	BB 422/622
OUTLINE: Introduction and review Transport	ANABOLISM I: Carbohydrates
Glycogenolysis Glycolysis Other sugars Pasteur: Anaerobic vs Aerobic Farmoartations Earmoartations Example Example Exa	Carbon Assimilation – Calvin Cycle Stage One – Rubisco Carboxylase
Pyruvate Krebs' Cycle Oxidative Phosphorylation	Oxygenase Glycolate cycle Stage Two - making sugar
Fat Catabolism Fatty acid Catabolism	Overview and regulation Calvin cycle connections to biosynthesis
Mobilization from tissues (mostly adipose) Activation of fatty acids Transport; carnitine Oxidation: β-oxidation, 4 steps:	Kornberg cycle - gly <u>ox</u> ylate Carbohydrate Biosynthesis in Animals
Protein Catabolism Amino-Acid Degradation Dealing with the nitrogen; Urea Cycle Dealing with the catopon; Seven Families Nucleic Acid & Nucleotide Degradation	precursors Cori cycle Gluconeogenesis
PHOTOSYNTHESIS: Overview of Photosynthesis	irreversible steps – four energetics 2-steps to PEP
Key experiments: Light Reactions energy in a photon	mitochondria Pyr carboxylase-biotin PEPCK FBPase
pigments HOW Light absorbing complexes-"red-drop experiment Reaction center Photosystems (PS)	Glycogen Synthesis UDP-Glc Glycogen synthase
PSII - oxygen from water splittin PSI - NADPH Proton Motive Force - ATP	Pentose-Phosphate Pathway Regulation of Carbohydrate Metabolism
Overview ot light reactions	Anaplerotic reactions







Pentose Phosphate Pathway

Providing reduced electrons and ribose



































Clinical Correlations

Newborn Nutrition

- · Newborns are doing a lot of biosynthesis
- Need for carbons sources for both energy and raw materials
- In addition, they have to have all the vitamins that these biosynthetic enzymes require for their cofactors: biotin, thiamine, B₆, folate, B₁₂ AND Fe.
- In particular, they need vitamins E and K: The GI tract is not fully developed and is sterile.
- The microbiome, which normally provides the needed vitamin K, takes several days to become established.
- About 1:400 newborns experience hemorrhagic disease; life-threatening internal bleeding



Clinical Correlations

Hyperglycemia

- · Called hyperglycemic-hyperosmolar coma
- · Mostly affect those with diabetes.
- The liver doesn't know that there is plenty of glucose as insulin isn't released or doesn't have it's necessary effects
- · Gluconeogenesis continues unabated; [Glc] can get up to 1000 mg/dL.
- Kidneys respond by getting rid of the glucose, but it takes water with it, so concentrations of salt in the blood increases (hyperosmolar).
- This condition, often acute, is more life threatening than ketosis for diabetics.
- · Glycation of enzymes
- Test of long-term blood glucose: Hb-A1c
- Increased glycation of proteins leads to many medical complications:
 - Retinopathy, nephropathy, cataracts, neuropathy, heart disease

