



Molecular - final exam

دفعة نبض 2019

Q1) Which of the following pathways is TRUE in cancer cells?

Select one

- a. Deletion of p53 → perfect DNA repair → inhibited cell growth
- b. Hyperphosphorylated retinoblastoma protein → binds E2F factor efficiently → prevent mitosis
- c. RAS mutation → loss of GTPase activity → prevents cell growth
- d. Poor blood supply → induces hypoxia-inducible factor 1 → inactivates glycolytic enzymes
- e. Myc protein → generates more pyruvate kinase (PK-M2) isoenzyme → generates more Pk-M2 isoenzyme

Answer: E

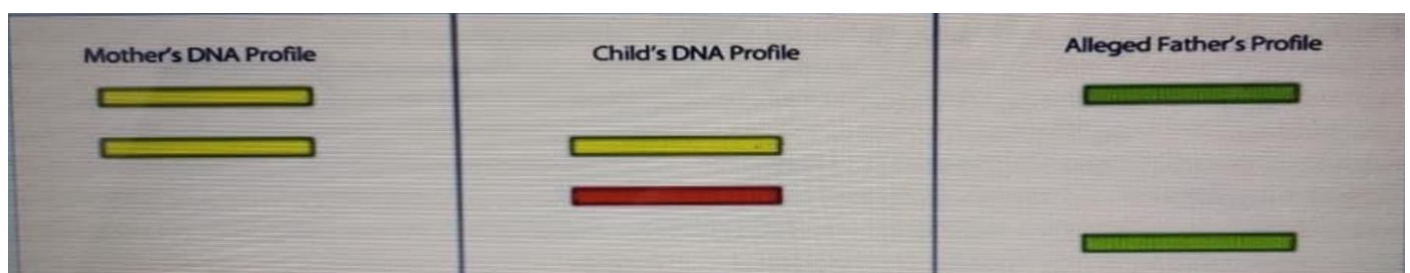
Q2) What is the possible target for anti-cancer therapy?

Select one

- a. Activators of glycolysis
- b. Activators of telomerase
- c. Activators of proto-oncogenes
- d. Activators of stem cell differentiation
- e. Activators of methylases of tumor suppressor genes

Answer: D

Q3) The figure shown illustrates a DNA fingerprinting analysis to examine paternity and maternity of a child. Which of the following is CORRECT?



Select one

- a. The child is adopted (false maternity and paternity)
- b. False maternity (ie, baby switched in the nursery)
- c. Correct maternity and paternity
- d. The supposed (alleged) father is not the child's natural father
- e. Data are not sufficient to detect the biological father

Answer: D

Q4) A 4-month-old boy presented with failure to thrive (grow). He was diagnosed as cystic fibrosis following identification of a mutant CFTR gene. Liposomes carrying the corrected copy of the gene CFTR were delivered directly to his nasal epithelium. What is the type of gene therapy used for this patient?

Select one:

- a. Ex vivo somatic gene therapy**
- b. In vivo somatic gene therapy**
- c. Ex vivo germ cell therapy**
- d. In vivo germ cell therapy**
- e. Genetic dedifferentiation**

Answer: B

Q5) Thymine dimer is a type of— damage due to—

Select one

- a. Endogenous exposure to UV light, NER enzymes**
- b Exogenous exposure to X-ray BER enzymes**
- c. Induced , exposure to UV light, Photolyases**
- d .Spontaneous, exposure to alkylating agents, BER enzymes**
- e. Induced exposure to UV light, NER enzymes**

Answer: E

Q6) The A and P sites are progressively occupied by amino acids being assembled into a chain in protein synthesis. These sites are part of?

Select one:

- a. tRNA**
- b. mRNA**
- c. The whole ribosome**
- d. Small ribosomal subunit**
- e. Large ribosomal subunit**

Answer: D

Q7) The traditional way of PCR is just qualitative, What type of PCR quantifies the rate at which new DNA is synthesized?

Select one:

- a. Multiplex
- b. Allele Specific
- c. Real Time
- d. Qualitative
- e. Conventional PER

Answer: C

Q8) Which of the following characteristics is TRUE as regards vectors used in gene therapy?

Select one:

- a. Liposomes have the highest transfer efficiency
- b. Adenovirus genome is integrated into human genome thus could cause cancer
- c. Retrovirus has integrase enzyme that integrates its own DNA into host genome
- d. Herpes simplex viral vectors could deliver therapeutic genes to all cells except neurons
- e. Liposomes are more expensive than viral

Answer: C

Q9) a replacement of proline codon with stop codon is called?

Select one:

- a. Transition point mutation
- b. Insertion frameshift mutation
- c. Nonsense mutation
- d. Silent mutation
- e. Non-conservative point mutation

Answer: C

Q10) A 13-year-old girl had noted a mass in her left breast. The DNA of the breast tissue was analyzed for the methylation status of promoters of some cell growth control genes, What is the most likely epigenetic defect in this patient?

Select one:

- a. Hypermethylation of the promoters of BRCA1 gene
- b. Hypermethylation of MY gene promoters
- c. Hypomethylation of p53 gene promoters
- d. Deletion of RAS gene

e. Change in nucleotide sequence of RAS gene

Answer: A

Q11) All of the followings are DNA regulatory regions except?

Select one:

- a. Enhancers
- b. Silencers
- c. Repressors
- d. Operators
- e. Promoters

Answer : C

Q12) What is the correct sequence of events in restriction fragment length polymorphism (RFLP) 1)isolation of DNA 2)Incubation with restriction endonucleases 3)Separation by electrophoresis 4)DNA amplification by PCR?

Select one:

- a 1. 2. 3. 4
- b. 4. 2 1 3
- c. 3 4 1 2
- d. 1, 3, 4, 2
- e. 1, 4, 2. 3

Answer: E

Q13) Spike protein is one of the proteins produced by novel corona virus (COVID-19). Which one of the following techniques is selected to Identify this protein?

Select one

- a. Western blotting using antibody probe
- b. Northern blotting using RNA probe
- c. Southern blotting using DNA probe
- d. Southern blotting using antibody probe
- e. Western blotting Using RNA probe

Answer: A

Q14) Restriction endonucleases can recognize?

Select one:

- a. Palindromic sequences
- b. Chimeric DNA
- c. DNA-RNA hybrids
- d. Homopolymer sequences
- e. RNA primers

Answer: A

Q15) Which of the following proteins increases in hepatocellular carcinoma (HCC)?

Select one:

- a. Alpha-Tetoprotein
- b. p53
- c. Retinoblastoma
- d. APC
- e. Prostatic-specific antigen

Answer: A

Q16) Restriction enzymes are known as molecular scissors, as regard type I restriction enzymes, all the following statements are true except?

Select one:

- a. B is an example
- b. It is formed of 3 different subunits Eco
- c. ATP, Mg⁺ 2 and S- adenosyl methionine are required
- d. Endonuclease and methylase activity are separated
- e. It cuts up to 1000 bp away from the restriction site

Answer: D

Q17) It is a difference in homologous DNA sequences that can be detected by the presence of fragments of different lengths after digestion of the DNA samples by restriction enzymes?

Select one:

- a. Restriction enzymes
- b. RFLP
- c. RT-PCR
- d. Molecular scissors
- e. Gel electrophoresis

Answer: B

Q18) All of the following statements about restriction endonucleases are true except?

Select one

- a. They are present in bacteria
- b. They act on double stranded DNA
- c. They recognize palindromic sequences
- d. They always produce sticky ends
- e. They are considered as molecular scissors

Answer : D

Q19) The direct deamination product of guanine is?

Select one:

- a. Xanthine
- b. Hypoxanthine
- c. Uracil
- d. Thymine
- e Adenine

Answer: A

Q20) Promotor is the site of a gene where RNA polymerase joins for initiating transcription, in this site, the deletion of two nucleotide pairs has taken place, what will be the result of this?

Select one:

- a. Protein synthesis in unlimited quantities
- b. Formation of normal protein
- c. Shortening of the synthesized protein
- d. Complete absence of protein
- e. Formation of abnormal proteins

Answer: D

Q21) Which of the following characters is TRUE as regards progenitor cells?

Select one:

- a. They can divide and further differentiate
- b. They are classified as totipotent stem cells
- c. They can replicate indefinitely
- d. Progenitor cells have no function in adult human
- e. Most progenitor cells are described as pluripotent

Answer: A

Q22) Which of the following forms of DNA repair does NOT require DNA polymerase?

Select one:

- a. Direct DNA repair
- b. Base excision repair
- c. Nucleotide excision repair
- d. Mismatch repair
- e. Recombination repair

Answer: A

Q23) In a eukaryote, activating transcription factors may stimulate gene expression by an enhancer, which is characterized by?

Select one:

- a. Being coding sequence of DNA

- b. Being located in within the gene only
- c. Being located within the promotor sequence
- d. Acting as enhancer or silencer
- e. Being position and orientation independent

Answer: C

Q24) One of the followings is true regarding depurination reaction?

Select one:

- a. It is an induced damage that occurs in DNA by simple hydrolysis reaction
- b. AP site is generated due to removal of adenine or thymine
- c. This damage cannot be corrected by DNA repair system as it is irreversible
- d. Depurination should be corrected after cell division so it will not be propagated throughout subsequent generations
- e. It can lead to base pair deletion if it was not corrected

Answer: E

Q25) RNA polymerase binds to the?

Select one:

- a. Enhancer
- b. Promoter
- c. Silencer
- d. Operator
- e. Shine-Dalgarno sequence

Answer: B

Q26) The lac operon is highly transcribed in?

Select one:

- a. presence of lactose and absence of glucose
- b. presence of lactose and glucose

- c. presence of glucose and absence of lactose
- d. absence of lactose and glucose
- e. Presence of glucose only

Answer: A

Q27) The first event in the protein synthesis in eukaryotes starting with the first amino acid (methionine) is?

Select one:

- a. Association between the ribosomal subunits
- b. Base pairing between met-tRNA to AUG codon of mRNA
- C. Binding of large ribosomal subunit to AUG codon of mRNA
- d. Covalent binding between the first two amino acids
- e. Polysomes formation

Answer: B

Q28) Which one of the following best describes inducible pluripotent stem cell (iPS)?

Select one:

- a Frozen embryos are the source of these stem cells
- b. There is ethical objection to their use
- c. It means inserting sperm into an egg
- d. Genetic reprogramming converts them from adult somatic cells to embryonic stem cells
- E. The most common problem with this technique is rejection of the transplanted new cells

Answer: D

Q29) Bacteria can transcribe and translate human genes to produce functional human proteins because?

Select one:

- a. the genetic code is universal
- b. bacterial ribosomes and eukaryotic ribosomes are identical
- c. eukaryotes do not really need a nucleus
- d. RNA has catalytic properties
- e. bacterial and eukaryotic RNA polymerases are identical

Answer: A

Q30) Which of the following is CORRECT as regards carcinogenesis?

Select one:

- a. Human cancers are never affected by environmental factors**
- b. Adenoviruses possess reverse transcriptase, which copies RNA to DNA**
- c. Chemical carcinogens interact covalently with DNA**
- d. RNA viruses are not known to be carcinogens**
- e. Indirect carcinogens react directly with DNA**

Answer: C

Q31) Which of the following genetic tests correctly matches its purpose?

Select one:

- a. Amniocentesis— > to identify genetic diseases in all pregnant women**
- b. Karyotyping --> to measure RNA expression**
- c. DNA sequencing --> to examine number of chromosomes**
- d. Fluorescent in situ hybridization(FISH)— > to detect HER-2/neu gene amplification**
- e. Northern blot --> to identify the molecular weight of a protein**

Answer : D

Q32) Which of the following is true of Histones?

- A. The amino acid sequences of histone proteins are very similar in different organisms**
- B. All histones form part of the nucleosome core particles in chromatin**
- C. Histones are widely found in prokaryotes**
- D. Histones are acidic proteins**
- E. Histones are found in animal chromatin but not in plant cells**

Answer: A

Q33) Which one of the following statements about Morula is TRUE?

Select one:

- a. It is classified as unipotent stem cell**
- b. It cannot differentiate to any specialized cell**
- c. It can produce only cells of a closely related family**

- d. It undergoes limited number of divisions
- e. It can construct a complete viable organism

Answer: E

Q34) If we assume that a synthetic mRNA of repeating sequence 5-CACACACACACACAC..... is used for protein synthesis, what product would you after protein synthesis?

Select one:

- a. One protein, consisting of a single amino acid
- b. Three proteins, each consisting of /Sifferent, single amino acid
- C. Two proteins, each with an alternating sequence of two different amino acids
- d. One protein, with an alternating sequence of three different amino acids
- e. One protein, with an alternating sequence of two different amino acids

Answer: E

Q35) Which one of the following repair systems is used to specifically correct the errors which escaped the proofreading activity of DNA Polymerase?

Select one:

- a. MMR enzymes
- b. NER enzymes
- C. NHEJ repair mechanism
- d. Direct repair system
- e. Homologous recombination system

Answer: A

Q36) What would happen in an in vitro DNA synthesis mixture containing the four deoxynucleoside triphosph (dNTPs) and no di-deoxynucleoside triphosphates (ddNTPs) ?

Select one:

- a. No new phosphodiester bonds would be formed
- b. All the products would be three nucleotides longer than the primer
- c. All the products would have the same size as the template strand
- d. All the products would be one nucleotide longer than the primer
- e. Halt of the products would be two nucleotides longer than the primer

Answer: C

Q37) an addition or deletion of a base or bases but does not occur in a multiple of three is known as?

Select one!

- a. Silent mutation
- b. Conservative mutation
- c. Frameshift mutation
- d. Transition or transversion mutation
- e. Nonsense mutation

Answer: C

Q38) What change occurs in chromosome structure between G1 and G2 phases of interphase?

- A. By G2, they have become more tightly condensed
- B. They begin to be more actively transcribed in G2 than G1
- C. Chromosomes in G2 contain two linear pieces of DNA while those in G1 have only one
- D. Chromosomes in G2 have a centromere which was not present in G1

Answer: C

Q39) The A, P, and E sites are progressively occupied by amino acids being assembled into a polypeptide. These sites are part of

- A. DNA
- B. the large ribosomal subunit
- C. mRNA
- D. tRNA
- E. the spliceosome

Answer :

Q40) A synthetic mRNA of repeating sequence 5'-CACACACACACACAC is used for a cell-free protein synthesizing system like the one used by Nirenberg. If we assume that protein synthesis can begin without the need for an initiator codon, what product or products would you expect to occur after protein synthesis?

- A. one protein, consisting of a single amino acid
- B. three proteins, each consisting of a different, single amino acid
- C. two proteins, each with an alternating sequence of two different amino acids

D. one protein, with an alternating sequence of three different amino acids

E. one protein, with an alternating sequence of two different amino acids

Answer: E

Q41) Which of the following is correct regarding bone marrow stem cells?

Select one:

a. They cannot divide

b They can specialize to all types of cells of human body

C. They belong to adult stem cells

d. They cannot further differentiate

e. Their culture in laboratory is not preferred due to ethical reasons

Answer: C

Q42) Which of the following genetic tests best matches its characteristic?

Select one:

a. Measuring phenylalanine in urine (phenylketonuria) is a direct molecular testing

b. Fluorescent in situ hybridization (FISH) is used to detect abnormal number of chromosomes

c. Karyotyping is used to detect the sequence of a mutated gene

d. Western blot is used to measure mRNA level in a tissue

e. Restriction fragment length polymorphism is dependent on creation or deletion of a restriction site

Answer: E

Q43) Which of the following is a description of chromatin?

Select one:

a. All the genetic sequences contained by members of a particular species

b. The DNA-protein complex which comprises eukaryotic chromosomes

C. Repetitive sequences contained within the genome of an organism

d. The protein coding sequences and their regulatory elements

e. All the nucleus content of a cell

Answer: B*

Q44) The restriction endonuclease is having a defense mechanism in bacterial system against foreign DNA such as able to protect its own DNA?

Select one:

- a. By methylation of bacterial DNA by restriction enzyme**
- b. By methylation of foreign DNA by restriction enzyme**
- c. By phosphorylation of bacterial DNA by restriction enzyme**
- d. By phosphorylation of foreign DNA by restriction enzyme**
- e. By glycosylation of foreign DNA by restriction enzyme**

Answer: A

Q45) Which one of the following statements is TRUE about gem line gene therapy?

Select one:

- a. It results in permanent changes that are passed down to subsequent generation**
- b. It is permissible (allowed) in humans**
- c. It includes transfer of genes to somatic cells**
- d. The effect is restricted to the actual patient and it's not passed on to his or her children**
- e. It means that the therapeutic gene is transferred to bone marrow cells of the patient's body**

Answer: A

Q46) Which phase the nucleotide triphosphates (dNTPs) are added to the growing DNA strand?

Select one

- a. Extension/elongation**
- b. Annealing**
- c. Denaturation/separation**
- d. Preparation**
- e. DNA extraction**

Answer : A

Q47) All the following mutations would cause cancer EXCEPT?

Select one:

- a. Point mutation of RAS which loses GTPase activity**
- b. Chromosomal translocation (8; 14)**

- c. Insertion of viral promoter region of a virus near MYC gene
- d. Deletion of APO gene
- e. Increase copy number of retinoblastoma gene

Answer: E

Q48) Which one of the following techniques is selected to measure the concentration of insulin mRNA in B cells of pancreas?

Select one:

- a. Western blotting using antibody probe
- b. Northern blotting using DNA probe
- c. Southern blotting using DNA probe
- d. Southern blotting using antibody probe
- e. Western blotting using RNA probe

Answer: B

Q49) Double strand break is a type of ---- damage due to ---- and this possible to be repeated in human by -- ?

Select one:

- a. Endogenous, exposure to UV light, NER enzymes
- b. Exogenous, exposure to X-ray, HR and NHEJ
- c. induced, exposure to UV light. Photolyases
- d. Spontaneous, exposure to alkylating agents, BER enzymes
- e. induced. exposure to UV light, NER enzymes

Answer: B

Q50) What change occurs in chromosome structure between G1 and G2 phases of interphase?

Select one!

- a. By G2, they have become more tightly condensed
- b. They begin to be more actively transcribed in G2 than G1
- c. Chromosomes in G2 contain two linear pieces of DNA while those in G1 have only one
- d. Chromosomes in G2 have a centromere which was not present in G1
- e. Chromosomes in G1 contain two linear pieces of DNA while those in G2 have only one

Answer: C

Q51) What is the most common problem of using adenoviral vectors in gene therapy?

Select one:

- a. Tumor formation (insertional mutagenesis)**
- b. Low transfer efficiency**
- c. Only infects cells of nervous system**
- d. Cannot infect soratic cells**
- e. Massive immunological response**

Answer: E

Q52) Restriction enzymes can be used in the following applications except?

Select one:

- a. Gene cloning**
- b. RFLP**
- c. Biotechnology**
- d. Protein expression experiments**
- e. Gel electrophoresis.**

Answer: D

Q53) Which one of the following repair systems is used to correct the damage caused by UV light?

Select one:

- a. MMR enzymes**
- b. NER enzymes**
- c. NHEJ repair mechanism**
- d. Direct repair system**
- e. Homologous recombination system**

Answer: B

Q54) Where do the spindle fibers connect to the chromosomes?

Select one:

- a. To the centromere
- b. To the kinetochore
- c. To the centriole
- d. To the centrosomes
- e. To the telomere

Answer: B

Q55) Which of the following is INCORRECT as regards stem cell niche?

Select one:

- a. it activates self renewal
- b. It regulates stem cell behavior only through direct contact
- c. It occurs in every organ
- d. It consists of stromal cells and extracellular matrix
- e. It is highly specific for each type of stem cell (organ-specific)

Answer: B

Q56) One of the followings is true regarding deamination reaction?

Select one:

- a. It is an induced damage that occurs in DNA by simple hydrolysis reaction
- b. AP site is generated due to removal of adenine or thymine
- c. This damage cannot be corrected by DNA repair system as It is Irreversible
- d. It can lead to base pair substitution if it was not corrected
- e. Deamination should be corrected alter cell division so it will not be propagated throughout subsequent

Answer: D

Q57) Which of the following metabolic effects occur in cancer cell ?

Select one:

- a. Defect in respiratory chain
- b. Increased number of mitochondria
- c. Decreased blood supply
- d. Decreased oxygen supply
- e. Inactivation of glycolytic enzyme

Answer: B

Q58) Which of the following are tumor suppressor genes?

Select one:

- a. Retinoblastoma and MYC
- b. P53 and retinoblastonia
- c. RAS and MYC
- d. P53 and RAS
- e. MYC and p53

Answer : B

Q59) All the following mutations Would cause cancer EXCEPT?

Select one:

- a. Point mutation of RAS which looses GTPase activity
- b. Chromosomal translocation t(8, 14)
- c. Insertion of viral promoter region of a virus near MYC gene
- d. Deletion of APC gene .
- e. Increase copy number of retinoplasmatoma gene

Answer: E

Q60) Which of the following pairs of structure has the same amount of DNA?

Select one:

- a. An unreplicated chromosome and a chromatid =
- b. A replicated chromosome and a sister chromatid
- c. A replicated chromosome and a bivalent ©
- d. An unreplicated chromosome and a bivalent
- e. Plasmid and circular chromosome

Answer: A

Q61) Which of the following is TRUE as regards Sanger's DNA sequencing?

Select one :

- a. DNA polymerase adds dNTPs to the free 5' OH of the primer

- b. Deoxy NTPs are added to terminate the chain elongation
- c. Dideoxy NTPs must be in much higher concentration than ordinary dNTPs
- d. Capillary electrophoresis is selected to separate fragments differing by 1 base
- e. Dideoxy nucleotides lack the -OH group on the 5' carbon of the deoxyribose

Answer: D

لا تَتَسَوْنَا مِن صَالِح دَعَائِكُم
بِالتَّوْفِيقِ
لِجَنَّةِ الطَّبِّ وَالْجِرَاحَةِ