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## Lactose Intolerance is Normal!

Dr Julia Lee-Thorp and Dr Becky Rogers Ackermann,  
Department of Archaeology, University of Cape Town

Last month's article on cow's milk and the problems which can be associated with it was packed full (to use the advertising jargon for milk) of interesting information. But we were rather startled to see lactose intolerance - which affects a majority of the world's population - described as a "disease". In fact, it is adult lactose *tolerance* for cows' milk that is unusual. We thought that curious readers might be interested in why this is so.



In his article [Milk Allergy and Lactose Intolerance](#) (May 2002), Dr Steinman gives the following figures for lactose intolerance for children over 5 years old: "90-95% of black individuals and 20-25% of white individuals throughout the world". In fact, the picture is much more complicated. Many Asian populations, especially people from Far East, have rates of lactase deficiency approaching 100%. Additionally, there are a few groups in Africa, such as the Fulani, who have relatively low rates of lactose intolerance (around 20-25 percent). Conversely, some European populations like the Swedes are almost completely lactose tolerant (apx. 4% deficiency). Given that most of the world does not fall neatly into 'black' or 'white' categories, such variation is important. In fact, the world average for lactose intolerance is probably much closer to the 90-95% range given for 'blacks.' Therefore, we were very surprised to see this condition described as a "disease". Elsewhere we have seen it described as a "disorder". Why should this be when most adults in the world are lactose intolerant, clearly making this the normal adult condition? The perception of lactose intolerance as a health problem is a rather narrow Western view. We imply no offence to Dr

Steinman, as this perspective is widely held, and in general misconceptions about the healthy associations of whole dairy milk are widespread and probably have a lot to do with marketing and advertising campaigns.

As the figures show, whole cow's milk is definitely not for everyone, at least not unless the milk is soured or fermented, as explained by Dr Steinman. Human infants, like other mammals, receive nourishment from mother's milk. Infants have an enzyme that allows milk sugar - lactose - to be digested. In most human populations, the manufacture of the lactase enzyme is "turned off" by around four years of age. The same is true of other mammals, which become lactose intolerant following weaning. The really interesting question, then, is why are some humans not lactose intolerant? And why are relatively few 'white' people - aka. of Western European origin - lactose intolerant?

The answer lies somewhere in the past. Human beings only began to cultivate domestic grains and keep domestic animals relatively recently. Sheep and then cattle were first domesticated just over 10 000 years ago, in the Near East where the wild progenitors of these animals lived. Grains like wheat and barley were also domesticated at around this time. All of this took place through selective breeding - and consequent genetic manipulation - with humans in control. It brought about a quantum change in the way that people lived - they settled down, cultivated most of their food and populations began to grow. Not all of the change was for the better, as amongst other new problems humans also began to inherit diseases from their animals and from close proximity to large numbers of people (like TB and other infectious diseases - but that is another story!). The new way of life spread, along with the cattle, sheep and grains, reaching Western Europe a few millennia later.

It was here in Western Europe that some populations began an evolutionary transition to lactose tolerance. This meant that in certain individuals, as a result of genetic change the enzyme allowing the digestion of milk sugar continued to be produced throughout adult life. So these individuals no longer lost their childhood lactose tolerance but carried it into adulthood. This mutation also occurred in the Fulani people in the Sahel, although somewhat later since domesticated cattle reached this area just a couple of millennia ago.

Lactase deficiency is a classic anthropological example of a genetic trait that has been influenced by cultural factors. There is a relationship between the frequency of lactase deficiency in a population and whether or not the population was involved in intensive dairy farming. Low levels of lactase deficiency are found in European populations with a long history of dairy farming, and highest levels in populations of Asian ancestry who were not dairy farmers. Low levels also occur in other populations that rely extensively on milk in their diet (like the Fulani of Western Africa, and it is believed, Khoi pastoralists of Southern Africa). These numbers suggest that the ability to digest whole milk later in life is selected for in environments where milk is a major source of nutrition and forms an important part of the diet. Genetic change resulting in lactose tolerance presumably carried strong advantages in such circumstances - i.e. in helping people to survive longer and to reproduce themselves.

This transition to lactose tolerance seems to have been most 'successful' (in evolutionary terms), in Western Europe. When Western Europeans began to

colonise other areas of the world from the 16th century onwards, the lactose tolerance 'gene' travelled along with them, no doubt increasing the frequency of lactose tolerance in contact populations across the colonised world.

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**For further information refer to:**

Cavalli-Sforza, LL, P Mendozzi, and A Piazza. (1994) The History and Geography of Human Genes. Princeton: Princeton University Press.

Harrison, GA, JM Tanner, DR Pilbeam, and PT Baker. (1988) Human Biology: An Introduction to Human Evolution, Variation, Growth, and Adaptability. 3rd edition. Oxford: Oxford University Press.

Relethford, JH (1997). Fundamentals of Biological Anthropology. 2nd edition. California: Mayfield Publishing Company.

**Figure caption:**

Seventeenth century ink and wash drawing of a Khoikhoi cow being milked, from The Khoikhoi at the Cape of Good Hope, (1993) published by the South African Library, with text by Andrew Smith and Roy Heiffer.

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