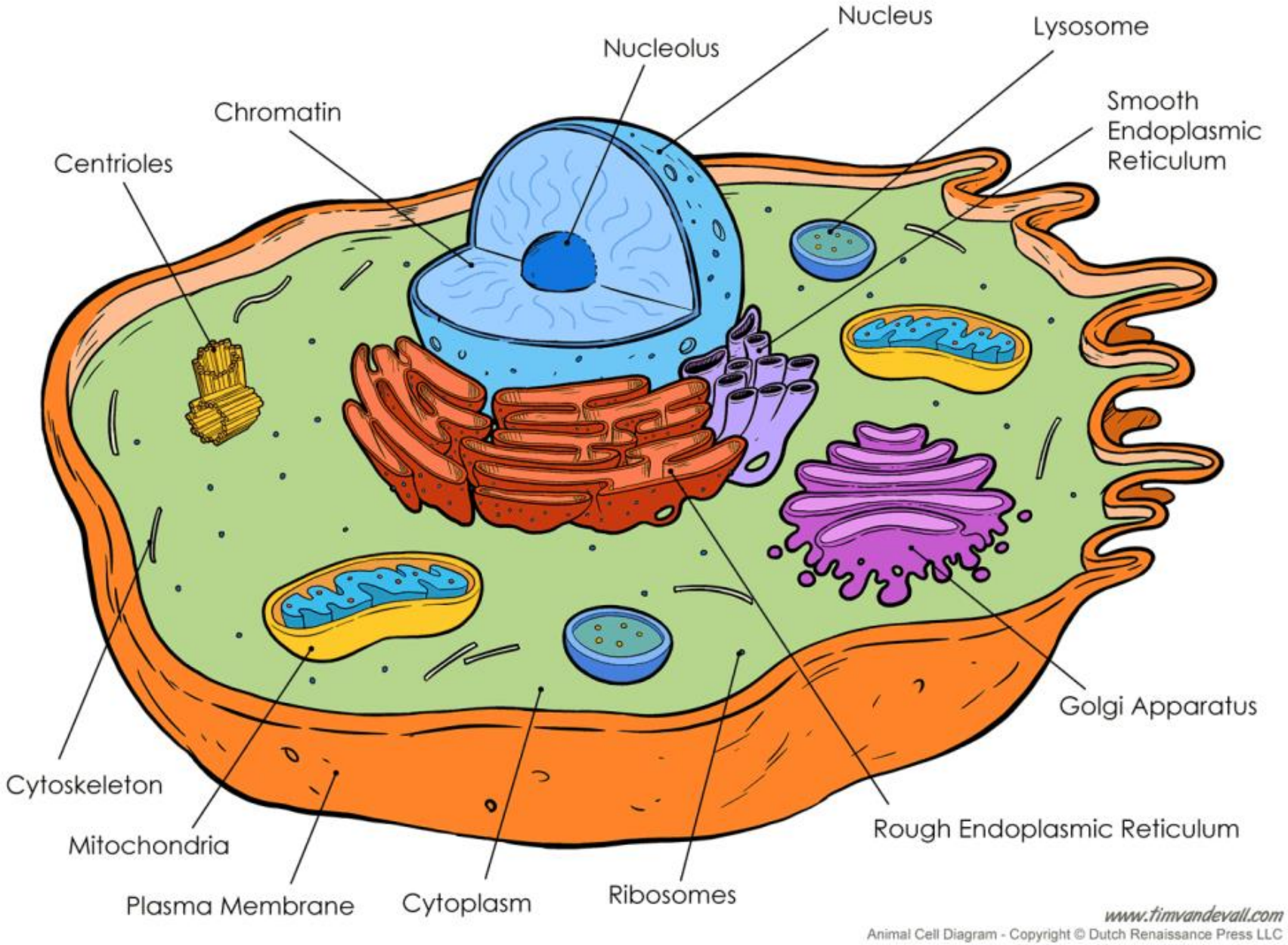
Casual Friday Presents

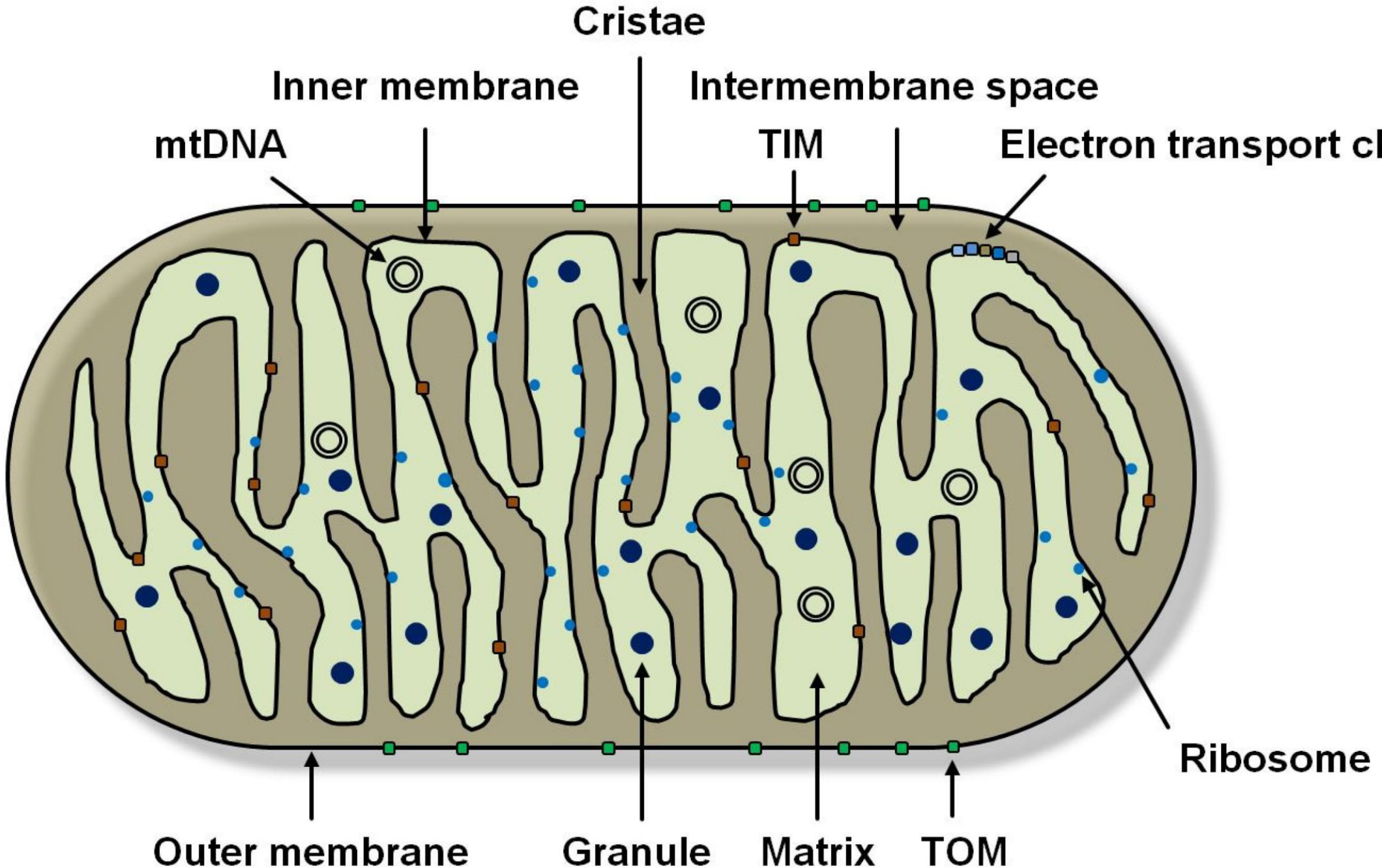
Fine-Tuning Mitochondrial Function Pt. 1

A BIOGENETIX CLINICAL PRESENTATION

biogenetix.com

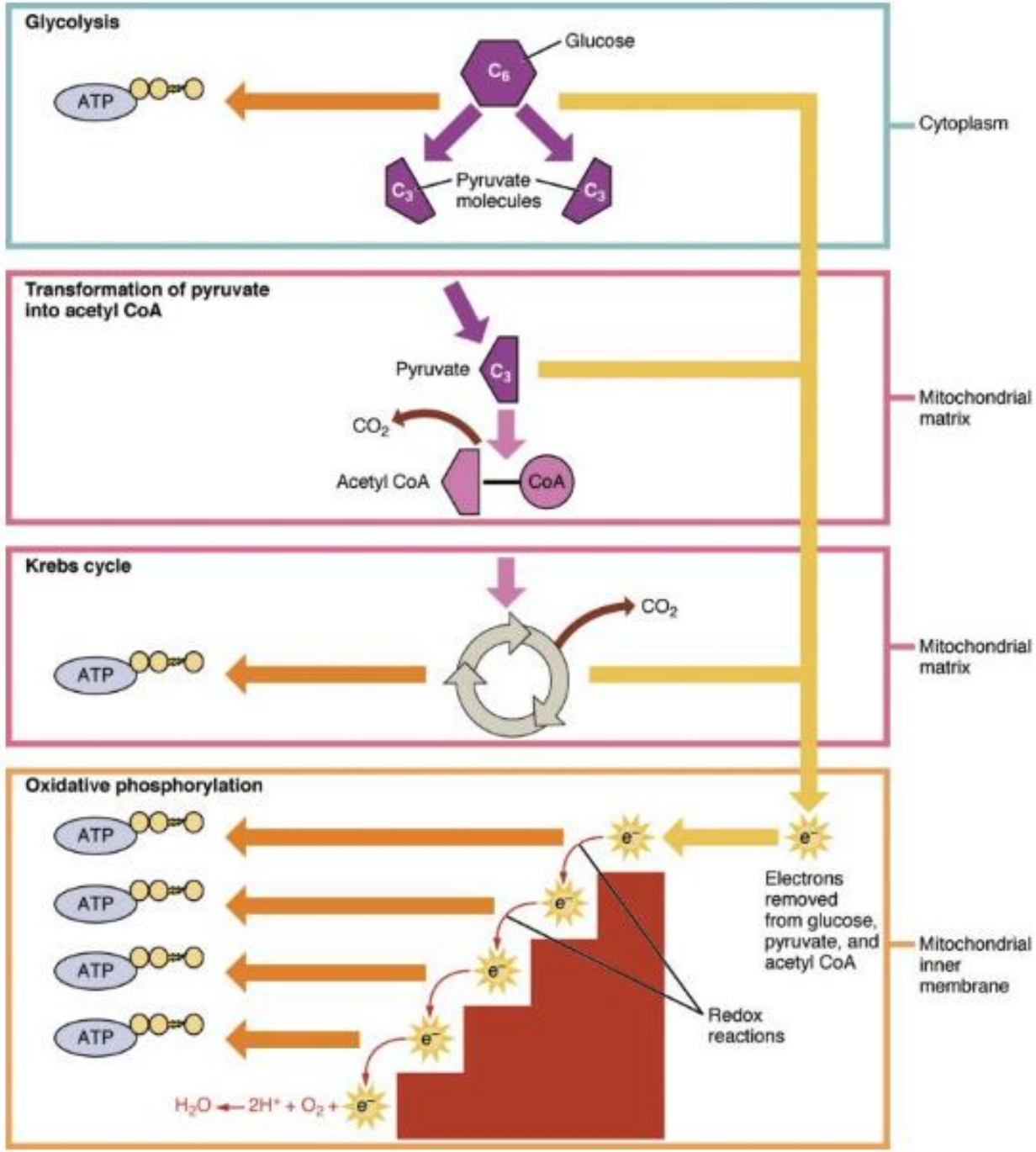
Biogenetix



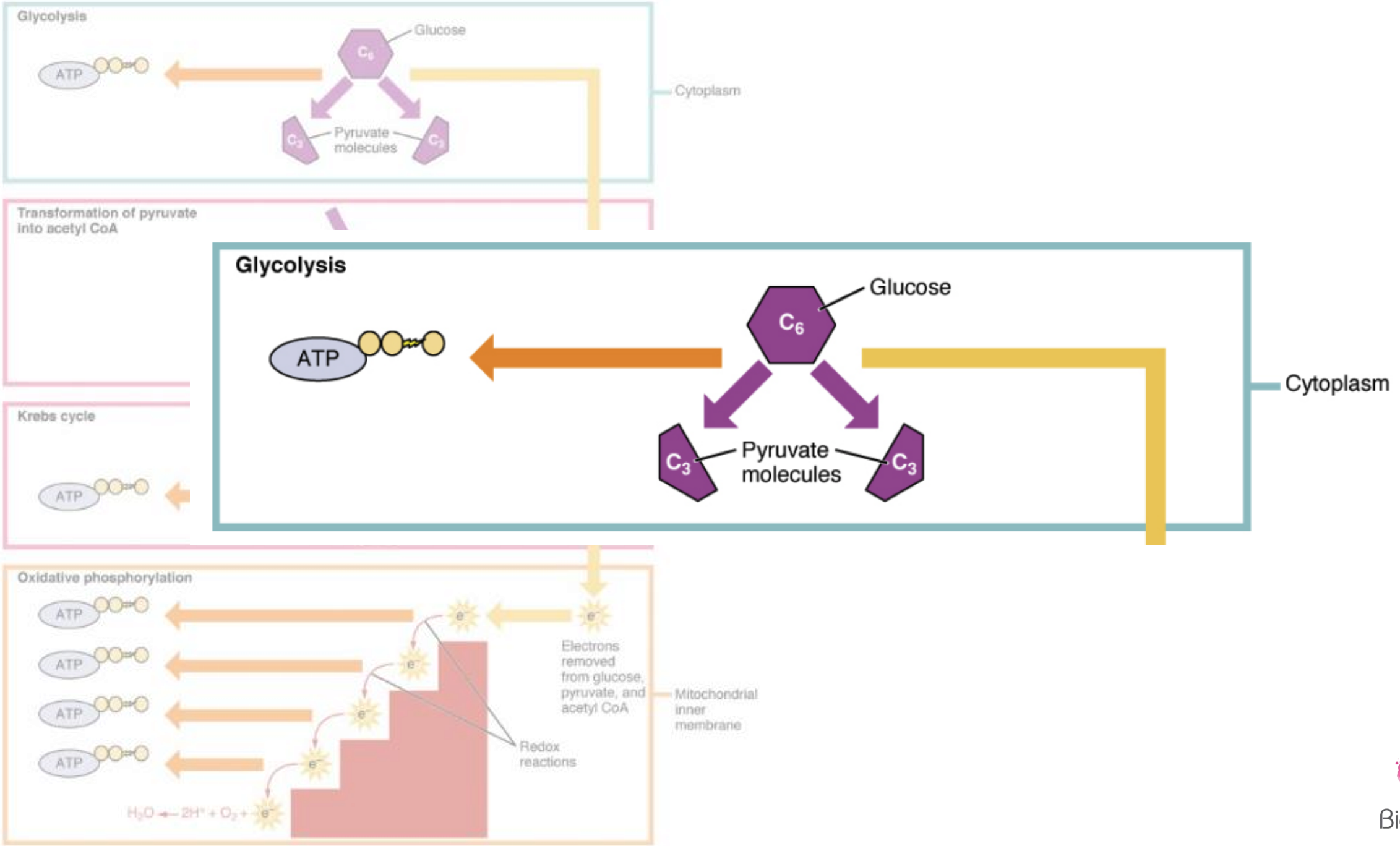


Biogenetix

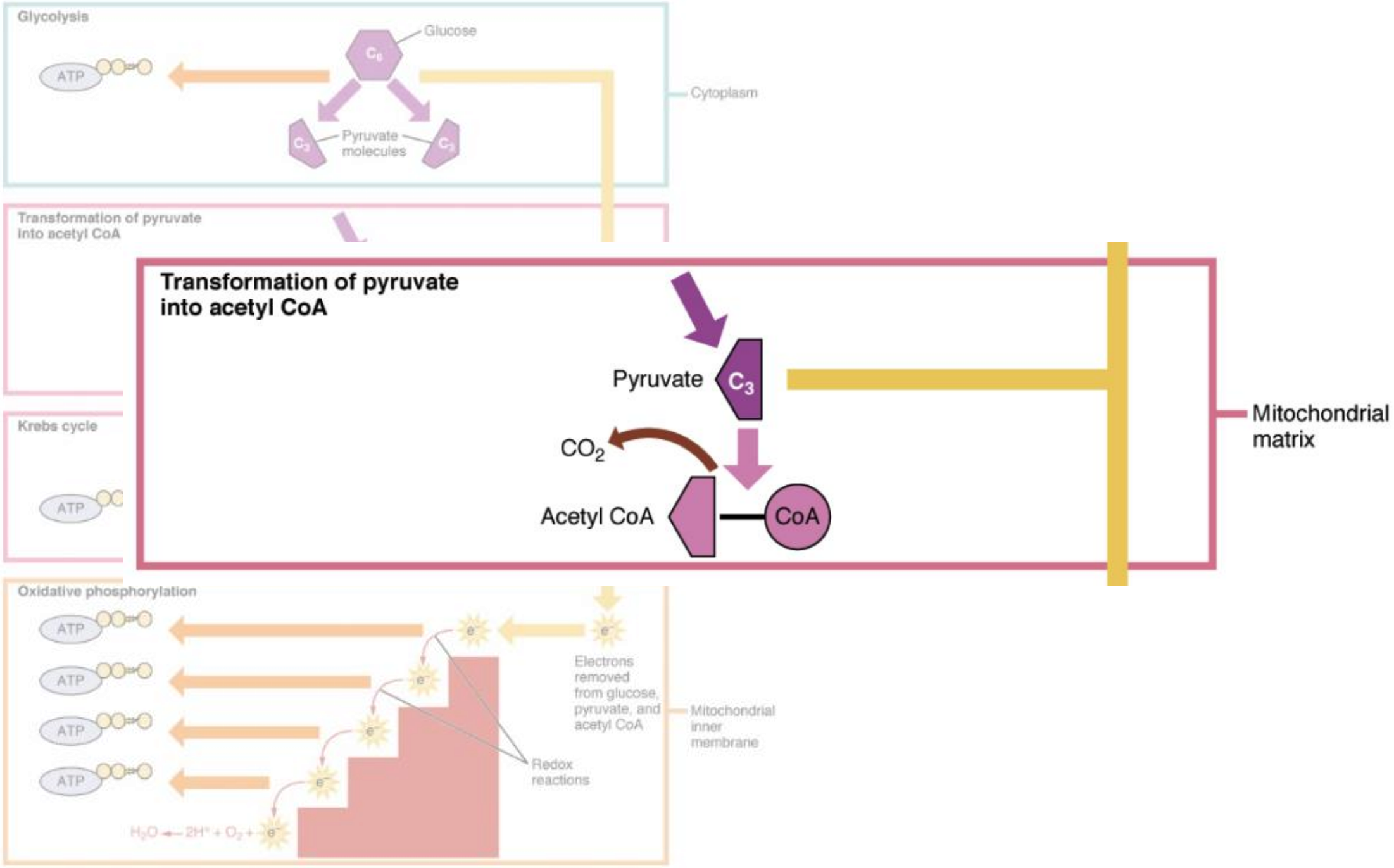
https://pub.mdpi-res.com/cimb/cimb-45-00250/article_deploy/html/images/cimb-45-00250-g001.png?1683018752


Glycolysis
Glucose
C_6
ATP
Cytoplasm
C_3
Pyruvate molecules
C_3
Transformation of pyruvate into acetyl CoA
Pyruvate
C_3
Mitochondrial matrix
CO_2
Acetyl CoA
CoA
Krebs cycle
CO_2
ATP
Mitochondrial matrix
Oxidative phosphorylation
ATP
ATP
ATP
ATP
e^-
e^-
e^-
e^-
e^-
Electrons removed from glucose, pyruvate, and acetyl CoA
Mitochondrial inner membrane
Redox reactions
$H_2O \leftarrow 2H^+ + O_2 + e^-$

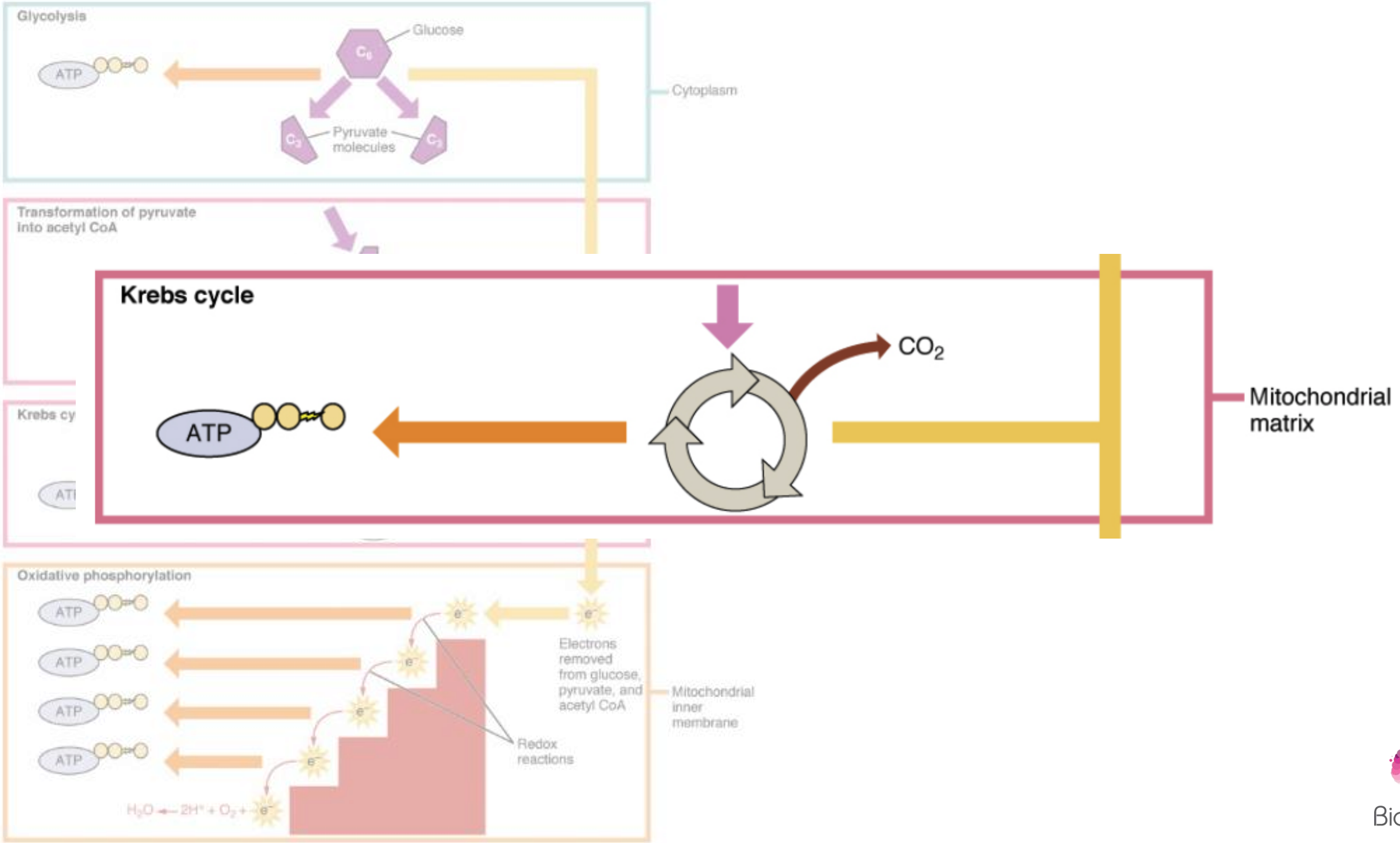
Biogenetix


Glycolysis
Glucose
C_6
ATP
Cytoplasm
C_3
Pyruvate molecules
C_3
Transformation of pyruvate into acetyl CoA
Glycolysis
Glucose
C_6
ATP
Cytoplasm
C_3
Pyruvate molecules
C_3
Krebs cycle
ATP
Oxidative phosphorylation
ATP
ATP
ATP
ATP
e⁻
e⁻
e⁻
e⁻
e⁻
Electrons removed from glucose, pyruvate, and acetyl CoA
Mitochondrial inner membrane
Redox reactions
$H_2O \leftarrow 2H^+ + O_2 +$ e⁻

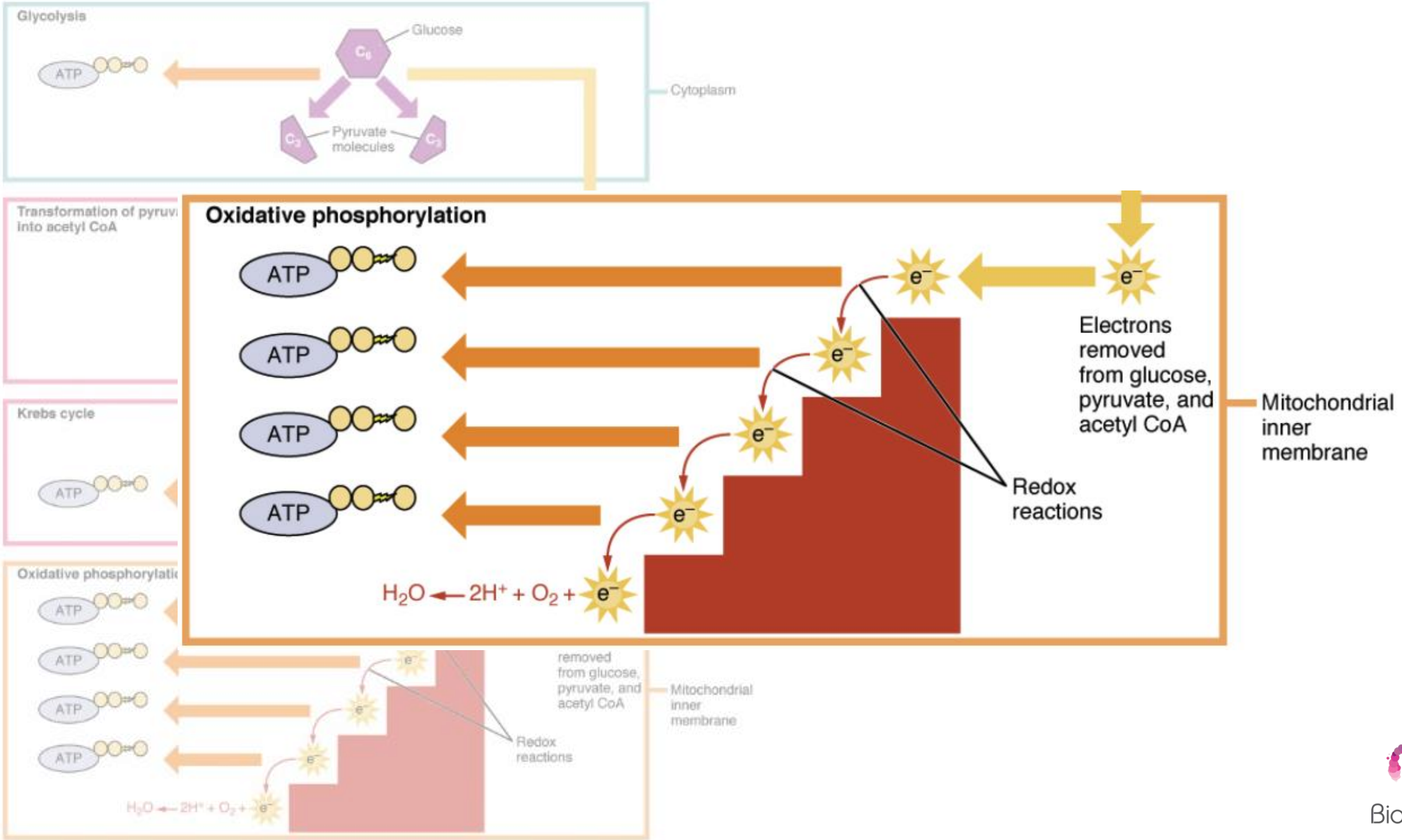
Biogenetix


Glycolysis
Glucose
ATP
Cytoplasm
Pyruvate molecules
Transformation of pyruvate into acetyl CoA
Krebs cycle
ATP
Transformation of pyruvate into acetyl CoA
Pyruvate
C_3
CO_2
Acetyl CoA
CoA
Mitochondrial matrix
Oxidative phosphorylation
ATP
ATP
ATP
ATP
Electrons removed from glucose, pyruvate, and acetyl CoA
Mitochondrial inner membrane
Redox reactions
H_2O ← $2H^+ + O_2$ +

Biogenetix

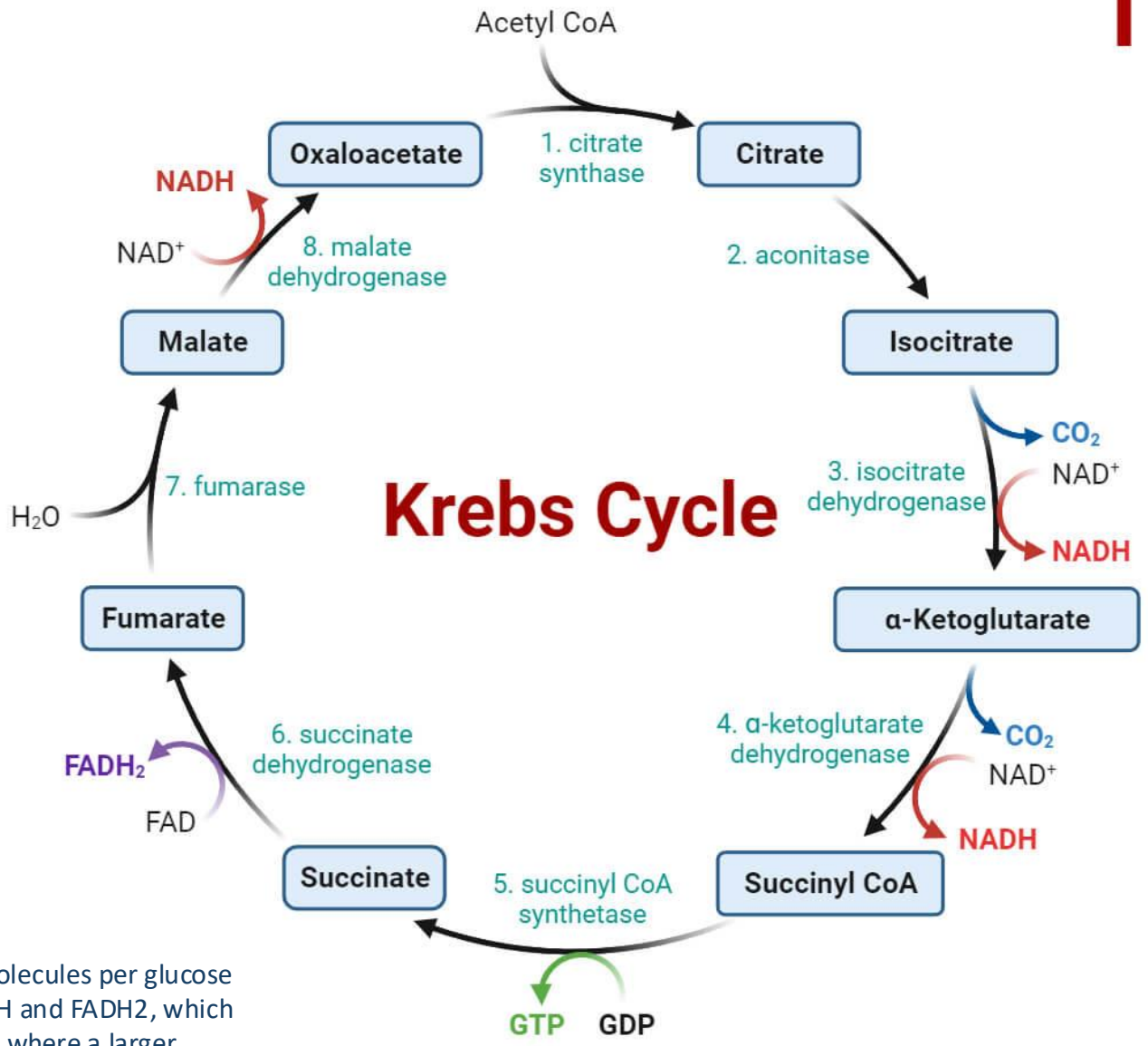

Glycolysis
Glucose
ATP
Cytoplasm
Pyruvate molecules
Transformation of pyruvate into acetyl CoA
Krebs cycle
CO_2
ATP
Mitochondrial matrix
Oxidative phosphorylation
ATP
ATP
ATP
ATP
Electrons removed from glucose, pyruvate, and acetyl CoA
Mitochondrial inner membrane
Redox reactions
$H_2O \leftarrow 2H^+ + O_2 +$

Biogenetix


Glycolysis
Glucose
ATP
Pyruvate molecules
Cytoplasm
Transformation of pyruvi into acetyl CoA
Krebs cycle
Oxidative phosphorylatio
Oxidative phosphorylation
ATP
ATP
ATP
ATP
e⁻
e⁻
e⁻
e⁻
e⁻
e⁻
H₂O ← 2H⁺ + O₂ +
Electrons removed from glucose, pyruvate, and acetyl CoA
Redox reactions
Mitochondrial inner membrane

Biogenetix

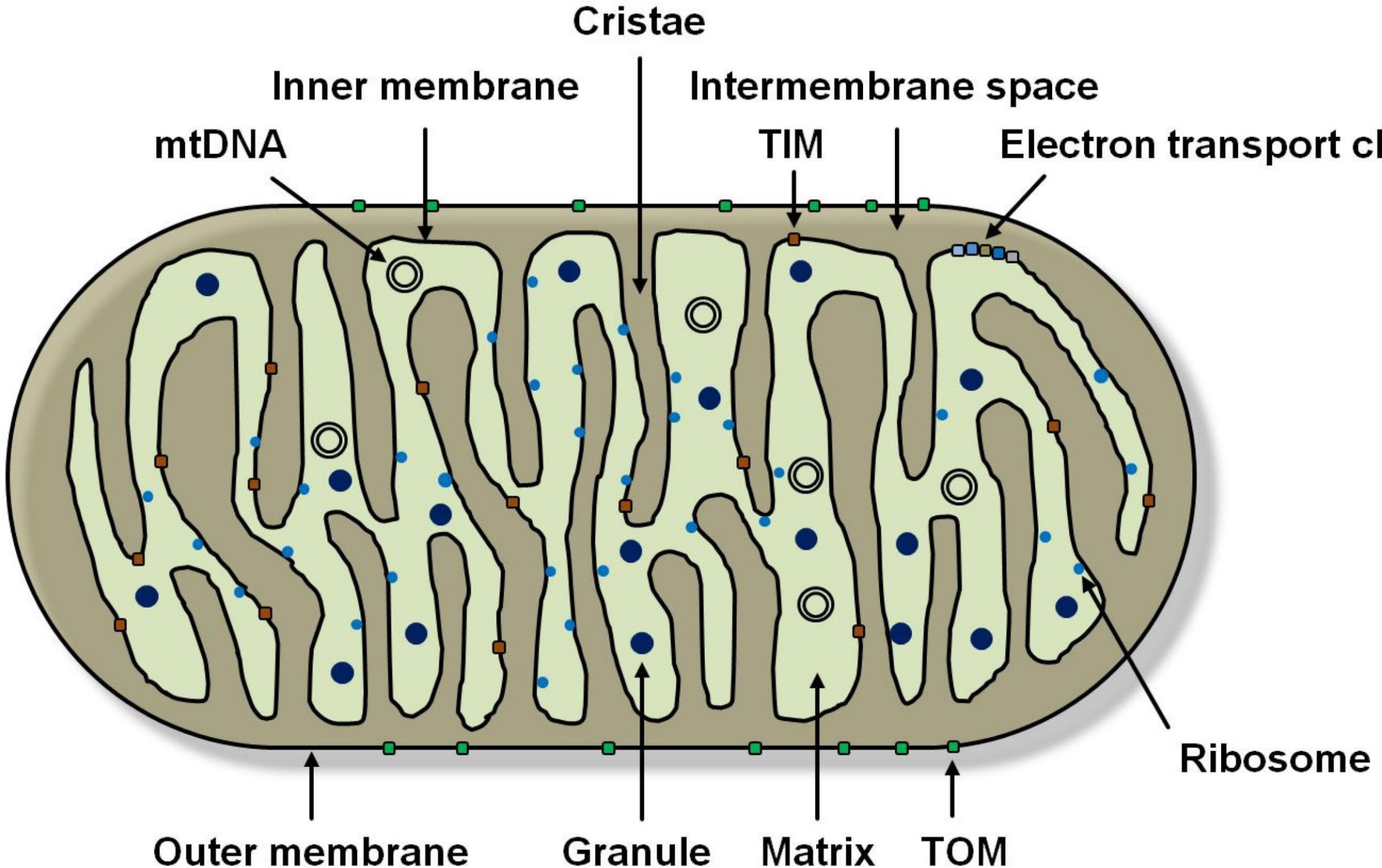
TCA Cycle



Products (Each Cycle)
1 ATP (GTP)
3 NADH
1 $FADH_2$
2 CO_2

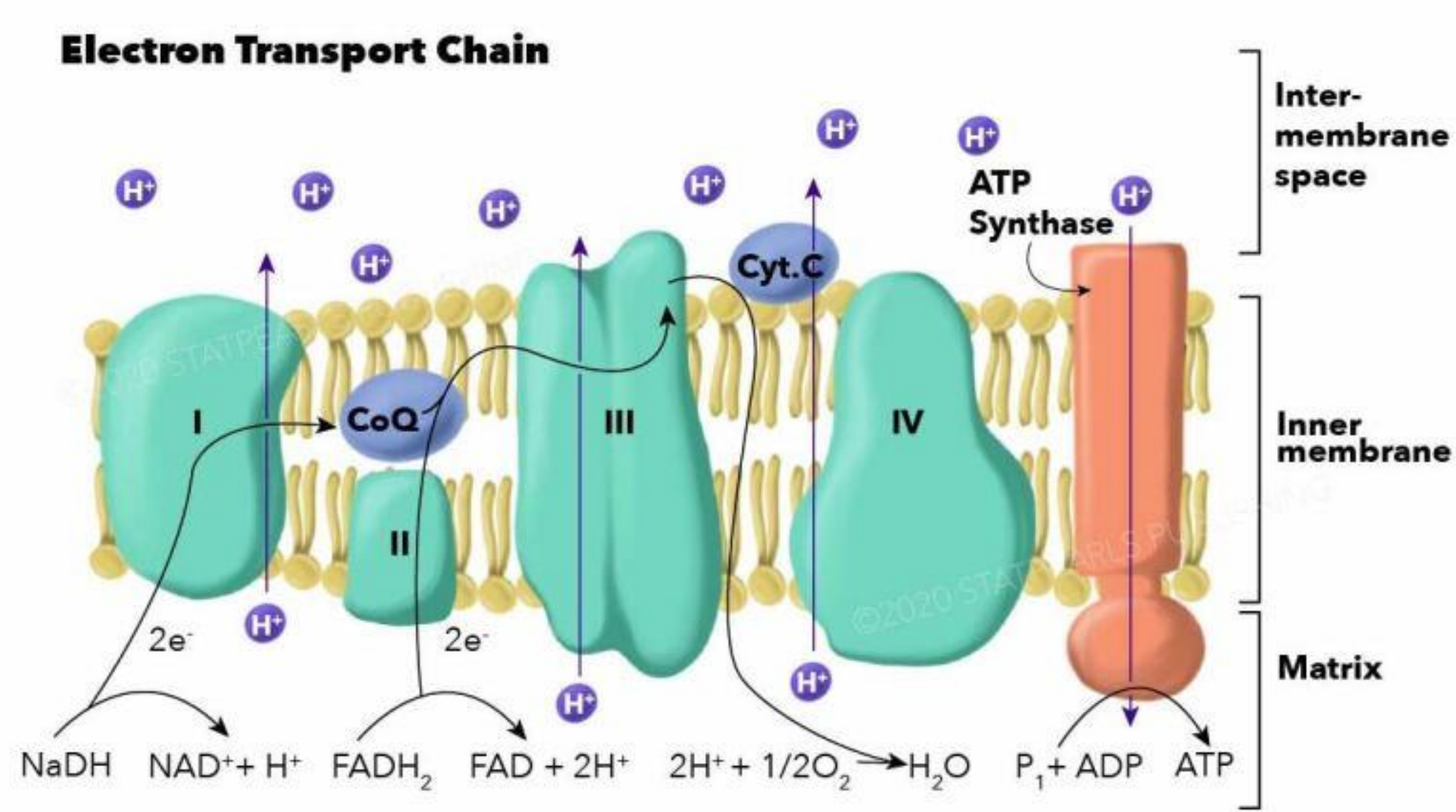
The Krebs cycle directly produces 2 ATP molecules per glucose molecule. However, it also generates NADH and FADH2, which are crucial for the electron transport chain where a larger amount of ATP is produced. While the complete oxidation of a glucose molecule in cellular respiration can yield up to 38 ATP, the Krebs cycle's direct contribution is 2 ATP.

https://microbenotes.com/wp-content/uploads/2023/09/Krebs-Cycle-1.jpeg



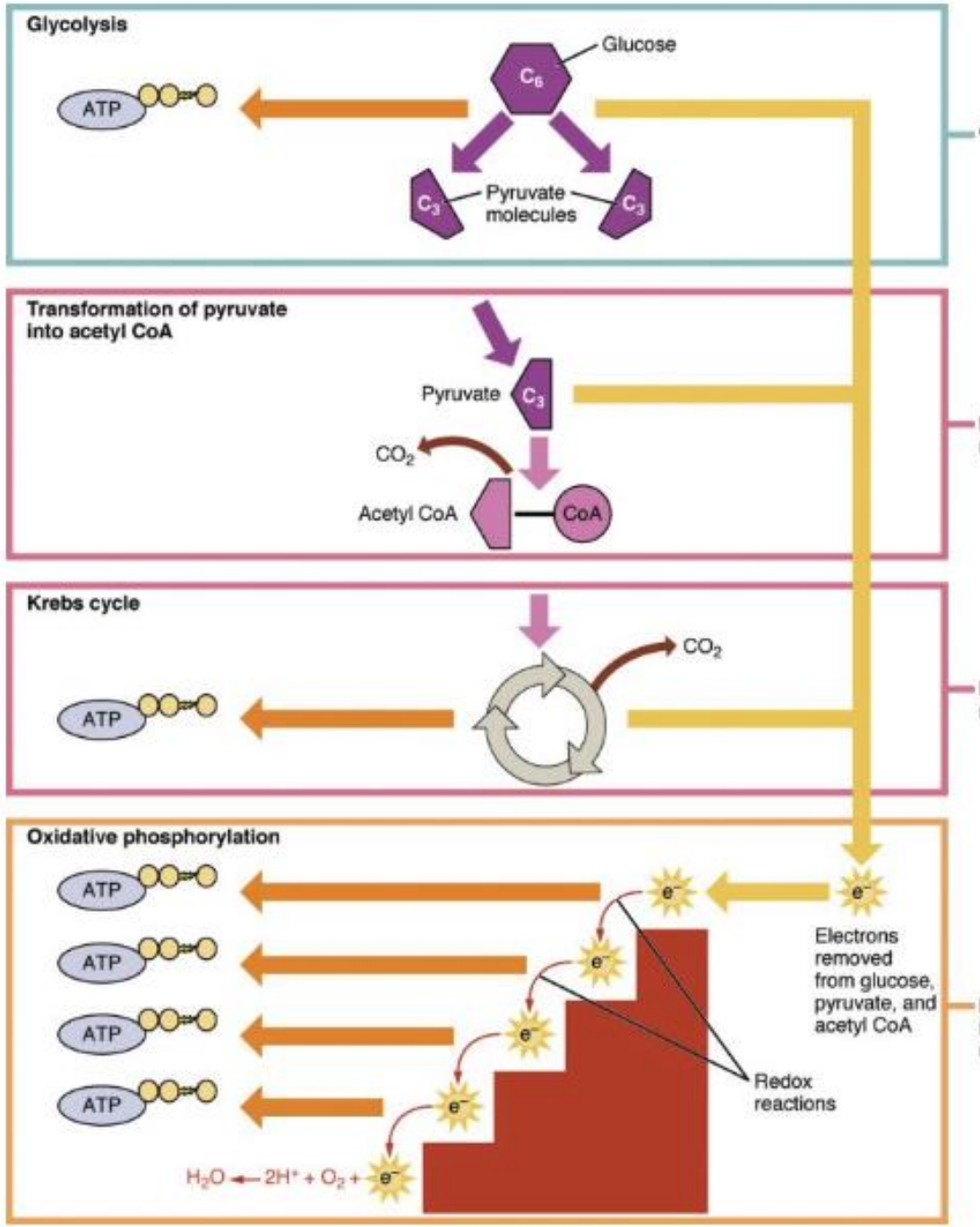
Biogenetix

https://pub.mdpi-res.com/cimb/cimb-45-00250/article_deploy/html/images/cimb-45-00250-g001.png?1683018752



https://www.ncbi.nlm.nih.gov/books/NBK526105/bin/Electron_Transport_Chain__2.jpg

Biogenetix



2 ATP, e-

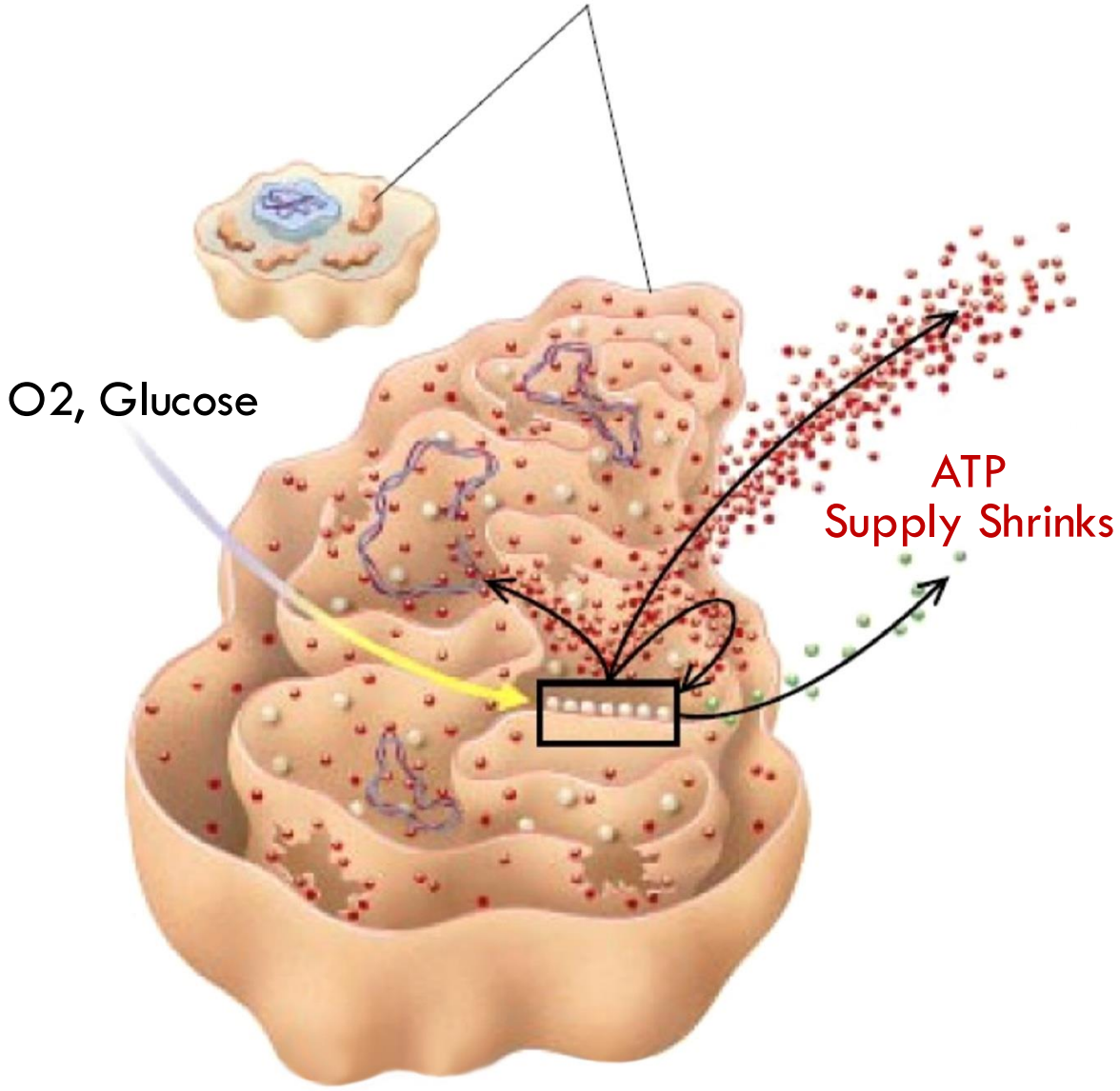
CO2, e-

CO2, e-

36 ATP

Biogenetix

Damaged Mitochondria in
Distressed Old Cell



Biogenetix

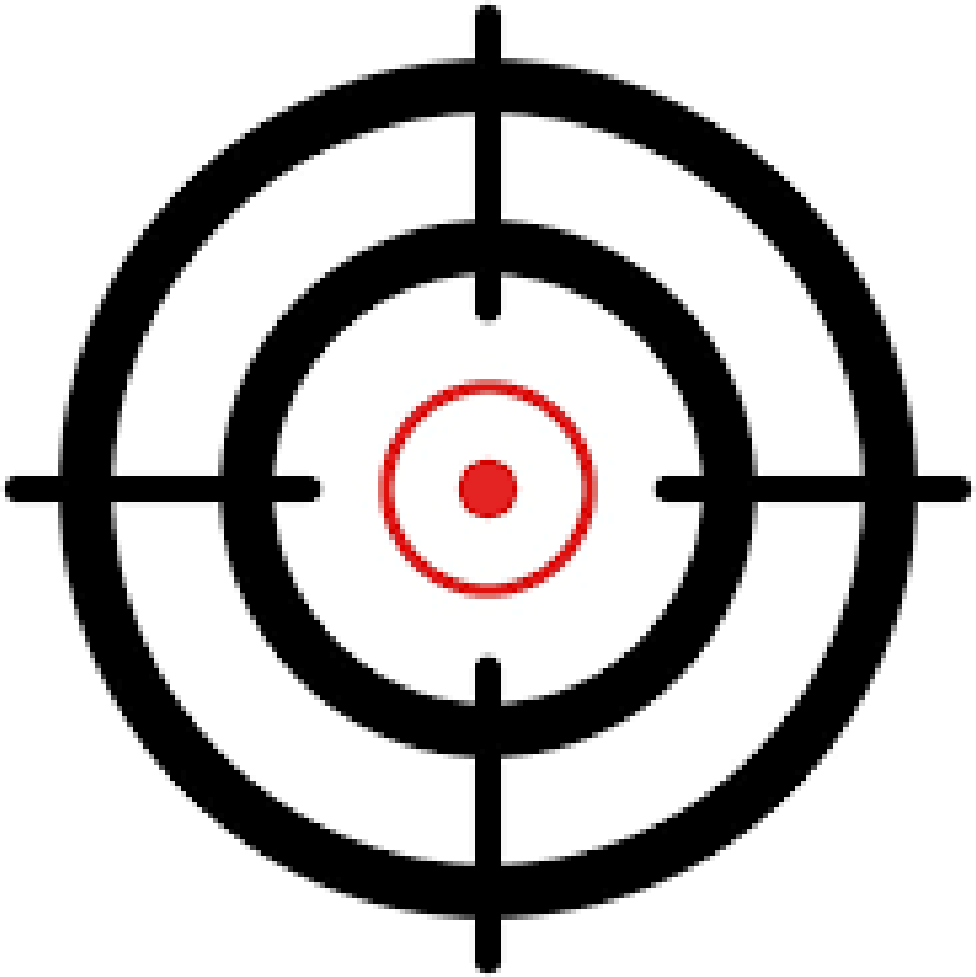
What is broken?

Where is it broken?

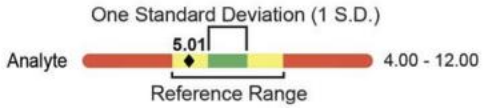
What interventions can we participate in?

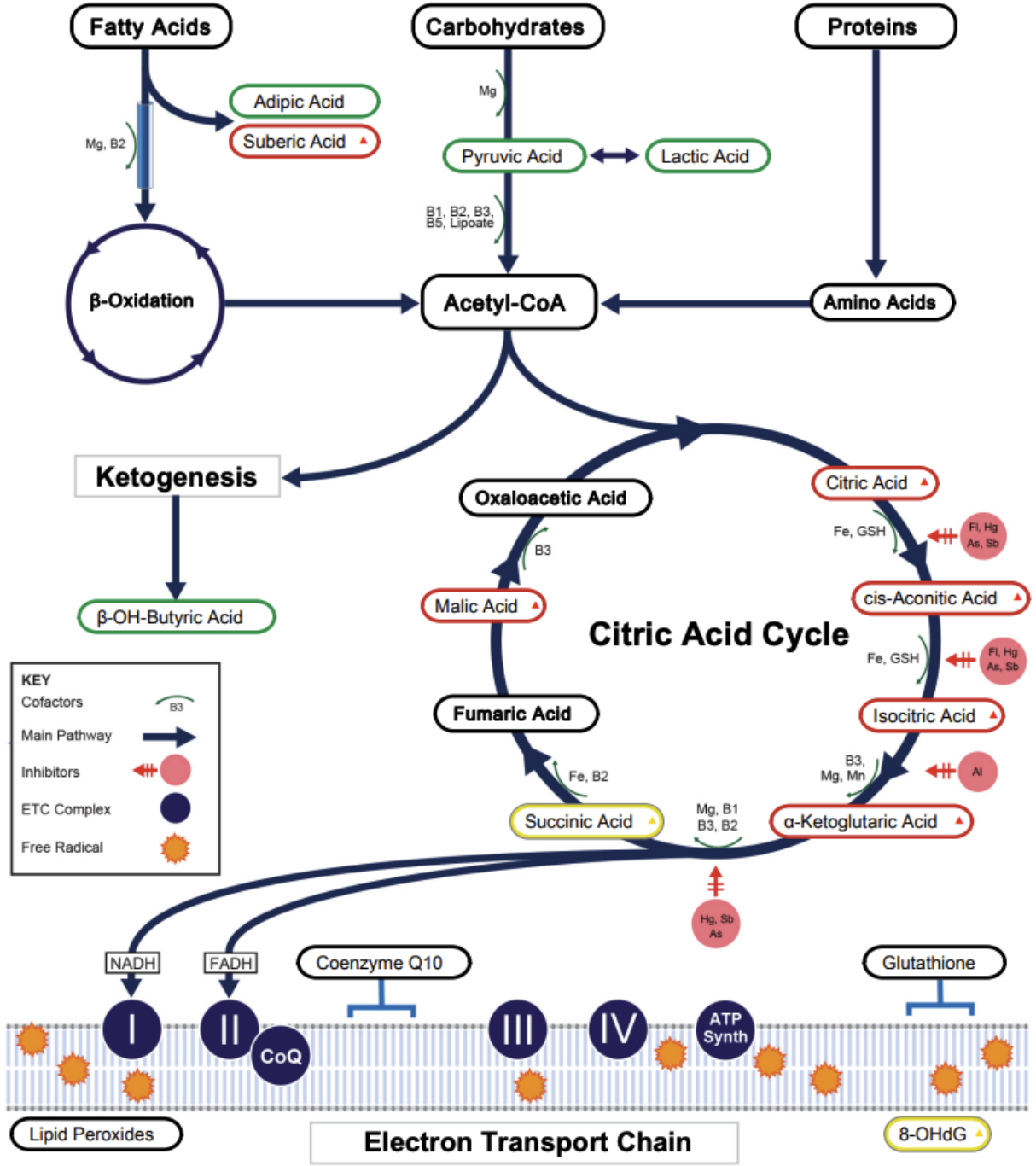
What results are we expecting?

How to maintain?



Biogenetix


One Standard Deviation (1 S.D.)
Analyte
5.01
4.00 - 12.00
Reference Range


Fatty Acids
Carbohydrates
Proteins
Adipic Acid
Suberic Acid
Mg, B2
Mg
Pyruvic Acid
Lactic Acid
B1, B2, B3, B5, Lipoate
β-Oxidation
Acetyl-CoA
Amino Acids
Ketogenesis
β-OH-Butyric Acid
Oxaloacetic Acid
B3
Malic Acid
Citric Acid
Fe, GSH
Fl, Hg As, Sb
cis-Aconitic Acid
Citric Acid Cycle
Isocitric Acid
B3, Mg, Mn
Al
α-Ketoglutaric Acid
Mg, B1 B3, B2
Succinic Acid
Fe, B2
Fumaric Acid
KEY
Cofactors
Main Pathway
Inhibitors
ETC Complex
Free Radical
Hg, Sb As
NADH
FADH
Coenzyme Q10
Glutathione
I
II
CoQ
III
IV
ATP Synth
Lipid Peroxides
Electron Transport Chain
8-OHdG

Biogenetix