Question #83159, Biology, Genetics

Question:

Elaine and Jerry each have a sibling with sickle-cell disease. Neither Elaine, nor Jerry, nor any of their parents has the disease, and none of them has been tested to reveal sickle-cell trait. Based on this incomplete information, calculate the probability that if this couple has a child, the child will have sickle-cell disease.

Solution:

The sickle-cell disease in people is determined by the following genotypes:

ss – sickle-cell disease

SS-healthy

Ss-healthy

Elaine – healthy	Jerry - healthy
Elaine`s sibling – sickle-cell disease	Jerry`s sibling - sickle-cell disease
Elaine`s parents - healthy	Jerry`s parents – healthy

From this information, Elaine`s and Jerry`s parents must have at least one copy of the "s" allele, as their sons (Elaine's and Jerry's siblings) have sickle-cell disease. So, Elaine and Jerry are heterozygotes - "Ss".

P: ♀ Ss   ₓ   ♂Ss

G: S,s | S,s

F_1:

	S	s
S	SS (25%)	Ss (25%)
s	Ss (25%)	ss (25%)

Answer:

The couple will have a child with sickle-cell disease with the probability of ***25%.***