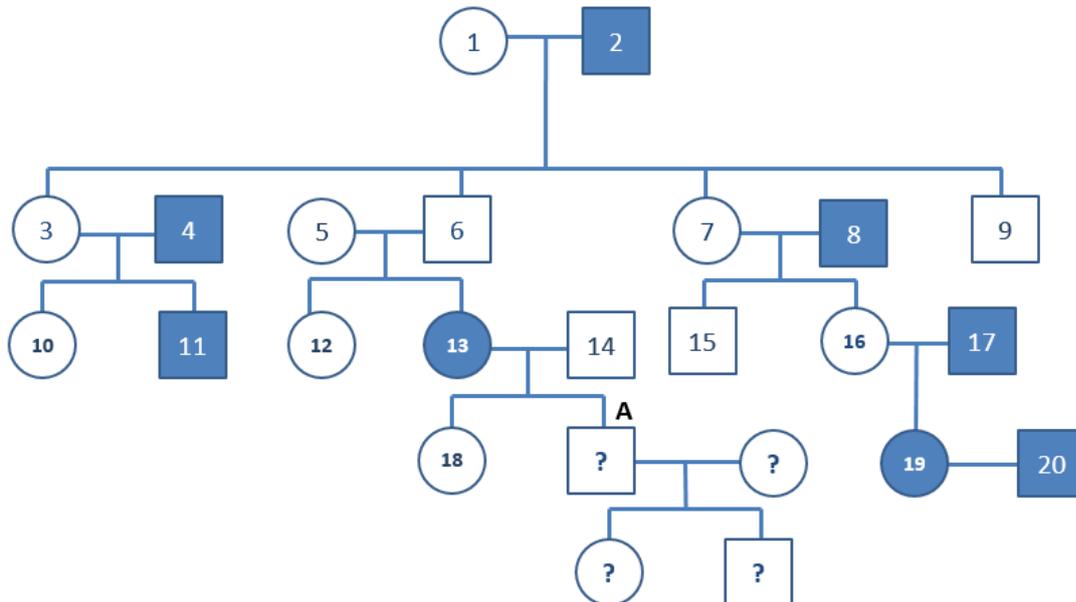


Genetics assignment – PKU

Below you see a big family tree. The grey coloured shapes represent people who have Phenylketonuria (PKU). For questions 1 through 7, assume the disease is not carried by X-genes (TB 2.06).



Assignment 1.

Make a legend for this family tree.

Assignment 2.

a) Determine whether the disease is dominant or recessive. Confirm this by explaining where this is visible in the family tree.

b) Draw this part of the family twice and give the genotypes of the parents and children for both the dominant possibility or recessive possibility to visualize your answer at a.

Assignment 3.

Give the genotype of all numbered people (sometime there are more possibilities, so write them all down).

Assignment 4.

Person 18 marries someone having the disease. When they receive a child, what will be the chance that this child has PKU?

Assignment 5.

Person 11 marries someone carrying the gene for PKU (without being sick). What's the chance to receiving four children with two having the disease and two completely healthy? The eldest is healthy and the third child has one allele for the disease. Also write down your calculation.

Assignment 6.

Person 16 and 17 would like to receive another child, but they are scared of receiving a child with PKU. They are thinking about using a sperm donor. The genotype of every sperm donor is known. In this way they can select someone without the disease. Will it matter whether the sperm donor has the disease or not for the chance of getting a healthy child? Explain using Punnett squares.

Assignment 7.

Person 19 and 20 aren't able to get children. How important is it to find out what the genotype is of the sperm donor for the chance of getting a healthy child? Explain your answer.

Assignment 8.

- a) Determine whether this disease could be caused by X-genes.
- b) Give two different parts of the family tree to prove that the disease is dominant or recessive. Draw both parts of the family tree and write down the genotype for the (im)possibility that the disease is caused by X-genes.

Assignment 9.

Person A has died at an age of 35 (but not caused by PKU). The genotype of this person is not known. Person A had two kids with his wife.

- a) Assume that the wife of person A did not have an allele for PKU. Determine the chance for the kids to have the disease. Remember: you don't know the genotype of person A, so check all possibilities.
- b) 1 out of 18.000 people have PKU. The chance for the father to have PKU is 1 out of 18.000. Determine the chance for every genotype of the kids making use of the possibility for the father to have PKU.

Assignment 10. – *you'll have to find information about PKU using your mobile phone or a different device.*

- a) Explain, using your findings of question 1 through 8 whether PKU is dominant or recessive. Also explain what it means when you have the homozygous or heterozygous genotype.
- b) Explain whether the disease is caused by X-genes or not and whether it is more common in men or woman or that it doesn't matter whether you're male or female.
- c) Is it possible to get the disease besides inheriting it?
- d) What are the symptoms of this disease?
- e) Around what age will these symptoms be visible?
- f) Is there a treatment for this disease? What will it mean for your daily life to have this disease?