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Immunology: Immune Responses & Vaccines

Printable Flashcards — Pre-Med Biology

Innate vs adaptive immunity, B and T cells, antibodies, vaccines, and lymphoid organ functions.

160 cards — Print double-sided, flip on long edge, then cut along dashed lines.

160 cards — Printable Flashcards

Free & Open-Source

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1

Immunology in one line: what's the immune system trying to do?

2

Pathogen means...

3

Antigen means...

4

Antibody means...

5

Antigen vs antibody (say it in 5 words so you stop mixing them):

6

Epitope is... (basic idea)

7

Innate vs adaptive immunity: what's the core difference?

8

Innate immunity is like...

2

A disease-causing organism
(virus, bacteria, fungi, parasite).

1

Spot threats and remove them
without wrecking your own tissues.

4

A protein made by B cells
that binds a specific antigen.

3

A molecule the immune system
can recognize as a target.

6

The specific part of an antigen
that an antibody/receptor binds.

5

Antigen = target. Antibody = binder.

8

Security guards: immediate
response, same rules for everyone.

7

Innate = fast, general. Adaptive =
slower at first, specific, with memory.

9

Adaptive immunity is like...

10

Which immunity has memory (classic exam answer)?

11

Do innate and adaptive immunity work separately?

12

What is inflammation trying to do (big idea)?

13

The 4 classic signs of inflammation (high-school level):

14

Fever is usually... helpful or harmful? (basic)

15

Immunity can be active or passive. What's active immunity?

16

What's passive immunity?

10

Adaptive immunity.

9

A detective + sniper: takes time to identify, then hits very specifically, and remembers.

12

Bring immune cells and fluid to a problem area and isolate the threat.

11

No, they work as a team.

14

Usually helpful (within reason).

13

Redness, heat, swelling, pain.

16

You receive antibodies from someone else (no memory made).

15

You make your own antibodies and memory cells.

17

Natural vs artificial immunity: what's natural active?

18

Natural passive vs artificial passive: give one of each.

19

First line of defense (before any white blood cell shows up):

20

Skin is a good barrier because... (pick the big reason)

21

Mucus + cilia in airways: what's the point?

22

Stomach acid mainly defends by...

23

Innate immunity recognizes pathogens using... (big idea)

24

Phagocytosis means...

18

Natural passive: antibodies from mother. Artificial passive: injected antibodies (immunoglobulin).

17

Getting infected and recovering (your immune system learns).

20

It's a tough physical wall.

19

Physical and chemical barriers (skin, mucus, stomach acid, etc.).

22

Killing microbes you swallow (low pH).

21

Trap particles/pathogens and move them out.

24

Cells 'eat' and digest microbes/particles.

23

General patterns common to microbes (not specific to one strain).

25

Neutrophils are best described as...

26

Macrophages are best described as...

27

Dendritic cells are famous for what job?

28

Natural killer (NK) cells: innate or adaptive?

29

NK cells mainly kill...

30

Complement system (basic idea): what does it do?

31

Opsonization means...

32

Interferons (basic idea): what do they signal?

26

Big phagocytes that also signal to other immune cells.

25

Fast first responders that phagocytose bacteria.

28

Innate.

27

Bridging innate to adaptive by presenting antigen to T cells.

30

Helps tag microbes, attract immune cells, and sometimes punch holes in pathogens.

29

Virus-infected cells and some tumor cells.

32

Warn nearby cells about viral infection and ramp up defenses.

31

Tagging a pathogen to make it easier for phagocytes to eat.

33

Innate immunity response time is usually...

34

Adaptive immunity has two main arms. Name them.

35

Humoral immunity is mainly about...

36

Cell-mediated immunity is mainly about...

37

Adaptive immunity is 'specific'. Specific to what?

38

Clonal selection (basic idea):

39

Why does the first exposure take time?

40

Memory cells are...

34

Humoral (B cells/antibodies) and cell-mediated (T cells).

33

Minutes to hours.

36

T cells attacking infected cells and coordinating responses.

35

B cells making antibodies.

38

Only the B/T cells that recognize the antigen get activated and multiply.

37

Specific to a particular antigen/epitope.

40

Long-lived B or T cells that respond faster next time.

39

Because the right B/T cells are rare and need time to multiply and differentiate.

41

B cells' main job (exam version)?

42

Plasma cell is basically...

43

Do B cells make antibodies by themselves, or do plasma cells do it?

44

Antibodies mainly fight pathogens that are...

45

Antibodies help by doing what 3 big things?

46

Neutralization means...

47

Agglutination means...

48

Antibody structure in one sentence (no chemistry):

42

A B cell turned into an antibody-producing machine.

41

Make antibodies (via plasma cells) and create memory B cells.

44

Outside cells (extracellular).

43

Plasma cells do most of the antibody secretion.

46

Antibody blocks the pathogen/toxin from binding to cells.

45

Neutralize, opsonize, and activate complement (also agglutinate).

48

Y-shaped protein with variable tips that bind antigen.

47

Antibodies clump pathogens together.

49

Variable region of an antibody does what?

50

Constant region of an antibody is mainly for...

51

Common trap: do antibodies kill pathogens directly?

52

IgM vs IgG (high-yield, basic): which shows up first in a primary response?

53

Secondary immune response: which antibody is usually dominant?

54

T cells are mainly for...

55

Helper T cells (CD4) do what (in plain English)?

56

Cytotoxic T cells (CD8) do what?

50

Interacting with immune cells and complement (the 'call backup' part).

49

Binds the antigen (specificity).

52

IgM first.

51

Not usually. They block and tag so other systems clear the pathogen.

54

Cell-mediated immunity: helping coordinate responses and killing infected cells.

53

IgG (faster and stronger).

56

Kill infected cells (especially virus-infected cells).

55

They coordinate the immune response (activate B cells and other immune cells).

57

Trap check: which T cell actually kills infected cells?

58

Regulatory T cells (Treg) are mainly about...

59

Cytokines are basically...

60

Common trap: do T cells make antibodies?

61

T cells usually need antigen presented to them. Who presents it?

62

MHC (major histocompatibility complex) is basically...

63

Very basic MHC rule: MHC I is on...

64

Very basic MHC rule: MHC II is on...

58

Stopping the immune system from overreacting / attacking self.

57

Cytotoxic T cells (CD8), not helper T cells.

60

No.

59

Chemical messages between immune cells.

62

A display platform on cells that shows antigen pieces to T cells.

61

Antigen-presenting cells (like dendritic cells, macrophages, B cells).

64

Professional antigen-presenting cells (APCs).

63

Most nucleated body cells.

65

If a virus infects a body cell, which immune cell is built to kill that infected cell?

66

Vaccine goal in one line:

67

Vaccine is active or passive immunity?

68

Trap check: antibiotics vs vaccines - same thing?

69

Another trap: vaccines 'cure' an infection you already have. True or false?

70

Live attenuated vaccine means...

71

Inactivated (killed) vaccine means...

72

Subunit vaccine means...

66

Train adaptive immunity so the second response is fast and strong.

65

Cytotoxic T cell (and NK cells early).

68

No. Antibiotics treat bacteria; vaccines train immunity before exposure.

67

Active immunity.

70

Weakened pathogen that can still replicate a bit.

69

Usually false.

72

Only part of the pathogen (antigen) is used.

71

Pathogen is dead; can't replicate.

73

Toxoid vaccine means...

74

mRNA vaccine (very basic idea):

75

Booster shot is basically...

76

Herd immunity (basic):

77

Why do vaccines reduce severe disease even if infection can still happen?

78

Passive immunization example (medical):

79

Maternal immunity: which type is it?

80

Primary immune response means...

74

Gives cells instructions to make an antigen so the immune system can learn it.

73

Inactivated toxin from a pathogen (train immunity against the toxin).

76

If enough people are immune, the pathogen spreads less, protecting vulnerable people too.

75

A reminder exposure to push a strong secondary immune response.

78

Giving pre-made antibodies (immunoglobulin) after exposure.

77

Because memory responses control the pathogen faster before it causes major damage.

80

Your first exposure to an antigen (slow start, smaller response).

79

Passive immunity.

81

Secondary immune response means...

82

Primary vs secondary: which one has a shorter lag time?

83

Primary vs secondary: which one produces MORE antibodies?

84

Primary response: what cell type is being created that matters for the future?

85

What does 'antibody titer' mean (basic)?

86

Graph trap: a higher antibody titer in secondary response means...

87

Why do symptoms often feel milder on reinfection after vaccination?

88

If you mix up 'innate' and 'adaptive', use this: which one needs time to learn?

82

Secondary.

81

Re-exposure to the same antigen (faster, stronger response).

84

Memory B and T cells.

83

Secondary.

86

Faster neutralization and better protection.

85

How much antibody is in the blood.

88

Adaptive.

87

Because the immune system controls the pathogen earlier (before it multiplies a lot).

89

If you mix up B and T: which one makes antibodies?

90

If you mix up helper vs cytotoxic T: which one coordinates?

91

If you mix up NK vs cytotoxic T: which one is innate?

92

Common trap: vaccines are the same as getting sick. True or false?

93

Common trap: 'antigens are produced by antibodies'. True or false?

94

Allergy (basic): what's happening?

95

Autoimmune disease (basic idea):

96

Immunodeficiency means...

90

Helper T (CD4).

89

B cells (via plasma cells).

92

False.

91

NK cells are innate.

94

Immune system overreacts to a harmless antigen (like pollen).

93

False.

96

Weakened immune response (more infections).

95

Immune system attacks self tissues.

97

Fast, non-specific immunity is called:

98

Specific immunity with memory is called:

99

Cell that turns into an antibody-secreting factory:

100

Immune cells that make antibodies (in general):

101

Immune cells that kill infected cells directly (adaptive):

102

Immune cells that coordinate immune response (adaptive):

103

Innate killer cell that targets virus-infected/tumor cells:

104

A vaccine mainly creates immune...

98

Adaptive immunity

97

Innate immunity

100

B cells

99

Plasma cell

102

Helper T cells

101

Cytotoxic T cells

104

Memory

103

Natural killer (NK) cell

105

First exposure response is called the... response.

106

Second exposure response is called the... response.

107

{{c1::Innate}} immunity is fast and general; {{c2::adaptive}} immunity is specific and has memory.

108

B cells -> {{c1::plasma cells}} -> {{c2::antibodies}}.

109

Helper T cells ({{c1::CD4}}) coordinate; cytotoxic T cells ({{c2::CD8}}) kill infected cells.

110

Vaccines produce {{c1::active}} immunity by creating {{c2::memory}} cells.

111

Secondary immune response is {{c1::faster}} and {{c2::stronger}} than primary response.

112

Mini boss: a virus is inside your cells. Which arm of immunity is crucial?

106

Secondary

105

Primary

108

B cells -> plasma cells -> antibodies.

107

Innate immunity is fast and general; adaptive immunity is specific and has memory.

110

Vaccines produce active immunity by creating memory cells.

109

Helper T cells (CD4) coordinate; cytotoxic T cells (CD8) kill infected cells.

112

Cell-mediated immunity (T cells).

111

Secondary immune response is faster and stronger than primary response.

113

Mini boss: bacteria are floating in blood. Which arm is super useful?

114

Mini boss: why is the secondary response usually faster?

115

Mini boss: why can passive immunity protect immediately but not last long?

116

Mini boss: a question says 'immune response is the same every time, no improvement'. Which system fits?

117

Mini boss: why do vaccines often need boosters?

118

Mini boss: someone says 'I took antibiotics so I'm immune now'. What's wrong?

119

Innate immunity example (pick one):

120

Adaptive immunity example (pick one):

114

Memory cells are already there,
so clonal expansion is quicker.

113

Humoral immunity (antibodies).

116

Innate immunity.

115

You get ready-made antibodies
but you don't form memory cells.

118

Antibiotics don't create immune memory.
They just kill bacteria (and not viruses).

117

To raise antibody levels again and
strengthen memory (secondary response).

120

Antibodies, memory B cells, cytotoxic T cells.

119

Skin barrier, inflammation,
phagocytosis, complement.

121

Trap wording: 'Antibodies are part of innate immunity.' True or false?

122

Trap wording: 'Inflammation is only caused by infection.' True or false?

123

Trap wording: 'Fever is always bad and should be eliminated.' True or false (basic)?

124

If you see 'antigen presentation', you should think about...

125

Where do B cells mature (basic)?

126

Where do T cells mature (basic)?

127

Thymus vs thyroid: don't mix them. Thymus is for...

128

Lymph nodes: what's their job in one line?

122

False.

121

False.

124

T cells needing antigen displayed (APCs + MHC).

123

False.

126

Thymus.

125

Bone marrow.

128

Filter lymph and help activate immune responses.

127

T cell maturation (immune).

129

Spleen: what's the big job?

130

Tonsils are basically...

131

Lymph is basically...

132

Mast cells are known for releasing...

133

Histamine mainly causes what local effects?

134

Eosinophils are most associated with fighting...

135

Basophils (basic): often involved in...

136

Allergic reaction (basic) often involves which antibody class?

130

Lymph tissue guarding the entry to the respiratory/digestive tract.

129

Filters blood (catches pathogens/old RBCs).

132

Histamine.

131

Tissue fluid that gets collected and returned to the blood (with immune cells in it).

134

Parasites (and also allergy/asthma stuff).

133

Vasodilation and increased vessel permeability (redness + swelling).

136

IgE.

135

Allergic/inflammatory responses (histamine-related).

137

IgA is mainly about...

138

IgG is famous for... (one high-yield fact)

139

If a question says 'first antibody made in a new infection', think...

140

B cell receptors/antibodies can bind...

141

T cell receptors bind...

142

If a question says 'requires antigen presentation', you're almost always in...

143

Primary response: why is there a 'lag phase'?

144

Secondary response is stronger partly because...

138

Long-term protection and crossing the placenta to the fetus.

137

Mucosal protection (saliva, tears, gut, etc.).

140

Free antigen in fluids.

139

IgM.

142

T cell territory.

141

Antigen fragments presented on MHC (not free antigen).

144

Memory cells are more numerous than the original rare naive cells.

143

Time needed for clonal selection and clonal expansion.

145

Secondary response antibodies are often higher 'quality' (bind better). Why?

146

Trap: 'Vaccines contain antibodies.' True or false?

147

Passive antibody shot vs vaccine: what's the key difference?

148

Trap: 'A vaccine is always a weakened live pathogen.' True or false?

149

Why can vaccine side effects happen even if the vaccine can't cause the disease?

150

Adjuvant (basic): why is it added to some vaccines?

151

Student says: 'Innate immunity makes antibodies.' Fix it.

152

Student says: 'T cells are just for making antibodies.' Fix it.

146

False (most vaccines contain antigens, not antibodies).

145

The system has had time to improve antibody affinity (basic idea).

148

False.

147

Antibody shot = immediate but no memory.
Vaccine = slower but makes memory.

150

To boost the immune response to the antigen.

149

Because immune activation causes inflammation symptoms (fever, soreness).

152

Wrong cell. T cells coordinate/kill infected cells; B cells make antibodies.

151

Nope. Antibodies are adaptive (B cells). Innate uses barriers, phagocytes, complement.

153

Student says: 'Secondary response is slower because the immune system is tired.' Fix it.

154

Student says: 'If I'm vaccinated I can never get infected.' Fix it (pre-med level).

155

B cells mature in the:

156

T cells mature in the:

157

Organ that filters blood for pathogens:

158

Lymph nodes filter {{c1::lymph}}; the spleen filters {{c2::blood}}.

159

B cells bind {{c1::free antigen}}; T cells bind antigen on {{c2::MHC}}.

160

Passive immunity = {{c1::no memory}} (fast but temporary).

154

Vaccines reduce risk and severity; some infections can still happen but are controlled faster.

153

Opposite. Secondary response is faster because memory cells already exist.

156

Thymus

155

Bone marrow

158

Lymph nodes filter lymph; the spleen filters blood.

157

Spleen

160

Passive immunity = no memory (fast but temporary).

159

B cells bind free antigen; T cells bind antigen on MHC.