## The Gene Orchestra Behind Cholesterol Balance

By Mihlali Madikane

Suppose you go on a date, two people eat the same plate of food that is rich in oils, meat, and fats. However, hours later one is perfectly fine while the other's blood test shows dangerously high cholesterol and triglyceride levels. Same meal yet their bodies respond differently. This is because of our DNA, our bodies run on instructions written in it. You can think of DNA as a recipe book. Each gene is like a recipe for how our bodies should handle fats, sugars, and cholesterol. But oftentimes, tiny spelling changes can sneak into the recipe, and these are called genetic variants. More often, the recipe will still work fine but some variants can change how the body processes food, that means cholesterol builds up, triglycerides spike, and the risk of heart disease increases.

This is particularly paramount in diabetic dyslipidaemia, a metabolic complication of type 2 diabetes characterized by elevated triglycerides, low HDL cholesterol, and abnormal LDL particles. It represents a dangerous imbalance in lipid metabolism that accelerates cardiovascular risk.

To bring this complex story to life, let's dive in on three fascinating genes CETP, LCAT, and RETN. These aren't the only genes involved, but they illustrate beautifully how tiny genetic changes can result in notably huge differences in cholesterol balance.

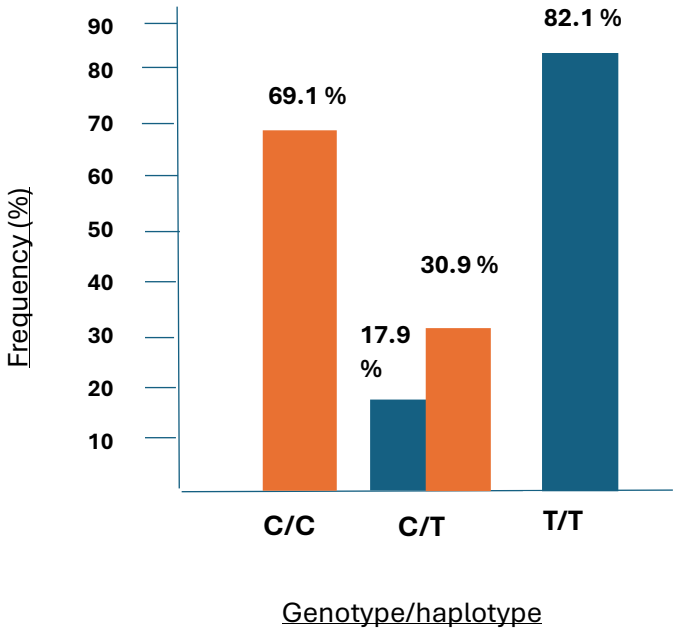
Do the variations on these genes influence cholesterol handling in people with type 2 diabetes. Could these genetic differences explain why some patients develop severe complications while others don't?

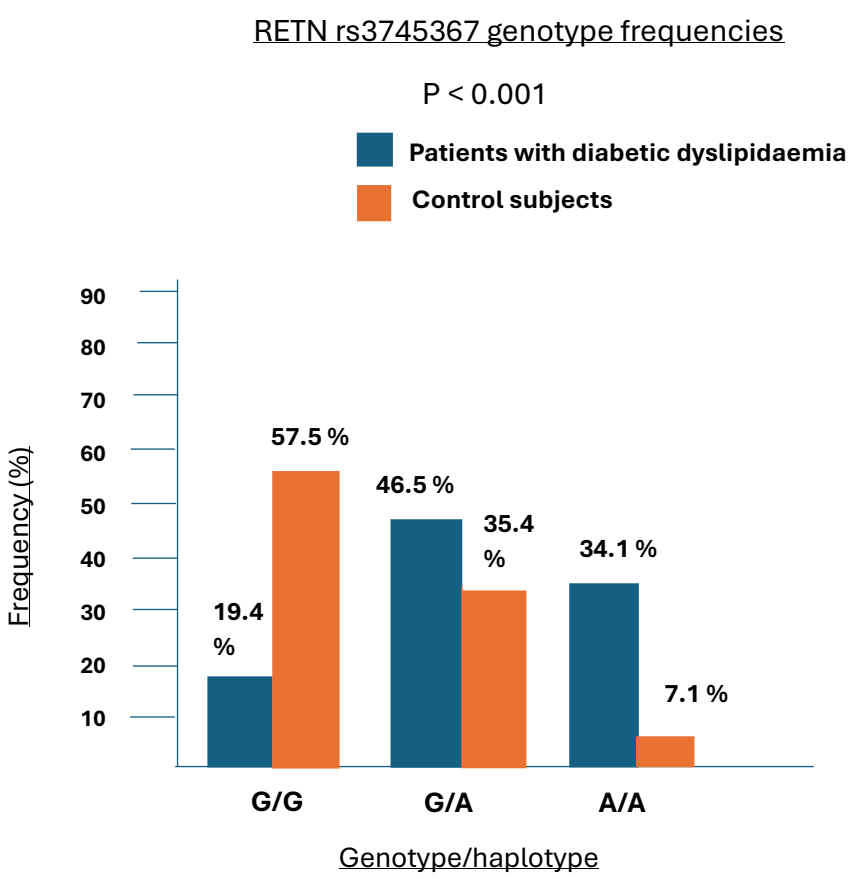
### METHODS

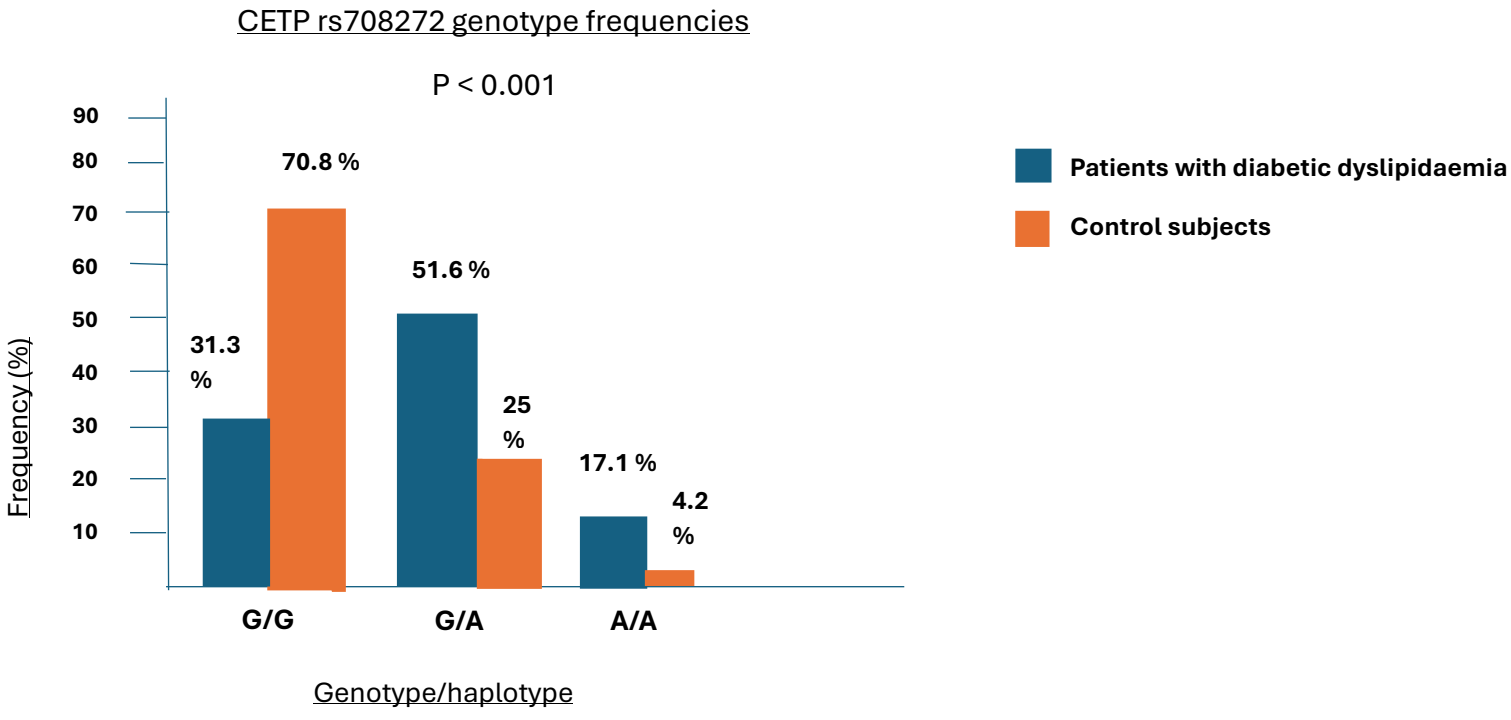
The researchers conducted a case–control study with patients from Ege University (2007–2011) with 217 diabetic patients and 212 healthy controls. Diabetes was diagnosed using standard glucose and HbA1c thresholds. Dyslipidaemia was defined by high triglycerides (>200 mg/dL) and/or low HDL (<45 mg/dL). Clinical records were reviewed, and blood samples were taken to measure glucose, HbA1c, and cholesterol levels. The lipid related genes were tested for specific polymorphisms (including CETP, LCAT and RETN) using Roche Light Cycler technology. Genotypes were identified by differences in melting curves (wild-type, heterozygous, or polymorphic). Biochemical results were compared across genotypes between patients and controls. Statistical tests included t-tests, chi-square, and normality checks, with significance set at $p < 0.05$.

**RESULTS**

Genotype distributions and allele frequencies of *RETN* (rs3745367)), *LCAT* (rs2292318) and *CETP* (rs708272) gene polymorphisms in the study groups.



(Note: The results were represented in a table but have been modified and presented in a graph here, adapted from Vardarlı et,al; 2017)

## CONCLUSION

Observing the cases and the control subjects, certain variants are present in patients with diabetic dyslipidaemia (cases) and yet absent in the control subjects and vice versa. This shows that some variants in the certain genes do predispose an individual to the disease and increase the susceptibility to diabetic dyslipidaemia. The combined findings indicate that genetic polymorphisms in RETN, LCAT, and CETP are significantly associated with diabetic dyslipidaemia with the p value being $p < 0.001$. These genes could serve as biomarkers for identifying individuals at higher risk of developing dyslipidaemia in the context of T2D. This in turns guides treatment and precision medicine in healthcare.

## References

Vardarlı, A.T., Harman, E., Çetintaş, V.B., Kayıkçıoğlu, M., Vardarlı, E., Zengi, A., Küçükaslan, A.Ş. and Eroğlu, Z., 2017. Polymorphisms of lipid metabolism enzyme-coding genes in patients with diabetic dyslipidemia. *The Anatolian Journal of Cardiology*, *17*(4), p.313.