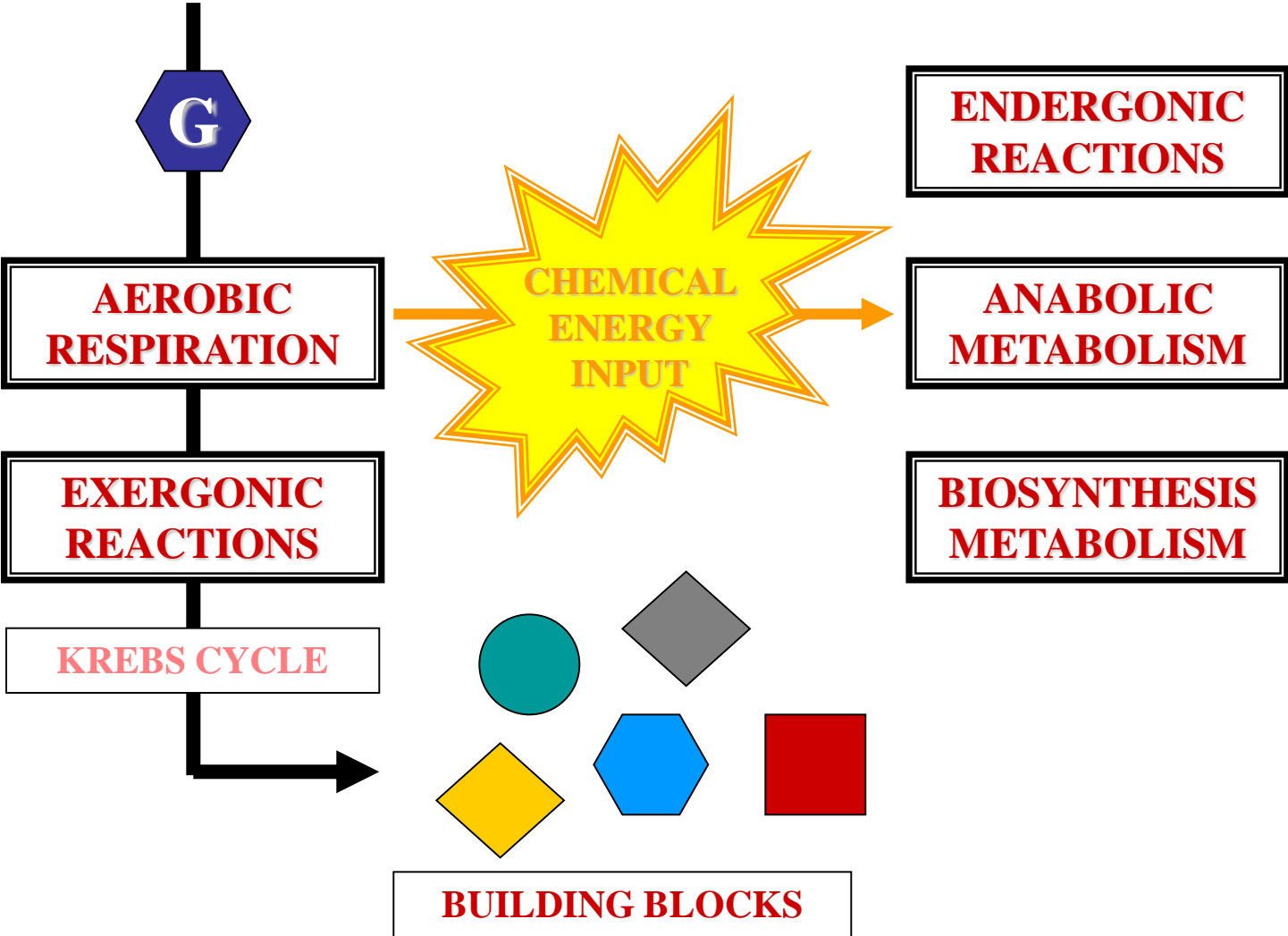




METABOLISM

GLUCOSE

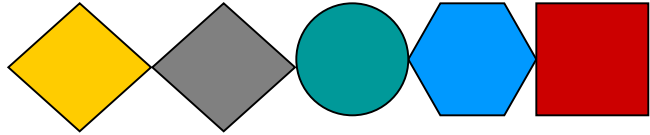




METABOLISM

GLUCOSE

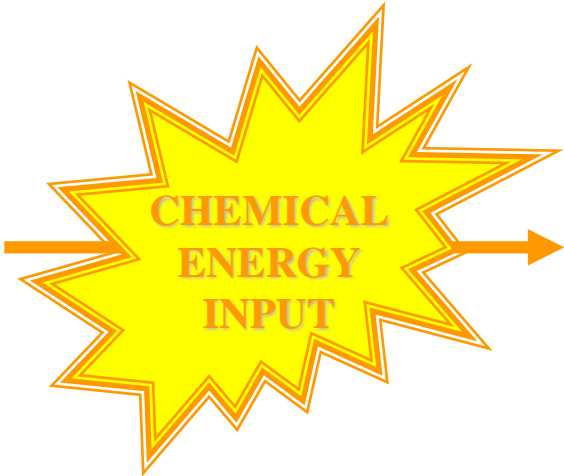
COMPLEX BIO-CHEM-CMPS



AEROBIC RESPIRATION

EXERGONIC REACTIONS

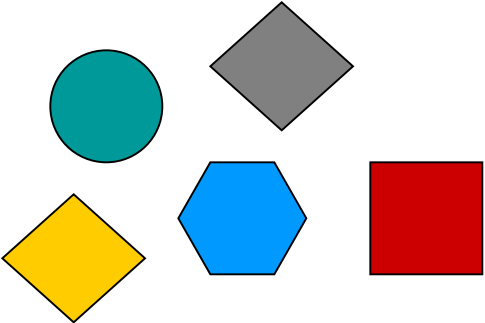
KREBS CYCLE



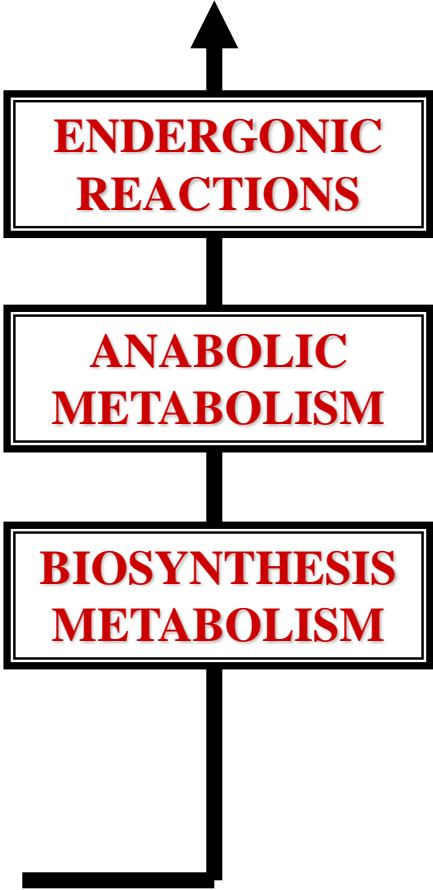
ENDERGONIC REACTIONS

ANABOLIC METABOLISM

BIOSYNTHESIS METABOLISM



BUILDING BLOCKS



***CELL
GROWTH
&
MAINTENANCE***



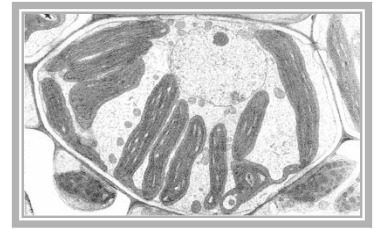
HOMEOSTASIS



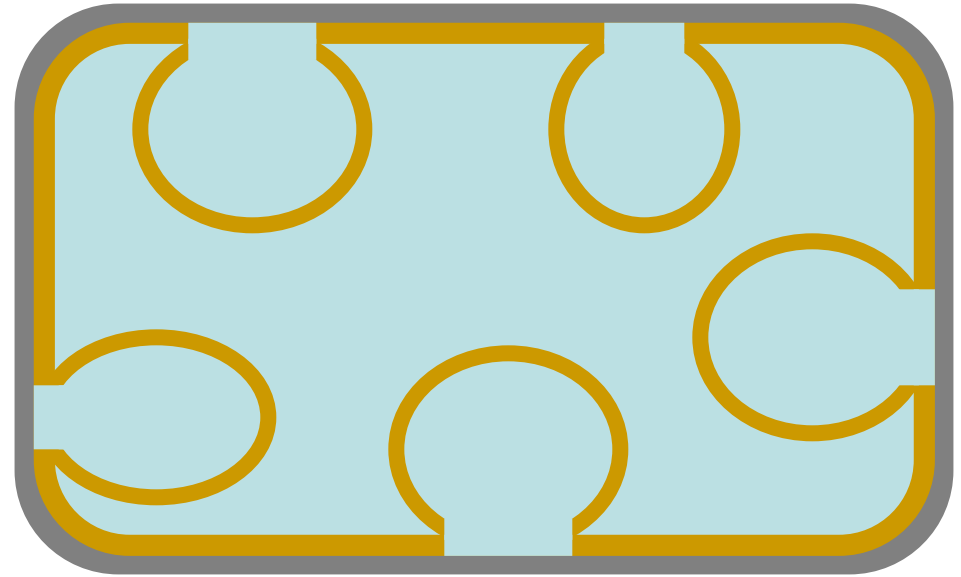
KREBS CYCLE SUMMARY



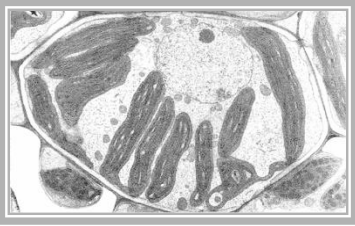
AEROBIC RESPIRATION



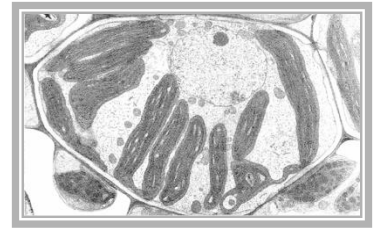
M



CELL



AEROBIC RESPIRATION

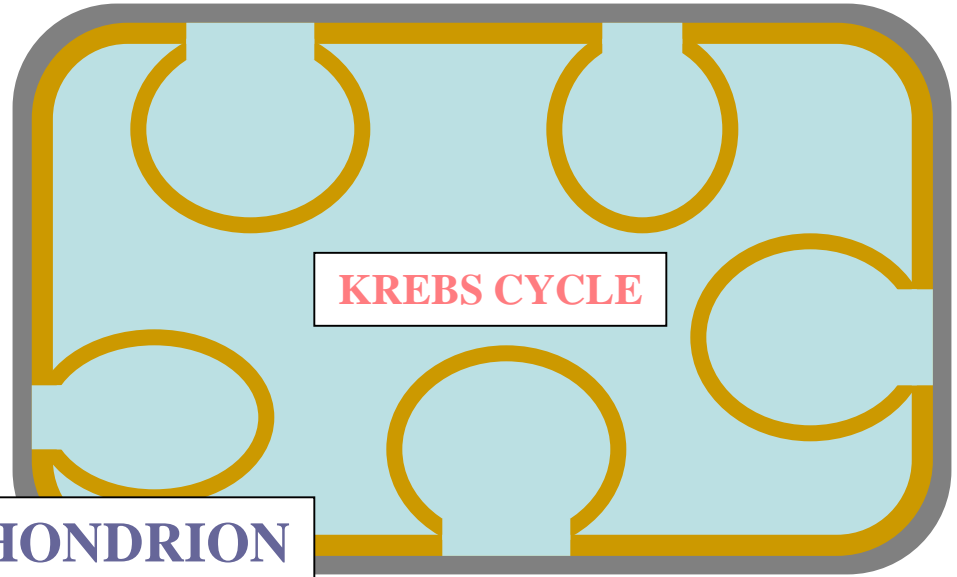


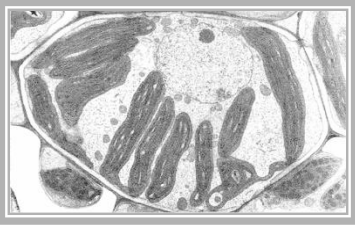
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MITOCHONDRION

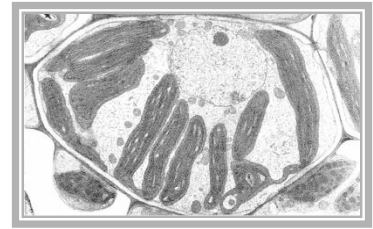
CELL

KREBS CYCLE





AEROBIC RESPIRATION



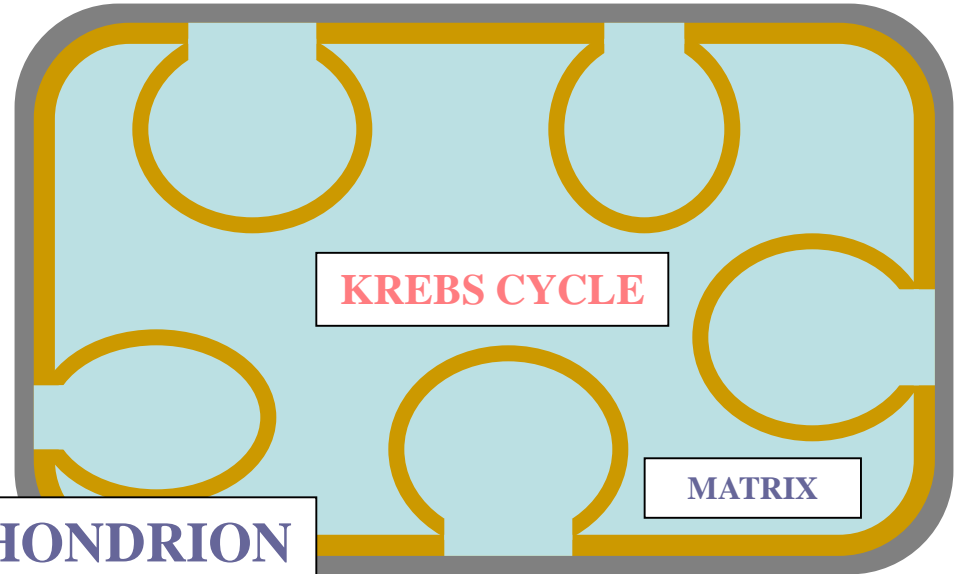
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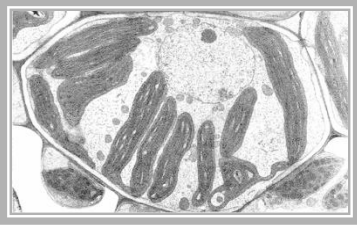
MITOCHONDRION

CELL

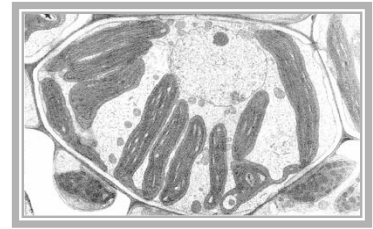
KREBS CYCLE

MATRIX

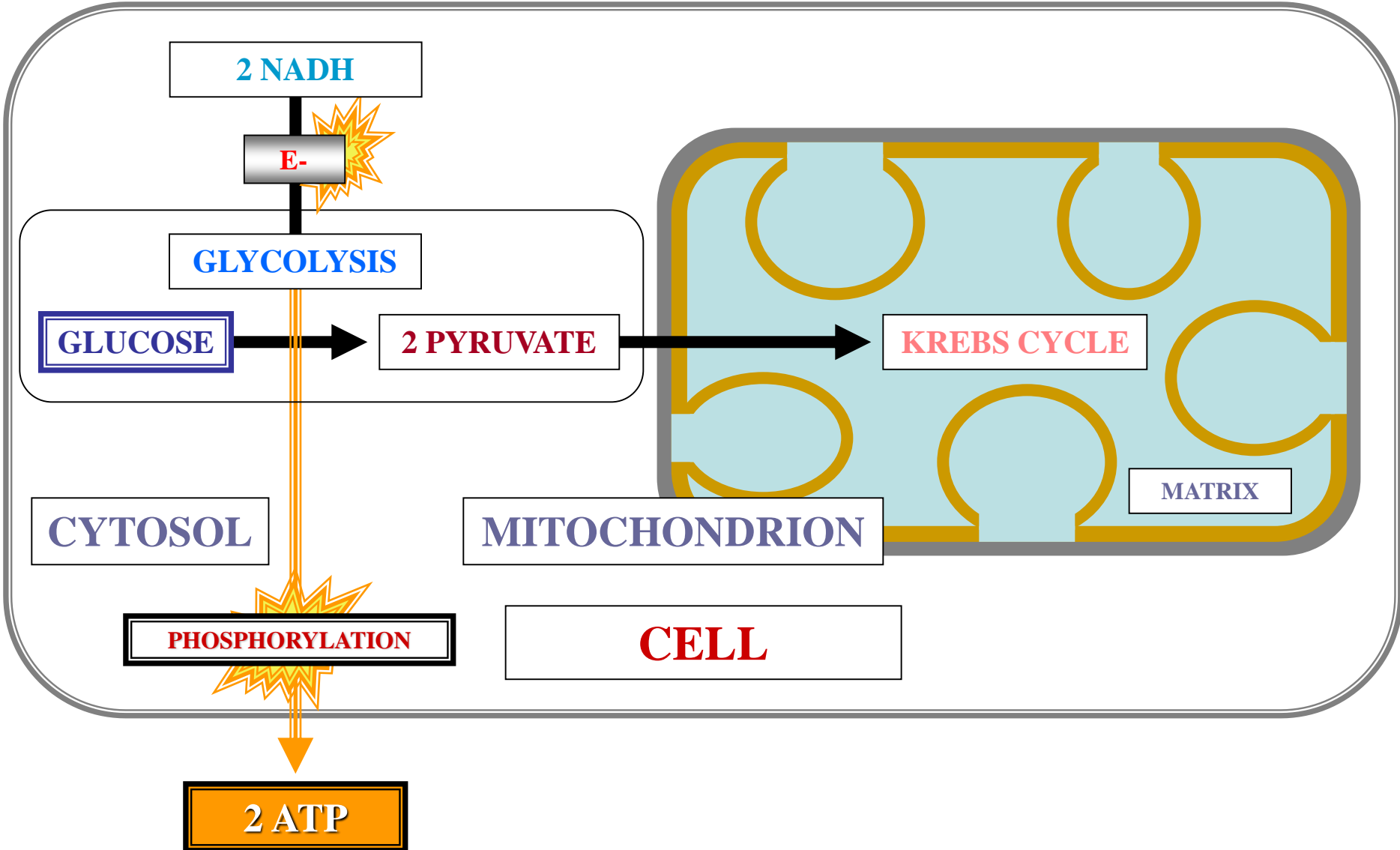


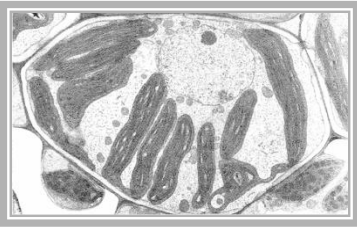


AEROBIC RESPIRATION

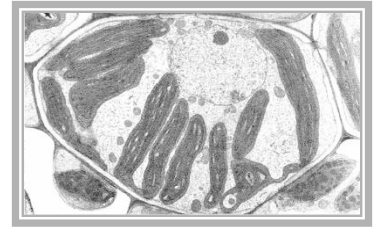


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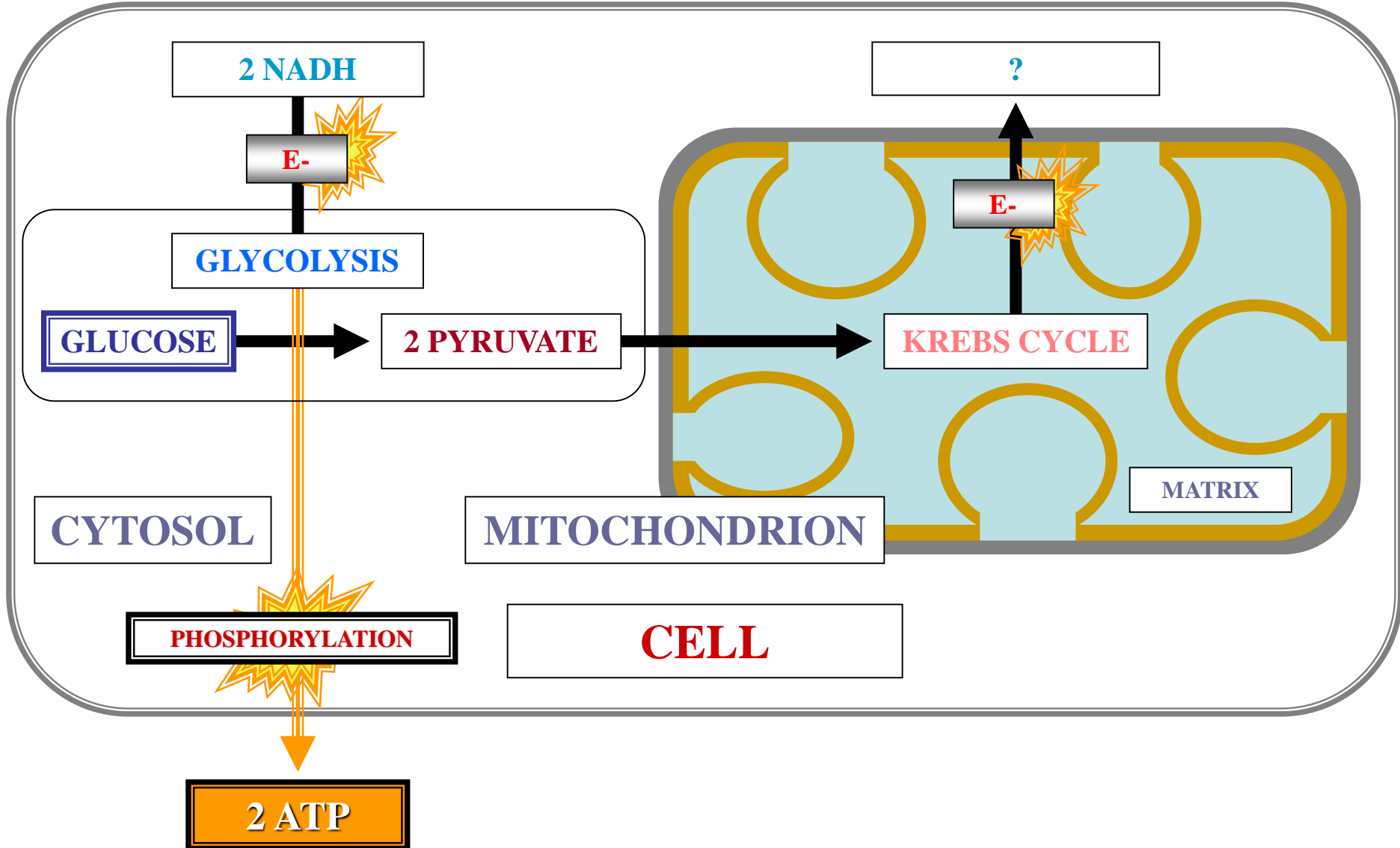


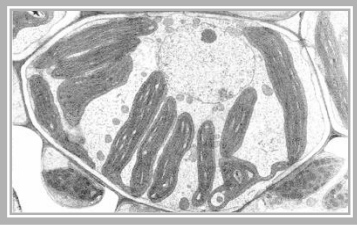


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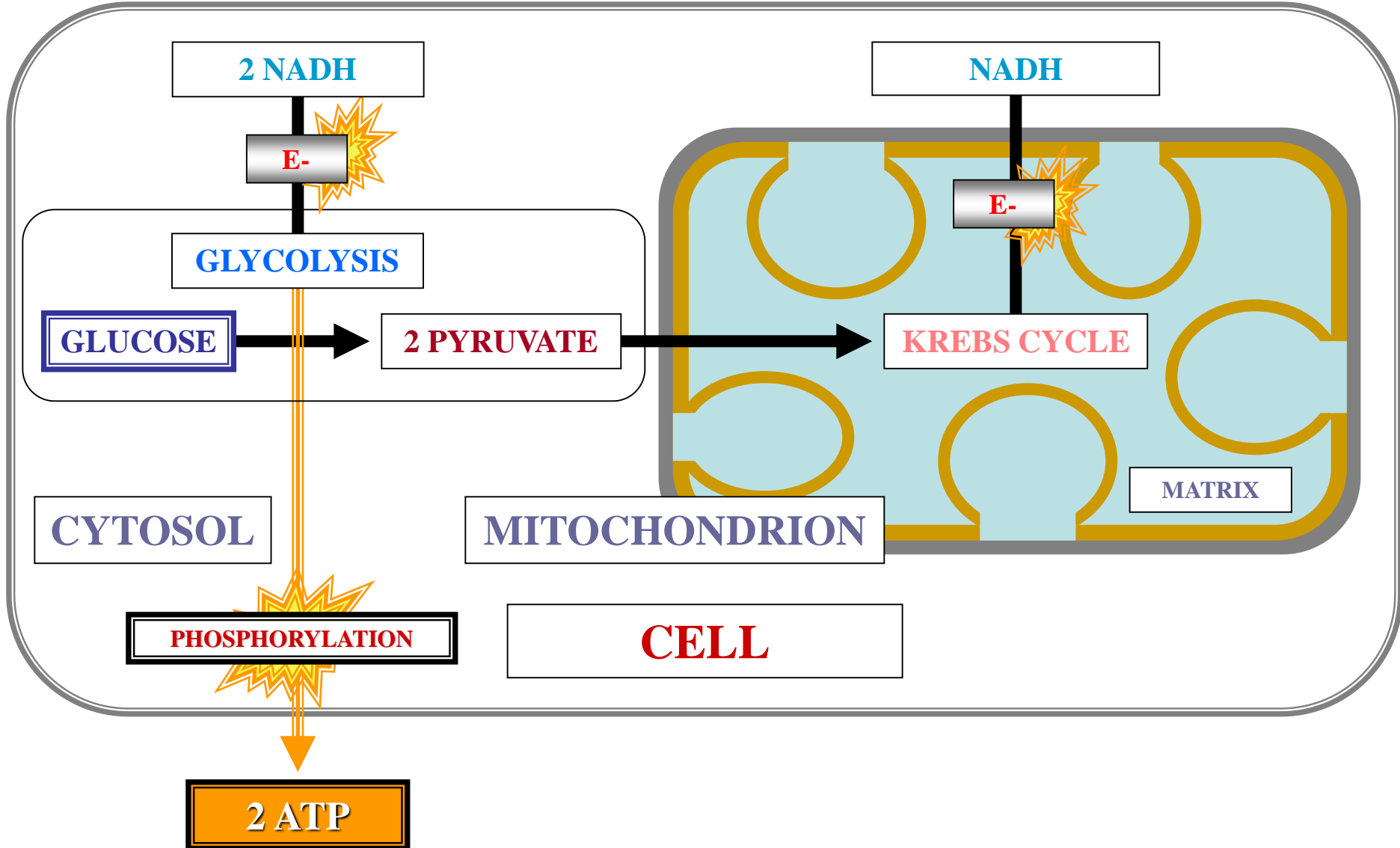
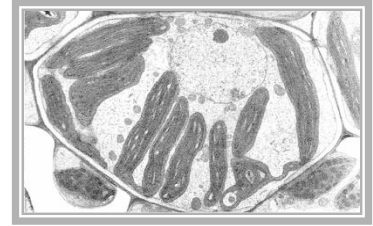


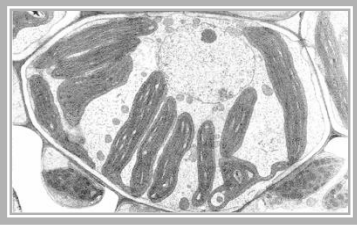
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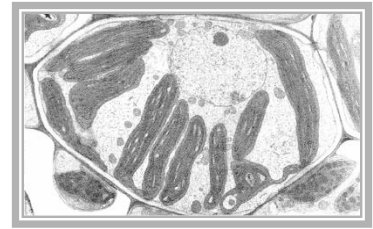


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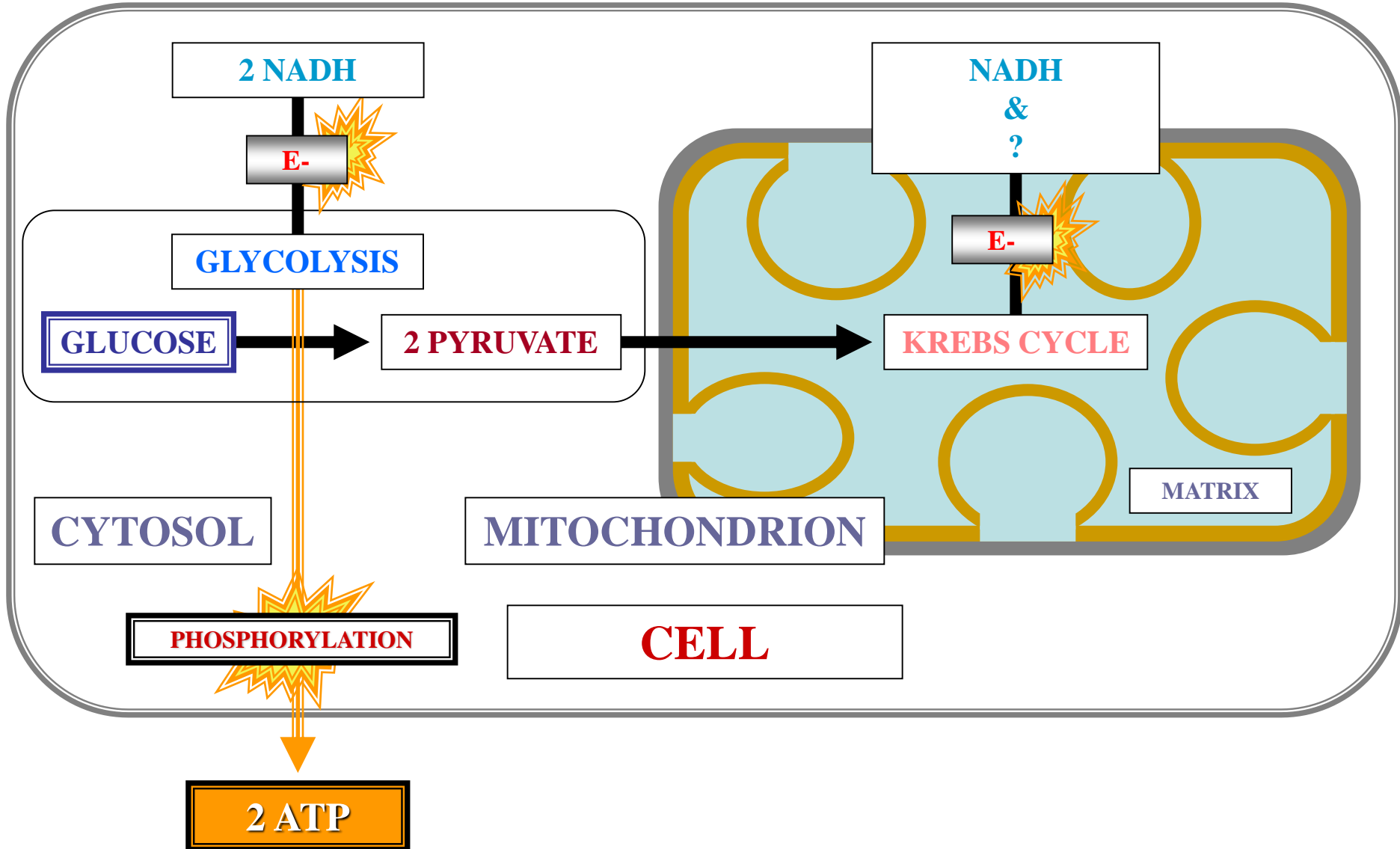


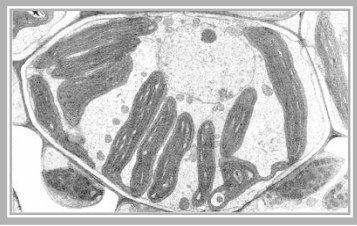
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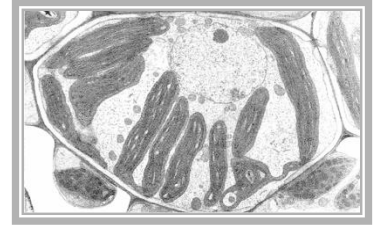
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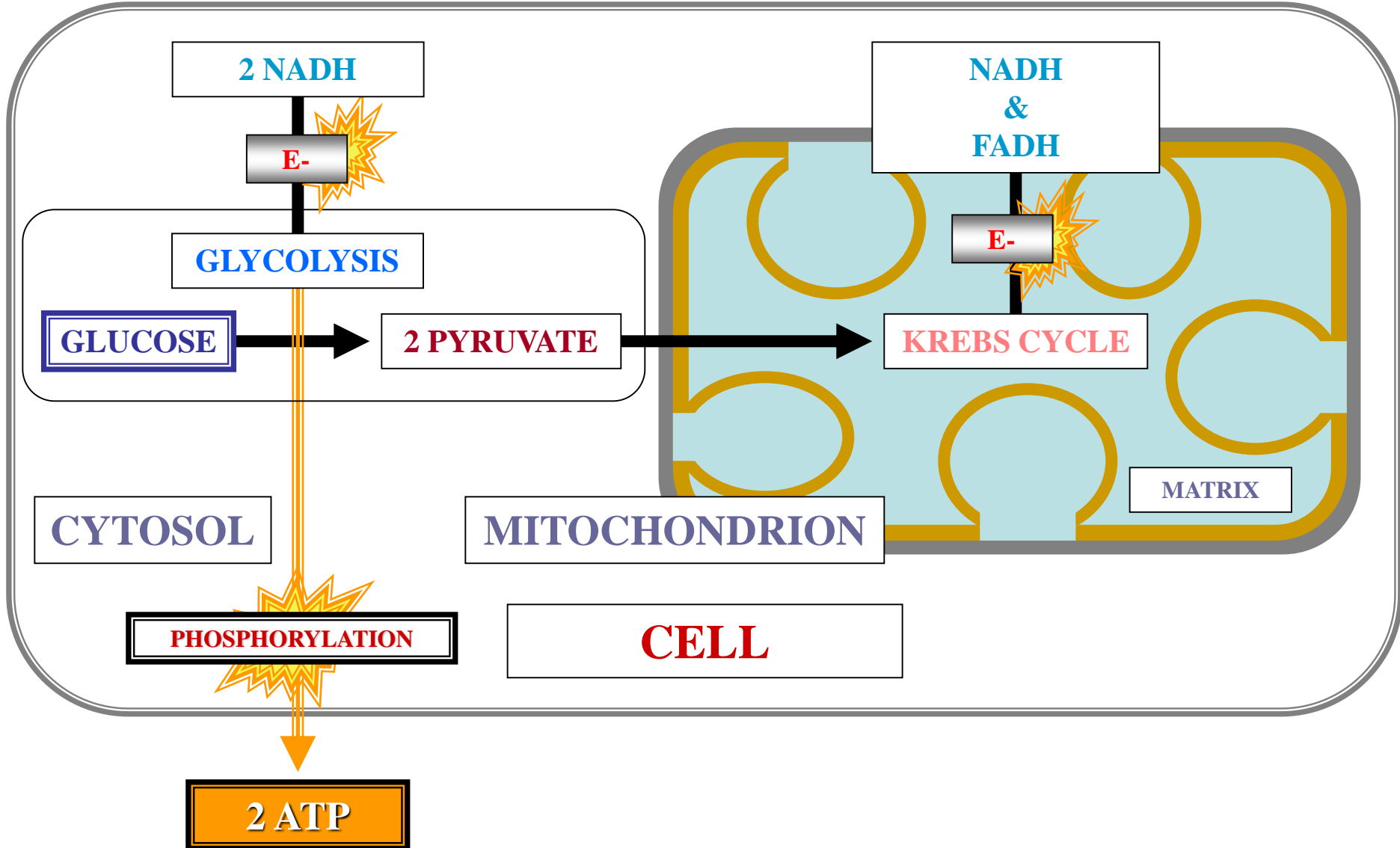


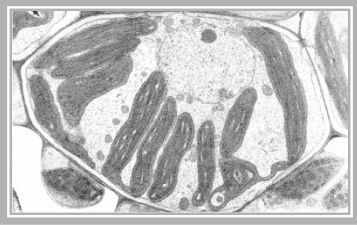
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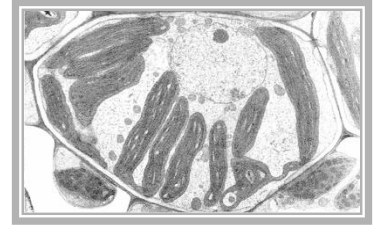
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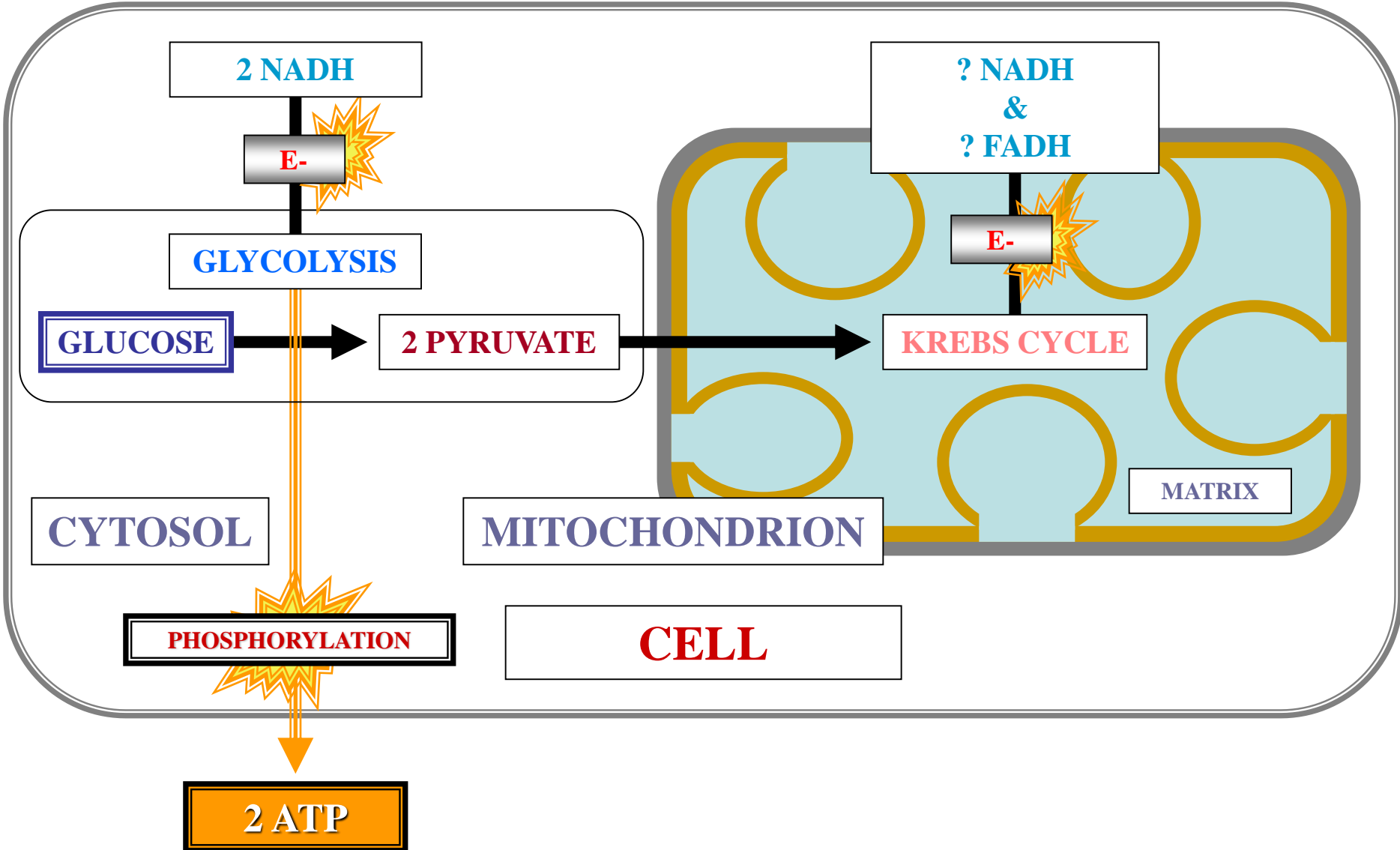


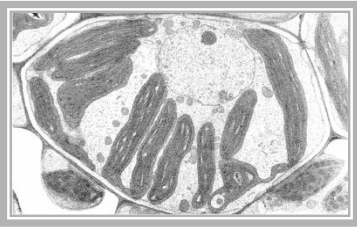
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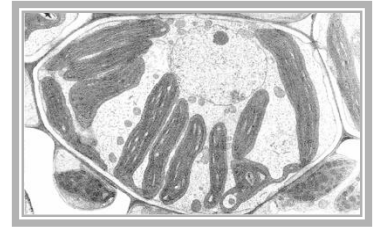
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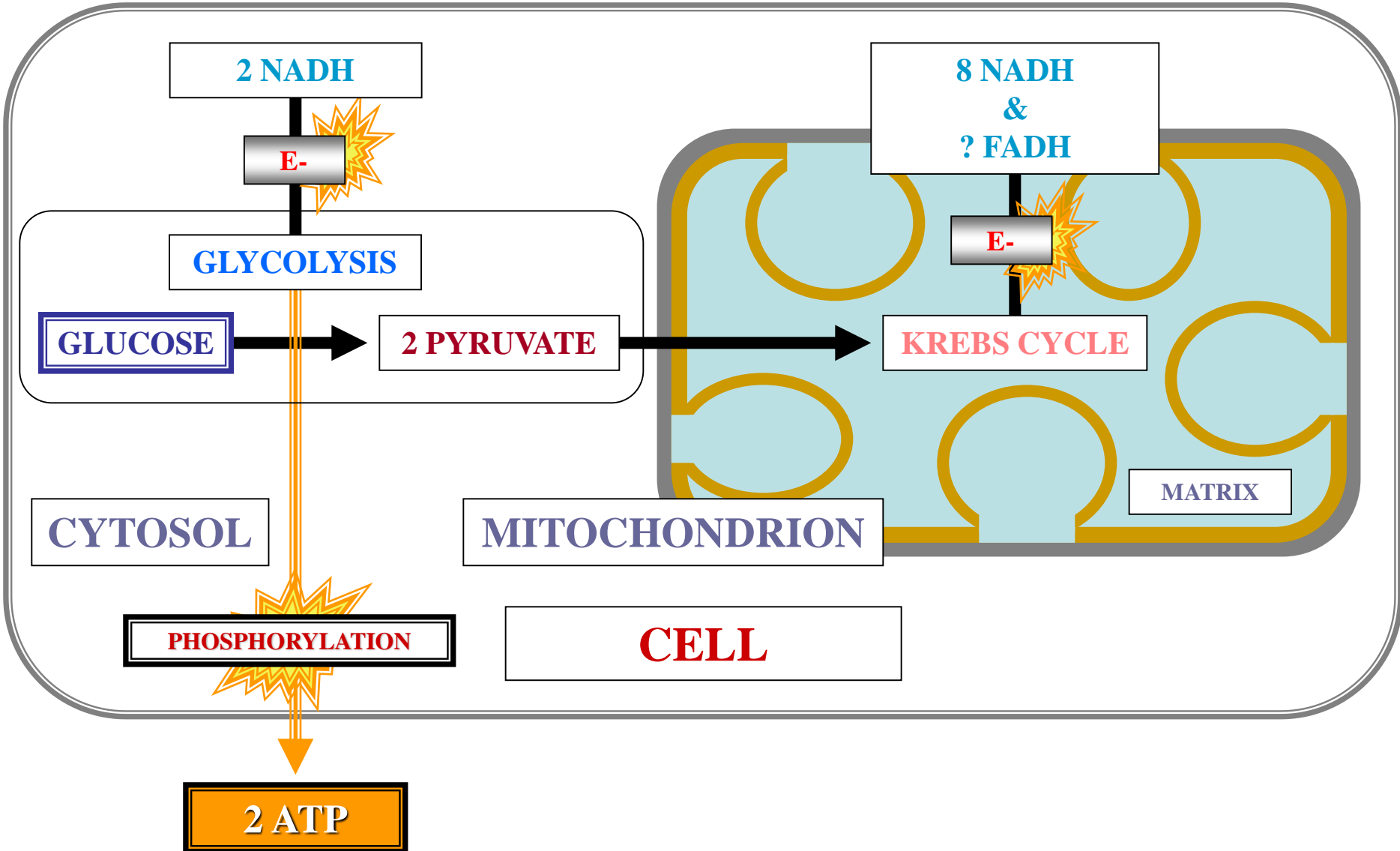


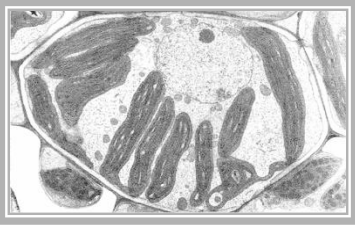
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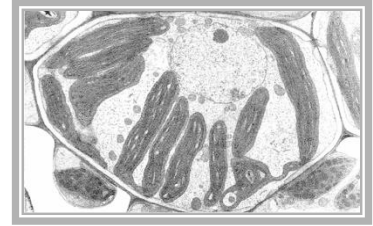
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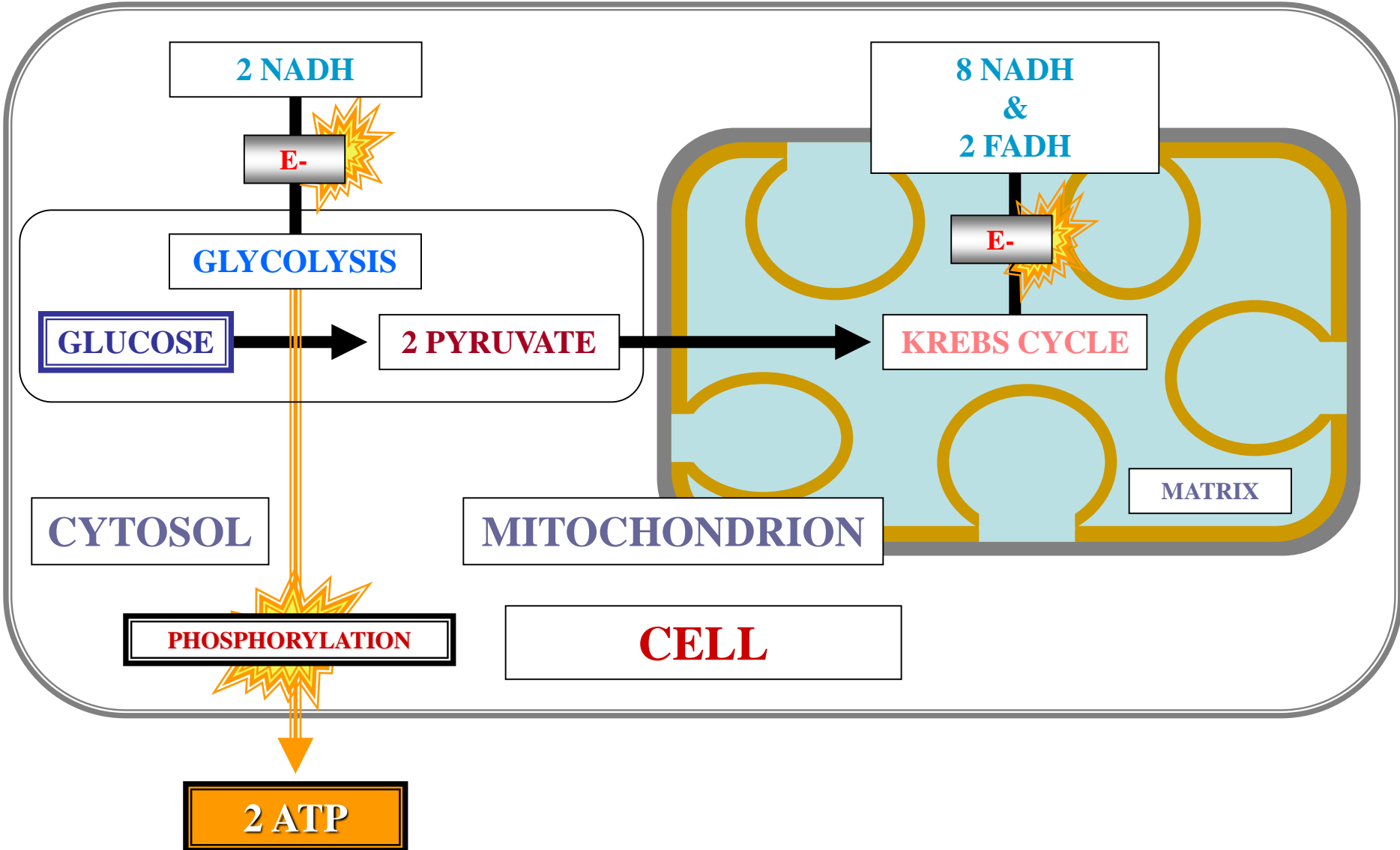


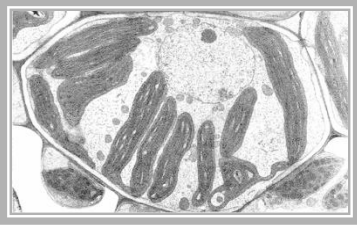


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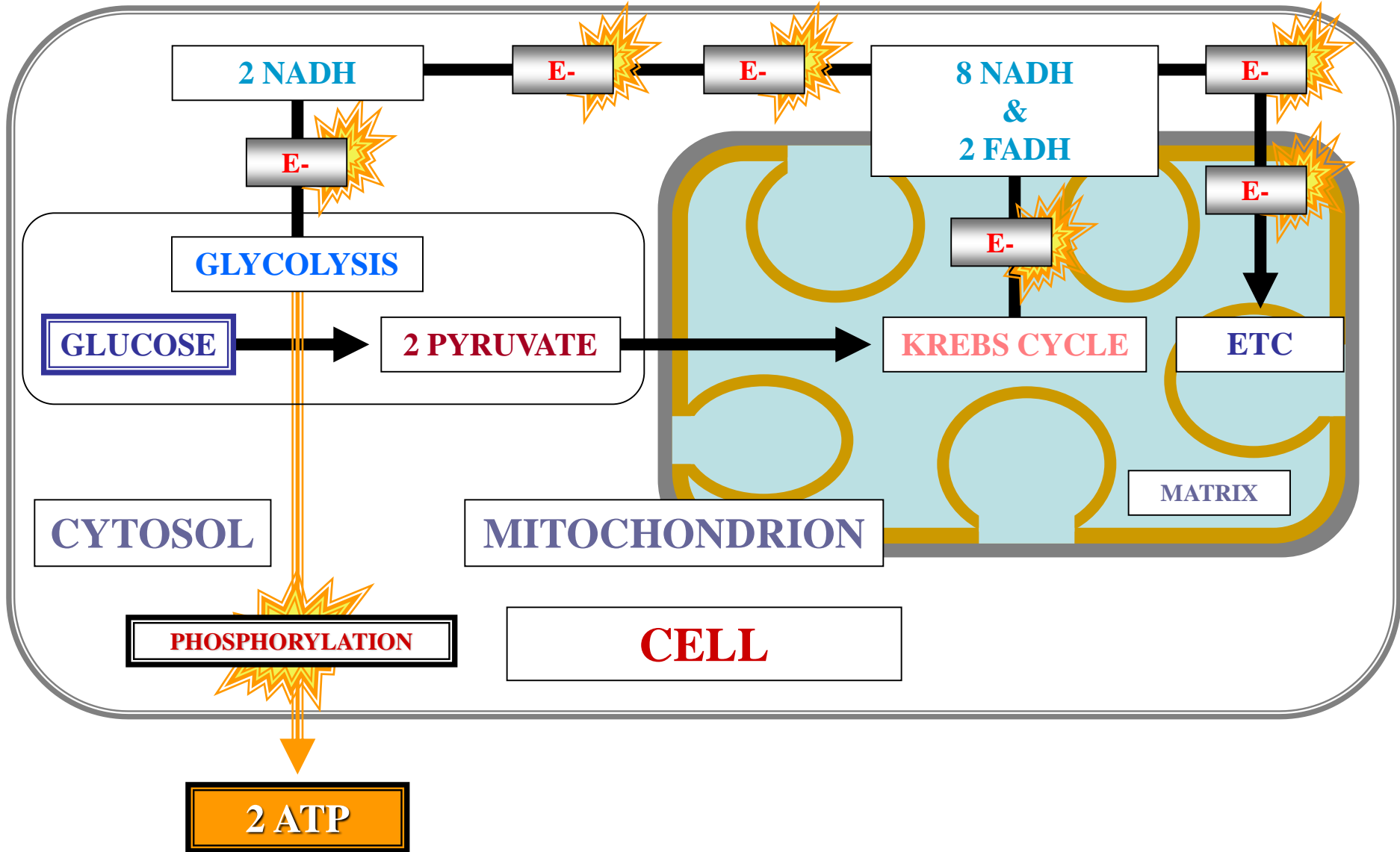
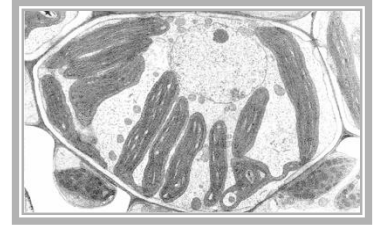


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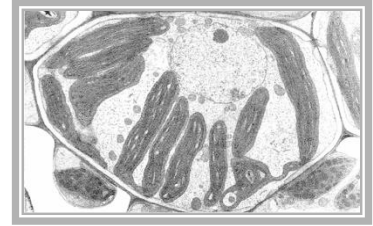
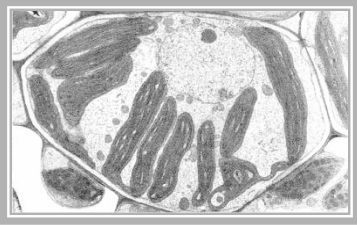




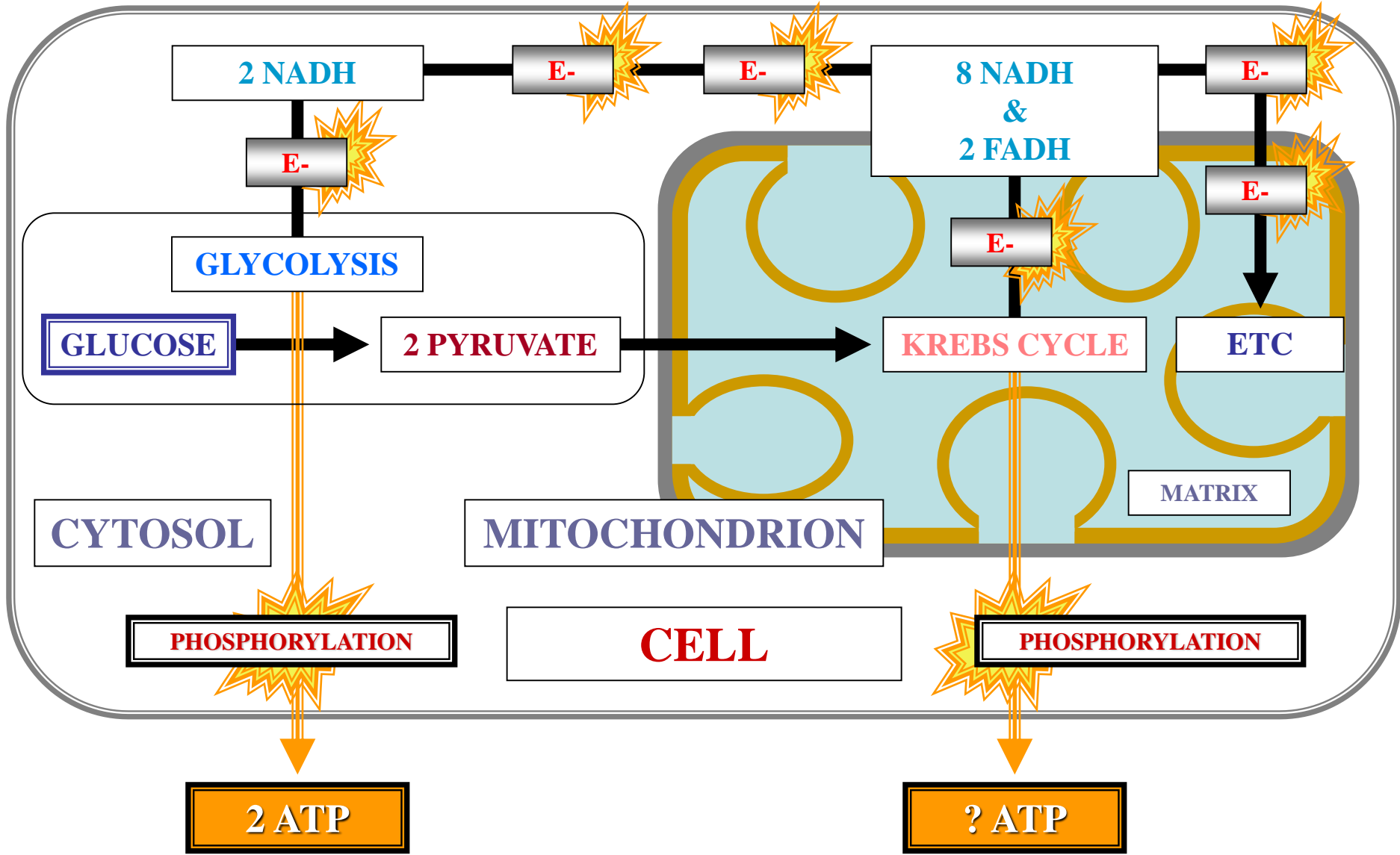
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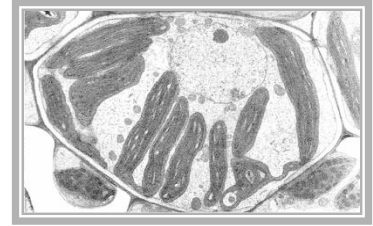
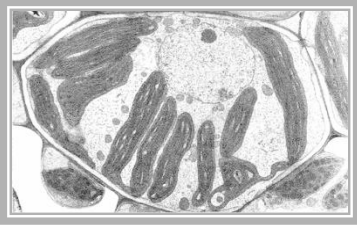
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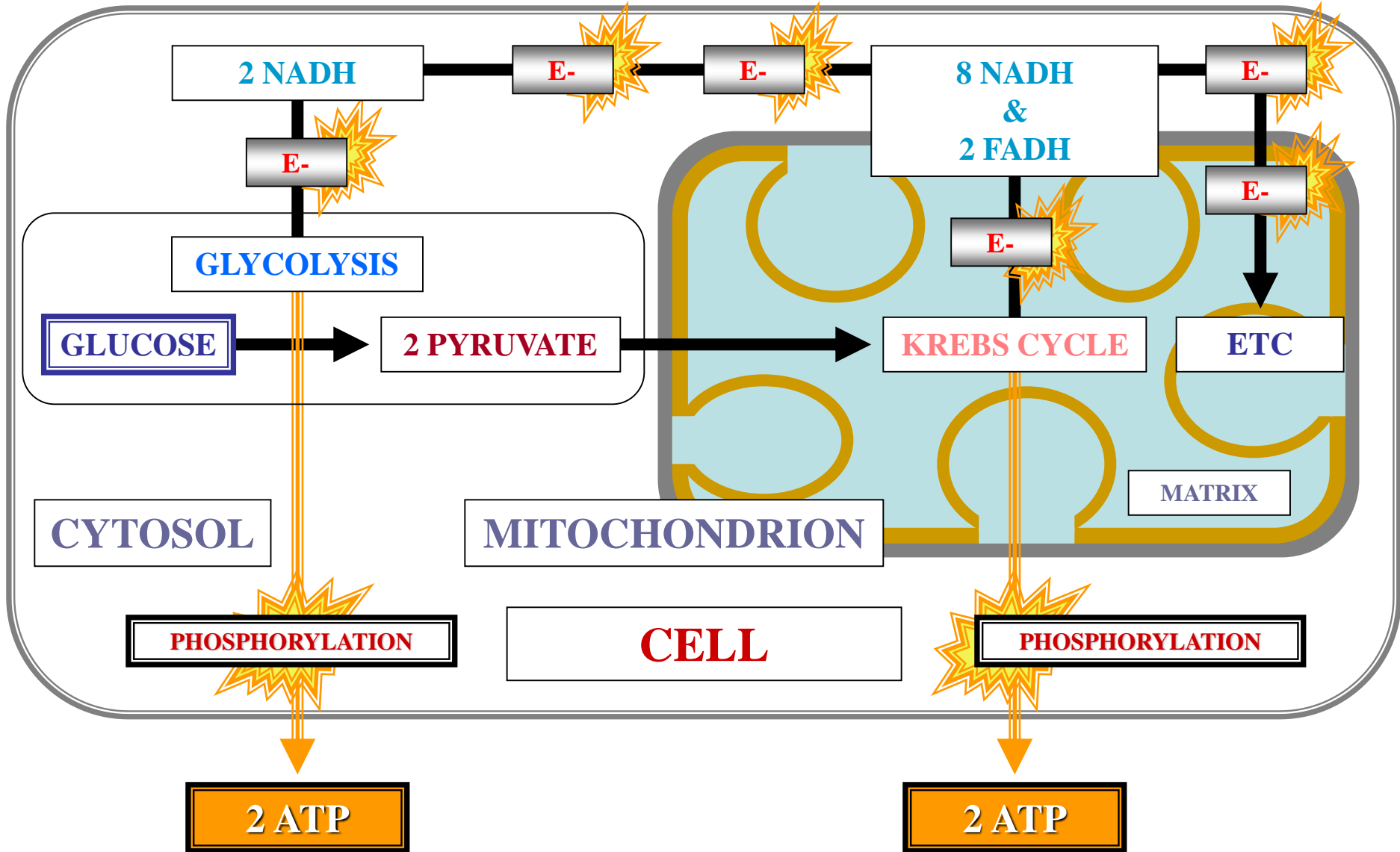
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AEROBIC RESPIRATION



P
D

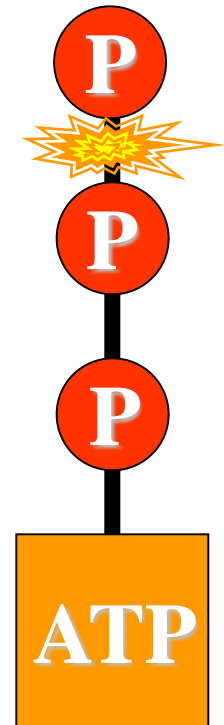


KREBS



SUBSTRATE PHOSPHORYLATION

**DIRECT ENZYME
SUBSTRATE
PHOSPHORYLATION**

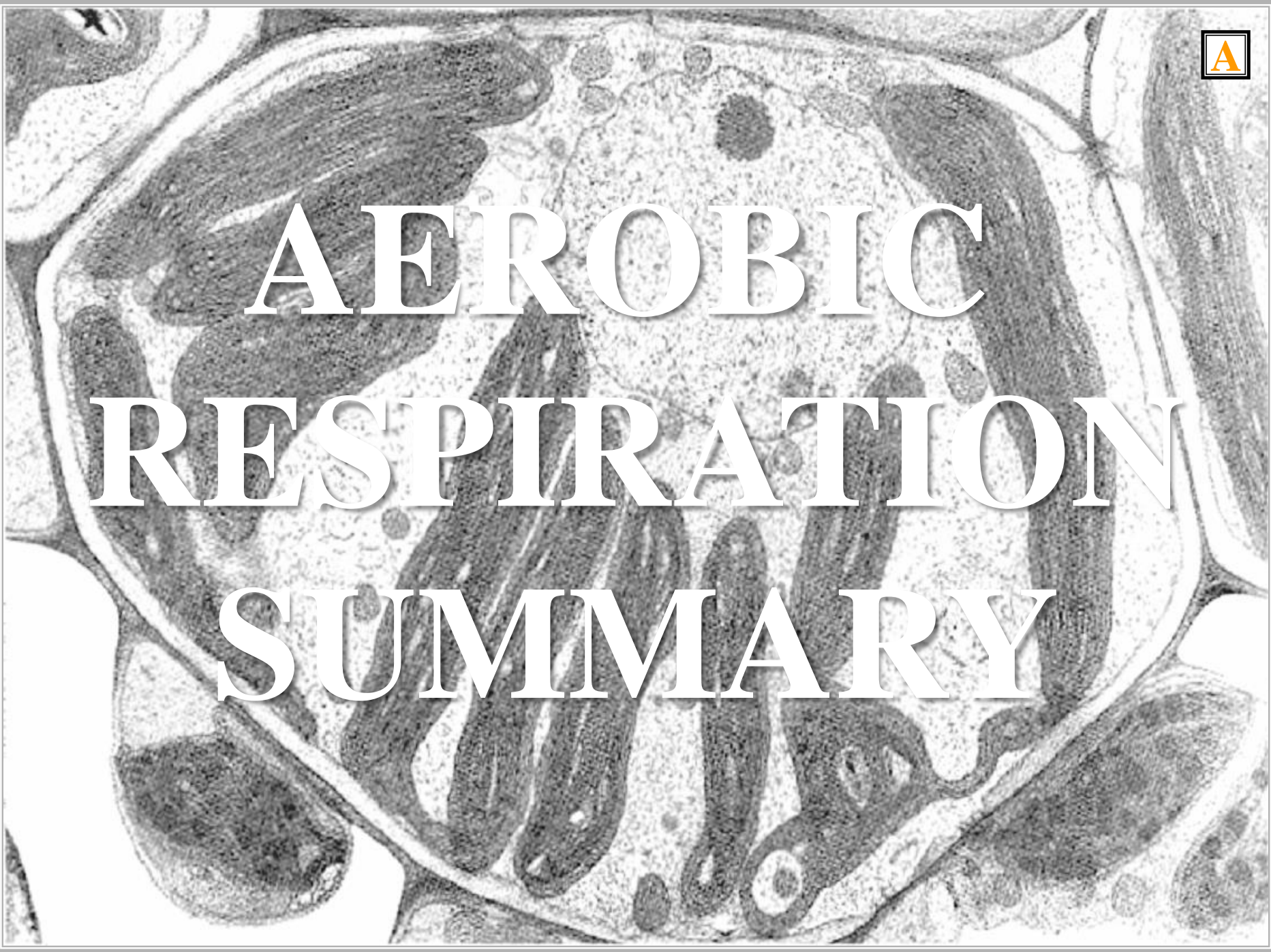


!!!ETC: ABSENT!!!

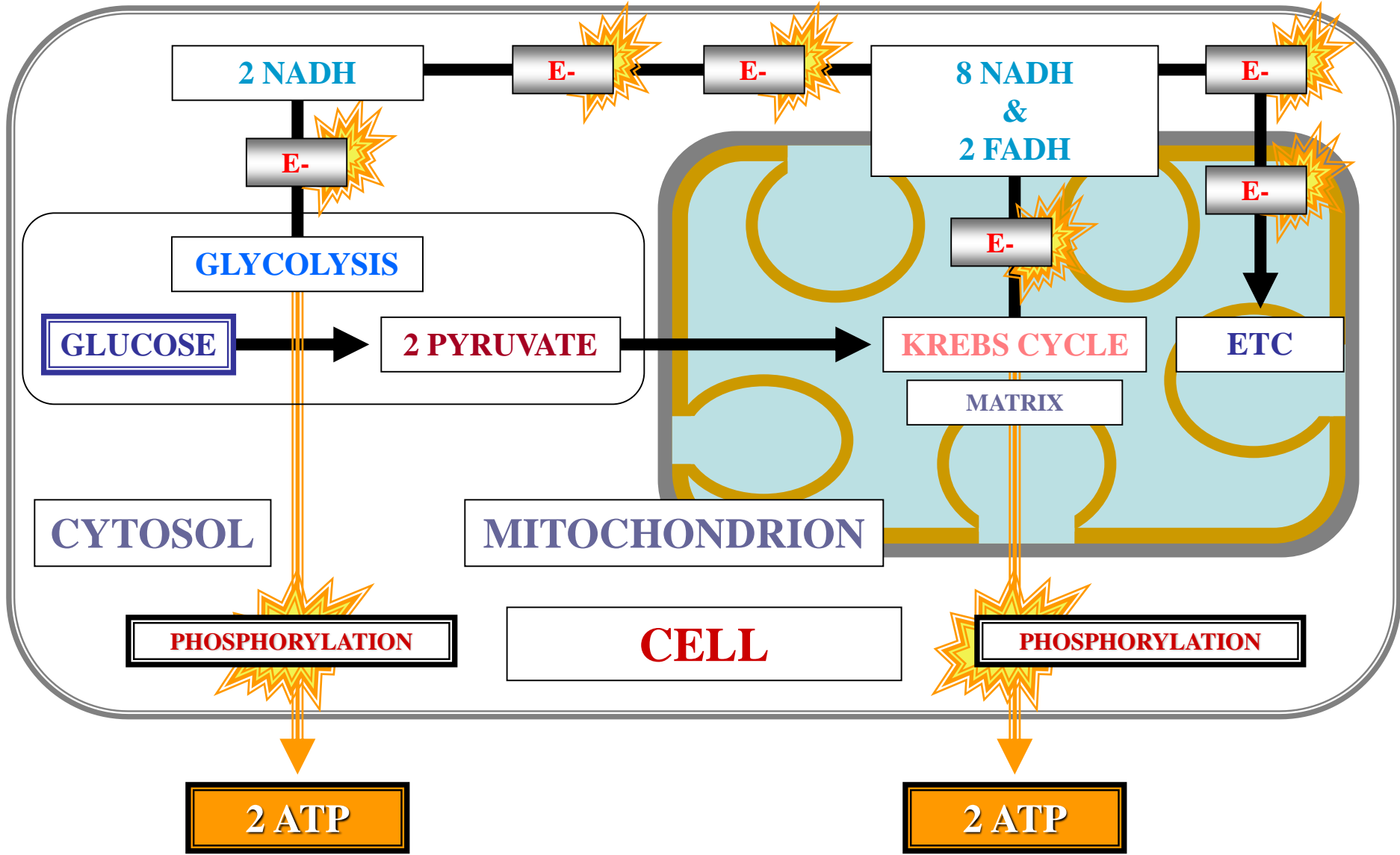
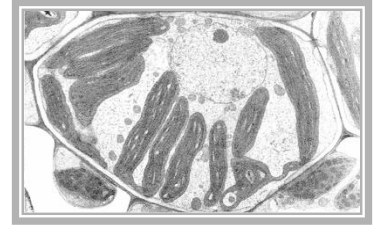
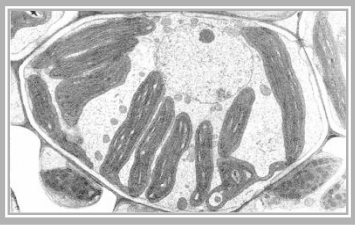




AEROBIC RESPIRATION SUMMARY



AEROBIC RESPIRATION



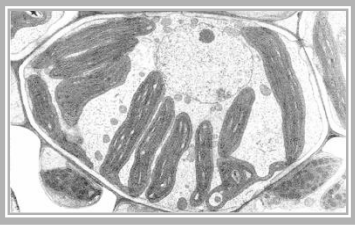


AEROBIC RESPIRATION ETC

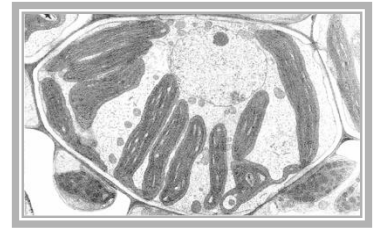
ETC OVERVIEW



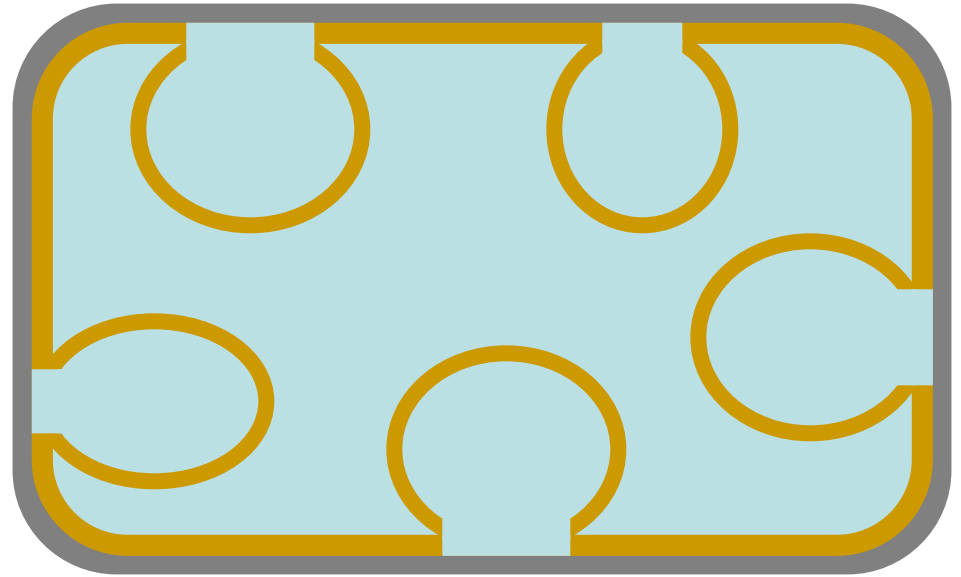
ELECTRON TRANSPORT CHAIN CELL LOCATION



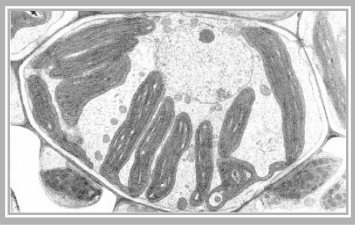
AEROBIC RESPIRATION



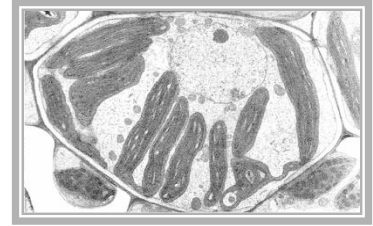
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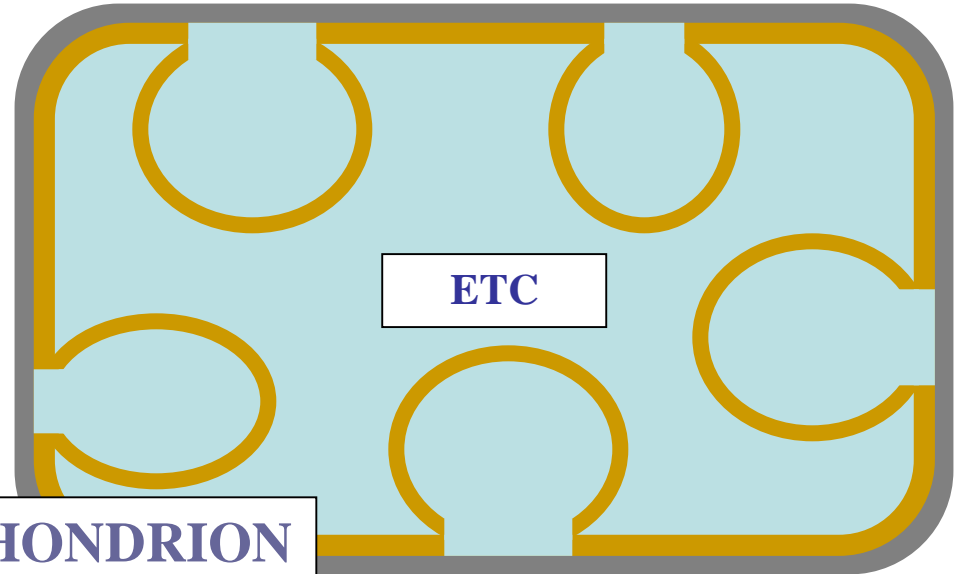
CELL



AEROBIC RESPIRATION

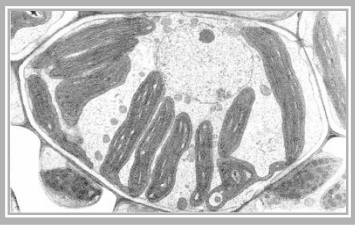


C



MITOCHONDRION

CELL



AEROBIC RESPIRATION

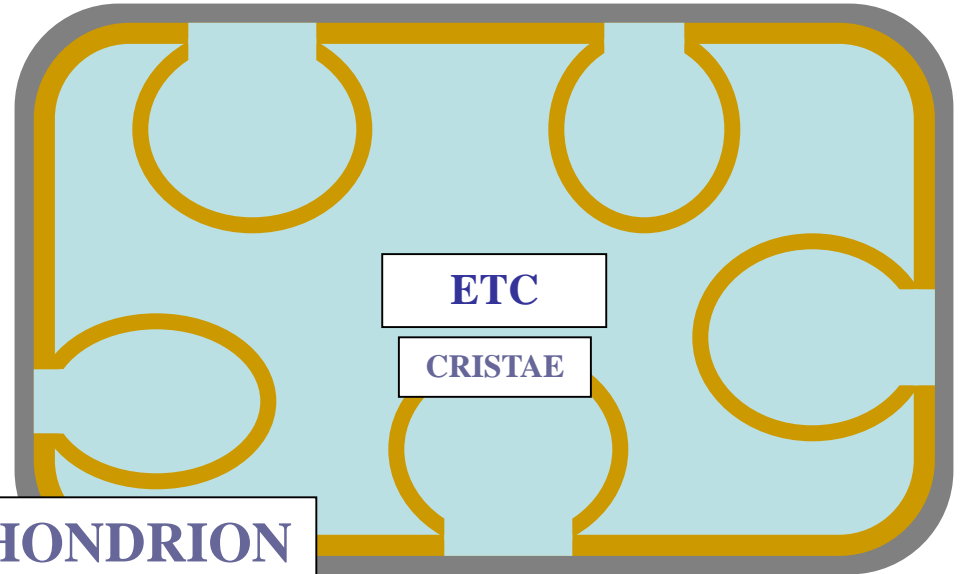


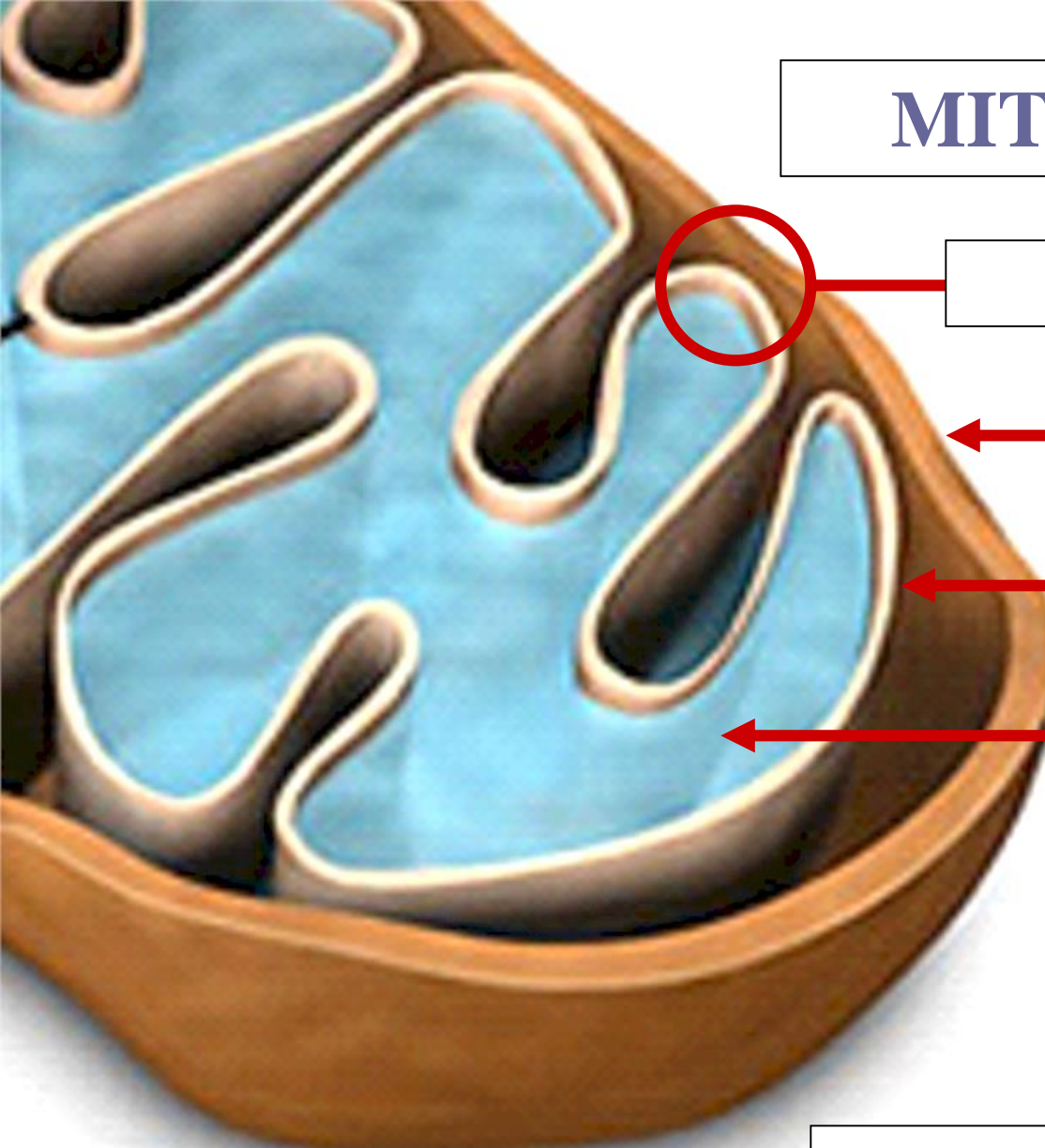
MITOCHONDRION

CELL

ETC

CRISTAE





MITOCHONDRION

DOUBLE MEMBRANE

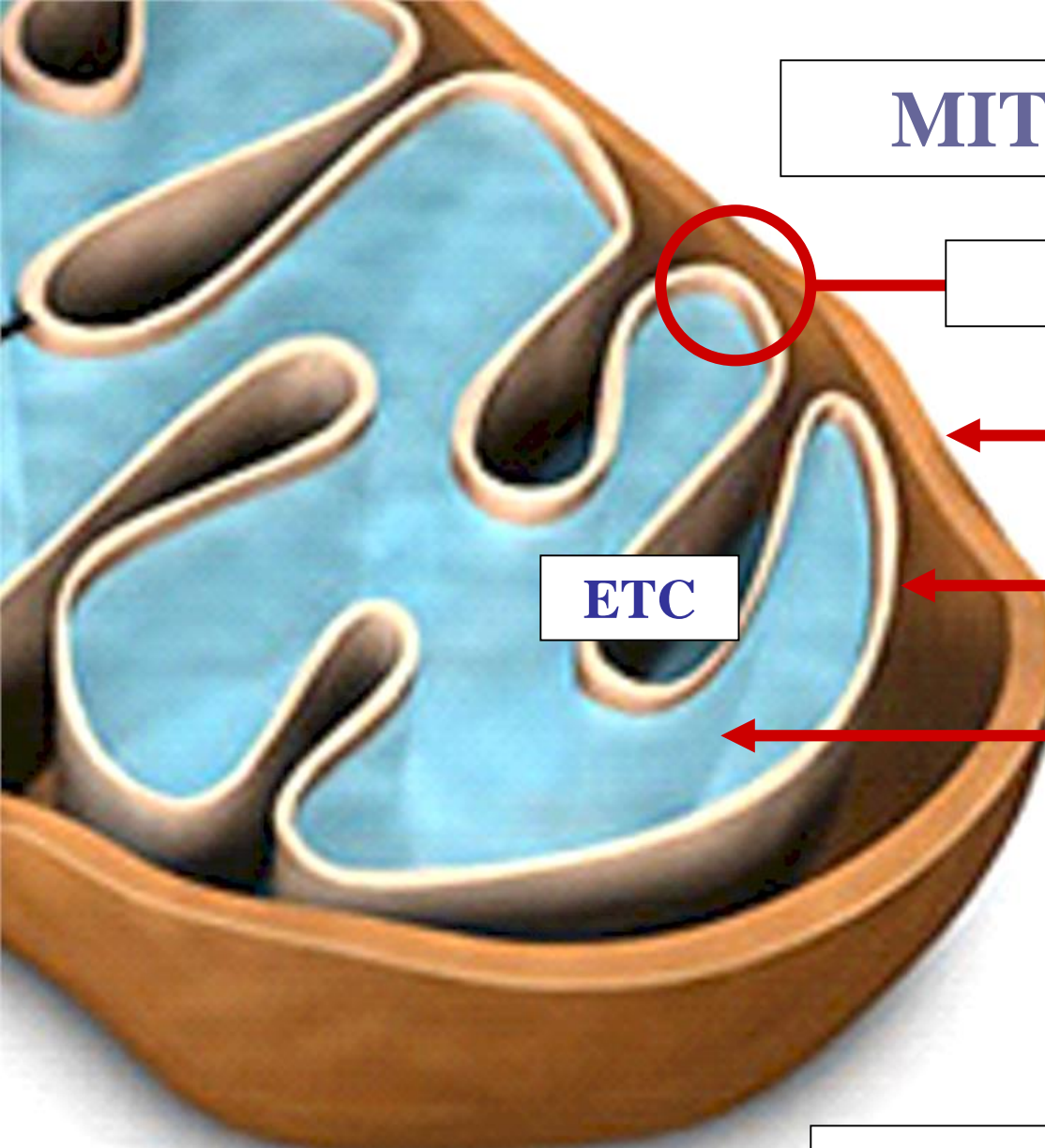
OUTER MEMBRANE

CRISTAE MEMBRANE

MATRIX

CELL CYTOSOL

ETC



MITOCHONDRION

DOUBLE MEMBRANE

OUTER MEMBRANE

ETC

CRISTAE MEMBRANE

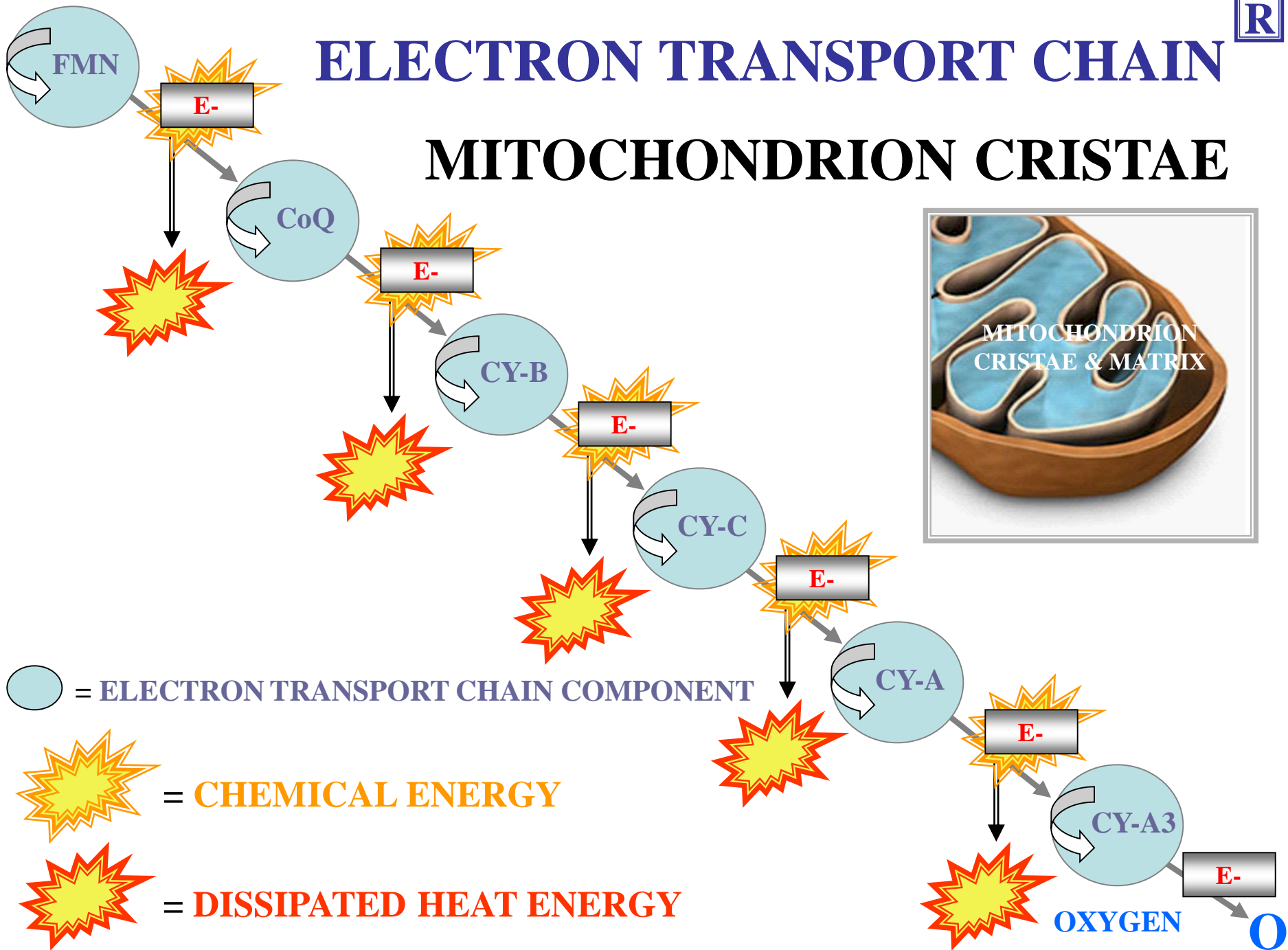
MATRIX

CELL CYTOSOL



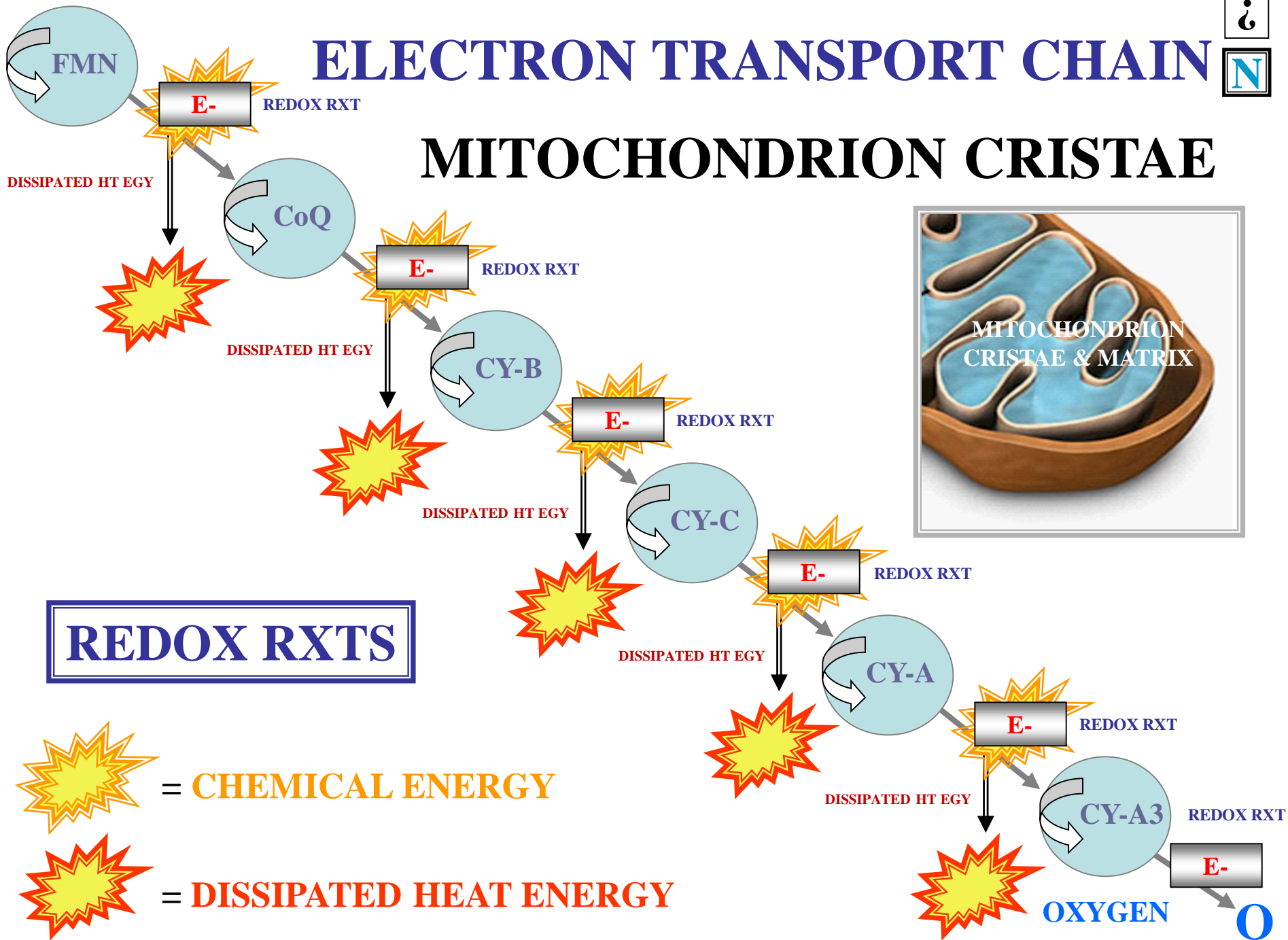
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



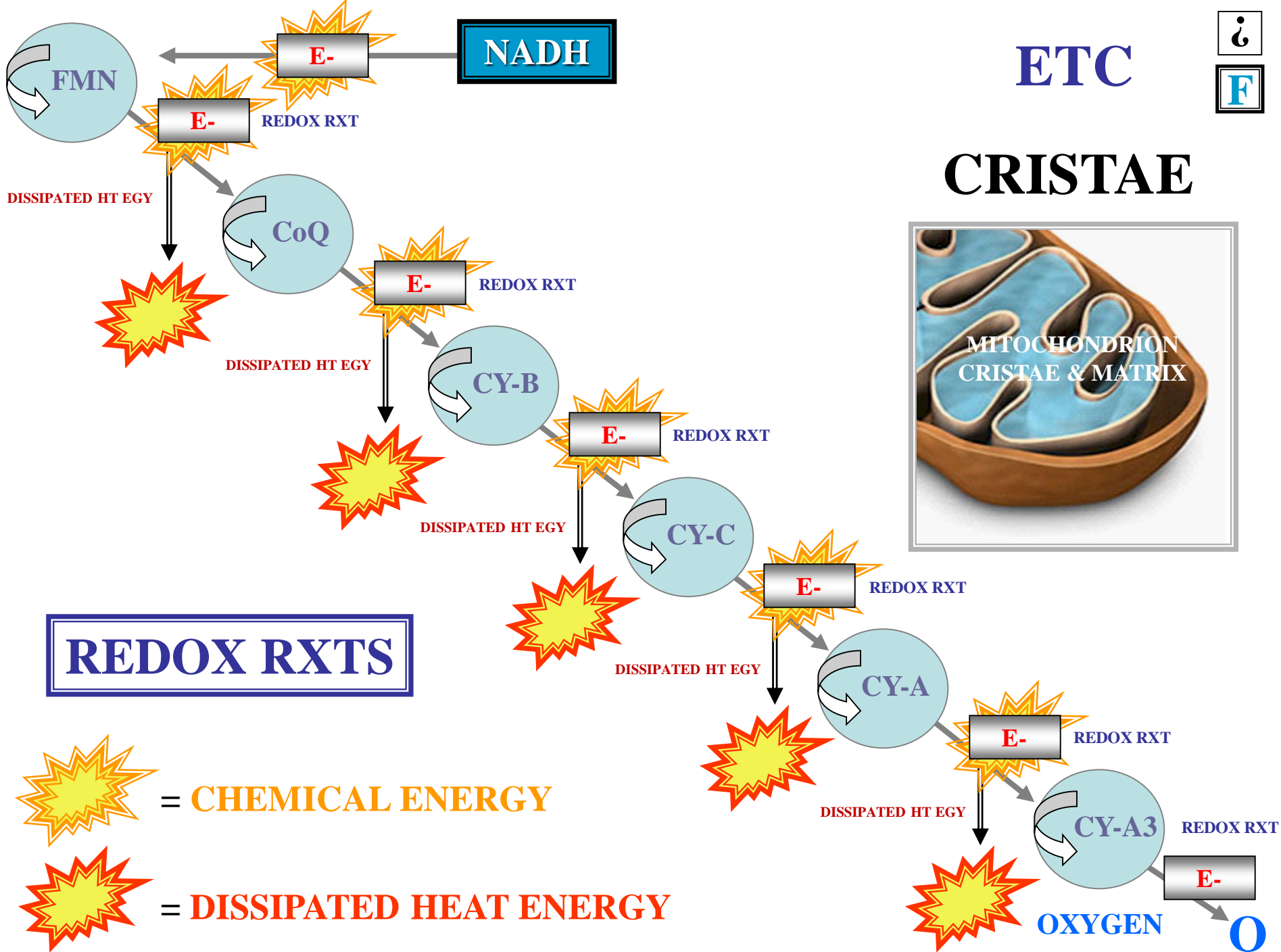
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



ETC

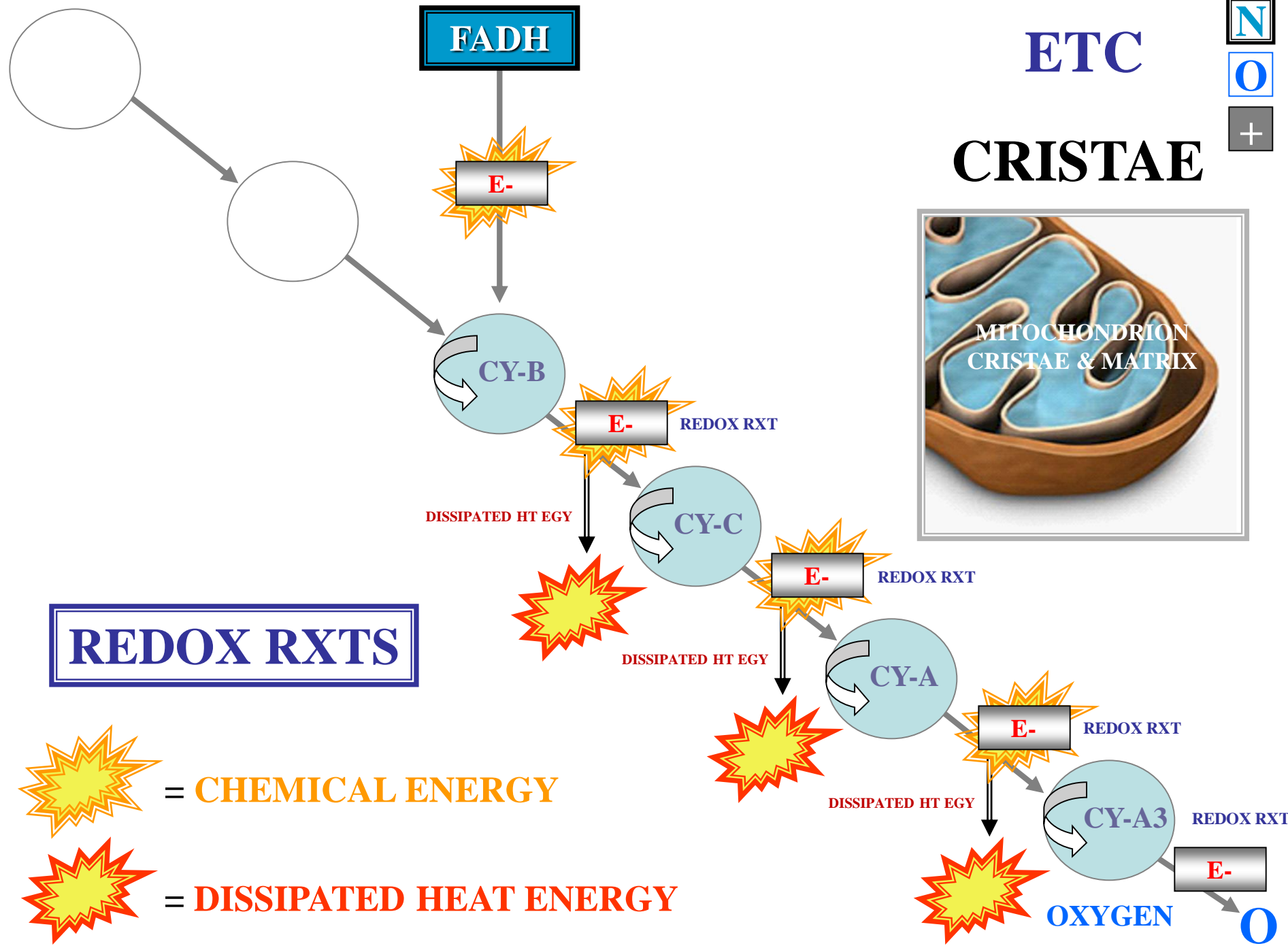
CRISTAE




 = **CHEMICAL ENERGY**

 = **DISSIPATED HEAT ENERGY**

ETC CRISTAE



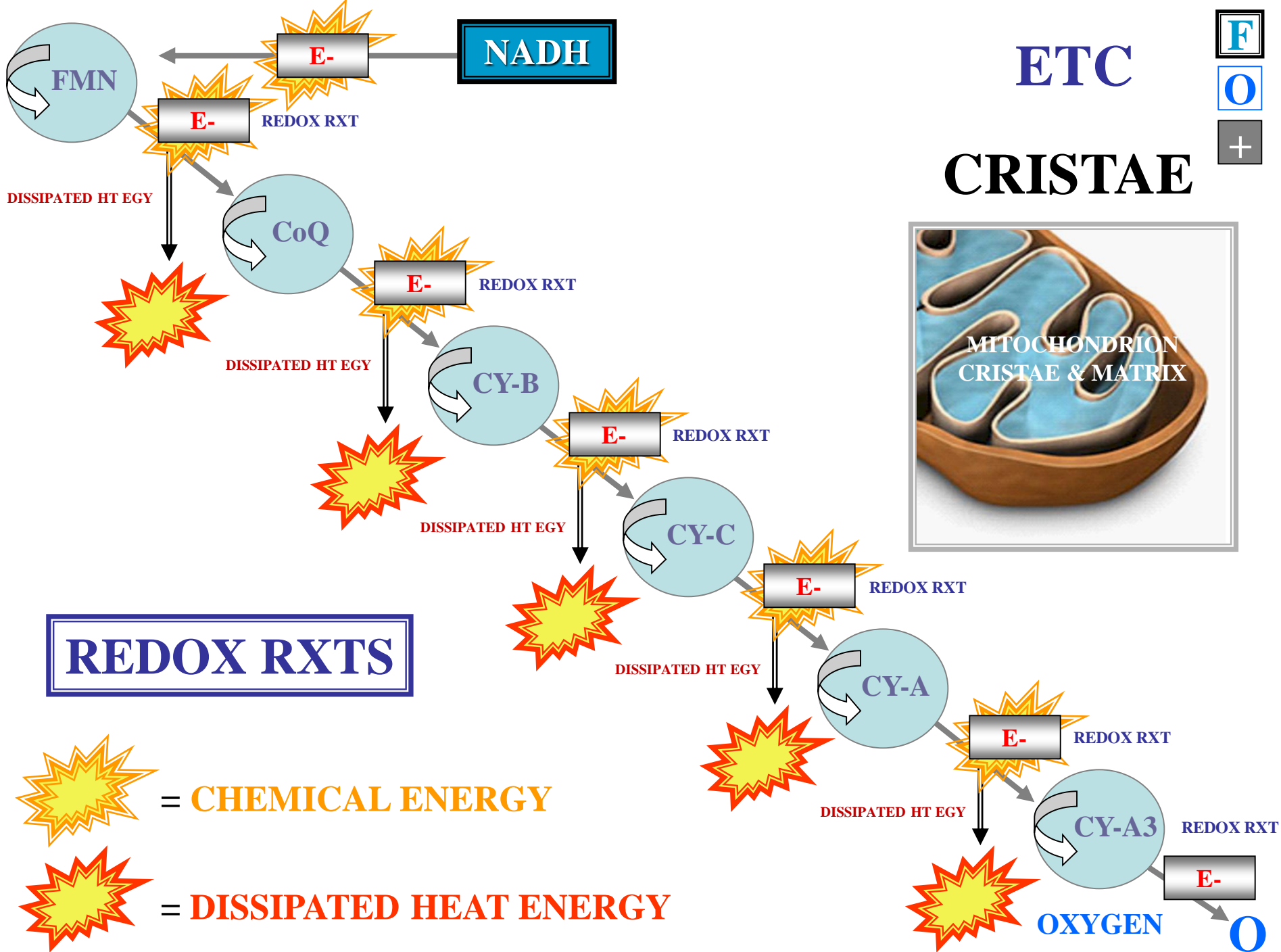
REDOX RXTS

-  = **CHEMICAL ENERGY**
-  = **DISSSIPATED HEAT ENERGY**

F
O
+

ETC

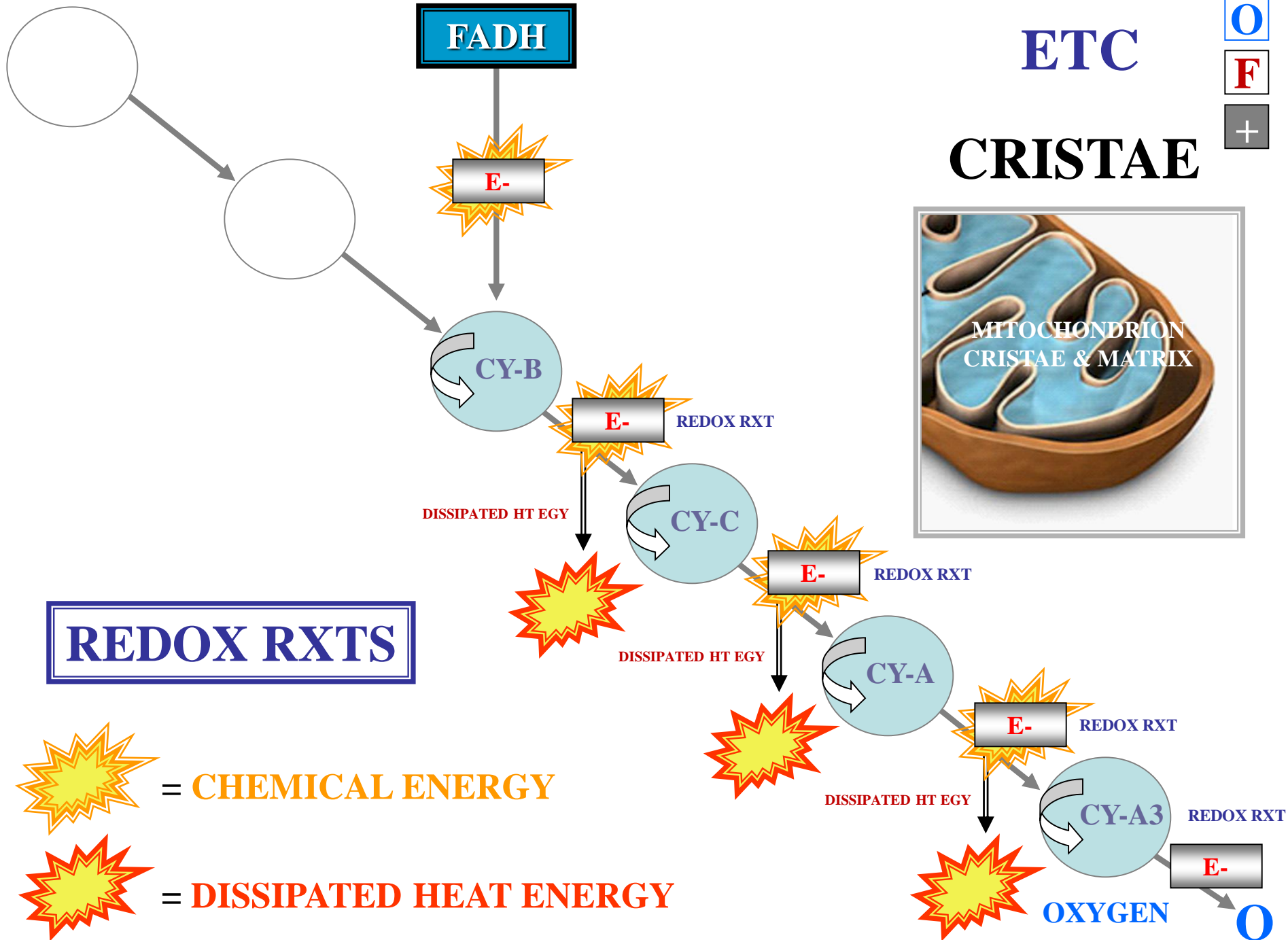
CRISTAE



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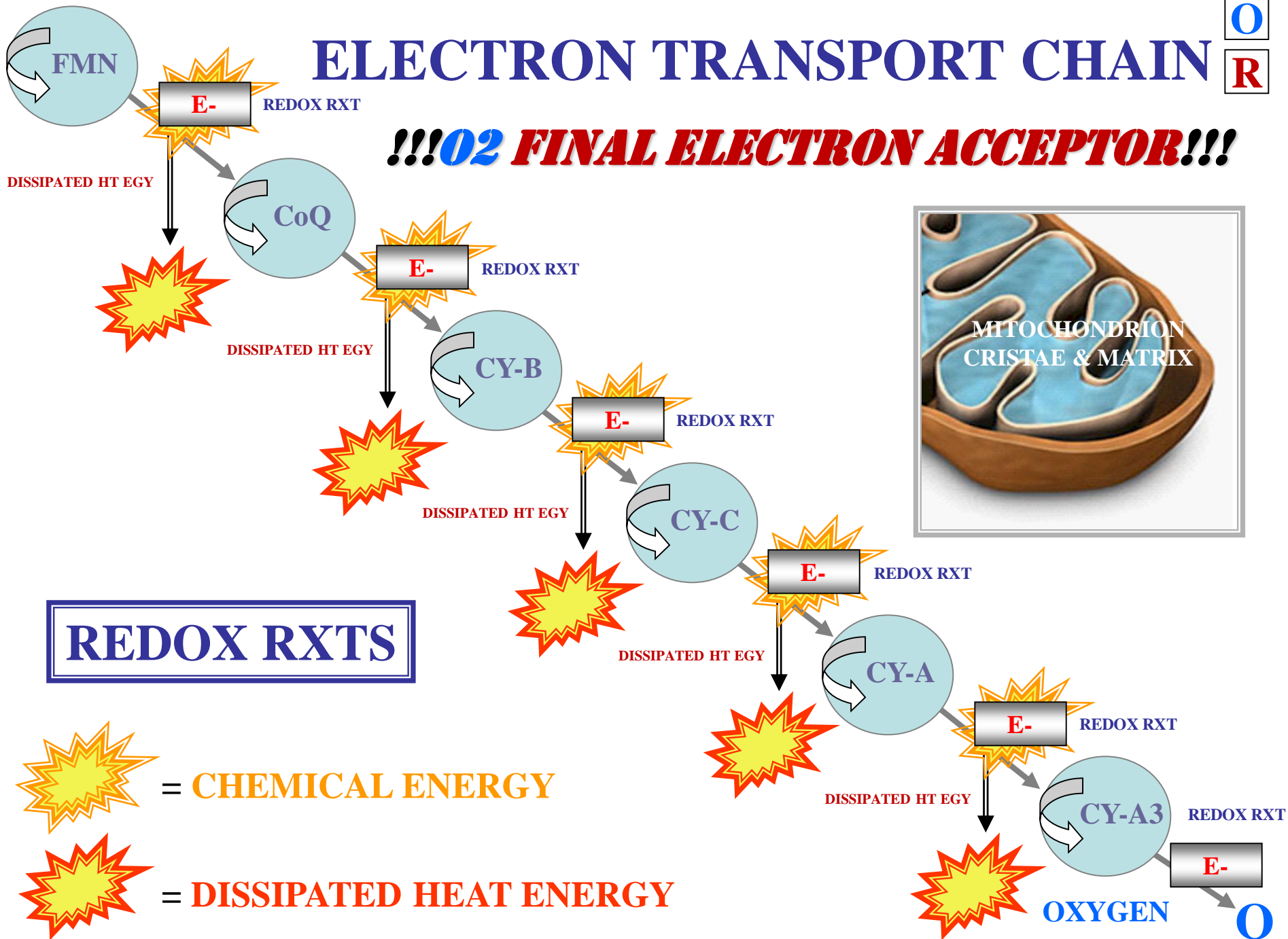
ETC

CRISTAE



ELECTRON TRANSPORT CHAIN

!!!O₂ FINAL ELECTRON ACCEPTOR!!!



REDOX RXTS

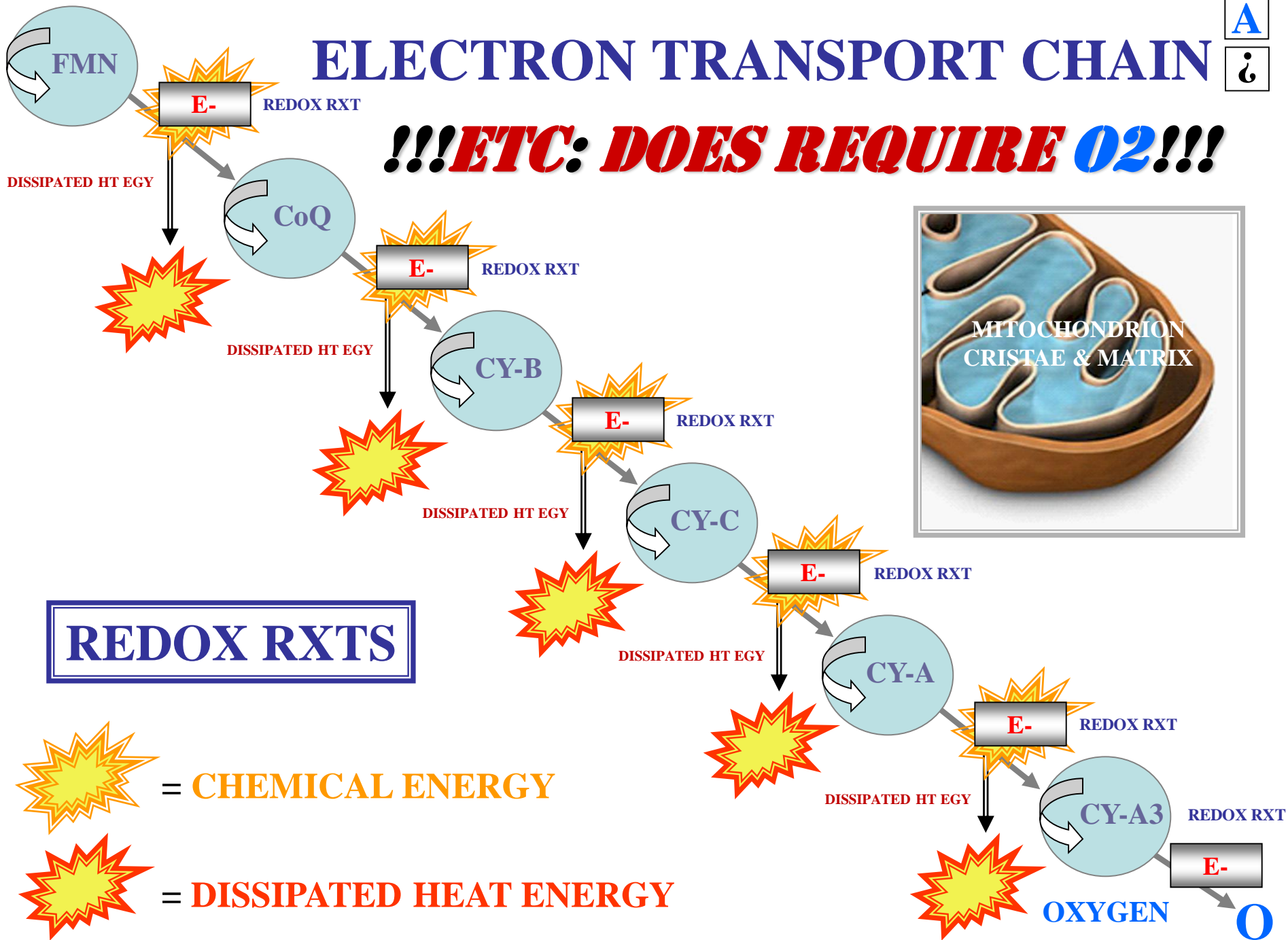
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY



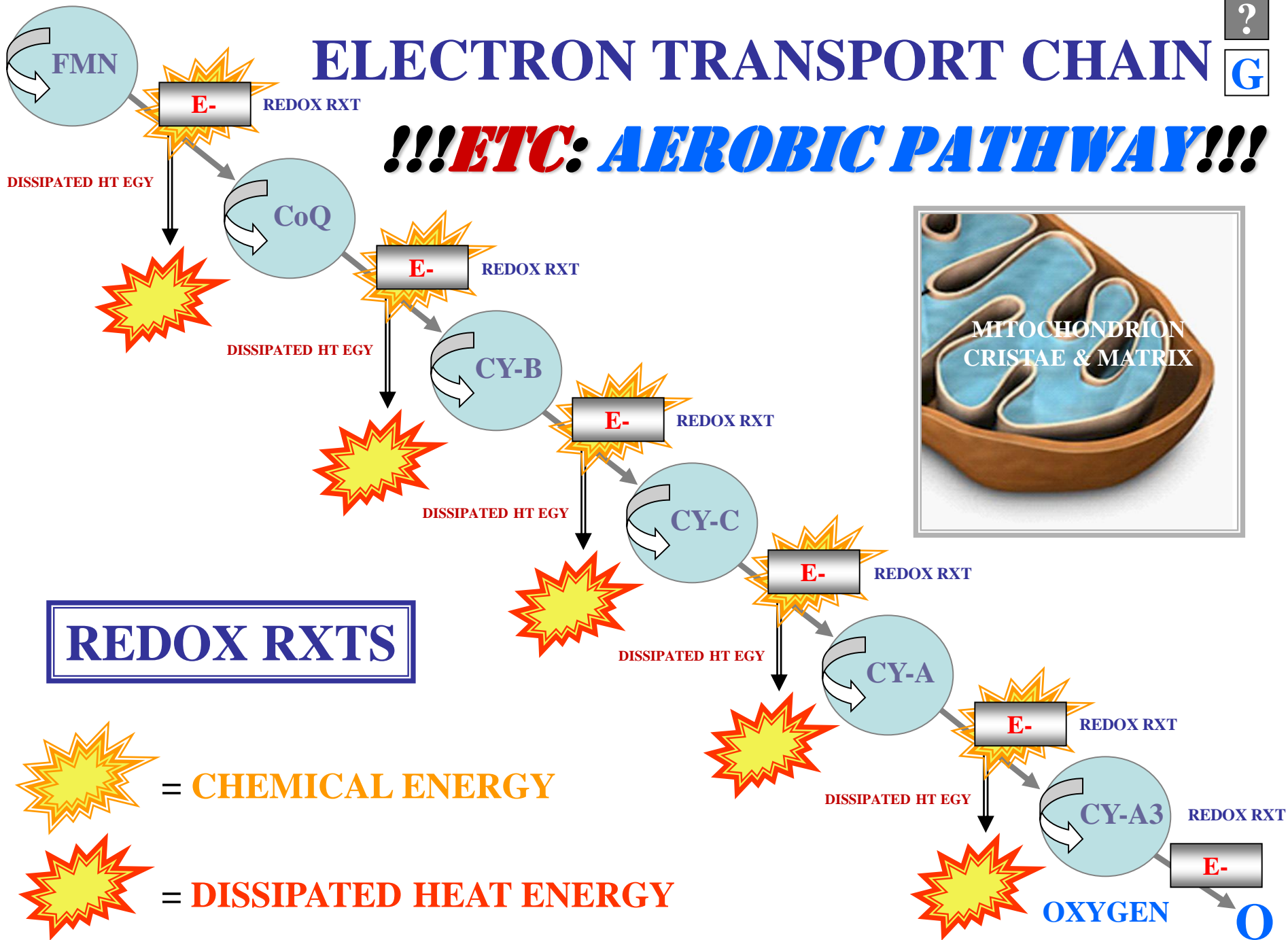
ELECTRON TRANSPORT CHAIN

!!!ETC: DOES REQUIRE O2!!!



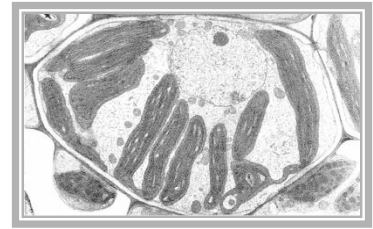
ELECTRON TRANSPORT CHAIN

!!!ETC: AEROBIC PATHWAY!!!





AEROBIC RESPIRATION



A

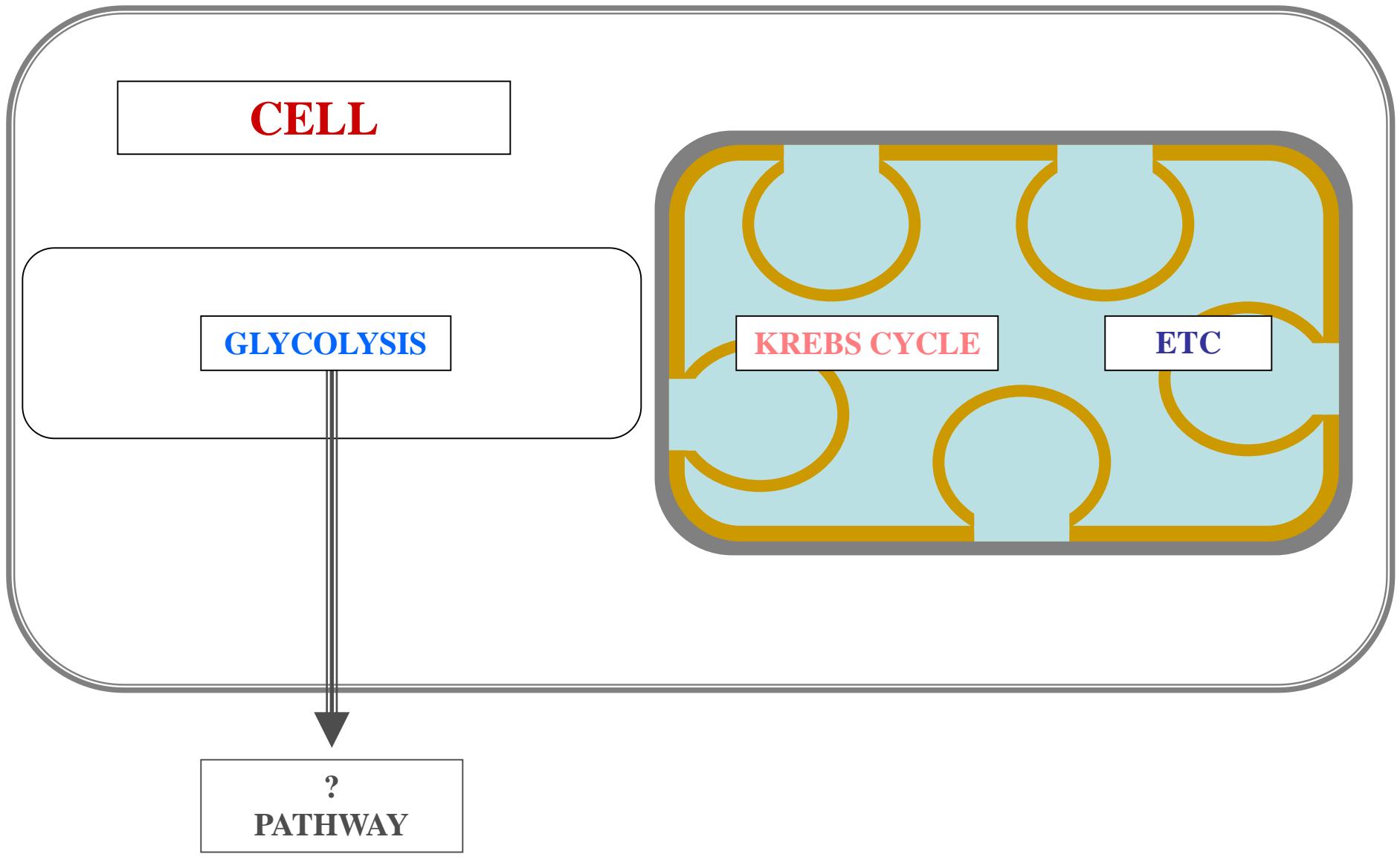
CELL

GLYCOLYSIS

KREBS CYCLE

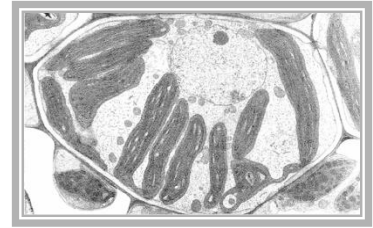
ETC

**?
PATHWAY**





AEROBIC RESPIRATION



?

K

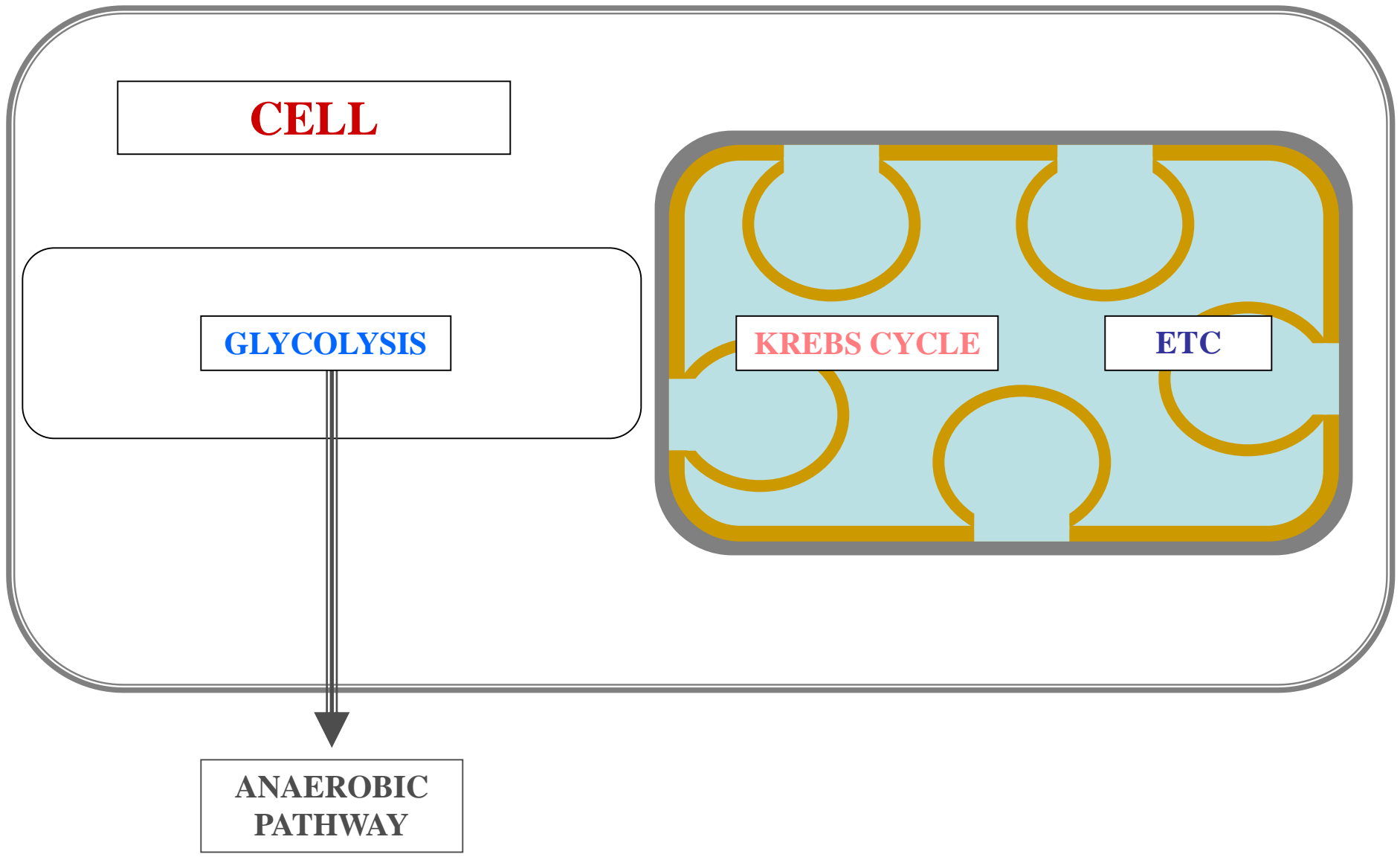
CELL

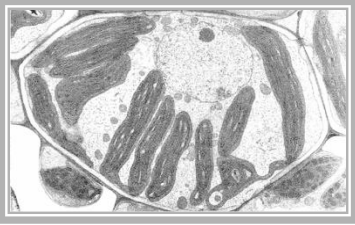
GLYCOLYSIS

KREBS CYCLE

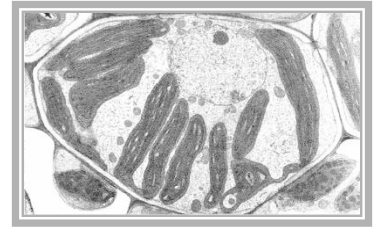
ETC

**ANAEROBIC
PATHWAY**





AEROBIC RESPIRATION



A

CELL

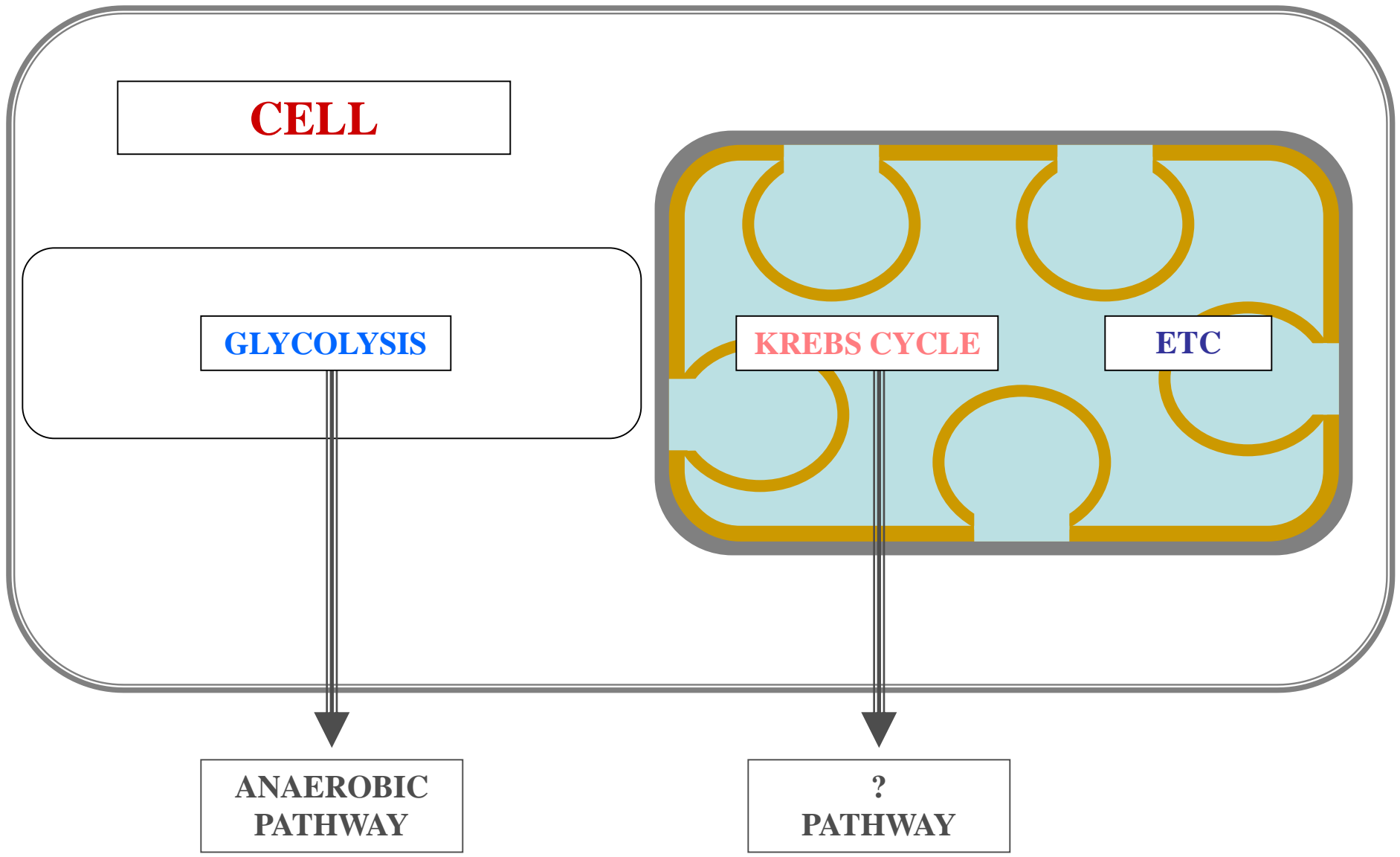
GLYCOLYSIS

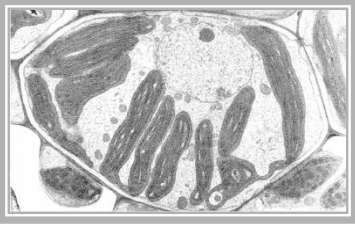
KREBS CYCLE

ETC

**ANAEROBIC
PATHWAY**

**?
PATHWAY**





AEROBIC RESPIRATION



?

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CELL

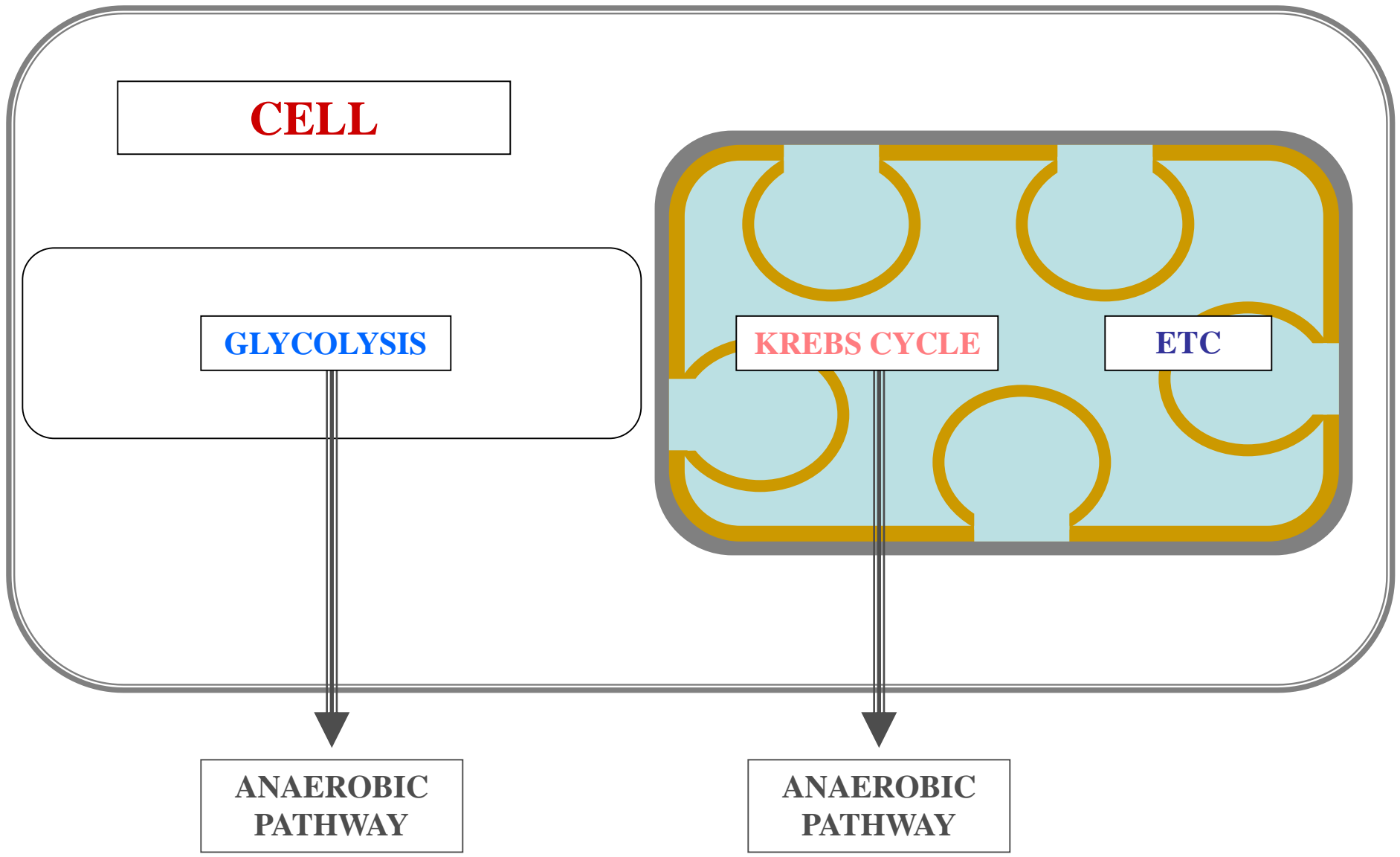
GLYCOLYSIS

KREBS CYCLE

ETC

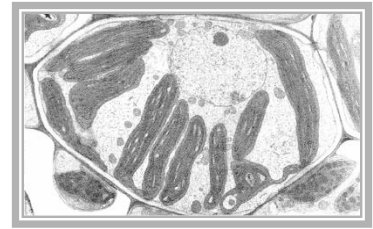
**ANAEROBIC
PATHWAY**

**ANAEROBIC
PATHWAY**





AEROBIC RESPIRATION



O
A

CELL

GLYCOLYSIS

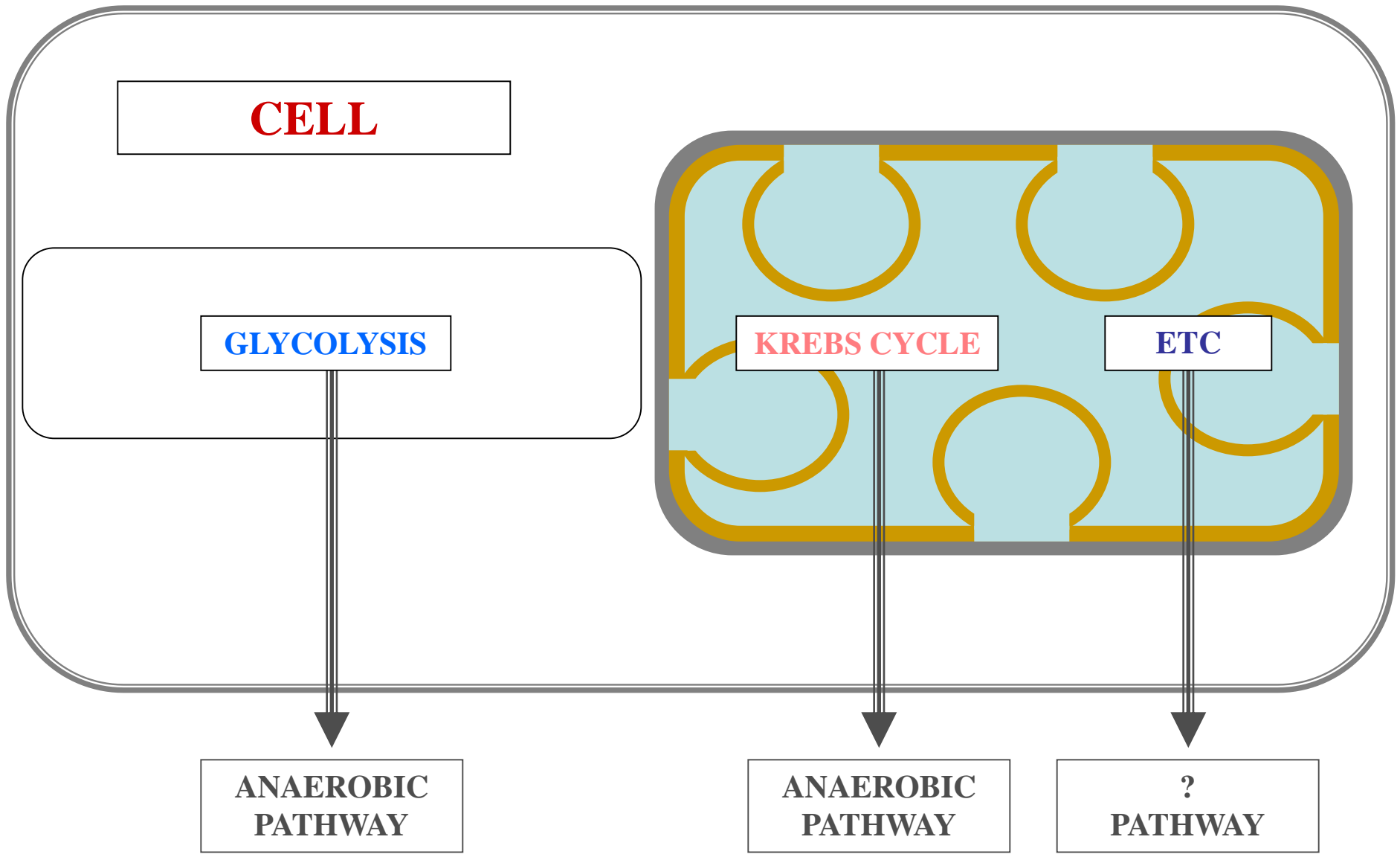
KREBS CYCLE

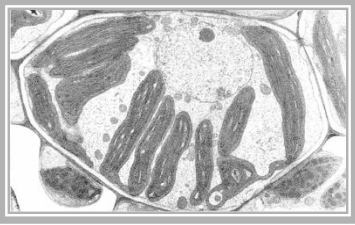
ETC

**ANAEROBIC
PATHWAY**

**ANAEROBIC
PATHWAY**

**?
PATHWAY**





AEROBIC RESPIRATION



CELL

GLYCOLYSIS

KREBS CYCLE

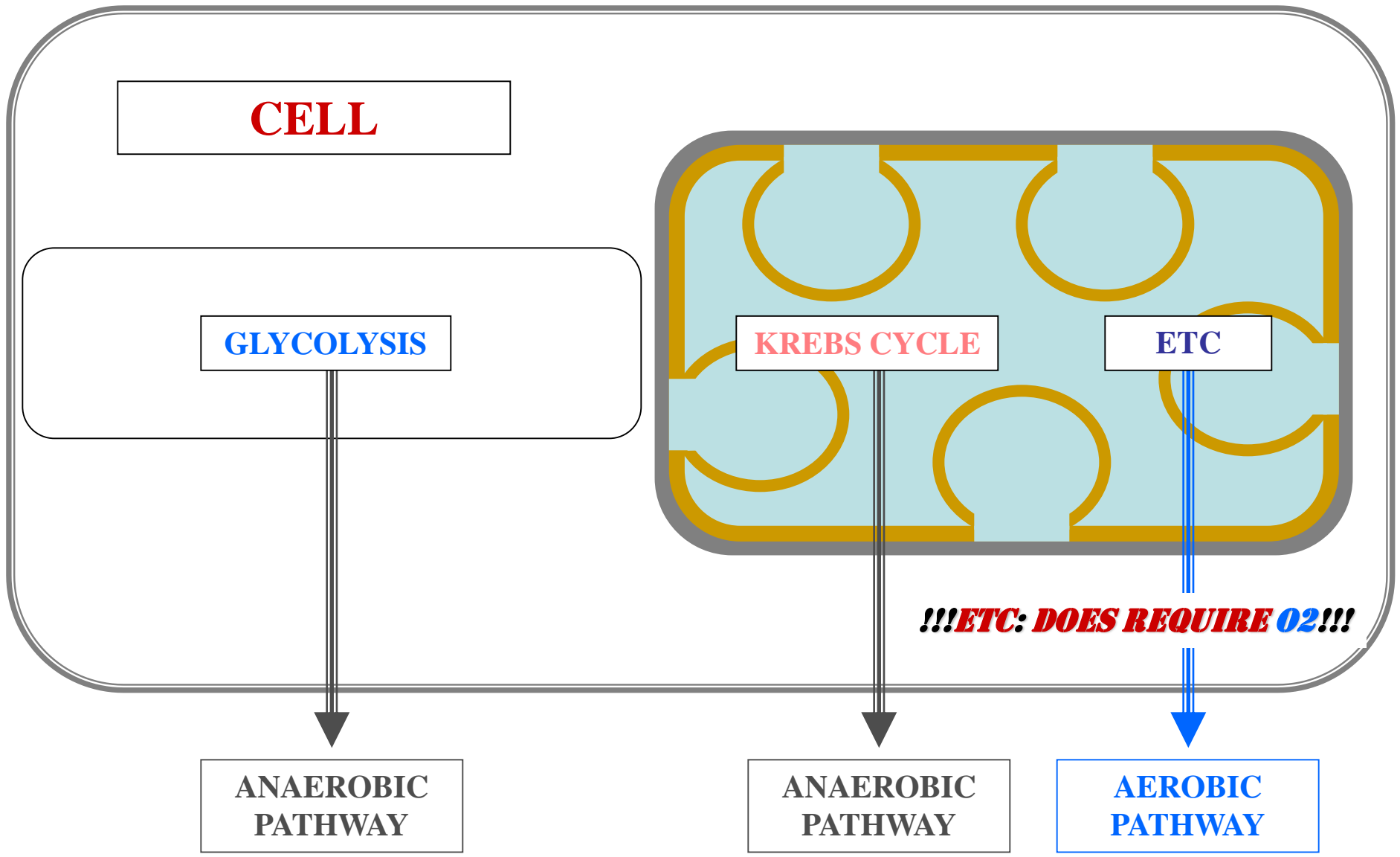
ETC

!!!ETC: DOES REQUIRE O₂!!!

**ANAEROBIC
PATHWAY**

**ANAEROBIC
PATHWAY**

**AEROBIC
PATHWAY**





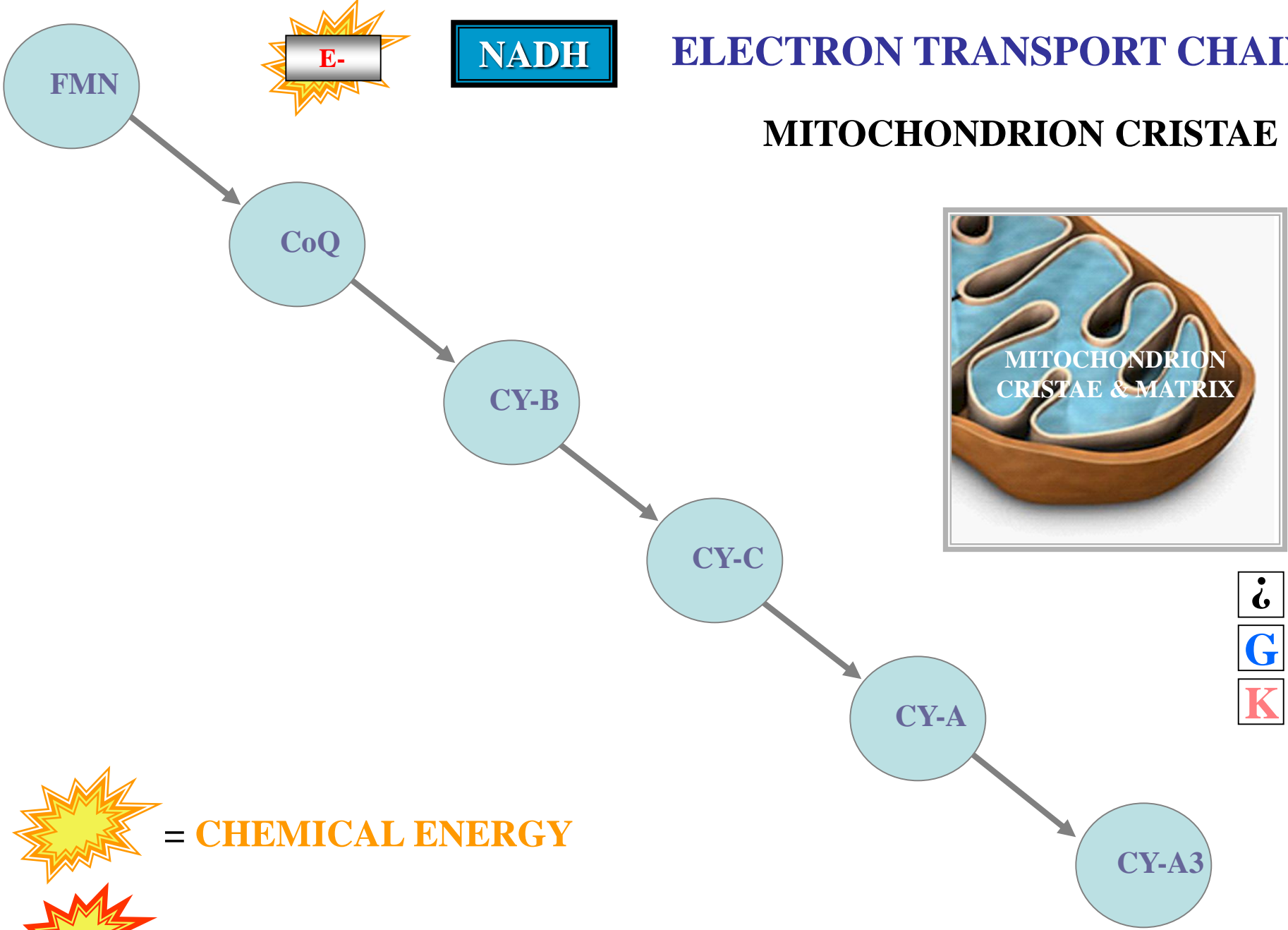
ETC SPECIFICS



NADH
E- DONOR

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



E-

NADH

FMN

CoQ

CY-B

CY-C

CY-A

CY-A3

MITOCHONDRION
CRISTAE & MATRIX

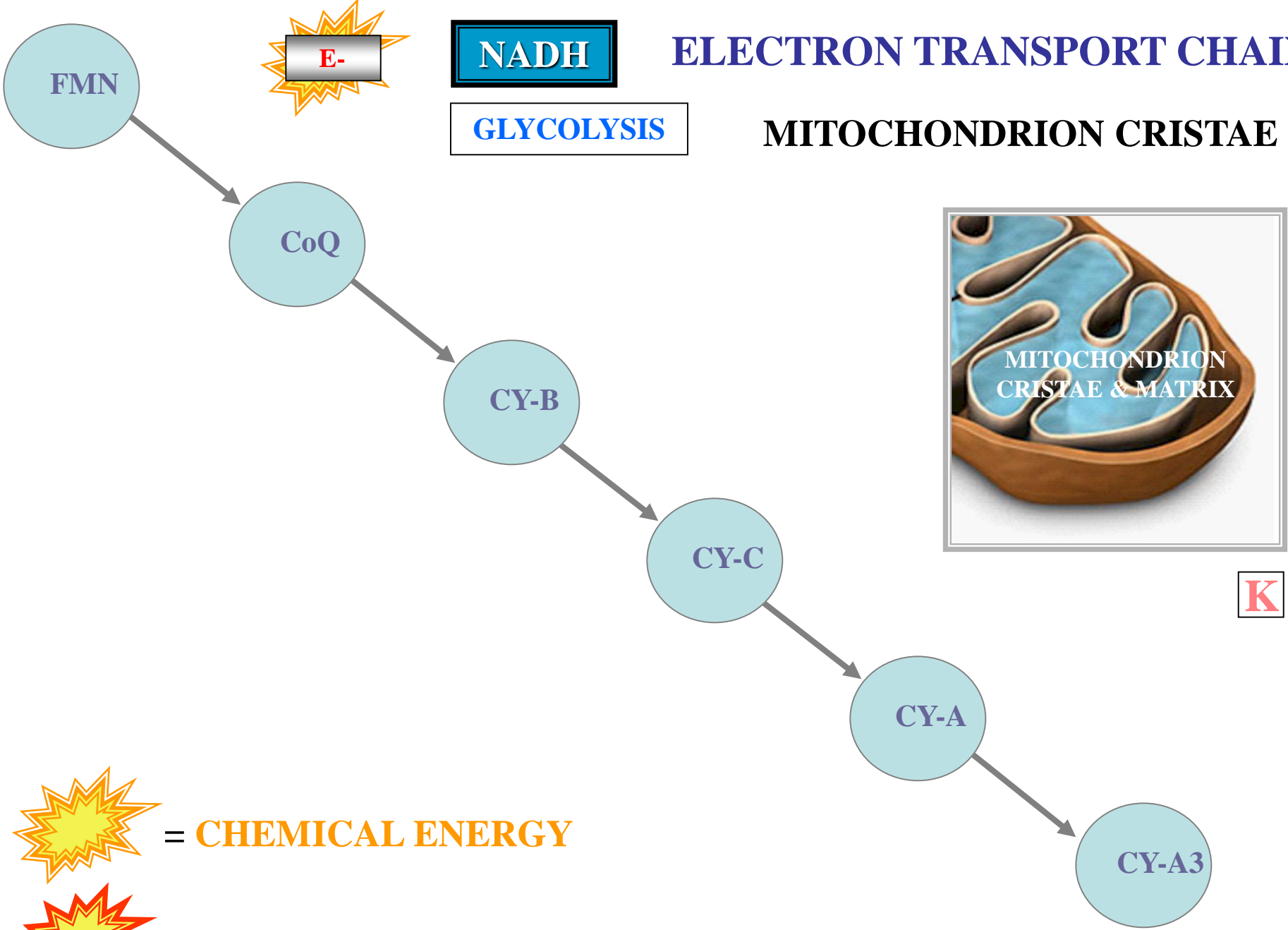
= CHEMICAL ENERGY

= DISSIPATED HEAT ENERGY

i
G
K

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE

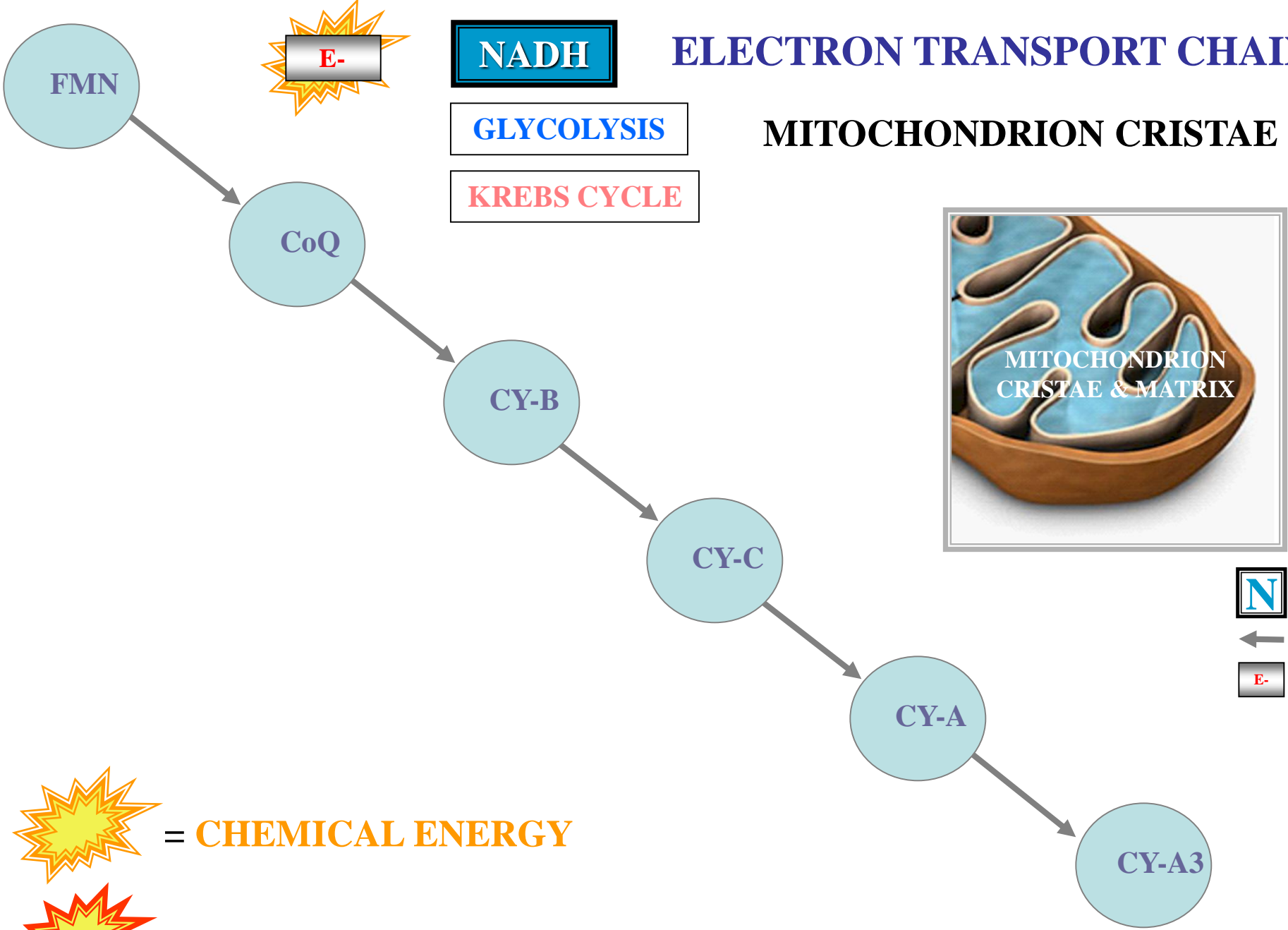


 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



NADH

GLYCOLYSIS

KREBS CYCLE

E-

FMN

CoQ

CY-B

CY-C

CY-A

CY-A3

N



E-



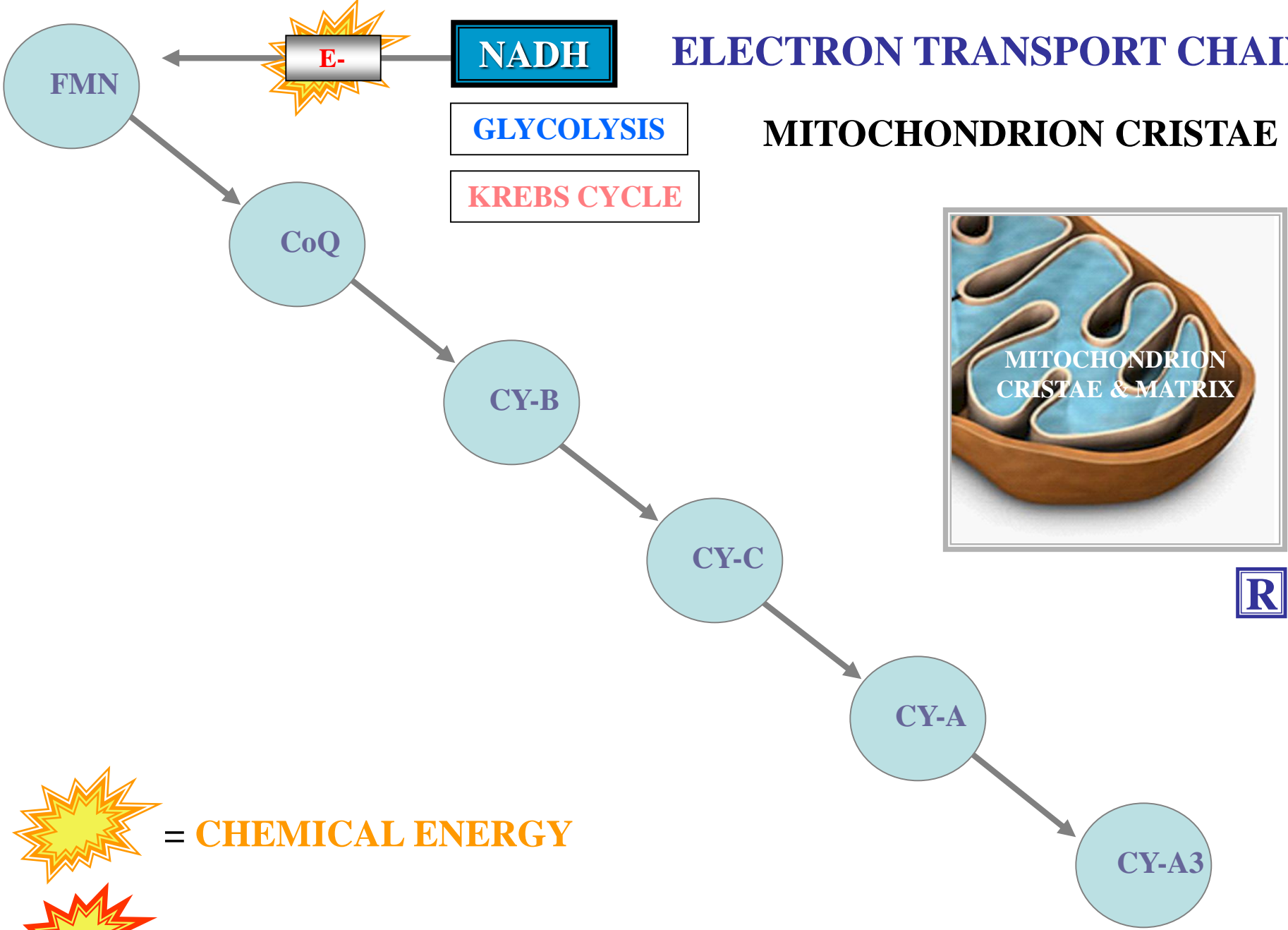
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= DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE

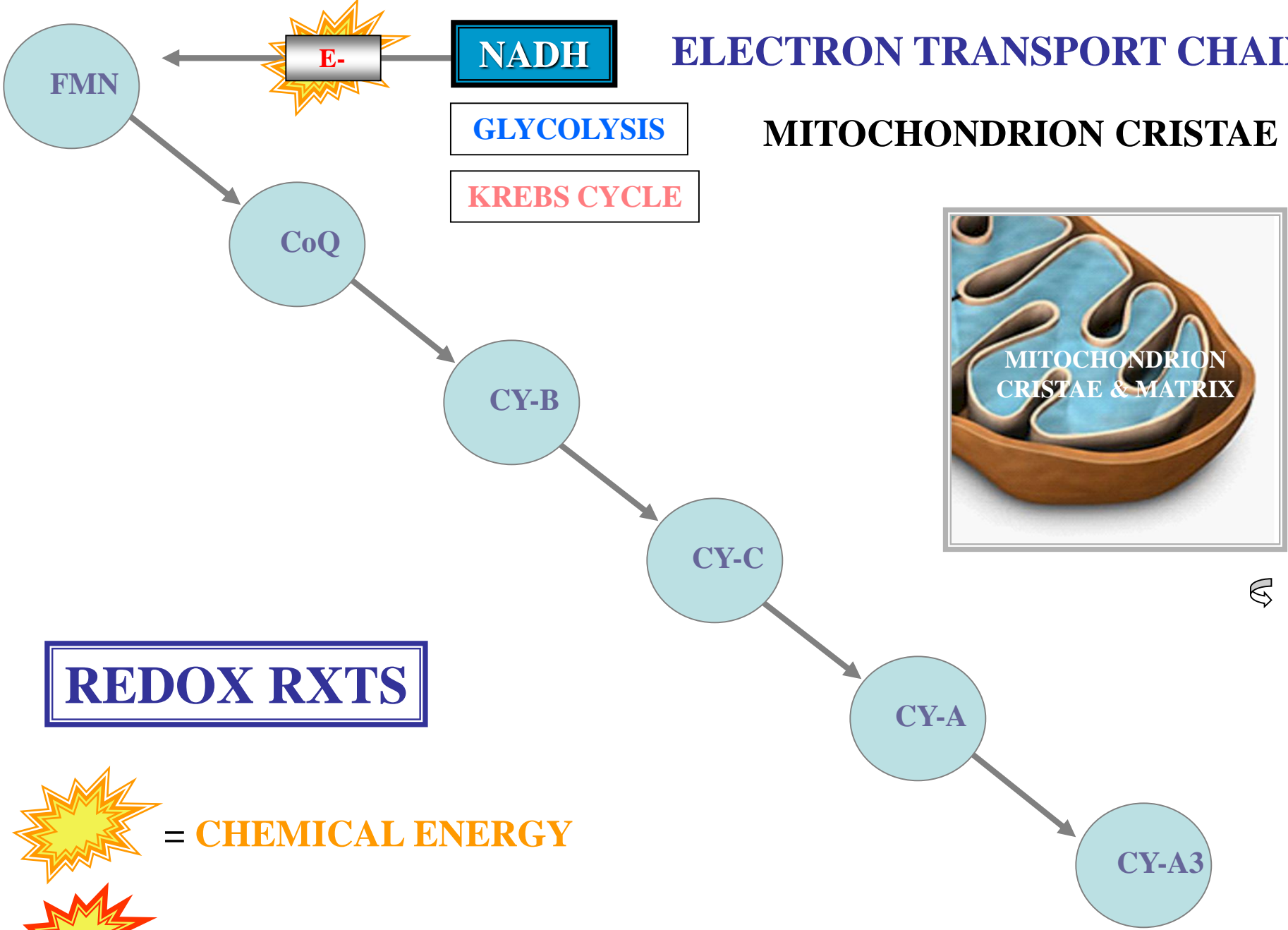


 = **CHEMICAL ENERGY**

 = **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



NADH

E-

FMN

CoQ

GLYCOLYSIS

KREBS CYCLE

CY-B

CY-C

CY-A

CY-A3

REDOX RXTS



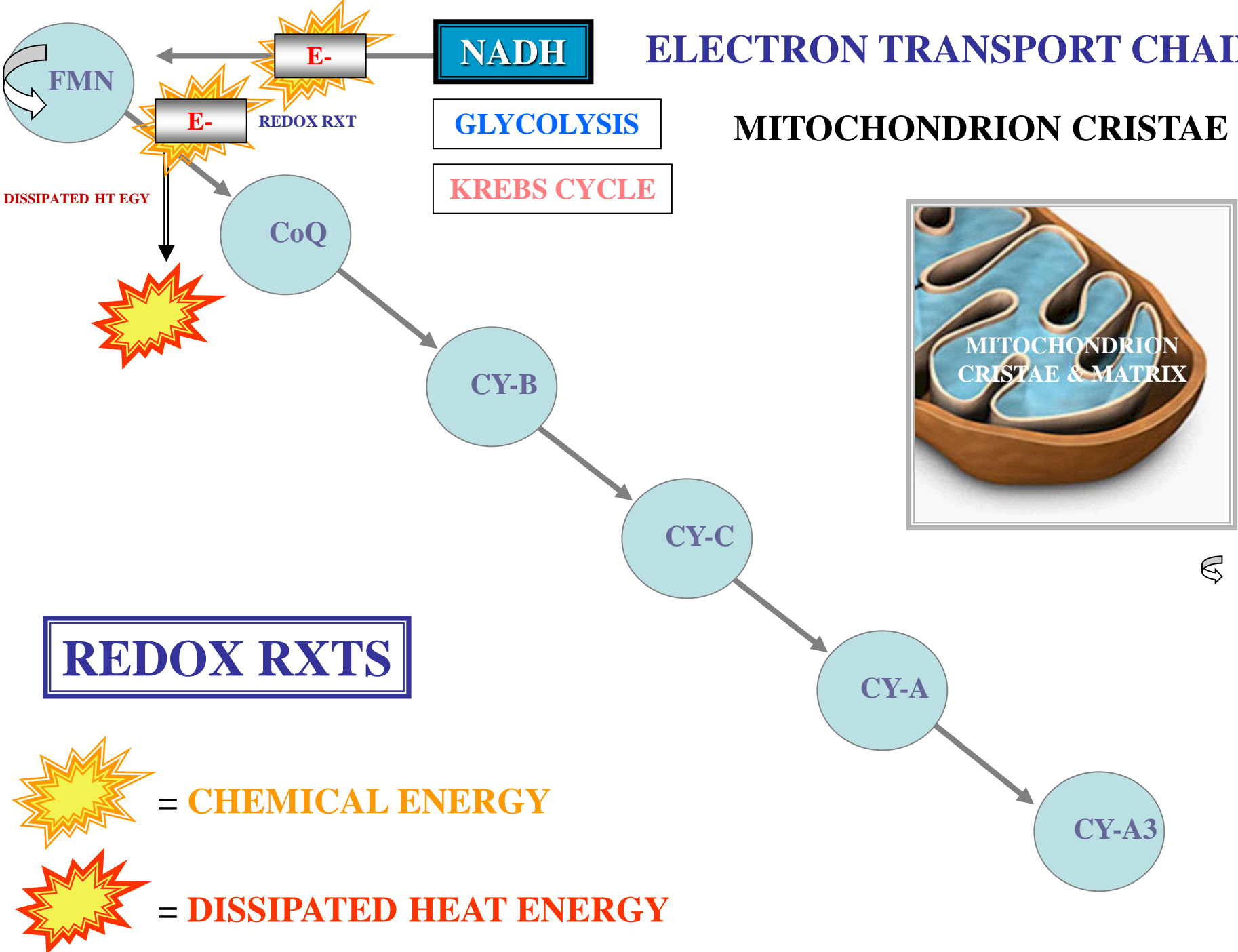
= **CHEMICAL ENERGY**



= **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



DISSIPATED HT EGY

NADH

FMN

E- REDOX RXT

GLYCOLYSIS

KREBS CYCLE

CoQ

CY-B

CY-C

CY-A

CY-A3

REDOX RXTS

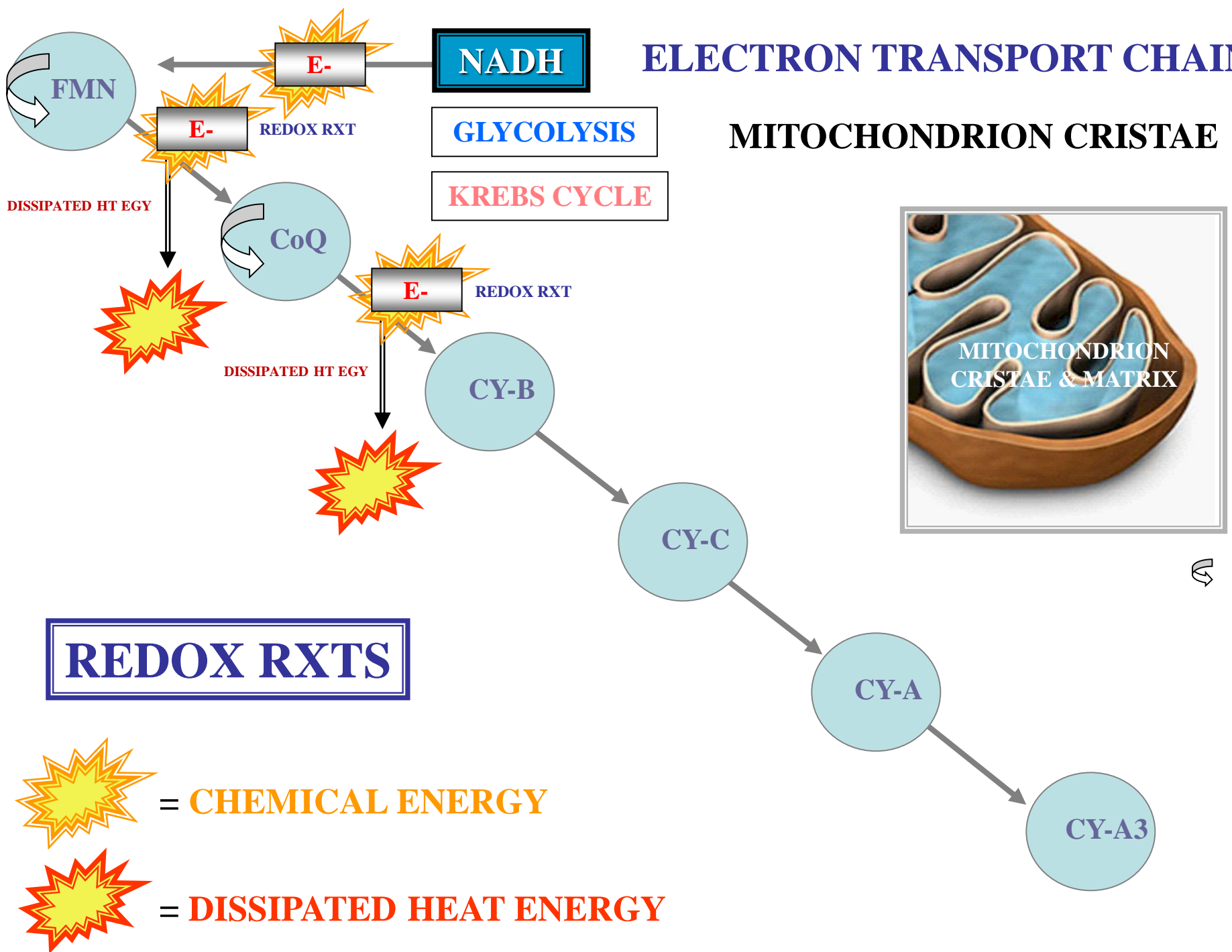
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY



ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



REDOX RXTS

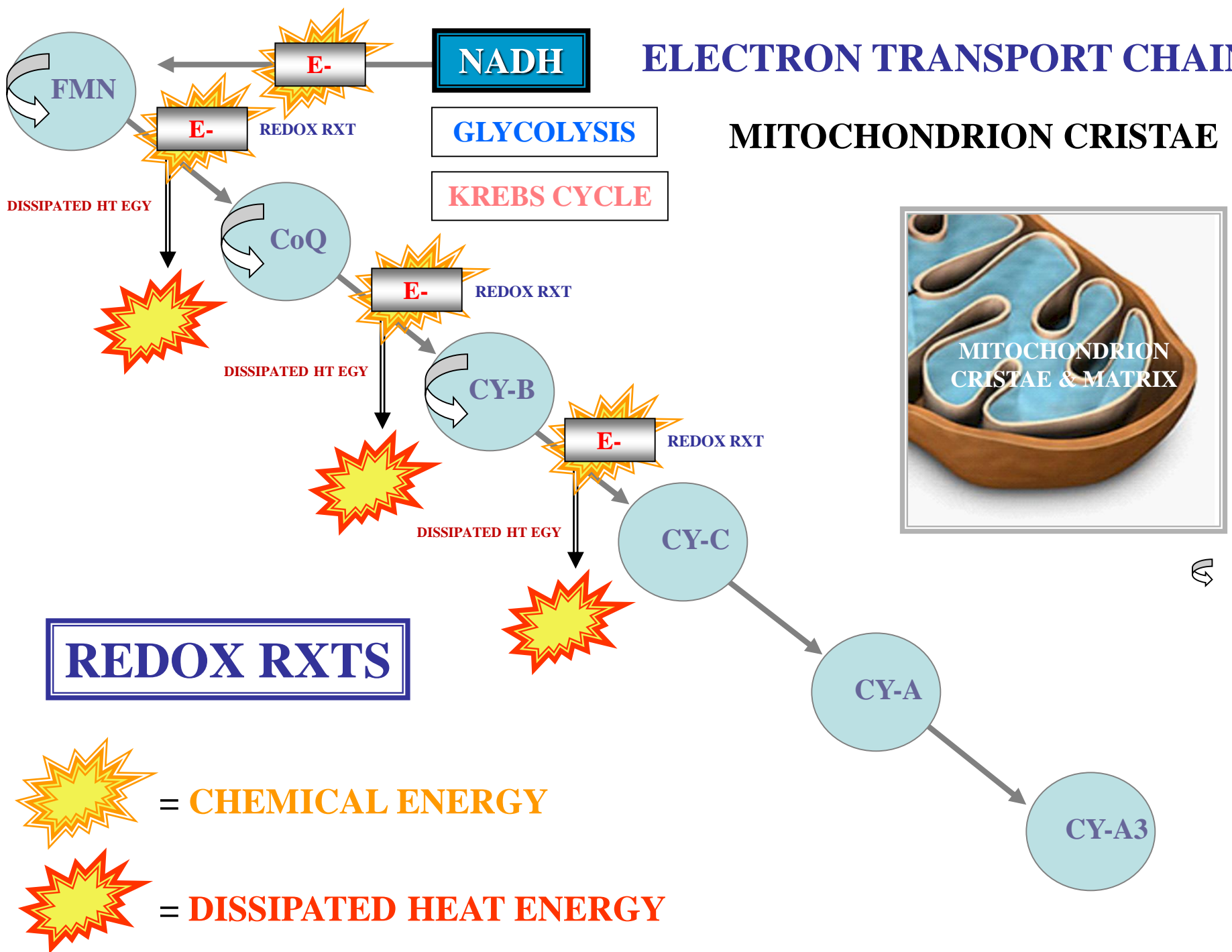
= CHEMICAL ENERGY

= DISSIPATED HEAT ENERGY



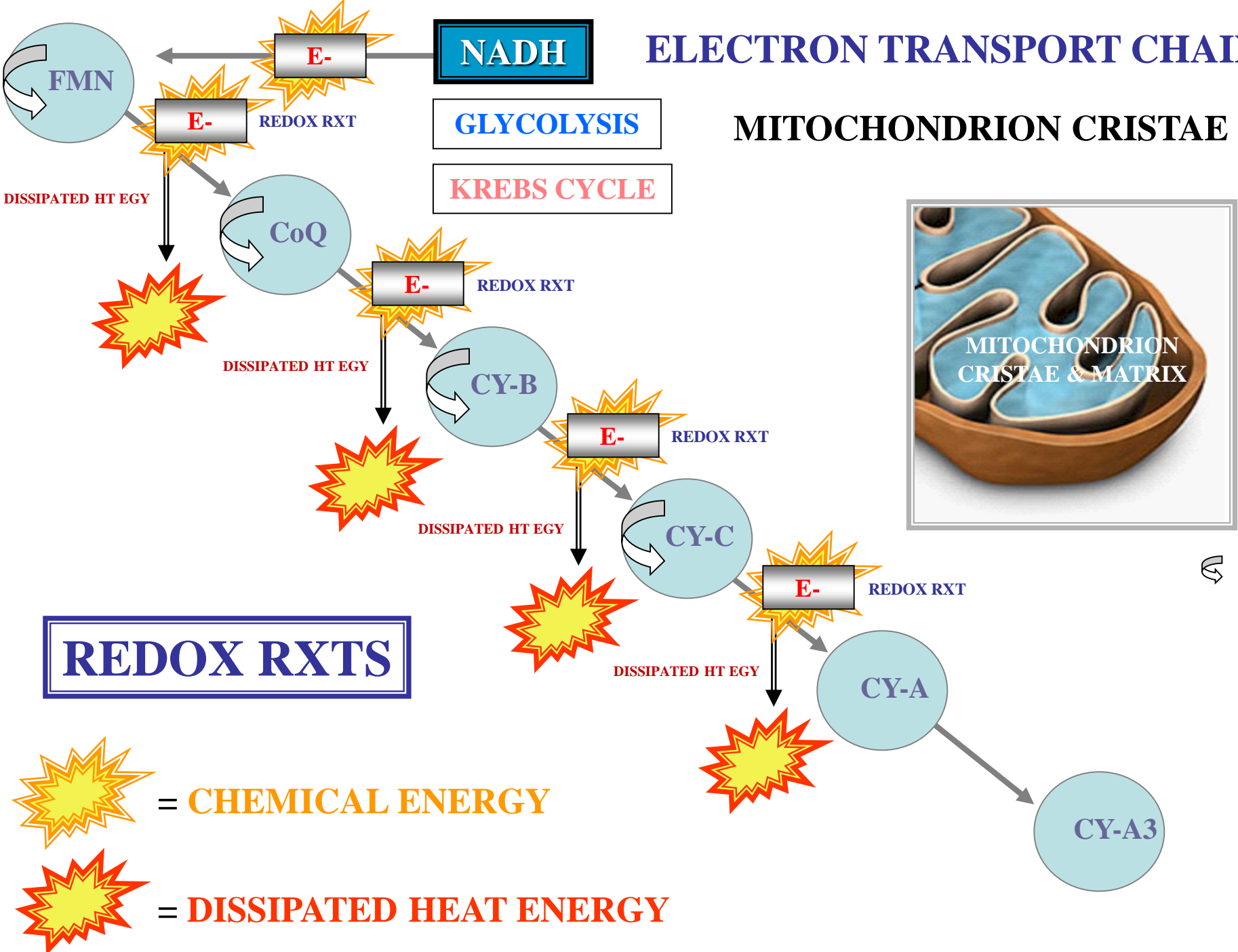
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



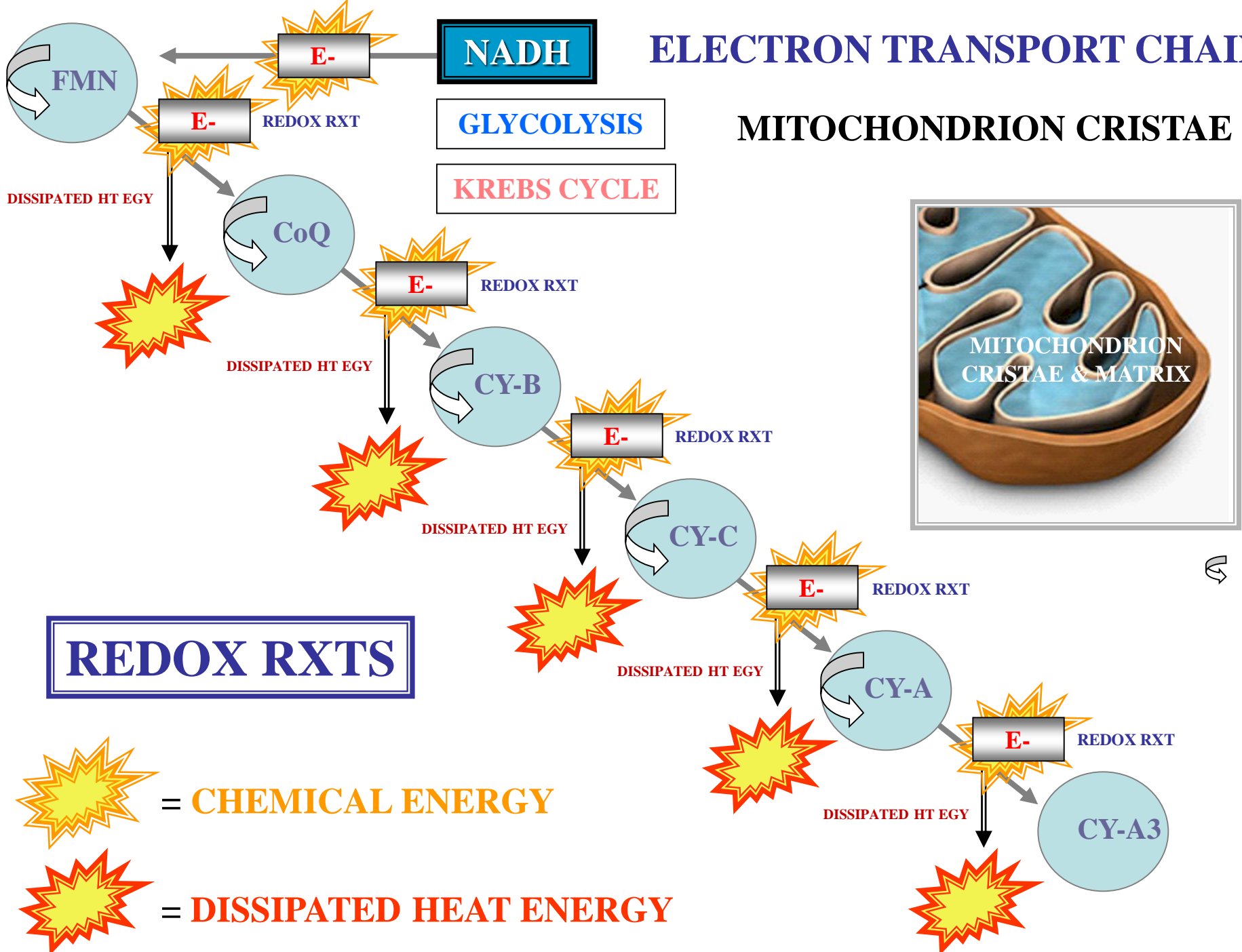
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



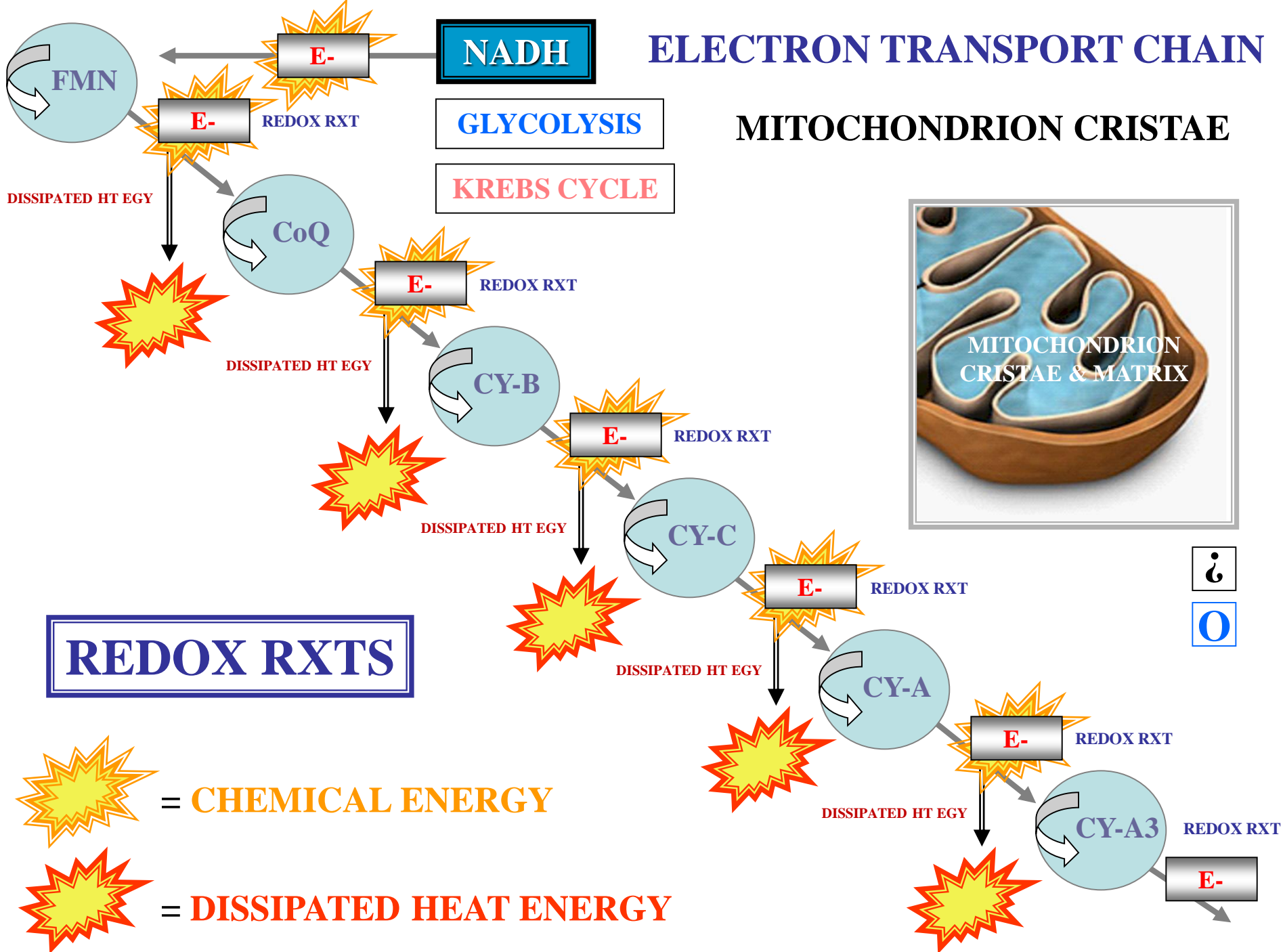
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MITOCHONDRION CRISTAE



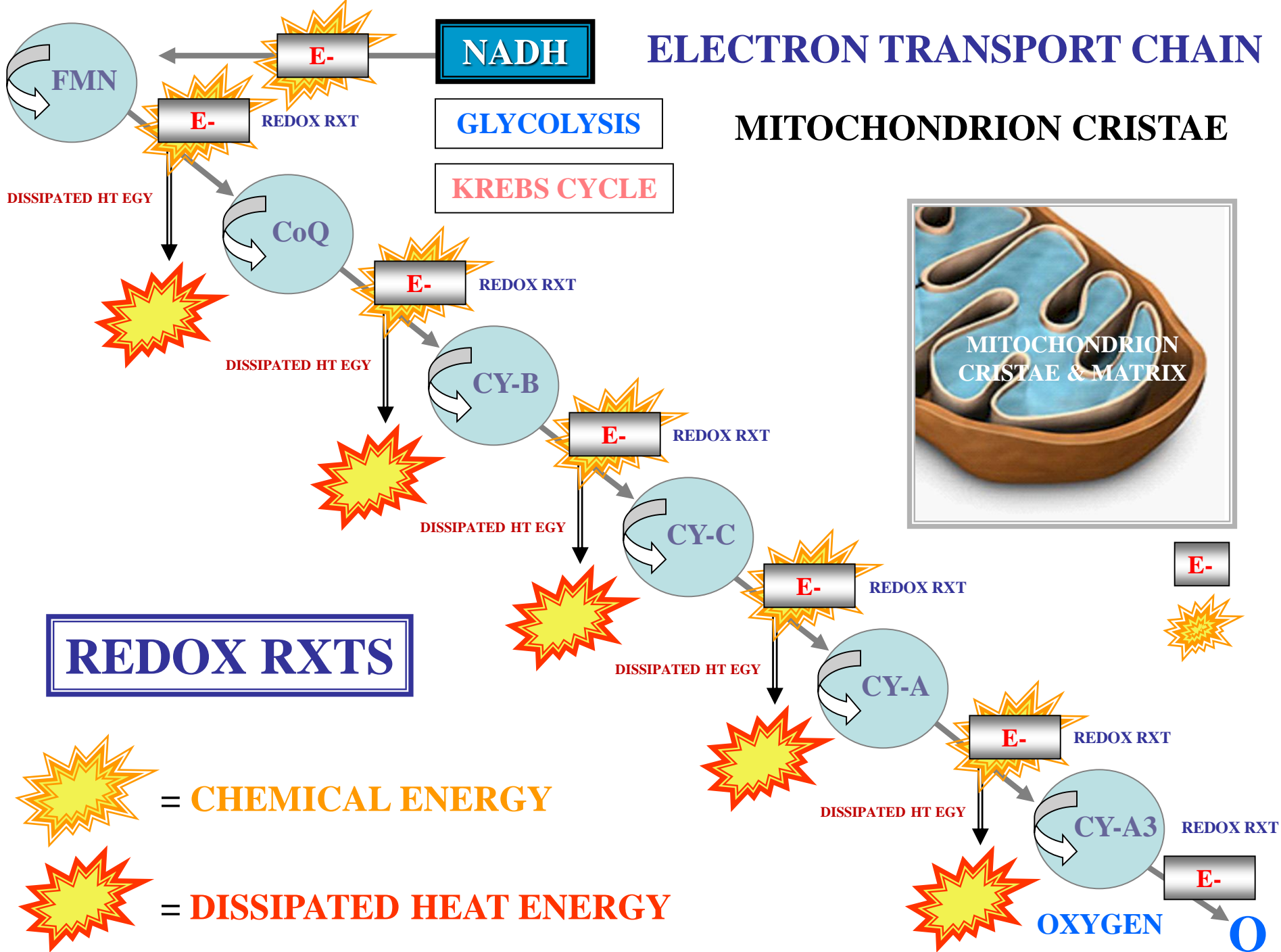
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



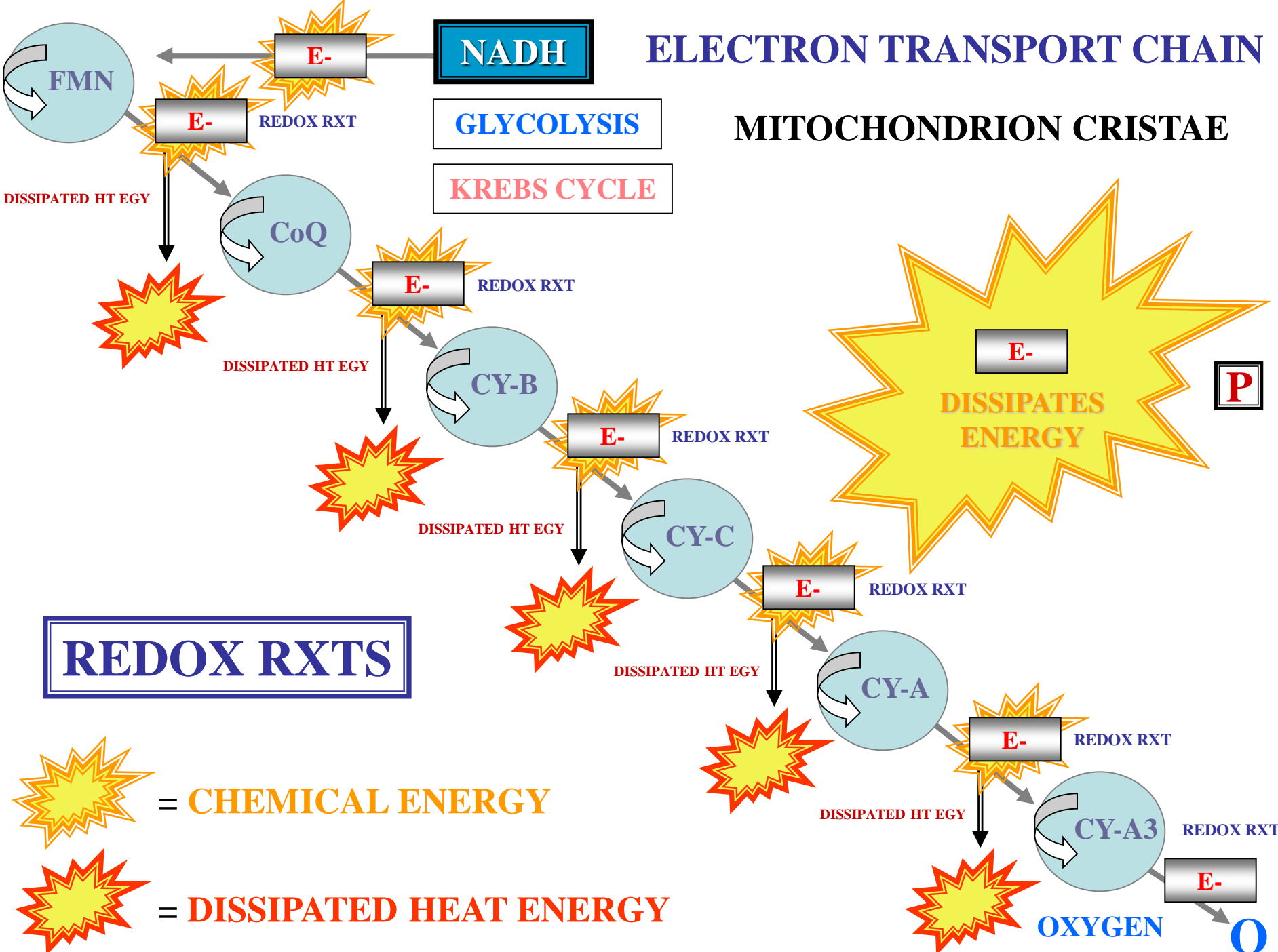
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



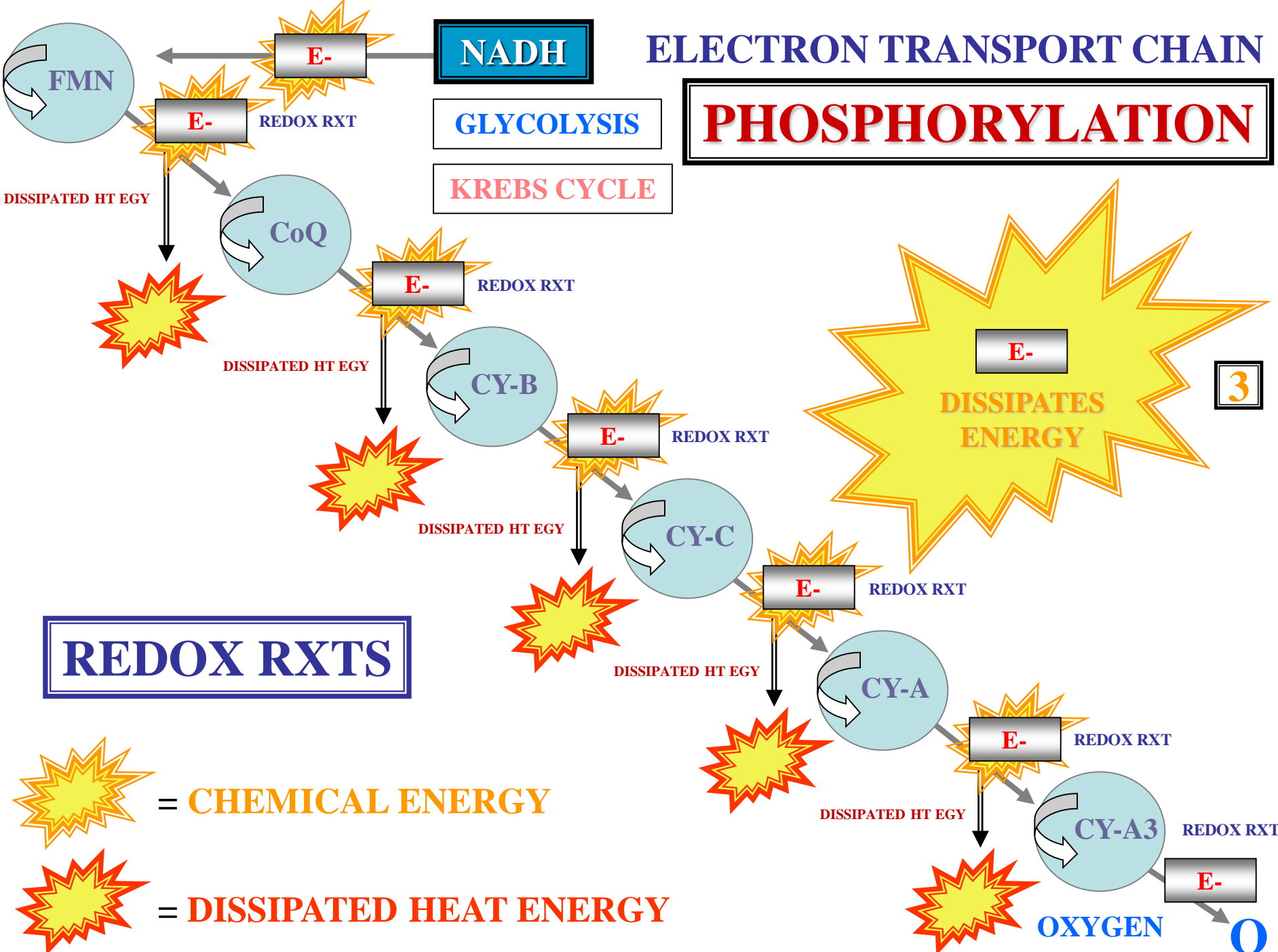
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



ELECTRON TRANSPORT CHAIN

PHOSPHORYLATION



FMN

E^- NADH

GLYCOLYSIS

KREBS CYCLE

DISSIPATED HT EGY

DISSIPATED HT EGY

DISSIPATED HT EGY

DISSIPATED HT EGY

DISSIPATED HT EGY

E^- REDOX RXT

E^- REDOX RXT

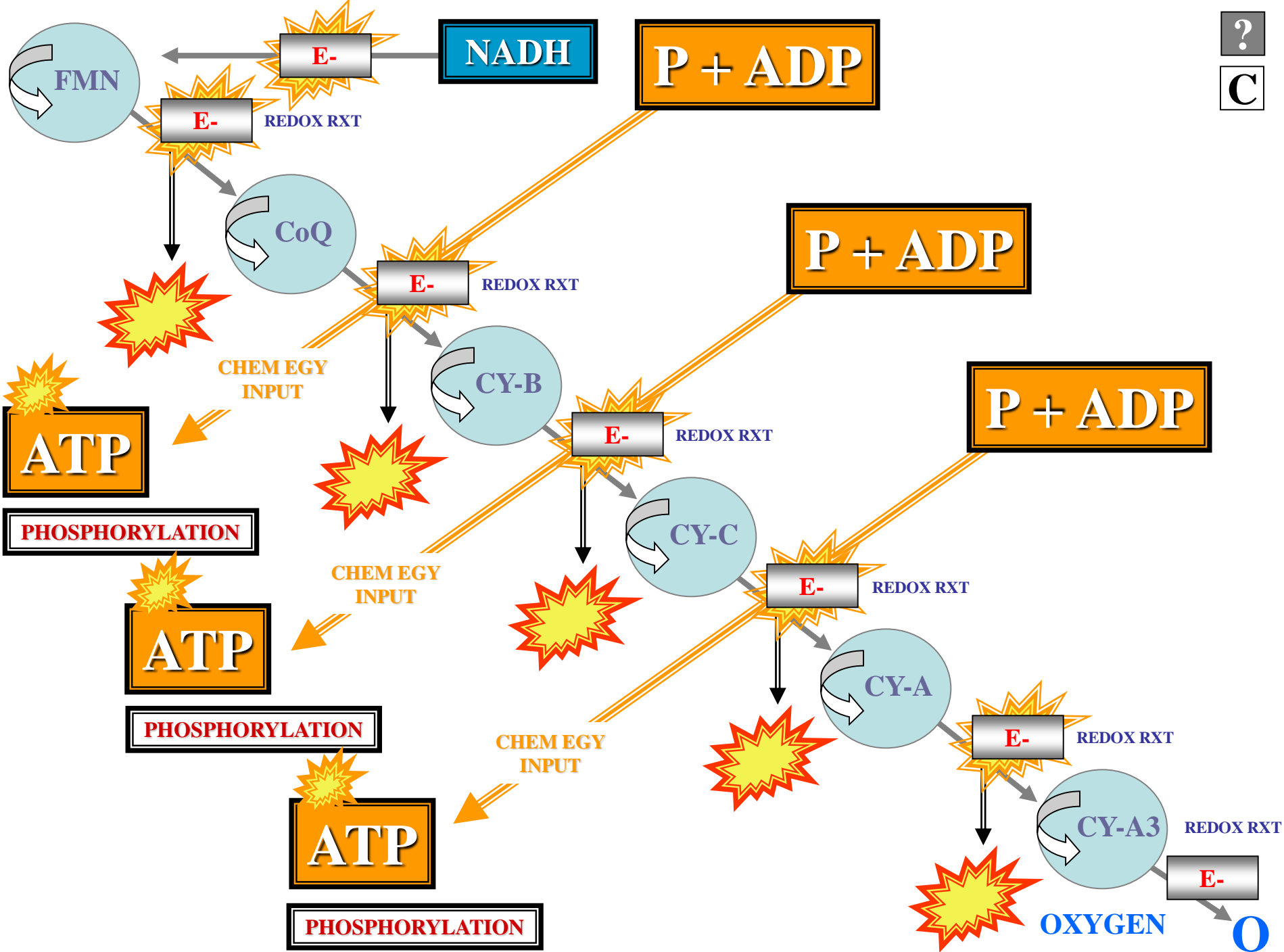
E^- REDOX RXT

E^- REDOX RXT

E^- REDOX RXT

E^- REDOX RXT





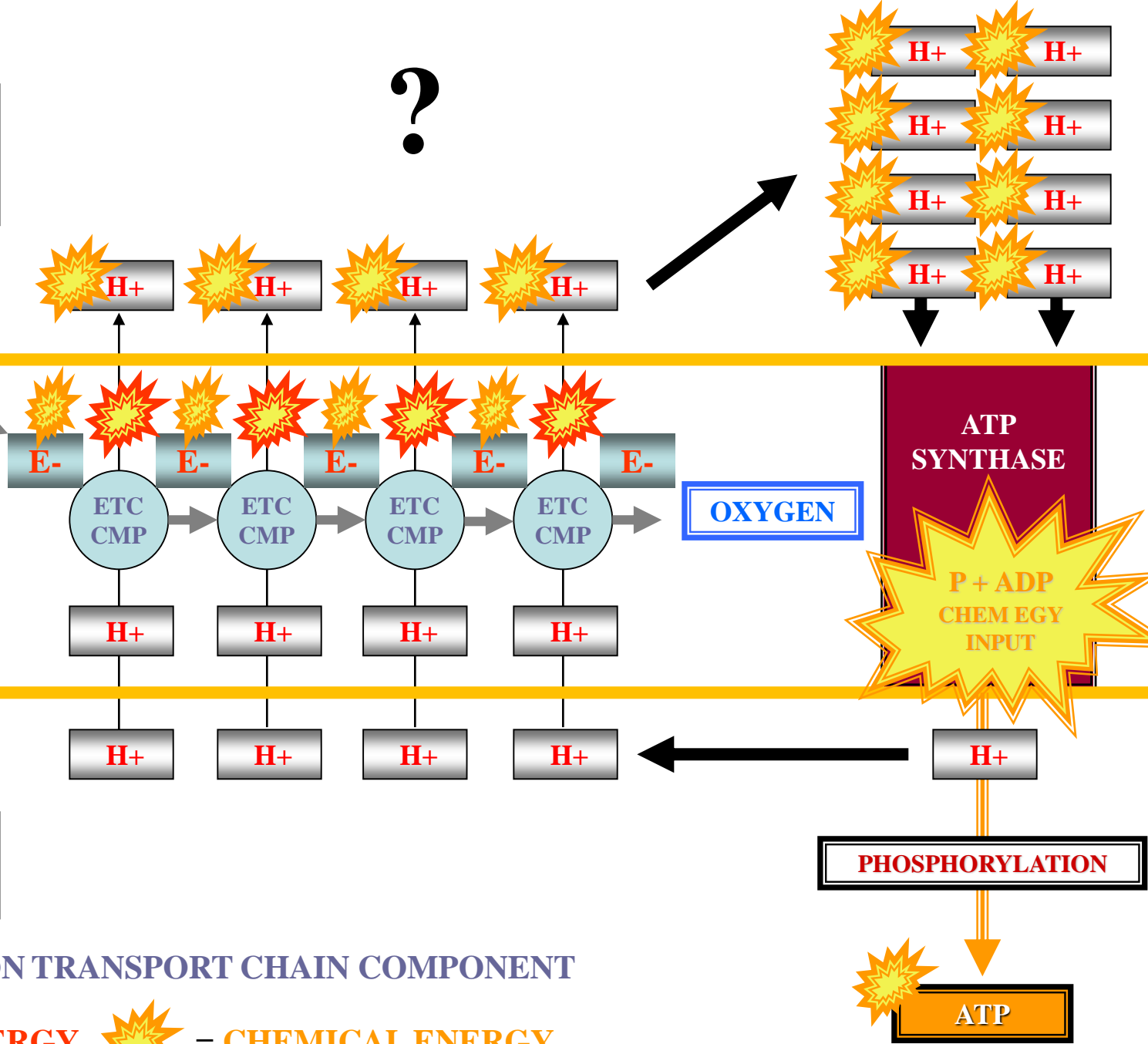
C

MITOCHONDRION CRISTAE SPACE

?

E- DONORS
MITOCHONDRION CRISTAE MEMBRANE

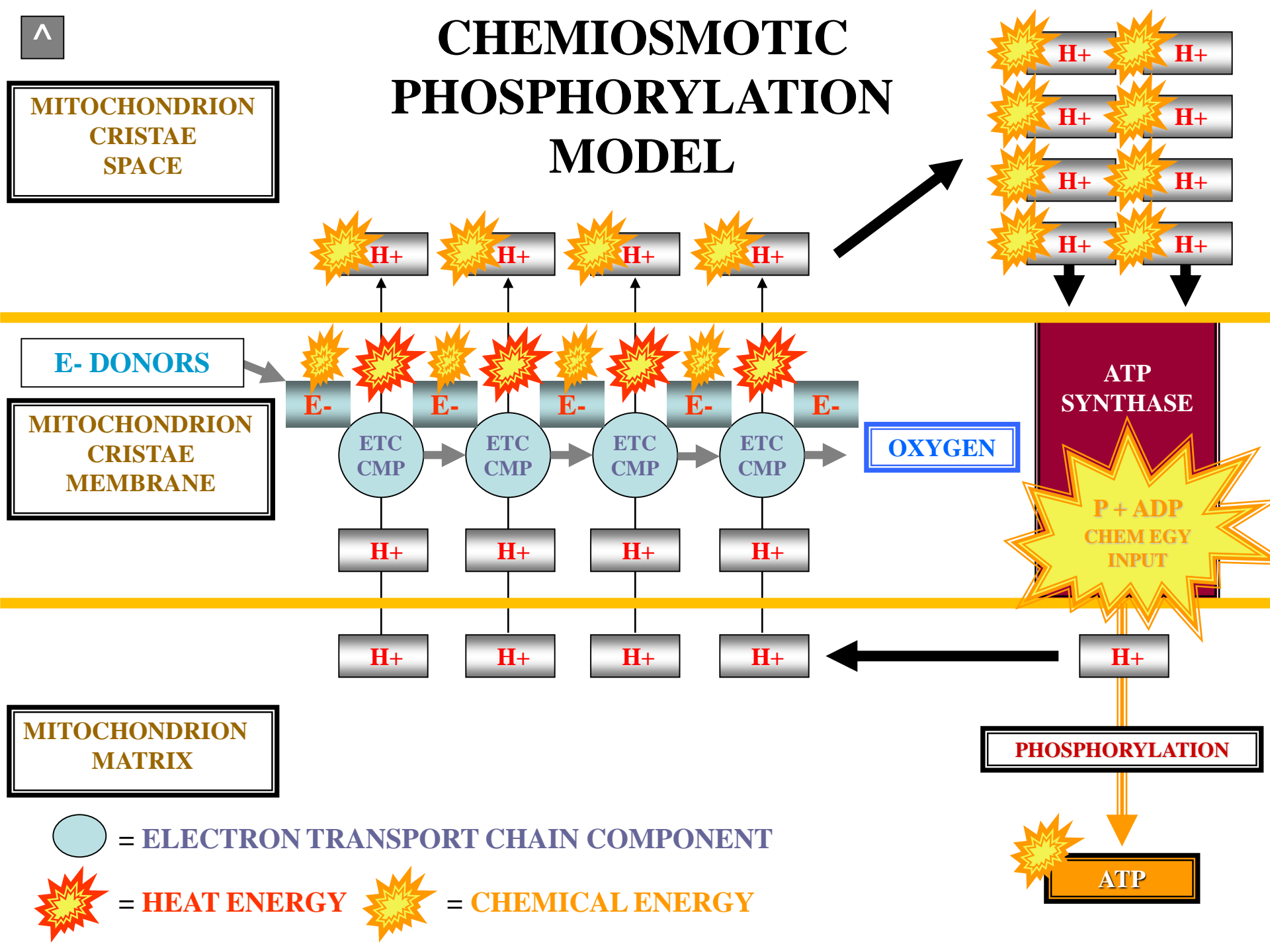
MITOCHONDRION MATRIX



● = ELECTRON TRANSPORT CHAIN COMPONENT

★ = HEAT ENERGY ★ = CHEMICAL ENERGY

CHEMIOSMOTIC PHOSPHORYLATION MODEL

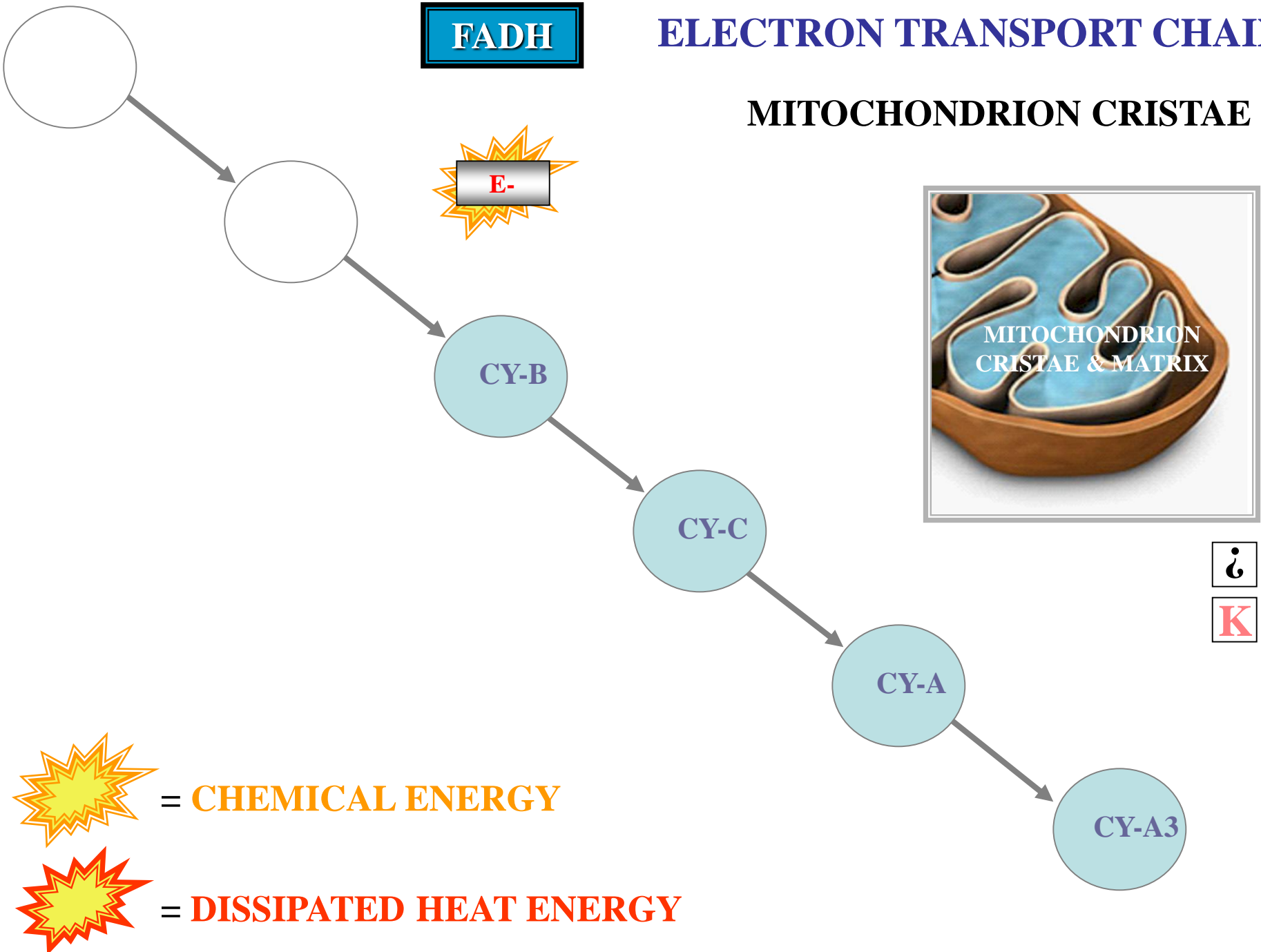




FADH E- DONOR

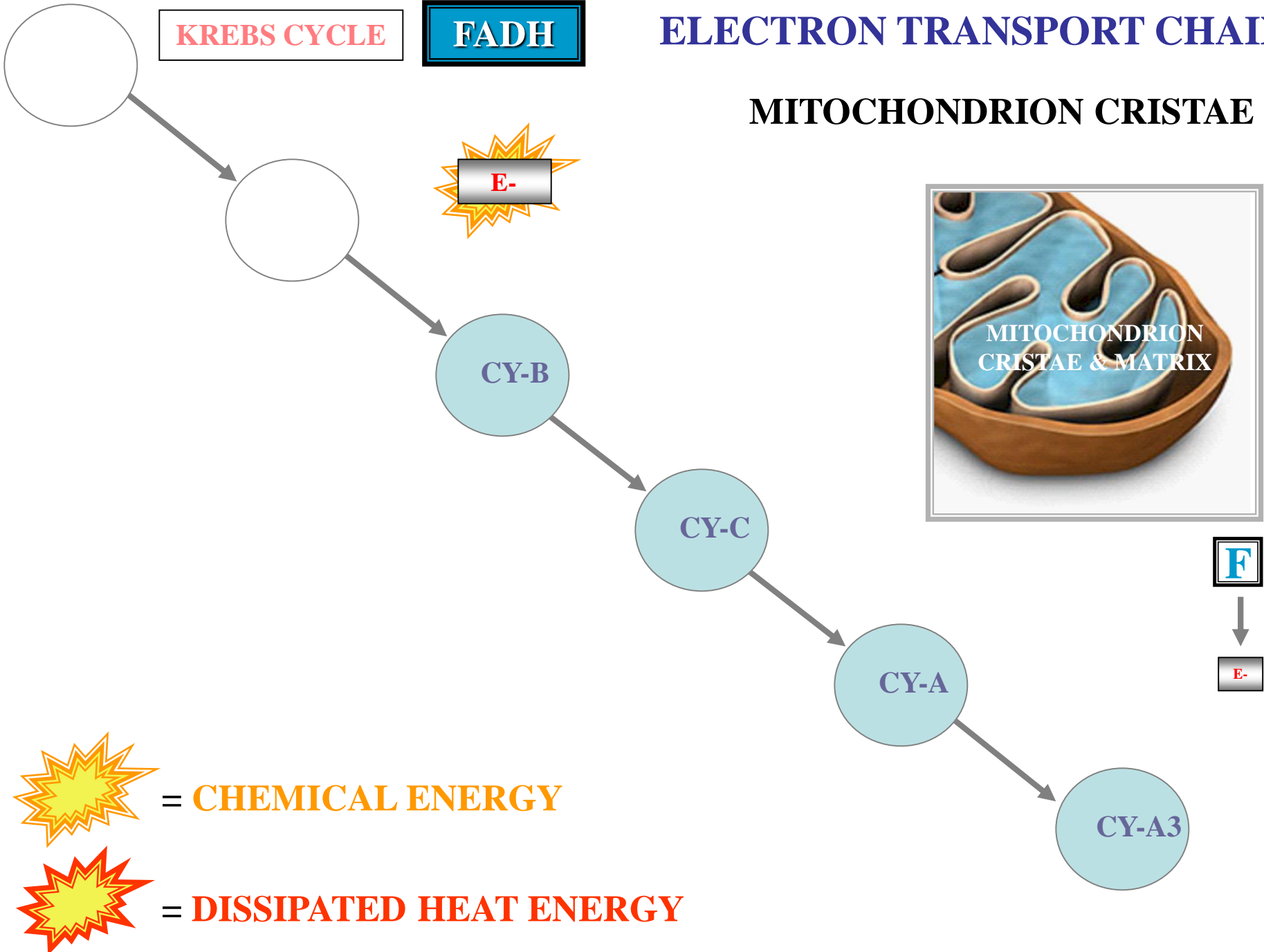
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE

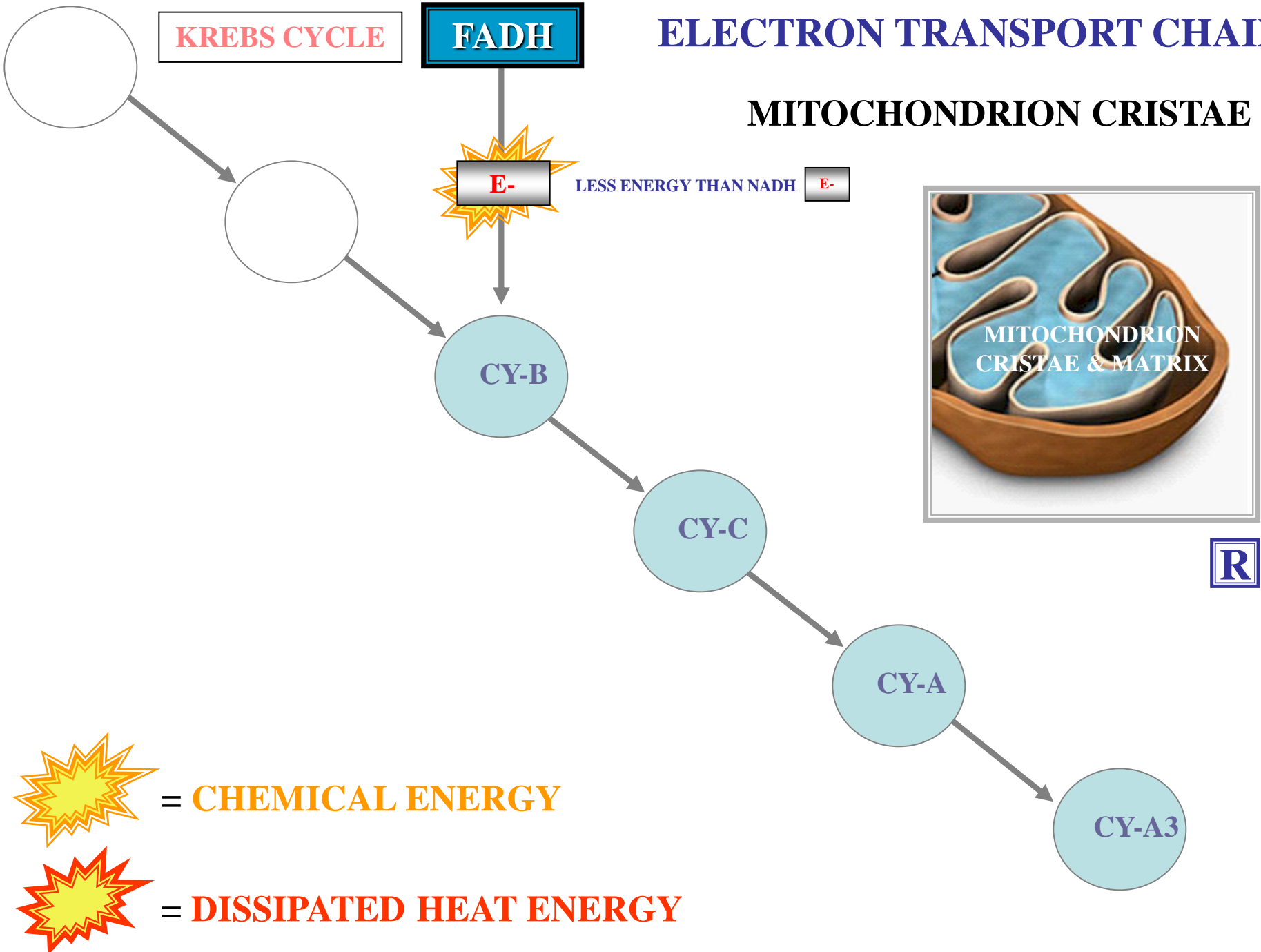


 = **CHEMICAL ENERGY**

 = **DISSIPATED HEAT ENERGY**

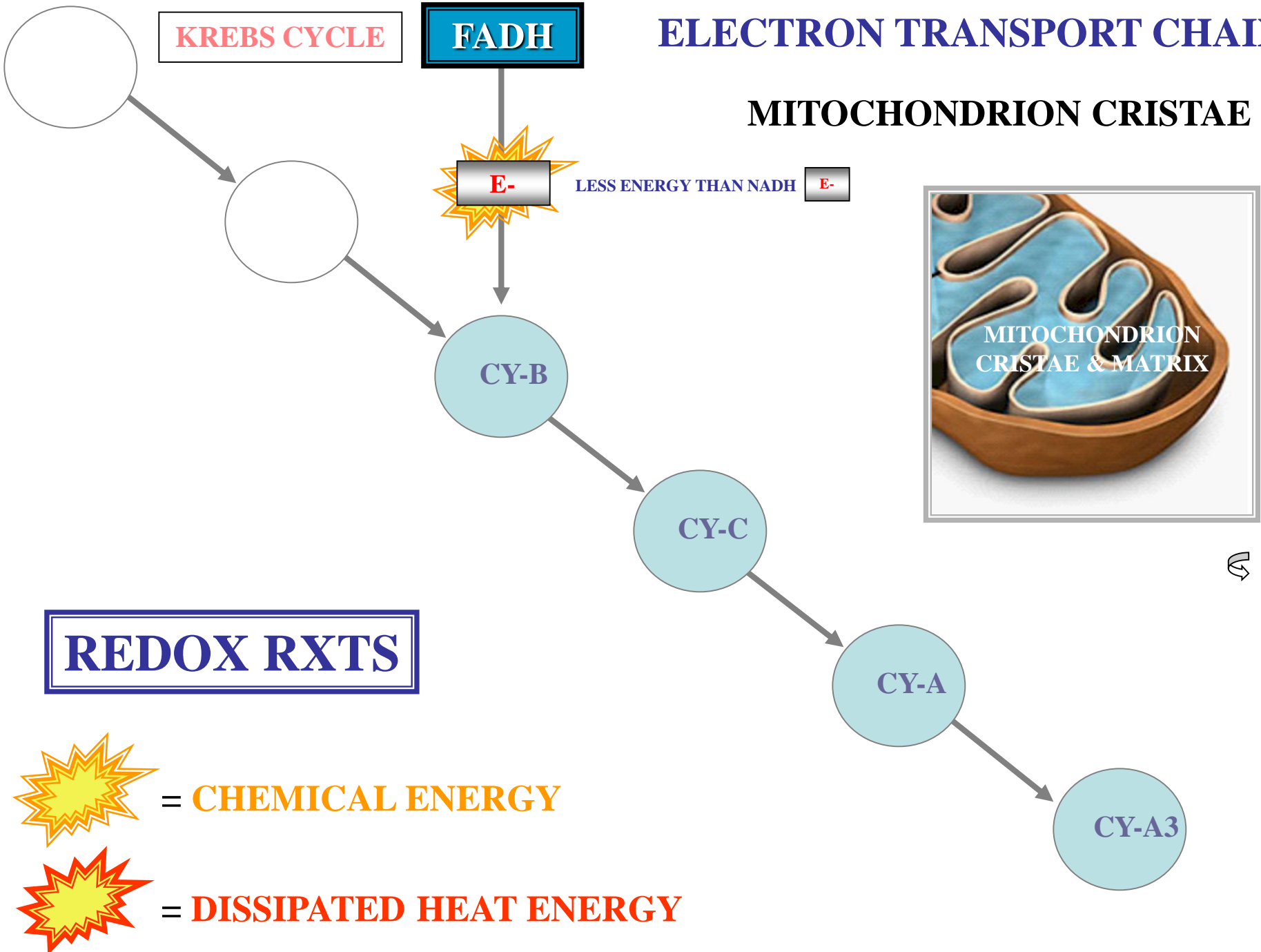
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



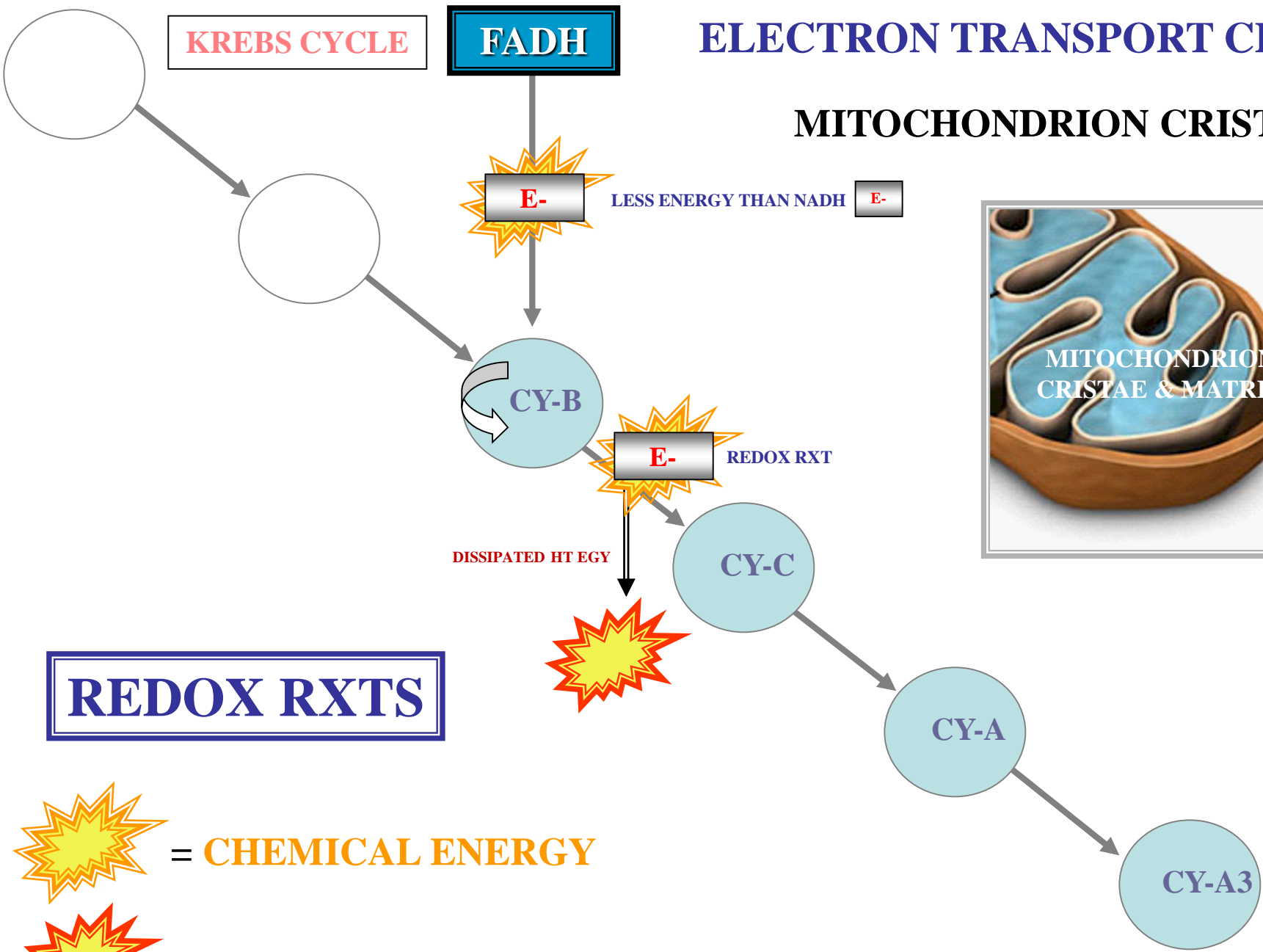
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



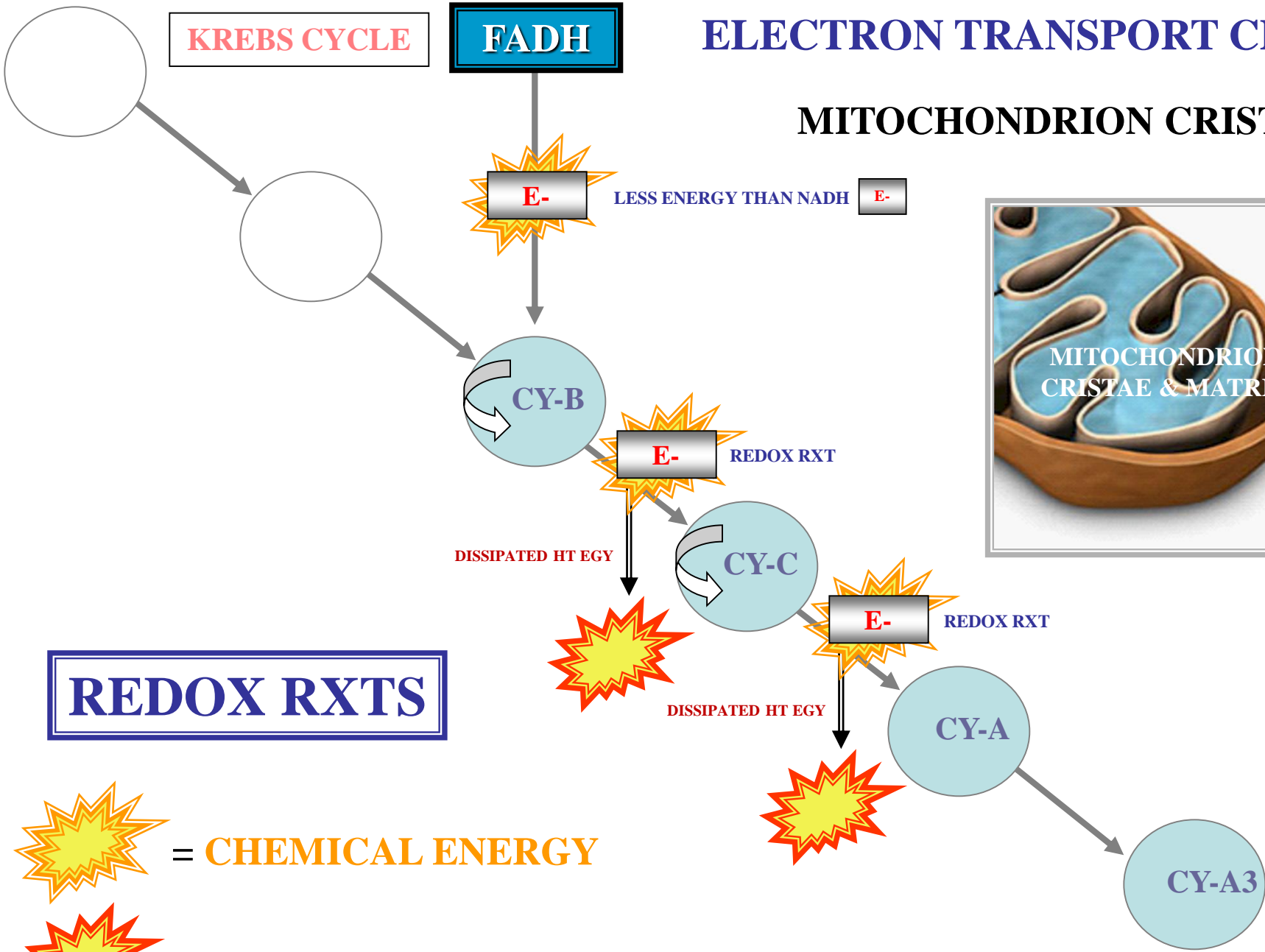
REDOX RXTS

= **CHEMICAL ENERGY**

= **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



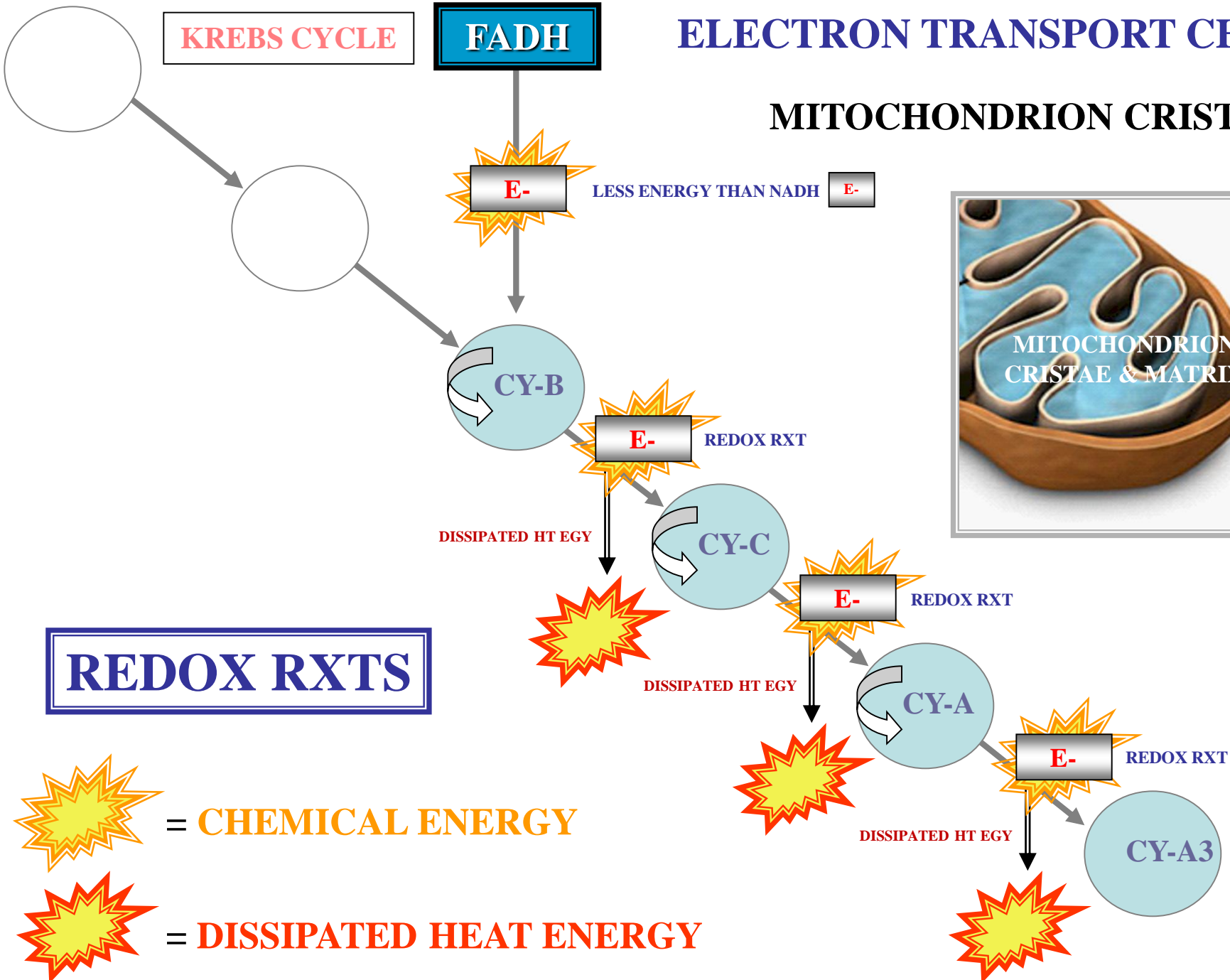
REDOX RXTS

 = **CHEMICAL ENERGY**

 = **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



REDOX RXTS

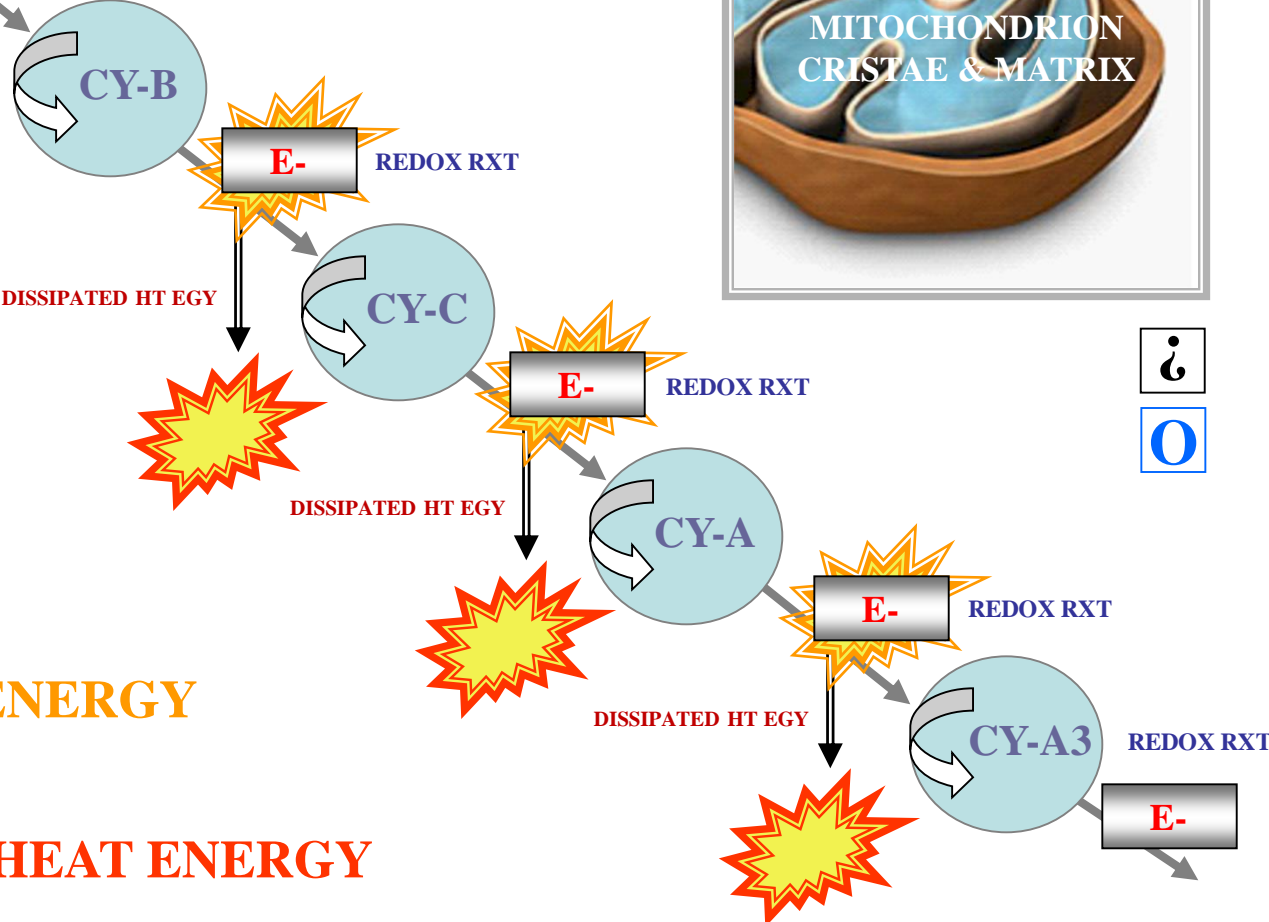
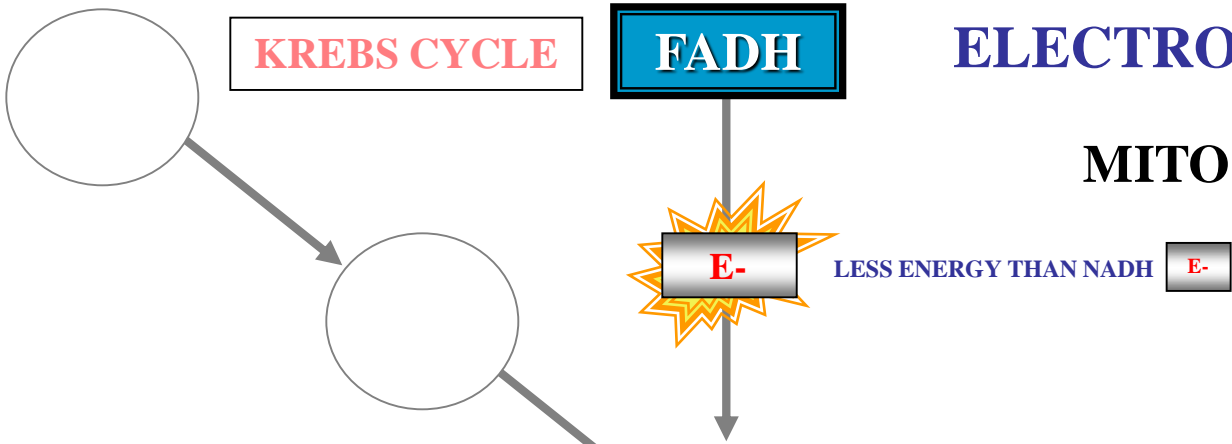
 = **CHEMICAL ENERGY**

 = **DISSIPATED HEAT ENERGY**



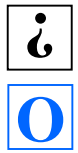
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



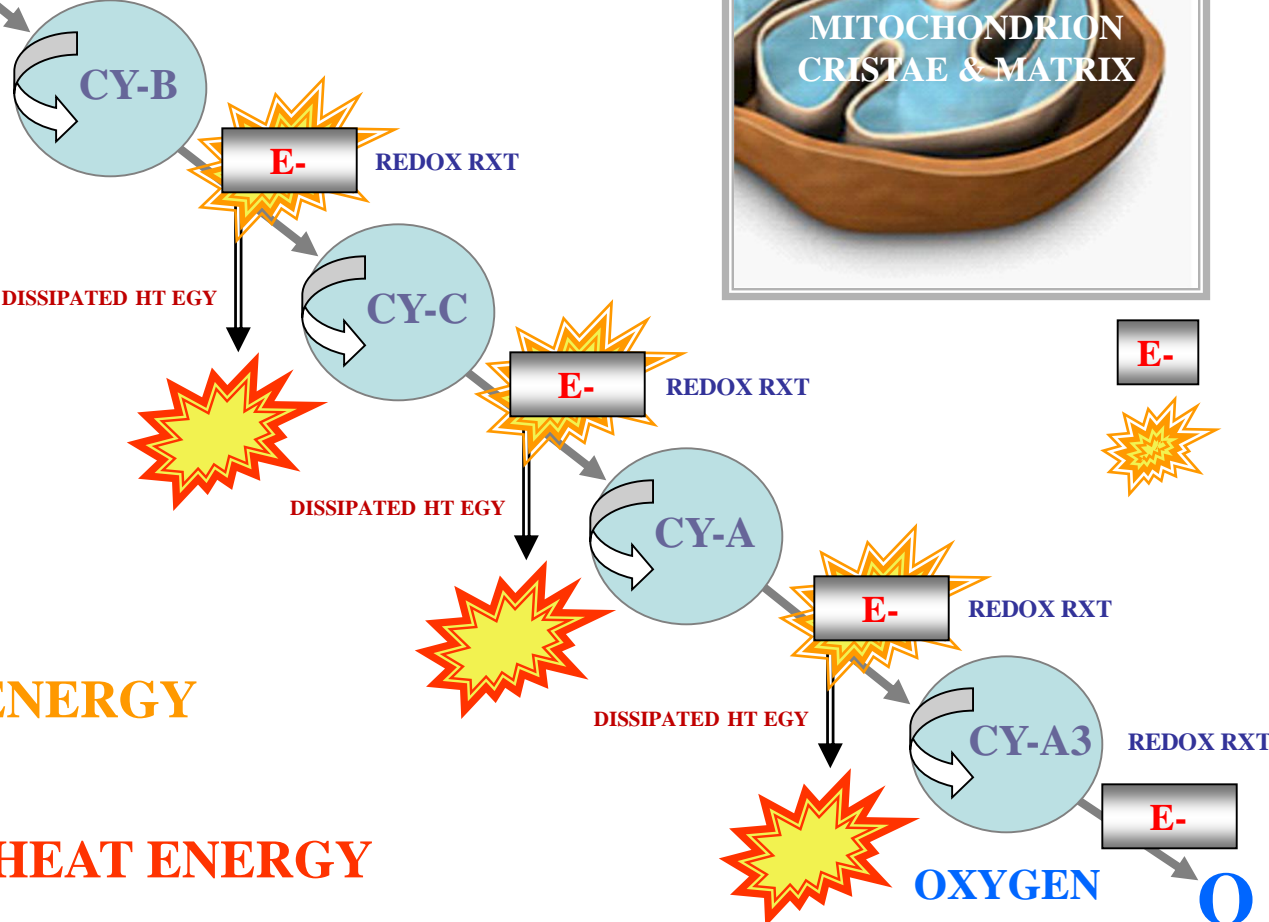
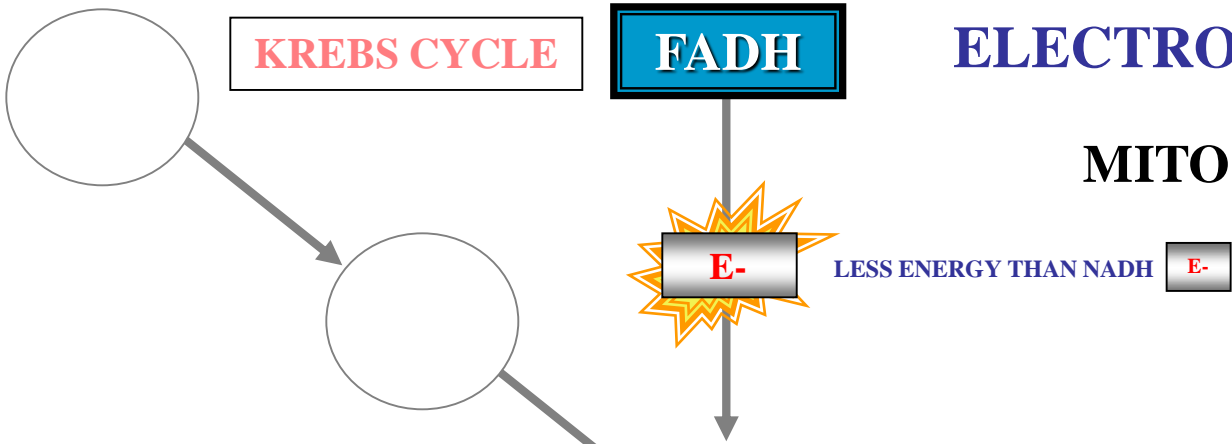
REDOX RXTS

- = CHEMICAL ENERGY
- = DISSIPATED HEAT ENERGY



ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



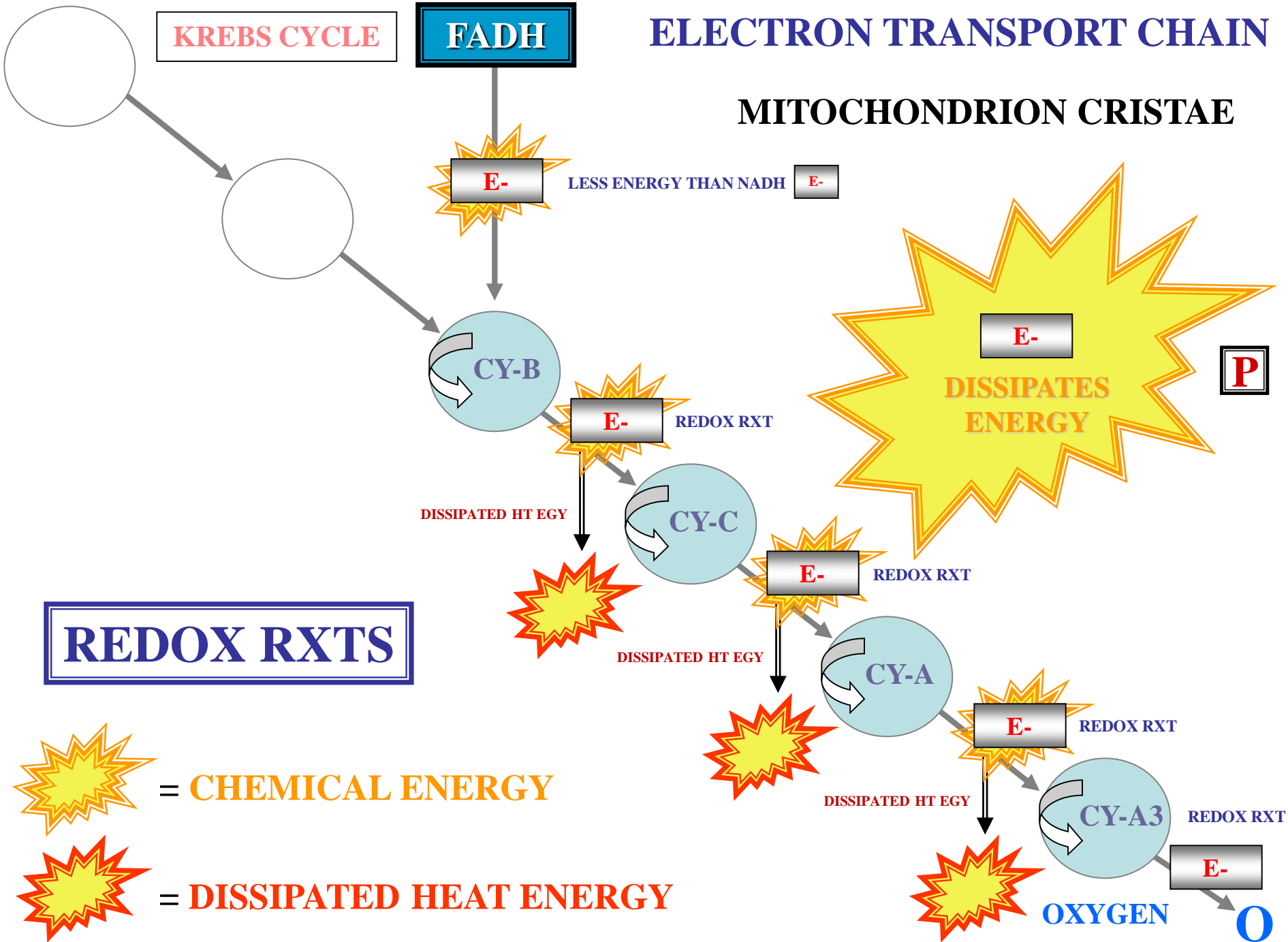
REDOX RXTS

= CHEMICAL ENERGY

= DISSIPATED HEAT ENERGY

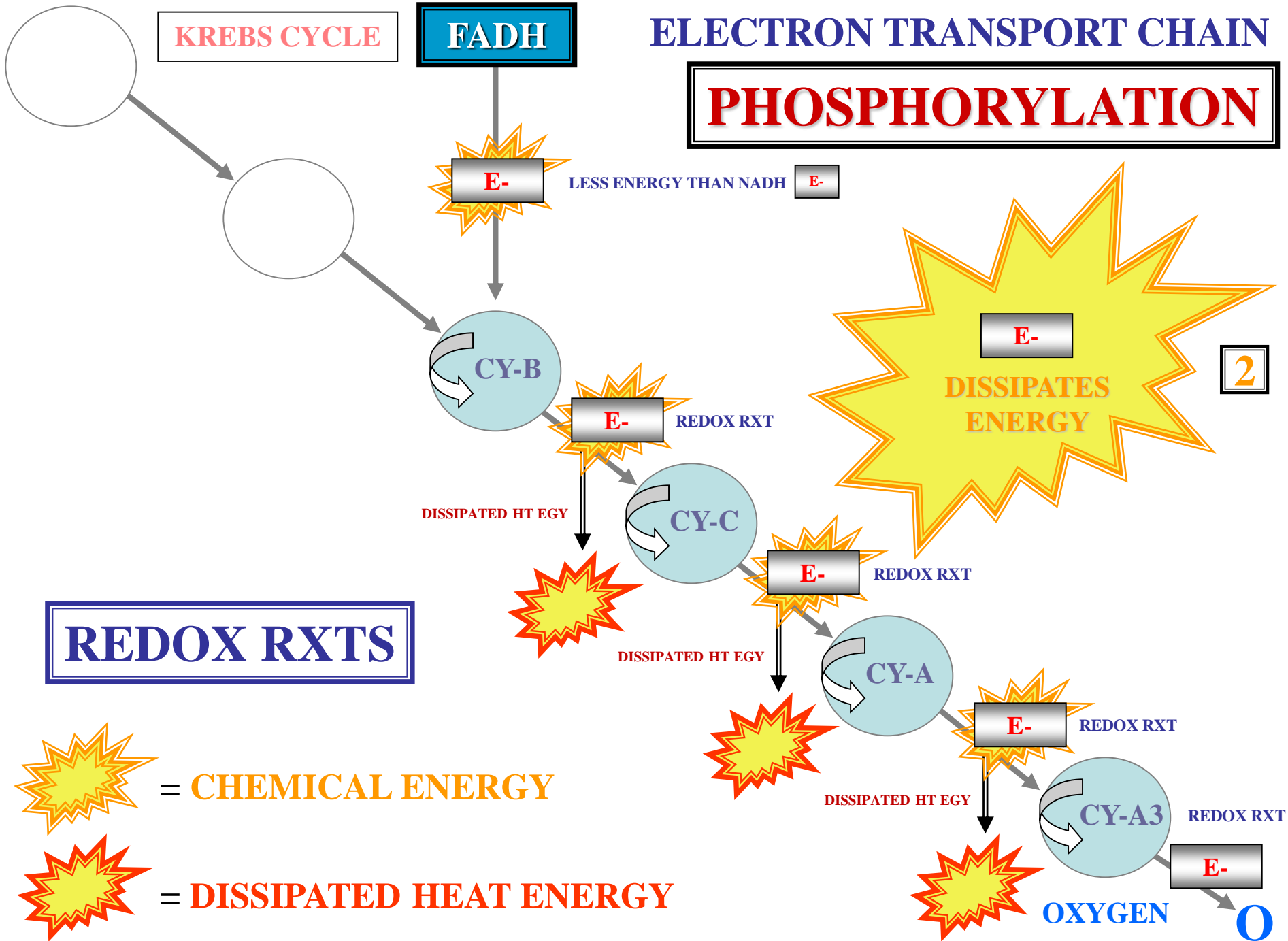
ELECTRON TRANSPORT CHAIN

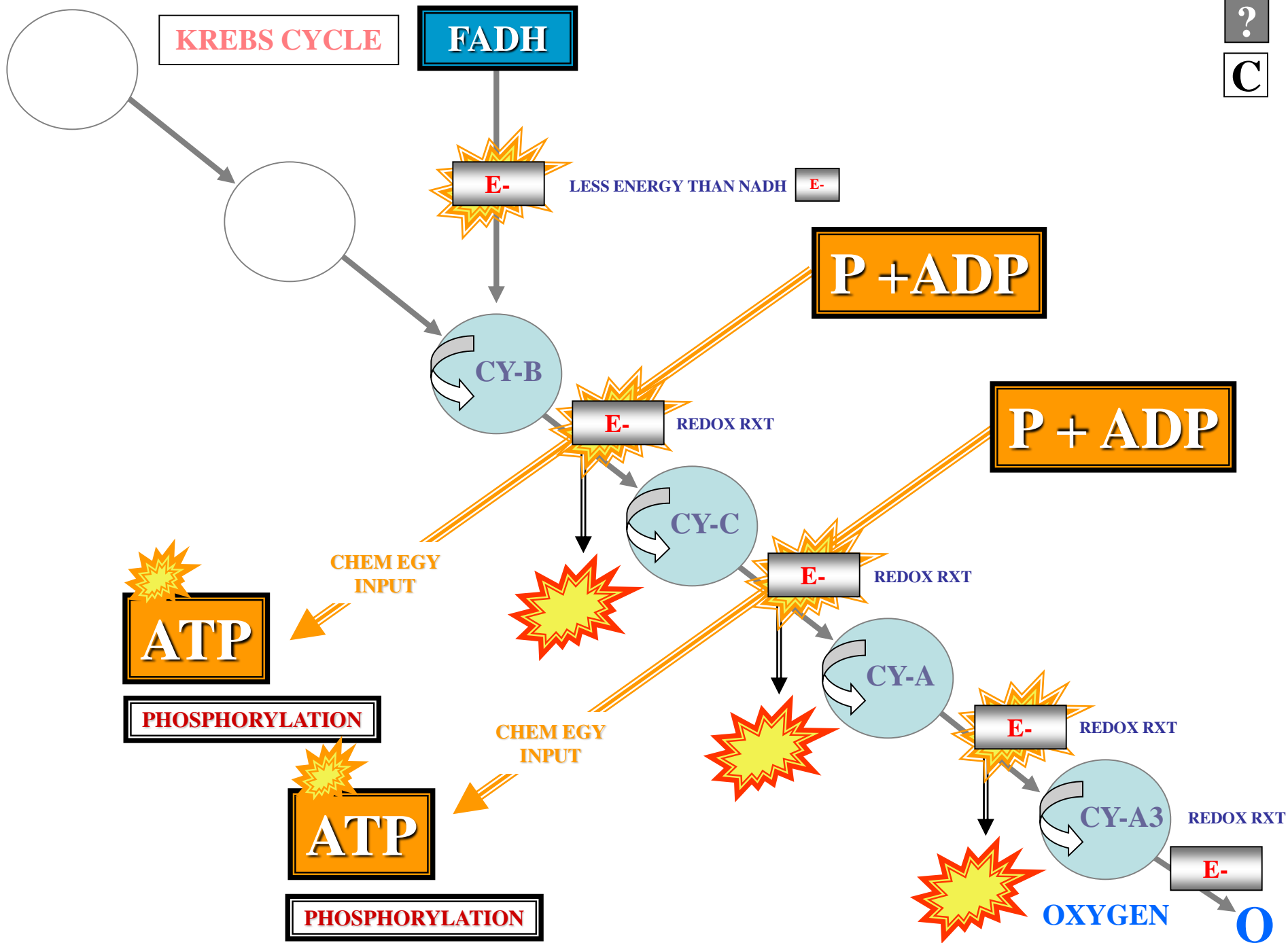
MITOCHONDRION CRISTAE



ELECTRON TRANSPORT CHAIN

PHOSPHORYLATION





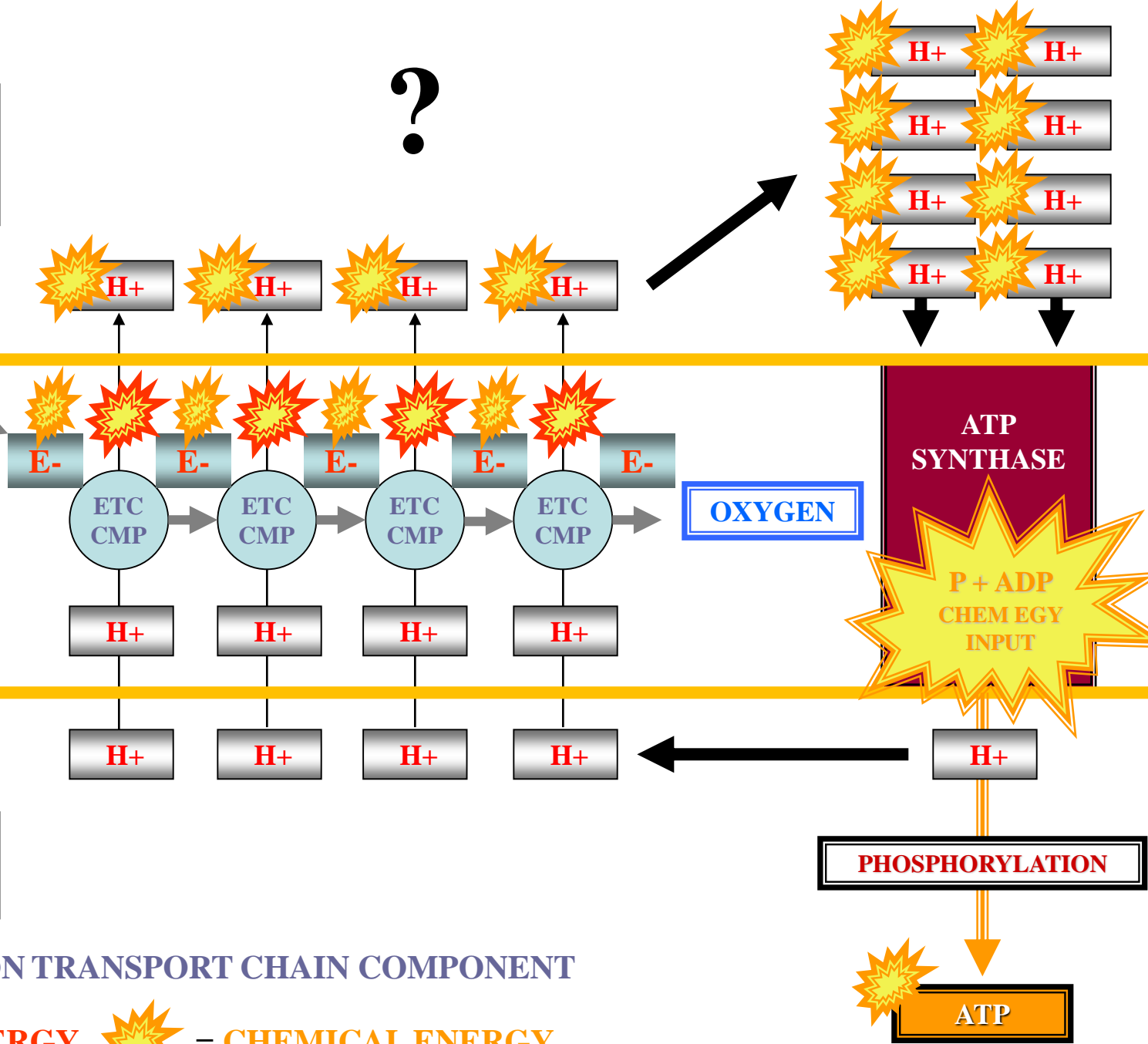
C

MITOCHONDRION CRISTAE SPACE

?

E- DONORS
MITOCHONDRION CRISTAE MEMBRANE

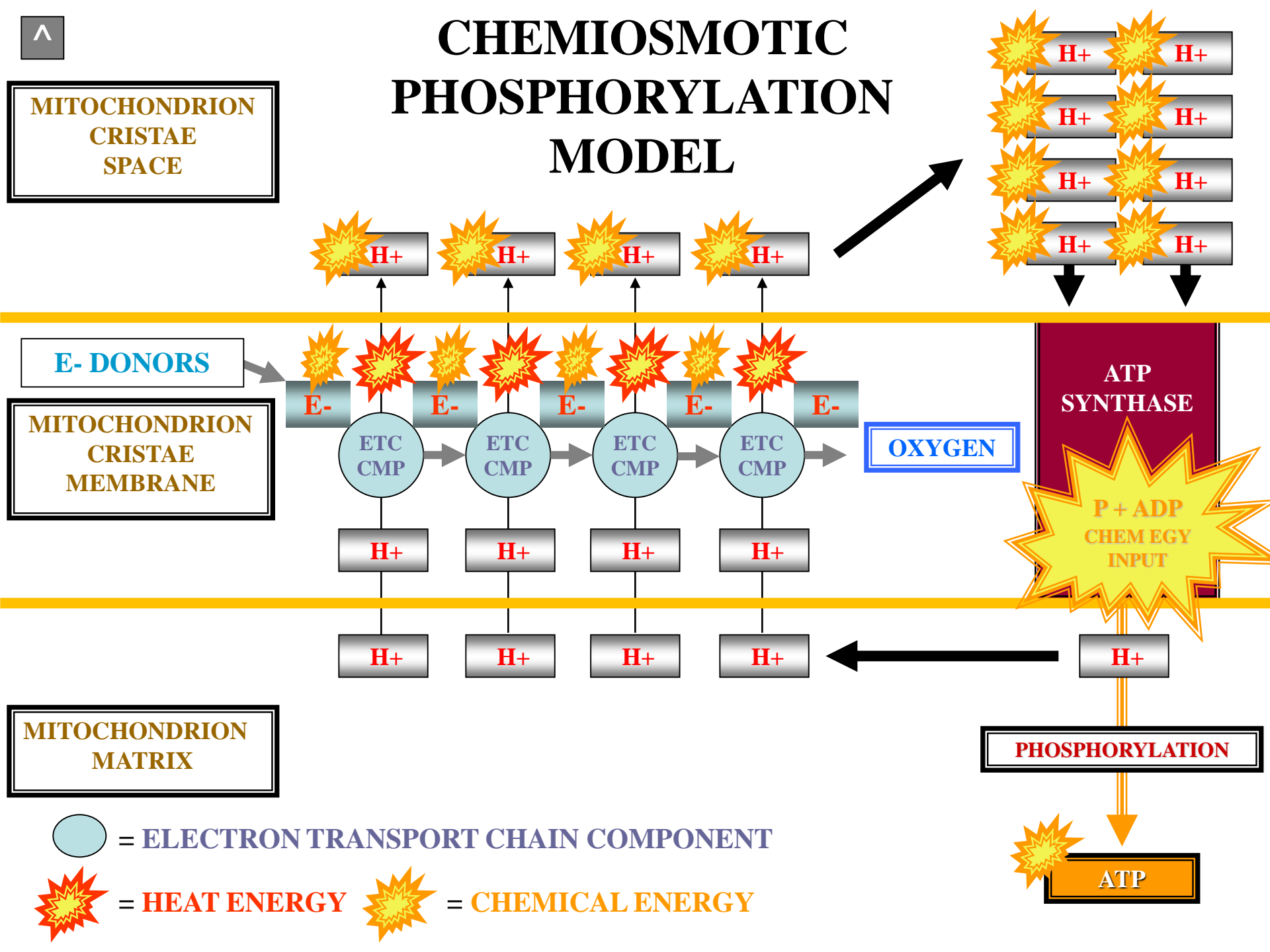
MITOCHONDRION MATRIX



● = ELECTRON TRANSPORT CHAIN COMPONENT

★ = HEAT ENERGY ★ = CHEMICAL ENERGY

CHEMIOSMOTIC PHOSPHORYLATION MODEL





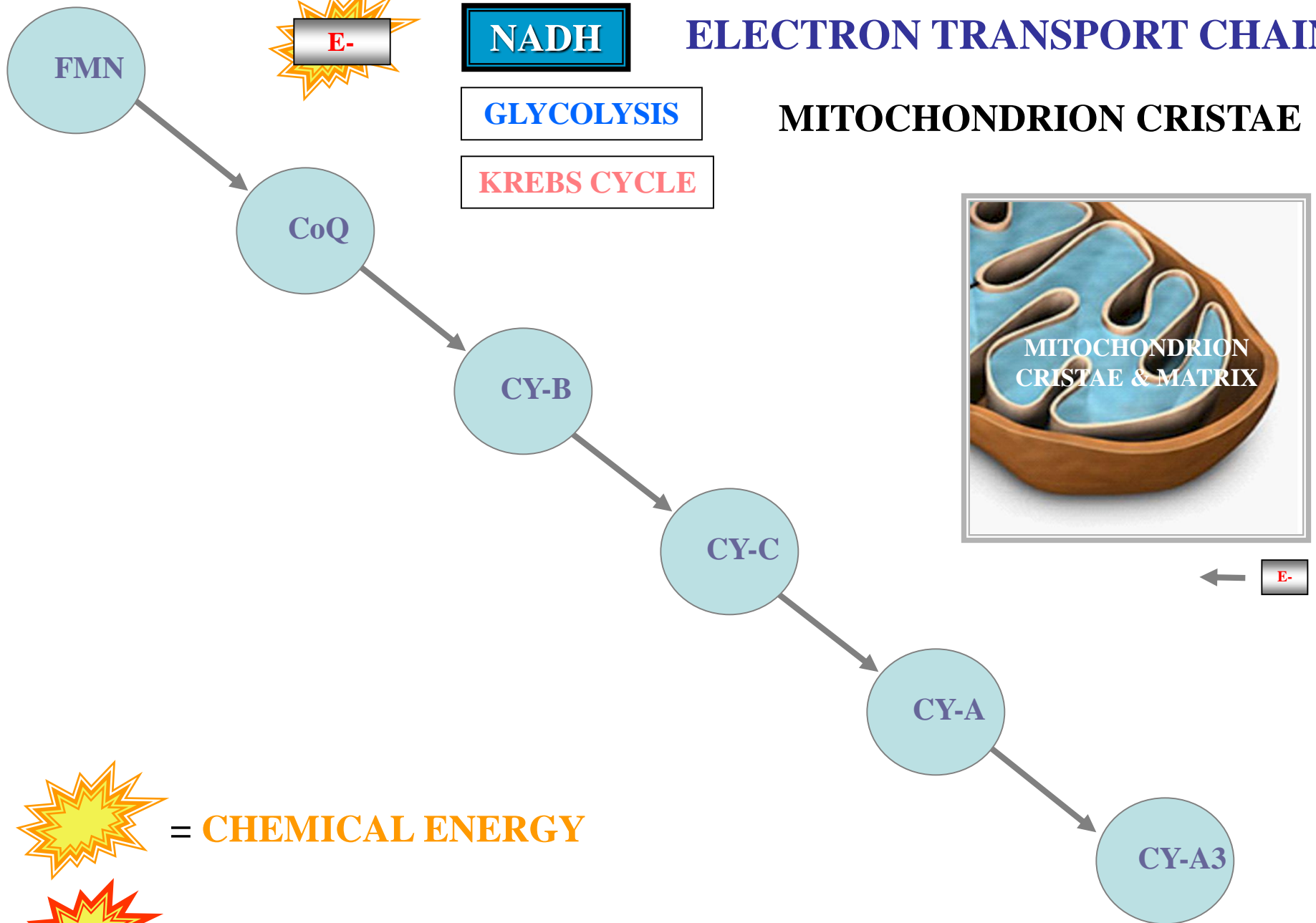
NADH & FADH PHOSPHORYLATION



NADH PHOSPHORYLATION

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE

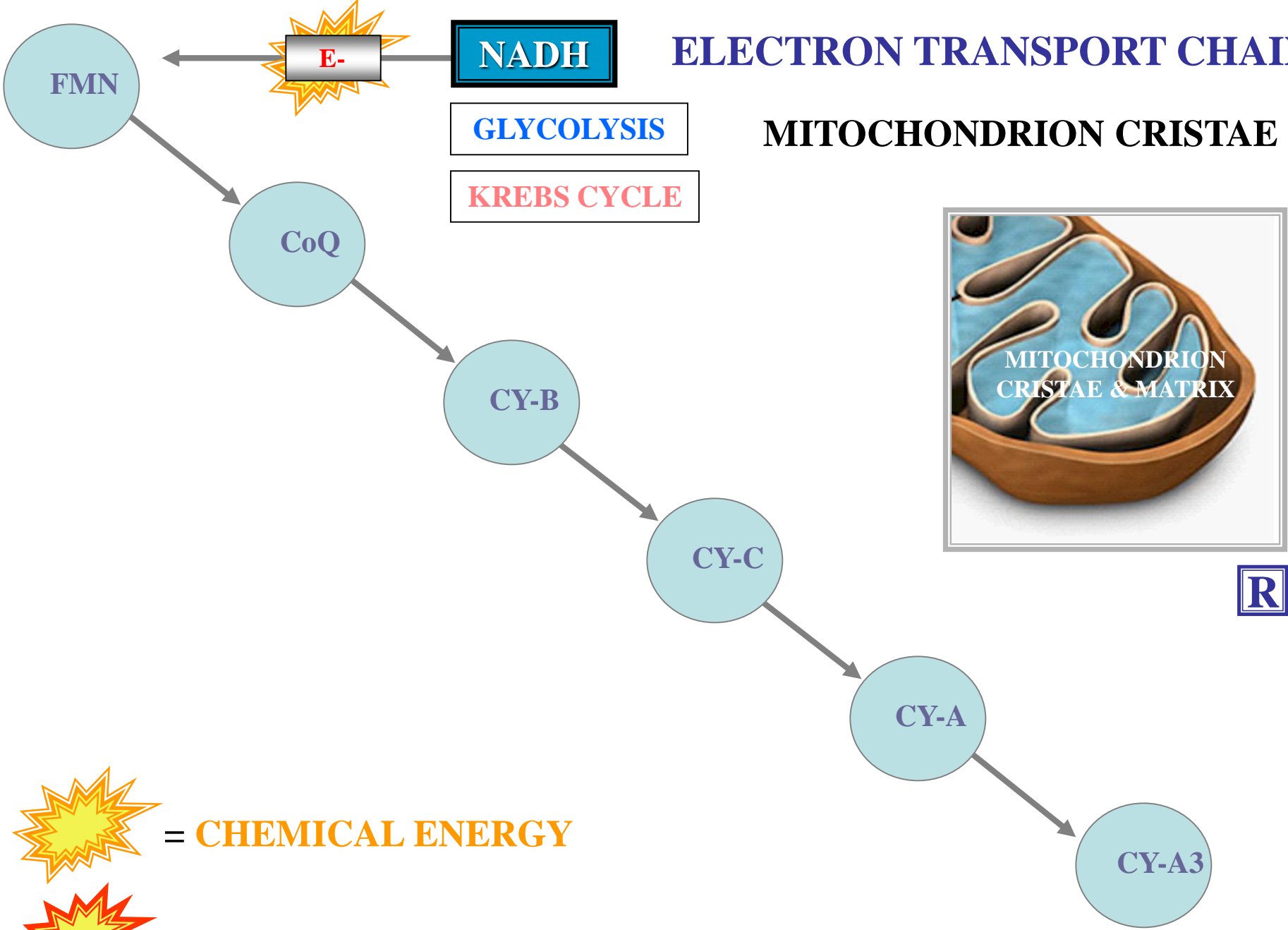


 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



 = **CHEMICAL ENERGY**

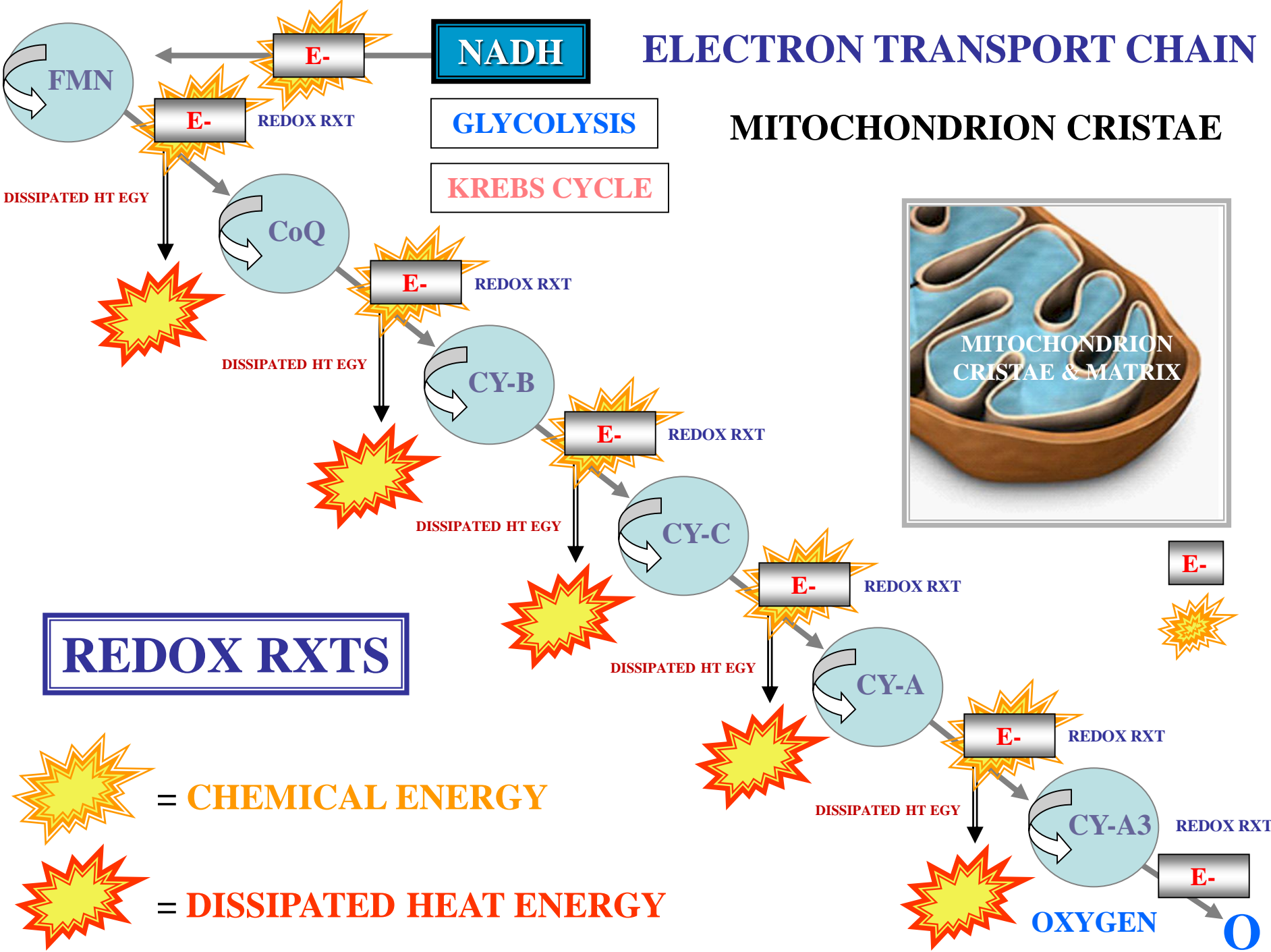
 = **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



MITOCHONDRION CRISTAE & MATRIX



REDOX RXTS

NADH

GLYCOLYSIS

KREBS CYCLE

DISSIPATED HT EGY

DISSIPATED HT EGY

DISSIPATED HT EGY

DISSIPATED HT EGY

DISSIPATED HT EGY

OXYGEN

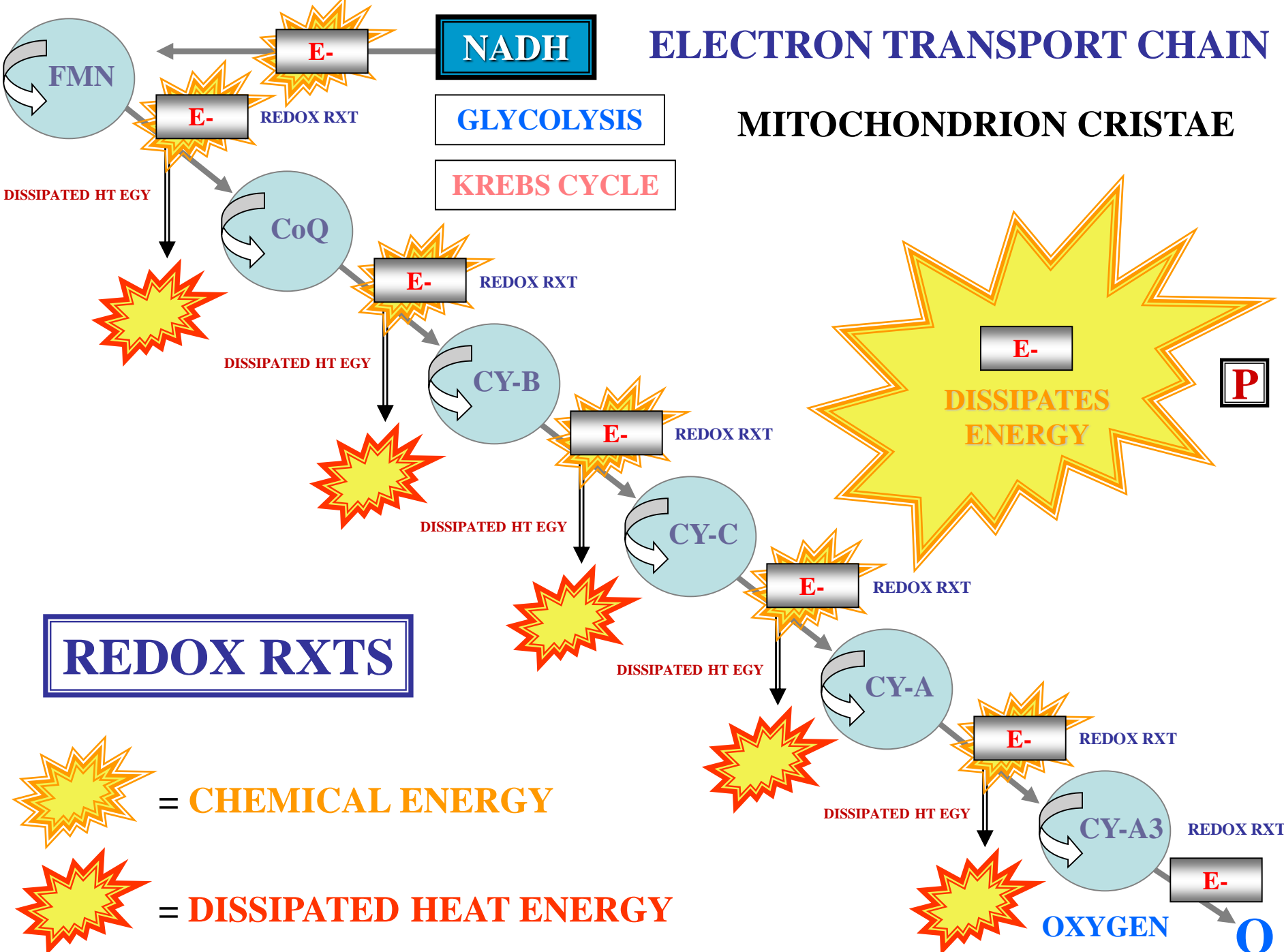
O

E-



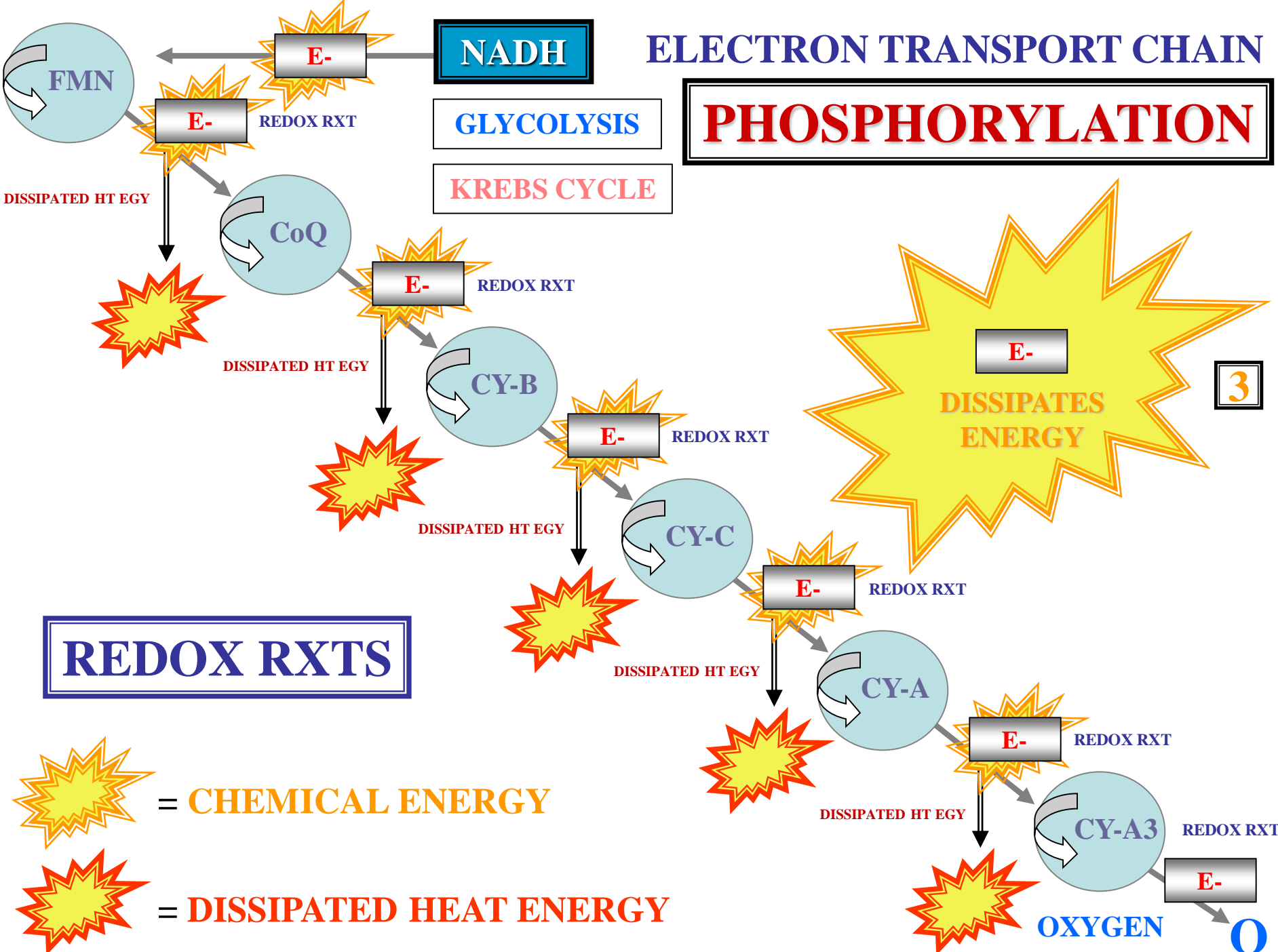
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



ELECTRON TRANSPORT CHAIN

PHOSPHORYLATION



NADH

GLYCOLYSIS

KREBS CYCLE

FMN

E- REDOX RXT

DISSIPATED HT EGY

CoQ

E- REDOX RXT

DISSIPATED HT EGY

CY-B

E- REDOX RXT

DISSIPATED HT EGY

CY-C

E- REDOX RXT

DISSIPATED HT EGY

CY-A

E- REDOX RXT

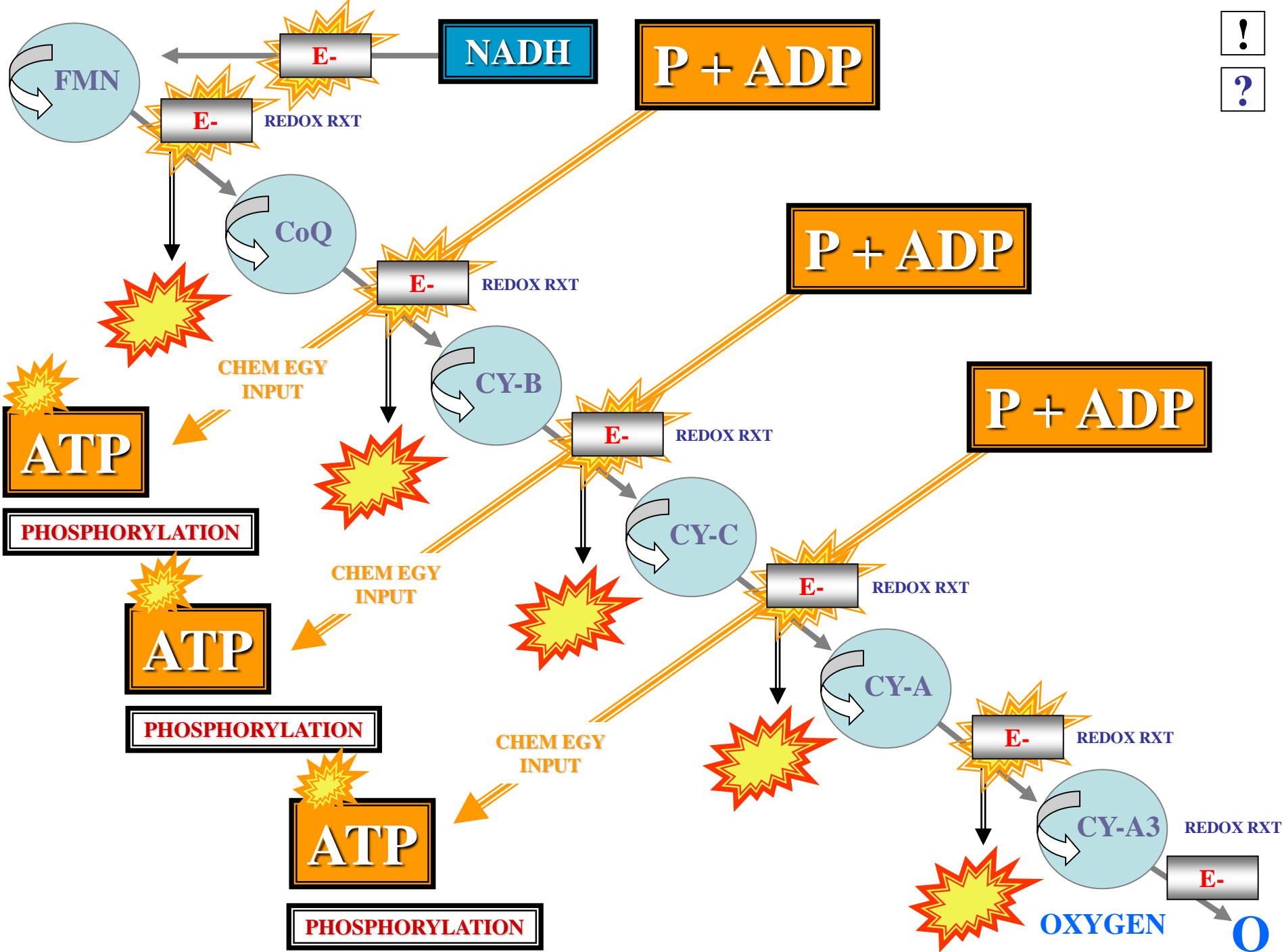
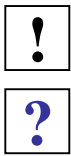
DISSIPATED HT EGY

CY-A3

E- REDOX RXT

OXYGEN

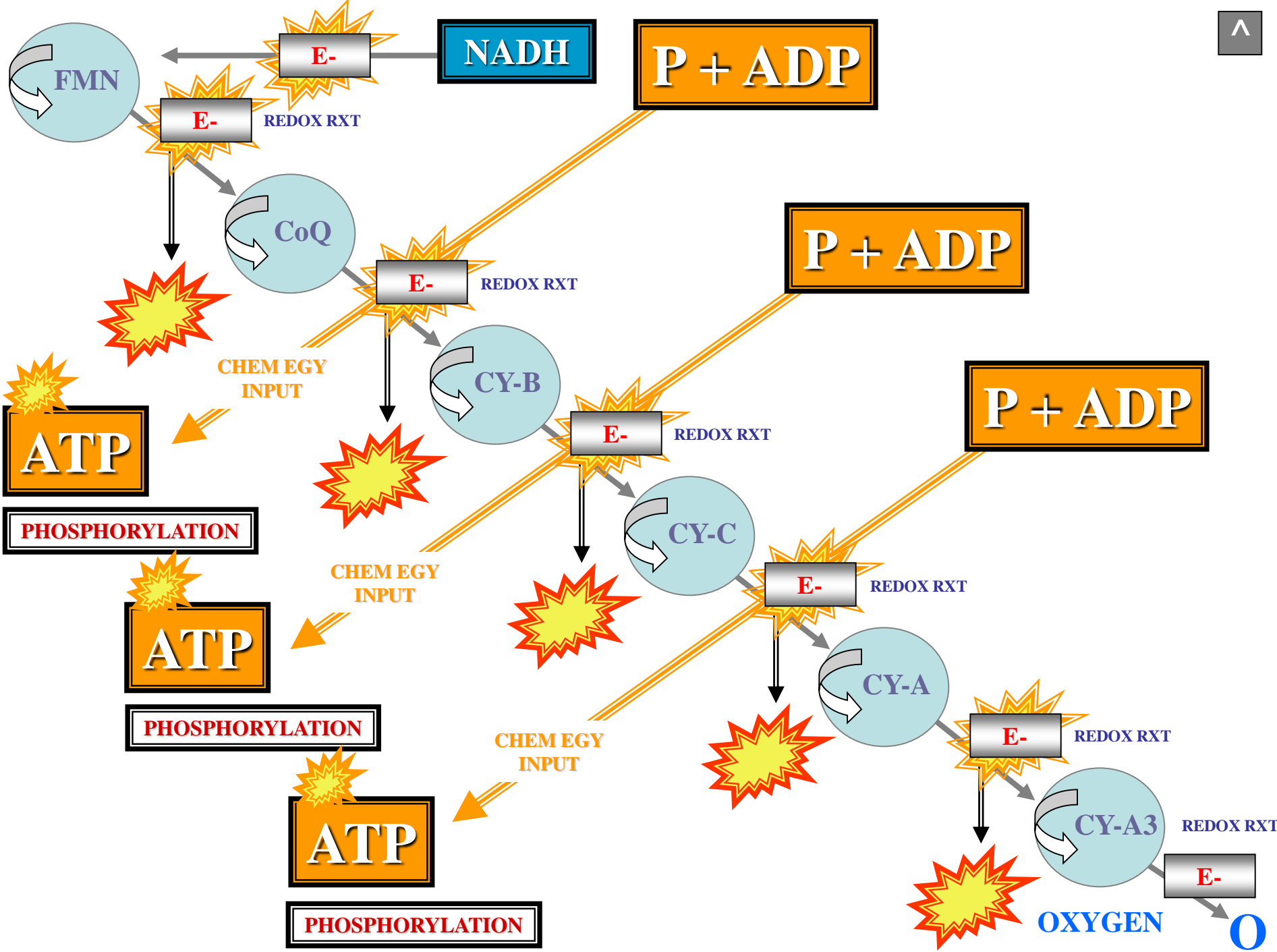
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QUESTION

**HOW MANY ATP
PHOSPHORYLATIONS
PER NADH?**

QUESTION



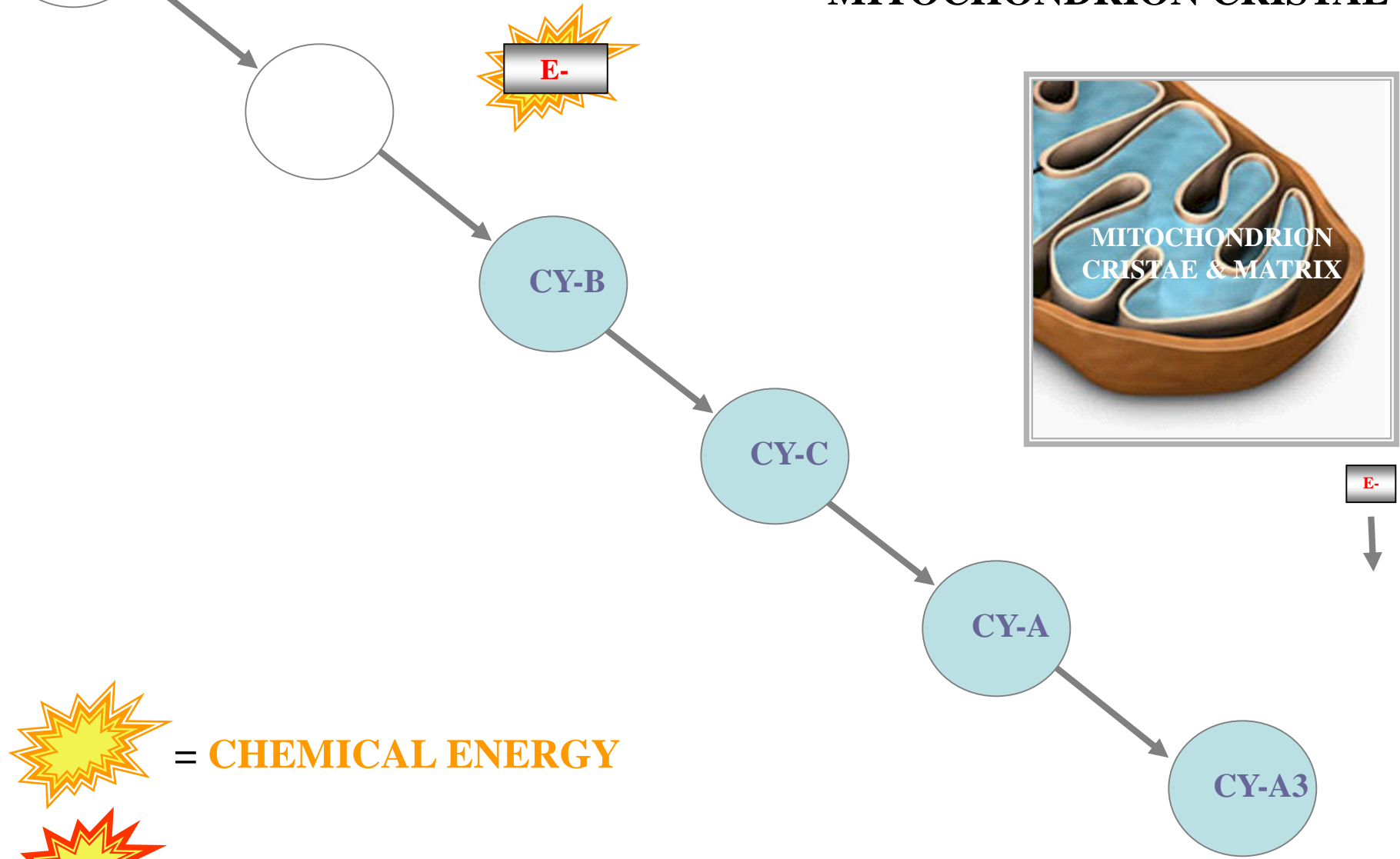


FADH PHOSPHORYLATIONS



ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE

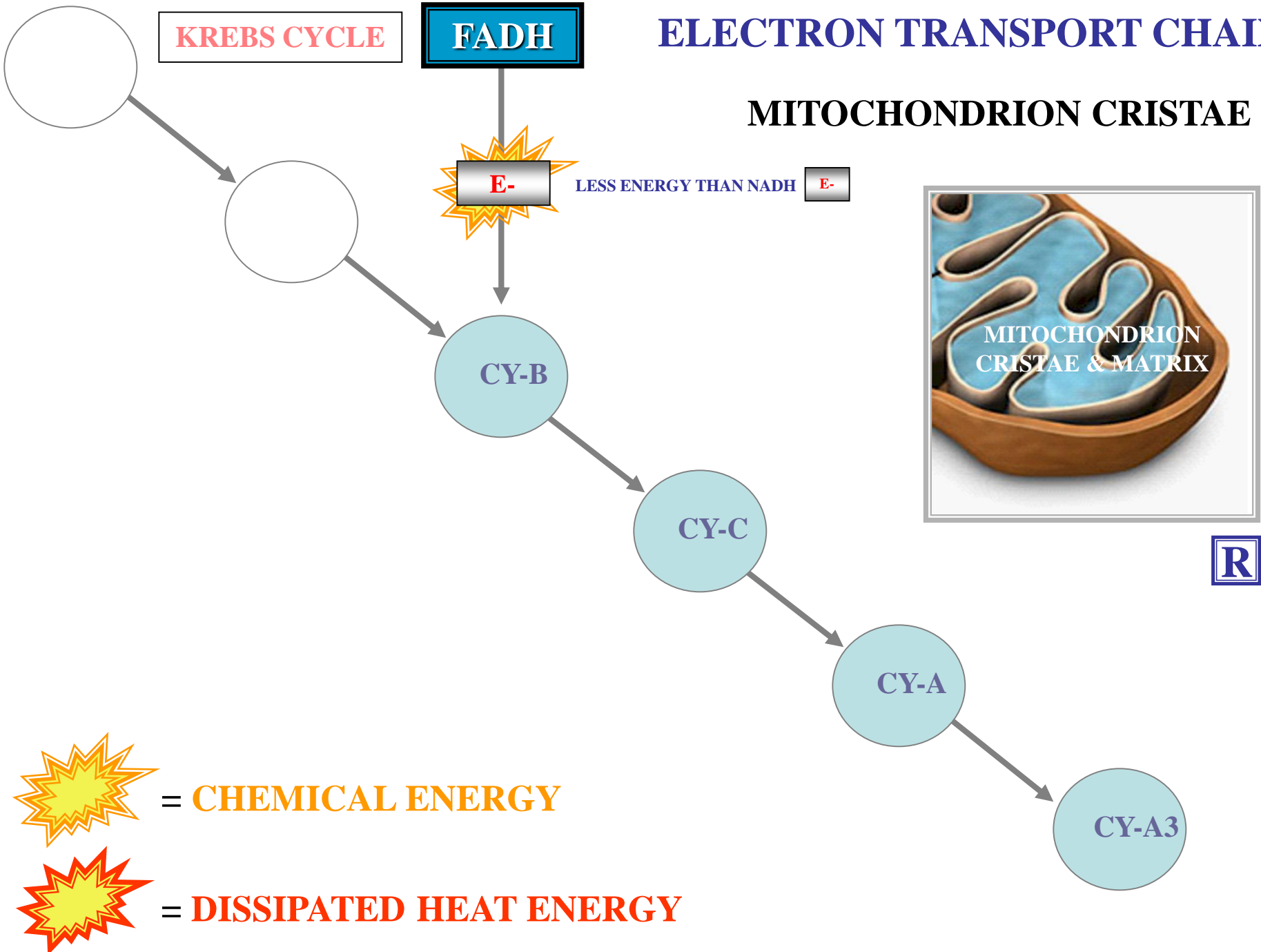


 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

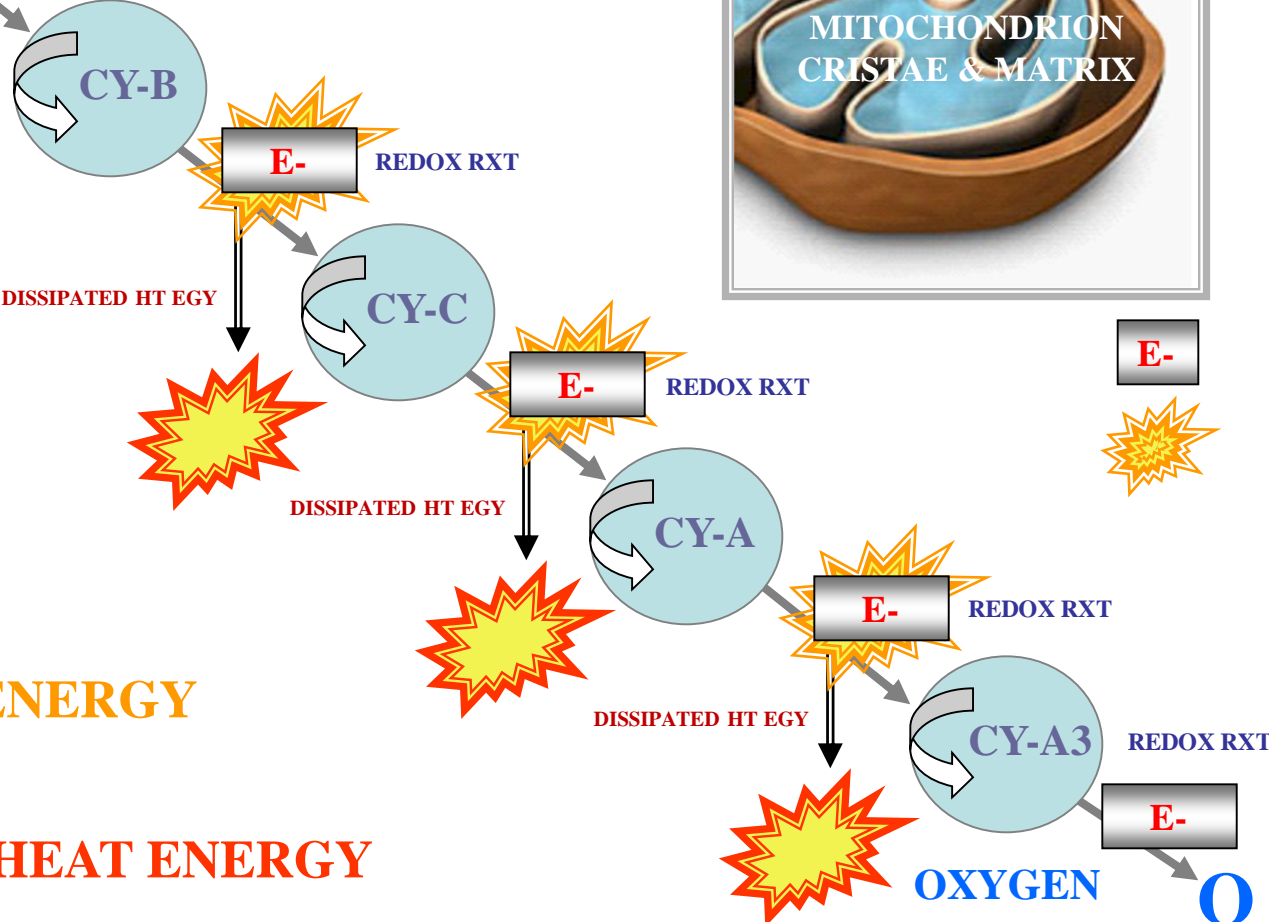
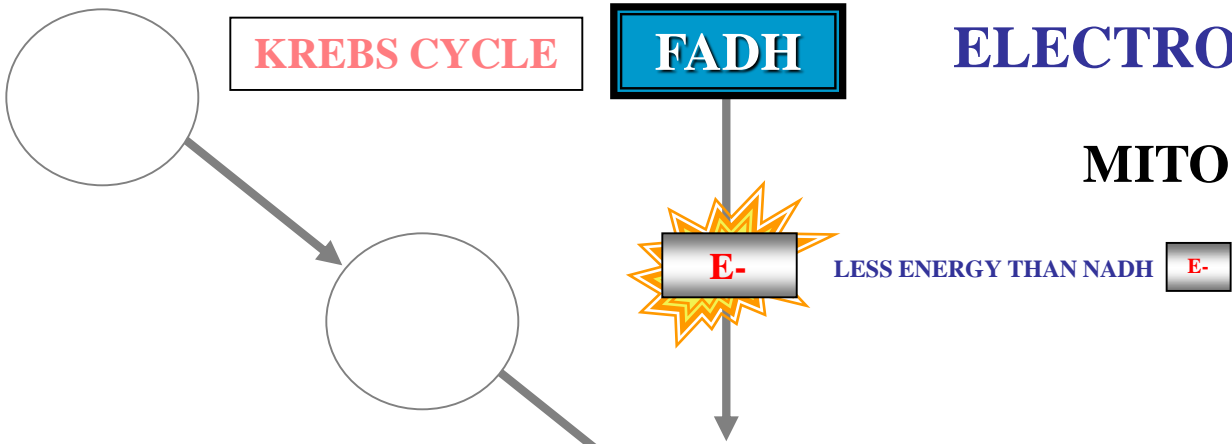
ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



ELECTRON TRANSPORT CHAIN

MITOCHONDRION CRISTAE



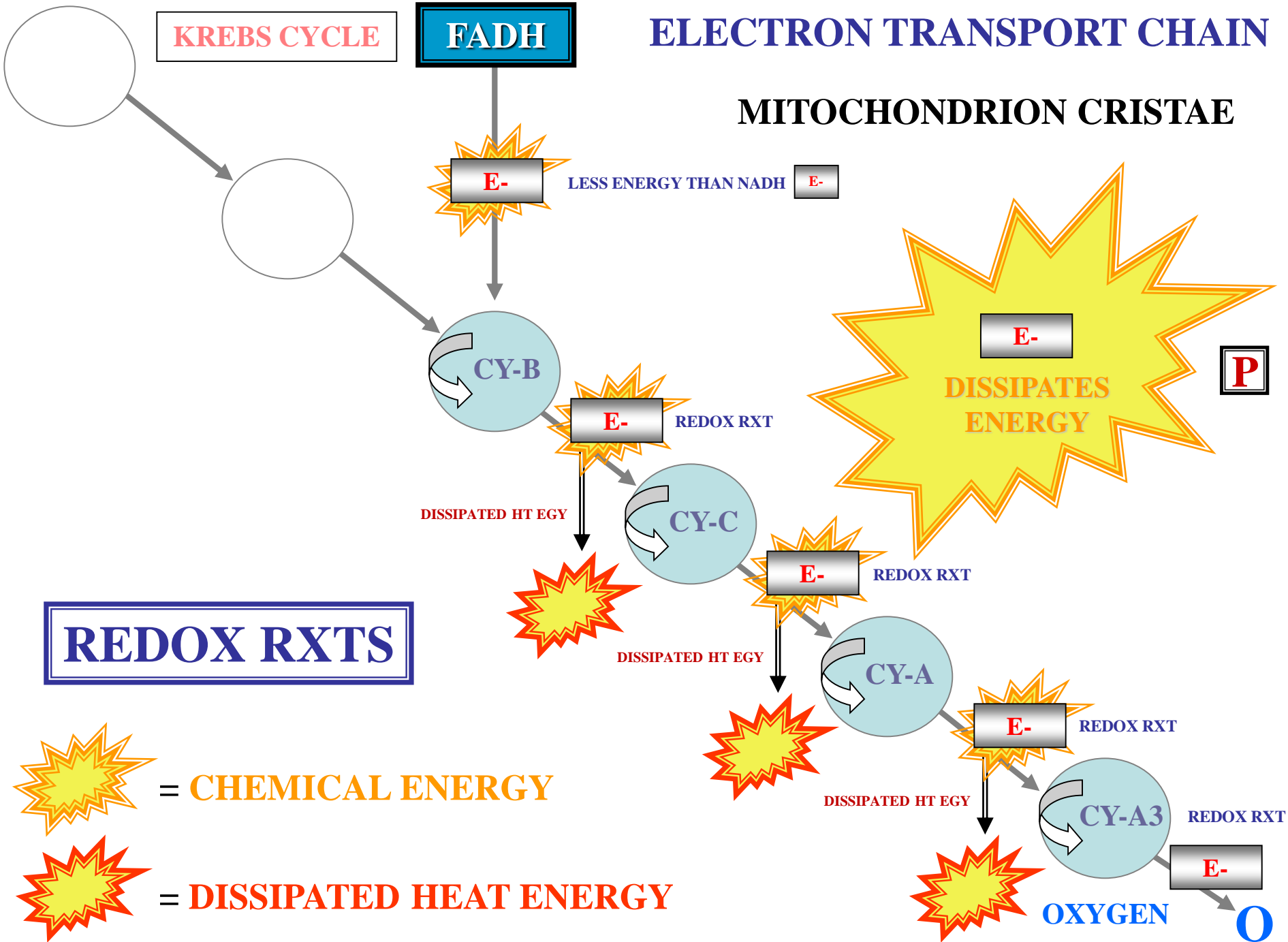
REDOX RXTS

= CHEMICAL ENERGY

= DISSIPATED HEAT ENERGY

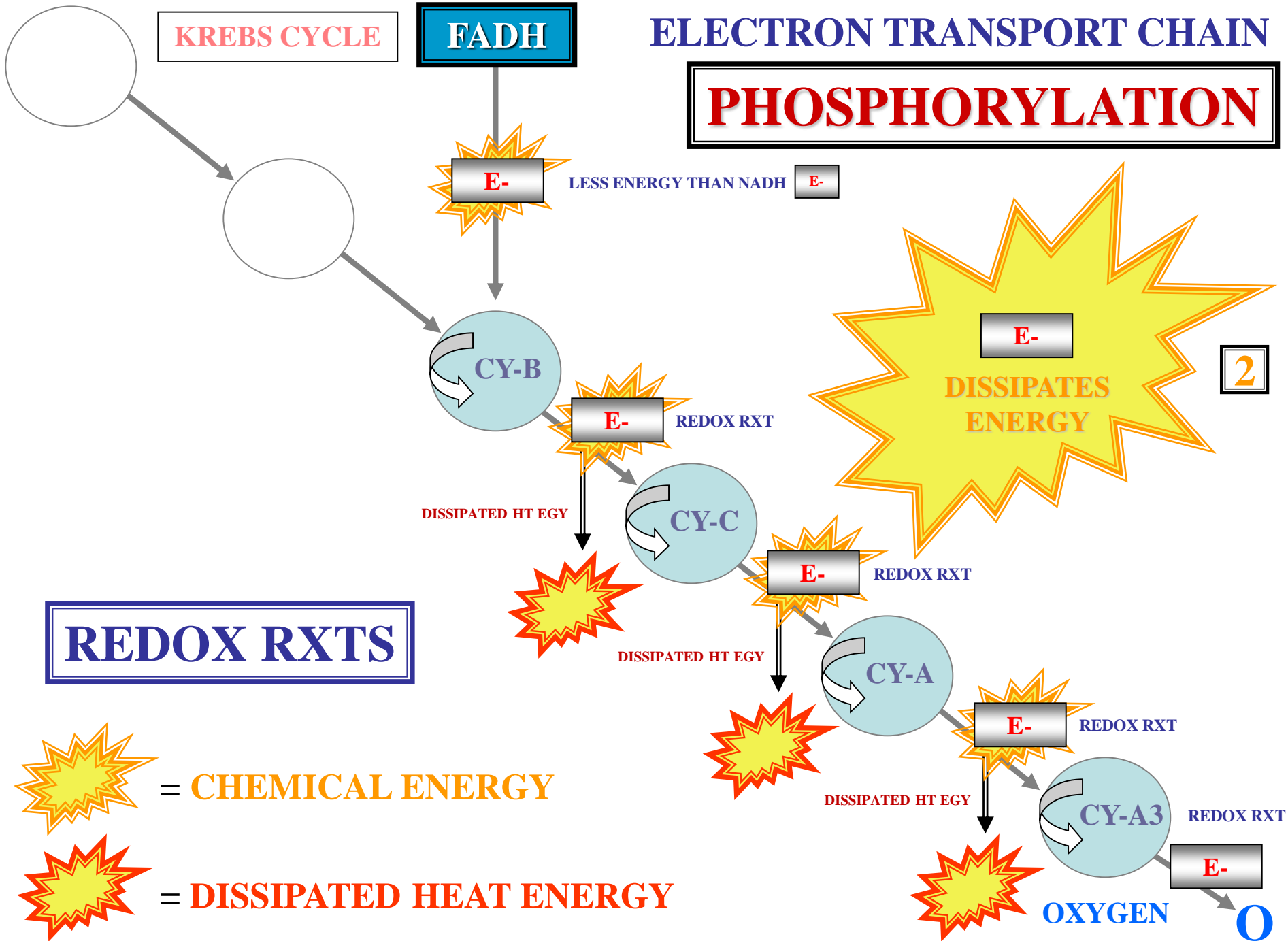
ELECTRON TRANSPORT CHAIN

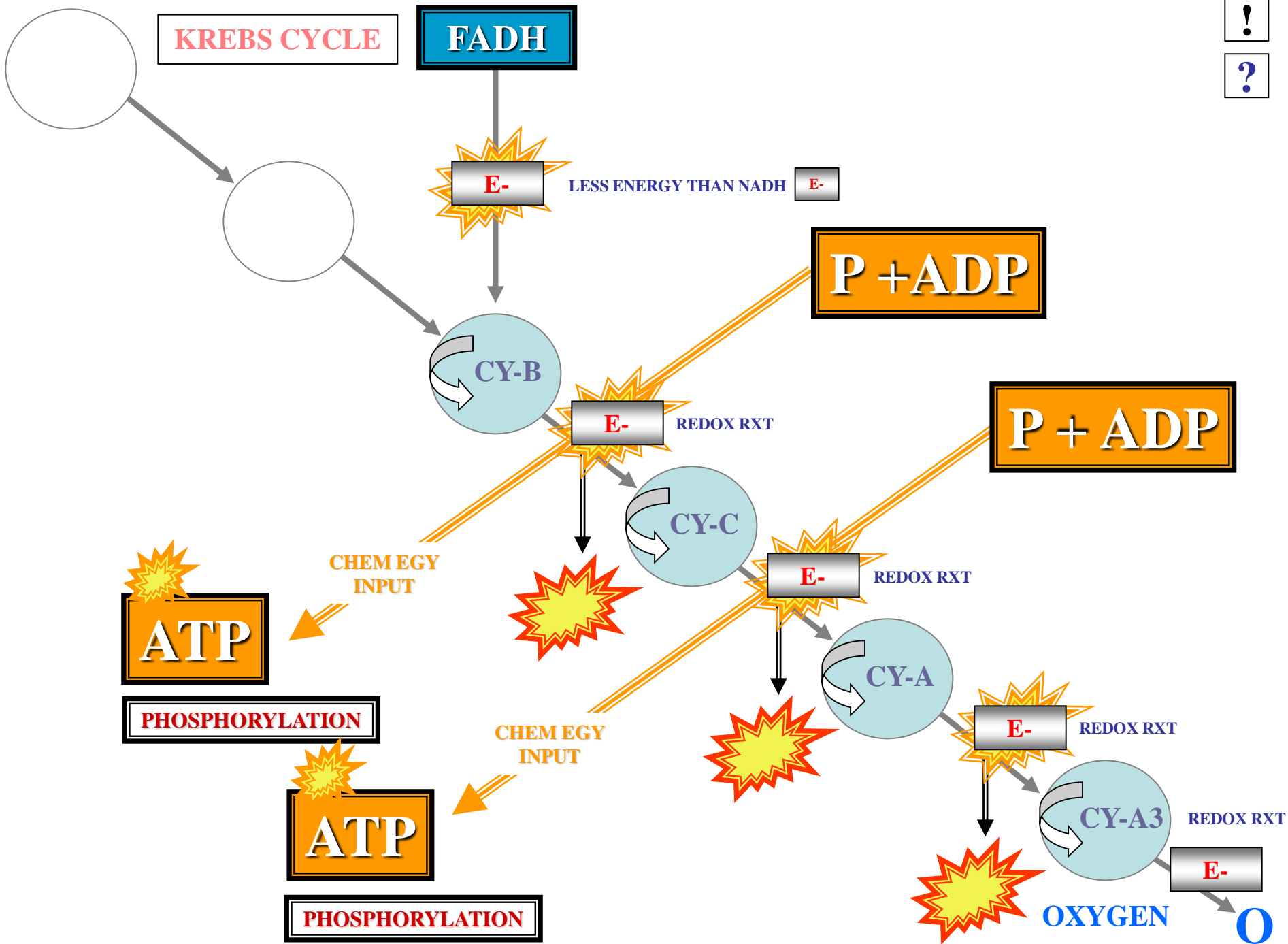
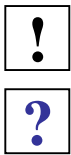
MITOCHONDRION CRISTAE



ELECTRON TRANSPORT CHAIN

PHOSPHORYLATION

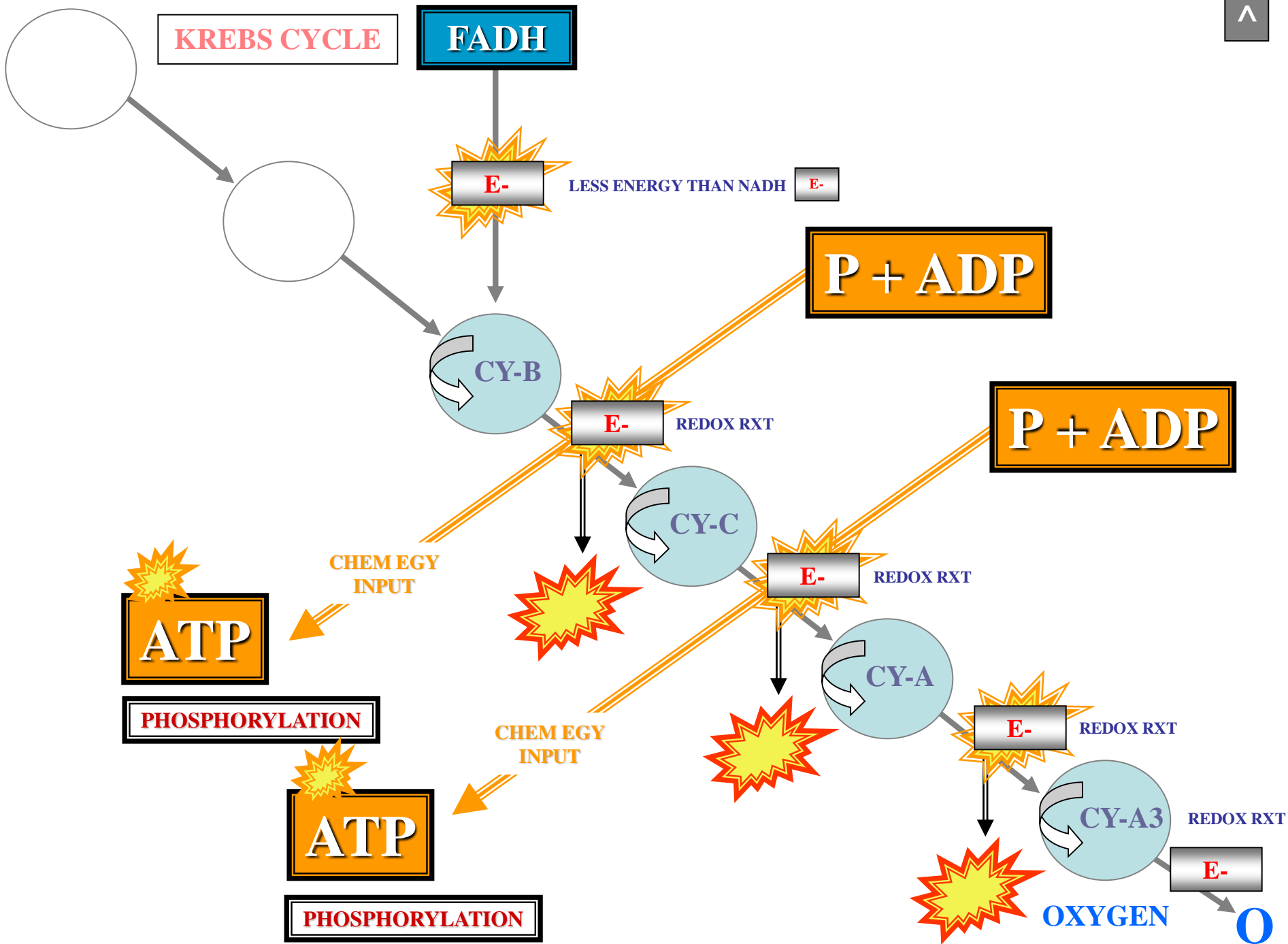




QUESTION

**HOW MANY ATP
PHOSPHORYLATIONS
PER FADH?**

QUESTION



ELECTRON TRANSPORT CHAIN OUTCOME

QUESTION

WHAT COMPONENT
PATHWAYS CONTRIBUTE
E- DONORS TO THE ETC?

QUESTION

