



L-tryptophan and gene technology

Claims have been made that the use of gene technology was responsible for a disease outbreak in 1989 which claimed 37 lives. This incident is often used to question the safety of gene technology, and this paper looks at those claims and the evidence available.

The disease, eosinophilia-myalgia syndrome (EMS), affected over 1500 people in the USA and the cause of EMS was traced to certain batches of L-tryptophan, manufactured in Japan by Showa Denko. The company used a fermentation process with the bacterium *Bacillus amyloliquefaciens* — in much the same manner as yeasts ferment the sugars in grape juice to make the alcohol in wine. The L-tryptophan is then extracted and purified following fermentation.

L-tryptophan, an essential amino acid, was often taken as a diet supplement in the belief that it helped manage sleeping difficulties, premenstrual tension, stress and depression, despite the absence of any medical data to support effectiveness of the treatment. Excessive dietary intake of L-tryptophan in the wrong circumstances has been shown to have ill-effects on some individuals.

In 1989, Showa Denko made two changes to the manufacturing process for the extraction of L-tryptophan:

- a 50 per cent reduction in the amount of activated carbon used in the filtration method to remove impurities following fermentation
- the use of a new GM strain of the bacterium (known as strain V) to boost production.

Chemical analyses have established that the L-tryptophan extracted during the new process contained 50–60 contaminants, mostly in tiny amounts (one in every million molecules). The development of EMS has not been linked to the L-tryptophan itself, but rather to one of these contaminants known as EBT — an odd amino acid consisting of two tryptophan molecules joined together. More recently the presence of additional contaminants has also been linked to the occurrence of EMS.

It is likely that changes in the filtration method used to remove impurities resulted in contaminated L-tryptophan. The contaminant causing EMS does not arise from the bacterium, but rather only appears during the purification process. Therefore, the incidence of EMS cannot be attributed to gene technology or to the inadvertent transfer of additional 'toxic' DNA during the procedure.

The presence of the contaminants would also be expected if the same purification procedure was used for L-tryptophan extraction from non-genetically modified *Bacillus amyloliquefaciens*. In this respect, rare cases of EMS were linked to L-tryptophan well before the introduction of the GM bacterium.



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Further information

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