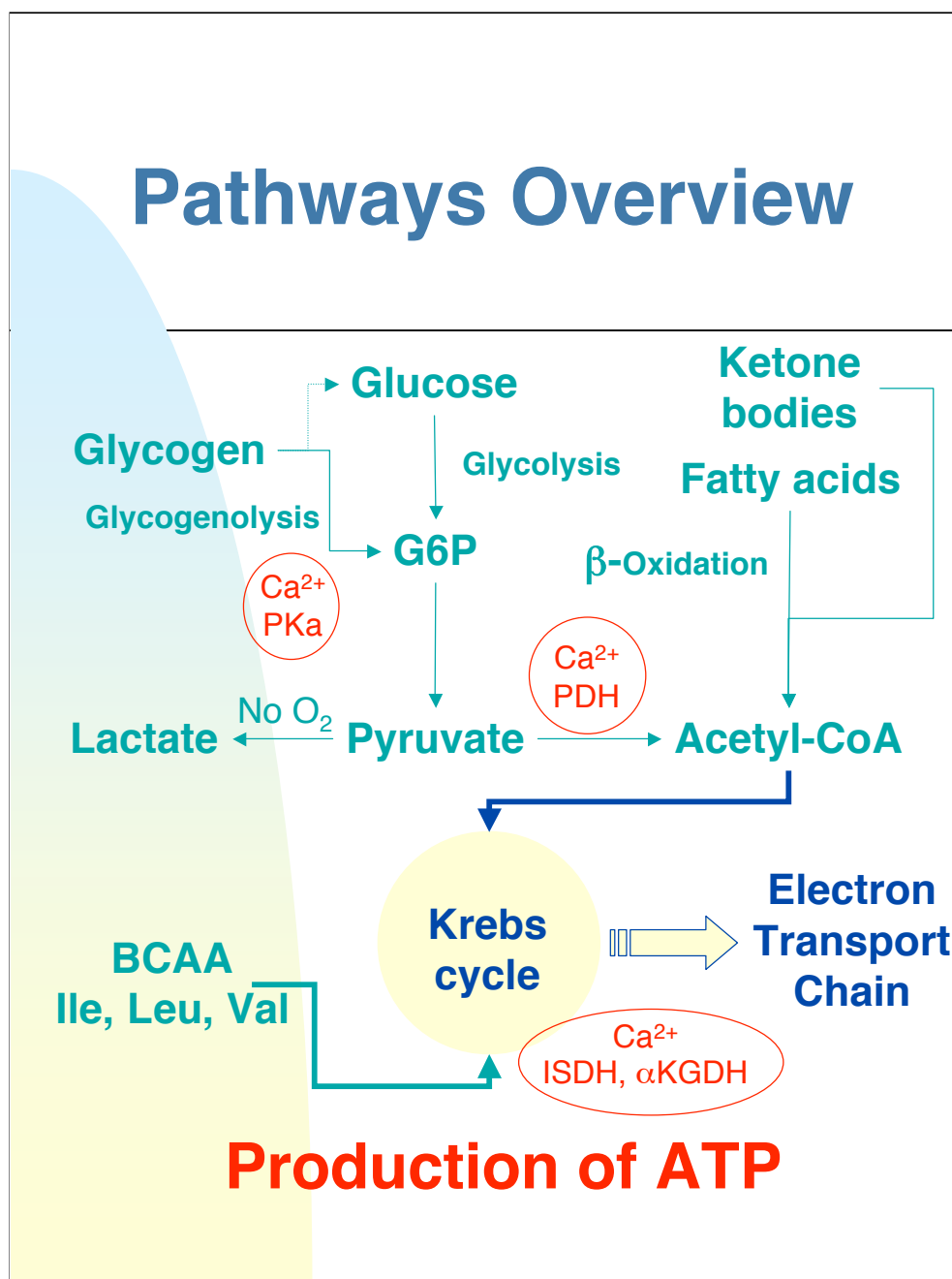


Metabolism in Skeletal Muscle

- **Glycolysis**
- **Glycogenolysis**
- **β -oxidation (ketone bodies)**
- **Krebs (tricarboxylic acid) cycle**
- **Branched-chain amino acids**
- **Electron transport chain**
- **Calcium regulation**
- **Key enzyme regulation**

Eric Niederhoffer
SIU-SOM



G6P: glucose-6-phosphate

PKa: phosphorylase kinase a

PDH: pyruvate dehydrogenase

BCAA: branched-chain amino acids

Ile: isoleucine & **Val:** valine (enter as succinyl CoA); **Leu:** leucine (enters as acetyl CoA)

ISDH: isocitrate dehydrogenase

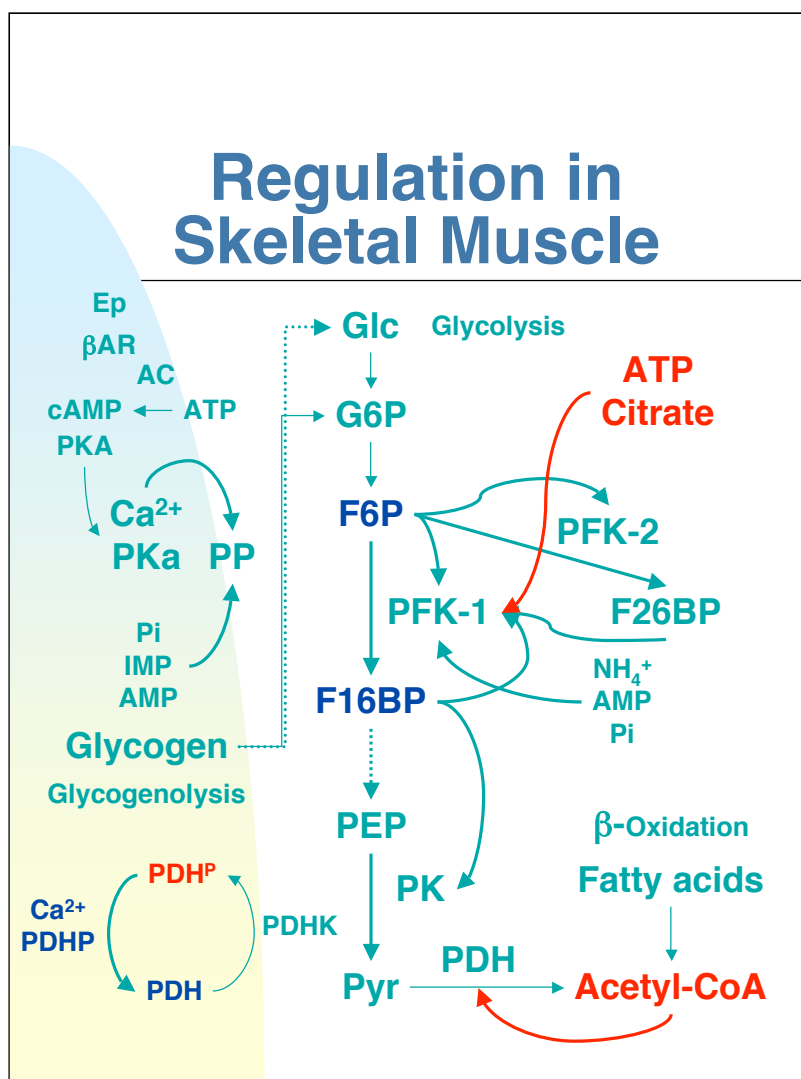
αKGDH: α-ketoglutarate dehydrogenase

ATP: adenosine triphosphate

Fast twitch (Type 2) fibers (white) use anaerobic glycolysis, glycogen

Slow twitch (Type 1) fibers (red, myoglobin) use oxidative metabolism, β-oxidation, fatty acids

Maple syrup urine disease results from defect in branched chain α-keto acid dehydrogenase complex; special diet needed; 4 children in St. Louis.



Ep: epinephrine

AC: adenylyl cyclase

PKA: protein kinase A

Pi: inorganic phosphate

Glc: glucose

G6P: glucose-6-phosphate

PDH: pyruvate dehydrogenase

PFK: phosphofructokinase

F26BP: fructose-2,6-bisphosphate

Pyr: pyruvate

PDHP (or K): pyruvate dehydrogenase phosphatase (or kinase)

2ADP to ATP + AMP by adenylate kinase; AMP to IMP by AMP-deaminase

AMP to adenosine by 5'-nucleoridase, adenosine binds to A2 receptors leading to vasodilation (increased blood supply to muscles)

βAR: β adrenergic receptor

cAMP: cyclic adenosine monophosphate

PP: phosphorylase

IMP: inosine monophosphate

F6P: fructose-6-phosphate

PKa: phosphorylase kinase a

ATP: adenosine triphosphate

F16BP: fructose-1,6-bisphosphate

PEP: phosphoenolpyruvate

PK: pyruvate kinase

Review Questions

- **How does muscle produce ATP (carbohydrates, fatty acids, ketone bodies, branched-chain amino acids)?**
- **How is skeletal muscle phosphofructokinase-1 regulated?**
- **What are the key Ca^{2+} regulated steps?**