Student worksheet answers

1.7 Alleles for blood group traits co-dominate

Pages 16–17

Co-dominant traits

1 What is co-dominance?

Neither allele is dominant over the other so both are expressed when present.

2 List all the different alleles for ABO blood grouping.

IA, IB, i

3 Which allele is recessive and which alleles are co-dominant with regards to ABO blood grouping?

i is recessive; IA and IB are co-dominant

4 What is the phenotype for each of the following individual’s genotypes?

a IA IB

AB

b IBi

B

c ii

O

d IBIB

B

5 What percentage of individuals are rhesus negative?

20% (80% of people have the rhesus markers present on the surface of their red blood cells).

6 Emma has the genotype IAIB and Geoff has the genotype IAi.

a What is Emma’s phenotype? AB

b What is Geoff’s phenotype? A

c Draw a diagram in the space below to show how the surface of Emma’s red blood cells differ to those of Geoff’s.

Emma’s red blood cells:

*Diagrams will vary. Example:*



Geoff’s red blood cells:

*Diagrams will vary. Example:*



d Complete the Punnett square below to determine the possible genotypic and phenotypic ratios of Emma and Geoff’s children.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Geoff | |
|  |  | IA | i |
| Emma | IA | IAIA | IAi |
| IB | IAIB | IBi |

Genotypic ratio: ¼ IAIA : ¼ IAi : ¼ IAIB : ¼ IBi

Phenotypic ratio: ½ A : ¼ AB : ¼ B

Extend your understanding

7 Explain why it is preferable for a patient to be given the same blood group when receiving a blood transfusion.

Red blood cells contain different proteins on their surface. While one individuals red blood cells have A proteins on the surface, another individual may have B proteins. A person with only A proteins can only receive A (or O) blood. These blood groupings are carefully checked prior to a transfusion. If a patient receives blood proteins not present in their blood, clots may form, which can block blood vessels and result in death.

8 Explain why it is possible in an emergency for a patient who is AB+ to receive blood from any other blood group, while a patient who is O– can only receive blood from an O– donor. You may need to use the internet to research this topic.

A patient with AB+ blood group has both A proteins and B proteins on the surface of their red blood cells. They can therefore receive blood from any blood group (as O types contain no proteins on the surface of the red blood cells). They can also receive rhesus positive or negative blood. A patient who is O– does not have A or B proteins on the surface of their cells, so can therefore only receive blood from another O blood group. Because rhesus negative individuals will destroy rhesus positive red blood cells, they can only receive blood from O– individuals.