

MICROBIOLOGY

METABOLISM: AN OVERVIEW

I. METABOLIC PATHWAYS

A. CATABOLISM

1. GENERAL CONSIDERATIONS
 - a. BREAKDOWN OF ORGANIC COMPOUNDS
 - b. PRODUCTION OF ENERGY--ATP
 - c. PRODUCTION OF "REDUCING POWER"-NADH & NADPH
 - d. PRODUCTION OF METABOLITES (EG. AMINO ACIDS)
2. GLYCOLYSIS
 - a. BREAKDOWN OF GLUCOSE TO 2 PYRUVATES
 - b. TWO ATPs PER GLUCOSE
TWO EARLY PHOSPHORYLATIONS USING ATP
TWO PAIR OF LATE ATP PRODUCING REACTIONS
 - c. HEXOSES ----> TRIOSES
OTHER HEXOSES "FEED IN" (EG. FRUCTOSE & GALACTOSE)
TRIOSES MAY BE USED FOR ANABOLIC REACTIONS
 - d. TWO NADHs PRODUCED
 - e. THE MAJOR CATABOLIC PATHWAY
 - f. PATHWAY DESCRIPTION
3. OTHER SUGAR CATABOLIC PATHWAYS
 - a. PENTOSE PHOSPHATE PATHWAY
 - b. ENTER-DOUDOROFF PATHWAY
4. THE KREBS CYCLE (TCA CYCLE, CITRIC ACID CYCLE)
 - a. PYRUVATE DEHYDROGENASE
 - b. THE CYCLE
 - c. PRODUCTION OF NADH & FADH
5. THE ELECTRON TRANSPORT CHAIN
6. OXIDATIVE-PHOSPHORYLATION (CHEMIOSMOSIS)
7. FERMENTATIONS
 - a. SUGARS (OR OTHER ORGANICS)
 - b. NO OXYGEN
 - c. AN ORGANIC MOLECULE AS ELECTRON ACCEPTOR
 - d. (NADH IS USED, ACCEPTOR IS REDUCED)
 - e. FATE OF PYRUVATE
 - 1) LACTIC ACID FERMENTATION
 - 2) ALCOHOLIC FERMENTATION
 - 3) MIXED ACID FERMENTATION
 - 4) BUTANEDIOL FERMENTATION
 - 5) OTHERS (EG. ACETIC ACID FERMENTATION)

B. ANABOLISM

1. BIOSYNTHETIC PATHWAYS
2. REQUIRE ENERGY (ATP) AND REDUCING POWER (NADPH)
3. SYNTHESIS OF METABOLITES (EG. HISTIDINE)
4. SYNTHESIS OF BIOPOLYMERS (EG. PROTEINS)

II. INTEGRATION OF METABOLISM (METABOLIC PATHWAYS)

- A. CATABOLIC PATHWAYS
- B. ANABOLIC PATHWAYS
- C. AMPHIBOLIC PATHWAYS
- D. REGULATION