

# Immunodeficiency Disease

Developed by

Parker A. Small, Jr, MD  
Department of Immunology and  
Medical Microbiology  
College of Medicine  
University of Florida  
Gainesville, Florida

Susan M. Johnson, PhD  
College of Pharmacy  
University of Florida  
Gainesville, Florida

Updated by

G. Virella, MD, PhD  
Medical University of South Carolina  
Charleston, South Carolina

## **Note to Instructors**

This workbook is divided into five sections:

1. Introduction to the POPS System, introduction to and objectives of the clinical simulation, and a pretest
2. Color-coded booklets with pretest answers and the clinical problem
3. Group question and answer sheets
4. Posttest
5. Posttest answers

Each student should receive a copy of the first section to study and answer questions before the group problem-solving session. If you wish, the second section also may be distributed for the students to review prior to the group session.

# Immunodeficiency Disease

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## Pretest

**Instructions.-** Please mark your answers to the following questions on this exam to facilitate later discussion and review. If your instructor has provided a separate answer form, please be sure to fill in the identification section; then answer the questions both on the form and on this exam.

Choose the *one* correct or most appropriate answer. If you do not know an answer, leave it blank. Do not guess. Health professionals who think they know something, but don't, can do real harm. Those *who know* they don't know something can get help.

**Don't be upset if you don't know all the answers. The purpose of the pretest is to alert you to certain important concepts. The posttest will be similar to the pretest.**

1. Detectable serum antibody against a T-independent pathogen is a good indication that
  - (A) a functional B-cell system exists.
  - (B) a functional T-cell system exists.
  - (C) both functional T-cell and B-cell systems must exist.
  - (D) a cellular immune response to the pathogen has been mounted.
  - (E) the patient has an immune deficiency.
2. Positive skin tests showing delayed-type hypersensitivity, such as for mumps or tuberculosis, indicate that
  - (A) a humoral immune response has occurred.
  - (B) a cell-mediated immune response has occurred.
  - (C) both the T-cell and B-cell systems are functional.
  - (D) only the B-cell system is functional.
  - (E) the patient has an immune deficiency.
3. A T-cell deficiency associated with thymic hypoplasia leads to infection of the following type(s):
  - (A) intracellular bacterial (e.g., *Mycobacterium*) and extracellular bacterial (eg, *Staphylococcus*)
  - (B) extracellular bacterial (e.g., *Staphylococcus*) and viral
  - (C) viral and intracellular bacterial
  - (D) fungal and extracellular bacterial
  - (E) none of the above
4. Infantile, X-linked agammaglobulinemia is associated with excessive infections of the following type(s):
  - (A) intracellular bacterial (e.g., *Mycobacterium*)
  - (B) extracellular bacterial (e.g., *Staphylococcus*)
  - (C) viral
  - (D) fungal
  - (E) none of the above
5. Reaction to poison ivy is
  - (A) an antibody-mediated response referred to as allergic contact dermatitis.
  - (B) a cell-mediated response referred to as allergic contact dermatitis.
  - (C) a purely chemical response to caustic irritants.
  - (D) an IgE-mediated response referred to as allergic contact dermatitis.
  - (E) none of the above.

## Immunodeficiency Disease

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Pretest (continued)

6. A lack of development of secondary follicles in the lymph nodes, appendix, and spleen indicates:
  - (A) a deficient B-cell system.
  - (B) an acute dietary deficiency.
  - (C) a deficient cell-mediated immune system.
  - (D) an elderly patient.
  - (E) a deficient T-cell system.
  
7. A normal primary immune response in a human requires approximately how much time to produce detectable antibody levels in the blood?
  - (A) 5 to 10 hours
  - (B) 1 to 2 days
  - (C) 1 week
  - (D) 1 month
  - (E) 5 to 15 minutes
  
8. The complement system can be called
  - (A) a specific enhancer of nonspecific immunity.
  - (B) a specific enhancer of specific immunity.
  - (C) a nonspecific enhancer of nonspecific immunity.
  - (D) a nonspecific enhancer of specific immunity.
  - (E) none of the above.

# Immunodeficiency Disease

## Pretest (continued)

Questions 9 through 11 refer to the following data:

The sera (X and Y) and bronchial secretions (Z) were heated at 56°C for 30 minutes to destroy any complement present. Serum or secretions were then mixed with an antigen (Ag) in the presence of complement and incubated to allow fixation of complement if antibody (Ab) were present. To determine if complement remained in an active or "unfixed" state, indicator red blood cells (RBCs with antibody on their surfaces) were added after the incubation. Any unfixed complement then lysed the indicator RBCs.

**+ means reagent added; - means reagent not added**

Each of the 12 rows represents a reaction in a separate tube

	Tube	Antigen	Complement	Lysis of RBCs
	Serum X	Antigen 1		
1	+	+	+	no
2	-	+	+	yes
3	+	-	+	yes
4	+	+	-	no
	Serum Y	Antigen 2		
5	+	+	+	no
6	-	+	+	no
7	+	-	+	yes
8	+	+	-	no
	Secretions Z	Antigen 3		
9	+	+	+	yes
10	-	+	+	yes
11	+	-	+	yes
12	+	+	-	no

9. Is there antibody to antigen 1 in serum X?
  - A. yes
  - B. no
  - C. can't tell, because Ag fixes complement without Ab present (anticomplementary Ag)
  - D. can't tell, because antiserum fixes complement without homologous Ag present (anticomplementary antiserum)
  - E. can't tell, because antiserum and homologous Ag lyse cells without complement
  
10. Is there antibody to antigen 2 in serum Y?
  - A. yes
  - B. no
  - C. can't tell, because Ag fixes complement without Ab present (anticomplementary Ag)
  - D. can't tell, because antiserum fixes complement without homologous Ag present (anticomplementary antiserum)
  - E. can't tell, because antiserum and homologous Ag lyse cells without complement
  
11. Is there any antibody to antigen 3 in bronchial secretions Z?
  - A. yes
  - B. no
  - C. can't tell, because Ag fixes complement without Ab present
  - D. can't tell, because bronchial secretions fix complement without homologous Ag present
  - E. can't tell, because Ab such as IgA (which does not fix complement) could be present

# Immunodeficiency Disease

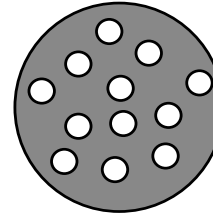
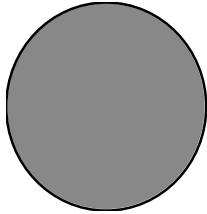
## Pretest (continued)

Questions 12 and 13 refer to the following data:

### Explanation of Virus Neutralization Assay

This solid circle represents a monolayer (a layer one cell thick) of monkey kidney fibroblasts in tissue culture.

Three days after a solution containing approximately ten infectious poliovirus particles was added, the monolayer of cells looked like this. (Each hole represents a plaque, i.e., an area where the cells were killed by the poliovirus.)



To determine the amount of antibody to poliovirus present, a *standard amount of virus* was added to *increasing dilutions of the antiserum being tested*. The serum-virus mixture was then spread over the surface of the tissue culture monolayer. The number of plaques obtained at each dilution was compared with the number of plaques obtained by plating the standard virus preparation without antiserum, thereby allowing a determination of the 50% plaque reduction titer.

This type of assay was done for poliovirus type 1 on serum from a patient, and the following results were obtained:

Serum Dilution	1:2	1:10	1:50	1:250	1:1250	No Serum
Number of plaques	0	2	40	60	101	120

12. A valid conclusion would be:
- (A) the patient is not currently infected with type 1 poliovirus.
  - (B) the patient has Ab against type 1 poliovirus.
  - (C) the patient currently has an infection with type 1 poliovirus.
  - (D) the patient has a bacterial infection.
  - (E) the patient has no antibody against type 1 poliovirus.
13. The 50% plaque reduction titer for the above data is
- (A) between 10 and 50.
  - (B) 250.
  - (C) 60.
  - (D) between 250 and 1250.
  - (E) between 50 and 250.

When you have completed the pretest, consult your study materials. Try to identify the correct answers and understand the concepts that make them correct. The list of objectives may be used as a guideline for your studies. When your group meets, you will have the responsibility of explaining some of the correct pretest answers to the others. *Please bring your textbook and pretest to the group meeting.*