Molecular Biology

Final Exam 2

NOTE : ***all question answers at the end of the file*** .

Question 1

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 somatic cells.

e. Massive immunological response.

Question 2

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 retinoblastoma gene.

Question 3

The A and P sites are progressively occupied by amino acids being assembled into a chain in protein synthesis. These sites an

Select one:

a. TRNA

b. mRNA

C. The whole ribosome

d. Small ribosomal subunit

e. Large ribosomal subunit

Question 4

Which of the following metabolic effects in cancer cells is FALSE?

Select one:

a. Hypoxia in spite of increased angiogenesis.

b. High rates of glycolysis for rapid production of energy.

c. The expression of pyruvate kinase M2 (PKM2) is upregulated in cancer cells.

d. Glucose is processed mainly into CO_2, producing 32 molecules of ATP/mol.

e. Hypoxia-inducible factor-1 (HIF-1) increases expression of glycolytic enzymes.

Question 5

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

Question 6

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

Select one:

a. An unreplicated chromosome and a chromatid.

o 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

Question 7

The nitrogen bases of DNA (choose the incorrect answer)?

Select one:

a. Flat and stacked above one another.

b. Each base pair is rotated about 360 in B DNA around the axis of helix relative to the next base pair

c. About 10 bases pairs make a complete 3600.

d. The pyrimidines are adenine (A) and guanine (G)

e. They have basic natures

Question 8

Ligands that bind to a receptor but fail to activate the physiological response are called?

Select one:

a. Agonist

b. Antagonist

c. Receptors counter receptors

d. Receptors

e. Paracrine ligands

Question 9

Which of the following is NOT required to perform Southern blotting?

Select one:

a. Restriction endonucleases.

b. Nitrocellulose membrane.

C. Alkaline buffer.

d. Agarose gel.

e. Dideoxy nucleoside triphosphates.

Question 10

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 PCR

Question 11

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.

Question 12

. . . . . is the deamination product of thymine?

a. Xanthine

b. Hypoxanthine

c. Uracil

d. Thymine

e. Adenine

Question 13

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

Question 14

The restriction endonuclease is having a defense mechanism in bacterial system against foreign DNA such as viruses. But how 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

Question 15

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

Question 16

Double strand break is a type of ---------- damage due to ---------- and it is possible to be repaired in human by---------?

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

Question 17

PCR is important laboratory technique, all the following are conditions for optimum results of PCR except?

Select one:

a. Primers should flank the sequence of interest

b. Ideal Annealing temperature must be very high enough

C. Annealing temperature should be usually 1-2° C or 5° C lower than melting temperature

d. Prevent exposure of pre-PCR reagents and materials to post-PCR contaminants

e. GC Content of primers should be in the range of 40-60 %

Question 18

Which of the following genetic tests is MISMATCHED with its aim?

Select one:

a. Newborn screening tests - to start treatment as early as possible.

b. DNA fingerprint - to detect the biological father of a child.

C. Carrier testing - to detect future complications of a disease in a patient with symptoms.

d. Amniocentesis to identify genetic diseases in the fetus.

e. Preimplantation genetic diagnosis - for implantation of healthy embryo.

Question 19

Which of the following is not correct regarding DNA structure?

Select one:

a. DNA is a right-handed antiparallel double-stranded helix

b. The two strands are helically coiled

c. The structure of DNA maximizes the exposure of the negatively charged phosphate backbone to water

d. The hydrophobic bases in the middle is shielded from water

e. DNA makes a complete turn every 3.4 nm with a diameter of about 20 nm

Question 20

Inactivation of which of the following pathways is a target for cancer therapy?

Select one:

a. Retinoblastoma expression.

b. p53-dependent pathway.

c. Metastatic genes.

d. Apoptosis.

e. Demethylation of promoters of tumor suppressor genes (TSG).

Question 21

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.

Question 22

Which of the following pathways is TRUE in cancer cells?

Select one:

a. Hypermethylation of p53 gene promoter + high p53 protein inhibits cell growth.

b. Hyperphosphorylated retinoblastoma protein
binds E2F factor efficiently → prevents mitosis.

C. RAS mutation loss of GTPase activity → stimulates cell growth.

d. Poor blood supply → induces hypoxia-inducible factor 1 + inactivates glycolytic enzymes.

e Amplification of Myc gene — more Myc protein inhibits cell growth.

Question 23
Which one of the following statements is TRUE about germ-line gene therapy?

Select one:

a. It results in permanent changes that are passed down to subsequent generations.

b. It is permissible (allowed) in humans.

C. It includes transfer of genes to somatic cells.

d. Its effect is restricted to the actual patient and is 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.

Question 24
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.

Question 25

If we assume that a synthetic mRNA of repeating sequence 5'-CACACACACACACACAC... 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 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

Question 26

The C-terminal domain of cell membrane receptors which initiate the intracellular signaling cascade (Signal transduction) is?

Select one:

a. Transmembrane domain

b. Agonist ligands

c. Intracellular domain

d. Antagonist ligands

e. Extracellular domain

Question 27

Promotor is the site of a gene where RNA polymerase joins for initiating transcription, in this site, the deletion of two nucleotide 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 protein

Question 28

If a bacterium can grow in a minimal medium it is called?

Select one:

a. Prototroph

b. Auxotroph

c. Broth

d. Transposons

e. Multigenic

Question 29

A replacement of proline codon with lysine codon is called?

Select one:

a. Conservative missense mutation

b. Insertion frameshift mutation

C. Nonsense mutation

d. Silent mutation

e. Non-conservative missense mutation

Question 30

Which of the following are tumor suppressor genes?

Select one:

a. Retinoblastoma and MYC.

b. p53 and retinoblastoma.

C. RAS and MYC.

d. p53 and RAS e. MYC and p53.

Question 31

The cofactor required for the activity of the DNA polymerase enzyme?

Select one:

a. Ca

b. Mg+2

c. Buffer solution

d. Fe

e. Cobalt

Question 32

If the A260/A280 ratio of DNA sample was 1.85 then the corresponding sample?

Select one:

a. is contaminated with proteins

b. is highly pure sample

c. is containing excessive amounts of ssDNA

d. cannot be used immediately for other applications like sequencing

e. is contaminated with lipids

Question 33

Which one of the following statements about inner cell mass is TRUE?

Select one:

a. It is classified as unipotent stem cell.

b. It cannot differentiate to any specialized cell.

c. It undergoes limited number of divisions.

d. It can differentiate into all derivatives of the three primary germ layers.

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e. It can construct a complete viable organism.

Question 34

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

Question 35
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).

Question 36
G-Protein transmembrane domain is comprised of?

Select one:

a. 7 transmembrane helices

b. 8 transmembrane helices

C. 9 transmembrane helices

d. 10 transmembrane helices

e. 6 transmembrane helices

Question 37

As regard the intracellular receptors, all the following statements are true except one?

Select one:

a. The steroid and thyroid hormones are prominent ligands

b. found in the cytoplasm or inside nucleus

c. function in the nucleus

d. Act as transcription factors to alter the rate of transcription of particular genes

Question 38

One of the followings is true regarding deamination reaction?

Select one:

a. It is an induced damage that occurs in DNA by simple hydrolysis rea ction

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 after cell division so it will not be propagated throughout subsequent generations

Question 39

As regard type I restriction enzymes, all the following statements are true except?

Select one:

a. It is formed of 3 different subunits

b. Endonuclease and methylase activity are separated

C. ATP, Mg+2and S-adenosyl methionine are required.

d. Eco B is an example.

e. It cuts up to 1000 bp away from the restriction site.

Question 40

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

Question 41

Weak transcription of Lac operon occurs in the following condition?

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

Question 42

In DNA extraction process, the following reagent is used for disruption and solubilization of cell membrane?

Select one:

a. Proteinase K

b. EDTA

C. SDS

d. Guanidinium chloride

e. Sodium acetate

Question 43

All of the followings are DNA regulatory proteins except?

Select one:

a. Enhancers

b. Activators

c. Repressors

d. CAP protein

e. Lac repressor

Question 44

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.

Question 45

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

Question 46

Xeroderma pigmentosum?

Select one:

a. is a type of colon cancer

b. is a kind of dominant genetic disorder

c. caused by deficiency of MMR enzymes

d. victims are extremely sensitive to sunlight

e. is an autoimmune disease

Question 47

DNA has all of the followings except?

Select one:

a. Thymine

b. Cytosine

c. Deoxyribose

d. Phosphate group

e. Uracil

Question 48

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 51 carbon of the deoxyribose.

Question 49

The ribose in DNA is?

Select one:

a. 2-deoxy-B-D-ribose
b. 2-deoxy-a-D-ribose

C. 2-deoxy-B-L-ribose

d. 2-deoxy-a-L-ribose

e. 2-oxy-B-D-ribose

Question 50

In which PCR phase the nucleotide triphosphates (dNTPs) are added to the growing DNA strand?

Select one:

a. Preparation

b. Annealing

c. Extension/elongation

d. Denaturation/separation

e. DNA extraction

Question 51

With regard to their chromosomes, what is a major difference between prokaryotes and eukaryotes?

Select one:

a. Eukaryotes are diploid while prokaryotes are haploid.

b. Prokaryotes have DNA located in their cytoplasm, while all the DNA in eukaryotic cells is located inside a membrane E nucleus.

C. Eukaryotes have linear chromosomes while most prokaryotes contain a single circular chromsome.

d. Prokaryotes compact their DNA to a high degree while eukaryotes maintain the chromosomes in an uncompacted sta

e. Prokaryotes have linear chromosomes while eukaryotes have circular chromosomes

Question 52

Gene expression is highly regulated process because it is responsible of?

Select one:

a. Cell communication

b. Cell function and structure

C. Apoptosis

d. type of DNA damage

e. generation of ROS

Question 53

The following DNA damage will create AP site?

Select one:

a. Deamination

b. Exposure to ionizing radiation

c. Depurination

d. Base modifiers

e. Base tautomers

Question 54

Small molecules that occur in the cytoplasm in response to a hormone binding to a cell-surface receptor, and activates various kinases to regulate the activities of other enzymes are known as?

Select one:

a Agonist ligands

b. G-proteins

c. Antagonist ligands

d. Second messengers

e. Receptors

Question 55 :
TRNA binds to the?

Select one:

a. Enhancer

b. Promoter

C. Silencer

d. Operator

e. Shine-Dalgarno sequence

Question 56

Calculate the absorbance of the sample at 260nm given that the purity of DNA sample is 1.8 and the absorbance at 280nm wa

Select one:

a. 1.5

b. 1.8

C. 0.83

d. 1.2

e. *2.7*

Question 57

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

Question 58

Which of the following metabolic effects occur in cancer cells?

Select one:

a. Defect in respiratory chain.

b. Increased numbers of mitochondria.

c. Inactivation of glycolytic enzymes.

d. Sufficient blood supply.

e. Sufficient oxygen supply.

Question 59

The following is common point of regulation of gene expression both in eukaryotes and prokaryotes?

Select one:

a. Transcription initiation

b. Transcription elongation

c. mRNA transportation and localization

d. post transcriptional modification

e. RNA splicing

Question 60

Which description fits the term DNA fingerprints?

Select one:

a. DNA profile is the same for all unrelated individuals.

b. DNA profiling uses repetitive sequences that are highly variable, called variable number of tandem repeats.

C. The probability of having two people with the same DNA fingerprint is very high.

d. It identifies difference in patterns of coding genes between individuals.

e. 100% of the child's bands of his DNA profile come from his father.

Question Answers :

1- E	2- E	3- C	4- D	5- A
6- A	7- D	8- B	9- E	10- C
11- E	12- D	13- B	14- A	15- E
16- B	17- B	18- C	19- C	20- C
21- C	22- C	23- A	24- B	25- E
26- C	27- D	28- A	29- E	30- B
31- B	32- B	33- D	34- E	35- B
36- A	37- E	38- D	39- B	40- B
41- B	42- C	43- A	44- C	45- B
46- D	47- E	48- D	49- A	50- C
51- C	52- B	53- C	54- D	55- E
56- E	57- B	58- A	59- A	60- B

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