



Laurea Mag. in Medical Biotechnologies - A. A. 2013/2014

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MODULO RISPOSTE

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Rispondere così:



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1. What is euthanasia?
 - a) The administration of chemotherapeutic drugs that, in the terminal stage, may lead to shorten the life of the patient;
 - b) Intervention by which, at the explicit request of the patient, a doctor will directly and intentionally procures death;
 - c) The refusal by the patient of treatments that, in the terminal phase of an illness, can prolong life, but in such conditions as he deemed unacceptable;
 - d) The act or omission with which the life of a patient is suppressed, because it is deemed unworthy of being lived.

2. What is the type of force or effect that causes the initial folding of a protein in solution?
 - a) hydrophobic effect
 - b) polar forces
 - c) electrostatic forces
 - d) van der Waals forces

3. The relative abundance of the two isotopes of bromine is: Br-79 (78.91 a.m.u.) and 50.69% Br-81 (80.92 a.m.u.) 49.31%. The mass of the bromine will then be:
 - a) 80.81 u.m.a
 - b) 78.91 u.m.a.
 - c) 79.03 u.m.a
 - d) 79.90 u.m.a

4. How many are the possible sequences for a gene of 110 bp in length?
 - a) 440
 - b) 2^{110}
 - c) 4^{110}
 - d) 110^4

5. What is the Chi-square test?
 - a) An index of dependency, in an absolute sense, between two characters
 - b) An index that measures the asymmetry of a distribution of data
 - c) A relationship between the variances of the distributions of two quantitative traits found on the statistics units
 - d) An index that measures the linear dependence between two relative quantitative characters on statistical units



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6. "[...] Because if we find as a fact that the variation of speed among bodies of different specific gravities is less and less according as the medium becomes more and more yielding, and if finally in a medium of extreme tenuity, though not a perfect vacuum, we find that, in spite of great diversity of specific gravity [peso], the difference in speed is very small and almost inappreciable, then we are justified in believing it highly probable that in a vacuum all bodies would fall with the same speed." (from G. Galilei, Dialogs concerning two new sciences, Verso, London, 1990, p. 82).
Climbed onto the roof of a building, at the same time we drop from a height of 100 meters a lead ball weighing ten pounds and another smaller than a kilo. WHICH of these events will occur according to Galileo:
- a) the ten pounds lead ball touches the ground well ahead of the other
 - b) the balls hit the ground at the same time
 - c) the heavier ball hits the ground with a slight advance over the other
 - d) the lighter ball hits the ground a bit before the other
7. Select the wrong statement on the peptide bond
- a) The carbonyl oxygen and hydrogen amide are usually in *trans* conformation
 - b) the six atoms that form the bond lie on a plane
 - c) the six atoms that form the bond form a dihedral angle
 - d) Hydrogen has charge partially positive while the oxygen has charge partially negative
8. Human mitochondrial DNA is about:
- a) 1700 bp
 - b) 17,000 bp
 - c) 170,000 bp
 - d) 1,700,000 bp
9. The DNA polymerase gamma
- a) has 5'→ 3' exonuclease activity
 - b) Replicates the mitochondrial DNA
 - c) has RNAase H activities
 - d) all previous answers are correct



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10. The *western blotting* is:

- a) A technique to transfer onto a nylon or nitrocellulose membrane proteins that have been previously separated by electrophoresis on polyacrylamide gel,
- b) A technique to transfer onto a nylon or nitrocellulose membrane DNA fragments that have been previously separated by electrophoresis on agarose gel and are subsequently identified by hybridization with DNA or RNA probes.
- c) A technique to transfer onto a nylon membrane RNA fragments that have been previously separated by electrophoresis on agarose gel and are subsequently identified by hybridization with DNA probes
- d) A technique to transfer and immobilize a sample of nucleic acids onto a solid support, generally a membrane of nitrocellulose or nylon.

11. Most drugs are absorbed

- a) By passive diffusion
- b) By facilitated diffusion
- c) Active transport
- d) Micro-pinocytosis

12. What do you get crossing two heterozygotes for a pair of alleles ?

- a) The 50% of homozygous recessive and 50% of homozygous dominant
- b) Approximately 33% of homozygous recessive, about 33% of homozygous dominant and approximately 33% of heterozygotes
- c) 25% of heterozygotes, 25% of homozygous dominant and 50% of homozygous recessive
- d) The 25% homozygous recessive, 25% of homozygous dominant and 50% of heterozygotes

13. The bacterial plasmids are:

- a) circular DNA molecules localized in the nucleus of the bacterial cell.
- b) replicons that propagate stably as extrachromosomal elements
- c) linear DNA molecules localized in the cytoplasm of the bacterial cell
- d) circular DNA molecules essential for the survival of the bacterial cell

14. The lines Z

- a) delimit the sarcomere
- b) delimit areas in the adrenal cortex
- c) represent the course of the sensory neurons
- d) represent lipofuscin deposits on the membranes



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15. The “genetic revolution” has reopened the debate on the relationship between science and ethics. According to the European Convention on Bioethics (Oviedo Convention), which of the following statements describes a correct relationship between science and ethics in the biotechnological era?
- a) Science is and must be a completely independent human enterprise. It must be independent not only from the methodological aspects, but also from both the means it employs and the ends it pursues.
 - b) Ethical principles and values must be taken into consideration when science applies to the biotechnological field. On the contrary, there cannot be any ethical limitation regarding basic research (“pure science”) and the means it employs.
 - c) Science must be granted full independence from a methodological point of view. However, science is not a totally independent human enterprise, since it must respect in its work fundamental values and principles, such as basic human rights and individual liberties.
 - d) Being a human enterprise embedded in a specific political, social and economical context, science must be fully controlled from the outside.
16. Fermi: “How many arbitrary parameters did you use for your calculations?”
Dyson: I thought for a moment about our cut-off procedures and said, “Four.”
Fermi: “I remember my friend Johnny von Neumann used to say, with four parameters I can fit an elephant, and with five I can make him wiggle his trunk.”
Dyson, F. A meeting with Enrico Fermi (spring 1953); how one intuitive physicist rescued a team from fruitless research. *Nature* 2004.
Considering the text above, which of the following statements is appropriate?
- a) Fermi invites Dyson to insist in his own research
 - b) Fermi suggests to revise some of the aspects of the research to be more successful
 - c) Fermi suggests to completely change the research direction
 - d) Dyson had the opportunity to talk to the famous scientist Enrico Fermi but he did not take into account his advice
17. What’s the main problem in the assembly of sequences in a genome project ?
- a) Repeated sequences
 - b) Intronic sequences
 - c) Exonic sequences
 - d) Promoter regions
18. The gene transfer into eukaryotic cells may be performed by means of:
- a) infection with adenoviral vectors
 - b) Infection with the bacteriophage λ
 - c) infection with the plasmid pBR322
 - d) all previous solutions are correct



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19. A point mutation is defined as a transition
- a) if it is a change from purine to purine
 - b) if it is a change from pyrimidine to pyrimidine
 - c) if it is a change from purine to pyrimidine
 - d) if it is a change from purine to purine or pyrimidine to another pyrimidine
20. A natural killer cell is
- a) a T lymphocyte with cytotoxic functions and responsible for the interaction with specific cellular antigens
 - b) a specialized lymphocyte that recognizes and destroys foreign cells or infected host cells in a non-specific way.
 - c) a lymphocyte which naturally produces immunoglobulins without the need to recognize the antigen.
 - d) macrophage with a strong ability to destroy cells infected by microorganisms
21. The end of a chromosome is called:
- a) Telomere
 - b) Nucleosome
 - c) Telomerase
 - d) Chromatid
22. “ ... It is certainly impossible for any person who wishes to devote a portion of his time to chemical experiment, to read all the books and papers that are published in connection with his pursuit; their number is immense, and the labour of winnowing out the few experimental and theoretical truths which in many of them are embarrassed by a very large proportion of uninteresting matter, of imagination, and of error, is such, that most persons who try the experiment are quickly induced to make a selection in their reading, and thus inadvertently, at times, pass by what is really good.” Michael Faraday, 1826 Apology letter reported by J. G. Crowther. *British Scientists of the Nineteenth Century* (1935).
- a) Faraday states that he has no time to read scientific literature
 - b) Faraday believes that most of the scientific literature is fake and it is difficult to choose the right things to read
 - c) Faraday believes that most of the scientific literature is fake and it is not worthy to read at all
 - d) Faraday confesses that he does not read scientific literature
23. What is the fragile X syndrome ?
- a) A skin disease
 - b) A bone deformation
 - c) A muscle disease
 - d) A chromosome aberration



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24. The quaternary structure of a protein
- a) is the set of functional domains of a protein
 - b) is the way how the polypeptide chain folds to give the native protein
 - c) may be either alpha or beta
 - d) is observed only in proteins complexes consisting of more than one polypeptide chain
25. What is DNA micro satellite:
- a) repeated DNA sequences arranged in tandem, of length between 100 and 5000 kb
 - b) repeated DNA sequences arranged in tandem, of length between 100 bp and 20 kb
 - c) repeated DNA sequences arranged in tandem, of a length typically less than 150 bp
 - d) stretch of repeated identical nucleotides, of length between 10 and 50 bp
26. Ohm's law
- a) you can write Ohm's law as $I = VR$
 - b) correlates the current passing through the resistor with the applied potential difference
 - c) correlates the current passing through a condenser with the applied potential difference
 - d) depends on the absolute temperature
27. What does homology mean ?
- a) indicates that two DNA sequences (coding, for example, for a protein) have in common the same evolutionary origin
 - b) is a unit of measure that evaluates how two protein or DNA sequences are similar
 - c) is a quantitative characteristic of the protein or DNA sequence that is calculated in database searches
 - d) is a sequence feature that depends on the composition of amino acids, for proteins, or type of nucleotides, for DNA sequences
28. Which is the methionine codon ?
- a) GUC
 - b) AUG
 - c) GUG
 - d) UAG
29. The amphipathic compounds
- a) can form only van der Waals interactions
 - b) present donor and acceptor groups of hydrogen bonds
 - c) have both a polar and an apolar portion
 - d) all previous answers are correct



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30. In organic compounds with the same molecular formula, positional isomerism occurs when
- a) the same number of carbon atoms are arranged to form different, linear or branched chains
 - b) the same functional group is inserted in different positions of the same carbon chain
 - c) four atoms or different groups of atoms are bonded to the same carbon atom
 - d) two atoms or different groups of atoms are bonded to the same carbon atom
31. How many hydrogen bonds can a water molecule form ?
- a) One
 - b) Two
 - c) Three
 - d) Four
32. The sound:
- a) is an electromagnetic wave that has a frequency between 20 Hz and 20 kHz
 - b) propagates very quickly in vacuum
 - c) is a pressure wave that has a frequency between 20 Hz and 20000 Hz
 - d) does not propagate in water
33. In a pedigree, the square is the symbol of
- a) Male
 - b) Female
 - c) Unsexed
 - d) Proband
34. What is the unit of work:
- a) Watt
 - b) Joule
 - c) Newton
 - d) Coulomb
35. Which of the following receptors are not membrane receptors:
- a) receptor channels
 - b) receptors associated with tyrosine kinase
 - c) receptors for thyroid hormones
 - d) receptors for integrins



36. Interleukin 2

- a) stimulates the proliferation of T lymphocytes
- b) stimulates the proliferation of B lymphocytes
- c) stimulates the proliferation of the connective cells
- d) stimulates the proliferation of tumor cells

37. A pseudogene is

- a) a sequence of an endogenous retrovirus which resembles that of a *wild-type* retrovirus
- b) a nucleotide sequence that has similarity with a functional gene but its biological information is rearranged so that the pseudogene is no longer functional
- c) a gene sequence localized in mitochondrial DNA
- d) a gene sequence that shows alternative *splicing* signals

38. What's the Biosphere ?

- a) Is the habitat
- b) Is the global sum of all ecosystems
- c) Is one particular ecosystem
- d) Is an ecological niche

39. The receptor for GABA type A is a target for:

- a) Acetylcholine
- b) Dopamine
- c) Benzodiazepines
- d) Cannabinoids

40. Ovulation in women is characterized by

- a) LH surge
- b) low levels of estrogen
- c) Prolactin surge
- d) atrophy of the corpus luteum

41. The superoxide dismutase

- a) in the presence of hydrogen ion (proton), catalyzes the conversion of two molecules of superoxide in a molecule of hydrogen peroxide and an oxygen molecule
- b) in the presence of hydrogen ion (proton), catalyzes the conversion of one molecule of superoxide into two molecules of water and three oxygen
- c) in the presence of hydrogen ion (proton), catalyzes the conversion of one molecule of superoxide into two molecules of water
- d) all previous answers are correct



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42. $\log(0.5)$:
- a) is a negative number
 - b) does not exist
 - c) is zero
 - d) is a positive number
43. In autosomal recessive heredity
- a) the character appears with equal frequency in males and females
 - b) an affected individual has both parents that are affected
 - c) the character appears more frequently in males than in females
 - d) The generation jump is never observed
44. The baculoviruses:
- a) have a genome consisting of small ssRNA wrapped in a rod-shaped capsid and infect insect cells.
 - b) have a genome consisting of small ssRNA wrapped in a rod-shaped capsid and infect plant cells.
 - c) have a genome consisting of small ssRNA wrapped in an icosahedral capsid and infect insect cells.
 - d) have a large genome consisting of dsDNA wrapped in a rod-shaped capsid and infect insect cells.
45. The structural formula $R-CO-OR$ represents a
- a) Ketone
 - b) Ester
 - c) carboxyl group
 - d) Aldehyde
46. Explain how retroviruses infringe the rule of the Central Dogma of Crick
- a) stably insert into the genome of the infected cell
 - b) they recombine by means of transposition
 - c) have an diploid RNA genome
 - d) are able to convert RNA into DNA



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47. Prolactin is produced by:
- a) breast
 - b) ovary
 - c) pituitary
 - d) uterus
48. 1.6×10^{-19}
- a) is the Boltzmann constant
 - b) is the value of the elementary charge expressed in Coulomb
 - c) is Avogadro's number
 - d) is the value of the gas constant in $\text{J/mol}^\circ \text{K}$
49. Based on the information contained in the following passage, answer the next question.
What is lost in an irreversible way with death? In answering this question it is important to avoid the use of vague and indeterminate concepts. Consider the following definition: "death is the loss of what is essentially important for the human being." It is a definition clearly unsatisfactory, since we can say: "This patient has lost all that is essentially important but he is still alive". Concepts such as "essentially relevant" are inherently uncertain and should be avoided in the absence of further specification. Eg., it can be said that a massive brain damage or loss of reproductive functions, the loss of physical attractiveness of a movie star or a radical violation of one's own moral principles can all be reasons necessary and sufficient to conclude that what is "essentially relevant" is gone.
Only one of the following statements is authorized by the text of David Lamb, which one?
- a) If a person has lost what is essentially important for him, it means that he wants to end his life
 - b) The loss of reproductive function coincides with what is "essentially relevant"
 - c) To define the concept of death, all personal evaluations and subjective concepts must be abandoned
 - d) The concept of death can not be objectively defined
50. Calculate what is the mass percentage concentration (% m/m) of a solution obtained by dissolving 15 g of KI in 735 g of water.
- a) 1%
 - b) 2%
 - c) 5%
 - d) 20%