

Zoom Workshop Dr. Phillip Carpenter

Biochemistry & Metabolism: The Fasted State



Your online MCAT Prep testing center developed
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Hormones Control Metabolic Pathways

MAJOR HORMONES REGULATING METABOLISM

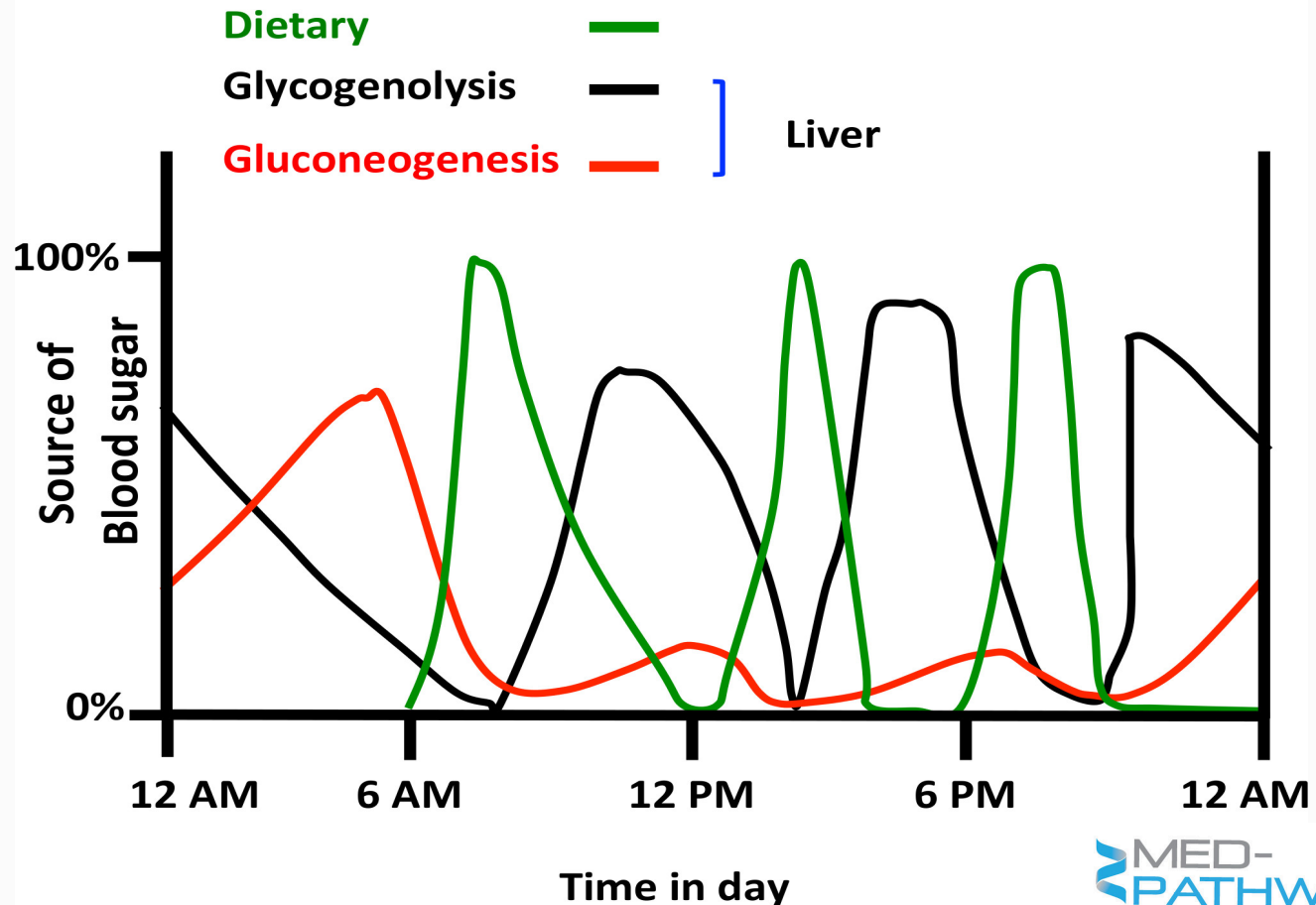
Hormone	Site of release	Target Tissue(s)	Biochemical Effects
Insulin	Pancreatic β cells	Widespread	$\downarrow$ Glycemia $\uparrow$ Fat, Glycogen, Proteins
Glucagon	Pancreatic α cells	Liver	$\uparrow$ Glycemia, Gluconeogenesis
Epinephrine	Adrenal medulla	Widespread	$\uparrow$ Glycemia: Gluconeogenesis, Glycogen degradation, Triglyceride mobilization
Cortisol	Adrenal cortex	Widespread	$\uparrow$ Glycemia, Protein breakdown

The Fed & Fasted States: Maintaining Glycemia

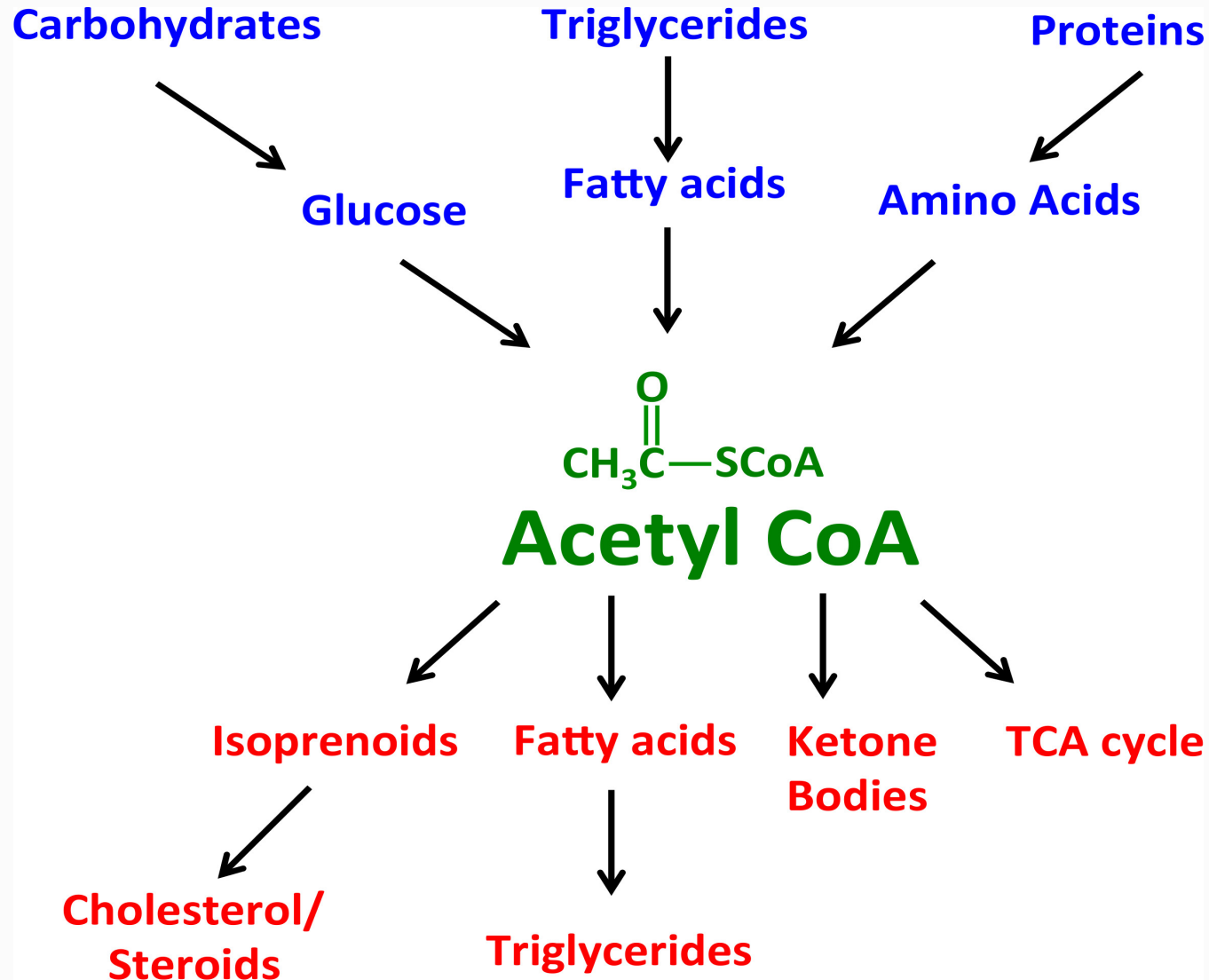
3 SOURCES OF BLOOD SUGAR

HIGH BLOOD SUGAR
(+ INSULIN)

LOW BLOOD SUGAR
(+ GLUCAGON)

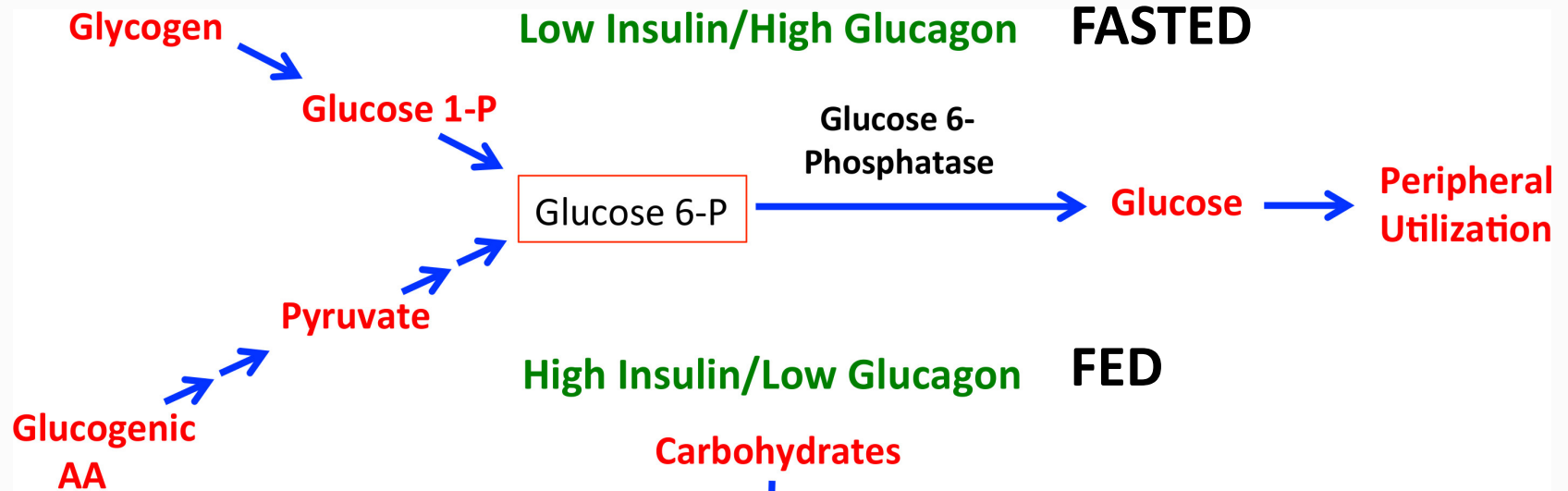


Acetyl CoA

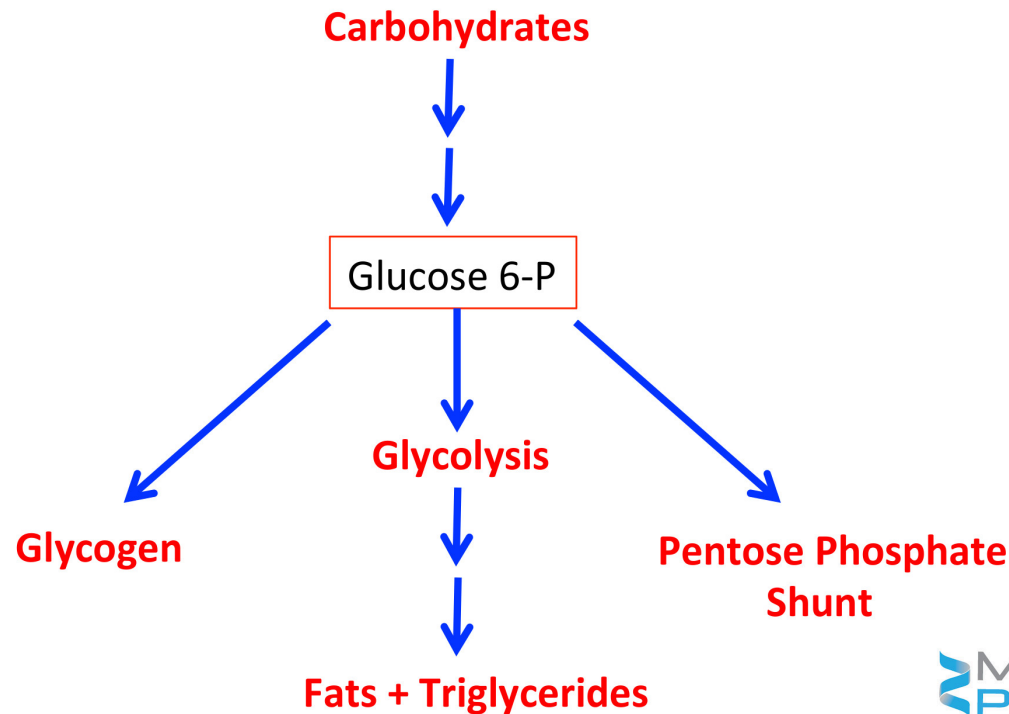


The Fed & Fasted States

A.



B.



Hepatic Gluconeogenesis vs Glycolysis

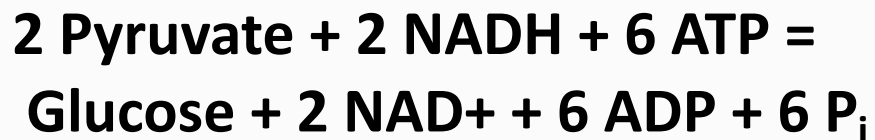
FASTED

Glucose 6-P



Pyruvate

Gluconeogenesis



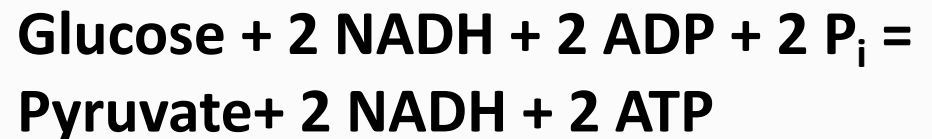
FED

Glucose 6-P



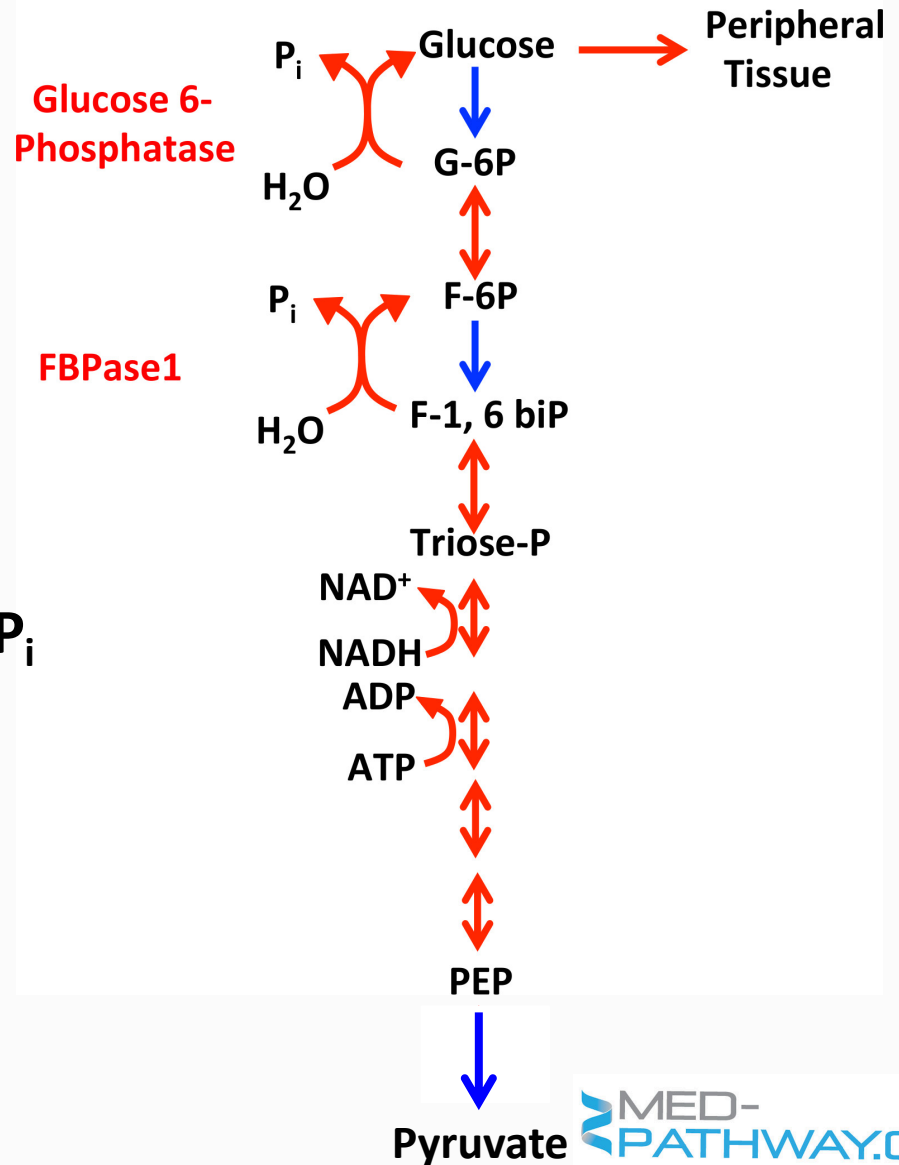
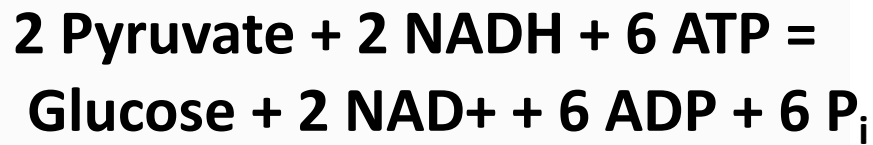
Pyruvate

Glycolysis

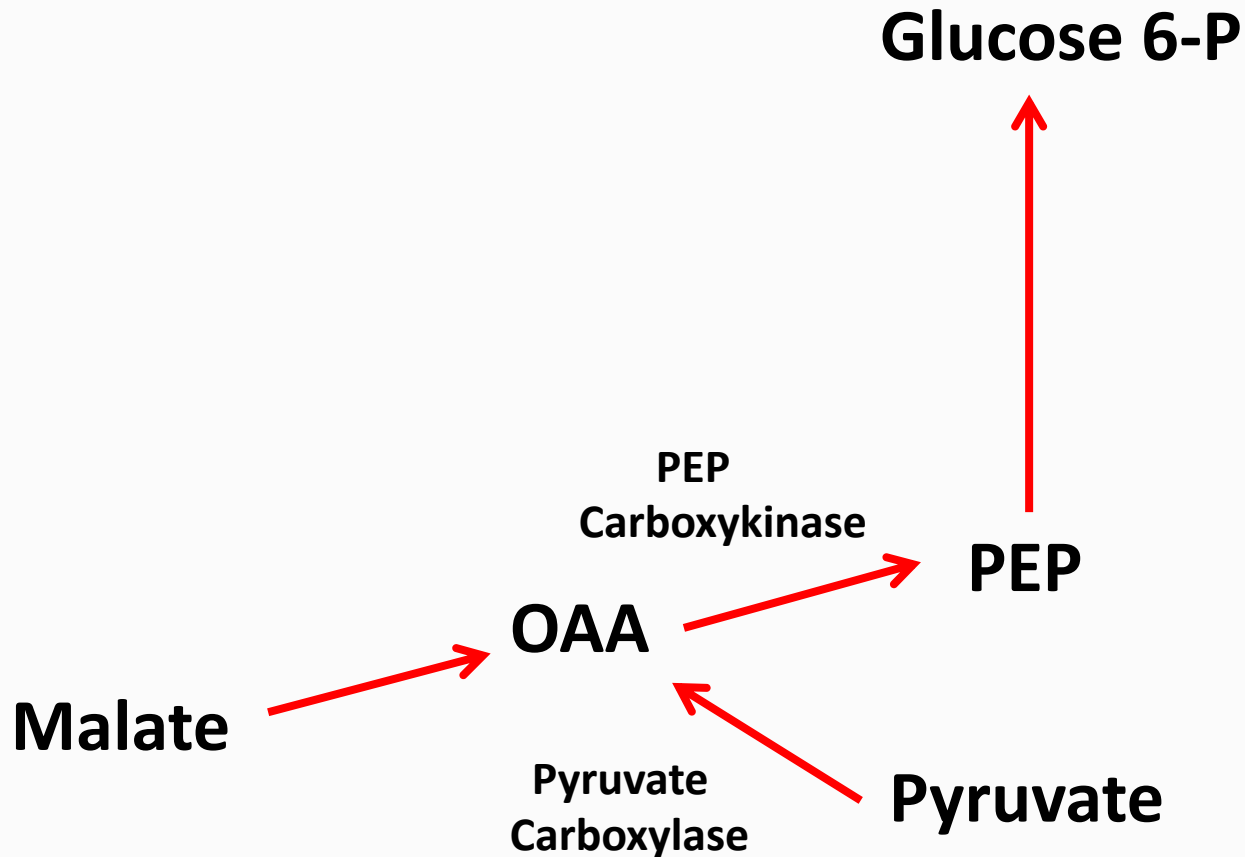


Gluconeogenesis

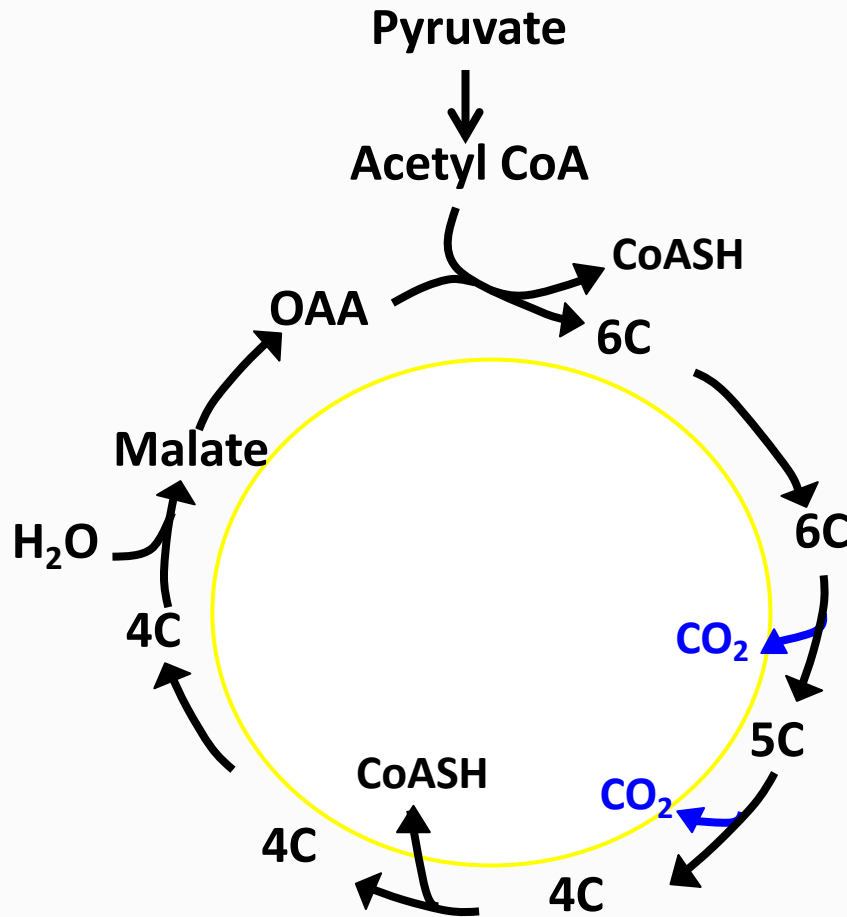
**Must overcome 3 IRREVERSIBLE
STEPS OF GLYCOLYSIS**



Converting Pyruvate to PEP in Gluconeogenesis

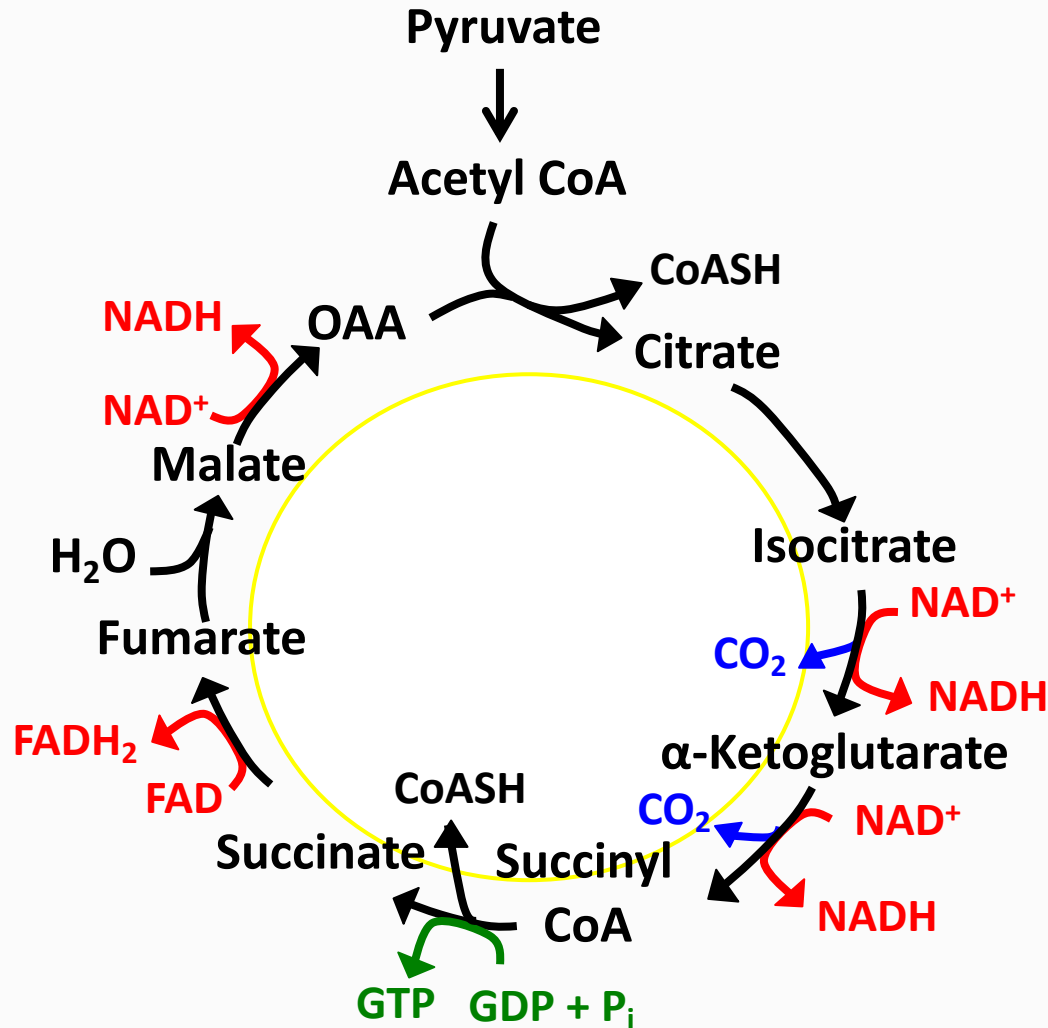


TCA Cycle

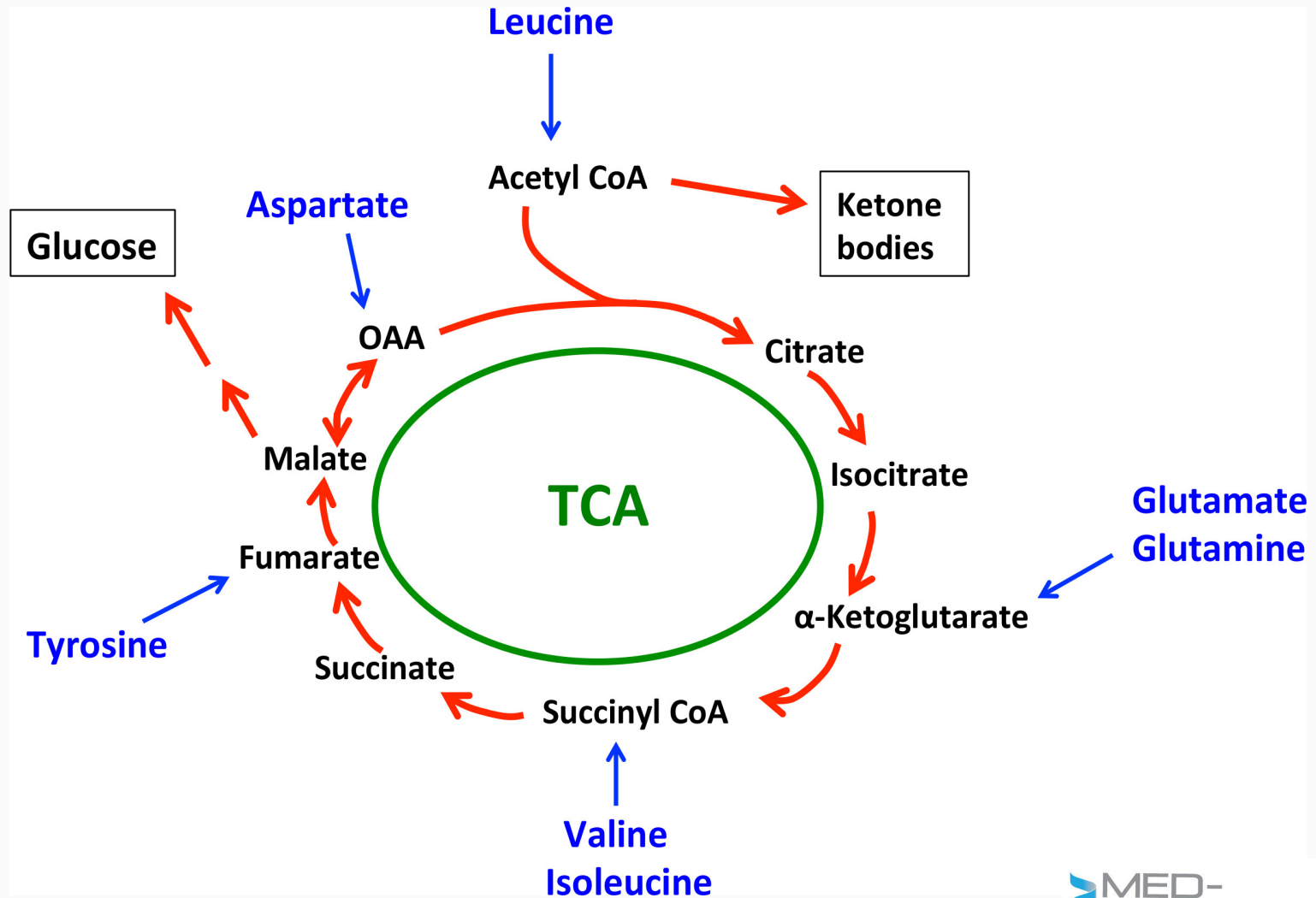


$$\begin{aligned} 4 + 2 &= 6 \\ 6 &= 6 \\ 6 - 1 &= 5 \\ 5 - 1 &= 4 \end{aligned}$$

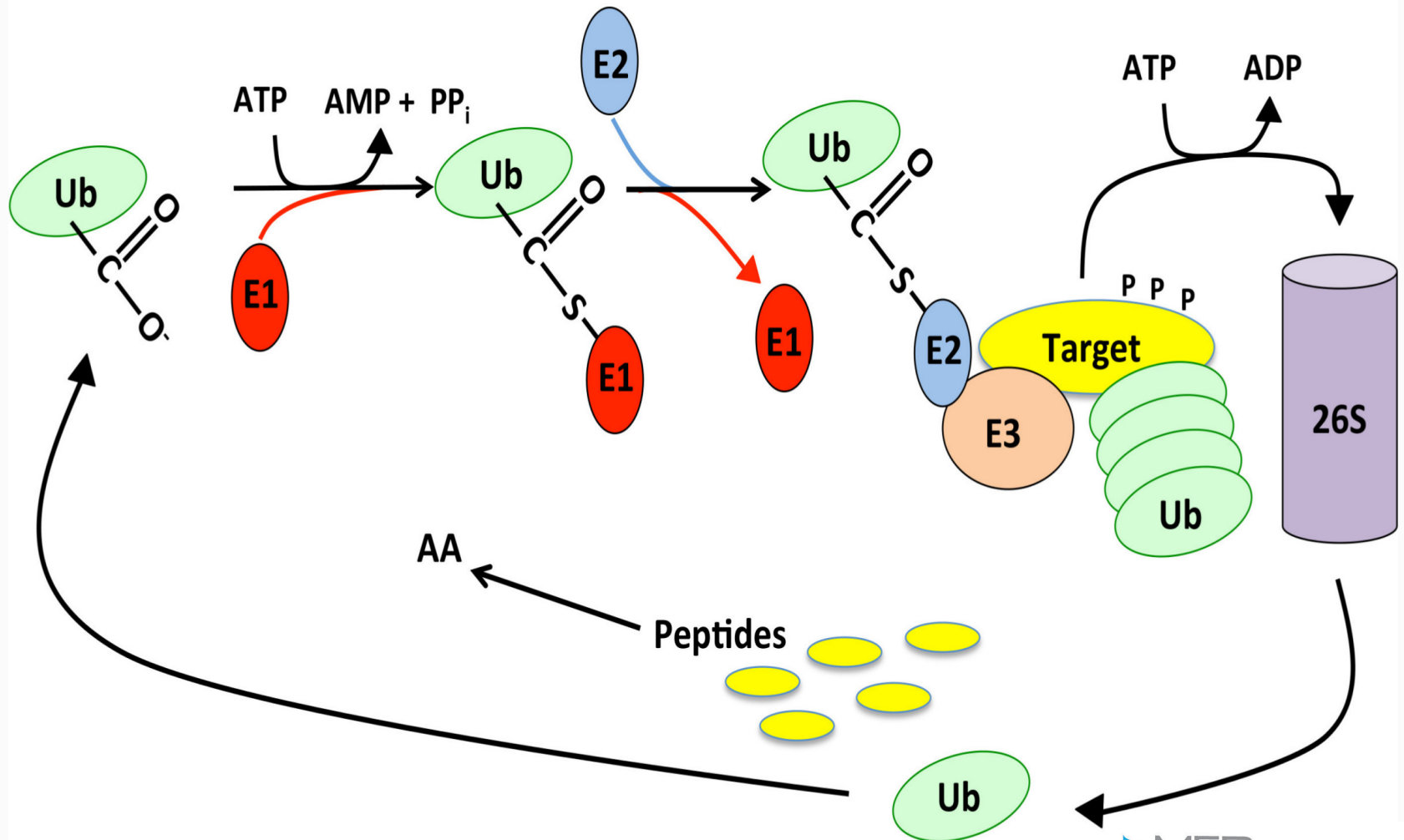
TCA Cycle



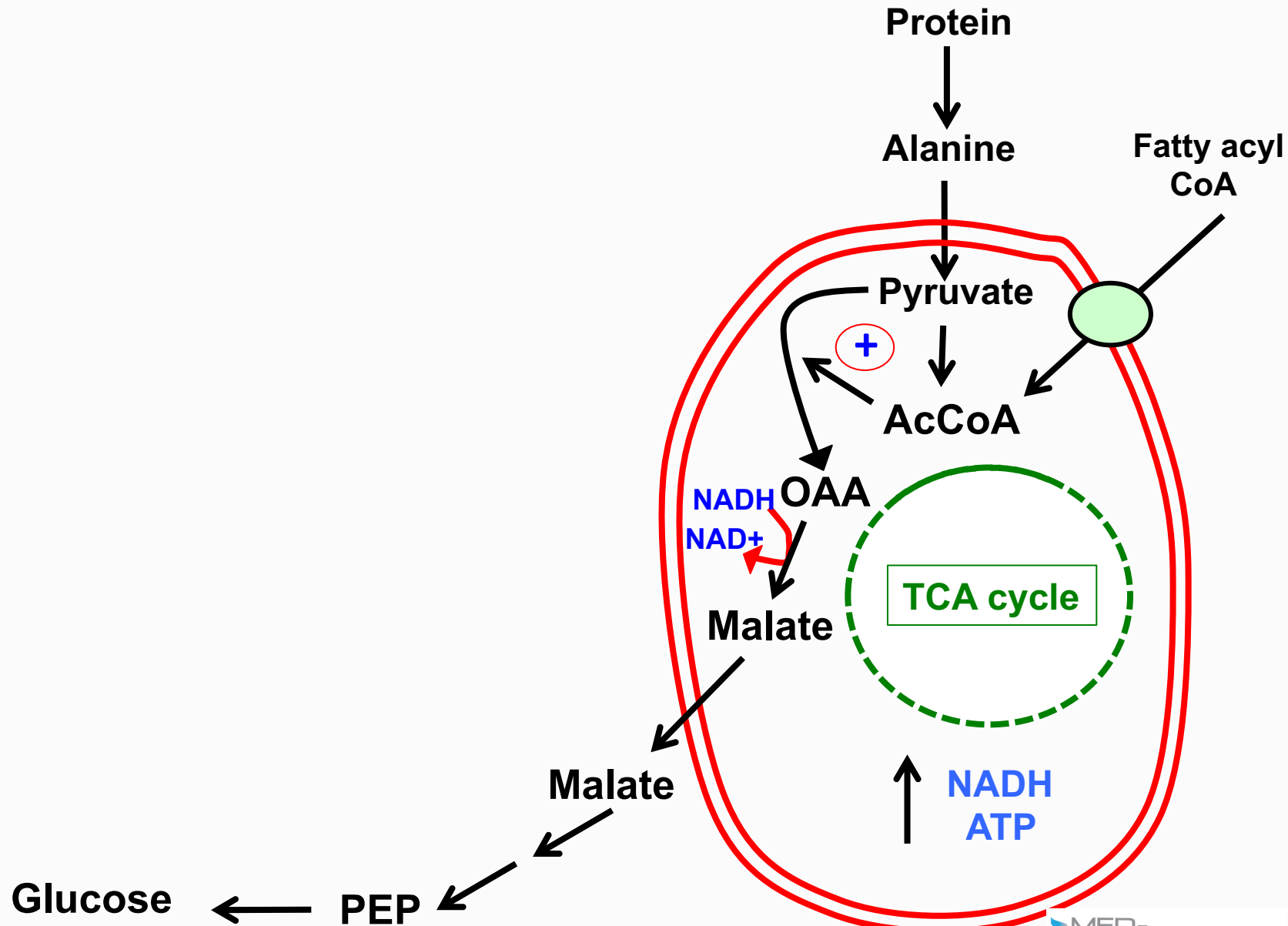
TCA Cycle as a Source For Carbon



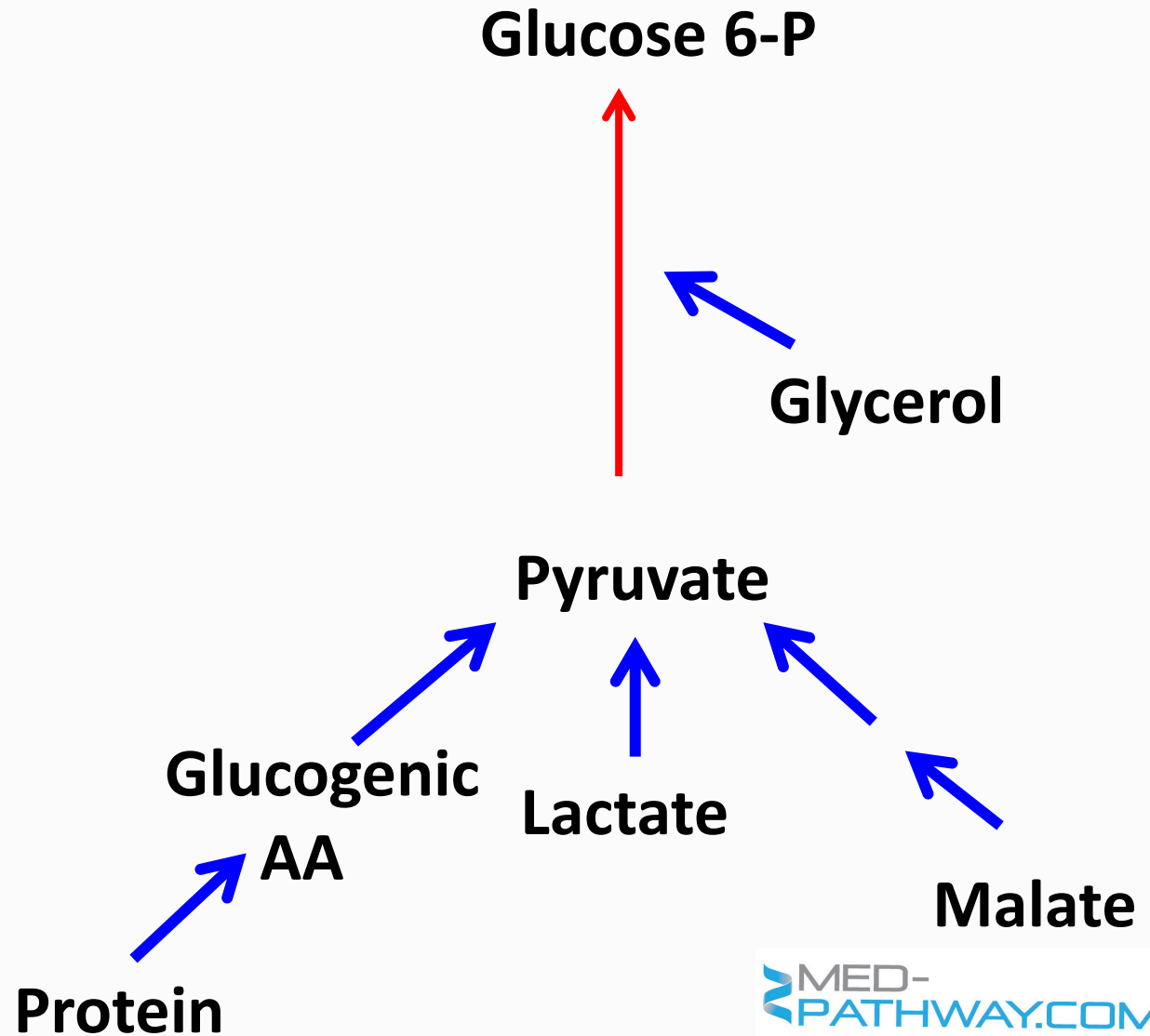
Ubiquitin Degradation of Proteins



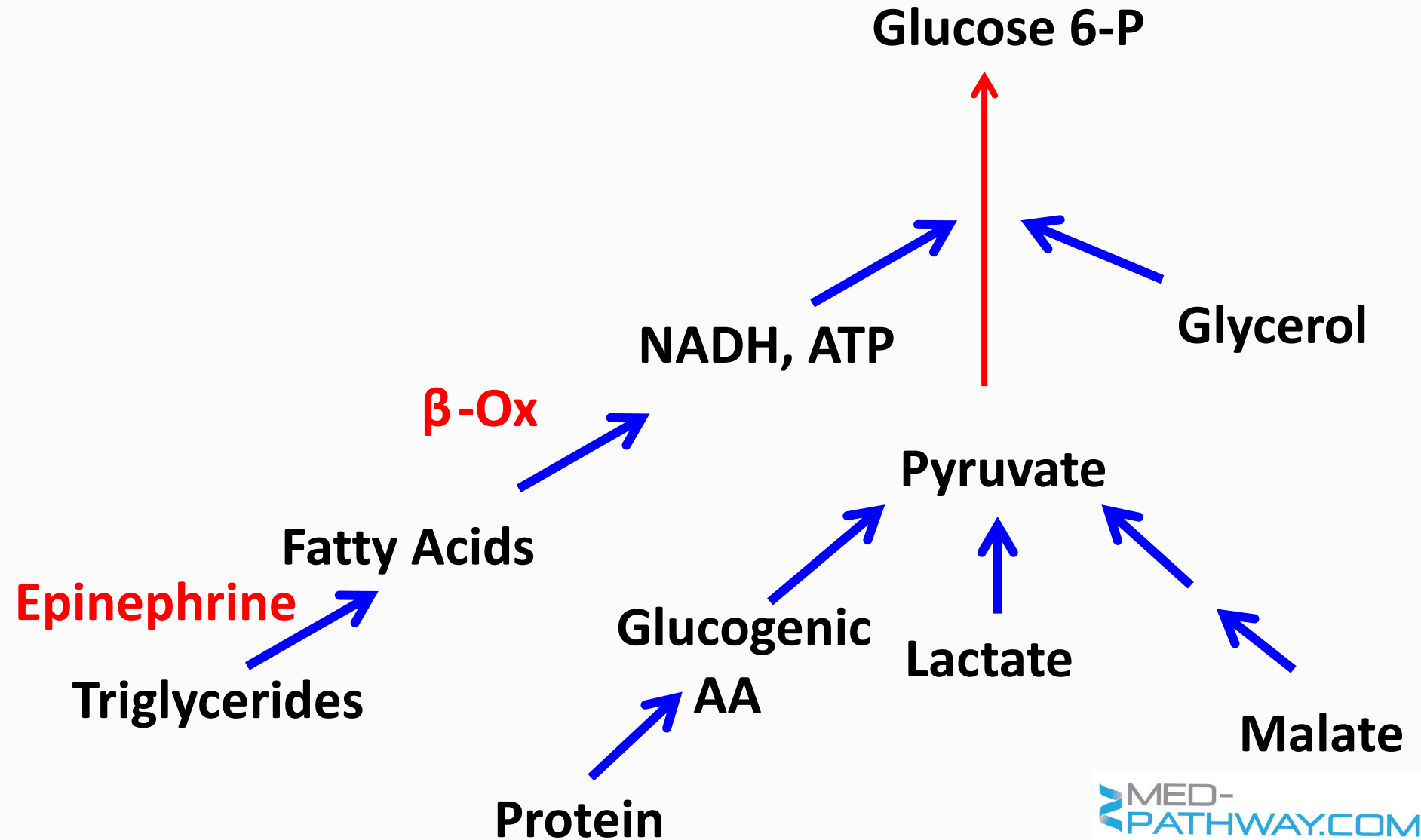
Fatty Acid Degradation & Gluconeogenesis



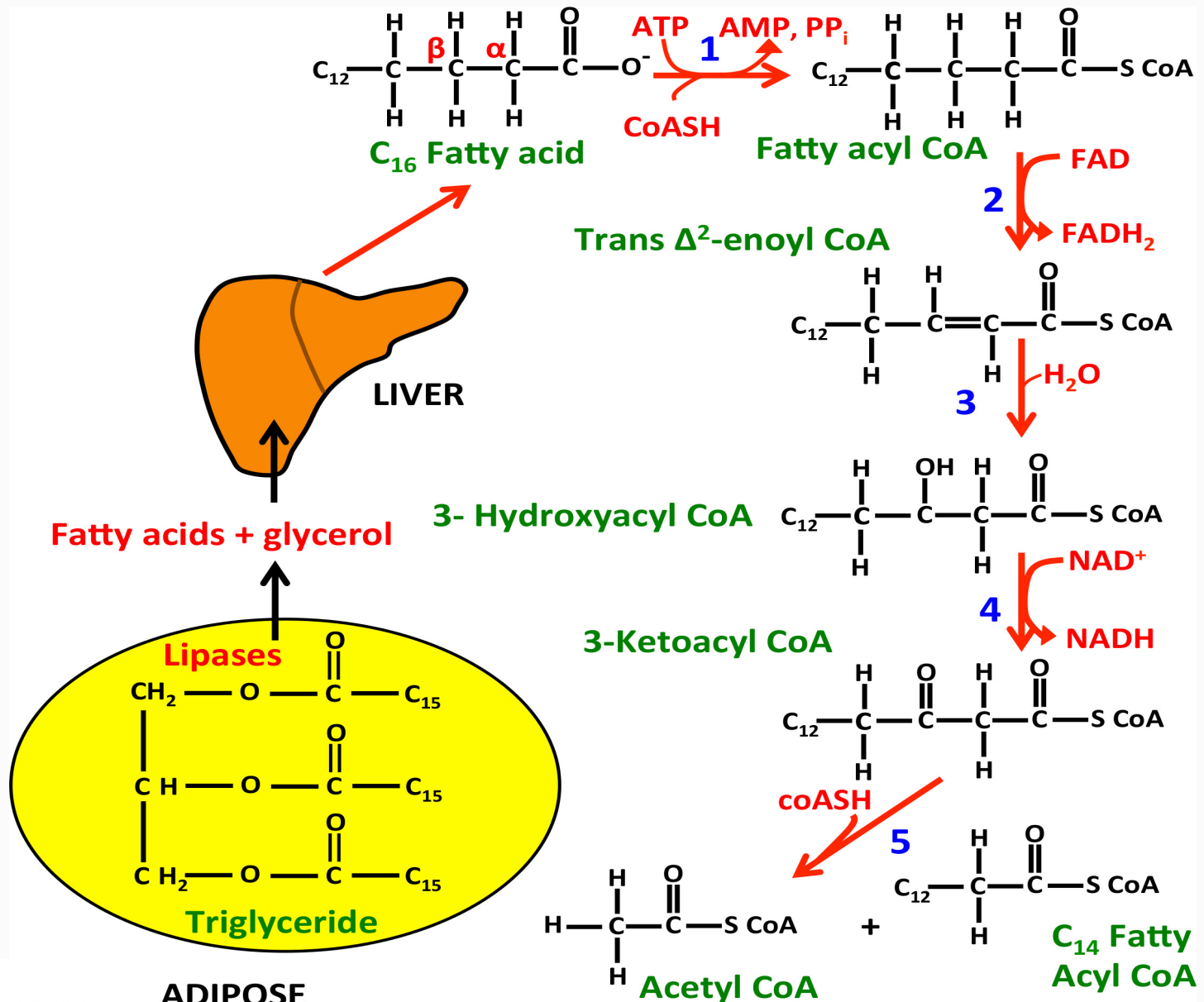
Carbon Sources of Gluconeogenesis



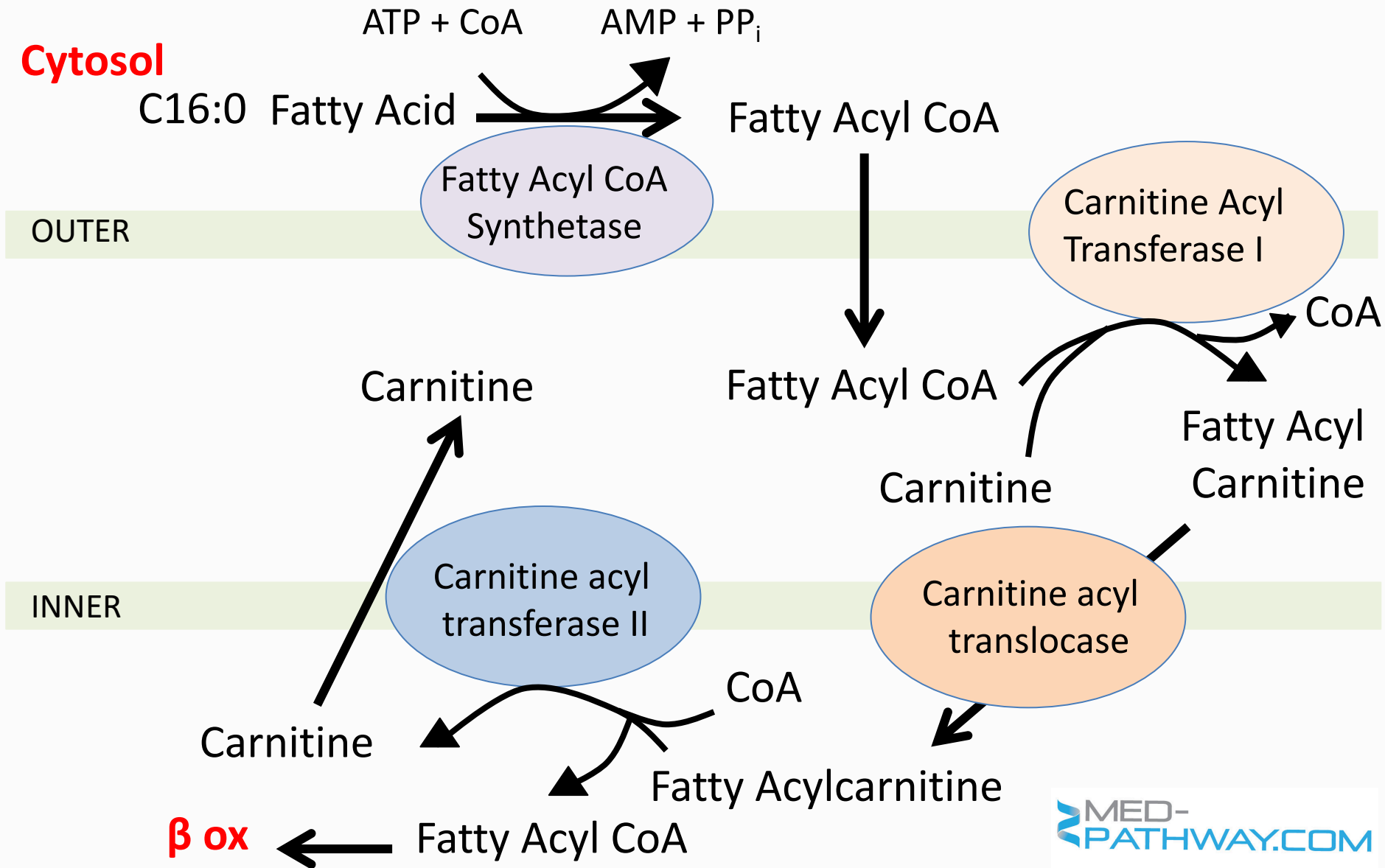
Gluconeogenesis is Coupled to β -Ox



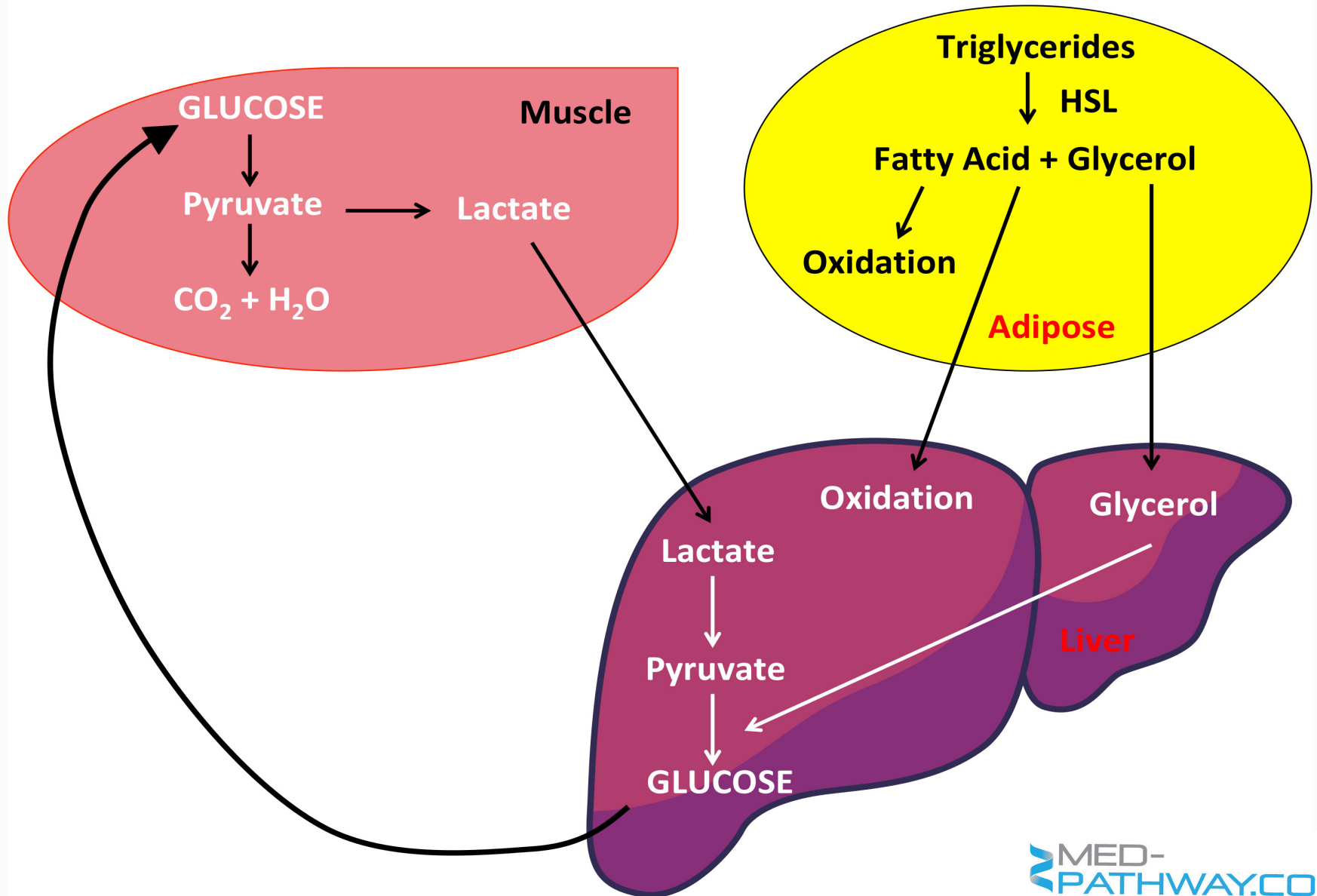
Fatty Acid Degradation Pathway



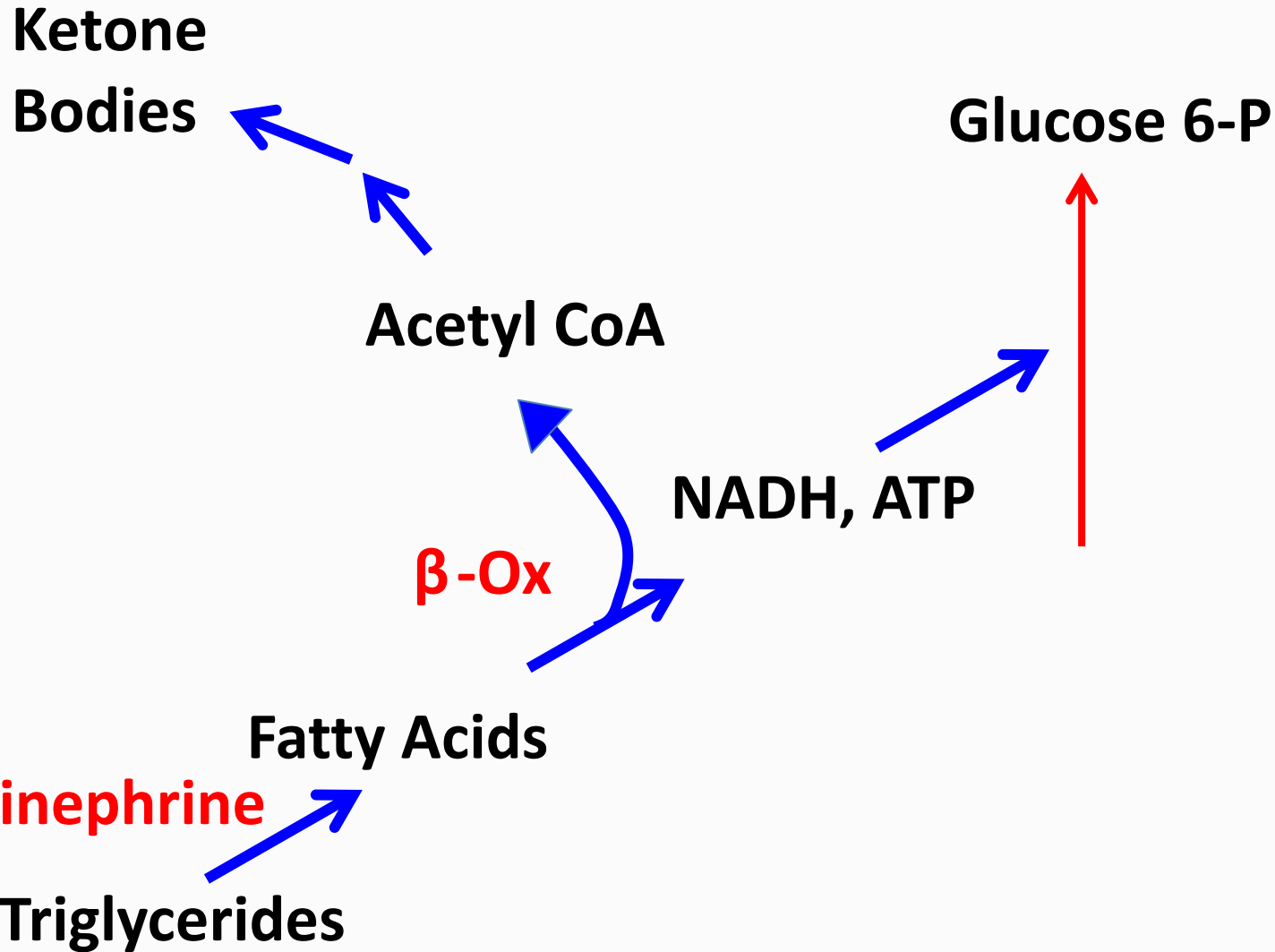
Carnitine Shuttle Imports LCFA into Matrix



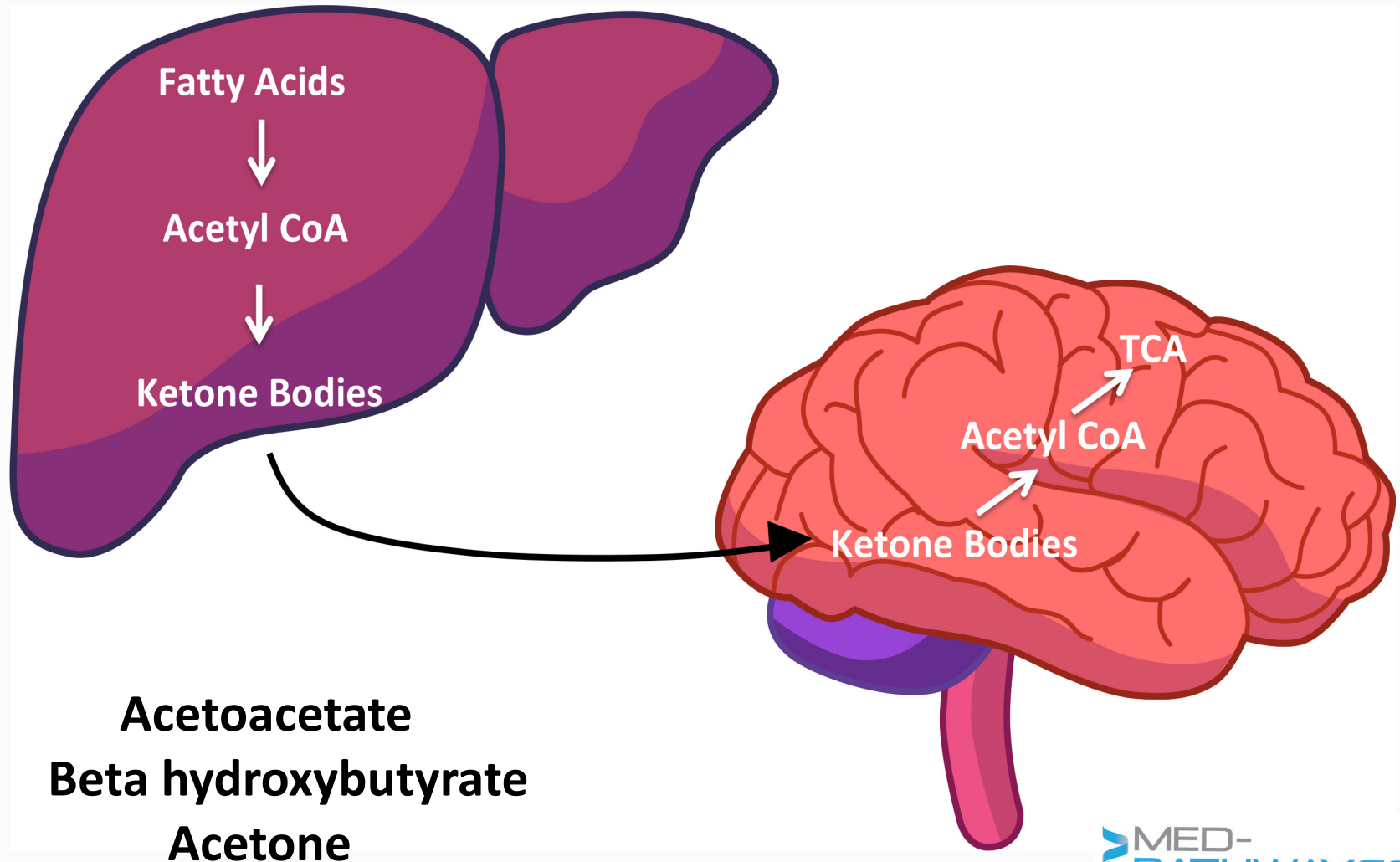
The Cori Cycle



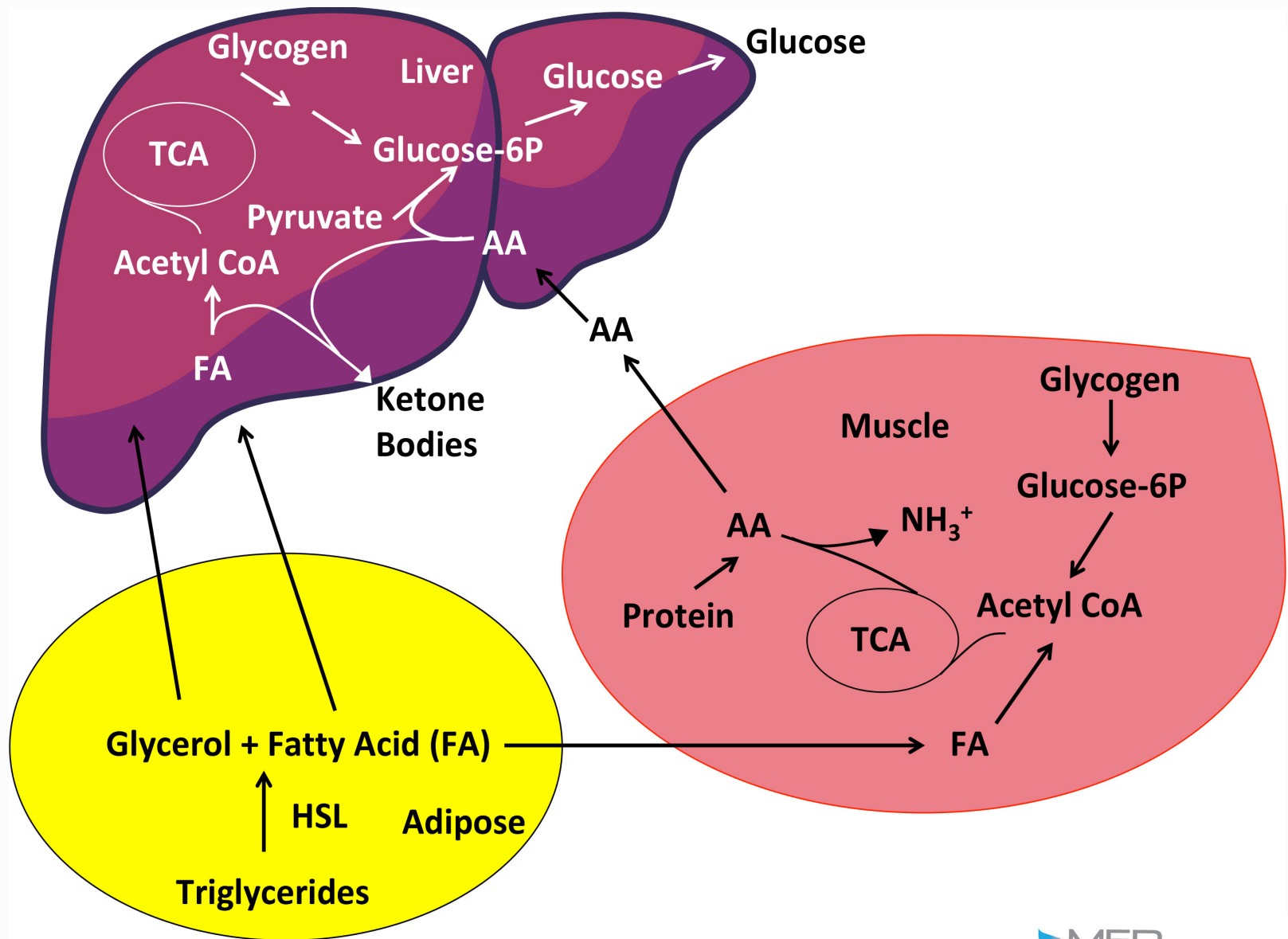
Ketone Bodies Are Derived from Fatty Acids



Tissue Specific Production/Utilization of Ketone Bodies



Type I Diabetes & The Fasted State



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