NBME IMMUNOLOGY PRACTICE TEST (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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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.

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!

Questions

1. Which laboratory assay assesses the overall functional activity of the classical complement pathway?

A. ELISA for C3

B. Western blot for C5

C. CH50 assay

D. AH50 assay

2. Which T cell subset is primarily involved in delayed-type (Type IV) hypersensitivity responses?

A. Th2 cells

B. Th17 cells

C. Th1 cells

D. Regulatory T cells

3. Which laboratory test is commonly used to detect specific antibodies or antigens in serum and can be confirmed by Western blot?

A. Immunofluorescence assay

B. Agglutination test

C. Western blot

D. ELISA

4. Which transcription factor is essential for regulatory T cell development?

A. GATA3

B. RORγt

C. T-bet

D. FOXP3

5. Which hypersensitivity reaction is mediated by IgE and results in immediate-type allergic responses?

A. Type II hypersensitivity

B. Type I hypersensitivity

C. Type III hypersensitivity

D. Type IV hypersensitivity

6. Which ligand interactions correctly match the following cell pairs: APC with CD4+ T cell, virus-infected cell with CD8+ T cell, and CD4+ T cell with B cell?

A. APC–CD4+ T cell: MHC-II with TCR, CD4; B7 with CD28; Virus–CD8+ T cell: MHC-I with TCR, CD8; CD4+ T cell–B cell: CD40L with CD40

B. APC–CD4+ T cell: MHC-II with TCR, CD4; CD40 with CD28; Virus–CD8+ T cell: MHC-I with TCR, CD8; CD4+ T cell–B cell: CD40 with CD40L

C. APC–CD4+ T cell: MHC-II with TCR, CD4; B7 with CD28; Virus–CD8+ T cell: MHC-I with TCR, CD8; CD4+ T cell–B cell: CD40L with CD40

D. APC–CD4+ T cell: MHC-I with TCR, CD8; B7 with CD28; Virus–CD8+ T cell: MHC-II with TCR, CD4; CD4+ T cell–B cell: CD40 with CD40L

7. Hyperacute transplant rejection is characterized by which mechanism and timing?

A. Acute rejection: CD8+ T cells reacting against foreign MHCs

B. Graft-versus-host disease: donor T cells attack host

C. Chronic rejection: fibrosis months later

D. Hyperacute rejection: preformed antibodies (type II) - occurs in minutes

8. Where is the antigen loaded for MHC-I and MHC-II?

A. MHC-I: endosome; MHC-II: cytosol

B. MHC-I: antigen loaded in RER; MHC-II: antigen loaded in acidified endosome (after release of invariant chain)

C. MHC-I: nucleus; MHC-II: lysosome

D. MHC-I: Golgi; MHC-II: Endoplasmic reticulum

9. Which T cell subset releases IL-4, IL-5, and IL-10, and what are the actions of these cytokines?

A. Th2; IL-4 drives IgE switching; IL-5 activates eosinophils and promotes IgA; IL-10 modulates inflammation

B. Th1; IL-4 drives IgE switching; IL-5 activates eosinophils

C. Th17; IL-17 recruits neutrophils

D. Treg; IL-10; TGF-β

10. Which antibody binds to mast cells?

A. IgA

B. IgG

C. IgE

D. IgM

Answers

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

Explanations

1. Which laboratory assay assesses the overall functional activity of the classical complement pathway?

A. ELISA for C3

B. Western blot for C5

C. CH50 assay

D. AH50 assay

Assessing the overall functional activity of the classical complement pathway is best done with a test that measures the end result of the entire cascade. The CH50 assay does exactly that: it quantifies the serum's ability to lyse antibody-sensitized sheep red blood cells, which requires intact classical pathway components from C1 through C4 and C2 to form the C3 convertase and drive hemolysis. By finding the serum dilution that yields 50% lysis, the CH50 reflects the functional integrity of the classical pathway; a low CH50 indicates a deficiency or dysfunction in any classical component. In contrast, the AH50 tests the alternative pathway, and measuring a single protein like C3 by ELISA or C5 by Western blot assesses quantity rather than the pathway's overall functional activity.

2. Which T cell subset is primarily involved in delayed-type (Type IV) hypersensitivity responses?

A. Th2 cells

B. Th17 cells

C. Th1 cells

D. Regulatory T cells

Delayed-type (Type IV) hypersensitivity is driven by a T cell–mediated response, specifically that the T helper 1 (Th1) subset steers this process. Th1 cells differentiate and release cytokines like IFN-γ that activate macrophages, leading to the macrophage-dominated inflammation seen in DTH reactions. The response takes time to develop because it requires antigen presentation, T cell activation, and macrophage activation, typically peaking after 24–72 hours. This is why DTH reactions occur later after exposure, as in the tuberculin skin test or contact dermatitis. Other helper T cell subsets have different roles: Th2 cells promote antibody-mediated responses and allergic reactions (not the classic DTH), Th17 cells recruit neutrophils and are involved in certain mucosal defenses and autoimmune processes, and regulatory T cells suppress immune responses. Therefore, Th1 cells are the best fit for delayed-type hypersensitivity.

3. Which laboratory test is commonly used to detect specific antibodies or antigens in serum and can be confirmed by Western blot?

A. Immunofluorescence assay

B. Agglutination test

C. Western blot

D. ELISA

This tests a sensitive serologic method used to detect specific antibodies or antigens in serum, typically employed as a screening test with a confirmatory step. In ELISA, the target antigen or antibody is captured on a solid surface, and an enzyme-labeled secondary antibody produces a color change that reflects the amount of target present. Its high sensitivity makes it ideal for screening large numbers of samples for infections or immune markers. Because ELISA can yield false positives, a more specific test is used to confirm positive results. Western blot fits this role well: it separates viral or bacterial proteins by electrophoresis, transfers them to a membrane, and uses patient antibodies to reveal which specific proteins are recognized. The pattern of bands provides higher specificity, helping distinguish true infections from cross-reactivity or nonspecific binding. Other methods like immunofluorescence can detect antibodies but are less practical for high-throughput screening, and agglutination tests are less sensitive. Western blot is typically reserved as a confirmatory step rather than a primary screening test.

4. Which transcription factor is essential for regulatory T cell development?

A. GATA3

B. RORγt

C. T-bet

D. FOXP3

FOXP3 is the master regulator that drives regulatory T cell development and their suppressive function. Regulatory T cells, which help maintain immune tolerance, express CD4, CD25, and FOXP3. FOXP3 controls a transcriptional program that enables these cells to dampen immune responses, partly by promoting molecules like CTLA-4, IL-10, and TGF-β. When FOXP3 is absent or defective, regulatory T cells fail to develop properly or lose their suppressive activity, leading to severe autoimmunity such as IPEX syndrome. Other transcription factors—GATA3 for Th2, T-bet for Th1, and RORγt for Th17—define other helper T cell lineages and are not essential for regulatory T cell development. Thus, FOXP3 is the essential transcription factor for regulatory T cell development.

5. Which hypersensitivity reaction is mediated by IgE and results in immediate-type allergic responses?

A. Type II hypersensitivity

B. Type I hypersensitivity

C. Type III hypersensitivity

D. Type IV hypersensitivity

This question targets IgE-mediated immediate hypersensitivity. In this type, exposure to an allergen first leads to IgE production by B cells under the influence of Th2 cytokines (like IL-4). The produced IgE binds to FcεRI receptors on mast cells and basophils, sensitizing them. Upon subsequent exposure, the allergen cross-links the bound IgE, triggering rapid degranulation of these cells and release of mediators such as histamine, leukotrienes, and prostaglandins. These mediators cause immediate effects: vasodilation and increased vascular permeability (edema), smooth muscle contraction (bronchoconstriction), and mucous secretion, producing symptoms like hives, runny nose, wheezing, or, in severe cases, anaphylaxis. The hallmark is that this reaction is IgE-dependent and occurs within minutes of exposure. In contrast, other hypersensitivities involve different mechanisms: antibody-mediated cytotoxic reactions use IgG or IgM against cell surfaces or tissues; immune complex–mediated reactions involve deposition of antigen–antibody complexes; and T cell–mediated delayed-type hypersensitivity relies on sensitized T cells rather than antibodies and takes longer to manifest.

6. Which ligand interactions correctly match the following cell pairs: APC with CD4+ T cell, virus-infected cell with CD8+ T cell, and CD4+ T cell with B cell?

A. APC–CD4+ T cell: MHC-II with TCR, CD4; B7 with CD28; Virus–CD8+ T cell: MHC-I with TCR, CD8; CD4+ T cell–B cell: CD40L with CD40

B. APC–CD4+ T cell: MHC-II with TCR, CD4; CD40 with CD28; Virus–CD8+ T cell: MHC-I with TCR, CD8; CD4+ T cell–B cell: CD40 with CD40L

C. APC–CD4+ T cell: MHC-II with TCR, CD4; B7 with CD28; Virus–CD8+ T cell: MHC-I with TCR, CD8; CD4+ T cell–B cell: CD40L with CD40

D. APC–CD4+ T cell: MHC-I with TCR, CD8; B7 with CD28; Virus–CD8+ T cell: MHC-II with TCR, CD4; CD4+ T cell–B cell: CD40 with CD40L

Two signals drive T cell activation. First, the T cell receptor recognizes peptide presented by the appropriate MHC class with the right co-receptor (CD4 for MHC II, CD8 for MHC I). Second, a co-stimulatory interaction boosts the signal (B7 on the antigen-presenting cell binds CD28 on the T cell). For helper T–B cell collaboration, CD40L on the T cell engages CD40 on the B cell to promote activation, isotype switching, and germinal center development. APCs present to CD4+ T cells via MHC class II, with the CD4 co-receptor helping stabilize signaling, and provide co-stimulation through B7 binding CD28. Virus-infected cells present to CD8+ T cells via MHC class I with CD8, delivering the TCR signal and CD8 co-receptor participation. CD4+ T cells then provide help to B cells through CD40L binding to CD40 on B cells, driving their activation and antibody responses. So the combination that matches these interactions is: MHC II with TCR and CD4 for APC–CD4+ T cell, B7 with CD28 for co-stimulation; MHC I with TCR and CD8 for virus–CD8+ T cell; CD40L with CD40 for CD4+ T cell–B cell help.

7. Hyperacute transplant rejection is characterized by which mechanism and timing?

A. Acute rejection: CD8+ T cells reacting against foreign MHCs

B. Graft-versus-host disease: donor T cells attack host

C. Chronic rejection: fibrosis months later

D. Hyperacute rejection: preformed antibodies (type II) - occurs in minutes

Hyperacute rejection hinges on preformed antibodies against donor antigens, a type II hypersensitivity reaction. In the recipient, circulating antibodies (often against donor HLA or ABO antigens) bind the graft endothelium and activate complement, triggering rapid thrombosis of graft vessels and ischemic graft failure. Because these antibodies are already present before transplantation, the reaction happens within minutes to hours after the transplant. This immediate, antibody-mediated process distinguishes it from other forms: acute rejection is mainly T cell–mediated against donor MHCs and occurs days to weeks later; graft-versus-host disease involves donor T cells attacking the recipient, typically after hematopoietic stem cell transplantation; chronic rejection develops months later with fibrotic changes.

8. Where is the antigen loaded for MHC-I and MHC-II?

A. MHC-I: endosome; MHC-II: cytosol

B. MHC-I: antigen loaded in RER; MHC-II: antigen loaded in acidified endosome (after release of invariant chain)

C. MHC-I: nucleus; MHC-II: lysosome

D. MHC-I: Golgi; MHC-II: Endoplasmic reticulum

Antigen loading for MHC class I happens in the endoplasmic reticulum. Newly made MHC-I molecules associate with beta2-microglobulin and, after proper folding, bind peptides that are transported into the ER by TAP from cytosolic proteasomal degradation. This peptide loading stabilizes the MHC-I complex, which then travels to the cell surface to present to CD8+ T cells. For MHC class II, loading occurs later in the endosomal/lysosomal pathway, specifically in acidified compartments. In the ER, MHC-II binds the invariant chain, which blocks the peptide-binding groove and directs the complex to endosomes. In these compartments, the invariant chain is degraded to CLIP, and specialized processes (involving HLA-DM) promote exchange of CLIP for antigenic peptides. The loaded MHC-II-peptide complex then moves to the cell surface to present to CD4+ T cells. So the best description is that MHC-I loads peptides in the rough endoplasmic reticulum, while MHC-II loads peptides in acidified endosomes after the invariant chain is removed.

9. Which T cell subset releases IL-4, IL-5, and IL-10, and what are the actions of these cytokines?

A. Th2; IL-4 drives IgE switching; IL-5 activates eosinophils and promotes IgA; IL-10 modulates inflammation

B. Th1; IL-4 drives IgE switching; IL-5 activates eosinophils

C. Th17; IL-17 recruits neutrophils

D. Treg; IL-10; TGF-β

The key idea is that different helper T cell subsets steer the immune response with distinct cytokine profiles. The subset that secretes IL-4, IL-5, and IL-10 is the Th2 lineage. IL-4 drives B cells to switch to IgE, which is central to allergic sensitization and defense against parasites. IL-5 promotes the growth and activation of eosinophils, cells important for combating helminth infections and contributing to allergic inflammation. IL-10 acts as an anti-inflammatory mediator, damping down macrophage activation and Th1 responses, helping regulate the overall immune reaction and supporting a more regulated antibody response. Together, these cytokines highlight a humoral-skewed, anti-inflammatory, eosinophil-associated response characteristic of Th2.

10. Which antibody binds to mast cells?

A. IgA

B. IgG

C. IgE

D. IgM

Mast cells are primed to respond to allergens when a specific antibody class binds to their surface via a high affinity receptor. IgE binds tightly to the FcεRI receptor on mast cells (and basophils), effectively coating the cell with IgE. When the same allergen is encountered and cross links these bound IgE molecules, the mast cell degranulates, releasing histamine and other mediators that drive allergic symptoms. The other antibody classes—IgA, IgG, and IgM—don't bind mast cells in this way to trigger degranulation; they have different roles and interact with different receptors, such as Fcγ receptors for IgG, Fcα receptors for IgA, and complement activation for IgM.

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:

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