

## Unit 5 - Week 3: Molecular Pathology

### Course outline

How does an NPTEL online course work?

### Zero Assignment

Week 1: "Fundamentals of Central Dogma of Molecular Biology" and "Chromosome Structure and Function"

Week 2: Pedigree Analysis and Molecular Biology Tools

### Week 3: Molecular Pathology

● Lecture 9: Mutations and instability of human DNA (Part 1)

● Lecture 10: Mutations and instability of human DNA (Part 2)

● Lecture 11: Animal Models for Human Diseases

○ Quiz : Week 3- Assignment

○ Feedback For Week 3

● Week 3- Assignment Solutions

Week 4: Gene discovery for monogenic and polygenic disorders

### Lecture Notes

### Text Transcripts

### Books

### VIDEO DOWNLOADS

### Live Sessions

## Week 3- Assignment

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2020-02-19, 23:59 IST.**

1) Which one of the following pairs are matched INCORRECTLY with respect to PCR? 1 point

- Synthesis | thermostable DNA polymerase
- Template | single-stranded RNA
- Primer | oligonucleotide
- Annealing | variable temperature

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*Template | single-stranded RNA*

2) You were given four tubes containing purified molecules as mentioned below, and you have the ability to sequence each of these molecules and determine the sequences. Which one of them will NOT offer the precise sequence of the coding regions of the gene? 1 point

- Tube 1 – DNA
- Tube 2 – mRNA
- Tube 3 – cDNA
- Tube 4 – Protein

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*Tube 4 – Protein*

3) A higher prevalence of a monogenic disorder could be due to 1 point

- A founder effect
- A non-allelic recombination event involving repeat elements
- Consanguineous marriages
- All of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*All of these*

4) The term “non-allelic homologous recombination” refers to: 1 point

- recombination between two alleles of the same gene present on the homologous chromosomes
- recombination between two segments that show high sequence similarity but are located on two different chromosomes
- recombination between two non-alleles located on the homologous chromosomes
- none of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*recombination between two non-alleles located on the homologous chromosomes*

5) From the options given below, identify the combination that correctly paired the technique with its target 1 point

Technique		Target	
M	Southern blot	i	Chromosomes
N	Northern blot	ii	Protein
O	Western blot	iii	DNA
P	FISH	iv	RNA

- M-iv, N-iii, O-iii, P-i
- M-i, N-iv, O-ii, P-iii
- M-iii, N-iv, O-ii, P-i
- M-iv, N-ii, O-I, P-iii

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*M-iii, N-iv, O-ii, P-i*

6) A patient referred to a clinical cytogeneticist for diagnosis is likely to have a balanced translocation between chromosomes 9 and 21. Which one of the following options correctly identifies the approach that the cytogeneticist can use to confirm the translocation? 1 point

- Fluorescence *in situ* hybridization
- Karyotyping
- Polymerase chain reaction
- All of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*All of these*

7) Mouse (*Mus musculus*) and the fruit fly (*Drosophila melanogaster*) are among a few of the organisms often used to model human genetic disorders. Which one of the following options is INCORRECT with regard to their choice as the model system? 1 point

- They are amenable for genetic experiments
- Their life cycle is relatively short
- They share all the genes that are known in the human genome
- A single cross produces relatively many progenies

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*They share all the genes that are known in the human genome*

8) Embryonic stem cells are used to knock-out specific genes in the mouse. Which one of the following statements correctly describes the utility of embryonic stem cells in the knockout approach? 1 point

- Embryonic stem cells are easy to transfect with the DNA construct as compared to the other embryonic cell types
- DNA can be mutated only in embryonic stem cells
- Embryonic stem cells upon introduction into another embryo can differentiate into and form all cell types, including the germ cells
- All of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*Embryonic stem cells upon introduction into another embryo can differentiate into and form all cell types, including the germ cells*

9) While studying the “loss of function” of a gene in the global knockout, sometimes, it may lead to a lethal phenotype. Which one of the following options correctly identifies the alternative strategy that might be used to overcome this challenge? 1 point

- Using Cre-lox system
- Using conditional knock-out
- Using tissue-specific ablation of the gene
- All of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*All of the above*

10) Which one of the following statements distinguishes a conditional knockout mouse from a global knockout mouse? 1 point

- A targeting construct is used to replace/modify a gene
- The targeting construct can inactivate the gene
- The gene is inactivated in a specific type of cells/organ
- The gene is activated in all cells of the organism

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
*The gene is inactivated in a specific type of cells/organ*