



Evaluation of milk and lactose sensitivity in lactase non-persistence genotype

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Background

- Lactase non-persistence, characterized by inactivity of the lactase enzyme post weaning, results in lactose intolerance. Approximately 75% of the world's population exhibit this trait.
- The single nucleotide polymorphisms (SNPs) C/T₁₃₉₁₀ and G/A₂₂₀₁₈ are associated with lactase persistence traits but the degree that differing lactase persistence genotypes relate to symptoms and biomarkers of lactose malabsorption (breath H₂), especially in response to milk, is not well defined
- The lactose in conventional milk (containing A1 β-casein) and a2 milk™ (A1 β-casein free) may be absorbed differently.

Methods

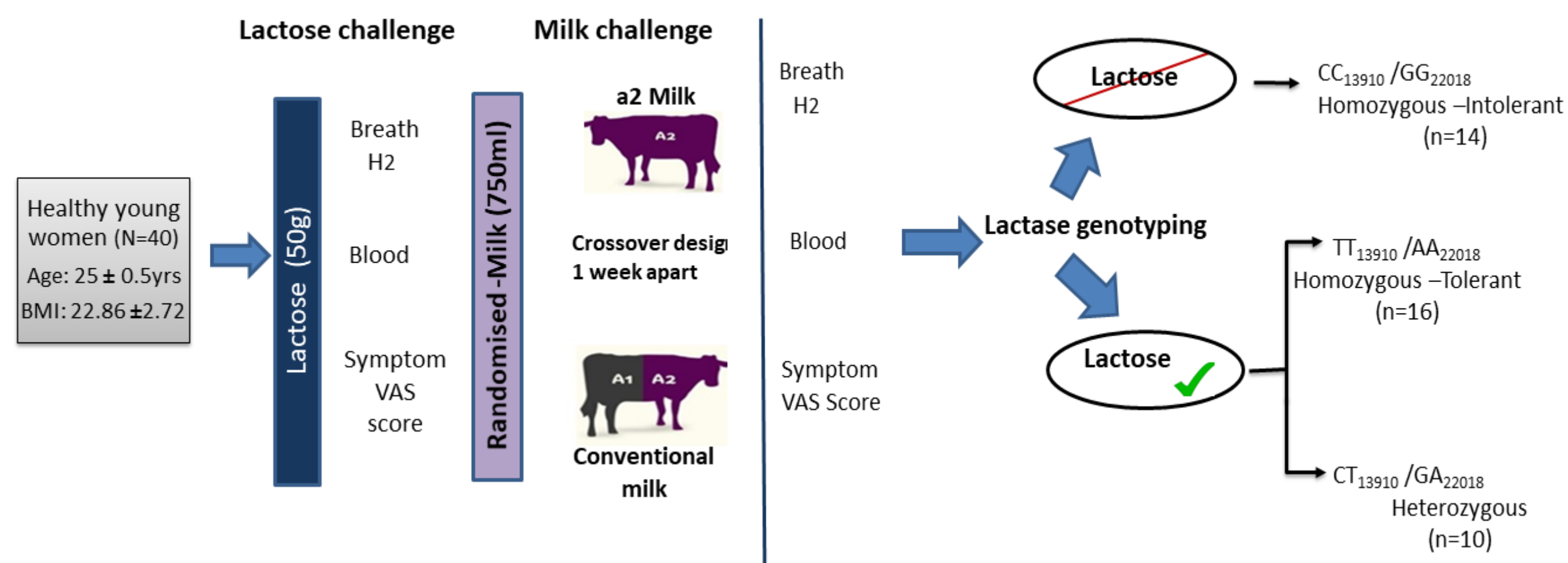
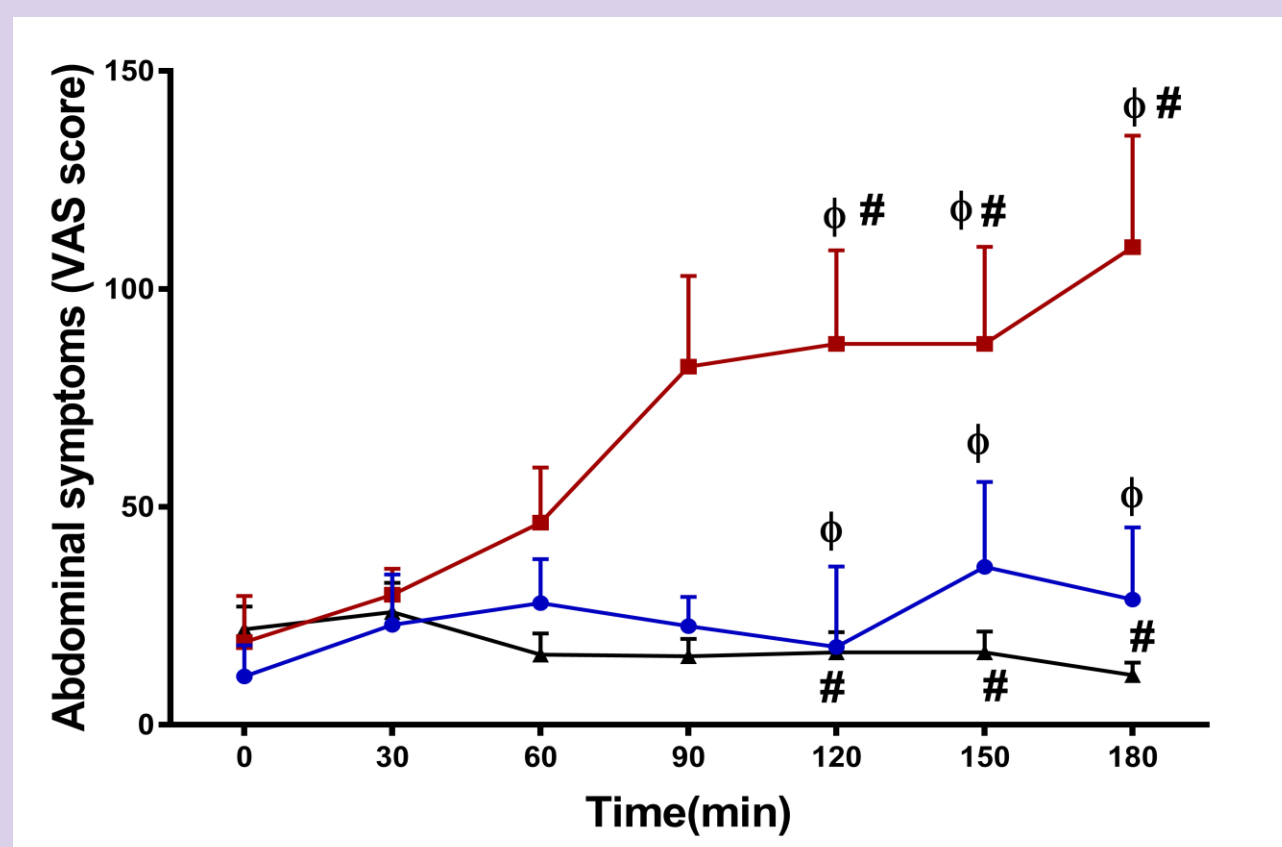
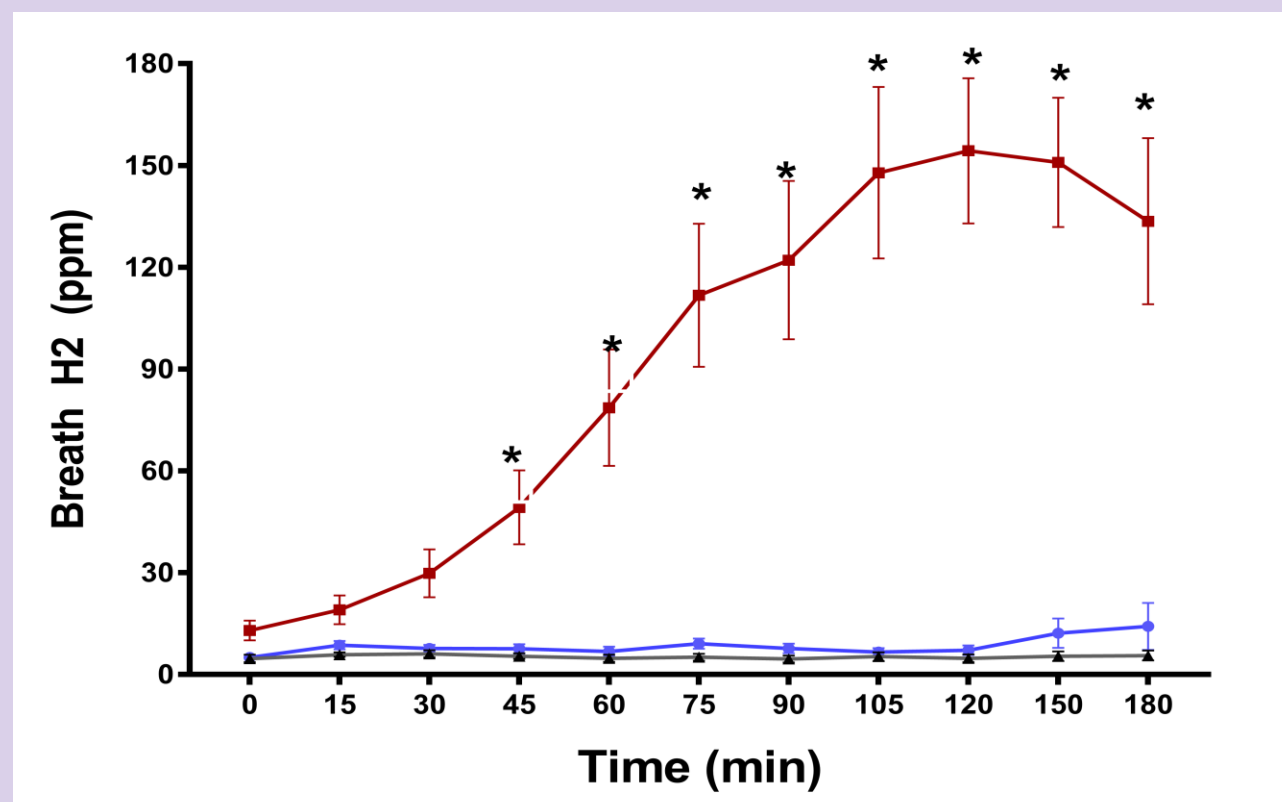


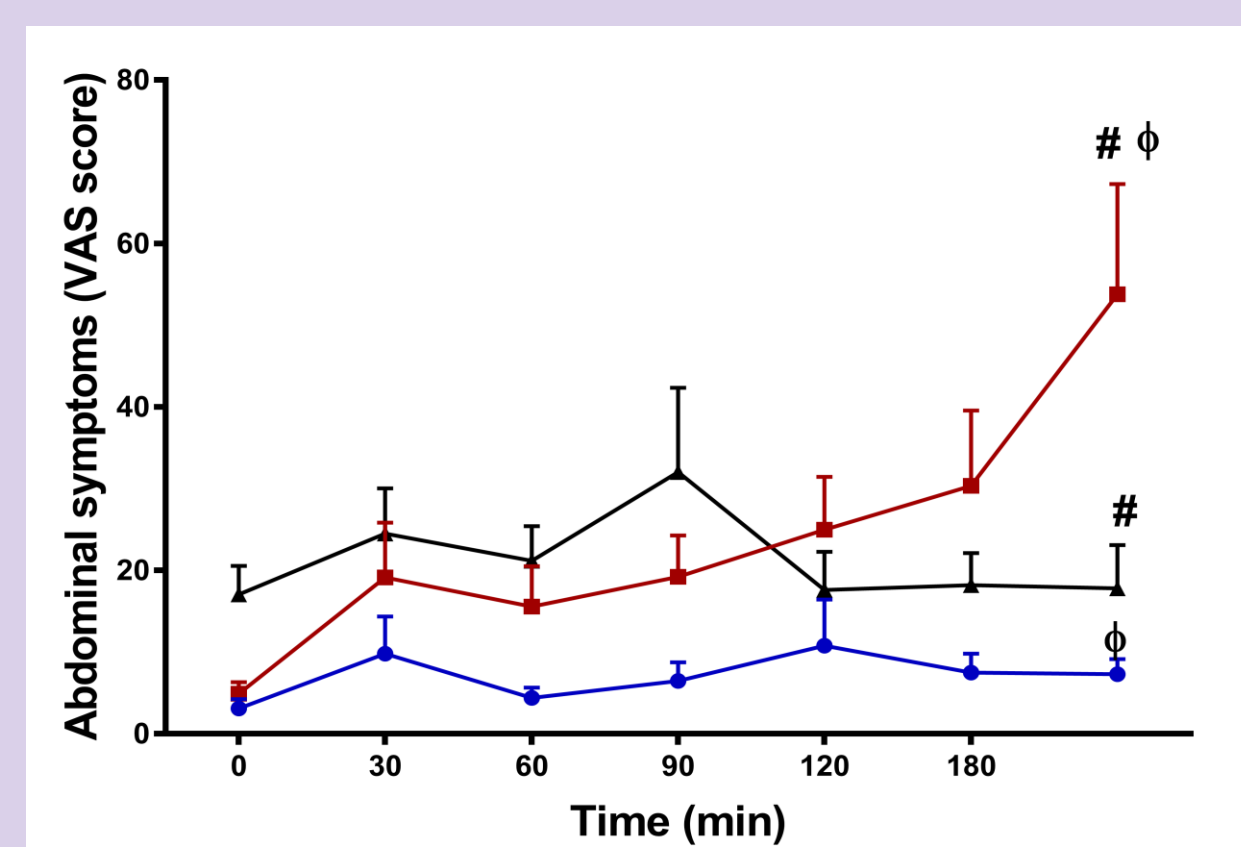
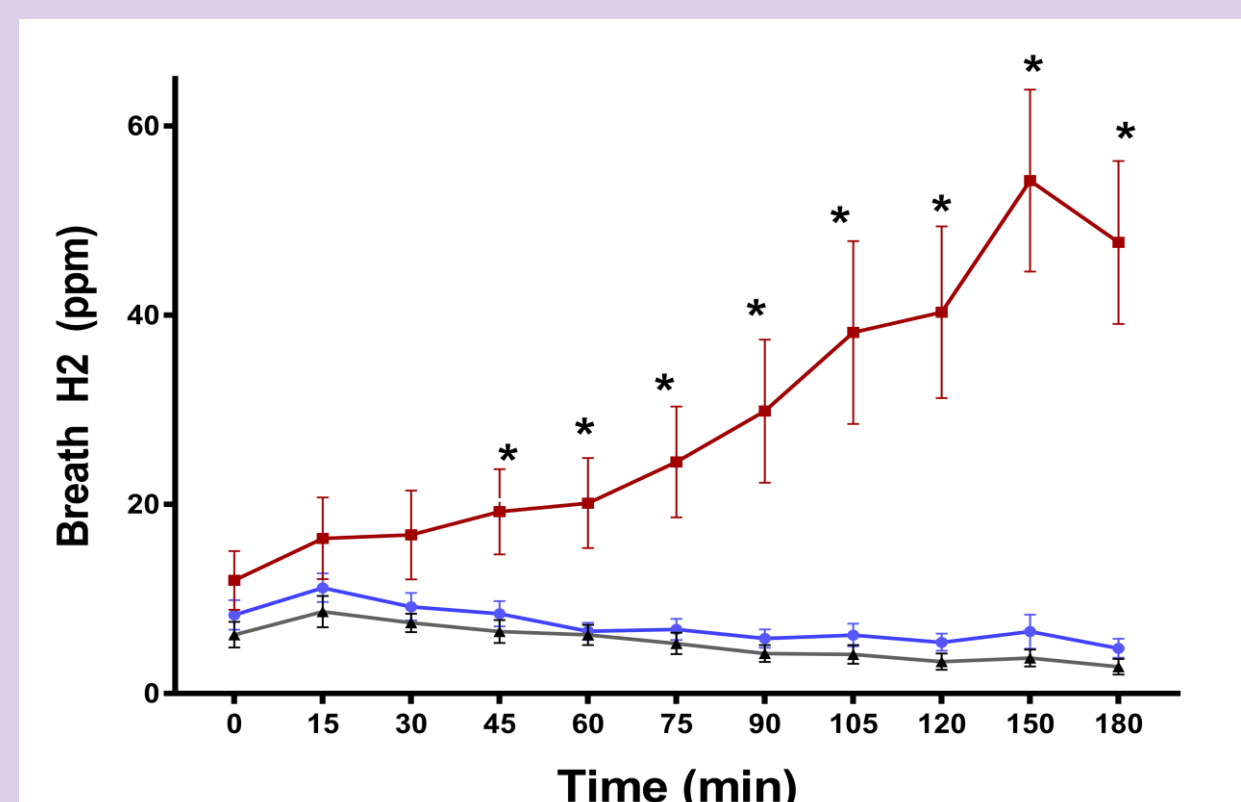
Fig 1) Study design from participant recruitment to intervention, sample collection to group identification by genotyping using restriction fragment length polymorphism.

Results

Post Lactose Ingestion



Post Milk Ingestion



—●— Homozygous intolerant —■— Homozygous tolerant —▲— Heterozygous

Fig 2. Measure of lactose malabsorption in different genotypes after lactose and milk ingestion.
Breath H₂ concentration after a) lactose b) after milk
Abdominal symptoms after c) lactose and d) after milk
* denotes concentration of H₂ is significantly different between homozygous intolerant compared to the other genotypes.
Φ denotes abdominal symptoms are significantly different between heterozygous and homozygous intolerant
denotes abdominal symptoms are significantly different between homozygous tolerant and homozygous intolerant

Objective

- To explore the differences in lactose intolerance of different genotypes in response to lactose, and to milks with differing casein composition.

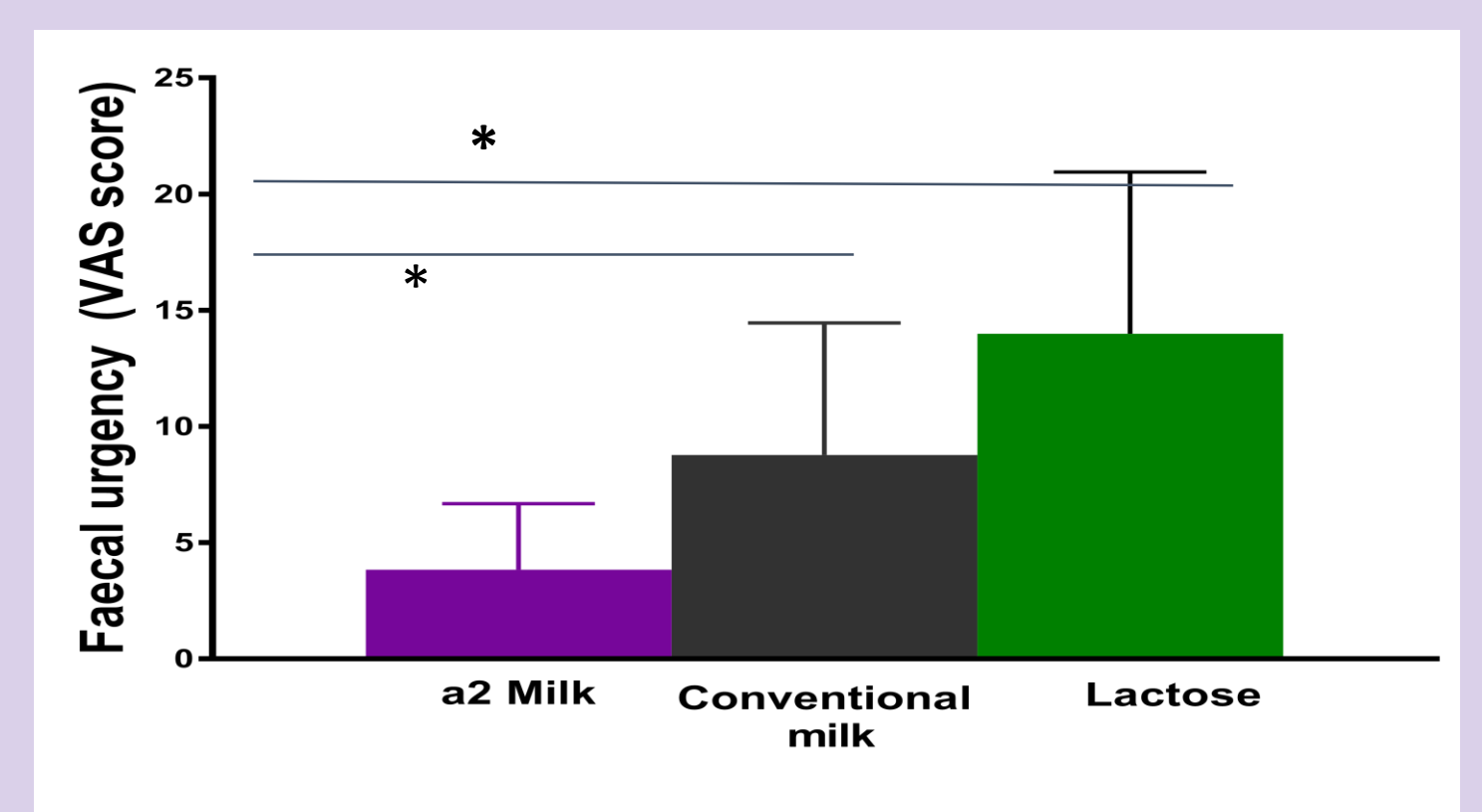
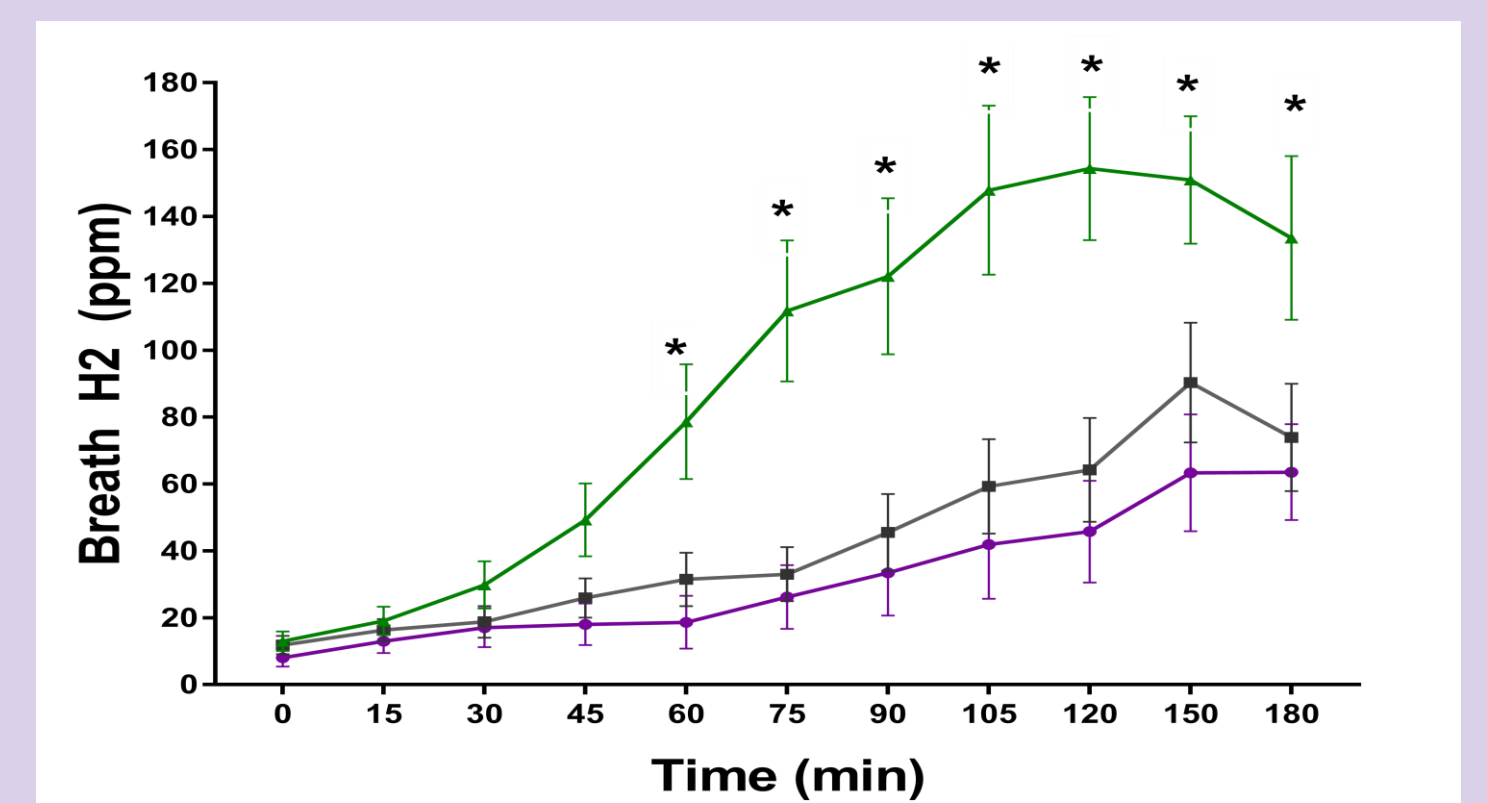
Hypothesis

- The differences in the β-casein content of milk (conventional milk (A1+A2 β-casein), and a2 Milk™, (A1 β-casein free) may influence the lactose absorption which can be accessed by breath H₂ and abdominal symptoms after milk ingestion..

Discussion

- Homozygous intolerant individuals reported greater increase in breath H₂ and digestive symptoms (abdominal cramps, rumbling, flatulence and diarrhea) after milk and lactose ingestion compared to the other genotypes.
- There was also difference in the breath hydrogen and digestive symptoms between lactose and milk ingestion in homozygous intolerant individuals that was absent in the other genotypes.
- Furthermore, these genotypes reported reduced faecal urgency after a2 Milk™ compared to conventional milk.

Homozygous Intolerant



—●— Lactose —▲— a2milk —■— Conventional milk

Fig 3 Postprandial changes in breath H₂ after lactose, conventional milk and a2 milk in Homozygous intolerant individuals.
a)Breath H₂ after lactose, a2 and conventional milk,b)Faecal urgency after a2 milk vs conventional milk ,*denotes faecal urgency experienced was significantly greater after conventional milk and lactose compared to a2 Milk.

Conclusions

- Homozygous intolerant individuals (CC₁₃₉₁₀/GG₂₂₀₁₈) had greater malabsorption and digestive discomfort to lactose and milk compared to other genotypes, with the intensity being higher for lactose compared to milk. The prevalence of this genotype is not well established, however it is apparent that these individuals have very limited capacity to tolerate lactose.
- Homozygous intolerant genotype experienced less faecal urgency after a2 Milk™ compared to the conventional milk and lactose. However, long term ingestion of a2 Milk™ may provide better understanding of its benefits in these individuals.