Genetics questions

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Q1. Although the most frequent forms of Down syndrome are caused by nondisjunction of chromosome 21, Down syndrome occasionally runs in families. The cause of this form of familial Down syndrome is _____ .

A. an inversion involving chromosome 21

B. a chromosomal aberration involving chromosome 1

C. too many X chromosomes.

D. a translocation between chromosome 21 and a member of the D chromosome group.

E. a maternal age effect.

Ans: D

Q2. The condition that exists when an organism gains or loses one or more chromosomes but not a complete haploid set is known as _____ .

A. polyploidy

B. euploidy

C. aneuploidy

D. triploidy

E. Trisomy

Ans: C

Q3. Name the single individual whose work in the mid-1800s contributed to our

understanding of the particulate nature of inheritance as well as the basic genetic

transmission patterns. With what organism did this person work?

A. Gregor Mendel; Pisum sativum

B. George Beadle; Neurospora

C. Thomas Hunt Morgan; Drosophila

D. Calvin Bridges; Drosophila

E. Boris Ephrussi; Ephestia

Ans: A

Q4. A recessive allele in tigers causes the white tiger. If two normally pigmented tigers

are mated and produce a white offspring, what percentage of their offspring would be

expected to have normal pigmentation?

A. 25%

B. 50%

C. about 66%

D. 75%

E. about 90%

Q5. Polydactyly is expressed when an individual has extra fingers and/or toes. Assume

that a man with six fingers on each hand and six toes on each foot marries a woman

with a normal number of digits. Having extra digits is caused by a dominant allele. The

couple has a son with normal hands and feet, but the couple's second child has extra

digits. What is the probability that their next child will have polydactyly?

A. 1/32

B. 1/8

C. 7/16

D. ½

E. ¾

Ans: D

Q6. Tightly curled or wooly hair is caused by a dominant gene in humans. If a

heterozygous curly-haired person marries a person with straight hair, what

percentage of their offspring would be expected to have straight hair?

A. 25% curly

B. 50% straight

C. 75% curly

D. 100% straight

E. It is impossible to predict the outcome.

Ans: B

Q7. Jacobs syndrome in humans, which is manifested by a higher than average stature

and potential behavioral problems, is caused by which chromosomal condition?

A. 45,X

B. 47,XYY

C. Triploidy

D. 47,XXY

E. 47,21+

Ans: B

Q8. Which of the following human genetic conditions is missing a chromosome?

A. Jacob syndrome

B. Klinefelter syndrome

C. XXXX syndrome

D. Down's syndrome

E. Turner syndrome

Ans: E

Q9. Individuals have been identified who have two different karyotypes, such as (45,X

and 46,XY) or (45,X and 46,XX). Such individuals are called:

A. Heteromorphic

B. Homogametic

C. Trisomic

D. Mosaics

E. Heterogametes

Ans: D

Q10. Which of the following karyotypes would lead to male characteristics in humans?

A. XO

B. XYY

C. XXY

D. Both A and B

E. Both B and C

Ans: E

Q11. Klinefelter and Turner syndromes have how many chromosomes, respectively?

A. 47,46

B. 46,46

C. 45,47

D. 47,45

E. 46,45

Ans: D

Q12. Which regions of the X chromosome recombine with Y during meiosis?

A. the pseudoautosomal regions

B. the heterochromain

C. SRY

D. the male- specific region of the Y

E. the centromere

Ans: A

Q13. A recessive gene for red- green color blindness is located on the X chromosome

in humans. Assume that a woman with normal vision (her father is color blind)

marries a color- blind male. What is the likelihood that this couple's first son will be

color blind?

A. 75%

B. 0%

C. 50%

D. 100%

E. 25%

Ans: C

Q14. One form of hemophilia is caused by a sex- linked recessive gene. Assume that a

man with hemophilia marries a phenotypically normal woman whose father had

hemophilia. What is the probability that their baby is a daughter and affected with

hemophilia?

A. ¼

B. 1/8

C. ½

D. 1/16

E. ¾

Ans: A

Q15. The accompanying figure is a pedigree of a fairly common human hereditary

trait. Given that one gene pair is involved, what is the inheritance pattern of the trait?

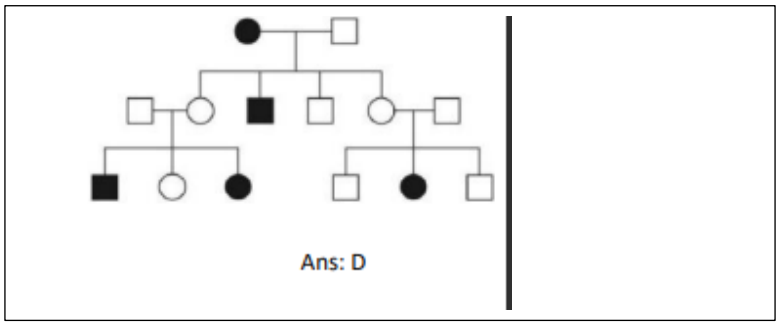
A. X- linked dominant

B. X- linked recessive

C. Epistasis

D. autosomal recessive

E. autosomal dominant



Ans: D

Q16. Which of the following statements below is false?

A. Normally in humans, a male that is carrying an X- linked dominant trait will pass it

to all his daughters.

B. Normally in humans, females are carriers of X- linked recessive traits if they are

heterozygous.

C. At meiosis I, the X and Y chromosomes line up as if they were homologs.

D. Normally in humans, all the sons of a female homozygous for an X-linked

recessive gene will inherit that trait.

E. Normally in humans, all the sons of a male showing an X- linked phenotype will

inherit the trait.

Ans: E

Q17. For an individual with the XXY chromosomal composition, the expected number

of Barr bodies in interphase cells is:

A. Two

B. One

C. Three

D. Variable

E. Zero

Ans: B

Q18. What region is the major control center of X inactivation in mammals?

A. Xic

B. NRY

C. SRY

D. MSY

E. Barr Body

Ans: A

Q19. How many Barr bodies would one expect to see in cells of Turner syndrome

females and Klinefelter syndrome males, respectively?

A. zero and two

B. one and one

C. zero and one

D. one and zero

E. zero and zero

Ans: C

Q20 Assume that black fur in cats is due to the X- linked recessive gene b, whereas its

dominant allele B produces yellow fur. A Bb heterozygote is a mosaic called "calico." A

mating between a black male and a calico female occurred. Give the phenotypes of

the offspring.

A. calico females and yellow males

B. all calico regardless of sex

C. calico females, black females, yellow males, and black males

D. calico females, yellow females, black males, and yellow males

E. all black regardless of sex

Ans: C

Q21. Where is the general location of a Barr body?

A. adjacent to the Y chromosome

B. in the nucleolus

C. attached to the other X chromosome

D. attached to the nuclear envelope

E. stuck in a nuclear pore

Ans: D

Q22. What is the blood type of individuals who cannot add the terminal sugar to the H

substance?

A. Bombay phenotype

B. AB

C. A

D. B

E. O

Ans: E

Q23. In a mating between individuals with the genotypes IA

i × I

B

i, what percentage of

the offspring are expected to have the O blood type?

A. 25%

B. 75%

C. 50%

D. 100%

E. 0%

Ans: A

Q24. In a mating between individuals with the genotypes IA

I

B × ii, what percentage of

the offspring are expected to have the O blood type?

A. 0%

B. 50%

C. 25%

D. 100%

E. 75%

Ans: A

Q25. What is meant by the "beads on a string" model of chromatin?

A. The beads are the histones, and the string is the transcriptionally active DNA

loops.

B. The beads are the nucleosomes, and the string is the linker DNA.

C. The beads are molecules of DNA polymerase that attach to the DNA string.

D. The beads are ribosomes, and the string is the mRNA that has been transcribed

from active chromatin.

E. The beads are the heterochromatic regions that are tightly compacted, and the

strings are euchromatic regions that are being actively transcribed.

Ans: B

Q26. Which histone protein is not part of the nucleosome structure?

A. H1

B. H2A

C. H2B

D. H3

E. H4

Ans: A

Q27. Typically, methylation of nucleosome N-terminal tails leads to:

A. removal of the protein components of the chromatin from the DNA.

B. relaxed packaging of the chromatin and increased transcription.

C. tighter packaging of the chromatin and reduced transcription.

D. increased amounts of euchromatin relative to heterochromatin.

E. activation of topoisomerase.

Ans: C

Q28. Typically, acetylation of histone tails leads to:

A. removal of the protein components of the chromatin from the DNA.

B. relaxed packaging of the chromatin and increased transcription.

C. tighter packaging of the chromatin and reduced transcription.

D. increased amounts of euchromatin relative to heterochromatin.

E. activation of topoisomerase.

Ans: B

Q29. Which type of chromosome has no p arms?

A. Metacentric

B. Submetacentric

C. Acrocentric

D. Subacrocentric

E. Telocentric

Ans: E

Q30. You have identified a chromosome that has both p and q arms, but notice that

the p arms are composed of highly repetitive DNA. What type of chromosome is this?

A. Metacentric

B. Submetacentric

C. Acrocentric

D. Subacrocentric

E. Telocentric

Ans: C

Q31. How many pairs of chromosomes are found in a typical human somatic cell's

karyotype?

A. 0

B. 22

C. 23

D. 44

E. 46

Ans: C

Q32. You are trying to prepare a DNA karyotype, but this time you forgot to add

trypsin to your chromosome preparation. What effect would you expect to see?

A. Dyes would stain the chromosomes better because more proteins are present to

take up the dye.

B. Dyes would not stain the chromosomes at all.

C. Chromosomes will be uniformly stained, so it would be very difficult to isolate

individual chromosomes.

D. Chromosomes would be degraded quickly because the trypsin is necessary to

promote DNA stability by adding more scaffold proteins to the chromatin.

E. The chromosomes would be more difficult to pair up because the trypsin acts as

a dye, creating a banding pattern that distinguishes between chromosomes.

Ans: C

Q33. When nondisjunction occurs early in embryogenesis rather than gametogenesis,

what would you expect in the resulting karyotype?

A. Monosomy

B. Trisomy

C. Mosaicism

D. uniparental disomy

E. random X-inactivation

Ans: C

Q34. Prader-Willi and Angelman syndromes are caused by which type of chromosomal

mutations, both in connection with chromosome 15?

A. Monosomy

B. Trisomy

C. Mosaicism

D. uniparental disomy

E. random X-inactivation

Ans: D

Q35. A chromosome contains the following gene order: A B C D • E F G H. Which of the

following rearrangements represents an inversion?

A. A B C D • E F G H

B. A F G H • B C D E

C. A B C C C D • E F G H

D. A D E • F G H

E. A B C D • H G F E

Ans: E

Q36. In case of Robertsonian translocation causing Down syndrome. How many

chromosomes would you expect to see in the karyotype of a somatic cell in an

affected individual?

A. 21

B. 23

C. 45

D. 47

E. 46

Ans: E

Q37. Nondisjunction can occur at either the first or second division of meiosis. XYY

individuals would most likely arise from nondisjunction at the _____ meiotic division

in the _____ .

A. first; mother

B. second; mother

C. first; father

D. second; father

E. more than one of the choices could give rise to XYY individuals

Ans: D

Q38. A chromosome with two arms of equal length is referred to as

A. acrocentric

B. homologous

C. telocentric

D. metazoan

E. Metacentric

Ans: E

Done by Layan Daoud