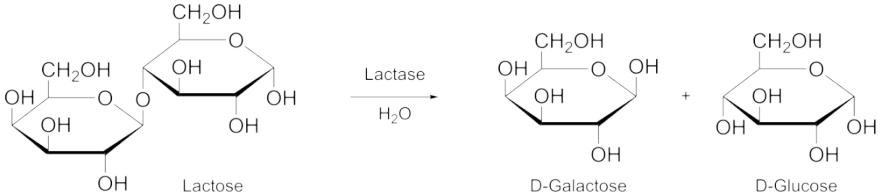




SNP SUMMARY: LACTASE (LCT) -13910 C>T (or MCM6)

Overview	Lactose intolerance or lactase non-persistence (LNP) is the syndrome of diarrhea, abdominal pain, or flatulence, occurring after lactose ingestion. These symptoms are caused by a decreased ability to hydrolyze lactose due to a decrease in lactase expression, which is associated with a gene variation upstream from the lactase gene.
Name of gene	Lactase gene
Symbol of gene	LCT
Gene database	http://www.ncbi.nlm.nih.gov/SNP/snp_ref.cgi?rs=rs4988235
rs number	rs4988235
Base change	C>T
Position on gene	-13910 upstream of the lactase transcriptional start site. The SNP is located in an intron of the adjacent gene minichromosome maintenance 6 (MCM6).
SNP's nomenclature	<i>LCT</i> -13910 C>T

Population frequency	<p>It is found predominantly in European / Caucasian populations</p> <ul style="list-style-type: none"> • Caucasian CC=26.7%, CT=13.3%, TT=60% • African/African American CC=79.2%, CT=20.8%, TT=0% • Hispanic CC=52.2%, CT=39.1%, TT=8.7%
Name of enzyme	<p>Lactase or lactase-phlorizin hydrolase (LPH) enzyme</p>
Impact of SNP on biological pathway	<ul style="list-style-type: none"> • Lactose is hydrolysed by the enzyme lactase into monosaccharides galactose and glucose utilised for energy. • Lactase gene expression is turned off after the weaning phase and therefore individuals may have a decreased ability to hydrolyze lactose. • Leading to a condition known as Lactose intolerance/non-persistence. • Not all mechanisms as to how gene expression is turned off or reduced are known but possible explanations involve the activator or repressor molecules. • Various studies have demonstrated that the -13910 C>T SNP is functional and is associated with changes in LCT gene expression. • Individuals homozygous for the C allele (CC genotype) have almost undetectable levels of intestinal lactase production compared to TC or TT individuals.
Biochemical pathway	<p>http://interactive-biology.com/wp-content/uploads/2012/08/Lactase-hydrolysis1-1024x232.png</p>  <p>The diagram illustrates the biochemical pathway of lactose hydrolysis. On the left, a lactose molecule is shown as a disaccharide composed of two pyranose rings linked by an oxygen atom. The top ring is D-galactose and the bottom ring is D-glucose. An arrow labeled 'Lactase' with 'H₂O' below it points to the right. On the right, the products are shown: a D-galactose molecule and a D-glucose molecule, each as a single pyranose ring.</p>
Nutrient interaction	<p>Lactose is hydrolysed into D-galactose and D-glucose in the presence of adequate lactase enzyme.</p>
Established diet-gene	<p>Identification of a CC genotype is likely to predict the presence of lactase non-persistence (lactose intolerance), a TT genotype</p>

interactions	will frequently, but not perfectly, predict lactase persistence, and a TC heterozygote genotype will not predict the phenotype, but should warrant further investigation.		
Potential dietary recommendations	<ul style="list-style-type: none"> • General tolerance level = 12g of lactose. • Intake of cheese and yoghurt is better tolerated, large amounts of milk consumption is restricted. • Lactase enzymes can be ingested concomitantly with lactose-containing food products. 		
Lactose content in various foods	Lactose containing food	Household quantity and grams (g) of lactose	Quantity of food product providing approximately 12 g of lactose
	Milk	250 ml/1 cup = 12 g	250 ml/1 cup
	Yogurt	125 g (1 small tub) = 3.0-3.75 g	375 g
	Cream	100 g = 3 g	400 g
	Ice cream	125ml/1/2 cup = 6 g	250ml/1 cup
	Cottage cheese, low fat	1/2 cup = 4-5 g	250ml/1 cup
	Cheddar cheese	30g (matchbox-size) = 0 g	360 g
	American, Swiss, or Parmesan cheese	30 g (matchbox-size) = 0-1 g	360 g
Examples of lactose-containing food consumption	Providing approximately 12 g of lactose: <ul style="list-style-type: none"> • 1 cup of milk and 30 g of Cheddar cheese OR <ul style="list-style-type: none"> • ½ cup of Ice-cream and ½ cup of milk and 30g of cheddar cheese OR <ul style="list-style-type: none"> • 1 tub 125g of yogurt and ½ cup of milk and ½ cup of low fat cottage cheese 		

References

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