

1. Which of the following initiates the coagulation cascade *IN VIVO*?

- A. Factor XII
- B. Thrombin
- C. Tissue factor
- D. Factor X
- E. Prekallikrein

2. What does von Willebrand factor do?

- A. Binds platelets to each other
- B. Binds platelets to the subendothelium
- C. Binds platelets to the phospholipid surface
- D. Carries factor VII
- E. Cleaves factor V

3. Which of the following is true?

- A. The extrinsic system is activated first, and then the intrinsic system is turned on later
- B. The intrinsic system is weak and short-lived
- C. The extrinsic system is only important *in vitro*
- D. Factors V and VII are only important *in vitro*

4. Which of the following anti-clotting substances acts on factors V and VIII?

- A. ATIII
- B. Protein C
- C. TFPI
- D. Plasmin
- E. t-PA

5. Which of the following is a cofactor?

- A. XII
- B. X
- C. VIII
- D. VII
- E. II

6. What are the ingredients in a PTT?

- A. Plasma + phospholipid + calcium
- B. Plasma + thromboplastin + calcium
- C. Plasma + phospholipid + thromboplastin
- D. Plasma + thrombin + calcium
- E. Plasma + plasmin + calcium

7. Which test evaluates the extrinsic pathway?

- A. PT (INR)
- B. PTT
- C. TT
- D. Closure time
- E. Bleeding time

8. Which of the following is true regarding the bleeding time?

- A. It is a highly reliable and reproducible test
- B. The sample is evaluated using an optical densitometer
- C. It evaluates platelet function *in vivo*
- D. It is a commonly ordered test
- E. It evaluates the coagulation system

9. What is the most common inherited bleeding disorder?

- A. von Willebrand's disease
- B. [Hemophilia A](#)
- C. Hemophilia B
- D. [Factor V Leiden](#)
- E. TTP

10. Which disorders may show “factor-type” bleeding?

- A. von Willebrand's disease
- B. Hemophilia A
- C. Both
- D. Neither

11. Patients with which of the following diseases may have a normal PTT?

- A. von Willebrand's disease
- B. Hemophilia A
- C. Hemophilia B
- D. Factor V Leiden

12. TTP:

- A. May present with CNS deficits
- B. Is caused by a toxin produced by E. coli
- C. Is treated supportively
- D. Does not show a microangiopathic blood picture

Answers: 1. C, 2. B, 3. A, 4. B, 5. C, 6. A, 7. A, 8. C, 9. A, 10. C, 11. A,D 12. A

13.The majority of patients complaining of ease of bruising are going to have.

- a. von Willebrand disease
- b. Factor VIII deficiency
- c. Aspirin induced platelet dysfunction
- d. Grackelguber's disease

ANSWER:

The correct answer is: c

14.A twenty-seven year-old woman complains of heavy menstrual periods, ease of bruising and excessive bleeding following a dental procedure. She has a normal platelet count, normal PT, but slightly prolonged aPTT. Of the following, the test that will most likely make the diagnosis is.

- a. Ristocetin cofactor
- b. Factor VII assay
- c. Test for anticardiolipin antibodies
- d. all of the above.

The correct answer is: A

15.People with advanced cystic fibrosis are likely to have a clotting disorder marked by an abnormality of which of the following tests?

- a. PT
- b. aPTT
- c. both
- d. neither

The correct answer is: C

16. Referring to the previous question about people with cystic fibrosis, the reason they have abnormal clotting is:

- a. Because of their chronic hypoxia they are unusually clumsy and therefore injure themselves more frequently.
- b. They have trouble absorbing fats, and by extension fat soluble vitamins.
- c. Their excessive infections make them excessively prone to DIC.
- d. This CF gene is closely linked to the factor VIII gene, and they are more likely to inherit both.

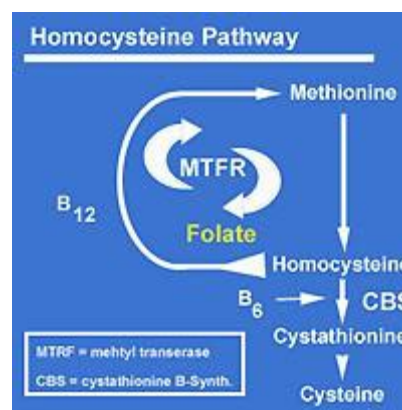
The correct answer is: B

17. When considering underlying possibilities for a bleeding tendency (such as platelets or proteins), one must keep in mind categories of abnormality, such as :

- a. Quantity
- b. Quality
- c. Both
- d. Neither

The correct answer is: C

18. High blood levels of homocysteine are known to increase severity of atherosclerosis and frequency of both arterial and venous thrombosis. The reason is:



- a. Homocysteine promotes the formation of microaggregates of clotting proteins.
- b. Homocysteine is linked to the formation of anticardiolipin antibodies.

- c. Homocysteine causes decreased levels of protein C and S.
- d. This is in fact completely wrong, homocysteine is protective.

The correct answer is: C

19. Features of the antiphospholipid syndrome include all of the following except

- a. A prolonged PT
- b. A prolonged aPTT
- c. High incidence of venous thrombosis
- d. Placental infarction and fetal loss

The correct answer is: A

20. The following picture is of an uncommon complication of Coumadin use. It is known as Coumadin skin necrosis, and occurs because



- a. When injected subcutaneously for the first time, Coumadin can cause a significant vasospasm.
- b. Sometimes crystalline forms of Coumadin can cause platelet aggregation.
- c. This picture is actually an example of post phlebotic syndrome, and is not related to Coumadin at all.
- d. Factor C and S are also vitamin K dependent proteins, and in people heterozygous for C deficiency, the level of factor C drops faster than the II, VII, IX and X.

The correct answer is: D

21. The following picture is of a potential problem seen in people after having had a deep vein thrombosis. It occurs because



- a. The vein in which the thrombus formed will never work the same again.
- b. The doctor probably forgot about the importance of compression stockings.
- c. The patient may have experienced another thrombotic event.
- d. All of the above.

The correct answer is: D

22. Remembering the business about Leiden factor V is important for all the following reasons except

- a. It's an interesting example of a protein once turned on, cannot be turned off.
- b. The mutation occurs only in men.
- c. It's present in 5% of the Caucasian population.
- d. If I don't think about it, I'll never diagnose when it actually comes along.

The correct answer is: b

23. Which of the following is/are true statements?

- a. Arterial thrombi tend to form because of platelet activation or endothelial injury.
- b. Venous thrombi tend to form because of blood stasis and factor activation.
- c. Both
- d. Neither

The correct answer is: c

24. A 24-year-old woman presents with a bleeding history, a normal aPTT and a prolonged PT. The element of interest here is

- a. Her von Willebrand portion of VIII
- b. Her platelet count
- c. This is statistically impossible as she has two X chromosomes.
- d. Her factor VII level


The correct answer is: d

25. Which of the following is/are true statements?

- a. Bruises and petechiae tend to imply platelet problems.
- b. Deep muscle and joint hemorrhages tend to imply clotting factor problems.
- c. Both
- d. Neither.

The correct answer is: c

Blood bank MCQ

 Question

The reactivity of blood group A is confirmed by detecting the presence of which immunodominant sugar molecule?

- A. N-acetyl-D-neuraminic acid
- B. L-fucose
- C. N-acetyl-D-galactosamine
- D. N-acetyl-D-glucosamine
- E. None of the above

Blood Groups 1: ABO Quiz

1-The mating of parents of which two ABO phenotypes can potentially produce offspring with ALL of the common four blood types?

- A. AB and O
- B. AB and A
- C. AB and AB
- D. A and B
- E. AB and B
- F. None of the above

2-The mating of parents of which two ABO phenotypes can potentially produce offspring with ALL of the common four blood types?

- A. AB and O
- B. AB and A
- C. AB and AB
- D. A and B
- E. AB and B
- F. None of the above

3-Bombay phenotype (O_h) individuals may have antibodies with all the following specificities EXCEPT:

- A. Anti-A
- B. Anti-B

- C. Anti-H
- D. Anti-O
- E. Anti-A,B

4-Which cells agglutinate most strongly with *Ulex europaeus* lectin?

- A. A₂ and O
- B. A₁ and A₂
- C. O and AB
- D. B and AB
- E. A₁ and B

5-Immune A and B alloantibodies differ from non-red cell stimulated (naturally occurring) A and B alloantibodies in that the immune antibodies:

- A. Are generally IgG
- B. Are unable to cross the placenta
- C. Can be enhanced in reactivity by incubation at 4C
- D. Cause direct agglutination at room temperature

6-What ABH substances would be found in the saliva of a group B secretor?

- A. H
- B. H and A
- C. H and B
- D. H and O
- E. None

7-The ABO system is the most important blood group system in transfusion safety. Why?

- A. ABO is the only blood group system in which reciprocal antibodies are normally produced for the antigens an individual lacks AND the ABO antibodies are capable of causing rapid, intravascular hemolysis
- B. Reactions with ABO antibodies are the most common cause of transfusion-related death

- C. Regardless of maternal and fetal ABO type, ABO antibodies are implicated in hemolytic disease of the fetus and newborn (HDFN)
- D. Routine ABO forward and reverse grouping is difficult to interpret and fraught with error
- E. All of the above

8- Of the following choices, the most common source of ABO discrepancies is:

- A. Bombay phenotype
- B. An individual who is not a secretor
- C. Clerical errors or a sample mix-up
- D. Use of an uncalibrated centrifuge
- E. Patient with acute myelogenous leukemia (AML)

9-An ABO discrepancy between forward and reverse grouping owing to weak-reacting or missing antibodies could be BEST explained by which of the following:

- A. Subgroups of blood group A
- B. Patients with extreme ages (the very old or the very young)
- C. Acquired B phenomenon
- D. Antibodies to low incidence antigens or diluents present in reagent A or B cells
- E. All of the above

10-A blood donor has the genotype hh, AB . What is his apparent red cell phenotype during routine forward and reverse group typing?

- A. A
- B. B
- C. O
- D. AB
- E. Cannot be determined

11-Approximately what percentage of group A individuals could be further classified as subgroup A_1 ?

- A. 20%
- B. 40%
- C. 60%
- D. 80%
- E. >95%

12-All of the following statements are TRUE regarding the A₂ blood group EXCEPT:

- A. *Dolichos biflorus* lectin generally does not agglutinate A₂ RBCs
- B. *Ulex europaeus* lectin may agglutinate some A₂ RBCs
- C. A₂ RBCs have more A antigen than A₁ RBCs
- D. If anti-A₁ is made, it is usually clinically insignificant
- E. Most A₂ individuals have the same form of anti-B as A₁ individuals
- F. All of the above are true

13-Which of the following genes codes for production of the same basic antigen as the *H* gene?

- A. *O*
- B. *Le*
- C. *Lu*
- D. *Se*
- E. None of the above

14-All of the following statements are TRUE regarding Hemolytic Disease of the Fetus/Newborn (HDFN) caused by ABO antibodies EXCEPT:

- A. It is generally mild
- B. It may occur during the first pregnancy
- C. It is usually seen with group O mothers
- D. A negative fetal DAT doesn't exclude the diagnosis
- E. It is second in frequency to Rh HDFN

15-All of the following should be irradiated before they are given to an immunocompromised patient EXCEPT:

- A. Whole Blood.
- B. Peripheral stem cell reinfusions.
- C. Granulocyte transfusions.
- D. Apheresis platelets.
- E. Leukocyte-reduced RBCs.

16-From the following list, choose the factor that does NOT decrease the measurable response to platelet transfusion:

- A. Fever
- B. ABO incompatibility
- C. Rh incompatibility
- D. Recipient HLA antibodies
- E. Splenomegaly
- F. Amphotericin B therapy

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18-

A 59-year-old male is admitted with major trauma following an automobile accident. His blood type is O-negative, but you are out of O-negative blood. Which of the following blood products would be UNACCEPTABLE to transfuse?

- A. AB positive red cells

- B. A negative platelets
- C. O positive red cells
- D. AB positive FFP
- E. B positive FFP

19-What if the person described in the previous question had been AB-negative? Which of the following red cell types would be acceptable to give him? (CHOOSE ALL THAT APPLY)

- A. AB positive
- B. A negative
- C. O positive
- D. O negative
- E. B positive

20-A 40 year old female loses 15% of her blood volume as a result of an accidental arterial laceration during a hysterectomy. The most appropriate immediate therapy is:

- A. Crystalloids
- B. Colloids
- C. Crystalloids and packed red cells
- D. FFP and packed red cells
- E. Whole blood

21-A 55 year old male has a gastrointestinal hemorrhage and drops his hematocrit from 45% to 19%. A bleeding arteriovenous malformation is resected, and the patient stabilizes. The clinician calls you to ask what level he should expect the patient's hematocrit to rise to if he gives him 4 units of red blood cells. You say:

- A. About 23%
- B. About 25%
- C. About 27%
- D. About 31%

- E. About 35%

22-Leukocyte reduction is indicated for prevention of all of the following EXCEPT:

- A. Febrile nonhemolytic transfusion reactions
- B. Transfusion-associated Graft vs Host Disease
- C. HLA alloimmunization
- D. Transmission of Cytomegalovirus (CMV)
- E. All of the above are prevented by leukocyte reduction

23-

From the list below, choose the blood product that does NOT have a decreased risk of transmission of cytomegalovirus (CMV).

- A. Irradiated platelets
- B. Blood from a CMV-seronegative donor
- C. Deglycerolized red blood cells
- D. Red cells leukocyte reduced by filtration
- E. Washed red blood cells

VIROLOGY

Multiple Choice Quiz

Please answer all questions

1

A lysogenic cycle involves

- A) early lysis of the host cell
- B) the ultimate formation of a prophage
- C) lysis by the lambda lytic protein
- D) a period of genome integration

2

The genetic alteration of a cell's genome is called

- A) transformation
- B) reverse transcription
- C) genome conversion
- D) invasion

3

The CD8+ cell antiviral factor (CAF) is used to

- A) block the CCR5 receptor
- B) disable the CXCR4 receptor
- C) block replication of the HIV virus
- D) mutate the CCR5 and CXCR4 receptors

D)

4

The function of the drug AZT is to

- A) disable reverse transcription
- B) block production of envelope protein
- C) block HIV replication
- D) block capsid protein formation

5

Influenza subtypes differ in their

- A) protein spikes
- B) capsid composition
- C) capsule composition
- D) kinds of nucleic acids

6

When a bacteriophage is integrated into a cellular genome it is called a

- A) virulent virus
- B) lytic virus

- C) prophage
- D) transducing virus
- E) microphage

7

The infectious substance of prions is

- A) protein
- B) glycoposphate
- C) RNA
- D) DNA
- E) glycoprotein

8

Viruses are considered to be

- A) non-living
- B) primitive precursors of bacteria
- C) a link between life and non-life
- D) primitive organisms
- E) very small bacteria

E)

9

Each HIV particle possesses a glycoprotein called _____ on its surface

- A) CD4
- B) gp120
- C) CXCR4
- D) gp8
- E) nef

10

The only structural pattern that has been found among isometric viruses is

- A) icosahedral
- B) spherical
- C) helical
- D) tetrahedral
- E) capsular

11

_____ are small naked fragments of RNA that infect plant cells.

- A) Prions
- B) Nucleons
- C) Prophages
- D) Macrophages
- E) Viroids

12

Viruses that cause lysis in host cells are called

- A) temperate viruses
- B) phagocytic viruses
- C) prions
- D) virulent viruses
- E) infectious viruses

13

_____ is the virus causing fever blisters

- A) Herpes simplex
- B) Chlamydia

- Epstein-Barr virus
- C)**
- Human papillomavirus
- D)**
- Lyme disease
- E)**

14

Which of the following is not a viral disease?

- mumps
- A)**
- measles
- B)**
- chicken pox
- C)**
- rubella
- D)**
- diphtheria
- E)**

15

An example of an emerging virus is

- Herpes
- A)**
- polio
- B)**
- rubella
- C)**
- CJD
- D)**
- Ebola

E)

16

Copying the HIV virus' nucleic acid depends on

- replicase
A)
- reverse transcriptase
B)
- transcriptase
C)
- reverse replicase
D)
- nucleases
E)

17

Persons infected with HIV may not develop AIDS because the virus has the _____ gene.

- CAF
A)
- gag
B)
- pol
C)
- nef
D)
- env
E)

18

_____ may prevent HIV replication by binding with the CD4

receptor.

- A) gp120
- B) CXCR4
- C) Reverse transcriptase
- D) CCR5
- E) Chemokines

19

Typically, viruses form _____ around their nucleic acid.

- A) an envelope
- B) a cell wall
- C) a capsid
- D) a cell membrane
- E) a capsule

20

Viruses are most conveniently thought of as

- A) lost chromosomes
- B) the most primitive bacteria

- particles of genomes
- C)**
- prions
- D)**
- escaped genomes
- E)**

21

In AIDS patients, the virus homes in on the _____ T cells.

- CD1+
- A)**
- CD2+
- B)**
- CD3+
- C)**
- CD4+
- D)**
- CD5+
- E)**

22

The viral enzyme, _____, causes the host cell to synthesize a double strand of DNA complementary to the viral RNA.

- reverse transcriptase
- A)**
- chemokine
- B)**
- virase
- C)**
- replicase
- D)**

- antiscryptase
- E)**

23

The first virus to be purified was the

- flu virus
- A)**
- tobacco mosaic virus
- B)**
- smallpox virus
- C)**
- polio virus
- D)**
- plague virus
- E)**

24

When a virus kills the infected host cell in which it is replicating, the reproductive cycle is called a _____ cycle.

- lysogenic
- A)**
- phagocytic
- B)**
- lytic
- C)**
- viroidal
- D)**
- endocytic
- E)**

25

Of the viruses listed below, the most lethal is

- A) influenza
- B) Ebola
- C) measles
- D) herpes simplex
- E) Epstein-Barr

26

Viruses have an overall structure that is

- A) spherical
- B) isometric
- C) icosahedron
- D) helical
- E) all of the above

27

The basic structure of a virus contains:

- A) a nucleic acid
- B) a cell wall

- a protein coat
- C)**
- both a and b
- D)**
- both a and c
- E)**

28

Which of the following are not matched correctly:

- virulent virus-lytic cycle
- A)**
- temperate virus-non-infecting virus
- B)**
- lysogenic virus-genome becomes part of host genome
- C)**
- lytic cycle-kills host cell
- D)**
- none of the above
- E)**

29

Viruses are more closely related to chemical matter than to a living organism.

- True
- A)**
- False
- B)**

30

New strains of influenza continually arise because the virus mutates and recombines the gene encoding the protein that makes it resistant to antibodies.

True
A)

False
B)

31

The HIV virus uses the host cell's reverse transcriptase to manufacture DNA.

True
A)

False
B)

32

Some viruses enter the cell through endocytosis.

True
A)

False
B)

33

HIV binds to the human white blood cell receptor protein CD4.

True
A)

False
B)

34

HIV is a DNA virus.

True
A)

- False
B)

35

Viruses and bacteria are the only infectious agents found in plants and animals.

- True
A)
- False
B)

36 How does a virus recognize its host cell?

- a. the spikes on the host cell recognize attachment molecules in the viral nucleic acid
- b. the cell wall has extensions that fit particular envelope molecules on the virus
- c. by the pili on the outside of the cell wall
- d. a protein on the virus matches the shape of a molecule in the plasma membrane of the host

How is a provirus related to disease symptoms?

- a. the provirus can produce endospores during unfavorable times
- b. the provirus periodically shifts to a lytic cycle, causing disease symptoms
- c. the provirus continually lyses cells, causing disease symptoms
- d. the provirus secretes powerful toxins that make the host ill

37. When a virus becomes a provirus , it _____.

- a. stops reproduction of the host cell
- b. interferes with the normal functioning of the host cell
- c. is replicated right along with the host cell's chromosomes
- d. causes cell lysis, releasing multiple copies of the virus

38. What type of nucleic acid do retroviruses contain?

- a. RNA
- b. DNA
- c. reverse transcriptase
- d. proteins

39. Which of the following happens to the viral nucleic acid during a lytic cycle?

- a. the viral DNA becomes integrated into the host cell's chromosomes
- b. the viral DNA is used to attach the bacteriophage to the host cell's receptors
- c. the viral DNA forms a provirus

- d. immediately takes over the host cell genetic material

itside, protein coat on a virus called?
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is incorporated into a host cell's chromosome is

e

the following is necessary for a virus to

- cell
- temperature
- ter, and food

**protect us against dangerous viral
aining the body to recognize and destroy
ing viruses. Vaccines are made from**

- : dead versions of a dangerous virus.
- e blood cells.
- hat cure the symptoms of viral diseases.

' the following diseases has NOT been

minated by vaccines?

-
-
-
-

l vaccination happens when

- es a person a measles vaccine.
- omes immune to chicken pox after contracting it.
- ches a cold.
- ating influenza once, a person can contract it again.

Bacteriology

1

The encountered bacteria are roughly spherical. Their shape is

- A) coccus
- B) bacillus
- C) pleomorphic

2. other common bacterial shape is that of a rod, of

- coccus

- A)
- B) bacillus
- C) pleomorphic

3.

In bacterial cells, ribosomes are packed into the cytoplasmic matrix and also loosely attached to the plasma membrane. What is the function of ribosomes?

- A) Site of energy production
- B) Site of protein synthesis
- C) Site of genetic reproduction

4.

What is a plasmid?

- A) Self-replicating segment of double stranded DNA
- B) Self-replicating segment of single stranded RNA
- C) A bacterial chromosome

5.

Plasmids are important to the genetics of many bacteria. This is because

- A) they are inherited from one generation to the next.
- B) they may carry genes that give their host a selective advantage.
- C) they can render bacteria drug-resistant.
- D) All of the above.

6

Bacteria do not always swim aimlessly but are attracted by such nutrients such as sugar and amino acids, and are repelled by harmful substances and bacterial waste products. Movement toward chemical attractants and away from repellents is called

- A) gliding motility.

- A)
- tumbling.
- B)
- chemotaxis.
- C)

7

Some bacteria are considered pleomorphic. This means

- they are shaped like
- A) bent rods.
- they have a corkscrew
- B) shape.
- they do not have just
- C) one shape.
- they are not either
- D) bacilli or cocci.

Poly-beta-hydroxybutyrate inclusion bodies

- A) protect bacteria from excessive drying.
- B) store carbon for energy and biosynthesis.
- C) turn reddish brown when stained with iodine.
- D) are composed of polymers of glucose.

9.

Gas vesicles in bacteria

- help move cells to
- A) optimal nutrient levels.
- store oxygen for
- B) growth anaerobically.
- are bounded by a lipid
- C) bilayer membrane.
- are bounded by a
- D) membrane impervious to gas.

10.

Magnetosomes in bacteria

- help cells attach to
- A) metal objects.
- help cells to
- B) magnetically attach to

- help cells to float on the surface of fresh water ponds.
- C)** help cells to orient in the earth's magnetic field.
- D)** the earth's magnetic field.

11

The 70S procaryotic ribosomes consist of

- two 40S subunits.
- A)** a 50S and a 30S subunit.
- a 40S and a 30S subunit.
- C)** a 50S and a 20S subunit.
- D)** subunit.

12

Gram positive cells

- **A)** have a second, outer membrane that helps retain the crystal violet stain.
- **B)** have multiple layers of peptidoglycan that help retain the crystal violet stain.
- **C)** have a thick capsule that traps the crystal violet stain.
- **D)** have a periplasmic space that traps the crystal violet.

13

The presence of D-amino acids in the crosslinks of the peptidoglycan layer is most likely because

- most peptidases can only cleave L-amino acids.
- A)** D-amino acids fit the structural constraints of the cell wall better than L-amino acids.
- most L-amino acids have already been used for protein synthesis.
- C)** used for protein synthesis.

- D-amino acids are
- D)** easier to crosslink in the absence of ribosomes.

14

The third amino acid in the peptidoglycan crosslinking chain is either diaminopimilic acid or lysine because this amino acid must

- be positively charged
- A)** for a salt bridge to form.
- be hydrophilic.
- B)**
- have a free amino
- C)** group for peptide bond formation.
- have a large R-side
- D)** chain to fill space in the cell wall.

15

Gram positive cells

- have thick,
- A)** homogeneous cell walls.
- have large amounts of
- B)** teichoic acids.
- do not have an outer
- C)** membrane.
- all of the above are
- D)** true.

16

The outer membrane of Gram negative cells is more permeable than the plasma membrane because

- LPS is larger than
- A)** most membrane phospholipids.
- lipoproteins stretch the
- B)** outer membrane.
- porin proteins
- C)** establish holes in the outer membrane.
- the core
- D)** polysaccharide spans the lipid bilayer.

17

The most important role of the prokaryotic cell wall is to

- maintain the shape of the cell.
- A)** protect the cell from osmotic pressures.
- prevent ions from diffusing away from the cell.
- C)** block the effects of antibiotics like penicillin.

18. Which of the following is not true about capsules and slime layers?

- They consist of secreted material lying outside of the bacterial cell wall.
- A)** They can prevent desiccation of bacteria cells.
- They are required for bacteria to grow normally in culture.
- C)** They help bacteria resist phagocytosis by macrophages.

19

Fimbriae

- attach bacteria to various surfaces.
- A)** cause bacteria move through fluids.
- sense changes in nutrient concentration.
- C)** are pathways for the secretion of exoenzymes.

20

A bacillus bacterium with a single flagellum at each end is described as

- Monotrichous
- A)** Amphitrichous
- Lophotrichous
- C)**

- Peritrichous
- D)**

21

Which of the following is not true about bacterial flagella?

- A)** Most of their length consists of a hollow, rigid protein tube.
- B)** They are constructed largely of a single protein called flagellin.
- C)** They spin like wheels, either clockwise or counterclockwise.
- D)** They use cytoplasmic ATP as their primary energy source.

22

The flagellar filament grows by

- A)** enzymatic addition of subunits to the tip of the flagellum.
- B)** enzymatic addition of subunits to the base of the flagellum.
- C)** self-assembly of subunits traveling through the hollow flagellum to the tip.
- D)** self-insertion of subunits along the length of the filament.

23

How does a bacterium control the direction of swimming?

- A)** The length of the flagellum acts as a rudder to steer the bacterium.
- B)** The speed of rotation is faster when the bacterium is headed the correct way.
- C)** The bacterium can stop and spin until it is pointed the correct way.
- D)** The bacterium does not control the direction of its swimming.

24

The methyl-accepting chemotaxis proteins of bacteria

- A)** are directly connected to the flagellar motor to guide the bacterium.
- B)** can only sense conditions that are

favorable for bacterial growth.

- integrate multiple
- C)** signals through a two component phospho-relay system.
- tell the bacterium
- D)** which way to go.

25

Bacteria accomplish chemotaxis by

- Steering toward better
- A)** growth conditions.
- Making long,
- B)** uninterrupted runs when conditions are good.
- Frequently stopping
- C)** and tumbling to better sense good conditions.
- Stopping movement
- D)** when conditions are good.

26

What is the purpose of bacterial endospores?

- Allow the bacterium to
- A)** make hundreds of "seeds" to spread on the wind.
- Help the bacterium to
- B)** differentiate into faster growing stages of bacteria.
- Allow the bacterium to
- C)** survive the absence of oxygen.
- Allow the bacterium to
- D)** survive extended periods of heat or dryness.

27

Grinding and mixing of foods such as sausage and hamburger

- increase the food surface area.
- A)**

- alter cellular structure.
- B)** distribute contaminating microorganisms throughout the food chain.
- C) All of the above.
- D)** None of the above.
- E)**

3

Which is NOT true about aflatoxins?

- Cause frameshift mutations
- A)** Are carcinogenic
- B) Are alkaloids
- C) Fluoresce
- D)** Have been found in beer
- E)**

28

There is an increased sensitivity to aflatoxins in individuals previously infected with

- hepatitis B.
- A)** measles.
- B) mumps.
- C) chickenpox.
- D)** rabies.
- E)**

29

Complex algal toxins, most of which are temperature stable, are known to cause peripheral neurological system effects, often in less than _____ after ingestion.

- one hour
- A)** two hours
- B) three hours
- C)**

- four hours
- D)**
- five hours
- E)**

30

Louis Pasteur established the modern era of food microbiology in 1857 when he showed that microorganisms cause _____ spoilage.

- beer
- A)**
- wine
- B)**
- juice
- C)**
- milk
- D)**
- grain
- E)**

31

Several major brands of beer are _____ rather than pasteurized to better preserve the flavor and aroma of the original product.

- centrifuged
- A)**
- precipitated
- B)**
- filtered
- C)**
- heat-treated
- D)**
- All of the above
- E)**

32

Which of the following terms describes organisms that thrive in the cold?

- Mesophiles
- A)**
- Thermophiles
- B)**
- Psychrophiles
- C)**
- Aerophiles
- D)**
- Basophiles
- E)**

33

Despite efforts to eliminate spoilage organisms during canning, sometimes canned foods are spoiled. This may be due to

- spoilage before canning.
- A)** underprocessing during canning.
- B)** leakage of contaminated water through can seams during cooling.
- C)** All of the above.
- D)** None of the above.
- E)**

34

The effectiveness of many chemical preservatives depends primarily on the food

- temperature.
- A)** pH.
- B)** water content.
- C)** acidity.
- D)** All of the above.
- E)**

35

Sodium nitrite is responsible for

- protecting against botulism.
- A)** reducing rate of spoilage.
- B)** maintenance of red color in meat.
- C)** All of the above.
- D)** None of the above.
- E)**

36

Which is NOT true of the bacterium produced by *Streptococcus lactis*?

- A small hydrophobic protein
- A)** Nontoxic to humans

- B)
- Affects mainly Gram-negative bacteria
- C)
- Improves inactivation of *C. botulinum* during the canning process
- D)
- Inhibits germination of any surviving *C. botulinum* spores
- E)

37

***E. coli* O157:H7 is thought to have acquired enterohemorrhagic genes from**

- Clostridium*
- A)
- Bacillus*
- B)
- Campylobacter*
- C)
- Shigella*
- D)
- Listeria*
- E)

38

The main reservoir of *Staphylococcus aureus* is

- human feces.
- A)
- human nasal cavity.
- B)
- human red blood cells.
- C)
- All of the above.
- D)
- None of the above.
- E)

39

A major advance in the detection of foodborne pathogens is the use of standardized pathogen DNA patterns, or "foodborne pathogen _____"

- fingerprinting.
- A)
- plasmid patterns.
- B)
- chromosomal patterns.
- C)
- polymerase chain reaction.
- D)

- All of the above.
- E)**

40

Which type of fermentation is used to produce yogurt?

- Mesophilic
- A)**
- Thermophilic
- B)**
- Therapeutic
- C)**
- Yeast-lactic fermentations
- D)**
- Mold-lactic fermentations
- E)**

41. Which of the following refers to the addition of microorganisms to the diet in order to provide health benefits beyond basic nutritive value?

- Antibiotics
- A)**
- Adjuvants
- B)**
- Prebiotics
- C)**
- Probiotics
- D)**
- Synbiotics
- E)**

42. Inherited retinoblastoma requires _____ mutation(s) or deletion(s).

- A)** one
- B)** two
- C)** three
- D)** four

43

In which of the human cells listed below is telomerase active?

- A)** blood
- B)** bone

- C) muscle
- D) sperm

44

Which of the following is not a characteristic of cancer cells?

- A) loss of cell cycle control
- B) transplantability
- C) loss of contact inhibition
- D) all are characteristic

45

The Philadelphia chromosome is associated with which type of cancer?

- A) breast
- B) thyroid
- C) nerve
- D) leukemia

46

BRCA-1 is associated with which cancer?

- A) breast
- B) thyroid
- C) nerve
- D) leukemia

47

If 85% of lung cancer cases occur in heavy smokers, can lung cancer still have a genetic origin?

- A) yes
- B) no

48

An increasing number of women in the rural south die from ____ cancer.

- A) breast
- B) colon
- C) lung
- D) mouth

49

Which of the following statements about telomerase is incorrect?

- A) It is an enzyme that adds DNA to telomeres.
- B) It serves as the template for telomeres lengthening.

- C) It is not activated in cancer cells.
- D) Its activity continually resets the cellular clock.

50

Familial cancer is caused by

- A) a mutation in somatic cells only.
- B) a mutation in germline cells only.
- C) a germline mutation plus a somatic mutation in affected tissue.
- D) two germline mutations.

51

A cancerous tumor eventually grows faster than surrounding tissues because a greater proportion of its cells are dividing. True or false?

- A) true
- B) false

52

Which type of cancer in humans is directly caused by a viral infection?

- A) acute T cell leukemia
- B) Wilms' tumor
- C) Burkitt's lymphoma
- D) Rous sarcoma

An oncogene transcribed and translated with another gene produces a

- A) transcribed protein.
- B) fusion protein.
- C) fusion cell.
- D) cancer protein.

16

The P53 protein normally promotes

- A) DNA repair.
- B) tumor formation.
- C) cell division.
- D) apoptosis.

17

The P53 gene is especially prone to

- A) point mutation.
- B) chromosomal rearrangement.

- C) loss.
- D) none of the above.

18

FAP colon cancer results from ____ mutation(s).

- A) one
- B) two
- C) three
- D) four or more

19

Which type of study compares the incidence of a type of cancer among ve different groups of people?

- A) population
- B) case-control
- C) prospective
- D) empiric

20

Which type of study would compare cancer rates seen in a group of individuals who take herbal supplements versus those in a control group w do not use the supplement?

- A) population
- B) case-control
- C) prospective
- D) empiric

21

Which of the following cancers develops from loss of tumor suppression?

- A) cute T cell leukemia
- B) Wilms' tumor
- C) Burkitt's lymphoma
- D) Rous sarcoma

22

Why is genetic counseling for familial breast cancer difficult?

- A) BRCA1 and BRCA2 are incompletely penetrant.
- B) Breast cancer can occur in other ways.
- C) Not all mutations are associated with disease.
- D) all of the above

23

Which of the following is not a traditional cancer treatment?

- A) blocking telomerase
- B) inhibiting angiogenesis
- C) stimulating specialization
- D) none of the above

24

A mutation in which gene makes nearby DNA more susceptible to replication errors?

- A) APC
- B) BRCA1
- C) P53
- D) RB

25

Which of the following may contribute to causing cancer?

- A) a mutation in a gene that slows the cell cycle
- B) faulty DNA repair
- C) loss of control over telomere length
- D) all of the above