

Understanding the Genetic Heritability of Male Pattern Baldness

Nicole Couture & Harrison Piper



What is, Male Pattern Baldness?

Androgenetic alopecia, or male pattern baldness, is the most common form of hair loss that affects both men and women.

In 2017, a study was done on 954 patients and found that androgenetic alopecia prevalence was found in 67.1% of men and 23.9% of women (Salman et al., 2017).



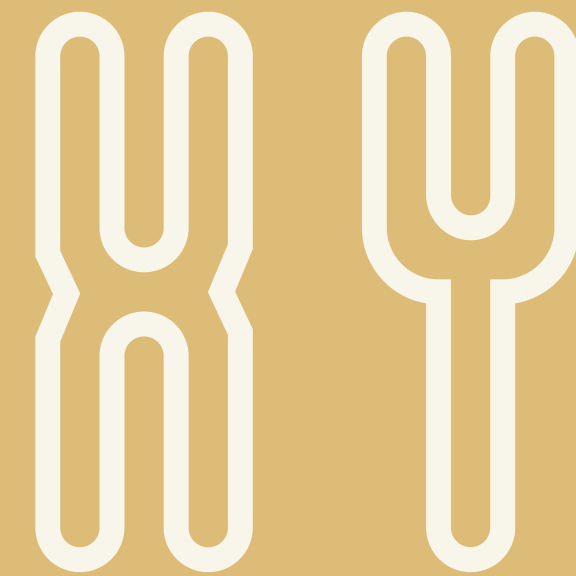


Genetic Origins of Male Pattern Baldness

Though it is known that androgenetic alopecia is fairly common, the origins of what causes this genetic hair loss condition is still unknown.

However, a promising study was released completed by The University of Melbourne in which researchers at the university aimed to determine if the **androgen receptor gene** is associated with male pattern baldness.

What are Androgen Receptor genes?



The gene encoding androgen receptor (AR), alternatively known as the dihydrotestosterone (DHT) receptor, is located on the X chromosome.

The androgen receptor is a type of nuclear receptor that is activated by binding any of the androgenic hormones. The main function of the AR is to regulate gene expression.

Possible **Androgen** **Receptor Genes** Associated with Male Pattern Baldness:

1

Stu1

Androgen receptor restriction
fragment polymorphism (rs6152
SNP)

2

CAG

Androgen Receptor repeat
polymorphism that is correlated to
AR activity

3

GGC

Androgen Receptor repeat
polymorphism that is correlated to
AR activity



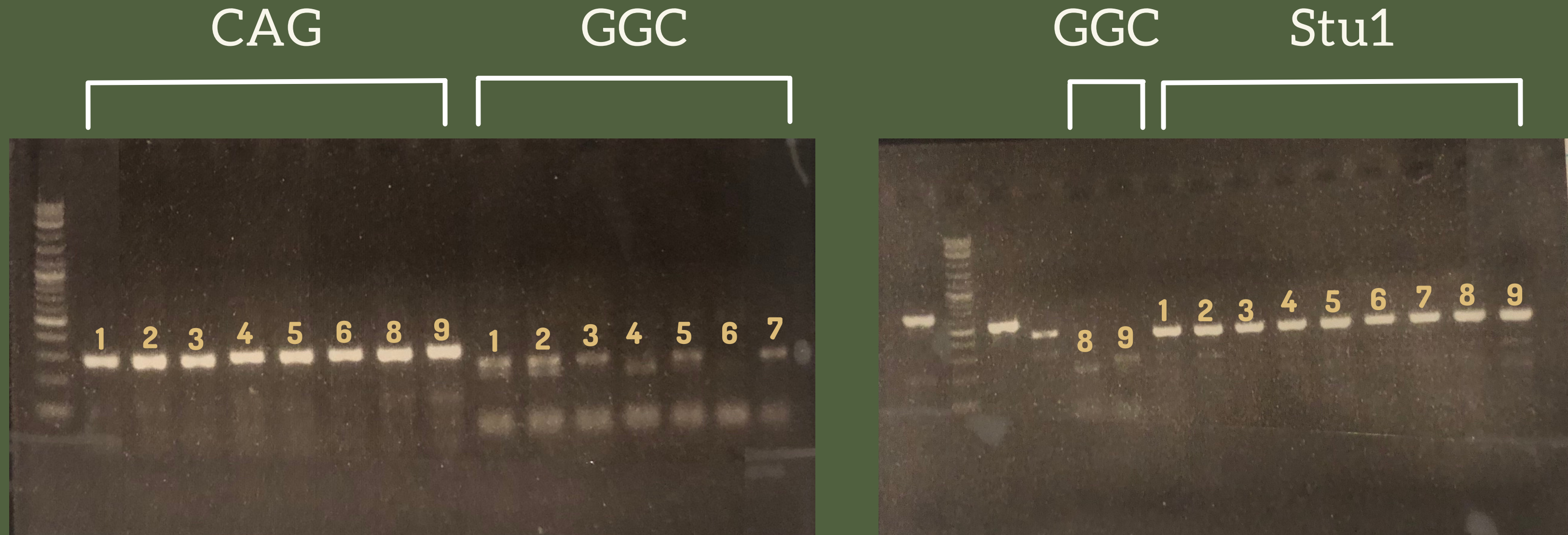
Research Objective

Collect genomic DNA samples from 8 genetically related individuals who may or may not express male pattern baldness and compare allele frequencies of the three different **androgen receptor gene polymorphisms** that may contribute to male pattern baldness.

Protocol

- Collect ~200ul of saliva sample from 8 genetically related individuals
- Isolate genomic DNA from saliva samples
- Measure the concentration of the genomic DNA samples
- Prepare primers for amplification of androgen receptor polymorphisms
- Complete PCR experiments for all 8 DNA samples for the three possible androgen receptor polymorphisms
- Purify the PCR product to remove any additional nucleotides
- Send all samples and primers to Sequetech for DNA sequencing using Ion Torrent technology
- Analyze data to identify androgen receptor polymorphisms

Results

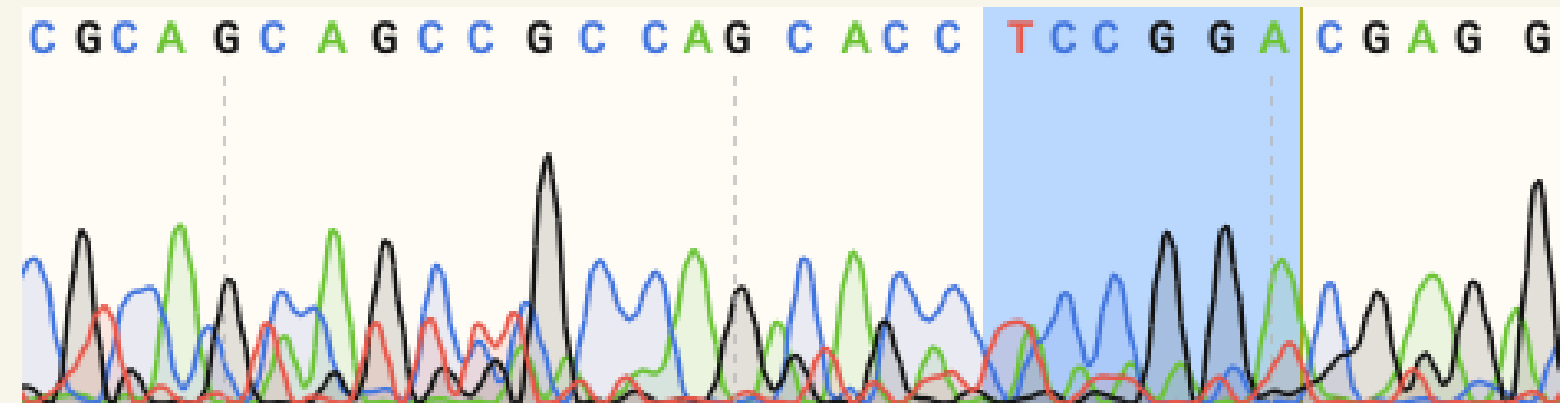


After running our PCR experiment on the DNA samples, it can be seen that all genetically related family members have a significant amount of the CAG repeat polymorphism, as does the control DNA (#9). It can also be seen that all samples have the GGC triple repeat polymorphism except for sample #6 which has significantly less repeats. Finally, this PCR data also tells us that all of the DNA samples have the AR restriction site as expected.

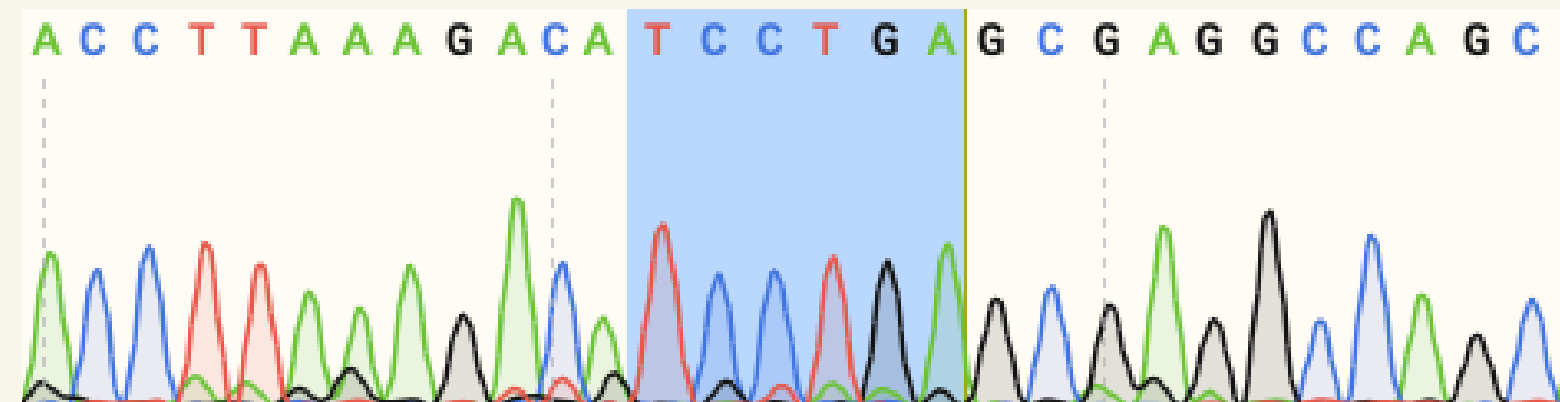
Results

Sequetech Ion Torrent Next Generation Sequencing

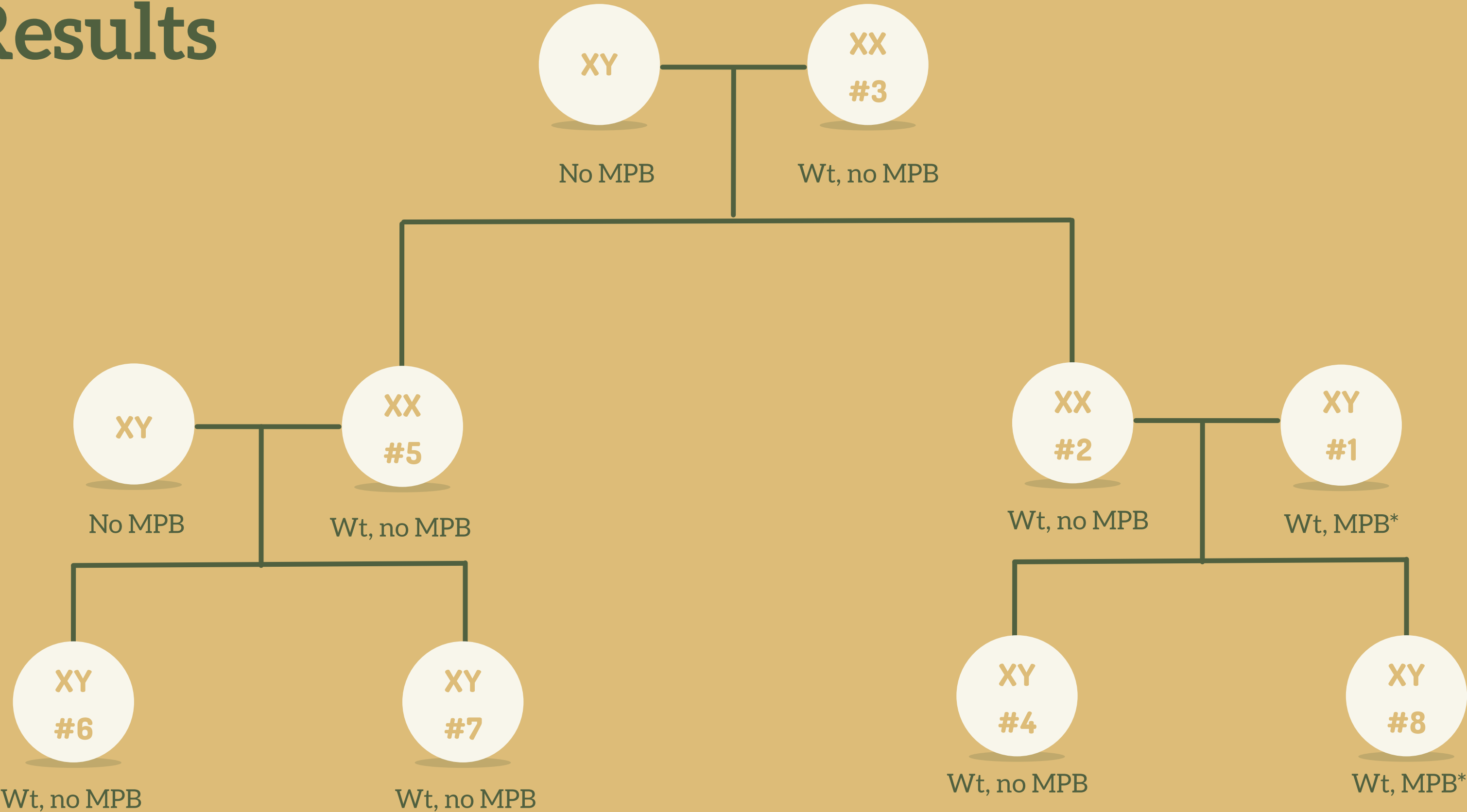
All 8 related family members had the presence of the **wild type** allele for the Stu1 AR gene.



Control DNA with the **G to A mutation**. This mutation is on the X chromosome and prevents baldness.



Results



Conclusion

In concluding this experiment, we have demonstrated that the presence of the wild type Stu1 Gene and triple repeat polymorphisms (CAG & GGC) doesn't guarantee the presence of MPB in young adults.

However, this experiment would have to be completed on a larger scale and may be repeated in later life to determine if MBP would develop throughout life.



Thank you for your time!

Any Questions?



References

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