Genetic Factors in Cancer Development

Genetics · Answer Key · 25 Questions

1. Which gene is an example of a DNA repair gene involved in detecting DNA damage and has an important role in cell cycle progression?

A) BRCA1
B) p53
C) ATM
D) APC

2. Multiple double-stranded DNA breaks can lead to high rates of what?

A) Cell cycle arrest
B) Chromosomal rearrangements
C) Apoptosis
D) DNA replication

3. The syndrome of ataxia-telangiectasia is associated with progressive cerebellar ataxia and a high incidence of what?

A) Cardiovascular diseases
B) Autoimmune disorders
C) Malignancies
D) Neurological disorders

4. Genes that confer a high probability of susceptibility to specific cancers are usually:

A) Recessive and low penetrant
B) Dominantly inherited and highly penetrant
C) Autosomal recessive and low penetrant
D) X-linked and low penetrant

5. Mutations in which genes account for the majority of hereditary breast carcinomas?

A) RB1 and APC
B) ATM and p53
C) BRCA1/2
D) Ras

6. What is the estimated lifetime risk of breast carcinoma for carriers of BRCA1/2 mutations?

A) 10-20%
B) 25-40%
C) 55-85%
D) 90-100%

7. The RB1 gene, located on chromosome 13, encodes a nuclear protein that acts as a:

A) Proto-oncogene
B) DNA repair gene
C) Growth factor
D) Tumor suppressor

8. Inactivation of both alleles of the RB1 gene causes which condition?

A) Familial adenomatous polyposis
B) Retinoblastoma
C) Li-Fraumeni syndrome
D) Ataxia-telangiectasia

9. Mutations in the APC gene are associated with which condition, characterized by numerous colonic adenomas?

A) Retinoblastoma
B) Li-Fraumeni syndrome
C) Familial adenomatous polyposis (FAP)
D) Ataxia-telangiectasia

10. Tumour viruses expressing genes that disrupt the activity of tumor suppressor genes are an example of genes with modest effects that may interact with what?

A) Genetic mutations
B) Environmental factors
C) Epigenetic modifications
D) Post-translational modifications

11. Genetic (somatic) mutations caused by recognizable carcinogens can lead to which type of cancers?

A) Hereditary cancers
B) Sporadic cancers
C) Syndromic cancers
D) Monoclonal cancers

12. Which of the following is listed as an exogenous carcinogen that can cause somatic mutations?

A) Tumor suppressor genes
B) Growth factors
C) Aromatic hydrocarbons
D) Proto-oncogenes

13. The science of EPIGENETICS has established that other modifications can occur in the genetic code that influence:

A) Protein structure
B) Gene expression
C) DNA replication
D) Cellular signal transduction

14. Most cancers are thought to arise as monoclonal, meaning they originate from:

A) Multiple cells accumulating mutations
B) A single cell accumulating mutations
C) Viral infection
D) Environmental exposure

15. Genes whose function is lost during carcinogenesis are classified as:

A) Proto-oncogenes
B) DNA repair genes
C) Tumor suppressor genes
D) Oncogenes

16. Tumor suppressor genes can be classified as recessive because:

A) Mutation in one allele is sufficient for loss of function
B) Both allele copies must be inactivated for complete loss of function
C) They are always inherited
D) They promote cell proliferation

17. Functional mutations in tumor suppressor genes result in the loss of what?

A) Cell proliferation mechanisms
B) DNA repair mechanisms
C) Growth inhibitory mechanisms
D) Signal transduction pathways

18. The p53 gene is an example of a:

A) Proto-oncogene
B) DNA repair gene
C) Tumor suppressor gene
D) Oncogene

19. Approximately what percentage of human cancers possess p53 mutations?

A) 10-20%
B) 25-30%
C) 50%
D) 75-80%

20. Proto-oncogenes are genes whose function becomes what in carcinogenesis?

A) Lost
B) Inactivated
C) Enhanced
D) Repressed

21. Proto-oncogenes typically encode for proteins involved in:

A) DNA repair
B) Cell cycle arrest
C) Controlling cell proliferation
D) Detecting DNA damage

22. Mutations in proto-oncogenes are dominant at the cellular level because:

A) Both alleles must be mutated
B) Mutation in only one allele is needed
C) They are always recessive
D) They are always inherited

23. The Ras gene is an example of a:

A) Tumor suppressor gene
B) DNA repair gene
C) Proto-oncogene
D) Oncogene

24. Mutated Ras products remain in what state, even without appropriate growth factor receptor signals?

A) Inactive
B) Repressed
C) Activated
D) Degraded

25. Mutations in Ras are implicated in approximately what percentage of all cancers?

A) 5-10%
B) 15-20%
C) 30%
D) 50%