Quiz 4

1. The recurrence risk of heart disease in the monozygotic twin of a proband is 38%; in a dizygotic twin it is 16%; and in a full sibling it is 7%.

a) Why is the recurrence risk less for a dizygotic twin then it is for a monozygotic twin?

*Because heart disease has a genetic component, and monozygotic twins share 100% of their genes, while dizygotic share only 50%.*

b) Why is the recurrence risk less for a full sibling then it is for a dizygotic twin?

*Because heart disease has an environmental component. Although dizygotic twins share the same number of genes as full siblings, twins have a more similar environment than other siblings, both in the womb and throughout their childhoods.*

2. Below are three different pedigrees showing two parents and their daughter. The genotypes for several linked genetic markers are shown for each individual. For each pedigree write down every possible haplotype phase of the daughter. (There may be more than one)

A1A2

B1B2

A1A2

B2B3

A1A2

B1B3

A1A2

B1B2

A1A3

B2B3

A1A3

B2B3

A1A2

B1B2

C1C2

A1A2

B2B3

C1C3

A1A2

B1B3

C1C3

a) b) c)

*a) A1 B1/A2 B3 or A1 B3/A2 B1*

*b) A1 B2/ A3 B3*

*c) A1 B1 C1/A2 B3 C3 or A1 B3 C3/ A2 B1 C1*

3. HindIII is a restriction enzyme which cuts at the six base pair motif:

 

and results in the following restriction map for Bob and Jane over an 8kb region of the human genome.

 Bob Jane

8kb

5kb

3kb

a) Assume there are 3 HindIII restriction sites associated with this 8kb region. What is the most likely reason for the difference between Bob and Jane's restriction maps?

*On both of Jane’s alleles and one of Bob’s the center “restriction site” is different from the motif recognized by HindIII and thus does not cut there. The result is one 8 kb fragment.*

b) Bob and Jane have a daughter named Sue. Draw out all possible restriction maps for Sue (assume that no new mutations have occurred). Note: You may not need to use all the spaces provided.

 Sue Sue Sue Sue

8kb

5kb

3kb