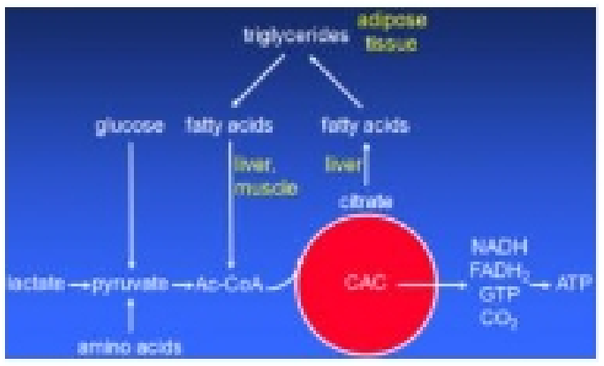
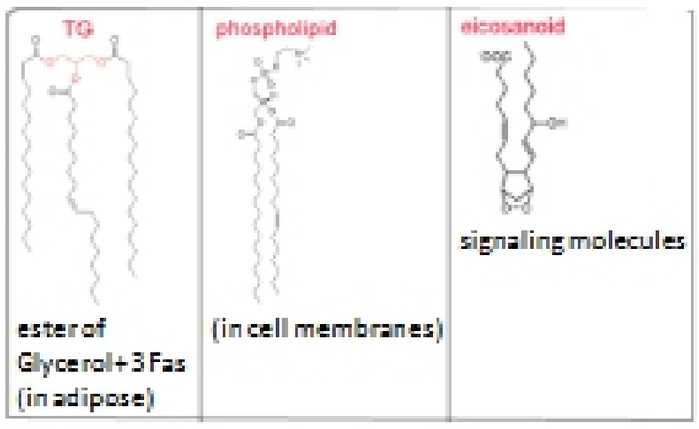
FA Synthesis

Friday, October 31, 2014
9:39 AM

Outline:
- FA overview
- Glucose --> Malonyl-CoA
- FA synth
- Elongation
- Desaturation
- Essential FAs
- Eicosanoid synth
- Trans FAs

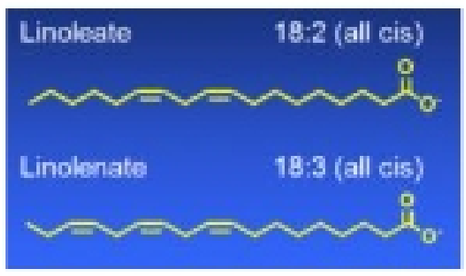
Learning Objectives:
- common chemical notations of Fas (C18:2, Δ9, ω-3, n-6)
- structures & chemical properties of cis- vs. trans- unsaturated FAs, mono- vs. poly- unsaturated FAs, & saturated FAs
- essential FAs, 2 classes of essential FAs, dietary sources of each class, & desirable intake
- linoleate (linoleic acid) & linolenate (linolenic acid)
- pathway of FA synth (reactants, products, cellular location, tissue distribution)
- regulation of Malonyl-CoA carboxylase & FA Synthase activity
- elongation & desaturation of FAs (reactants, products, cellular location, tissue distribution)
- overall purpose of Prostaglandin synth (reactants, products, cellular location, tissue distribution)
- regulation & pharma modification of Cyclooxygenase (COX) activity in Prostaglandin synth
- classify dietary supplements EPA (eicosapentaenoic acid) & DHA (docosahexaenoic acid) & explain physiologic purpose of adding one of these supplements to diet





ester of Glycerol + 3 Fas (in adipose) | (in cell membranes)

Weight for Same Amount of Energy:
TG : Glycogen
1 : 6



Common FAs:
- Palmitate (16:0)
- Stearate (18:0)
- Oleate (18:1)

Essential FAs:
- Linoleate (18:2) --> Arachidonic Acid (20:4)
- Linolenate (18:3) --> EPA, DHA

**Arachidonic Acid is essential only if no Linoleate*

Supplements:
- EPA (20:5)
- DHA (22:6)

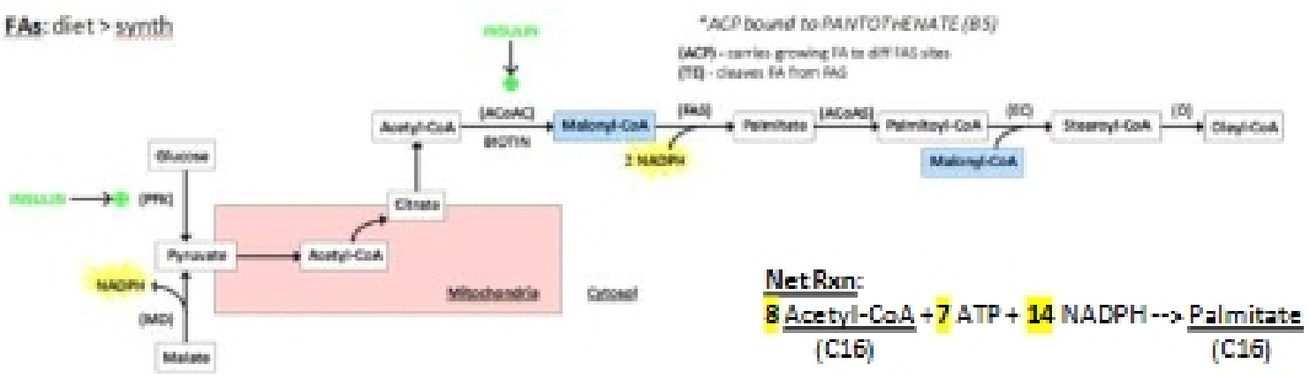
**more effective than essential FAs*

Membrane Anchors:
- Myristoate (14:0)
- Palmitate (16:0)

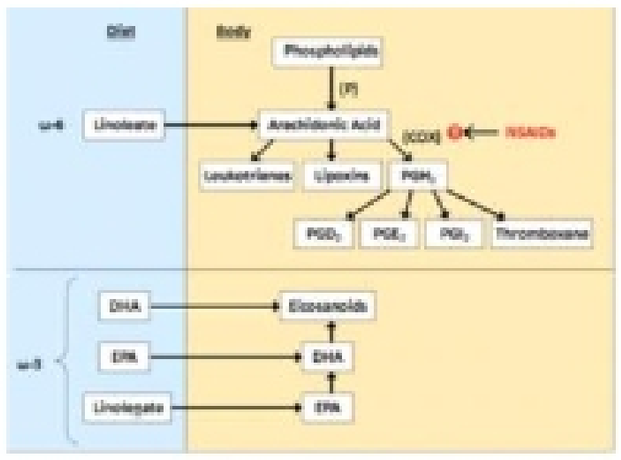
**Free FAs = toxic!!*

Blood	albumin
Cells	FA binding proteins

FA Synthesis (Only after Big Meal w/Excess Glucose):
↑Glucose, ↑I, ↑F26BP, ↑PFK, ↑Glycolysis, ↑CAC, ↑Citrate, ↑Acetyl-CoA, ↑Malonyl-CoA, ↑Palmitate (FAs)



Net Rxn:
8 Acetyl-CoA + 7 ATP + 14 NADPH --> Palmitate
(C16) (C16)



Sources of NADPH for FAS:

- PPP	G6P --> 6PG--> R5P
- MD	Malate --> Pyruvate

Thioesterase (TE): (tissue-specific)

Women	Liver + Breast	C = 8-12
Men	Liver	C = 16