DETECTION METHODS FOR FOODS DERIVED FROM GENETIC ENGINEERING

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During the debate about the use of genetic engineering in food production there was and still is an intensive discussion about detection and labelling of foods derived from genetic engineering. Detection methods for these types of foods could be based on the newly introduced genetic information. Because of its high sensitivity, its specificity and rapidity, the polymerase chain reaction (PCR) will be the method of choice for this purpose.

With PCR there is a possibility to amplify specifically very little amounts of DNA with primers corresponding to the gene of interest. If no inhibitory factors interfere with the PCR-reaction, 10 to 20 target molecules are sufficient to allow successful amplification and subsequent identification. However, when applied to food samples the PCR can be inhibited or its sensitivity can be severely reduced. Using complex food matrices as a DNA source, detection limits about 100-times less were achieved by agarose gel electrophoresis and about 15-times less by specific DNA-hybridization. This could be attributed to difficulties in extracting DNA from complex food matrices and reduction to a sensitivity of the PCR by several food compounds. The difficulties in extracting DNA from food matrices may be due to binding of DNA and microorganisms to food ingredients, thus interfering with the release of nucleic acid. The inhibitory effect on the PCR might be linked to the precipitation or denaturation of the DNA as well as to the denaturation or inhibition of the DNA-polymerase.

Requirements for the PCR are the availabilty of adequate intact recombinant de-oxyribonucleic acid (rDNA), the knowledge of the genetic modification (necessary to design specific PCR-primers) and that this genetic modification is not exclusively due to genes of the own species (self-cloning). Intact DNA is available, if the food is the genetically engineered organism, itself or if the food contains genetically engineered organisms. In food containing isolated or processed products from genetically engineered organisms, but not the genetically engineered organism itself a clear detection will be possible in exceptional cases only! e.g. if there is still rDNA of sufficient fragment length or if an ingredient normally not found in this organism is produced. For example in pizza tomatoes, peeled tomatoes, french fries, fried potatoes and potato crispes, DNA suitable for PCR was found. Therefore it should be possible to detect that

these foods were derived from genetic engineering. Such a detection is impossible in beer, tomato soup, potato flour, mashed potatoes or soya been oil, since PCR-analysis gave no indication of the presence of DNA in these products. In principle, the used method is able to detect specifically little amounts of DNA in such products, which was shown by adding *Escherichia coli* DNA. For isolated products which are identical to conventionally produced ones such a detection is impossible to manage.

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ABSTRACTS

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