# Jorde: Medical Genetics, 4th Edition

## Chapter 1: Background and History

### Multiple Choice

1. Achondroplasia has a high mutation rate. This is most likely the result of
a. Paternal age effect
b. Maternal age effect
c. Large gene size
d. Methylated CG dinucleotide
e. None of the above

**Answer:** d

**Correct Feedback:** This has been shown to be the cause of achondroplasia.

**Incorrect Feedback:** This has not been shown to be the cause of achondroplasia.

2. The effect of mutations in the SHOX gene would best be described as
a. Haploinsufficiency
b. Dominant negative
c. Autosomal recessive
d. Gain of function
e. X-linked recessive

**Answer:** a

**Correct Feedback:** The effect is best described as haploinsufficiency.

**Incorrect Feedback:** This does not explain the effects of mutations in the SHOX gene.

3. Which of the following mechanisms is known to cause Prader-Willi syndrome?
a. Chromosome duplication
b. Translocation
c. Uniparental disomy
d. Autosomal trisomy
e. Autosomal monosomy

**Answer:** c

**Correct Feedback:** Prader Willi syndrome is effected by genomic imprinting. Thus, a uniparental disomy could cause the disease.

**Incorrect Feedback:** This would not cause Prader Willi syndrome.

4. Suppose you have established that a disease gene is closely linked to a marker whose location is known. Which of the following would **not** be useful in defining the disease gene's location?
a. Testing for unmethylated CG islands
b. Existence of a chromosome deletion in a patient
c. Existence of trisomy in a patient
d. DNA sequencing
e. Testing for cross-species conservation

**Answer:** c

**Correct Feedback:** This would not be useful in defining the disease gene's location.

**Incorrect Feedback:** This could help you find the disease gene's location.

5. Which of the following is **least** likely to be seen in a patient with Huntington disease?
a. Dementia
b. Affective disorder
c. New mutation
d. Delayed age of onset
e. Loss of motor control

**Answer:** c

**Correct Feedback:** This is rarely seen in Huntington disease. It has one of the lowest known mutation rates of all human disease genes, estimated at approximately 1 per 1 million (per locus per generation).

**Incorrect Feedback:** This is seen with Huntington disease.

6. Which of the following is not a characteristic of osteogenesis imperfecta?
a. Locus heterogeneity
b. Allelic heterogeneity
c. Pleiotropy
d. Imprinting
e. Dominant negative mutation effects

**Answer:** d

**Correct Feedback:** Imprinting is more common with Prader-Willi and Angelman syndromes.

**Incorrect Feedback:** This is a characteristic of osteogenesis imperfecta.

7. In which of the following diseases are dominant negative mutation effects seen?
a. Huntington disease

b. Cystic fibrosis
c. Retinoblastoma
d. Marfan syndrome
e. None of the above

**Answer:** d

**Correct Feedback:** Marfan syndrome shows dominant negative effects.

**Incorrect Feedback:** One of the above shows dominant negative effects.

8. Which of the following is **not** true of Fragile X syndrome?
a. It is associated with methylation
b. It can be diagnosed using a karyotype
c. It is caused by a trinucleotide repeat expansion
d. It displays nearly 100% penetrance
e. None of the above

**Answer:** d

**Correct Feedback:** Fragile X syndrome is an X-linked dominant condition with 80% penetrance in males and 30% penetrance in females.

**Incorrect Feedback:** This is true of Fragile X syndrome.

9. Which of the following diseases follow(s) a "2-hit model"?
a. Osteogenesis imperfecta
b. Adult polycystic kidney disease
c. Cystic fibrosis
d. Retinoblastoma
e. B and D

**Answer:** e

**Correct Feedback:** e. Retinoblastoma and Adult polycystic kidney disease both follow a 2-hit model.

**Incorrect Feedback:** a. Osteogenesis imperfecta does not follow a 2-hit model.b. This is true but is not the only true answer.c. Cystic fibrosis does not follow a 2-hit model.d. This is true but is not the only true answer.

10. The recurrence risk for trisomy 13 is increased by
a. Advanced paternal age
b. 13/15 translocation in one of the parents
c. Extensive methylation of chromosome 13
d. Advanced maternal age

e. B and D

**Answer:** e

**Correct Feedback:** e. Both advanced maternal age and a 13/15 translocation in one of the parents increases the recurrence risk for trisomy 13.

**Incorrect Feedback:** a. Paternal age is usually not a factor in nondisjunction.b. This is true but is not the only true answer.c. This does not increase the recurrence risk for trisomy 13.d. This is true but is not the only true answer.

11. Which of the following is **not** correct about the XIST gene
a. It is expressed only on the inactive X chromosome
b. It produces an RNA product (which coats the inactivated X chromosome) but no protein product
c. It is expressed during embryonic development
d. It is expressed at twice the level in females as in males
e. All of the above are true

**Answer:** d

**Correct Feedback:** d. The mRNA transcripts are not detected in normal males at all.

**Incorrect Feedback:** a. This is correct about the XIST gene which is responsible for X inactivation in normal females.b. This is correct about the XIST gene which is responsible for X inactivation in normal females.c. This is correct about the XIST gene which is responsible for X inactivation in normal females.e. one of the above is false.