

**1. Active artificially acquired immunity is a result of:**

**Select one:**

- A. Injection of an immune serum.
- B. Contact with a pathogen.
- C. Antibodies passed on from mother to fetus through the placenta.
- D. Vaccination.
- E. Antibodies passed on from mother to baby through breast milk.

**Answer:** D. Vaccination.

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**2. All of the following are true of antigens, EXCEPT:**

**Select one:**

- A. They contain epitopes.
- B. They will react with antibodies.
- C. They contain antigenic determinants.
- D. They can elicit an immune response.
- E. They contain paratopes.

**Answer:** E. They contain paratopes.

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**3. Which of the following substances will not stimulate an immune response unless they are bound to a larger molecule?**

**Select one:**

- A. Antigen.
- B. Virus.
- C. Hapten.
- D. Miligen.
- E. Antibody.

**Answer:** C. Hapten.

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**4. Concerning adjuvants, all of the following are false, EXCEPT:**

**Select one:**

- A. Substances that enhance the immune response.
- B. Called antigenic determinants.
- C. They are antibodies passed on from mother to fetus.
- D. They are vaccinations against viral infections.
- E. Substances involved in passive immunity.

**Answer:** A. Substances that enhance the immune response.

**1. A polymorphonuclear neutrophil (PMN):**

**Select one:**

- a) Is a bone marrow stem cell.
- b) Is closely similar to a mast cell.
- c) Contains microbicidal cytoplasmic granules.
- d) Is not a professional phagocytic cell.
- e) Has granules which stain with eosin.

**Answer: c**

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**2. The paracortical area of a lymph node comprises mainly:**

**Select one:**

- a) Follicular dendritic cells
- b) Plasma cells
- c) Neutrophils
- d) B-cells
- e) T-cells

**Answer: e**

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**3. B cells mature in the.....while T cells mature in the:**

**Select one:**

- a) Thymus/bone marrow
- b) Spleen/bone marrow
- c) Bone marrow / Thymus
- d) Liver/Kidneys
- e) Bone marrow / Spleen

**Answer: c**

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**4. What is the major site for naïve B and T cell activation:**

**Select one:**

- a) Spleen
- b) Bone marrow
- c) Lungs
- d) Thymus
- e) Kidney

**Answer: a**

**Q1.** A lectin pathway in complement activation is all of the following except:

- a) C3 convertase is the same as in the classical pathway
- b) Depends on antigen-antibody binding as in the classical pathway
- c) Involves C2 activation
- d) Involves C3b
- e) Involves C5b

**Answer:** b) Depends on antigen-antibody binding as in the classical pathway

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**Q2.** Which of the following key components of the complement pathway can be directly activated by the lectin pathway?

- a) C1
- b) C2
- c) C7
- d) C9
- e) C4

**Answer:** b) C2

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**Q3.** Complement component C3 in the alternative pathway is cleaved by:

- a) C3b
- b) C3bBb
- c) Factor B
- d) Simultaneously by antigen
- e) Simultaneously by antigen and antibody

**Answer:** b) C3bBb

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**Q4.** Classical complement pathway properties are all true except:

- a) Is an effector arm of adaptive immunity
- b) Opsonizes bacteria
- c) Produces chemotactic and anaphylatoxin
- d) Is directly activated by bacteria
- e) Was the first complement pathway discovered

**Answer:** d) Is directly activated by bacteria

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**Q5.** CR1 complement receptors on phagocytic cells bind:

- a) Factor H
- b) Factor I
- c) C3d
- d) Only inactive C6

e) C3b

**Answer:** e) C3b

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**Q6.** Complements that act as anaphylatoxins include:

a) C3a and C5a

b) C3b and C4b

c) C3d and C3b

d) C4b and C2b

e) C5-C8

**Answer:** a) C3a and C5a

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**Q7.** The initial complement component that is bound by complement-fixing antibodies is:

a) C1q

b) C1s

c) C3b

d) C5a

e) C9

**Answer:** a) C1q

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**Q8.** The classical and alternative pathways meet at complement component:

a) C4

b) C4b

c) Factor D

d) C5

e) C3

**Answer:** e) C3

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**Q9.** A complement component strongly chemotactic for neutrophils is:

a) C9

b) C5a

c) C3

d) C3b

e) C5

**Answer:** b) C5a

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**Q10.** Complement proteins work by:

a) Neutralizing antigens

b) Creating an impermeable barrier

c) Phagocytosis of target cells

d) Forming pores in the membranes of target cells

e) Producing inflammation

**Answer:** d) Forming pores in the membranes of target cells

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**Q11.** One function of complements is to:

- a) Inactivate perforins
- b) Mediate the release of histamine
- c) Neutralize bacteria
- d) Phagocytize antigens
- e) Cross-link allergens

**Answer:** b) Mediate the release of histamine

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**Q12.** One function of complements is to:

- a) Enhance phagocytosis
- b) Activate T cells
- c) Release histamine
- d) Promote apoptosis
- e) Activate perforins

**Answer:** c) Release histamine

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**Q13.** The principal function of complements is:

- a) Mediates histamine release
- b) Bind with antibodies to lyse cells
- c) Promote antigen elimination
- d) Neutralize toxins
- e) Enhance cytokine secretion

**Answer:** b) Bind with antibodies to lyse cells

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**Q14.** Complement activation is done by:

- a) IgM
- b) IgG
- c) IgD
- d) IgM + IgG
- e) IgA

**Answer:** d) IgM + IgG

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**Q1.** Isotype switching occurs in:

- a) Paracortical area of the lymph node
- b) Cortex of the lymph node
- c) Bone marrow
- d) Medulla
- e) Circulation

**Answer:** b) Cortex of the lymph node

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**Q2.** IgM: All are true except:

- a) Is first produced by B-cells
- b) Is most commonly tetrameric
- c) Has the same number of constant domains as IgE
- d) Is a weak bacterial agglutinator
- e) Is the main class of natural antibodies

**Answer:** b) Is most commonly tetrameric

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**Q3.** All are functions of the Fc part of the antibody except:

- a) Complement activation
- b) Antigen opsonization
- c) Helps in macrophage phagocytosis
- d) Determines isotype
- e) Binding C1q

**Answer:** b) Antigen opsonization

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**Q4.** A Fab fragment:

- a) Is produced by pepsin treatment
- b) Is produced by the separation of heavy and light chains
- c) Binds antigen
- d) Lacks light chains
- e) Has no interchain disulfide bonds

**Answer:** c) Binds antigen

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**Q5.** The effect of an antibody is determined by:

- a) Constant region of the heavy chain
- b) Variable region of the light chain
- c) Constant region of the light chain
- d) Variable region of the heavy chain

e) Antigen-binding site

**Answer:** a) Constant region of the heavy chain

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**Q6.** Antibody structure consists of:

- a) Two heavy and two light chains
- b) One heavy and one light chain
- c) One light and one heavy chain
- d) Three heavy and two light chains
- e) Two light and one heavy chain

**Answer:** a) Two heavy and two light chains

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**Q7.** Papain enzyme digestion of antibodies produces:

- a) Two Fab fragments and one Fc fragment
- b) One Fab fragment and two Fc fragments
- c)  $F(ab')_2$  and a smaller Fc fragment
- d)  $F(ab')_2$  and a larger Fc fragment
- e)  $F(ab')_2$  and two Fc fragments

**Answer:** a) Two Fab fragments and one Fc fragment

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**Q8.** The number of antigens that can bind to an IgM antibody is:

- a) 2
- b) 4
- c) 6
- d) 8
- e) 10

**Answer:** e) 10

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**Q9.** The least abundant immunoglobulin in adult serum is:

- a) IgM
- b) IgG
- c) IgA
- d) IgD
- e) IgE

**Answer:** e) IgE

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**Q10.** The presence of IgM indicates:

- a) Second exposure to the same antigen
- b) An acute infection
- c) An allergic reaction is present
- d) A reaction between mother and fetus across the placenta
- e) Activation of memory cells

**Answer:** b) An acute infection

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**Q11.** Which of the following statements does not apply to IgG?

- a) Appears early in the primary immune response
- b) Neutralizes bacterial toxins
- c) Can fix complement
- d) Crosses the human placenta
- e) Opsonizes bacteria

**Answer:** a) Appears early in the primary immune response

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**Q12.** The predominant immunoglobulin in external secretions such as tears and mucus is:

- a) IgE
- b) IgM
- c) IgA
- d) IgG
- e) IgD

**Answer:** c) IgA

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**Q13.** The correct order of immunoglobulins related to their concentration is:

- a) IgG > IgA > IgM > IgD > IgE
- b) IgG > IgD > IgM > IgE > IgA
- c) IgG > IgM > IgA > IgE > IgD
- d) IgG > IgE > IgA > IgM > IgD
- e) IgG > IgA > IgE > IgM > IgD

**Answer:** a) IgG > IgA > IgM > IgD > IgE



**Q1.** After B cell activation in the peripheral lymph nodes, all are true except:

- a) B cells convert to CD20+ plasma cells
- b) Memory B cells enter circulation
- c) Plasma cells reside in the medulla
- d) Antibodies enter the circulation
- e) B cells originate from the germinal center

**Answer:** a) B cells convert to CD20+ plasma cells

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**Q2.** Which of the following proteins does NOT make up the B cell co-receptor?

- a) CD19
- b) CD21
- c) CD20
- d) CD81
- e) CR2

**Answer:** c) CD20

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**Q3.** Natural antibodies are all true except:

- a) Polyspecific
- b) Against microbial carbohydrates
- c) High-affinity IgM
- d) Low-affinity IgM
- e) Produced without T-cell help

**Answer:** c) High-affinity IgM

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**Q4.** All are T-independent B cells except:

- a) Marginal zone B cells
- b) B1 cells
- c) CD5+ B cells
- d) Follicular B cells
- e) Natural antibody-producing cells

**Answer:** d) Follicular B cells

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**Q5.** The germinal center is incubated with:

- a) Activated T cells
- b) Activated B cells
- c) Antibodies
- d) Naive B cells
- e) Naive T cells

**Answer:** b) Activated B cells

**Q6.** Mature B cells can be detected by the presence of:

- a) CD20
- b) CD32
- c) CD21
- d) CD28
- e) CD40

**Answer:** a) CD20

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**Q7.** Which antibody plays an inhibitory role on B cells?

- a) IgM
- b) IgA
- c) IgE
- d) IgG
- e) IgD

**Answer:** d) IgG

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**Q8.** B cells in the periphery that have not been exposed to antigens are called:

- a) Pre-B cells
- b) Mature B cells
- c) Immature B cells
- d) Naive B cells
- e) Pro-B cells

**Answer:** d) Naive B cells

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**Q9.** Blocking microbial toxins and viruses to prevent binding to cellular receptors is mediated by which antibody mechanism?

- a) Antibody agglutination
- b) Antibody precipitation
- c) Antibody neutralization
- d) Antibody-dependent cell-mediated cytotoxicity (ADCC)
- e) Antibody opsonization

**Answer:** c) Antibody neutralization

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**Q10.** The germinal center is an important site of:

- a) Hematopoiesis
- b) B-cell maturation
- c) B-cell receptor editing
- d) Myeloid cell differentiation
- e) Antibody V-gene rearrangement

**Answer:** e) Antibody V-gene rearrangement

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**Q11.** The T-cell ligand CD28 binds to which of the following on a B cell?

- a) B7
- b) CD2
- c) CD40
- d) CD40L
- e) LFA-3

**Answer:** a) B7

---

**Q12.** Which of the following accurately describes a difference between B cells and plasma cells?

- a) Plasma cells express CD20, while B cells do not
- b) Plasma cells are the primary antibody producers, while B cells do not produce antibodies
- c) B cells have a high level of immunoglobulin production, whereas plasma cells do not
- d) B cells are short-lived and produce antibodies, while plasma cells are long-lived and produce antibodies
- e) Plasma cells undergo isotype switching, while B cells do not

**Answer:** b) Plasma cells are the primary antibody producers, while B cells do not produce antibodies

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**Q13.** Which process resembles negative selection in T cells but occurs in B cells?

- a) Clonal expansion
- b) Isotype switching
- c) Receptor editing
- d) Positive selection
- e) Antibody neutralization

**Answer:** c) Receptor editing

---

**Q14.** All of the following are expressed on B cells except:

- a) CD19
- b) CD20
- c) CD21
- d) CD40L

**Answer:** d) CD40L

**Q15.** What causes a negative signal to B cell activation?

- a) CD22
- b) CR2
- c) CD59
- d) CD40
- e) CD28

**Answer:** a) CD22

**Q1.** MHC class II contains all of the following except:

- a) Alpha 1
- b) Alpha 2
- c) Alpha 3
- d) Beta 1
- e) Beta 2

**Answer:** c) Alpha 3

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**Q2.** The MHC II and invariant (Ii) chain are synthesized in the:

- a) Endoplasmic reticulum
- b) Cytoplasm
- c) Golgi apparatus
- d) Endosome

**Answer:** a) Endoplasmic reticulum

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**Q3.** Regarding processed antigens entering the endoplasmic reticulum and binding to MHC, all are true except:

- a) The antigen is an endogenous antigen
- b) The antigen is a viral antigen
- c) It binds only MHC class I
- d) It can bind both MHC class I and II
- e) It needs a peptide transporter to enter the endoplasmic reticulum

**Answer:** d) It can bind both MHC class I and II

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**Q4.** MHC class II molecules are made up of two chains called \_\_\_\_\_, whose function is to bind peptides and present them to \_\_\_\_\_ T cells.

- a) Alpha and beta, CD4
- b) Alpha and beta2-microglobulin, CD8
- c) Alpha and beta, CD8
- d) Alpha and beta2-microglobulin, CD5
- e) Alpha and beta, gamma-delta T cells

**Answer:** a) Alpha and beta, CD4

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**Q5.** MHC expression is decreased in cells because of infection by:

- a) Virus
- b) Worm
- c) Bacteria
- d) Autoimmunity

e) Aging  
**Answer:** a) Virus

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**Q6.** Viral proteins formed inside an infected cell associate with cells and are presented on the surface by:

- a) Cytokines
- b) MHC class I molecules
- c) MHC class II molecules
- d) Antibody molecules
- e) Complement

**Answer:** b) MHC class I molecules

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**Q7.** Expression of MHC genes is:

- a) Codominant
- b) Dominant for maternal genes
- c) Dominant for paternal genes
- d) Dependent on thymic selection
- e) Totally dependent on T cells

**Answer:** a) Codominant

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**Q8.** The paracortical area of the lymph node mainly comprises:

- a) Follicular dendritic cells
- b) Plasma cells
- c) Neutrophils
- d) B cells
- e) T cells

**Answer:** e) T cells

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**Q9.** The main costimulatory molecule for T-cell activation is provided by:

- a) CD28
- b) Surface Ig
- c) B7
- d) VLA-4
- e) IL-2

**Answer:** a) CD28

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**Q10.** Proliferation of activated T cells:

- a) Is stimulated by a single signal induced by engagement of the T-cell receptor with antigen-MHC
- b) Requires both the signal induced by engagement of TCR and costimulation from B7

- c) Requires interaction between LFA-1 and CTLA-4
- d) Requires mutual binding of LFA-3 and CD2 on the antigen-presenting cell and T-cell, respectively
- e) Cannot be stopped

**Answer:** b) Requires both the signal induced by engagement of TCR and costimulation from B7

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**Q11.** Deletions in the T-cell CD154 (CD40L) gene result in:

- a) Congenital X-linked agammaglobulinemia
- b) IgA deficiency
- c) Deficiency in cytotoxic T-cell activity
- d) Hyper-IgM syndrome
- e) Wiskott-Aldrich syndrome

**Answer:** d) Hyper-IgM syndrome

**NOVA**

**Q1.** When a resting naïve T-cell engages its specific MHC/peptide complex displayed on the surface of a dendritic cell, it first:

- a) Undergoes blast cell formation
- b) Produces IL-2
- c) Undergoes cell death
- d) Differentiates into effector cells
- e) Secretes IL-1

**Answer:** a) Undergoes blast cell formation

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**Q2.** One principal function of the Class I and Class II major histocompatibility complex proteins is to:

- a) Transduce the signal to the T-cell interior following antigen binding
- b) Mediate immunoglobulin class switching
- c) Present antigen for recognition by the T-cell antigen receptor
- d) Stimulate production of interleukins
- e) Bind complement C3d

**Answer:** c) Present antigen for recognition by the T-cell antigen receptor

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**Q3.** T-cell antigen receptors are distinguished from antibodies by:

- a) T-cell receptors are glycosylated
- b) T-cell receptors must interact with antigen uniquely presented by other cells but not with free antigen
- c) T-cell receptors bind various cytokines
- d) T-cell receptors bind complement to lyse cells
- e) T-cell receptors are mediators of allergic reactions

**Answer:** b) T-cell receptors must interact with antigen uniquely presented by other cells but not with free antigen

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**Q4.** The T-cell ligand CD28 binds which of the following on a B cell:

- a) B7
- b) CD2
- c) CD40
- d) CD40L
- e) LFA-3

**Answer:** a) B7

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**Q5.** Which T-helper cells are responsible for chemotaxis of neutrophils and macrophages?

- a) Th1 + CD8
- b) Th2 + CD4
- c) Th17 + CD4



d) Treg + CD4

**Answer:** c) Th17 + CD4

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**Q6.** Which type of T-helper cell is involved in stimulating eosinophils?

a) CD4-Th1

b) CD4-Th2

c) CD4-Th17

d) CD8-Th1

e) CD8-Th2

**Answer:** b) CD4-Th2

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**Q7.** All of the following are true about Th1 cells except:

a) Activation of neutrophils

b) Activation of NK cells directly through INF-gamma

c) Activation of CD8 T cells

d) Activation of B cells to secrete IgE

**Answer:** d) Activation of B cells to secrete IgE

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**Q8.** Binding of which PRR on a macrophage helps in cytokine production?

a) Toll-like receptors

b) Complement receptors

c) Fc receptors

d) Scavenger receptors

e) Opsonin receptors

**Answer:** a) Toll-like receptors

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**Q9.** Which of the following receptors is NOT considered a PRR?

a) Scavenger

b) C3b

c) MBL

d) Fc receptor

e) Toll-like receptor

**Answer:** c) MBL

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**Q10.** CTLA-4 receptor is:

a) An inhibitory receptor on naïve T cells

b) An inhibitory receptor on active T cells

c) Binds CD28 on APC

d) An inhibitory receptor on macrophages

e) Expressed on naïve T cells

**Answer:** b) An inhibitory receptor on active T cells

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**Q11.** The T-cell receptor:

a) Is composed of five polypeptide chains

b) Is secreted into the plasma by the T cell

c) Is the recognition element of the humoral arm of the immune system

d) Recognizes antigen fragments via the alpha and beta chain

e) The signaling element is CD4

**Answer:** d) Recognizes antigen fragments via the alpha and beta chain

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**Q12.** Which characteristic is common to both T-cell receptors and immunoglobulins?

a) The antigen receptors are composed of two identical heavy chains and two identical light chains

b) Receptor editing for both occurs in bone marrow

c) Their production occurs in bone marrow

d) Somatic recombination of V, D, and J segments is responsible for the diversity of the antigen-binding site

e) Somatic hypermutation changes the affinity of antigen-binding sites in both and contributes to further diversification

**Answer:** d) Somatic recombination of V, D, and J segments is responsible for the diversity of the antigen-binding site

**NOVA**