

1. Calculate population genotype frequencies

- Assume HWE ($F_{ST}=0$)
- Allele frequencies (X locus):
 - Allele 10 = 0.12
 - Allele 11 = 0.34
 - Allele 12 = 0.21
 - Allele 13 = 0.19
 - Allele 14 = 0.24
- Genotypes and population genotype frequencies
 - Mother (female) = 12/12, => ???
 - Child (female) = 10/14 , => ???
 - Alleged Father (male) = 13, , => ???

2. Calculate posterior probabilities with different priors

- LR = 1,000
- Test a range of prior odds (1/1000, 1/100, 1/10, 1/1, 10, 100,1000)
- Discuss the results and consequences

3. Calculate posterior probabilities

- $LR=100$
- Priors: $\Pr(H_1) = 0.1$, $\Pr(H_2) = 0.9$
- What is the posterior probability for H_1 , $\Pr(H_1|E)$?

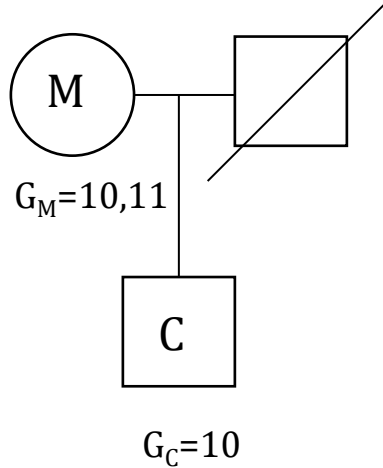
4. Test the impact of priors

- Consider two hypotheses (H_1 and H_2), and that the LR has been estimated to 398. What will the posterior probability be given that the prior probability for H_1 is 0.01? or 0.5? or 0.9?
- Discuss: Implications
- Discuss: Who should set the priors?
- Discuss: Who should set up the hypotheses?

5. Three hypotheses, calculate the posteriors

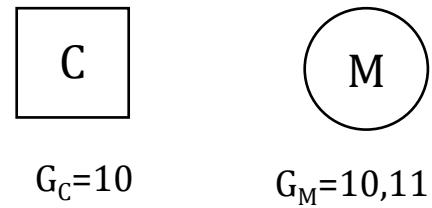
- H_1 : The tested man is the biological father of the child
- H_2 : The tested man is the paternal uncle to the child
- H_3 : The tested man is unrelated to the child
- Likelihood, $\Pr(\text{DNA}|H_1) = 0.0123$
- Likelihood, $\Pr(\text{DNA}|H_2) = 0.32$
- Likelihood, $\Pr(\text{DNA}|H_3) = 0.0010$
- **LRs? (H_1/H_3), (H_1/H_2)**
- **Posterior probabilities? (assume equal priors)**

Maternity duo (X locus)



H1: M is mother to C

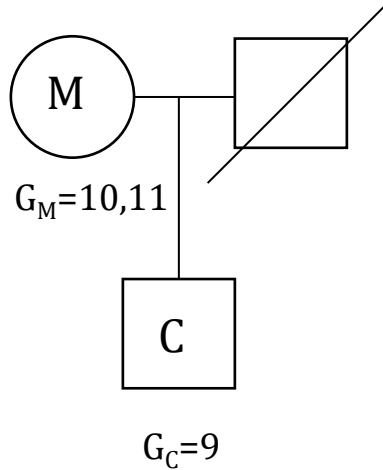
VS



H2: M and C are unrelated

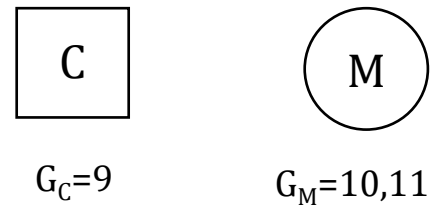
LR? (the algebraic formula)

Maternity duo-mutation (X locus)



H1: M is mother to C

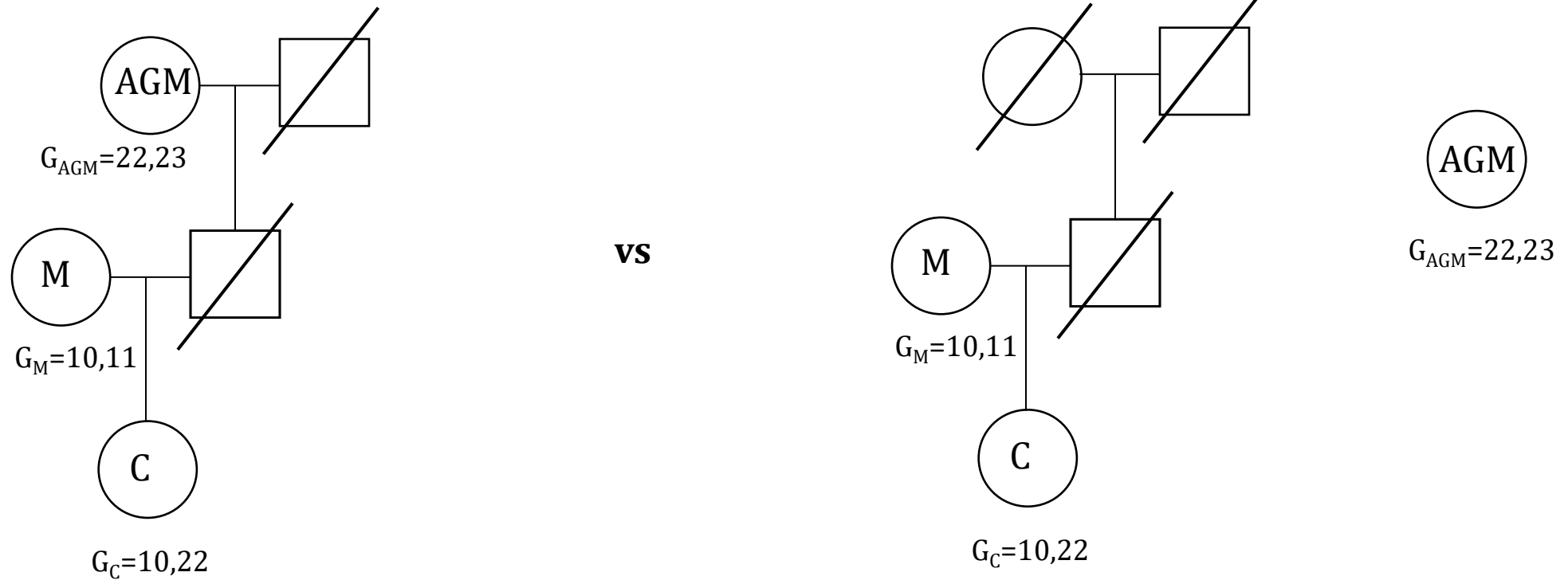
VS



H2: M and C are unrelated

LR? (the algebraic formula)

Alleged paternal grandmother



H1: AGM is paternal grandmother to C. M is mother to C H2: AGM and C are unrelated. M is mother to C

LR? (the algebraic formula)

In the case scenarios below, are autosomal or X-chromosomal markers generally more informative?

Case scenario	Autosomal	X-chromosomal	Similar
Full siblings vs mat half siblings (female children)			
Full siblings vs mat half siblings (male children)			
Full siblings vs pat half siblings (female children)			
Full siblings vs pat half siblings (male children)			
Maternal half siblings vs unrelated (female children)			
Maternal half siblings vs unrelated (male children)			
Paternal half siblings vs unrelated (females children)			
Paternal half siblings vs unrelated (male children)			
Paternal uncle vs unrelated (female child)			
Paternal uncle vs unrelated (male child)			
Paternal aunt vs unrelated (female child)			
Paternal aunt vs unrelated (male child)			
Paternal grandmother vs unrelated (female child)			
Paternal grandmother vs unrelated (male child)			
Paternal grandfather vs unrelated (female child)			
Paternal grandfather vs unrelated (male child)			