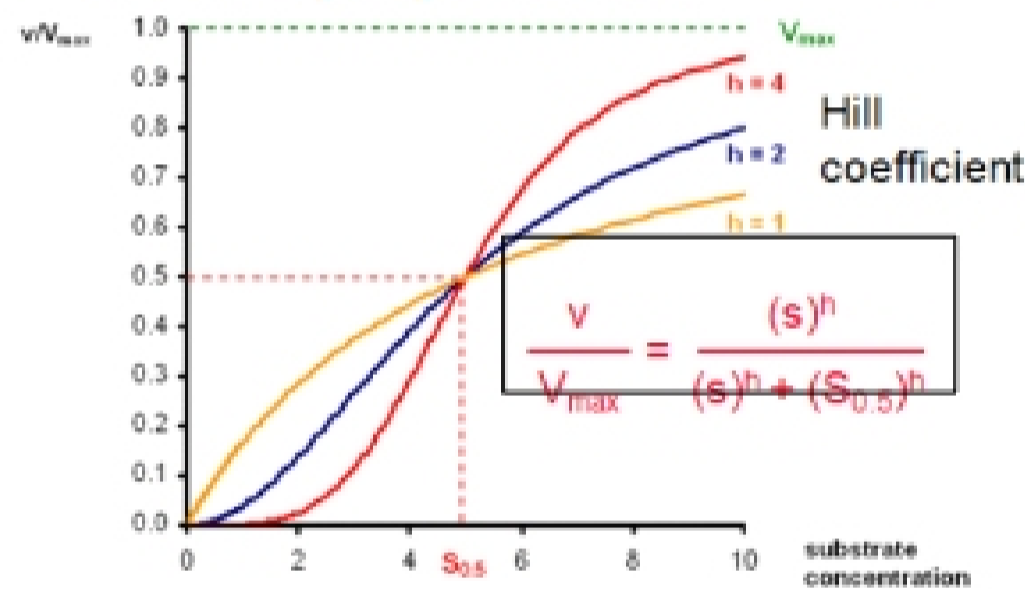
$$V/V_{max} = S/(S+K_m)$$

↑K_m, ↓Affinity, ↓V_{max}, ↑V/V_{max}
↑h, ↑S-curve

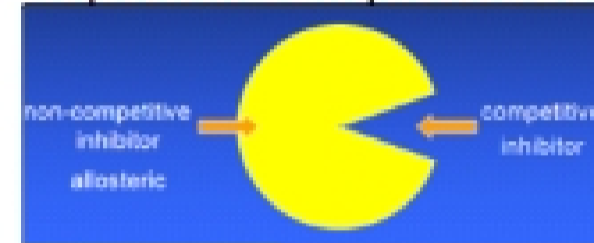
K_m = [substrate] at which the rxn rate = V_{max}/2

Cooperativity

COOPERATIVITY - interaction of several enzyme subunits; binding of Substrate 1 & Enzyme 1, increases affinity of Enzyme 2 for Substrate 2

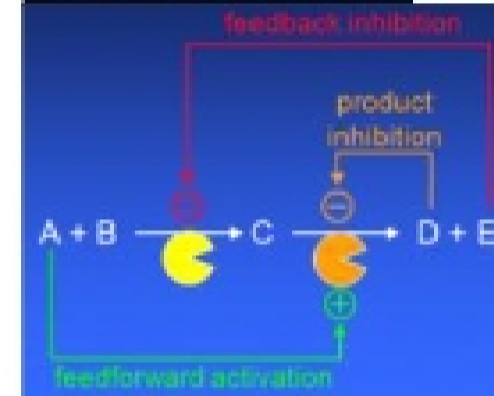


Competitive vs. NonCompetitive Inhibitors



SUICIDE INHIBITOR - irreversible (permanent)

Feed-Back vs. Feed-Forward



IRREVERSIBLE - large ΔG; regulated
REVERSIBLE - small ΔG; not regulated

Flux

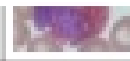

Steady State	Non-Steady State
<p>Concentration of metabolites does not change.</p> <p>This metabolite flux is identical</p>	<p>Concentration of metabolites does change over time.</p> <p>This metabolite flux is different</p>

MEGAKARYOCYTE (Me) - bone marrow cell from which platelets branch off

HEMATOXYLIN (nuclei of WBC)

EOSIN (binds to hemoglobin on RBC)




			nucleus
RBCs (NO nucleus)			NONE
WBCs (nucleus)	LYMPHOcyte (T/B-Cells)		big
	MONOcyte (DC + Macrophage)		dented
	GANULOcyte	NEUTROphil (degrading enzymes, phago) (pus)	3-4 lobes
		EOSINophil	2 lobes

	(MBP vesicle)		
	BASOPHIL (histamine vesicle)		2 lobes

HEMATOPOIETIC STEM CELLS (HSC) - 1/10,000 cells in RED bone marrow; divide SLOWLY

- **LYMPHOID:**
 - Lymphocytes (B-Cells/T-Cells)
- **MYELOID:**
 - Megakaryocyte --> Platelet
 - **THROMBOPOETIN (Tpo)** - stimulates platelet synth
 - Erythroid --> RBC
 - **ERYTHROPOETIN (Epo)** - stimulates RBC synth
 - Granulocytes --> Neutrophils/Eosinophils/Basophils
 - **G-CSF (FIGRASTIM)** - stimulates Neutrophil production (infection) & HSCs release into blood
 - **BAND CELL** - immature neutrophils
 - Monocytes --> Macrophages/DCs

HSC > Me & Erythroid Progenitor > Proerythroblasts (5-7 days) > Polychromatophilic Erythroblasts > Reticulocyte (1 day) > RBC (120 days)

HYPOCHROMIC	↓ MCHC		Microcytic (↓ Hb) Macrocytic (↑ volume)
NORMOCHROMIC			
HYPERCHROMIC	↑ MCHC		

MICROCYTIC	↓ MCV
NORMOCYTIC	
MACROCYTIC	↑ MCV

MCH - Hb/cell
MCHC - [Hb]/cell
MCV - RBC volume

Crit = Hb x 3

RDW = SD/MCV (↑ RDW, ↑ range of sizes, anemia)

H-H Equation: $pH = pK + \log\left(\frac{HCO_3^-}{CO_2}\right)$

*Heme synthesis is ON DEMAND

HEMOPEXIN - removes free Heme in blood

Gly + Succinyl-CoA ↔ ALA ↔ **PBG** → ~~X~~ → Protoporphyrin IX → Heme → BR (Spleen)

ACUTE INTERMITTENT POLYPHRIA - ↑ PBG, ALA (neurotoxic)

Tx: **HEMIN** - provides negative feedback to ↓ PBG, ALA (normally provided by Heme)

Drugs to Avoid: Barbiturates, BC, EtOH

Main Source of BR: Heme

Main Source of Conjugated-BR: BR:Albumin, BR:Digluconide

BR Lab Results

TOTAL BR = Conjugated + Unconjugated

DIRECT BR = Conjugated + (Unconjugated) Total = Direct

% of Total	Diagnosis
<15	- excess synth - cannot conjugate - RBCs die quickly
>15	- cannot dispose (CHOLESTASIS - damaged bile duct)

	Neonatal Jaundice (<15)	Gilbert Syndrome (<15)
	developmental	genetic
Causes	↓ Glucuronosyl Transferase	↓ UDP-Glucuronosyl Transferase
Drugs to Avoid	- sulfonamides - steroids	- irinotecan