General

Assessing chemical risks in food

Introduction

The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) is an independent scientific advisory committee which conducts risk assessment of chemicals, including those in food. Its aim is to form an objective view on the available evidence in a way that recognises both uncertainties and assumptions and considers the possible variation in interpretation of scientists working from different standpoints.

Related international committees dealing with chemicals in food are those of the European Food Safety Authority and of the World Health Organisation (see below for links).

The risk assessment process is defined as consisting of four linking steps. These are:

- hazard identification
- hazard characterisation
- exposure assessment
- risk characterisation

Risk is determined by both the hazard and the exposure. If there is no exposure, then there will be no risk. The higher the exposure, the more likely it becomes that there will be a risk.

Hazard identification

The Committee reviews all relevant available data on toxicity and the biological reasons for possible effects in order to identify whether a substance has the potential to cause harmful effects in humans. The available information varies for different types of chemical in food, and may include studies on humans, laboratory animals or other experimental or mathematical models. These studies take into account possible effects at different life stages, including before birth.

Hazard characterisation

This step estimates the nature, severity and duration of the adverse effects. Particular attention is paid to the relationship between the dose (or exposure) and the effect. For chemicals in food, the identification and characterisation processes aim to establish a safety guideline at which exposure over an entire lifetime is not expected to have any appreciable health risks. The safety guideline allows for the possibility that people may be more sensitive than animals used in the toxicity tests, and the fact that some people are more sensitive than others. It also takes into account whether there are important gaps in the evidence needed to set the safety guideline and takes a precautionary approach to allow for this. This safety guideline may be referred to as an Acceptable Daily Intake (for chemicals used in food production), as a Tolerable Daily Intake (for contaminants in food) or more generally as a Reference Dose.
For some types of chemical it is not considered possible to identify an intake without any appreciable health risks, and so a safety guideline cannot be set. This mainly applies to chemicals that have the potential to cause cancer, for which there could be some risk at any level. However the risk is related to exposure, so that at very low levels of exposure the risk is likely to very low. Such chemicals are not allowed to be used as food additives or pesticides, but may be present naturally, may occur as contaminants or be formed during cooking.

Exposure assessment

Exposure assessment considers the likely intake of a chemical from all relevant sources and uses, in order to estimate average and high level daily intakes. It may focus on particular subgroups with expected higher intakes, such as children or those eating a particular type of diet.

Risk characterisation

Risk characterisation compares the exposure with the safety guideline or the doses found by the hazard characterisation to have effects. The aim is to consider whether harm could result at the estimated exposure levels and how serious any effects might be. It needs to take into account uncertainties in the exposure and whether effects may occur at intakes above the safety guidelines.

Risk characterisation provides the basis for making decisions on whether there is a need to manage the risk by reducing exposure.