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Microbiology: Viruses

Printable Flashcards — Pre-Med Biology

Viral structure, replication cycles, lytic vs lysogenic pathways, and key virus concepts for pre-med exams.

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150 cards — Printable Flashcards

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1

Minimum definition of a virus (no fluff)?

2

Are viruses considered living organisms? (pre-med style answer)

3

Do viruses have ribosomes?

4

Do antibiotics kill viruses?

5

Virus vs bacterium: what's the cleanest difference?

6

What are the 2 pieces every virus must have?

7

What's a capsid?

8

What does "nucleocapsid" mean?



2

Usually no: they don't have their own metabolism and can't reproduce without a host cell.

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1

Genetic material (DNA or RNA) inside a protein coat, and it needs a host cell to replicate.

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4

No.

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3

No.

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6

A genome (DNA or RNA) and a capsid (protein coat).

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5

Bacteria are cells that reproduce on their own; viruses are not cells and must infect a host to replicate.

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8

Genome + capsid together.

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7

The protein shell that protects the viral genome.

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9

Envelope: what is it made of?

10

Enveloped vs non-enveloped viruses: which is usually more fragile outside the body?

11

Transmission trap: which type is more likely to spread via surfaces/fecal-oral route?

12

What are "spikes" on a virus?

13

What is viral tropism?

14

Capsid shapes: name the 3 classic categories.

15

What does "icosahedral" mean in viruses?

16

Helical virus capsid: what's the idea?



10

Enveloped viruses are usually more fragile.

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9

A lipid membrane stolen from the host cell (with viral proteins stuck in it).

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12

Viral surface proteins (often glycoproteins) used for attachment/entry into host cells.

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11

Non-enveloped viruses (generally).

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14

Icosahedral, helical, complex.

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13

The preference of a virus for certain cell types, based on receptor binding and host factors.

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16

Capsid proteins wrap around the genome like a spiral/rod.

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15

A roughly spherical capsid built with 20 triangular faces (efficient symmetric design).

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17

What is a 'complex' virus
example you should picture?

18

Do viruses have cytoplasm or organelles?

19

What's the difference between
a virion and a virus (in a cell)?

20

If a virus is enveloped, how
does it usually leave the cell?

21

What is the Baltimore classification
trying to group viruses by?

22

Quick rule: which genome type
can act directly as mRNA?

23

Why can't -ssRNA be translated immediately?

24

Big trap: do host cells have RNA-dependent
RNA polymerase (RdRP) sitting around?



18

No. They are not cells.

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17

A bacteriophage: head + tail + tail fibers.

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20

By budding (taking a piece of host membrane as its envelope).

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19

Virion = the complete infectious particle outside the cell. Inside the cell it's uncoated and replicating.

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22

+ssRNA.

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21

How they make mRNA.

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24

No (not in the normal way viruses need).

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23

It's complementary to mRNA, so it must be copied into +RNA first.

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25

Which viruses **MUST** carry an RNA-dependent RNA polymerase in the virion?

26

Retrovirus trap: HIV is +ssRNA, so can it be translated immediately like other +RNA viruses?

27

What enzyme makes DNA from RNA in retroviruses?

28

What enzyme inserts viral DNA into the host genome (retroviruses)?

29

What enzyme cuts viral polyproteins into functional proteins in HIV?

30

Do DNA viruses replicate in the nucleus or cytoplasm (general rule)?

31

Exception check: name a DNA virus group that replicates in the cytoplasm.

32

Do most RNA viruses replicate in the nucleus or cytoplasm (general rule)?



26

Not as its main strategy. It first reverse-transcribes into DNA and integrates.

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25

-ssRNA viruses and dsRNA viruses.

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28

Integrase.

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27

Reverse transcriptase.

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30

Nucleus.

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29

Protease.

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32

Cytoplasm.

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31

Poxviruses.

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33

Famous exception: which RNA virus does key replication steps in the nucleus?

34

RNA viruses mutate faster than DNA viruses: why?

35

Why do some viruses have segmented genomes (like influenza)?

36

Antigenic drift vs shift: which is small mutation over time and which is big reassortment jump?

37

+ssRNA can serve as $\{\{c1::mRNA\}\}$; -ssRNA must be copied into $\{\{c2::+RNA\}\}$ first.

38

-ssRNA and dsRNA viruses must package an $\{\{c1::RNA\}$ -dependent RNA polymerase $\}\}$ in the virion.

39

dsDNA viruses make mRNA using what enzyme (often)?

40

Why are DNA viruses more likely to use host enzymes than RNA viruses?



34

RNA polymerases (including reverse transcriptase) are error-prone and usually lack proofreading.

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33

Influenza.

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36

Drift = gradual mutations. Shift = sudden reassortment (segmented genomes).

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35

Segments can reassort if two strains infect the same cell, creating new combinations quickly.

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38

-ssRNA and dsRNA viruses must package an RNA-dependent RNA polymerase in the virion.

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37

+ssRNA can serve as mRNA; -ssRNA must be copied into +RNA first.

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40

Because cells already have DNA-dependent DNA polymerase and DNA-dependent RNA polymerase machinery (especially in nucleus).

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39

Host RNA polymerase (in the nucleus), or a viral one if they carry it.

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41

The basic viral replication steps (5 words)?

42

What does 'uncoating' mean?

43

Two common entry methods for animal viruses?

44

Why is receptor binding a big deal for infection?

45

What is the 'eclipse period' in viral growth?

46

Lysis vs budding: what's the difference?

47

Where do enveloped viruses get their envelope?

48

What does 'latent infection' mean in animal viruses?



42

Removing the capsid so the genome becomes available for replication/transcription.

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41

Attach -> enter -> uncoat -> replicate/assemble -> release.

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44

No receptor match = no entry = no infection.

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43

Fusion (often enveloped viruses) or endocytosis.

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46

Lysis bursts the cell to release virions; budding releases virions wrapped in membrane (envelope) without immediate cell rupture.

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45

Time after infection when no infectious virions are detectable because the virus is uncoated and replicating/assembling.

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48

The viral genome persists in the cell with little/no virus production, then can reactivate later.

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47

From host membranes during budding (plasma membrane or internal membranes).

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49

Why do some viruses kill cells, while others don't immediately?

50

If a virus is non-enveloped, how does it often leave the cell?

51

General pipeline: `{{c1::attachment}}` -
> `{{c2::entry}}` -> `{{c3::uncoating}}` -
> `{{c4::assembly}}` -> `{{c5::release}}`.

52

Bacteriophage: what does it infect?

53

Classic bacteriophage structure parts?

54

How does a phage 'enter' a bacterium?

55

Lytic cycle: what's the result for the bacterium?

56

Lysogenic cycle: what's the big idea?



50

By lysis (bursting the cell).

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49

Depends on how they exit and how much they disrupt host functions (lysis is destructive; budding can be less immediately lethal).

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52

Bacteria.

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51

General pipeline: attachment -> entry -> uncoating -> assembly -> release.

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54

It injects its genome through the bacterial cell wall/membrane; the capsid stays outside.

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53

Head (capsid), tail, base plate, tail fibers.

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56

Phage DNA integrates into the bacterial genome as a prophage and replicates with the host without killing it (until induced).

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55

The cell is lysed (killed) to release new phages.

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57

What's a prophage?

58

Induction: what triggers a prophage to enter lytic cycle (concept)?

59

Lysogenic conversion: what does it mean?

60

Transduction: what is it?

61

Generalized transduction happens during which phage cycle?

62

Specialized transduction happens during which phage cycle?

63

Generalized vs specialized transduction: what's the key difference?

64

Transduction uses a `{{c1::bacteriophage}}` to move DNA between bacteria.



58

Stress/DNA damage signals can trigger the prophage to excise and go lytic.

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57

Phage DNA integrated into the bacterial chromosome (lysogenic state).

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60

Gene transfer between bacteria using a bacteriophage.

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59

A prophage gives the bacterium new traits (often toxins) because phage genes are expressed.

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62

Lysogenic cycle (during improper excision of a prophage).

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61

Lytic cycle.

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64

Transduction uses a bacteriophage to move DNA between bacteria.

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63

Generalized = random bacterial genes. Specialized = only genes near the prophage insertion site.

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65

Generalized transduction = {{c1::random}}
bacterial DNA; specialized transduction
= DNA {{c2::near the prophage site}}.

66

If you see 'temperate phage' in a
question, what does that imply?

67

Virulent phage: what does it do (definition)?

68

HIV is what type of virus (genome + envelope)?

69

HIV has DNA or RNA as its genome in the virion?

70

HIV carries two copies of its
genome. What's the term for that?

71

HIV envelope proteins to know (high-yield)?

72

What host receptor does HIV gp120 bind first?



66

It can do lysogeny (it can integrate).

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65

Generalized transduction = random bacterial DNA; specialized transduction = DNA near the prophage site.

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68

An enveloped retrovirus with +ssRNA.

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67

Only lytic cycle (infects, replicates, lyses the bacterium).

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70

Diploid (two RNA copies).

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69

RNA (two copies of +ssRNA).

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72

CD4.

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71

gp120 (binds receptors) and gp41 (fusion).

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73

Why is HIV called a 'retro'virus?

74

HIV targets which immune cell type most famously?

75

HIV transmission: name the big routes pre-med expects.

76

HIV is NOT spread by which everyday actions?

77

HIV transmission trap: is saliva a major route?

78

HIV replication step order (big picture)?

79

In HIV, which step creates the DNA form of the virus?

80

In HIV, what is a provirus?



74

CD4⁺ T helper cells (also can infect macrophages and dendritic cells).

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73

Because it goes RNA -> DNA (reverse transcription), opposite of the usual DNA -> RNA.

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76

Casual contact like hugging, sharing food, coughing/sneezing, or mosquito bites.

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75

Sexual contact, blood exposure (needles/transfusions), and mother-to-child (pregnancy, birth, breastfeeding).

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78

Bind CD4/co-receptor -> fusion/entry -> reverse transcription -> integration -> transcription/translation -> assembly -> budding -> maturation.

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77

No, not in normal circumstances.

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80

The integrated viral DNA inside the host chromosome.

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79

Reverse transcription (RNA -> DNA).

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81

Why is HIV hard to eradicate from the body (concept)?

82

Which host enzyme makes HIV mRNA after integration?

83

Why does HIV mutate so fast?

84

HIV assembly: why does it make huge polyproteins?

85

Maturation in HIV happens mainly when?

86

HIV envelope: where does it come from?

87

Which HIV enzyme is needed to make HIV DNA in the first place?

88

Which HIV enzyme is needed to insert HIV DNA into host DNA?



82

Host RNA polymerase II.

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81

Because it integrates into host DNA and can stay latent as a provirus.

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84

It's efficient: one long polyprotein gets cut by protease into many functional proteins during maturation.

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83

Reverse transcriptase is error-prone (poor proofreading).

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86

Host cell membrane during budding.

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85

After budding, when protease cleaves polyproteins to form the mature capsid and enzymes.

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88

Integrase.

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87

Reverse transcriptase.

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89

Which HIV enzyme is needed to make new virions infectious after they bud?

90

HIV is a `{{c1::retrovirus}}`: its RNA is copied into `{{c2::DNA}}` by `{{c3::reverse transcriptase}}`, then inserted by `{{c4::integrase}}`.

91

General rule of thumb: `{{c1::enveloped}}` viruses are more sensitive to soap/drying than `{{c2::non-enveloped}}` viruses.

92

Virus genomes can be DNA or RNA. Can they be double-stranded or single-stranded?

93

What is the key enzyme name for RNA virus replication?

94

Do +ssRNA viruses always need to bring RdRP inside the virion?

95

What is an RNA-dependent DNA polymerase?

96

What is a DNA-dependent RNA polymerase?



90

HIV is a retrovirus: its RNA is copied into DNA by reverse transcriptase, then inserted by integrase.

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89

Protease.

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92

Yes to both (ssDNA, dsDNA, ssRNA, dsRNA).

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91

General rule of thumb: enveloped viruses are more sensitive to soap/drying than non-enveloped viruses.

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94

Not necessarily. Many can translate RdRP first (because +RNA is already mRNA).

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93

RNA-dependent RNA polymerase (RdRP).

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96

The enzyme that transcribes DNA into RNA (like host RNA polymerase).

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95

Reverse transcriptase.

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97

What is a DNA-dependent DNA polymerase?

98

If a virus is -ssRNA, what **MUST** happen before translation?

99

If a virus is dsRNA, why does it need RdRP immediately?

100

Common trap: do viruses replicate by 'binary fission'?

101

If a bacterium gains a toxin gene because of a prophage, what is that called?

102

Transduction vs conjugation: what's the difference?

103

Transduction vs transformation: what's the difference?

104

Bacteriophage lytic cycle in one line?



98

It must make +ssRNA (mRNA) first.

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97

The enzyme that replicates DNA from a DNA template.

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100

No.

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99

Because the cell can't directly translate dsRNA; it must produce +RNA mRNA strands.

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102

Transduction uses a phage; conjugation uses direct cell-to-cell contact (pilus).

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101

Lysogenic conversion.

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104

Attach -> inject genome -> make viral parts -> assemble -> lyse cell.

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103

Transduction uses a phage; transformation is uptake of naked DNA from the environment.

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105

Lysogenic cycle in one line?

106

A `{{c1::prophage}}` is integrated phage DNA in a bacterium; a `{{c2::provirus}}` is integrated viral DNA in a eukaryotic host (like HIV).

107

HIV spreads most efficiently through which body fluids (high-yield list)?

108

Why is HIV not typically spread through casual touch or sharing objects?

109

Mother-to-child transmission can happen when?

110

Generalized transduction: why is it called 'generalized'?

111

Specialized transduction: why is it called 'specialized'?

112

What has to happen first for specialized transduction to even be possible?



106

A prophage is integrated phage DNA in a bacterium; a provirus is integrated viral DNA in a eukaryotic host (like HIV).

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105

Phage genome integrates (prophage) and copies with the bacterium until induction triggers lytic mode.

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108

Because it doesn't survive well outside the body and casual contact doesn't provide the right fluid/entry route.

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107

Blood, semen, vaginal/rectal fluids, and breast milk.

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110

Because basically any bacterial gene can be transferred (random packaging error).

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109

During pregnancy, delivery, or breastfeeding.

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112

The phage must integrate into the bacterial genome (lysogeny).

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111

Because only specific bacterial genes near the prophage insertion site get transferred.

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113

Genome trap: can a virus have both DNA and RNA at the same time as its genome?

114

Do all viruses have an envelope?

115

Do all viruses have spikes?

116

Why is a capsid useful besides protection?

117

If a virus is enveloped, what's one practical consequence for disinfection?

118

Non-enveloped viruses are harder to kill outside the body because...

119

What does 'capsomere' mean?

120

HIV capsid protein name (common marker) to know?



114

No.

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113

No. Viral genomes are either DNA or RNA (not both).

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116

It helps deliver the genome into the right host cell (attachment/entry roles).

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115

No, but many do (especially enveloped viruses).

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118

Their outer layer is a tough protein capsid, not a fragile lipid membrane.

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117

Soap/alcohol can disrupt the envelope and inactivate it (often).

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120

p24.

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119

A protein subunit that makes up the capsid.

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121

HIV genome is RNA, but after infection the key long-term form is...

122

HIV entry: what two things must gp120 bind (high-yield)?

123

After HIV binds, how does it actually enter the cell?

124

What is the main reason HIV kills CD4⁺ T cells over time (big idea)?

125

AIDS is defined by what kind of problem?

126

HIV is enveloped. What does that suggest about its survival on dry surfaces?

127

If a virus genome is dsDNA, what is the most direct route to make viral mRNA?

128

If a virus genome is +ssRNA, what's the first thing it can do after uncoating?



122

CD4 plus a co-receptor (often CCR5 or CXCR4).

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121

Integrated DNA (provirus).

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124

Ongoing infection + immune activation can destroy infected cells and weaken immune function as CD4 levels drop.

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123

Fusion of viral envelope with the host membrane (mediated by gp41).

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126

It generally doesn't survive well on dry surfaces compared to non-enveloped viruses.

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125

Severe immunodeficiency due to loss of CD4⁺ T cell function, leading to opportunistic infections/cancers.

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128

Be translated by host ribosomes to make viral proteins (including RdRP).

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127

Transcription by a DNA-dependent RNA polymerase (often host RNA pol in nucleus).

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129

If a virus genome is -ssRNA, what's the first enzyme activity it needs after entry?

130

If a virus genome is dsRNA, why is it a problem for the host? (concept)

131

Why do retroviruses integrate into host DNA at all?

132

Key difference: prophage vs provirus (short)?

133

Lysogenic vs latent: why can these terms confuse people?

134

If a question says 'virus integrates and stays quiet, then later reactivates,' what's the core concept?

135

Why are bacteriophages important for bacterial evolution?

136

Classic trap: bacteriophages are 'bacteria with tails': true or false?



130

dsRNA is a strong 'viral alarm' signal for innate immunity.

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129

RdRP to make +RNA (mRNA).

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132

Prophage = integrated phage DNA in bacteria. Provirus = integrated viral DNA in eukaryotic host (retrovirus).

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131

Integration makes viral gene expression stable and lets the virus persist long-term in dividing cells.

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134

Genome persistence + reactivation (latent infection or lysogeny depending on host).

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133

Both mean 'genome is present but not making lots of virions', but lysogenic is for bacteriophages; latent is common for animal viruses.

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136

False. They are viruses, not cells.

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135

They move genes between bacteria (transduction) and can add new traits (lysogenic conversion).

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137

If a bacteriophage is in lysogenic state, does the bacterium immediately die?

138

In lytic growth, what causes the bacterial cell to burst (concept)?

139

Clue check: a virus is destroyed by detergents easily. That suggests it's...

140

Clue check: virus survives stomach acid and spreads fecal-oral. That suggests it's...

141

Clue check: viral genome is -ssRNA. What MUST be in the virion?

142

Clue check: virus integrates into host DNA and can stay silent. That suggests...

143

Clue check: head-tail virus attaches to bacteria and injects genome. That's...

144

Clue check: one viral particle carries reverse transcriptase and integrase. That's...



138

Phage-encoded enzymes can break down the bacterial cell wall, leading to lysis.

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137

No.

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140

Non-enveloped (generally).

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139

Enveloped.

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142

A retrovirus (like HIV) or a temperate phage (depending on host).

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141

RdRP (RNA-dependent RNA polymerase).

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144

A retrovirus (HIV is the famous one).

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143

A bacteriophage.

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145

Clue check: infection makes lots of new viruses quickly and kills the cell. That's a...

146

Clue check: bacteria gains a toxin gene from a phage without any new infection happening. That's...

147

Clue check: bacterial genes transferred by a phage accidentally packaging host DNA. That's...

148

Clue check: bacterial genes transferred because a prophage excised incorrectly and took nearby DNA. That's...

149

Clue check: HIV can't infect a cell because it lacks CD4. What's the concept being tested?

150

Last trap check: 'virus has a cell wall' - true or false?



146

Lysogenic conversion.

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145

Lytic-type infection (lytic cycle).

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148

Specialized transduction.

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147

Generalized transduction.

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150

False.

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149

Tropism (receptor requirement).

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