

# Past Papers

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



## MID – Lecture 7 to 9 **metabolism**

﴿ وَإِن تَتَوَلَّوْا يَسْتَبَدِلْ قَوْمًا غَيْرَكُمْ ثُمَّ لَا يَكُونُوا أَمْثَلَكُمْ ﴾

اللهم استعملنا ولا تستبدلنا

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First we will start with (51) past Qs

then there will be (2) test bank Qs

( all Qs will be by default past unless it  
is written to be test bank )

Q1: If complex I of the electron transport chain is inefficient, which consequence is likely?

- a) No production of ATP in cell
- b) We can't use NADH as an electron carrier
- c) We can't synthesize  $\text{H}_2\text{O}$  from  $\text{O}_2$
- d) ATP synthase turns off
- e) Increase  $\text{O}_2$  consumption

Answer: B

Q2: What inhibits Complex IV in the electron transport chain?

- A) Oligomycin
- B) Antimycin A
- C) Cyanide
- D) Rotenone
- E) Dinitrophenol

Answer: C

Q3: Incorrect about ATP / ADP translocase:

- A) Contains a single nucleotide binding site
- B) Is an exergonic process
- C) Its inhibition leads to inhibition of cellular respiration
- D) Has similar affinity to both ADP and ATP
- E) Allows ATP to flow with ADP exchange

Answer: B

Q4: The method discovered to reduce obesity:

- A) Antimycin A
- B) Supplementing with ATP
- C) Uncoupling of oxidation and phosphorylation
- D) Reducing electron flow
- E) Increasing mitochondrial mass

Answer: C

Q5: Inhibit ATP synthase directly:

- A) Oligomycin
- B) Amygdalin
- C) Antimycin
- D) Cyanide
- E) Rotenone

Answer: A

Q6: What is the effect of uncouplers on cellular respiration?

- a) Increase ATP production
- b) Inhibit electron transport chain
- c) Decrease proton gradient across inner mitochondrial membrane
- d) Decrease oxygen consumption
- e) More than one answer

Answer: C



Q7: If mitochondria are placed in a low pH solution, what would happen?

- a) Increased ATP production
- b) Decreased ATP production
- c) No change in ATP production
- d) Decrease in oxygen consumption
- e) B and D

Answer: A

## Q8: True about uncoupling proteins:

- a) Increases ATP production
- b) Stops formation of H<sub>2</sub>O
- c) Stops ATP synthesis but not consumption of O<sub>2</sub>
- d) Stops O<sub>2</sub> consumption
- e) Decreases cellular respiration

Answer: C

Q9: A scientist made an experiment on mitochondria, he added antimycin, and then added an acid that lowered the PH. What is expected to happen?

- A) ATP synthesis will be observed
- B) Electrons from FADH<sub>2</sub> will reach oxygen
- C) Cytochrome a<sub>3</sub> will be in the reduced form
- D) Oxidation of NADH will continue
- E) Oxidation of FADH<sub>2</sub> will continue

Answer : A

Q10: During electron transport, protons are pumped out of the mitochondrion at each of the major sites except for:

- A) Complex I
- B) Complex II
- C) Complex III
- D) Complex IV
- E) Complex MIM

Answer : B

Q11: An advantage of oxidative phosphorylation uncoupling in brown adipose tissue:

- A) Improved ATP production
- B) Increased fatty acid synthesis
- C) Heat generation
- D) Decreased oxygen usage
- E) Reduced NADH production

Answer : C

Q12: Coenzyme Q (Ubiquinone) functions in the electron transport chain as:

- A) A lipid-soluble electron carrier
- B) A water-soluble electron donor
- C) A covalently attached cytochrome cofactor
- D) A lipid-soluble oxygen carrier
- E) A water-soluble proton carrier

Answer : A

Q13: Cytochrome c oxidase complex in the electron transport chain:

- A) Accepts electrons from cytochrome c
- B) Pumps two protons out of the matrix space
- C) Donates four electrons to  $O_2$
- D) Produces two  $H_2O$  per  $O_2$  reduced
- E) All of the above

Answer : E

Q14: Uncoupling oxidative phosphorylation results in:

- A) Increased ATP production
- B) Increased heat generation
- C) Reduced respiration rate
- D) Enhanced NADH production
- E) Decreased O<sub>2</sub> consumption

Answer : B



Q15: Which of the following is true about NADH in the electron transport chain?

- A) It donates electrons to Complex II
- B) It pumps protons at Complex I
- C) It donates electrons to oxygen
- D) It donates electrons to  $\text{FADH}_2$
- E) It transports protons directly

Answer : B

Q16: Dinitrophenol was a drug used for weight loss, which of the following molecules does it resemble the most?

- A) Thermogenin
- B) Rotenone
- C) Antimycin
- D) CO
- E) Cyanide

Answer : A

Q17: Which of the following is correct regarding Oligomycin:

- A) It permits H<sup>+</sup> transport through mitochondrial membrane
- B) It binds to complex 2 of the electron transport chain
- C) It binds to the catalytic subunit of ATP synthase without inhibiting the transfer of electrons
- D) It inhibits ATP synthesis
- E) None of the above

Answer: D

Q18: Which of the following doesn't contain iron sulfur center:

- A) Complex I
- B) Complex II
- C) Complex III
- D) Complex IV
- E) All of the following complexes contain iron sulfur center

Answer : D

Q19: Which of the following is true about CoQ:

- A) It is highly hydrophilic
- B) It can accept one or two electrons
- C) It can move freely in the cytosol
- D) It is not essential for ATP production
- E) All of the above are false

Answer : B

Q20: What would happen if the NADH-CoQ oxidoreductase complex (Complex I) in the electron transport chain does not function?

- a) Increased ATP production
- b) Decreased OxPhos ATP production
- c) Increased oxygen consumption
- d) Decreased glycolysis rate
- e) Production of H<sub>2</sub>O stops

Answer: B

Q21: Is there any complex in the electron transport chain that does not require iron?

- a) Complex I
- b) Complex II
- c) Complex III
- d) Ubiquinone
- e) None of the above

Answer: D

Q22: Cyanide inhibits which complex in ETC?

- A) Complex I
- B) Complex II
- C) Complex III
- D) Complex IV
- E) Complex MIM

Answer : D



Q23: Which of the following molecules has the highest reduction potential in the electron transport chain?

- A) Coenzyme Q
- B) FADH<sub>2</sub>
- C) Cytochrome c
- D) NADH
- E) Oxygen

Answer : E

## Q24: The cytochrome c oxidase complex:

- A) accepts electrons from cyt c
- B) donates four electrons to O<sub>2</sub>
- C) produces 2 H<sub>2</sub>O per O<sub>2</sub> reduced
- D) pumps 2 protons out of the matrix space
- E) All of the above are correct

Answer : E

Q25: The main regulator of electron flow in the electron transport chain is:

- a) The NADH level
- b) FAD/FADH<sub>2</sub> ratio
- c) Calcium ions
- d) Oxygen
- e) ADP levels

Answer: E

Q26: A characteristic feature of glycerol phosphate shuttle is

- a) It operates through two isozymes, cytosolic and another in the matrix.
- b) Glycerol phosphate is oxidized to phosphoglycerate
- c) Malate is a component of the shuttle.
- d) It shuttles NADH across inner mitochondrial membrane by carrier molecule.
- e) It shuttles electrons from NADH across the inner mitochondrial membrane to FAD.

Answer: E

Q27: Copper ion is a prosthetic group of:

- a) NADH dehydrogenase
- b) Cytochrome reductase
- c) Succinate dehydrogenase
- d) Cytochrome oxidase
- e) ATP Synthase

Answer: D

## Q28: Dinitrophenol inhibits:

- a) NADH oxidation by Complex I
- b) Electron flow in electron transport chain and ATP synthesis
- c) ATP synthesis but not oxidation of NADH
- d) Electron flow in Complex IV

Answer: C

Q29: The complex in electron transport chain that DOES NOT have a direct link to coenzyme Q in some form is:

- a) Cytochrome c oxidase
- b) Complex III
- c) Complex II
- d) Succinate dehydrogenase complex
- e) Complex I

Answer: A

Q30: Which statement is CORRECT considering ATP generation in the electron transport chain?

- a) Entry of protons occurs through the  $F_0$  piece into the mitochondrial matrix
- b) The  $F_0$  piece of the ATP synthase is composed of one subunit
- c) The  $F_1$  piece of the ATP synthase is composed of one subunit
- d) The  $F_0$  piece of the ATP synthase binds ADP and  $P_i$  tightly before ATP synthesis occurs.
- e) Conformational changes are minimal in the  $F_0$  piece compared to the  $F_1$  piece

Answer: A



Q31: Uncoupling in mitochondria refers to:

- a) Stopping ATP synthesis but not stopping electron flow
- b) Increasing the pH value inside the mitochondrial matrix
- c) Blocking NADH electrons from entering the electron transport system
- d) Interruption of electron flow
- e) Stopping electron flow but not stopping ATP synthesis

Answer: A

Q32: If the inner mitochondrial membrane becomes more permeable to protons ,what happens?

- a) ATP synthesis increases
- b) No change
- c) inorganic phosphate concentration increases in the mitochondrial matrix
- d) ATP synthase become more active
- e) Inhibition of ATP synthase

Answer: E

Q33: How many molecules of ATP are produced in oxidative phosphorylation by using a single Acetyl COA?

- a) 10
- b) 36
- c) 20
- d) 5
- e) 15

Answer: A

Q34: How many  $O_2$  molecules will be reduced by using 4 glucose molecules?

- a) 32
- b) 10
- c) 12
- d) 24
- e) 16

Answer: D

Q35: ATP synthase can produce ATP using this mechanism as a direct source of energy:

- a) The oxidation of pyruvate producing  $\text{CO}_2$ , and  $\text{H}_2\text{O}$
- b) The conversion of glucose to pyruvate
- c) The breakdown of NADH and  $\text{FADH}_2$
- d) A proton gradient established in the mitochondria
- e) The metabolism of amino acids

Answer: D

## Q36: Ubiquinone is one of the following:

- a) It is a small protein with an iron-sulfur center and can carry one or two electrons between complexes II and III
- b) It is a small organic molecule that can carry one electron between complexes I and III in the mitochondrial inner membrane
- c) It is a large protein embedded in the inner membrane of the mitochondria and can transfer two electrons between complexes I and III
- d) It is a small organic molecule that is free in the mitochondrial intermembranous space
- e) It is a small organic molecule in the mitochondrial inner membrane that can transfer 1 of 2 electrons to complex III

Answer: E

Q37: Most  $O_2$  in your body consumed during breathing is converted into?

- a) CO then  $CO_2$
- b)  $CO_2$
- c)  $H_2O$
- d) CO
- e) Acetyl CoA

Answer: C

Q38: Which membrane characteristic is not correct about the inner mitochondrial membrane (IMM)?

- a) Contains cholesterol
- b) Impermeable to most ions and small molecules
- c) Site of electron transport chain
- d) Contains ATP synthase
- e) Very high protein content

Answer: A



## Q39: Which of the following is True about Ubiquinone – Cytochrome C

- a) Ubiquinone is a 2-electron donor - Cytochrome C is a 1 electron acceptor
- b) Ubiquinone is a 1-electron donor - Cytochrome C is a 2-electron acceptor
- c) Ubiquinone has a higher reducing potential than Cytochrome C
- d) Both are mobile protein electron carriers
- e) More than one correct answer

Answer: A

Q40: Which of the following is correct about oligomycin, cyanide, 2,4-Dinitrophenol:

- a) DNP and oligomycin inhibits ATP synthesis, cyanide affects the respiratory chain.
- b) DNP and cyanide inhibit ATP synthesis, oligomycin affects the respiratory chain.
- c) DNP affects the respiratory chain, cyanide and oligomycin inhibit ATP synthesis
- d) All of them inhibit ATP synthesis and the respiratory chain
- e) All of them inhibit ATP synthesis but not the respiratory chain

Answer: A

Q41: A mutation in the coenzyme Q results in which of the following:

- a) Increased body pH
- b) Disturbance in the transport of electrons from malate to oxygen
- c) Increased generation of body heat
- d) Increased oxygen consumption
- e) None of the above

Answer: B

Q42: In a patient with cyanide poisoning, The expected effect on cytochrome C oxidase:

- a) More oxidized
- b) No effect
- c) More reduced
- d) Increased activity
- e) Not enough information, so can not determine

Answer: C

Q43: What subunit is the proton path in ATP synthase?

- a)  $\alpha$  subunit
- b)  $\beta$  subunit
- c)  $\gamma$  subunit
- d) A subunit
- e) C subunit

Answer: D

Q44: What is the role of the  $\gamma$ -subunit in ATP synthase?

- a) Binding
- b) Rotation
- c) Structural
- d) Catalysis
- e) Point of entry and exit

Answer: B

Q45: How do uncoupling proteins influence ATP synthesis and oxygen consumption in mitochondria?

- a) Increase respiration & decreases ATP formation
- b) Decrease respiration & decrease ATP formation
- c) Decrease respiration & increase ATP formation
- d) Increase respiration & increase ATP formation
- e) Depends on the uncoupling protein

Answer: A

# Test Bank



Q1: Which has the strongest tendency to gain electrons?

- a)  $O_2$
- b) Coenzyme-Q
- c) Cytochrome-c
- d) FAD
- e)  $NAD^+$

Answer: A

Q2: 2,4-DNP, an uncoupler of Ox-Phos, was used as a weight-loss agent in the 1930s. Reports of fatal overdoses led to its discontinuation in 1939. Which of the following would most likely be true concerning Individuals taking 2,4-DNP

- a) Greater ATP level than normal
- b) Body temperature is elevated as a result of hypermetabolism
- c) Cyanide has no effect on electron flow
- d) The proton gradient across the IMM is greater than normal
- e) The rate of electron transport is abnormally low

Answer: B

For any feedback, scan the code or click on it.



Corrections from previous versions:

Versions	Question #	Before Correction	After Correction
V1 → V2			
V2 → V3			