

# Safety of Food Additives

## Introduction

Food additives evoke consumer concerns. Although consumers relate them to modern processed foods, they have been used for centuries. Egyptians and Romans used colours and flavourings to improve appearance of foods, and the Romans used saltpetre (potassium nitrate) for preservation. Salting and smoking have been used for meat and fish preservation. Baking powder used as raising agent, thickeners for sauces and gravies. Even today's home cooking aims to prepare foods by using ingredient and additives to make it more appealing and also to preserve it.

Developments in food science and technology have led to application of many new substances having numerous functions in food manufacture. Many additives are available like emulsifiers, intense sweeteners, wide range of preservatives and antioxidants to minimise spoilage and produce food products with appealing taste and appearance. Additive is defined as "substance not normally consumed as food in itself and not normally used as a characteristic ingredient of food whether or not it has nutritive value, the intentional addition of which to food for a technological purpose in the manufacture, processing, preparation, treatment, packaging, transport or storage of such food results, or may be reasonably expected to result, in it or its by-products becoming directly or indirectly a component of such foods".

Food additives play an important role in food supply. Today's consumer has the widest range and choice of foods. Consumers are demanding more variety and convenience with high standard and wholesomeness at affordable prices. Food additives have proven effective and safe through long use and testing and meeting consumer expectations for foods. During food preparation and marketing, they are subjected to many environmental conditions including temperature changes, oxidation and exposure to microbes. Additives play key role in maintaining the food quality and characteristics that consumers demand, keeping them safe, wholesome and appealing from farm to table.

## Evaluation of safety of food additives

All food additives must have useful purpose and proven safe before being approved for use in foods. Various food authorities at local levels and Joint Expert Committee on Food Additives (JECFA) at international level are in charge of screening this. Their assessment is based on all available toxicological data in humans and animals. From this, maximum level having no toxic effect is determined: "no-observed-adverse-effect level" (NOAEL) and is used for "Acceptable Daily Intake" (ADI) for each additive. ADI provides a large safety margin (commonly a 100-fold safety margin) and is the amount of additive that could be safely consumed everyday over a lifetime with no adverse health effects. Because of high safety margin, occasional intake above ADI does not cause any problems. Due to strict regulation and thorough testing, food additives can be considered quite safe. The ADI is usually given as a range of 0-x mg per kg bodyweight per day.

## Why and how to evaluate an ADI

ADI aims to protect the health of consumers and allows easier international trade. It is a practical approach to determine safety of additives achieving some harmonisation of regulatory control. They are universally applicable in different countries and to all sectors of population.

International body addressing safety of food additives JECFA is set up by FAO and WHO and helps set international standards that will be used by Codex, the international standards for food products. The concept of ADI and the JECFA safety evaluations have been widely adopted by the EU, US and food authorities worldwide.

Food additives can only be approved if they present no hazard to human health at the level of proposed use based on scientific evidence. All pertinent toxicological data is reviewed concerning observations in humans and mandatory tests in animals. The toxicological tests required to be reviewed include lifetime feeding studies and multigenerational studies that determine how the additive is metabolised by body. This shows any possible harmful effects of additive or its derivatives. NOAEL, the highest dietary level of an additive at which no adverse effects are observed, is determined and expressed as mg of additive per kg bodyweight per day. The NOAEL is then divided by a safety factor of 100 to give a large margin of safety in determining ADI.

NOAEL is determined in animals, not humans. Assuming that humans are more sensitive than the most sensitive test animal, and that the reliability of toxicity tests are limited by the number of animals tested and that such tests cannot represent diversity of human populations, subgroups showing even higher sensitivities like children, old and the infirm, it is prudent to adjust for all these different by taking a safety factor.

### **What is ADI is exceeded on any given day**

Intake of food additive on a given day above its ADI is not a cause for concern as it has a large built-in safety factor. In practice consumption above the ADI on a day is more than accounted for by consumption below ADI on most other days. However, if intake is regularly higher than ADI it may then be necessary to advise a reduction of levels in foods or to reduce the number of foods in which the additive is permitted.

The more vulnerable section of population that is children, older people, pregnant women etc. are advised not to consume certain foods that may have food additives with lower ADI. In the case of these sections of population, the margin of safety might be somewhat lower than the more robust sections.

### **Monitoring of dietary intakes of food additives**

Monitoring of intake of food additives is carried out by countries and then it is compared with the ADI. Average and extreme consumption estimates in population as whole or in particular subgroup of population is observed. This is done by observing the average consumption of various food products and estimating the additives consumed from each and totalling them to get an estimated average consumption of food additives. If it is observed that the average intake is higher than the ADI then in some food products through which the additives are taken in are restricted in diet or the permitted levels in these foods is lowered. It is necessary to conduct intake studies regularly to ensure that consumers are not exceeding the ADI of any additive and also to assess any changes in intake patterns.

### **Do food additives cause hyperactivity, allergies or food intolerances**

In 1970s some researchers suggested that changes in diet had coincided with increase in behavioural problems in children. It was suggested that food additives, and colours in particular could be linked to hyperactivity generating considerable interest and controversy. Scientific studies however, have found no association between food additives, including colours and the behavioural problems or hyperactivity.

Food additives have only rarely been shown to cause true allergic (immunological) reactions to some additives for example, tartrazine (yellow colour) and preservatives sulphites causing skin rash or asthma in sensitive individual individuals. However, such cases are extremely rare. Scientific studies have failed to show any reaction to MSG and aspartame.

Adapted from: European Food Information Council (EUFIC)

<http://www.eufic.org/article/en/page/BARCHIVE/expid/basics-food-additives/?lowres=1>

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