

# Copy of Exam 2 for printing - Results

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## Attempt 1 of 1

Written Feb 28, 2024 9:59 AM - Feb 28, 2024 9:59 AM

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Attempt Score **Pending Evaluation**

Overall Grade (Highest Attempt) **Pending Evaluation**

### Question 1

0 / 1 point

Lymph is

- ☐ the fluid component of blood
- ☐ the fluid of the extracellular matrix
- ☐ the fluid found inside blisters
- ☐ the fluid found at sites of inflammation causing swelling (edema) of the tissue
- ☐ the fluid in a specialized system of vessels that carry excess interstitial fluid from tissues back to the blood vascular system

### Question 2

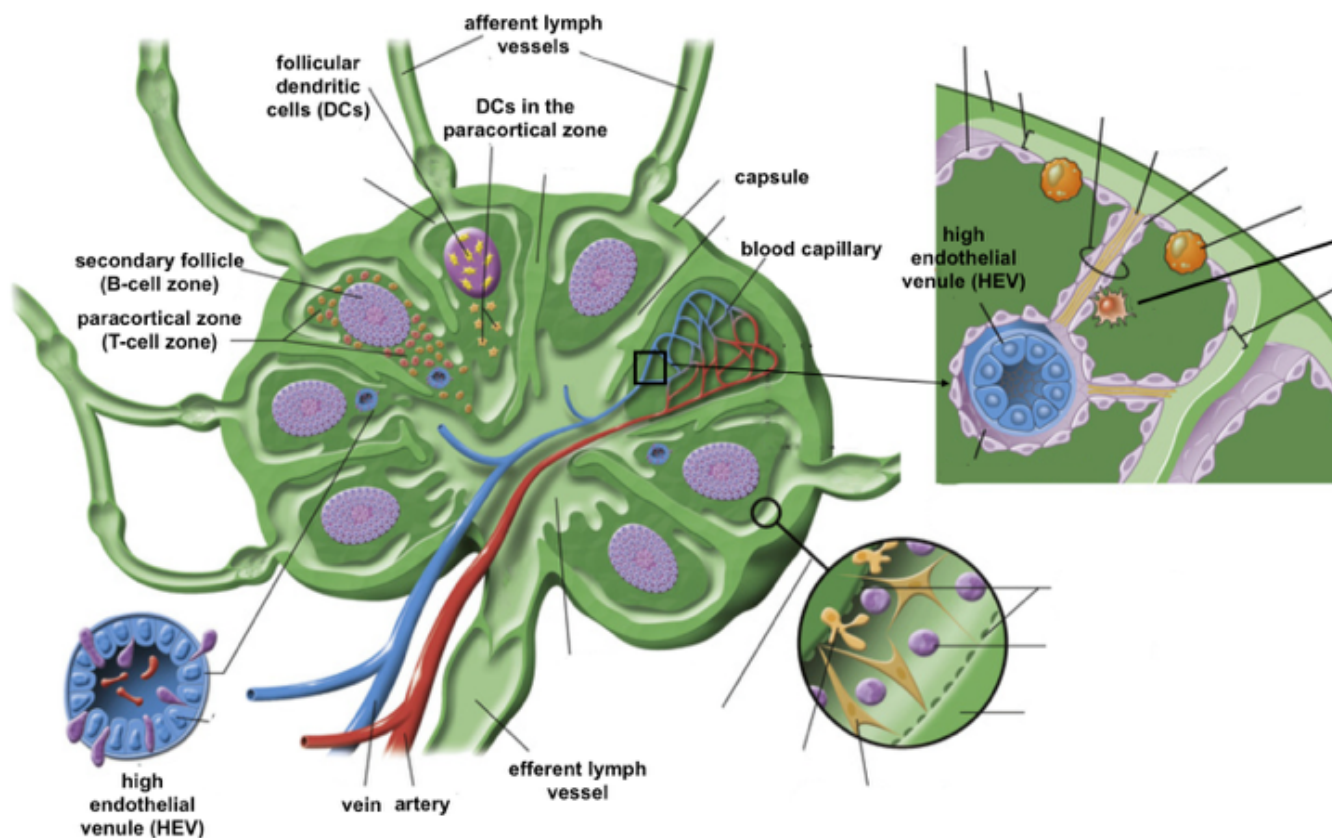
0 / 1 point

"engulfment of particles by a cell" is a textbook definition of

- ☐ phagocytosis
- ☐ edema
- ☐ opsonization
- ☐ apoptosis
- ☐ immune surveillance

### Question 3

0 / 1 point



Antigen-presenting Dendritic Cells (DCs) from the periphery need to enter the lymph node to present to naive T and B cells. How do these DCs get to the lymph node?

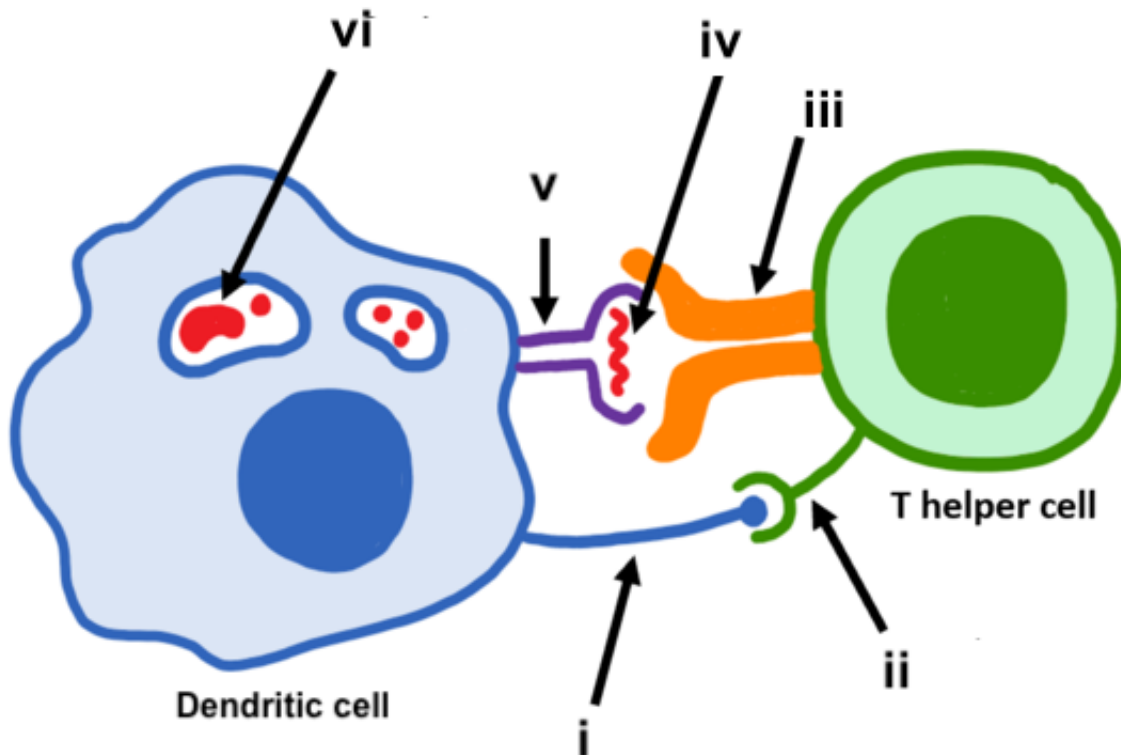
- ☐ by the artery supplying the lymph node
- ☐ by the HEVs
- ☐ by the efferent lymph vessels
- ☐ by the afferent lymph vessels
- ☐ by the secondary follicles

**Question 4****0 / 1 point**

A molecule that binds to T or B cell receptors and causes an adaptive immune response is

- ☐ antibody
- ☐ cytokine
- ☐ toxin
- ☐ interferon
- ☐ antigen

**Question 5****0 / 1 point**



In the image above

- ☐ The helper T cell is presenting antigen to and activating the dendritic cell
- ☐ The dendritic cell is presenting antigen to and activating the T helper cell
- ☐ The dendritic cell has been invaded by bacteria. The helper T cell is binding to the dendritic cell in order to kill the dendritic cell by phagocytosis
- ☐ the dendritic cell is binding to the T helper cell and will transport it to the site of colonization
- ☐ The dendritic cell has been invaded by bacteria. The helper T cell is binding to the dendritic cell to help kill the dendritic cell by apoptosis

**Question 6****0 / 1 point**

A super important family of defense molecules are interferons (IFN). The major (textbook) function of type I interferons is

- ☐ act as toxins against multicellular parasites including worms
- ☐ opsonize pathogen cells for phagocytosis
- ☐ make our urinary epithelium super leaky to facilitate the transport of bacteria into the urine
- ☐ signal neighbor cells to synthesize proteins that inhibit viral reproduction
- ☐ bind to and neutralize toxins

**Question 7****0 / 1 point**

The cell type that secretes antibody is

- ☐ Th (helper T) cell
- ☐ basophil
- ☐ neutrophil
- ☐ Plasma cell
- ☐ Tc (cytotoxic T) cell

**Question 8****0 / 1 point**

The major cell type of the adaptive immune system for defense against virus is

- ☐ eosinophil
- ☐ B cell
- ☐ macrophage
- ☐ Tc (cytotoxic T) cell
- ☐ neutrophil

**Question 9****0 / 1 point**

This cell type is a blood cell that travels to sites of inflammation and phagocytoses pathogens. This cell type is a

- ☐ mast cell
- ☐ basophil
- ☐ neutrophil
- ☐ Tc (Cytotoxic T) cell
- ☐ Plasma cell

**Question 10****0 / 1 point**

The targeting of virus-infected or cancerous cells by NK cells is called

- ☐ cytokine storm
- ☐ hemostasis
- ☐ adaptive immunity
- ☐ immune surveillance
- ☐ opsonization

**Question 11****0 / 1 point**

Some complement protein opsonizes bacteria. What is opsonization?

- ☐ to coat the cell with proteins that facilitate macrophage binding and phagocytosis
- ☐ to cause apoptosis
- ☐ to phagocytose a cell
- ☐ to coat the cell with toxins that disrupt plasma membrane function and kill the cell
- ☐ to create a pore in the cell that results in cell lysis

**Question 12****0 / 1 point**

Cytosolic (endogenous) protein fragments, including non-self protein fragments of intracellular virus or bacteria, are trafficked to the plasma membrane. Non-self fragments presented on the membrane mark the cell for destruction by

- ☐ phagocytosis by neutrophils
- ☐ antibody
- ☐ toxic secretion by eosinophils
- ☐ Tc (cytotoxic T) cell induced apoptosis
- ☐ cell lysis by Treg (regulatory T) cells

**Question 13****0 / 1 point**

The theory that there exist many millions of lineages of lymphocyte, each expressing a unique lymphocyte receptor that can bind to a unique antigen, but that a line is not activated until a naive lymphocyte in the line binds to an APC presenting the matching antigen, and that all progeny of the activated lymphocyte will only express the specific lymphocyte receptor and/or antibody, is called

- ☐ V(D)J recombination
- ☐ hypersensitive response
- ☐ immune surveillance
- ☐ clonal selection
- ☐ immune tolerance

**Question 14****0 / 1 point**

leucine is an essential amino acid. What is an essential amino acid?



- ☐ it is used as a co-enzyme
- ☐ it is necessary as part of the diet because we do not make an adequate amount (or make it at all)
- ☐ we only need it in very small amounts
- ☐ it is one of the 20 amino acids necessary to make protein
- ☐ it is necessary for cell function

**Question 15****0 / 1 point**

the fiber component of our diet

- ☐ is the plant component
- ☐ includes the (mostly carbohydrate) molecules that we do not digest because we do not make the enzymes to break these down
- ☐ includes the lipid soluble vitamins
- ☐ is the component coming from protein fibers such as collagen
- ☐ is any dietary polysaccharide

**Question 16****0 / 1 point**

lactose intolerance is due to

- ☐ the lactose binding to glucose inhibiting glucose re-absorption
- ☐ the lactose increasing HCL secretion in the stomach causing increased stomach acidity and irritation
- ☐ an autoimmune response in which the body sees lactose as a non-self antigen, which destroys the colon epithelium
- ☐ an allergic reaction to lactose
- ☐ the loss of lactase expression after early childhood

**Question 17****0 / 1 point**

Fatty acids are stored by both plants and animals as what molecule?

- ☐ triacylglycerol
- ☐ cholesterol
- ☐ glycogen
- ☐ starch
- ☐ low density lipoprotein

**Question 18****0 / 1 point**

What are the properties necessary and sufficient to classify a nutrient as a vitamin

- ☐ inorganic, trace
- ☐ essential, organic
- ☐ essential, organic, trace
- ☐ essential, inorganic, trace
- ☐ essential, organic, plant origin

**Question 19****0 / 1 point**

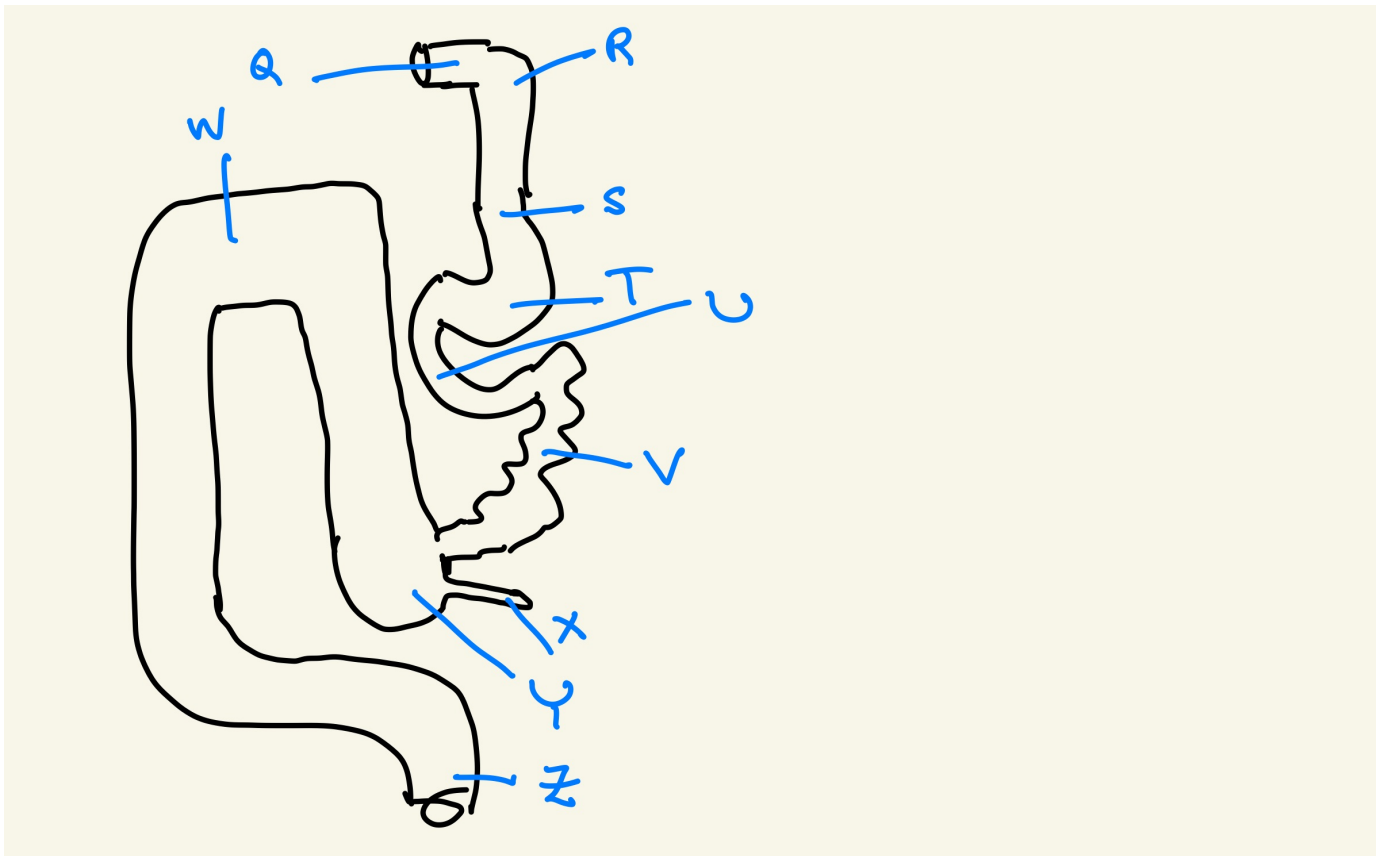
which food item is highest in percent calories from protein?

- ☐ peanuts
- ☐ grilled fish
- ☐ bacon
- ☐ salad
- ☐ french fries

**Question 20****0 / 1 point**

venous blood exiting the intestines is atypical. Why?

- ☐ the blood is well oxygenated
- ☐ the blood is high in fat
- ☐ the blood is transported to a 2nd capillary system (in the liver) before going to the heart
- ☐ the blood is circulated back to the rest of the body without first going to the heart
- ☐ the blood is blue

**Question 21****0 / 1 point**

Secretions from the pancreas drain into the part of the gut labeled

☐ X☐ Y☐ U☐ V☐ T**Question 22****0 / 1 point**

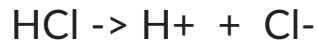
Glucose-dependent Insulinotropic Peptide (GIP), secreted by small intestine cells,

- ☐ signals goblet cells to increase mucus production in small intestine
- ☐ signals dilation of intestinal capillaries
- ☐ signals enzyme secretion by pancreas
- ☐ signals increased acid production by parietal cells in stomach
- ☐ signals pancreatic beta cells to secrete insulin

**Question 23****0 / 1 point**

gastric chief cells secrete pepsinogen, which

- ☐ is cleaved to pepsin, an enzyme that digests proteins
- ☐ is the major extracellular protein making up the ground substance of the mucus lining of the stomach
- ☐ is an enzyme that catalyzes the reaction



in the stomach

- ☐ a hormone that stimulates the secretion of peptidases from the pancreas
- ☐ is a hormone that stimulates acid secretion and stomach smooth muscle motility

### Question 24

0 / 1 point

The major site of chemical digestion and absorption in the GI tract is

- ☐ the colon
- ☐ the stomach
- ☐ the small intestine
- ☐ the liver
- ☐ the pancreas

### Question 25

0 / 1 point

a major role of the pancreas in digestion is

- ☐ secretion of digestive enzymes
- ☐ storage and secretion of bile
- ☐ interconversion of lipids, carbohydrates, and peptides
- ☐ secretion of insulin and glucagon
- ☐ absorption of digested molecules

**Question 26****0 / 1 point**

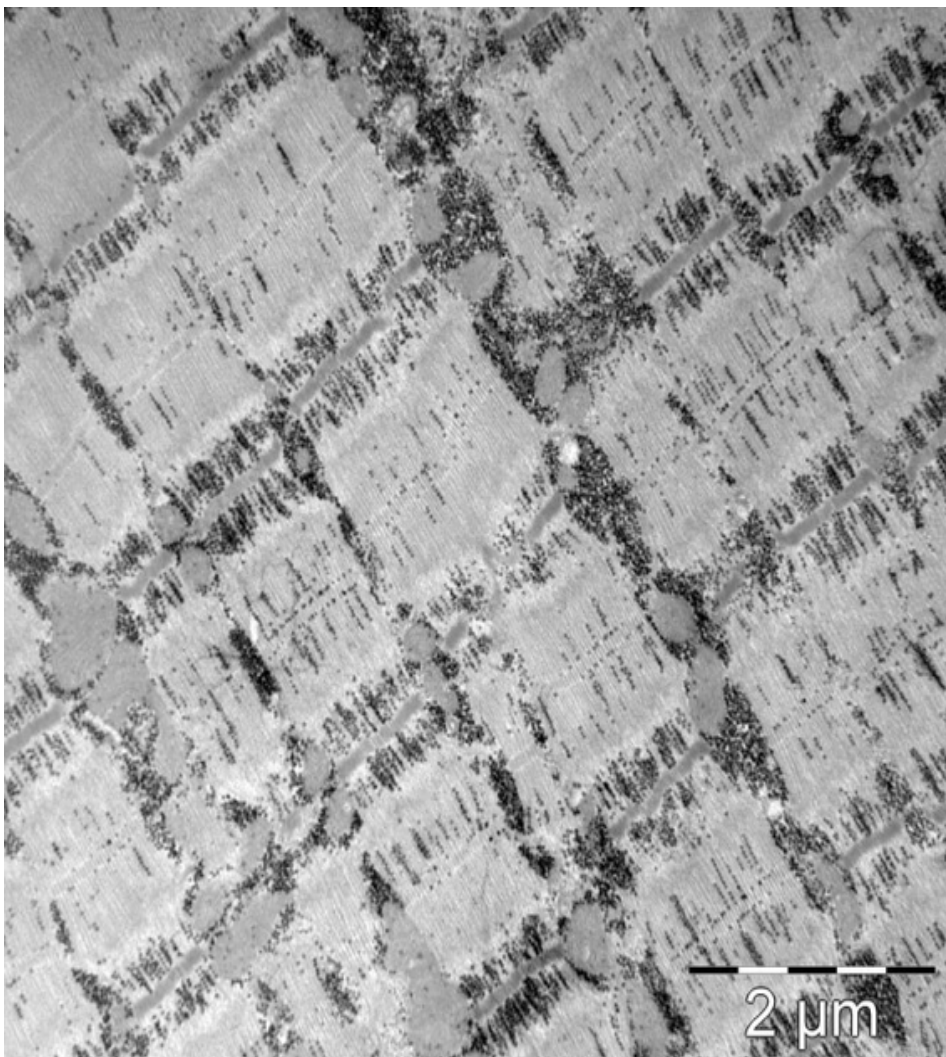
LDL is called "bad cholesterol" because

- ☐ it is from animal-food in our diet, as opposed to HDL ("good cholesterol") which we synthesize
- ☐ the kind of cholesterol in LDL is more toxic (causing atherosclerosis) than the kind of cholesterol in HDL ("good cholesterol")
- ☐ it is the cholesterol of animal fat and not plant oils
- ☐ LDL particles can deliver cholesterol to arterial walls, creating plaques that narrow the artery
- ☐ it is saturated while HDL ("good cholesterol") is unsaturated

**Question 27****0 / 1 point**

LDL receptors are important for

- ☐ creating lipoproteins in the intestinal epithelial cells
- ☐ digesting triacylglycerols and providing fatty acids to adipose cells
- ☐ creating lipoproteins in the liver
- ☐ digesting apolipoproteins
- ☐ transporting cholesterol and triacylglycerols into cells

**Question 28****0 / 1 point**

This electron micrograph of skeletal muscle shows lots of black dots, which are particles of a large, branched polysaccharide of glucose. These particles

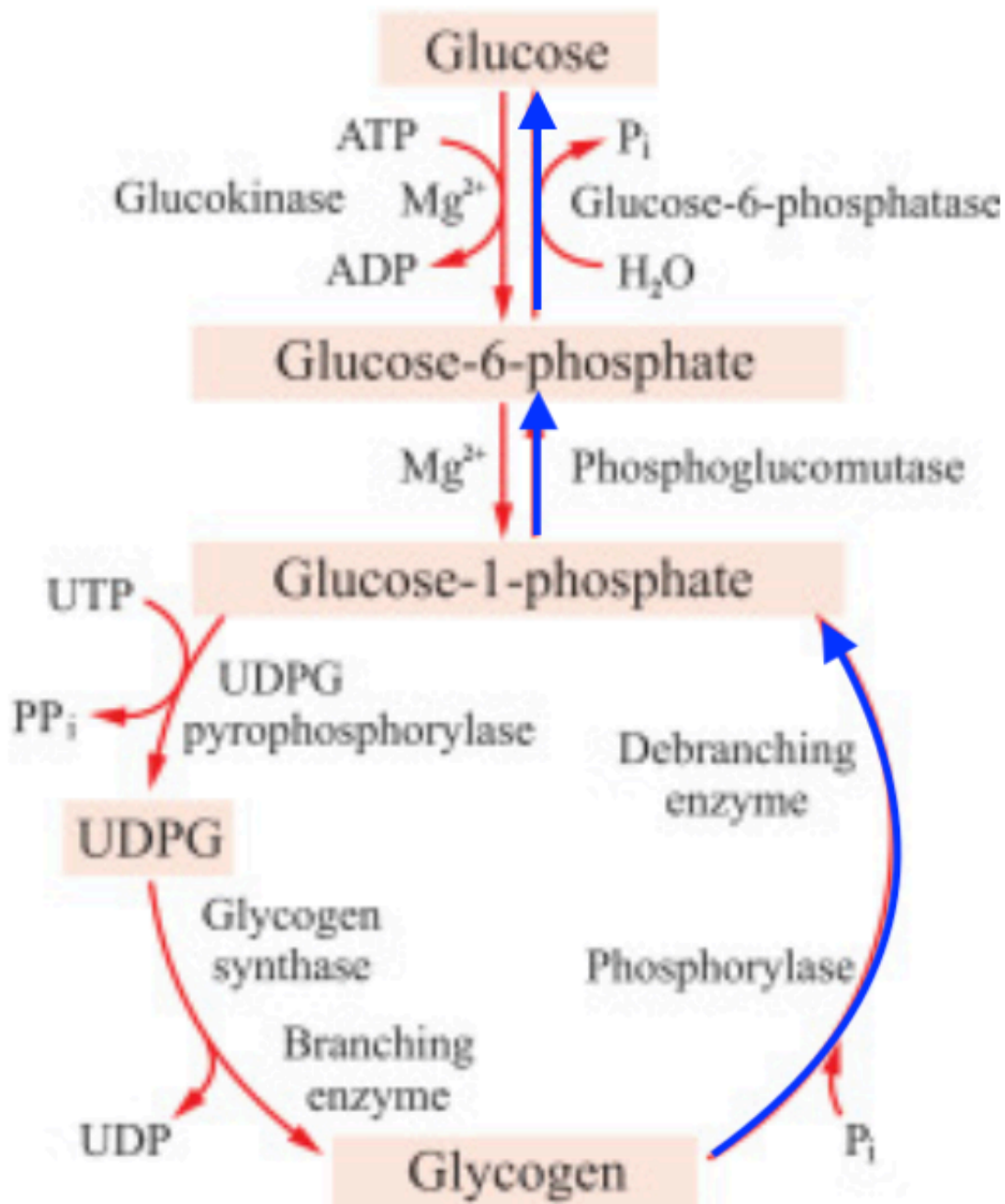


are

- ☐ starch
- ☐ cellulose
- ☐ glycogen
- ☐ maltose
- ☐ glycerol

**Question 29**

**0 / 1 point**



The set of reactions marked by the blue arrows is

- ☐ glycogenesis
- ☐ ketogenesis
- ☐ gluconeogenesis
- ☐ glycogenolysis
- ☐ glycolysis

**Question 30****0 / 1 point**

When blood glucose is limited, a pretty neat trick of the liver is

- ☐ lipogenesis from glucose
- ☐ protein synthesis from fatty acids
- ☐ gluconeogenesis from amino acids
- ☐ gluconeogenesis from fatty acids
- ☐ lipogenesis from fatty acids

**Question 31****0 / 1 point**

A major hormone of the absorptive state is

- ☐ glucagon
- ☐ insulin
- ☐ growth hormone
- ☐ aldosterone
- ☐ epinephrine

**Question 32****0 / 1 point**

The major hormone of the postabsorptive state that is secreted by the pancreas is

- ☐ glucagon
- ☐ growth hormone
- ☐ cortisol
- ☐ insulin
- ☐ epinephrine

**Question 33****0 / 1 point**

In the postabsorptive state,

- ☐ nutrient energy in the blood is low and tissues rely on amino acids from the breakdown of muscle tissue
- ☐ nutrient energy in the blood is high and tissues synthesize and store ATP
- ☐ nutrient energy in the blood is high and tissues use absorbed glucose and fatty acids
- ☐ nutrient energy in the blood is low and tissues rely on stored ATP
- ☐ nutrient energy in the blood is low and tissues use glucose from glycogen stores in the liver and fatty acids from triacylglycerol stores in adipose cells

**Question 34****0 / 1 point**

In untreated diabetes, the insulin signaling system is disrupted and excess

Acetyl-CoA is generated by beta oxidation of fatty acids. A pathological consequence of this is

- ☐ excess conversion of Acetyl-CoA to glucose and hyperglycemia
- ☐ excess ketogenesis and keto acidosis
- ☐ excess triacylglycerol storage and obesity
- ☐ excess aerobic ATP synthesis and hyperactivity and underweight body type
- ☐ excess cholesterol synthesis and increased risk of cardiovascular disease

### Question 35

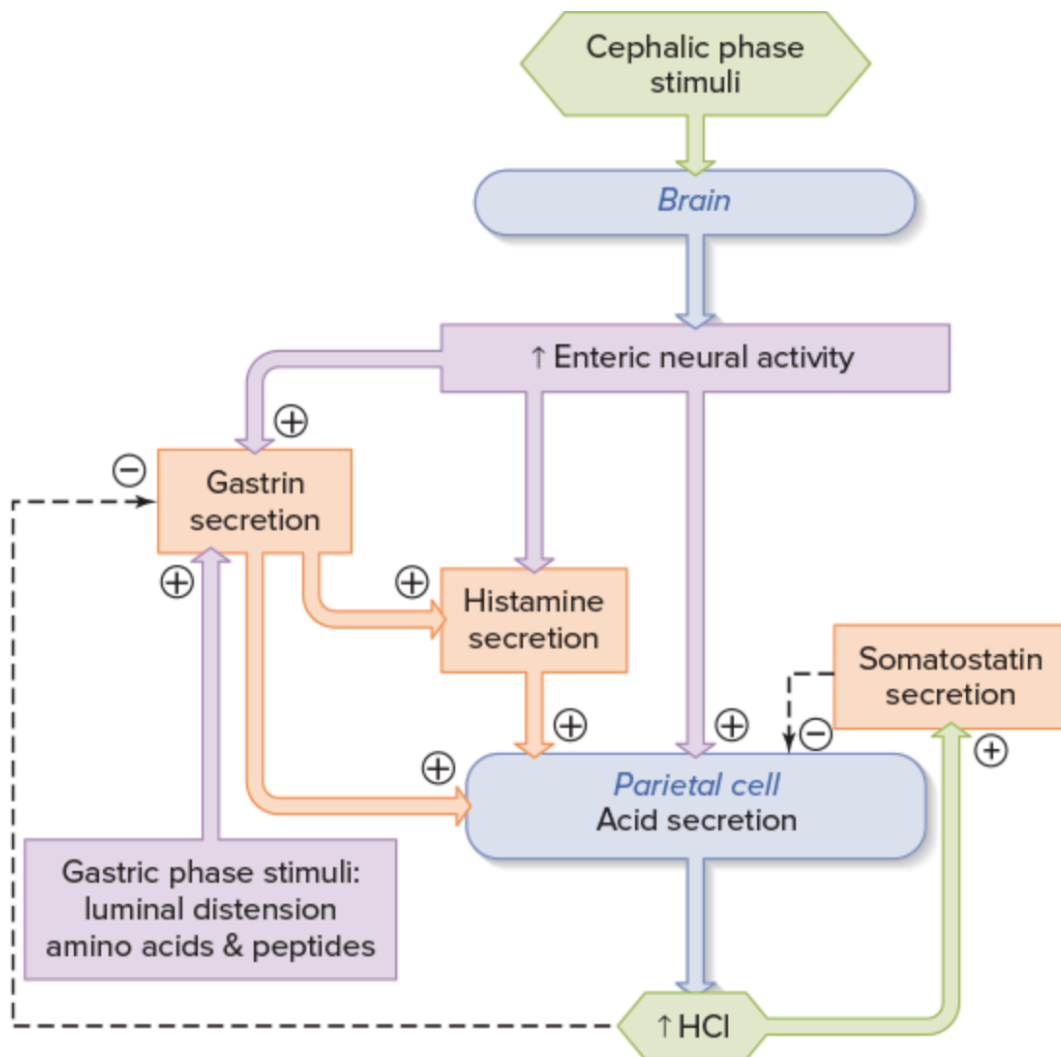
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de novo lipogenesis occurs when

- ☐ there is excess plasma cholesterol (more than needed or can be stored)
- ☐ there is excess plasma glucose (more than needed or can be stored)
- ☐ the body is starving and protein is converted to fat
- ☐ the body is starving and glucose is converted to fat
- ☐ there is excess plasma fatty acids (more than needed or can be stored)

### Question 36

0 / 1 point



How does the Brain stimulate increased Enteric neural activity?

- ☐ enteric motor neurons
- ☐ somatic motor neurons
- ☐ parasympathetic neurons
- ☐ visceral sensory neurons
- ☐ sympathetic neurons

**Question 37**

**0 / 1 point**

The northern European variant of lactase persistence is due to a substitution of T for C at a site 13,910 base pairs upstream of the lactase gene (LCT). This mutation doesn't change the protein product (since the mutation is not in the coding region) but the pattern of expression. What kind of mutation is this?

- ☐ insertion
- ☐ point mutation
- ☐ inversion
- ☐ deletion
- ☐ gene duplication

**Question 38****0 / 1 point**

Which of the following statements about mutations is TRUE?

- ☐ mutations only occur in cancer cell lines
- ☐ mutations occur only in germ line cells
- ☐ mutations are continually occurring in all of our tissues with dividing cell lines
- ☐ mutations occurred in our ancient ancestors but do not occur anymore
- ☐ mutations occur only before birth

**Question 39****0 / 1 point**

In the chart, + is the allele that makes a functional product and - is the allele that makes a dysfunctional product.

A	B	C	D
+/+	100% functional protein	watery	no disease
+/-	50% functional protein	intermediate	no disease
-/-	0% functional protein	thick	disease

What do we call +/+ in column A?

- ☐ the homozygous + genotype
- ☐ the heterozygous + genotype
- ☐ the dominant genotype
- ☐ the recessive genotype
- ☐ the co-dominate genotype

#### Question 40

0 / 1 point

In the chart, + is the allele that makes a functional product and - is the allele that makes a dysfunctional product.

A	B	C	D
+/+	100% functional protein	watery	no disease
+/-	50% functional protein	intermediate	no disease
-/-	0% functional protein	thick	disease

What does column A contain?



- ☐ different genotypes
- ☐ different proteins
- ☐ different phenotypes
- ☐ different genes
- ☐ different loci

**Question 41****0 / 1 point**

In the chart, + is the allele that makes a functional product and - is the allele that makes a dysfunctional product.

A	B	C	D
+/+	100% functional protein	watery	no disease
+/-	50% functional protein	intermediate	no disease
-/-	0% functional protein	thick	disease

The mapping of column A to the trait in column D is an example of

- ☐ polygenic inheritance
- ☐ incomplete dominance
- ☐ pleiotropy
- ☐ co-dominance
- ☐ Mendelian inheritance

**Question 42****0 / 1 point**

except for the sex chromosomes, the two chromosomes in a numbered pair

are homologous. What does homologous mean here?

- ☐ they are either both from the mother or both from the father
- ☐ they each have the same nucleotide sequence
- ☐ they each contain the same subset of genes
- ☐ the strand in one is the complement of the strand in the other
- ☐ they have the same number of nucleotides

### Question 43

0 / 1 point

CFTR has two alleles: + (which encodes a functional product) and - (which encodes a non-functional product). A person with the -/- genotype has Cystic Fibrosis but those with either +/- or +/+ genotypes do not. Which of the following is true?

- ☐ Cystic Fibrosis is autosomal recessive, because it is the "-" allele that causes the disease
- ☐ Cystic Fibrosis is autosomal dominant, because the "+" allele is the most common in the population
- ☐ Cystic Fibrosis is autosomal recessive, because a person must have two copies of the "-" allele to express the phenotype
- ☐ Cystic Fibrosis is autosomal dominant, because the "+" allele is the normal version
- ☐ Cystic Fibrosis is autosomal dominant, because a person needs only a single copy of the "-" allele to express the phenotype

### Question 44

0 / 1 point

Pyruvate kinase is the final enzyme in the glycolytic pathway. Four protein

variants of pyruvate kinase occur: PKL, PKR, PKM1, and PKM2.

PKL and PKR are encoded by the PKLR gene. PKM1 and PKM2 are encoded by the PKM gene.

The glycolytic pathway occurs in the

- ☐ cytoplasm
- ☐ inner mitochondrial compartment
- ☐ ribosome
- ☐ blood plasma
- ☐ plasma membrane

#### Question 45

0 / 1 point

Pyruvate kinase is the final enzyme in the glycolytic pathway. Four protein variants of pyruvate kinase occur: PKL, PKR, PKM1, and PKM2.

PKL and PKR are encoded by the PKLR gene. PKM1 and PKM2 are encoded by the PKM gene.

PKL, PKR, PKM1, and PKM2 are different

- ☐ isoforms
- ☐ alleles
- ☐ polymorphisms
- ☐ mutations
- ☐ subunits of a single protein with a quaternary structure

**Question 46****0 / 1 point**

Pyruvate kinase is the final enzyme in the glycolytic pathway. Four protein variants of pyruvate kinase occur: PKL, PKR, PKM1, and PKM2.

PKL and PKR are encoded by the PKLR gene. PKM1 and PKM2 are encoded by the PKM gene.

PKM1 is translated from a mRNA that includes exon 9 of the PKM gene but not exon 10. PKM2 is translated from a mRNA that includes exon 10 of the PKM gene but not exon 9. PKM1 and PKM2 arise by

- ☐ mutations
- ☐ deletions
- ☐ alternative splicing
- ☐ inversions
- ☐ single nucleotide polymorphisms

**Question 47****0 / 1 point**

The northern European variant of lactase persistence is due to a substitution of T for C at a site 13,910 base pairs upstream of the lactase gene (LCT). This mutation doesn't change the protein product (since the mutation is not in the coding region) but the pattern of expression. What are T and C?

- ☐ carbohydrates
- ☐ amino acids
- ☐ nucleic acids
- ☐ polypeptides
- ☐ nucleotides

**Question 48****0 / 1 point**

In a recent paper, researchers investigating the genetics of Type II diabetes mellitus (T2DM) described their methods:

analysis based on data visualization. We selected a T2DM dataset from a GWAS meta-analysis, and extracted 1,971 SNPs associated with T2DM. We mapped 580 SNPs to 360 genes, and then selected 460 pathways containing these genes from the curated collection of WikiPathways.

A term to describe a disease that is controlled by 360 genes is

- ☐ pleiotropy
- ☐ Mendelian
- ☐ epistasis
- ☐ isoform
- ☐ polygenic

**Question 49****0 / 1 point**

Red-green color blindness occurs in about 8% of males and 0.4% of females. Many genes contribute to Red-green colorblindness and most of these are on the X chromosome, which is the reason for the disparity in the

frequency between males and females. Call the allele that encodes a functional product "+" and the allele that encodes a non-functional product "-". Why is Red-green color blindness more frequent in males?

- ☐ because males inherit two copies of the X chromosome, and so have twice the likelihood of inheriting the "-" allele in one of the genes
- ☐ because males inherit a Y chromosome, which is much more likely to contain the "-" allele than is the X chromosome
- ☐ because females inherit two Y chromosomes, and so need to inherit two copies of the "-" allele to have the condition
- ☐ because females inherit a Y chromosome, which rarely contains the "-" allele
- ☐ because males inherit only a single X chromosome, which means that inheriting only a single copy of the "-" allele is sufficient to have the condition

### Question 50

0 / 1 point

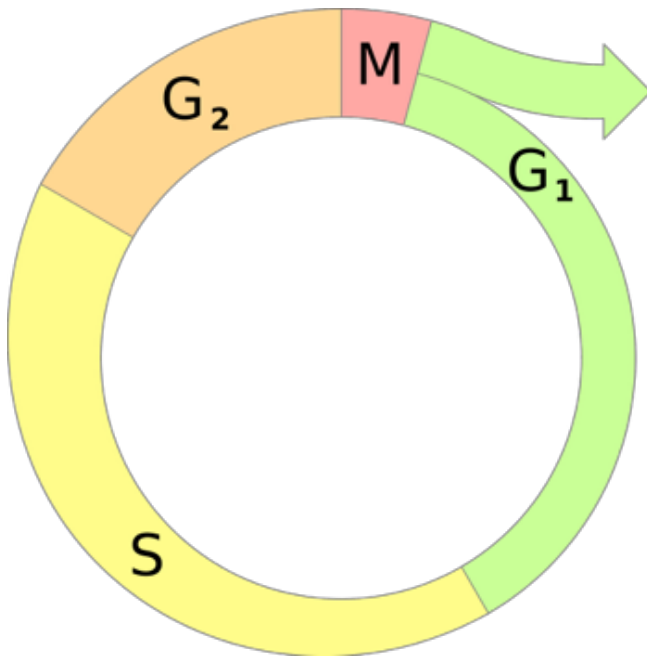
The + allele at CFTR encodes a functional protein. The - allele at CFTR encodes a dysfunctional protein. Dad is +/- at the CFTR locus. Mom is +/- at the CFTR locus. CFTR is on chromosome 7. Cystic fibrosis is an autosomal recessive disease. What percentage of the children of dad and mom are expected to have cystic fibrosis?

- ☐ 50%
- ☐ 25%
- ☐ 100%
- ☐ 0%
- ☐ 75%

**Question 51****0 / 1 point**

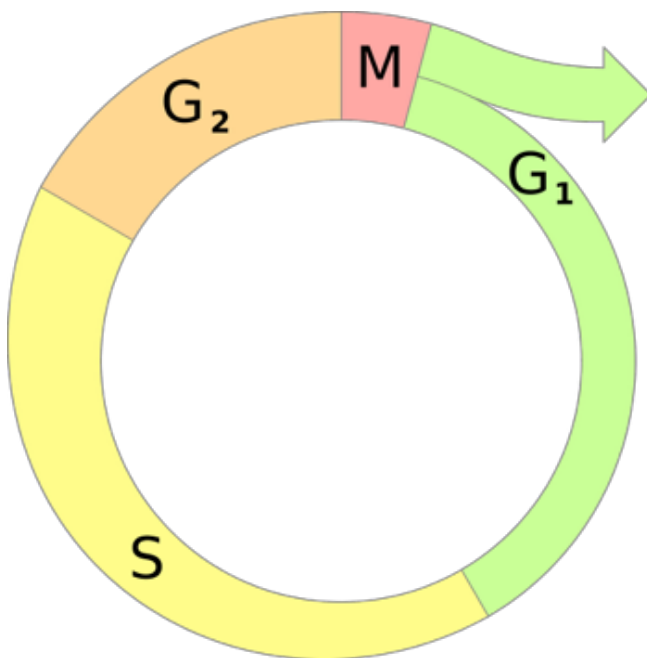
cancer is

- ☐ a disease of aging, in the sense that old cells die without being replaced and tissues and organs can no longer function
- ☐ a genetic disease, in the sense that it occurs because of the acquisition of mutations in genes that regulate the cell cycle
- ☐ an environmental disease, in the sense that environmental chemicals kill cells in the lungs, or stomach, or bone, or other tissues that are susceptible to cancers
- ☐ an infectious disease, in the sense that it occurs because of an adaptive immune response to pathogens

**Question 52****0 / 1 point**

Proteins active in G<sub>1</sub> assess the quality of DNA prior to S and can activate repair mechanisms or apoptosis pathways. This general mechanism of cell cycle control is known as

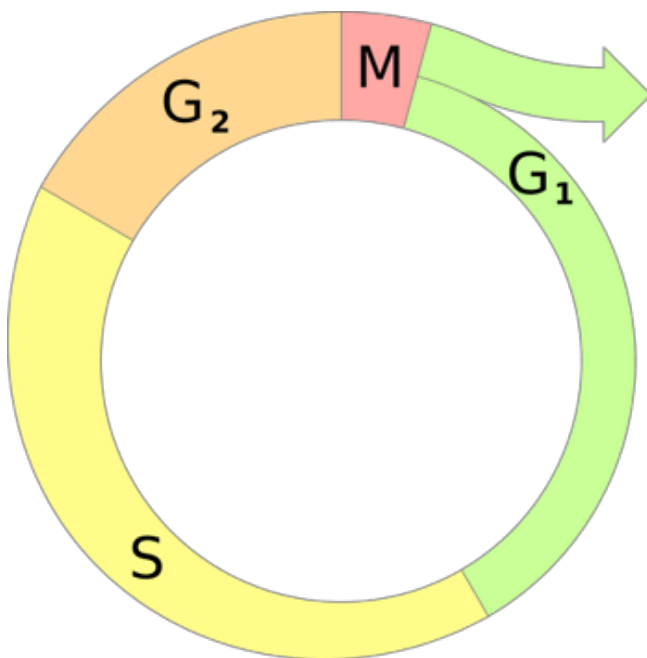
- ☐ a cell cycle growth factor
- ☐ tyrosine kinase receptor signaling
- ☐ a cell cycle checkpoint
- ☐ apoptosis
- ☐ a cyclin-dependent kinase pathway

**Question 53****0 / 1 point**

Cyclin-dependent kinase signaling paths activated in G<sub>1</sub> promote progression into S. Mutations can switch these kinases into permanently active states. The mutated genes encoding these cyclin-dependent kinases are known as



- ☐ oncogenes
- ☐ apoptotic factors
- ☐ tumor suppressor genes
- ☐ death factors
- ☐ growth factors

**Question 54****0 / 1 point**

Proteins active in G<sub>1</sub> assess the quality of DNA prior to S and can activate repair mechanisms or activate apoptosis pathways. Mutations in the genes for these proteins can generate a non-functional product (loss-of-function mutations). These genes are collectively known as

- ☐ death factors
- ☐ tumor suppressor genes
- ☐ growth factors
- ☐ oncogenes
- ☐ apoptotic factors

**Question 55****0 / 1 point**

Whales have a low cancer rate, probably because

- ☐ Whale cells are insensitive to carcinogens
- ☐ increased cell-cycle checkpoint sensitivity lowers the mutation rate, relative to smaller mammals
- ☐ Whales don't smoke
- ☐ Whales are not exposed to carcinogens
- ☐ a hyperactive NK/CD8+ system

Done