EPITHELIAL TRANSPORT MECHANISMS PRACTICE TEST (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Table of Contents

Copyright 1

Table of Contents 2

Introduction 3

How to Use This Guide 4

Questions 5

Answers 8

Explanations 10

Next Steps 15

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

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How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

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Questions

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1. Which transport directly hydrolyzes ATP?

A. Facilitated diffusion

B. Paracellular transport

C. Primary active transport

D. Simple diffusion

2. Which has greater resistance to local current flow: dendrites or the soma?

A. Soma

B. Both equal

C. Myelin thickness determines

D. Dendrites

3. Which sequence describes the LTP pathway as described?

A. AMPA depolarization Mg2+ exits NMDA NMDA Ca2+ LTP.

B. NMDA Ca2+ AMPA LTP.

C. Ca2+ inhibits PKC.

D. GABA blocks Excitatory Transmission.

4. Which channel mediates apical Ca2+ entry in the distal nephron?

A. ENaC (Epithelial Sodium Channel)

B. TRPV5

C. TRPV4

D. NCX (Na+/Ca2+ exchanger)

5. Which statement about receptor tyrosine kinase signaling is true?

A. G protein activation leads to adenylyl cyclase stimulation.

B. Phosphorylation of tyrosine residues on intracellular signaling proteins occurs.

C. Direct opening of ion channels without phosphorylation.

D. Activation of transcription factors without phosphorylation.

6. Which transporters mediate glucose absorption in enterocytes?

A. Apical GLUT2; basolateral SGLT1.

B. Apical SGLT1; basolateral GLUT2.

C. Apical SGLT1; basolateral GLUT4.

D. Apical GLUT4; basolateral GLUT2.

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7. Which chloride channel is the main target of CFTR in secretory epithelia and is activated by cAMP?

A. CFTR chloride channel

B. ClC-2 chloride channel

C. NKCC1 transporter

D. ENaC channel

8. Which enzyme forms bicarbonate intracellularly from CO2 within proximal tubule cells?

A. Carbonic anhydrase II

B. Na+/K+ ATPase

C. NHE3

D. NBCe1

9. What type of transport is B on the luminal side?

A. Facilitated diffusion

B. Active transport via ATP hydrolysis

C. Simple diffusion

D. Paracellular transport

10. Inhibition of the basolateral Na+/K+ ATPase would most directly reduce which process?

A. Passive diffusion of glucose

B. SGLT1-mediated Na+-coupled glucose uptake

C. GLUT2-mediated glucose exit

D. CFTR-mediated Cl- secretion

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Answers

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1. C
2. D
3. A
4. B
5. B
6. B
7. A
8. A
9. A
10. B

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Explanations

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1. Which transport directly hydrolyzes ATP?

A. Facilitated diffusion

B. Paracellular transport

C. Primary active transport

D. Simple diffusion

Direct energy comes from ATP being broken down by the transporter itself. In primary active transport, the pump hydrolyzes ATP on the cytoplasmic side to fuel a conformational change that moves ions or molecules against their gradients. This direct use of ATP distinguishes it from other forms of transport. Facilitated diffusion and simple diffusion both move substances down their gradients without using cellular energy. Paracellular transport occurs through tight junctions between cells and isn't driven by ATP. Secondary active transport does use energy, but only indirectly—the ion gradient created by a primary active pump powers transport, while the transporter itself doesn't hydrolyze ATP during the transport step.

2. Which has greater resistance to local current flow: dendrites or the soma?

A. Soma

B. Both equal

C. Myelin thickness determines

D. Dendrites

Current flow inside a neuron depends a lot on geometry. Dendrites are thin cables, so their internal (axial) resistance is high. That makes it harder for current to travel along the length of a dendrite, so the signal attenuates quickly and the dendrite resists spreading local current. The soma, being larger in diameter, has lower axial resistance, allowing current to move more easily through it. So dendrites resist local current flow more than the soma, making them the structure with greater resistance in this context. The answer isn't about myelin or equal resistance—the key factor here is the effect of small diameter on internal resistance.

3. Which sequence describes the LTP pathway as described?

A. AMPA depolarization Mg2+ exits NMDA NMDA Ca2+ LTP.

B. NMDA Ca2+ AMPA LTP.

C. Ca2+ inhibits PKC.

D. GABA blocks Excitatory Transmission.

LTP induction hinges on a sequence where initial excitatory drive through AMPA receptors causes depolarization, which removes the Mg2+ block from NMDA receptors. Once this block is relieved, NMDA channels open and Ca2+ can enter the postsynaptic neuron. The rise in intracellular Ca2+ then triggers signaling pathways that strengthen the synapse, leading to LTP. This matches the described sequence: AMPA depolarization Mg2+ block relief on NMDA NMDA activation Ca2+ influx LTP. Other options don't fit because they skip the essential depolarization step that frees the NMDA receptor, or imply different roles for Ca2+ or for inhibitory GABA.

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4. Which channel mediates apical Ca2+ entry in the distal nephron?

A. ENaC (Epithelial Sodium Channel)

B. TRPV5

C. TRPV4

D. NCX (Na+/Ca2+ exchanger)

Ca2+ entry from the tubular lumen into the distal nephron cells occurs through an apical channel that is highly selective for calcium. The channel located on the luminal surface of cells in the distal tubule and cortical collecting duct is TRPV5. It gates Ca2+ into the cell, which then exits across the basolateral membrane into the interstitium via PMCA or NCX, allowing Ca2+ to be reabsorbed into the blood. ENaC handles Na+ and has no role in Ca2+ entry. TRPV4 is another Ca2+-permeable channel but not the main apical entry pathway in this segment. NCX acts on the basolateral side to remove Ca2+ from the cell, not to bring it in apically.

5. Which statement about receptor tyrosine kinase signaling is true?

A. G protein activation leads to adenylyl cyclase stimulation.

B. Phosphorylation of tyrosine residues on intracellular signaling proteins occurs.

C. Direct opening of ion channels without phosphorylation.

D. Activation of transcription factors without phosphorylation.

Receptor tyrosine kinase signaling relies on phosphorylation of tyrosine residues. When an RTK binds its ligand, the receptor dimerizes and its intrinsic tyrosine kinase activity autophosphorylates tyrosine residues in the cytoplasmic domain. These phosphotyrosines act as docking sites for SH2-domain–containing signaling proteins, recruiting and activating downstream pathways such as the RAS–MAPK and PI3K–Akt cascades. This phosphorylation-driven recruitment and activation transmit the signal from the membrane to effect changes in gene expression. This differs from G protein–coupled receptor signaling, where G proteins modulate enzymes like adenylyl cyclase to change cAMP levels. Direct opening of ion channels without phosphorylation isn't the mechanism of RTKs, and transcription factor activation typically occurs downstream through phosphorylation cascades rather than directly.

6. Which transporters mediate glucose absorption in enterocytes?

A. Apical GLUT2; basolateral SGLT1.

B. Apical SGLT1; basolateral GLUT2.

C. Apical SGLT1; basolateral GLUT4.

D. Apical GLUT4; basolateral GLUT2.

Glucose absorption in enterocytes uses a sodium-driven uptake on the apical surface and a downhill diffusion step on the basolateral side. Specifically, the apical transporter is SGLT1, which co-transports glucose with sodium from the intestinal lumen into the cell, powered by the sodium gradient maintained by Na+/K+ ATPase. Once inside, glucose exits the cell across the basolateral membrane through GLUT2, a facilitated glucose transporter, into the bloodstream. This arrangement—SGLT1 at the apical membrane and GLUT2 on the basolateral membrane—explains how glucose moves from gut lumen into blood efficiently.

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7. Which chloride channel is the main target of CFTR in secretory epithelia and is activated by cAMP?

A. CFTR chloride channel

B. ClC-2 chloride channel

C. NKCC1 transporter

D. ENaC channel

The main idea is that in secretory epithelia, chloride secretion is driven by a chloride channel that is directly activated by cAMP. The channel responsible is CFTR itself. When cAMP levels rise, PKA phosphorylates the regulatory region of CFTR, increasing the likelihood that the channel opens. This allows Cl− to exit the cell into the lumen, and water follows by osmosis, producing the secreted fluid. Other options aren't the primary cAMP-activated channel in this context: ClC-2 is a different Cl− channel not governed by cAMP regulation in these secretory pathways; NKCC1 is a basolateral transporter that brings Cl− into the cell rather than secreting it; ENaC is a sodium channel whose function relates more to Na+ absorption and is not the main cAMP-activated Cl− conduit in secretory epithelia.

8. Which enzyme forms bicarbonate intracellularly from CO2 within proximal tubule cells?

A. Carbonic anhydrase II

B. Na+/K+ ATPase

C. NHE3

D. NBCe1

CO2 can cross into proximal tubule cells and is rapidly turned into bicarbonate there by carbonic anhydrase II, a cytosolic enzyme. It catalyzes the reaction CO2 + H2O HCO3- + H+, producing bicarbonate inside the cell, which is then reabsorbed across the basolateral membrane via NBCe1 while the proton is sent into the tubular lumen by NHE3. The other proteins mainly handle transport or ion gradients (Na+/K+ ATPase maintains pumps, NHE3 moves H+ and Na+ at the apical surface, NBCe1 moves bicarbonate across basolateral membrane) and do not catalyze the formation of bicarbonate from CO2. So the enzyme that forms bicarbonate intracellularly from CO2 is carbonic anhydrase II.

9. What type of transport is B on the luminal side?

A. Facilitated diffusion

B. Active transport via ATP hydrolysis

C. Simple diffusion

D. Paracellular transport

Facilitated diffusion is at work when a solute crosses the luminal membrane through a specific carrier or channel, moving down its concentration gradient without using direct energy. If the transport occurs via a membrane protein on the luminal side and shows saturation at higher solute levels (limited by the number of carriers), that pattern fits carrier-mediated transport rather than simple diffusion. It's not active transport, which would require ATP (or an ion gradient) to push solute against its gradient, and it's not paracellular transport, which moves between cells rather than through the luminal membrane via a transporter.

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10. Inhibition of the basolateral Na+/K+ ATPase would most directly reduce which process?

A. Passive diffusion of glucose

B. SGLT1-mediated Na+-coupled glucose uptake

C. GLUT2-mediated glucose exit

D. CFTR-mediated Cl- secretion

The key idea is that the basolateral Na+/K+ ATPase keeps intracellular Na+ low, creating a strong Na+ gradient across the apical membrane that powers secondary active transport. SGLT1 uses that gradient to bring Na+ and glucose into the cell from the lumen. If the Na+/K+ ATPase is inhibited, intracellular Na+ rises, the Na+ gradient collapses, and Na+-coupled glucose uptake by SGLT1 is directly and markedly reduced. Passive diffusion of glucose doesn't depend on Na+ driving force, so it's not directly affected. GLUT2-mediated glucose exit and CFTR-mediated Cl− secretion operate on different mechanisms, so they're not as directly tied to the Na+ gradient established by the basolateral pump.

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Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://epithelialtransmech.examzify.com

We wish you the very best on your exam journey. You've got this!

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