SI Session 10

1. What is required to transport the pyruvate molecule into the mitochondria?

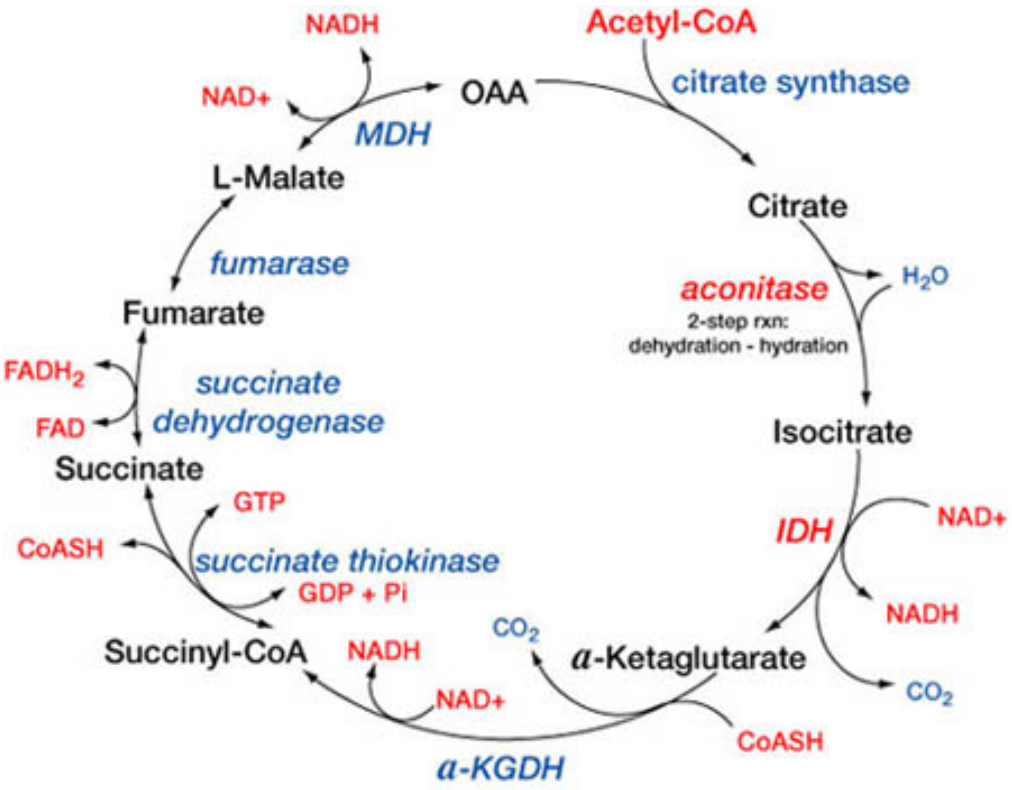
Coenzyme A and NAD+

2. Describe the process by which pyruvate is converted into Acetyl CoA.

Pyruvate + NAD + Coenzyme A → Acetyl CoA + CO2 + NADH

3. When you start the citric acid cycle how many carbons are in the Acetyl CoA molecule?
6

4. Draw out the Citric Acid cycle (Kreb's cycle). Label all intermediates and byproducts.
(you don't have to know enzymes on this chart)



5. What does the cycle produce for ONE molecule of Acetyl CoA?
3 NADH
1 FADH2
! ATP
2 CO2

6. What is chemiosmosis?
Using a hydrogen ion gradient (stored with potential energy) to power the synthesis of ATP

7. Explain how the electron transport chain works. How do the electrons move through the complexes?
NADH drops its electrons off at complex one. Complex one becomes reduced and the NADH is oxidized. Electrons are moved to complex three, so complex three is reduced and complex one is oxidized. The electrons are moved to complex four, so complex four is reduced and complex three is oxidized. The electrons move from complex four to the **last** electron acceptor, oxygen.

Electrons from FADH2 travel the same way except the FADH2 drops its electrons off at complex two
So (two-→ three → four → oxygen)

8. Where does $FADH_2$ bind? NADH?
FADH2 binds at complex II
NADH binds at complex I

This is why FADH2 produces one less ATP than NADH does. The FADH starts farther down in the chain.

9.Describe the flow of electrons through the electron transport chain.

See question 7

10. How is ATP generated via the ATP synthase protein?
As electrons move through the electron transport chain, hydrogen ions are being pumped out into the intermembrane space. The concentration of hydrogen in the intermembrane space is now HIGH so hydrogen ions want to move back in to the matrix (to try to reach equilibrium). Hydrogen ions move back into the matrix via the protein ATP Synthase. As hydrogens move through the protein it turns and adds a phosphate to ADP to synthesize ATP.

11. What is the final electron acceptor in the electron transport chain?
oxygen