



**Maeve Hanan**  
Registered  
Dietitian  
City Hospitals  
Sunderland, NHS

## LACTOSE INTOLERANCE

**Lactose is a disaccharide sugar mainly found in dairy products such as milk, cheese and yoghurts. Lactose intolerance can cause uncomfortable and sometimes severe symptoms. This article explores the background, diagnosis and treatment options for the different types of lactose intolerance which can present.**

Maeve works as a full-time Paediatric Dietitian in City Hospitals Sunderland. She also runs a blog called Dietetically Speaking.com which promotes evidence-based nutrition and dispels misleading nutrition claims and fad diets.

Lactose intolerance is a deficiency of the enzyme lactase; which is produced by cells in the lining of the small intestine in order to break down lactose into the monosaccharides glucose and galactose, which can be readily absorbed into the bloodstream.<sup>1</sup>

When there is a deficiency of lactase present, lactose can build up in the digestive system where it becomes fermented by bacteria and results in the production of various gases, which cause the symptoms associated with lactose intolerance, such as: explosive diarrhoea, bloating, abdominal pains, cramps, flatulence and nausea. Symptoms

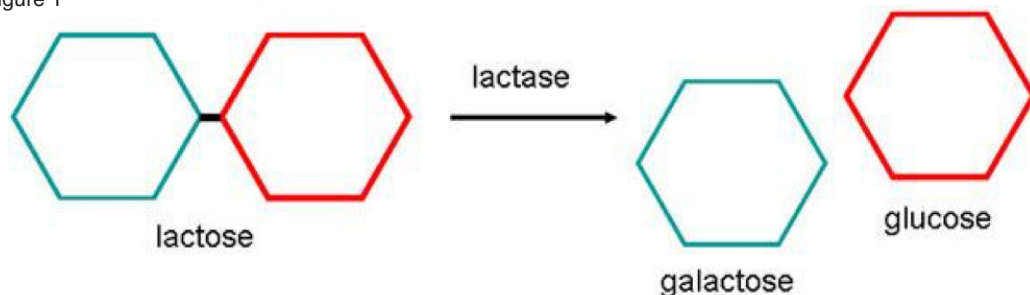
usually get more severe with larger volumes of lactose and, depending on the initial cause of the intolerance, this can either be temporary or permanent.<sup>2,3</sup>

### TYPES OF LACTOSE INTOLERANCE

#### Congenital lactase deficiency, or hereditary alactasia

This is a rare disorder caused by a mutation in the LCT gene which results in the absence of lactase and hence the inability of affected infants to break down the lactose present in breastmilk or formula. This can lead to severe diarrhoea and subsequent dehydration and weight loss if lactose is not excluded.<sup>1,4</sup>

Figure 1



## Not all cows' milk is the same

Find out more at [a2milk.co.uk/health-professionals](http://a2milk.co.uk/health-professionals)





### Primary lactase deficiency

This usually develops after infancy and tends to present between the ages of 5-20 years old.<sup>3</sup> Primary lactase deficiency occurs due to the gradual decrease in the expression of the LCT gene which causes a reduced production of lactase, although roughly 5-30% of the original lactase activity usually remains.<sup>3,4</sup> This process occurs in approximately 70% of all humans throughout their life, resulting in a decreased ability to digest lactose with age.<sup>1-3</sup>

With primary lactase deficiency, symptoms of intolerance usually occur within 30 minutes to two hours of ingesting lactose and the severity of symptoms is related to the dose of lactose consumed.<sup>1-2,5-6</sup>

The prevalence of primary lactase deficiency varies widely depending on geographical location and is highest in countries where dairy products are not traditionally consumed, such as Asian and African populations where the prevalence can range from 80-100%. Compare this to a much lower prevalence in Northern Europe, for example: 2% in Scandinavia, 5% in the UK, Ireland, Holland and Belgium, but can be as high as 70% in other European areas such as Sicily.<sup>3,5-6</sup>

### Secondary lactase deficiency

This can occur at any age, but most commonly presents in infants and young children. It occurs as a result of damage caused to the lining of the small intestine, interfering with its ability to produce lactase. This may occur for numerous reasons such as: gastroenteritis, bowel surgery, Crohn's disease, ulcerative colitis, coeliac disease, undiagnosed cows' milk protein intolerance, chemotherapy, or prolonged use of antibiotics.<sup>2,3</sup> Secondary lactase deficiency is often temporary and may resolve in two to four weeks, but this can also be long term if caused by a chronic condition.<sup>2,5</sup>

### Developmental lactase deficiency

This can occur in premature babies (i.e. those born before the 37th week of pregnancy) due

to an under-developed small intestine; this is usually temporary and tends to resolve as the infant grows.<sup>2</sup>

### DIAGNOSIS

The main route for diagnosing lactose intolerance involves trialling a lactose-free diet for two to three weeks and monitoring whether symptoms improve, then reintroducing lactose into the diet to see whether the symptoms return.<sup>5</sup>

Other methods of diagnosing lactose intolerance include the following:<sup>6-7</sup>

- Hydrogen breath test - this involves ingesting a lactose solution and measuring the subsequent amount of hydrogen produced by colonic bacteria; as this increases in those with lactose intolerance.
- Lactose tolerance test - where a blood test is taken after ingesting a lactose solution.
- Milk tolerance test - where blood sugar levels are checked after drinking a glass of milk, as no increase in blood glucose indicates that lactose has not absorbed in the small intestine.
- Intestinal biopsy - this can be used to test the amount of lactase produced by the intestinal lining; however, this is rarely conducted solely to test for lactose intolerance, but may be carried out to test for coeliac disease (which can produce similar symptoms to lactose intolerance).

Lactose intolerance can sometimes be confused with cows' milk protein intolerance in infants and children, which is an immune response to the protein in cows' milk rather than an inability to digest lactose adequately.<sup>8</sup> It is, therefore, important to take a detailed history to ensure allergenic symptoms are not misdiagnosed as a lactose intolerance. Similarly, it is important to exclude other conditions which can present with similar symptoms to lactose intolerance, such as irritable bowel syndrome, coeliac disease and bowel cancer.<sup>6-7</sup>

**a2 Milk™ is naturally easy to digest**

Find out more at [a2milk.co.uk/health-professionals](http://a2milk.co.uk/health-professionals)







## The astonishing story of the baby monitor that nodded off

Sara Webb Krohl's baby monitor used to be busy day and night helping Sara deal with what she thought was reflux.

Turns out her little boy's tum didn't get along with the A1 protein in most cows' milk. But since she switched to a2 Milk™, life's surprisingly quiet. So quiet, in fact, that even the baby monitor struggles to stay awake now and again.

Sara shared her story at [a2milk.co.uk/Sara](http://a2milk.co.uk/Sara) Why not try it yourself?



# a2tonishing™

Ordinary on the outside,  
extraordinary on the inside

\*In a poll of 155 Netmums members, 85% would recommend a2 Milk™ to a friend.

a2 Milk™ is not suitable for cows' milk protein allergy. If you have been medically diagnosed with any milk intolerance, seek advice from your doctor before use. Whole milk can be given to children over the age of 1, semi skimmed from the age of 2.



*Products made using fermentation processes, such as cheese and yoghurt (especially live yoghurt), are often better tolerated than fresh milk, due to the presence of beneficial bacteria.*

Table 1: Lactose-free options available

Milks	Lactose-free milk, oat milk, soya milk, flaxseed milk, sesame milk, rice milk (although not advised for those under five years old as can contain traces of arsenic), pea milk, coconut milk, quinoa milk, hemp milk, potato milk and nut milks such as almond or hazelnut milk
Spreads	Lactose-free and dairy-free spreads
Cheeses	Lactose-free cheese, hard/soft/melting varieties of milk-free cheeses based on soya, pea, cashew, almond or rice protein. Also, some cheeses are naturally low in lactose, such as: Edam, Cheddar, Emmental and Parmesan
Yoghurts, custards and desserts	Lactose-free, soya, pea, coconut and almond varieties
Ice creams	Lactose-free, soya, rice, coconut, almond and cashew varieties
Creams	Lactose-free, soya, oat rice, coconut and almond varieties

Adapted from BDA milk allergy food fact sheet<sup>8</sup>

## TREATMENT

Congenital lactase deficiency is treated by replacing breastmilk and ordinary infant formula with a lactose-free formula, then, as the infant grows, a lactose-free weaning diet, followed by lifelong lactose exclusion, is indicated.<sup>3,5</sup> Dietetic support is often advisable to ensure nutritional adequacy on this exclusion diet.

As those with primary lactase deficiency maintain some degree of lactase activity, total avoidance of lactose is usually unnecessary with this condition and including some lactose in the diet may actually improve lactose tolerance by interacting with intestinal flora; however, the long-term restriction of lactose intake is usually needed.<sup>3</sup>

Tolerance levels vary, but even those with a low level of lactase activity can usually consume roughly 12-15g of lactose (i.e. about 250ml of milk) and others may be able to tolerate up to twice this amount.<sup>3</sup> Products made using fermentation processes, such as cheese and yoghurt (especially live yoghurt), are often better tolerated than fresh milk, due to the presence of beneficial bacteria. Hard cheeses are also generally well tolerated, as they contain a very low level of lactose and it is thought that lactose is best tolerated when consumed as part of a meal, due to the effect of gut transit time.<sup>1,3</sup>

The treatment for secondary lactase deficiency includes excluding lactose for two to four weeks while the symptoms of intolerance continue, with



the gradual reintroduction of lactose-containing foods as tolerance returns.<sup>3</sup> Infants may require a lactose-free formula (or a soy formula if over six months old) during this period, breast milk can often still be tolerated, or in some cases lactase drops may be prescribed to help breastfed babies to absorb the lactose from breast milk.<sup>3-4</sup>

For those with a severe lactose intolerance, labels of food, drinks and medication may need to be checked (lactose can be used as a bulking agent in medication) to see whether they contain lactose. EU food labelling law currently mandates that milk needs to be clearly highlighted when present in a product and written, or verbal information needs to be available for food sold without labelling, such as in restaurants, delis and cafes.<sup>8</sup>

It is important to ensure nutritional adequacy within a lactose-reduced diet; especially in terms of calcium, protein, vitamin and mineral intake.<sup>5,8</sup> Lactose-free options are widely available from supermarkets, online shops and health food shops as outlined in Table 1.

There is another type of milk available which is called A2 milk, this milk excludes the protein A1 beta-casein and only contains the A2 beta-casein (both are present in normal cows'

milk). There has been some reported health benefits related to avoiding A1 beta-casein and although A2 milk contains the same level of lactose as ordinary milk, a study by Jianqin et al (2016)<sup>9</sup> found that replacing ordinary milk for A2 milk improved some symptoms of lactose intolerance; however, more large scale evidence is needed to evaluate these claims.<sup>10</sup>

## CONCLUSION

Accurate diagnosis and identifying the correct type of lactose intolerance is vital to avoid unnecessary dietary elimination and also in order to provide the most appropriate dietary advice. For example, those with secondary lactase deficiency usually only need temporary lactose exclusion, whereas those with primary lactase deficiency generally need long-term lactose reduction, but not total avoidance.

There are numerous lactose-free products available which can support in the nutritional management of those with lactose intolerance in order to avoid any unnecessary nutritional deficiencies.

*This article is sponsored by The a2 Milk Company, but all opinions in this article are that of the author.*

## References:

- 1 NIH (2017). Lactose Intolerance. <https://ghr.nlm.nih.gov/condition/lactose-intolerance>
- 2 NHS Choices: Lactose Intolerance, accessed January 2017. [www.nhs.uk/Conditions/lactose-intolerance/Pages/Introduction.aspx](http://www.nhs.uk/Conditions/lactose-intolerance/Pages/Introduction.aspx)
- 3 Bryony and Thomas (2007). The Manual of Dietetic Practice 4th Edition
- 4 NHS Choices: Lactose Intolerance – Treatment. Accessed January 2017. [www.nhs.uk/Conditions/lactose-intolerance/Pages/Treatment.aspx](http://www.nhs.uk/Conditions/lactose-intolerance/Pages/Treatment.aspx)
- 5 Shaw and Lawson (2014). Clinical Paediatric Dietetics 4th edition
- 6 The British Nutrition Foundation: Lactose Intolerance. Accessed January 2017. [www.nutrition.org.uk/nutritionscience/allergy/lactose-intolerance.html](http://www.nutrition.org.uk/nutritionscience/allergy/lactose-intolerance.html)
- 7 NHS Choices: Lactose Intolerance – Diagnosis. Accessed January 2017. [www.nhs.uk/Conditions/lactose-intolerance/Pages/Diagnosis.aspx](http://www.nhs.uk/Conditions/lactose-intolerance/Pages/Diagnosis.aspx)
- 8 BDA (2014). Food fact sheet: milk allergy. [www.bda.uk.com/foodfacts/milkallergy.pdf](http://www.bda.uk.com/foodfacts/milkallergy.pdf)
- 9 Jianqin et al (2016). Effects of milk containing only A2 beta casein versus milk containing both A1 and A2 beta casein proteins on gastrointestinal physiology, symptoms of discomfort, and cognitive behaviour of people with self-reported intolerance to traditional cows' milk. [www.ncbi.nlm.nih.gov/pubmed/27039383](http://www.ncbi.nlm.nih.gov/pubmed/27039383)
- 10 EFSA (2009). Review of the potential health impact of  $\beta$ -casomorphins and related peptides. <http://edepot.wur.nl/8139>



## Questions relating to: *Lactose intolerance*

Type your answers below, download and save or print for your records, or print and complete by hand.

**Q.1** Describe the aetiology of lactose intolerance.

A

**Q.2** What is Primary lactase deficiency?

A

**Q.3** Explain the cause of Secondary lactase deficiency.

A

**Q.4** What does a Hydrogen breath test involve?

A

**Q.5** What is the difference between a lactose tolerance test and a milk tolerance test?

A

**Q.6** Why can lactose intolerance be misdiagnosed and how can this be avoided?

A

**Q.7** Explain how congenital lactase deficiency is treated.

A

**Q.8** What is the treatment for Primary lactase deficiency?

A

**Q.9** What are the risks of a lactose-reduced diet in terms of nutritional adequacy?

A

Please type additional notes here . . .