

# 1. Calculate population genotype frequencies

- Assume HWE ( $F_{ST}=0$ )
- Allele frequencies:
  - 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
  - AF = 12/12, => ???
  - M = 10/14 , => ???

## 2. Calculate population genotype frequencies

- Assume substructure ( $F_{ST}=0.03$ )
- Allele frequencies:
  - 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
  - AF = 12/12, => ???
  - M = 10/14 , => ???



### 3. 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



## 4. Calculate posterior probabilities

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

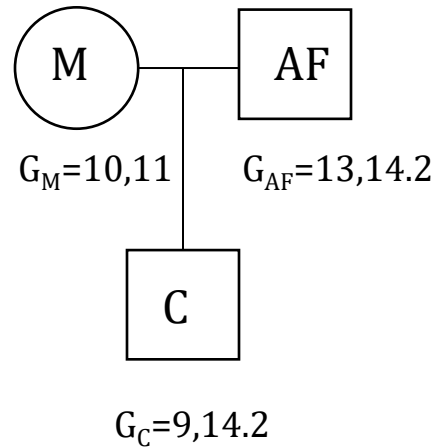
## 5. Test the impact of priors

- 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?

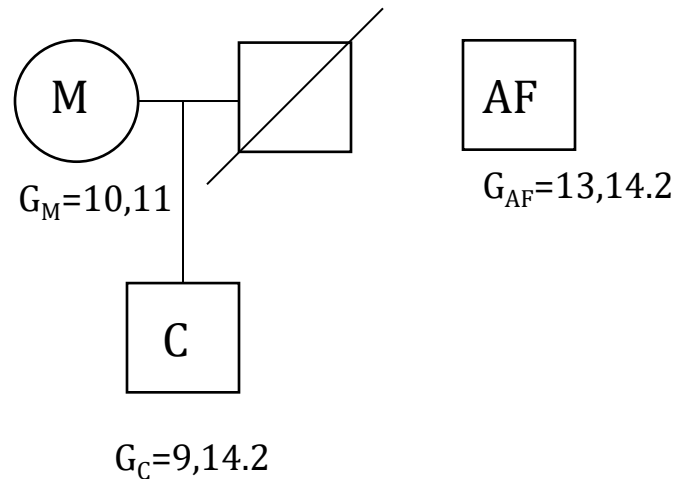
## 6. Three hypotheses, calculate the posteriors

- $H_1$ : The tested man is the biological father of the child
- $H_2$ : The tested man is the 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)**

## Paternity trio – maternal mutation

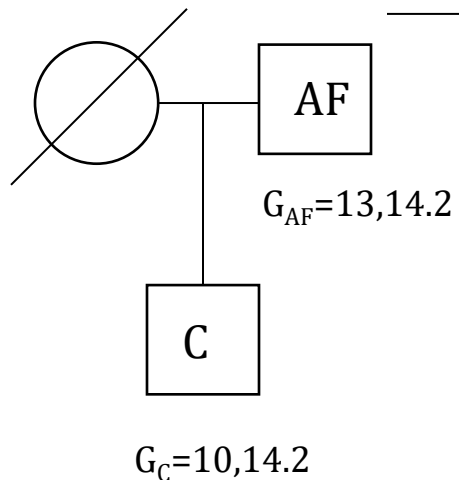


LR? (the algebraic formula)

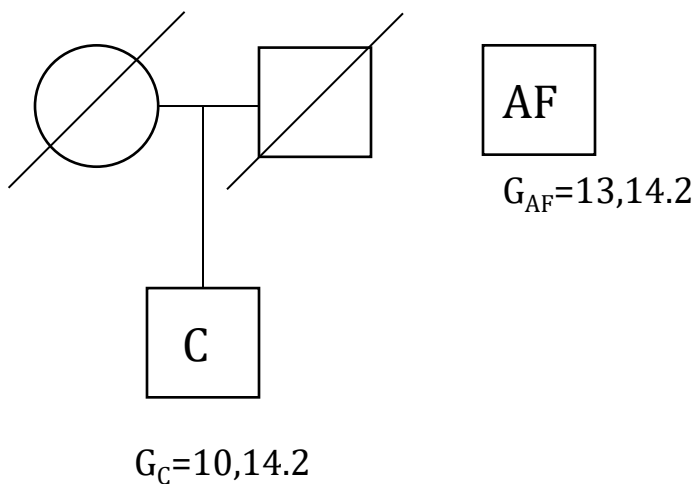




# Paternity Duo -1

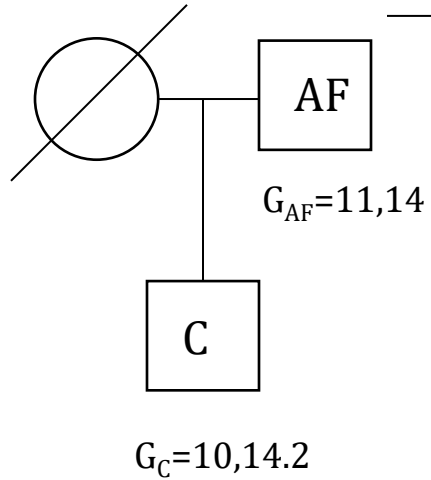


LR? (the algebraic formula)

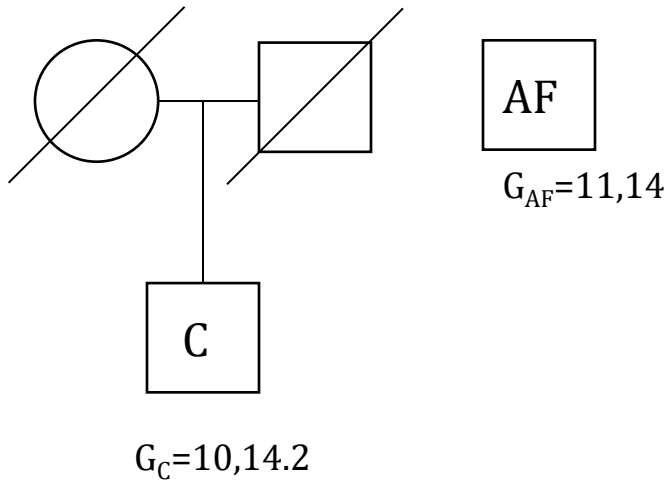




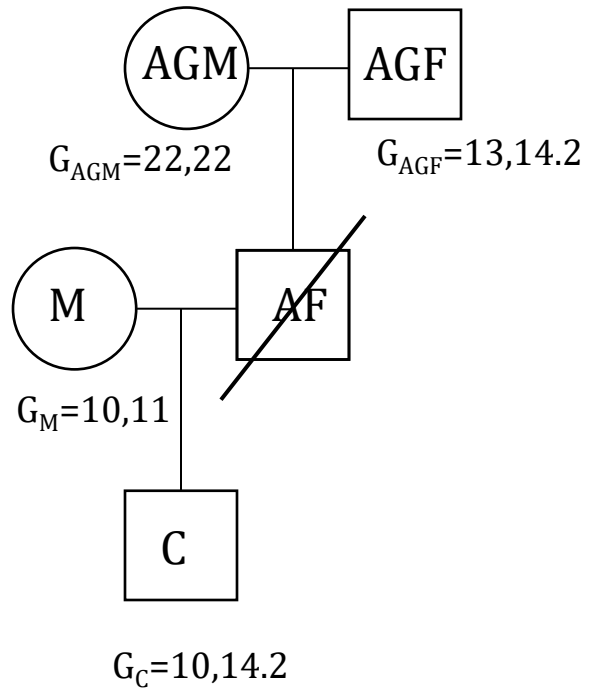
## Paternity Duo –mutation



LR? (the algebraic formula)



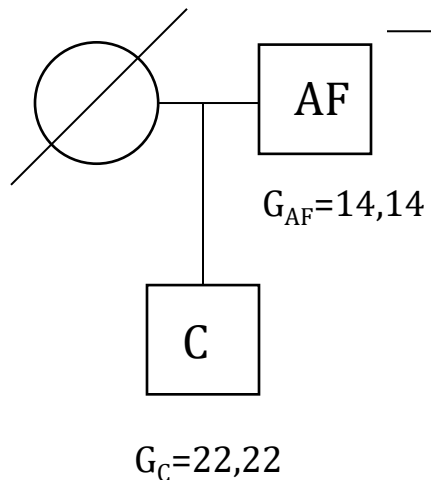
# Alleged paternal grandparents



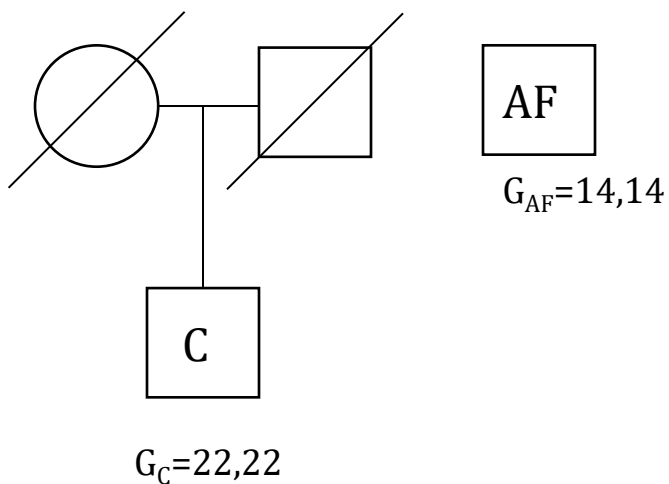
LR? (the algebraic formula)



## Paternity Duo –silent



LR? (the algebraic formula)





# Defining the hypotheses (two or more if needed)

## Missing person investigation

- 1) Reference = twin (mono or not is unknown)?
- 2) Reference = child and mother of the child?
- 3) Reference = both parents of the missing?
- 4) Reference = paternal uncle and mother of the missing?