Name the T-cell CD marker:
- Essential for Ab isotype switching (for B cell binding)

Name the T-cell CD marker:
- Interacts with MHC class I molecules

Name the T-cell CD marker:
- Expressed on all T cells and is needed as a signal transducer for the T cell receptor

Name the T-cell CD marker:
- Interacts with MHC class II molecules

What complement factor deficiency leads to
- Recurrent gonococcal infections?

What complement factor deficiency leads to
- Leukocyte adhesion deficiency with poor opsonization?

What complement factor deficiency leads to
- Hereditary angioedema?

Which IgG cannot activate complement?

What form of immunity is responsible for removal of intracellular infections?

True or false? Direct fluorescent Ab test is used to detect Abs in a patient?

What is the triad of Wiskott-Aldrich syndrome?

What complement factor deficiency leads to
- Increased susceptibility to pyogenic infections?

What test is done to diagnose CGD?

What is the valence of an Ig molecule equal to?

What is the name of the process that ensures that each B cell produces only one heavy-chain variable domain and one light chain?

What is the major Ab of the primary immune response?

CD4	CD3	CD8	CD40 ligand
IgG4	C1 inhibitor (C1-INH)	C1, C2, or C4 deficiency	C5-C8 deficiency
C3 deficiency	Thrombocytopenia, eczema, and immunodeficiency is the triad of this X-linked recessive disorder.	False. Direct tests detect Ags; indirect tests detect Abs.	Cell-mediated immunity
IgM	Allelic exclusion. It is to ensure that one B cell produces only one Ab.	The number of Ags that the Ab can bind	Nitroblue tetrazolium reduction test (NBT). It is negative in patients with CGD because there is no production of oxygen radicals.

What test is used to detect anti-RBC Abs seen in hemolytic anemia?	What subset of T cells recognizes the MHC class I Ags?	What cell surface marker is found on activated helper T cells?	What are the five Ig isotypes?
What is the term for the strength of the association between Ag and an Ab?	True or false? More Ag is needed to produce a secondary immune response than a first immune response.	What is the term for the strength of association between multiple Abbinding sites and multiple antigenic determinants?	What Ig mediates ADCC via K cells, opsonizes, and is the Ig of the secondary immune response?
What is the name of the B cell that secretes Ig?	What would be the result if an Ab were cleaved with papain?	What is the bone marrow maturation time for a phagocytic cell?	Which leukotrienes are associated with the late-phase inflammatory response?
Name the T-cell CD marker: Is a costimulatory molecule in T cell activation	What three cells are essential for T-cell differentiation in the thymus?	What is the only specific Ag-presenting cell?	What is the tetrad of Jarisch-Herxheimer reaction?

IgA, IgD, IgE, IgG, and IgM	CD40	CD8+ T cells (cytotoxic) Remember, 8×1=8 (CD×8×MHC class I=8); 4×2=8 (CD×4 MHC class II 8)	Coombs test
IgG	Avidity (more than one binding site)	False. Fewer Ags are needed to trigger a secondary response.	Affinity (one of each)
LTC4 and LTD4	14 days	There would be two Fab and Fc regions.	Plasma cell (mature B lymphocyte)
Rigors, leukopenia, decrease in blood pressure, and increase in temperature	B cells; macrophages and dendritic cells are nonspecific.	Dendritic cells, macrophages, and thymic epithelial cells	CD28

What is a plasma cell's life expectancy?	What are defined by Ag-binding specificity?	What type of binding occurs with one Fab or one idiotype of IgG?	What molecule that is needed to trigger T cell activation is noncovalently linked to TCR?
What is the name of the B cell–rich area of the spleen?	What IL, produced by macrophages, is chemotactic for neutrophils?	What Ig prevents bacterial adherence to mucosal surfaces?	What are the three rules of clonal selection?
What three cells are essential for T-cell maturation?	What is the term for a single isolated antigenic determinant?	What are the two opsonizing factors?	What is the most common Ig deficiency?
Which integrin mediates the adhesion to endothelial cells for migration in and out of the blood during an immune response?	What type of hypersensitivity is an Ab-mediated response against our own cells, receptors, or membranes via IgG or IgM?	What is the term to describe the limited portion of an Ag that is recognized by an Ab?	What cytokine do Th1 cells secrete to inhibit Th2 cell function?

CD3 molecule. It transmits signals to the inside of the T cell to trigger activation	Affinity	Idiotypes	7 to 14 days
1. One cell type 2. One Ab type 3. Random selection of hypervariable regions, and only cells with bound Ag undergo clonal expansion	IgA	IL-8. It not only is chemotactic, it also acts as an adhesive for neutrophils.	Primary follicle (in the white pulp)
IgA deficiency; patients commonly present with recurrent sinopulmonary infections and GI disturbances.	The Fc region of IgG and C3b	Hapten (not immunogenic)	Thymic epithelial cells, dendritic cells, and macrophages
INF-gamma	Antigenic determinant (epitope)	Type II hypersensitivity reaction	Beta2-integrins

During what stage of B-cell development is IgM first seen on the surface?	What Ig is responsible for Antibody-Dependent Cell-mediated Cytotoxicity of parasites, has a high-affinity Fc receptor on mast cells and basophils, and is responsible for the allergic response?	True or false? B-cell Ag receptors can be secreted.	Are more Abs produced in a primary or a secondary immune response?
What receptors are the best markers for NK cells?	True or false? Ag-Ab binding is irreversible	What three major cell lines participate in the acquired immune system?	What test is used to screen for HIV?
Name the macrophages by location: • Lungs	Name the macrophages by location: • CNS	Name the macrophages by location: • Kidney	What is the first human disease successfully treated with gene therapy?
What is the term for Ags that activate B cells without T-cell signaling?	What are the three rules governing a secondary immune response?	What type of hypersensitivity is a T cell-mediated response to Ags that are not activated by Ab or complement?	Name the macrophages by location: • Liver

More Ab is produced in less time in a secondary immune response (shorter lag period).	True. B cell antigen receptors are Abs.	IgE	Immature B cells
ELISA. It detects anti-p24 IgG.	T cells, B cells, and macrophages	False. It is reversible because the Ags and Abs are not linked covalently.	CD16 and CD56
Adenosine deaminase (ADA) deficiency	Mesangial macrophages	Microglial cells	Alveolar macrophages
Kupffer cells	Type IV hypersensitivity reaction (delayed type because of the 48–96 hour latency)	1. Covalent bonding between the hapten and carrier 2. B-cell exposure to hapten twice 3. T-cell exposure to carrier twice	Thymus-independent Ags

What test, by using specific Abs to different receptors, allows for rapid analysis of cell types in a blood sample?	What is the name of the T cell–rich area of the spleen?	What three complement fragments are also anaphylatoxins?	Name the B-cell CD marker: • Required for class switching signals from T cells
What are the three major functions of secretory IgA?	What IL is important in myeloid cell development?	What is the term for different classes and subclasses of the same gene products?	What is the first Ab a baby makes?
What is the term for the number of Ag-binding sites on an Ig?	Which major cell type is found in the red pulp of the spleen?	What is the name of the pathway that produces leukotrienes?	What is the term to describe basophils that have left the bloodstream and entered a tissue?
By which process do Abs make microorganisms more easily ingested via phagocytosis?	What MHC class acts to remove foreign Ags from the body?	What disorder is characterized by autoantibodies to IF?	What cytokines do Th2 cells secrete to inhibit Th1 cell function?

CD40	C3a, C4a, and C5a	PALS (Parietolateral lymphocytic sheath)	Flow cytometric analysis
IgM	Isotypes	IL-3 (3 face down is an M)	1. IgA receptor 2. Transport of IgA across epithelial barriers 3. Protection of IgA from degradative proteases
Mast cells	Lipoxygenase pathway, from arachidonic acid	RBCs. That is why it is called red pulp.	Valence
IL-4, IL-10, and IL-13	Pernicious anemia	MHC class II Ags. This is accomplished via CD4 T cells.	Opsonization

What branch of the immune system is acquired in response to an Ag?	True or false? T cells can recognize, bind, and internalize unprocessed Ags.	What type of hypersensitivity is a result of high circulating levels of soluble immune complexes made up of IgG or IgM Abs?	At what stage of B-cell development can IgM or IgD be expressed on the cell surface?
What would be the result if an Ab were cleaved with pepsin?	Why are patients with Chronic Granulomatous Disease not prone to develop infections from catalase-negative bacteria?	What are the two chains of the TCR that are mainly found on the skin and mucosal surfaces?	Which IL is associated with increases of IgG and IgE?
What Ig is associated with mucosal surfaces and external secretions?	What are the genetic variants of a molecule within members of the same species?	What cytokine do CD4 T cells secrete to activate B cells when the specific peptide in the groove of the MHC II molecule interacts with the TCR?	Which protein prevents internal binding of self proteins within an MHC class II cell?
Name the B-cell CD marker: • Receptor for EBV	Name the B-cell CD marker: • Used clinically to count B cells in blood	What immunologic test checks for a reaction between Abs and a particular Ag? (hint: ABO typing)	Which leukotriene is chemotactic for neutrophils?

Mature B cell; the memory B cell can have IgG, IgA, or IgE on its surface.	Type III hypersensitivity reaction	False. B cells recognize unprocessed Ags, but T cells can recognize only processed Ags.	Adaptive branch. The adaptive branch of the immune system has a slow initiation with rapid responses thereafter.
IL-4	gamma and delta chains	Catalase-negative bacteria secrete H_2O_2 as a byproduct (remember, catalase breaks down H_2O_2), allowing the neutrophils to use it as the substrate for the other toxic metabolites. Patients with CGD are prone to catalase-	There would be a Fab' region; thus, it would still be able to participate in precipitation and agglutination.
Invariant chain	IL-4 is secreted to activate B cells. This begins the second step in the immune response, known as Activation. CD4 T cells secrete INF-alpha to activate macrophages	Allotypes	IgA
LTB4	Agglutination test	CD19	CD21; it is a complement receptor for cleaved C3

True or false? The increased oxygen consumption after phagocytosis is for ATP production.	What is the limited portion of a large Ag that will actually be recognized and bound to an Ab and that contains approximately five to six amino acids or four to five hexose units?	What complement factor or factors are associated with • Chemotaxis?	What complement factor or factors are associated with • Membrane attack complex (MAC)?
What AR disorder is seen by age 1 to 2 with recurrent sinopulmonary infections, uncoordinated muscle movements, and dilation of the blood vessels?	What are the four chemotactic agents?	What subset of CD4 helper T cells stimulate B-cell division and differentiation?	Which region of the variable domain comprises the Ag-binding site of the Ab?
In MHC class II molecules, what chain blocks access to the peptide-binding groove during transportation within the cell, ensuring that the MHC class II–peptide complex is transported to the	What chromosome codes for HLA gene products?	What cells are atypical on a peripheral blood smear in heterophil-positive mononucleosis?	What is the major Ig of the secondary immune response in the mucosal barriers?
What T cell deficiency syndrome is associated with facial anomalies, hypoparathyroidism, thymic hypoplasia, and recurrent viral and fungal infections?	What is the stimulus for the classical pathway activation?	What is the first membrane-bound Ig on B cell membranes?	What region of the Ig does not change with class switching?

C5–C9	C5a	Antigenic determinant (epitope). (Idiotypes bind to epitopes.)	False; it is for the production of toxic metabolites.
Hypervariable region (three per light chain; three per heavy chain)	Th2	1. C5a 2. Leukotriene B4 3. IL-8 4. Bacterial peptides	Ataxia-telangiectasia
IgA	T cells, not B cells	The short arm of chromosome 6	Invariant chain. This is essential because the CD4 T cells have antigen receptors only for peptides bound to the MHC II molecule. (MHC restriction)
Hypervariable region	IgM; IgD follows shortly thereafter.	Ag-Ab complexes. The alternative pathway protects without use of Abs; the pathogen is the stimulus.	DiGeorge syndrome, which is due to a failure of the third and fourth pharyngeal pouch development. Remember, B cell deficiencies are associated with extracellular infection. T cell deficiencies are associated with

True or false? Patients with common variable hypogammaglobinemia have B cells in the peripheral blood.	What is the Ig associated with the primary immune response?	What MHC class of antigens do all nucleated cells carry on their surface membranes?	What Ig is responsible for activation of complement, opsonization, and ADCC and is actively transported across the placenta?
What is the name of the process in which cells migrate toward an attractant along a concentration gradient?	What are the two functions of the thymus in T-cell differentiation?	What is the name of the T cell–rich area of the lymph node?	What cell surface marker do all T cells have?
Name the type of graft described by these transplants: • From one site to another on the same person	Name the type of graft described by these transplants: Between genetically identical individuals	Name the type of graft described by these transplants: • From one person to the next (the same species)	Name the type of graft described by these transplants: • From one species to another
What complement factor or factors are associated with • Opsonization?	What complement factor or factors are associated with • Anaphylaxis?	What happens to the Ab specificity when class switching occurs in mature B cells?	What IL down-regulates cell mediated immunity?

IgG	MHC class I antigens; they are also found on the surface of platelets.	IgM	True. Common variable hypogammaglobinemia first appears by the time patients reach their 20s and is associated with a gradual decrease in Ig levels over time.
CD3	Paracortex	Hormone secretion for T-cell differentiation and T-cell education to recognize self from nonself	Chemotaxis
Xenograft	Allograft	Isograft	Autograft
IL-10	As the isotype is switched, the Ab specificity does not change because it does not affect the variable chains.	C3a, C4a, C5a	C3b

What are the four major functions of the acquired immune system?	What endotoxin receptor is the best marker for macrophages?	What is the term for the inherent ability to induce a specific immune response?	What molecule differentiates the MHC class I from II Ag? (Hint: it's in the light chain.)
What IL do T cells secrete to induce T-and B-cell division?	Development of what T cell line follows low affinity for self-MHC class II Ags in the thymus?	What is the term for a substance secreted by a leukocyte in response to a stimulus?	What subset of CD4 T cells is responsible for mast cell and eosinophil precursor proliferation?
What five main oxidizing reactions are used to kill ingested organisms?	What Ig is associated with ADCC for parasites?	True or false? RBCs do not have MHC class I Ags on their surface.	What Ig is associated with mast cell and basophil binding?
What type of Ag do T cells recognize?	What Ig is the major protective factor in colostrum?	What is the second cell involved in the immune response?	What is the term for thymic induction of T cells with high-affinity Ag receptors for self that are programmed to undergo apoptosis?

The Beta-2-microglobin. It is the separately encoded Beta-chain for class I Ags.	Immunogenicity; antigenicity refers to Ab/lymphocyte reaction to a specific substance.	CD14	1. Recognize self from nonself 2. Amplify via cell division or complementation 3. Control the level of the response 4. Remove foreign
Th2 cells	Cytokine. If a cytokine affects another class of leukocytes, it is called an interleukin.	CD4+T cells	IL-2. T cells express IL-2 receptors on their surface to induce self-expression.
IgE. It attaches via receptor for the Fc region of the heavy epsilon chain	True. Remember, all nucleated cells (and platelets) have MHC class I Ags, and RBCs are not nucleated.	IgE	1. H2O2 2. Superoxide 3. Hydroxyl radical 4. Myeloperoxidase 5. Hypochlorous acid
Negative selection. This helps to prevent autoimmune diseases.	The CD4 T cell; the APC is the first cell in the immune response.	IgA	Processed antigenic peptides bound in the groove of the MHC molecule

What are the four ways to down-regulate the immune system?	What is the only Ig that crosses the placenta?	What is given to pregnant women within 24 hours after birth to eliminate Rh+ fetal blood cells from their circulation?	What IL is essential for lymphoid cell development?
What is the name of the major chemotactic agent released from • The blood serum? (Hint: it is a complement factor.)	What is the name of the major chemotactic agent released from • Bacteria?	What cell surface marker is found on blood B cells?	What is the name of the B cell–rich area in the lymph node?
What T-cell surface projection recognizes and reacts to foreign Ags (presented by APCs)?	What is the confirmatory test for HIV?	What is the name of the major chemotactic agent released from • Neutrophils?	What is the name of the major chemotactic agent released from • Macrophages?
What B cell disorder is characterized by pre-B cells in the bone marrow, no circulating B cells in plasma, normal cell-mediated immunity, low Igs, and appearance by 6 months of age?	What subtype of IgG does not bind to staphylococcal A protein?	What mast cell mediator is a chemotactic agent?	What is the major Ig of the secondary immune response?

IL-7 (A 7 upside down is an L; L is for Lymphoid)	Rho (D) immune globulin (RhoGAM), an anti-RhD IgG antibody, prevents generation of RhD-specific memory B cells in the mother.	IgG	1. Decrease concentrations of Ag levels 2. Administer IgG in high concentrations 3. Inhibit B cells with Ag bound to IgG (complexes) 4. Turn off the original T
Primary follicle of the cortex	CD19	F-Met-Peptides	C5a
IL-8 (IL-1 and TNF-gamma also)	Leukotriene B4 (LTB4)	Western blot	TCR
IgG	Eosinophil chemotactic factor A	IgG3	Bruton X-linked hypogammaglobinemia. Tyrosine kinase deficiency leads to inadequate B cell maturation.

Which IL increases IgA synthesis?	What is the term for an immunogenic agent that is too small to elicit an immune response?	What type II hypersensitivity disorder is defined as • Autoantibodies directed against ACh receptors?	What type II hypersensitivity disorder is defined as • Autoantibodies directed against platelet integrin?
What is the term for processing an APC's pinocytosed material by fusing with a lysosomal granule and cleaving the Ag into peptide fragments?	What is the most common precipitin test used in clinical medicine?	What Ig activates the complement cascade most efficiently?	What assay is used to identify MHC class I molecules?
What is the term for the strength of the association between Ags and Abs?	What type of Ag do B cells recognize?	What Ig is associated with Ag recognition receptor on the surface of mature B cells?	Which chromosome is associated with MHC genes?
What type of cell can never leave the lymph node?	Via what pathway is glycolysis increased after phagocytosis?	What is the term for a delay in the onset of normal IgG synthesis seen in the fifth to sixth month of life?	What subset of CD4 helper T-cell function is helping the development of CD8 T cells?

Autoimmune thrombocyt-openia purpura	Myasthenia gravis	Hapten; if it is coupled with a carrier, it may become immunogenic.	IL-5. It also stimulates eosinophil proliferation.
Microcytotoxic assay	IgM	Radial Immuno Diffusion (RID) for Ig levels.	Ag processing; it is needed for class I molecules. Class II molecules have an invariant chain that protects them from breakdown.
Chromosome 6	IgD; IgM is also correct.	Free, unprocessed Ag	Avidity. There is a positive correlation between valence numbers and avidity.
Th1; they are also responsible for delayed-type hypersensitivity (type IV)	Transient hypogammagl-obinemia of infancy; it usually resolves by age 16 to 30 months.	HMP shunt	Plasma cell

What diseases are associated with the HLA-B27 allele	What disease is associated with the HLA-DR2 and HLA-DR3 alleles	What diseases are associated with the HLA-DR3 allele	What diseases are associated with HLA-DR4
What T cell line arises from low affinity for self-MHC class I Ags in the thymus?	What MHC class functions as a target for elimination of abnormal host cells?	What are the three polymorphonuclear leukocytes? Be specific.	What disease is associated with the HLA-A3 allele
What enzyme is deficient in patients with CGD?	What subtype of IgG does not activate complement cascade?	What two cell lines of the immune system do not belong to the innate branch?	What subset of T cells recognizes the MHC class II Ags?
What type II hypersensitivity disorder is defined as • Autoantibodies against the type IV collagen in the basement membrane of the kidneys and lungs?	What type II hypersensitivity disorder is defined as • Autoantibodies directed against the TSH receptor?	What type II hypersensitivity disorder is defined as • Autoantibodies directed against RBC Ag I?	What Ig activates the alternate pathway, neutralizes bacterial endotoxins and viruses, and prevents bacterial adherence?

Rheumatoid arthritis and type 1 diabetes (with HLA-DR3)	Sjogren's syndrome, active hepatitis, systemic lupus erythematosus (with HLA-DR2) and type 1 diabetes (with HLA-DR4)	Systemic lupus erythematosus	Psoriasis, ankylosing spondylitis, inflammatory bowel disease, and Reiter's syndrome
Primary Hemochromatosis	Neutrophils, eosinophils, and basophils	MHC class I Ags (the endogenous pathway). This allows the body to eliminate tumor cells, virus-infected cells—anything the body recognizes as nonself via CD8+ T cells.	CD8+ T cells
CD4+ T cells (helper)	T and B-cells belong to the adaptive branch, whereas PMNs, NK cells, eosinophils, macrophages, and monocytes belong to the innate branch.	IgG4	NADPH oxidase is deficient, resulting in an inability to produce toxic metabolites.
IgA	Autoimmune hemolytic anemia	Graves disease	Goodpasture syndrome