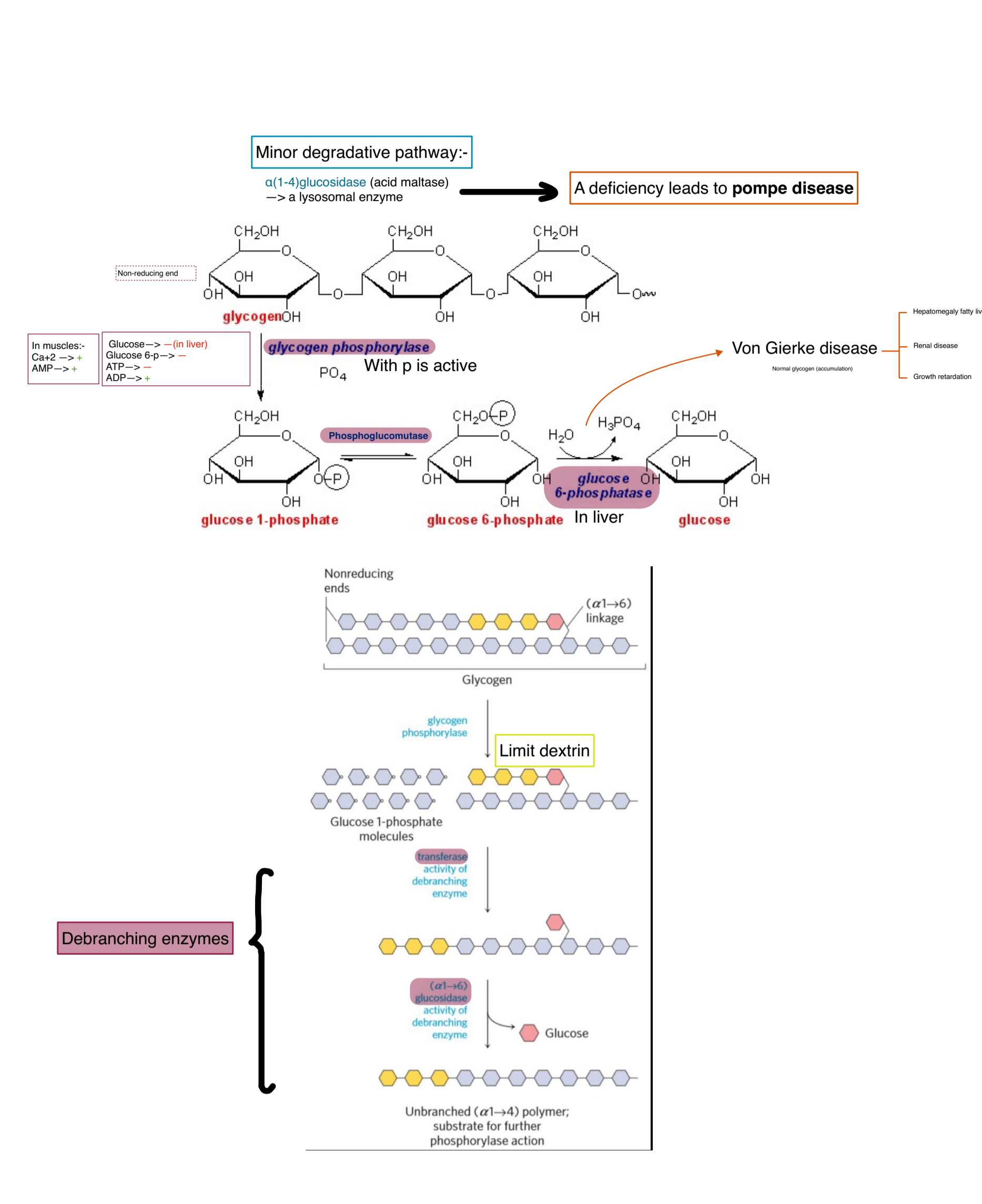
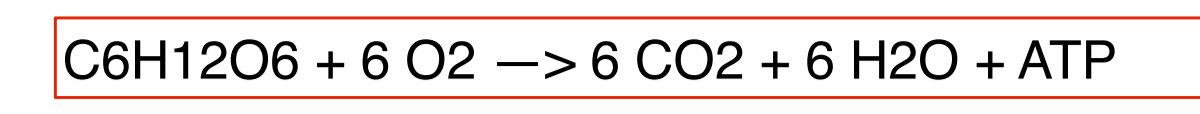
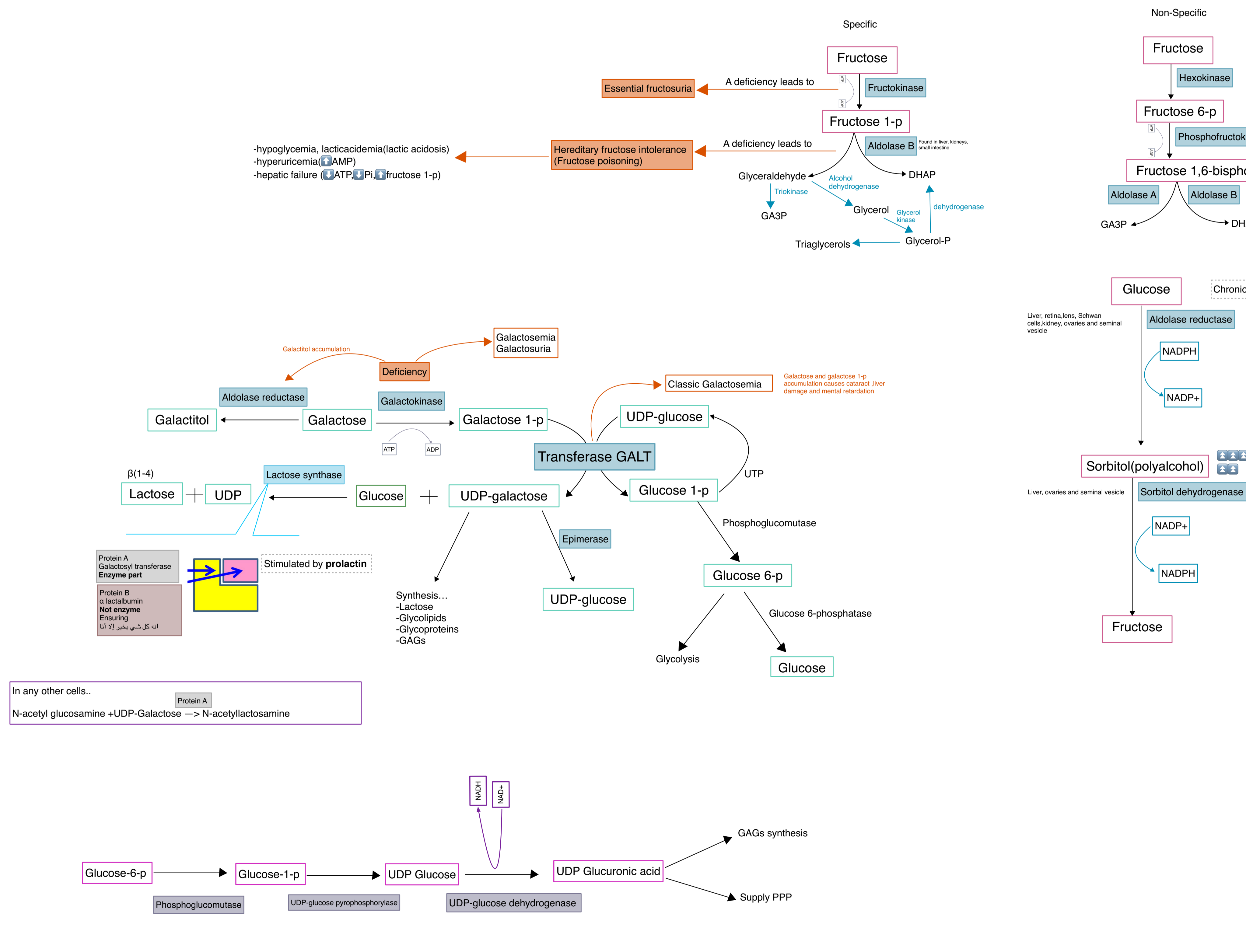


Glycogen metabolism

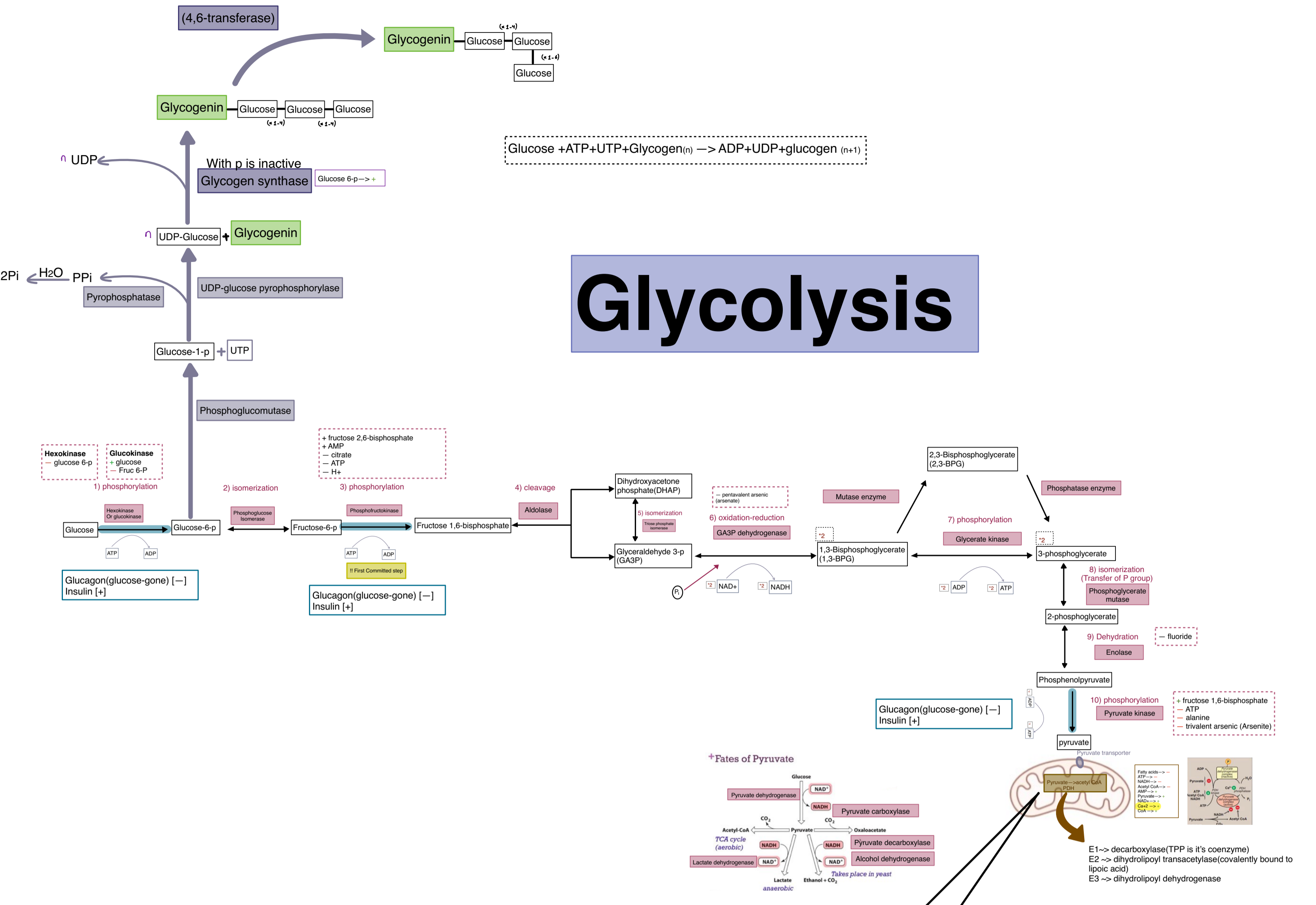


Glucagon (liver) \rightarrow cAMP \rightarrow PKA \rightarrow phosphorylation of glycogen phosphorylase & glycogen synthase kinase (stimulation of degradation of a glycogen & inhibition of synthesis of a glycogen).
 Insulin \rightarrow degradation of cAMP into 5'AMP using phosphodiesterase \rightarrow PPI dephosphorylates glycogen phosphorylase & glycogen synthase kinase \rightarrow inhibition of degradation of a glycogen & stimulation of synthesis of a glycogen.
 Epinephrine \rightarrow activate phospholipase C (degradation of phospholipids to IP3&PIP2). IP3 stimulates releasing of Ca²⁺ from ER. Ca²⁺-calmodulin activates phosphorylase kinase (stimulates glycogen degradation).

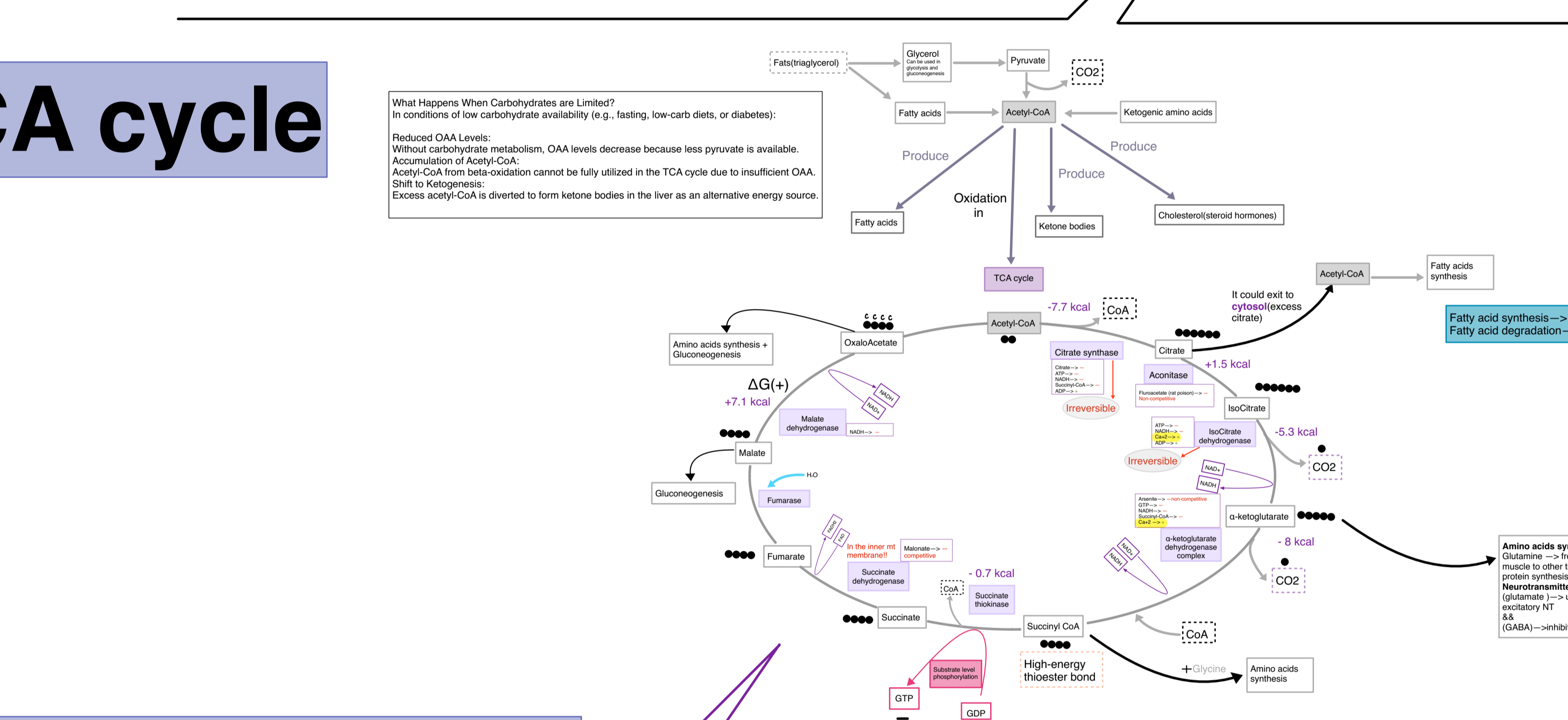
Metabolism of monosaccharides and disaccharides



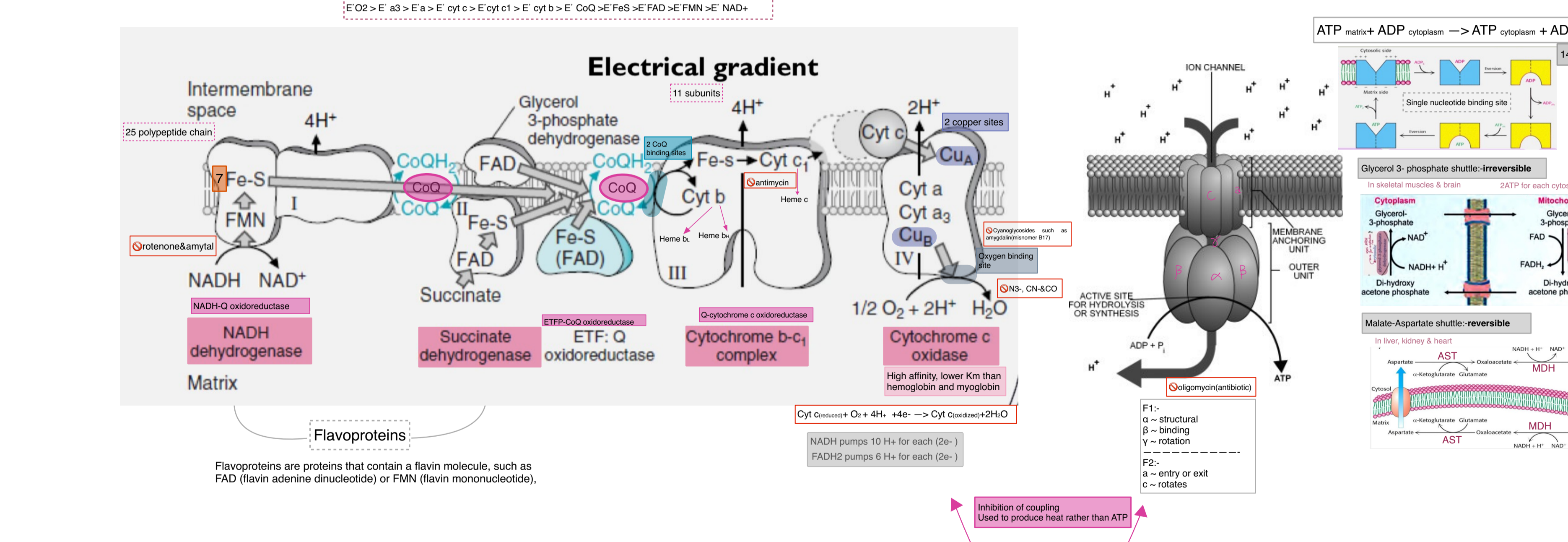
Glycolysis



TCA cycle



Oxidative phosphorylation



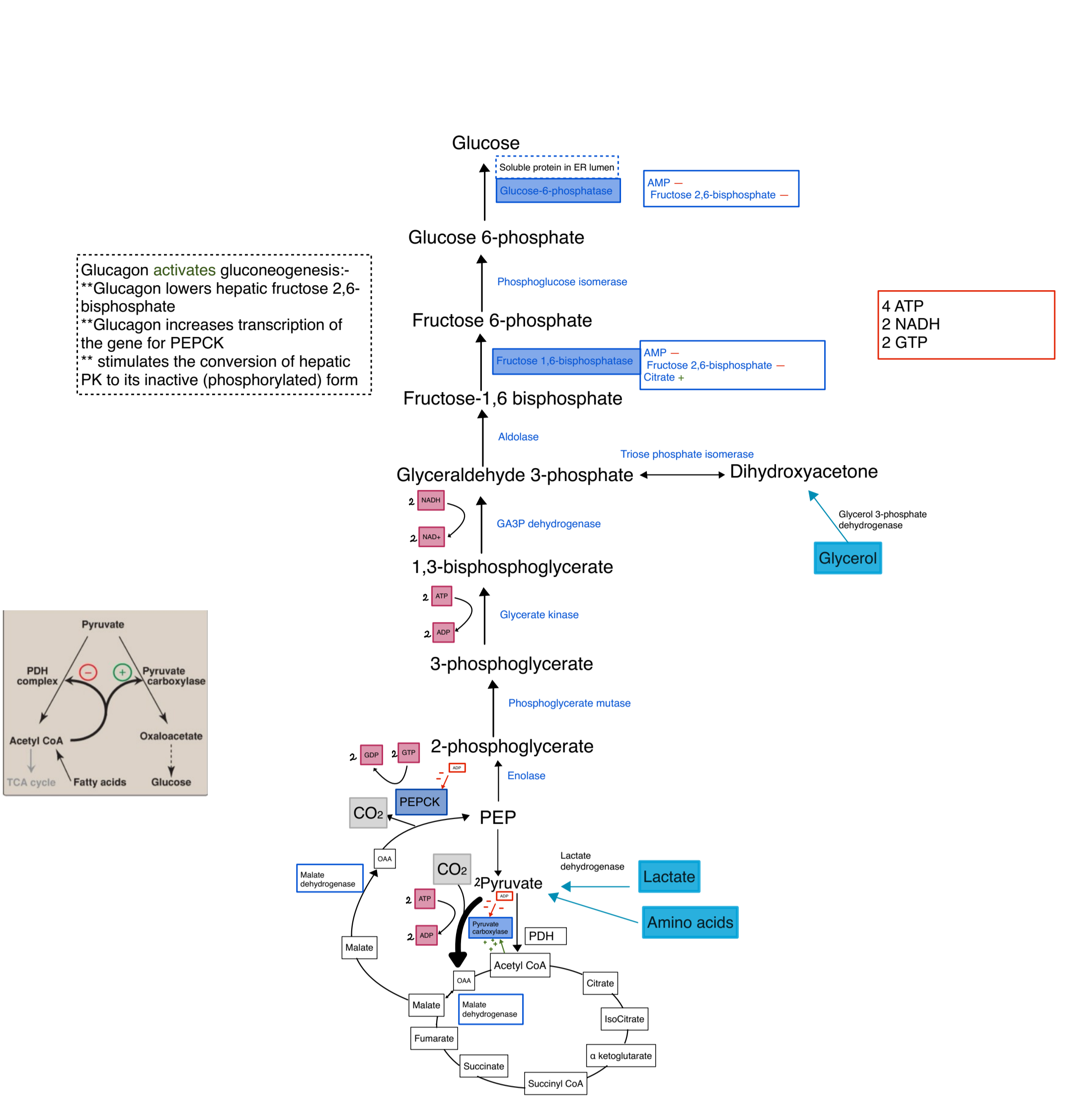
Flavoproteins: Flavoproteins are proteins that contain a flavin molecule, such as FAD (from adenine dinucleotide) or FMN (from mononucleotide).

Mitochondrial DNA: - small, circular & double stranded. - encodes 13 subunits (7 of I, 1 of III, 2 of IV & 2 of V). - repetitive segregation: μ mt-DNA \rightarrow μ mt-DNA in many daughter cells & heteroplasmic (mutation concentrated in one daughter cell). - Mutation rate: 10 times more than nuclear DNA.

Nuclear DNA: - encodes 1000 proteins for function of mitochondrial ox-ph (35 of I, 4 of II, 10 of III, 10 of IV & 14 of V). - autosomal recessive inheritance: copies of gene must be defective. - Affecting many types of cells and tissues. - Affect cells with high ATP demand more than low demand cells.

Mutations:
 - LHON: Leber hereditary optic neuropathy (III, IV).
 - Spontadic myopathy, amaurosis (III, IV).
 - Exophthalmopathy (IV).
 - NARP (IV).
 - Leigh syndrome (I).
 - Leigh syndrome (II).
 - Leigh syndrome (IV).

Gluconeogenesis



وعسى كل نبي امرئ ووعلى