

1  **Old exams**

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1. Which one of these answers best describes a eukaryotic cell?
2. Indicate which molecular properties/processes are characteristic for eukaryotes/prokaryotes
3. What part of the cell is a place of oxidative metabolism and ATP production and contains its own DNA?
4. What is the function of Golgi complex
5. What describes the mitochondrial DNA the best?
6. If a subcellular fraction of liver tissue exhibits an acidic pH, it most likely contains?
7. Which of the following molecules play a role in the degradation of proteins?

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What part of the cell is described by following statements?

- 8.No attached ribosomes, anchoring place for enzymes, site of fatty acid and phospholipid synthesis, Ca<sup>2+</sup> storage
- 9.Which types of bonds or interactions are LEAST likely to be involved in stabilizing the 3D structure of proteins?

There are four levels of structure that determine the shape of proteins. Match the level with the function.

- 8.The association of 1 or 2 more polypeptides into a multi subunit complex
- 9.The linear order of amino acids
- 10.Formation of catalytic pockets

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- 11.Glycolipids are located exclusively on the?
- 12."Zinc Fingers" motifs are important in cellular regulation because they are?
- 13.A protein is most likely to have the highest proportion of which of the following amino acid residues buried within its core? ( Look at table at the back of test)
- 14.Which of the following increases membrane fluidity?
- 15.Cells that produce large amounts of secretory proteins have abundant
- 16.If the amino acid cysteine is missing from a protein due to dietary deficiency, what would happen to the overall protein structure?

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- 17.What distinguishes a saturated fatty acid from an unsaturated fatty acid?
- 18.When a rat cell has been injected with a gene for human insulin that rat cell will produce?
- 19.If a cell has a protein that binds to calcium and it forms a loop around Ca<sup>2+</sup> ion what motif does this best describe?
- 20.Molecular chaperones are a class of proteins that play a role in
- 21.Peptide bonds connect?
- 22.Membrane proteins may interact with biomembranes through

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- 23.Which of the following cells would likely have a gene that codes for the hormone insulin?
  - 24.Which of the following cells would likely express a gene that codes for the hormone insulin?
- Match a process of glucose transport to the transport protein on the right.
- 25.Glucose is taken up from the gut into intestinal epithelial cells by
  - 26.Glucose exits from intestinal epithelial cells to blood by
  - 27.Glucose is taken up into liver cells via
  - 28.Glucose enters neurons in the brain
  - 29.Glucose from glycogen breakdown exits from liver cells to blood via

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- 35.In intestinal epithelial cells, which of the following processes occur by uniporter transport (facilitated diffusion)?
- 36.ATP hydrolysis is directly coupled to the transmembrane movement of?
- 37.If a person has a high glucose level concentration in their urine, this would most likely be caused by?
- 38.When a Na<sup>+</sup> channel opens and Na<sup>+</sup> rushes into a myocyte (heart muscle cell) the cell

membrane becomes

39. In mammalian cells the intracellular K<sup>+</sup> concentration is about 140 mM and the extracellular K<sup>+</sup> concentration is about 5 mM. What will happen when the extracellular concentration of K<sup>+</sup> is raised by injection? (death penalty)

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40. In the absence of insulin regulated Glut-4 the person will have

41. Which of the following statements best describes glycolysis?

42. What is the net ATP energy gain after a single round of glycolysis (breakdown of one molecule of glucose)?

43. In an aerobic conditions pyruvate is transported and metabolized (oxidized) to CO<sub>2</sub> and H<sub>2</sub>O. Where does this take place?

44. Glucose is labeled with <sup>14</sup>C and followed as it is oxidized to CO<sub>2</sub> and H<sub>2</sub>O, and synthesis of ATP in a mammalian liver cell. During this process the radioactive labeling will be detectable in?

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45. KCN (potassium cyanide) blocks the mitochondrial cytochrome c-oxidase (one of the complexes in Electron Transport Chain). What would this most likely do?

46. When a baby is born it needs energy to keep its body warm to adapt to the environment. This heat production happens in brown fat. What processes go on in brown fat cells?

47. Which of the following statements is NOT true about translocation of nascent proteins across the ER membrane?

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Based on cellular localization of the mature protein match the name of the protein to targeting sequences present in its sequence.

- Glucose uniporter GLUT 4
- ATP synthase
- Insulin
- Enzymes of glycolysis
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β- adrenergic receptor has 7 transmembrane segments. N-terminus of this receptor is located on the outside of the cell. Using this information, please answer the following 4 questions. It may be helpful to draw the protein.

52. Where was this protein synthesized?

53. The last targeting sequence on the protein is

54. C-terminus of this receptor is located

55. Which of the following posttranslational modifications of proteins does NOT occur in the lumen of the ER?

56. Proteins can enter which organelle(s) in their folded conformation?

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58. An important mechanism for dissociating ligand and receptor within the endocytic pathway is The process of internalization of extracellular molecules is called

59. Cells use endocytosis to

60. Once internalized, LDL (low density lipoprotein) receptors are

61. People with mutation in the internalization sequence of LDL receptor will have

62. Coat proteins

63. Clathrin coated vesicles are delivered

64. Lack or mutation of cytosolic chaperones in mammalian cell would cause following problems

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59. When the signaling molecule acts only on the cells in the immediate proximity the process of signaling is called

60. During signal transduction process, an activated receptor

61. Which mechanisms provide amplification of hormone action in the cell

- 62. Adapter proteins ..... (what they do?)
- 63. Protein kinase is an enzyme that
- 64. Which of the following is not a common intracellular second messenger?
- 65. Which enzyme makes cAMP from ATP?
- 66. PKA is activated by

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Indicate which family of receptors is involved in the following signaling processes in humans

- 66. Vision
- 67. Fight or flight response
- 68. Sensing blood glucose levels
- 69. Increased glucose transport to muscle cells
- 70.
- 70. Which of the following occurs as a result of epinephrine binding to its receptor in liver cells?
- 71. If your body released epinephrine into your blood stream what effect might you notice in your blood?
- 72. Which of the following is (are) physiological effects of epinephrine?

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- 73. Forskolin, a drug that increases intracellular concentration of cAMP will lead to following changes in blood glucose levels
- 74. Cholera toxin locks G protein in permanently activated state. In cholera the levels of cAMP in the cell are
- 75. In muscle cells, glycogen phosphorylase kinase is activated by
- 76. Glucocorticoids such as cortisol increase the concentration of enzymes necessary for glucose synthesis T/F
- 77. Receptors for cortisol are
- 78. Binding of cortisol to its receptors will cause

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- 79. Excess of cortisol in your blood stream will..... blood glucose levels
- 80. Estrogen and testosterone are steroid hormones, and are most likely to bind to:
- 81. Binding of hormone to a receptor tyrosine kinase causes all of the following except
- 82. Insulin
- 83. Pancreatic  $\beta$  cells are .....in high glucose concentration
- 84. Sulfonylurea drugs increase insulin secretion. The mechanism of this action can be best described as

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- 85. Activation of insulin receptor will cause
- 86. In visual signal transduction cascade receptor activation is caused
- 87. In the dark
- 88. In unstimulated rod cells, the intracellular concentration of cGMP
- 89. cGMP gated  $\text{Na}^+$  channels in retina will be maximally open
- 90. Flash of light causes
- 91. Which of the following events occur(s) during light activation of the rhodopsin receptor?
- 92. Light adaptation process includes
- 93.

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- TRUE (A) or FALSE (B)
- 93. G protein coupled receptors are intrinsic membrane proteins
- 94. Receptors can be located in the nucleus
- 95. Receptor molecules can contain zinc finger motifs in their structure
- 96. Adaptation of the receptor might include removal of the receptor from the cell membrane
- 97. Multiple steps in signaling cascades allow for the amplification of the signal
- 98. The endogenous GTPase activity of G-proteins serves to synthesize cGMP as a second messenger.