

BASIC INFORMATION REGARDING ACETALDEHYDE RESEARCH

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ACETALDEHYDE RISK FACTORS ARE BASED ON STRONG SCIENTIFIC EVIDENCE

- **Scientific evidence on the danger posed by acetaldehyde is based on dozens of studies with consistent findings.**
- **The greater a person's exposure to acetaldehyde, the greater his or her risk of cancer.**

Test animal studies conducted in the 1980s proved that acetaldehyde was mutagenic and carcinogenic in test animals.

Based on these studies, as early as the 1980s scientists suggested that acetaldehyde was possibly carcinogenic to humans and exposure to it should therefore be minimised.

During the last 20 years, information on the carcinogenic nature of acetaldehyde to humans has increased cumulatively.

Acetaldehyde is related to nearly all types of cancer in the gastrointestinal or respiratory tract

Nearly all gastrointestinal tract and respiratory tract cancer risk factors are related to exposure to acetaldehyde.

These risk factors include smoking, alcohol, poor oral hygiene, specific foodstuffs, specific genes related to acetaldehyde metabolism and certain diseases, such as an acid-free stomach. Due to the accumulation of these factors, in the worst case scenario, a person's acetaldehyde exposure can exceed the allowed "safety limit" by a thousand times.

Furthermore, exposure to acetaldehyde is strongest in the upper gastrointestinal tract (mouth, pharynx and oesophagus).

Additionally, the stomach and large intestine are subject to notable exposure to acetaldehyde, while the larynx and lungs are most exposed to smoking induced acetaldehyde.

Greatest disease risk among smokers using alcohol

The strongest evidence on the carcinogenic nature of acetaldehyde is based on two mutually supportive observations on the human genome.

Due to a single point mutation, every time they drink alcohol, hundreds of millions of Asians are exposed to concentrations of acetaldehyde in the saliva which are 2-3 times higher than normal. Excessive drinkers of alcohol carrying the mutation have a multi-tenfold risk of upper gastrointestinal tract cancer compared to people who do not have this mutation.

The cancer risk is greatest - up to 300-fold - among heavy drinkers who smoke, but it is also significantly increased among normal users of alcohol and even those who do not drink at all. The latter are most likely to be exposed to acetaldehyde through a range of foodstuffs.

Genes and acetaldehyde are linked to each other

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Another gene increasing the cancer risk can be found among the European population. Approximately 10-20 % of Europeans present with a gene mutation that increases the ability to produce acetaldehyde in the saliva and possibly also in the content of the large intestine. Should these gene carriers be excess users of alcohol, their risk of upper gastrointestinal tract or large intestine cancer is 2-4-fold compared to those who do not exhibit increased enzyme activity caused by the gene mutation.

Officials allow the addition of acetaldehyde in foodstuffs

For nearly 20 years, scientists have been arguing that based on scientific evidence, human exposure to carcinogenic acetaldehyde should be minimised. Based on evidence gathered from epidemiological, genetic and biochemical studies during the last decade, an expert panel appointed by the WHO stated in October 2009 that acetaldehyde is a Group I human carcinogen comparable to tobacco and asbestos. In 1998, an expert panel in charge of food additive safety appointed by the UN and WHO granted acetaldehyde a so-called GRAS classification ('Generally Regarded As Safe'). This decision, which is still valid, allows acetaldehyde to be added to foodstuffs. In 2005, the European Food Safety Authority, EFSA, published a uniform method based on animal testing according to which uniform risk assessments should be compiled on all carcinogenic substances.

Acetaldehyde requires safety limits

In 2009, a German-Canadian group of scientists used this method to assess the cancer risk posed by acetaldehyde related to European drinking habits. According to the resulting estimate, the daily dose of acetaldehyde for a normal weight person, weighing 70 kilos, should not exceed 0.4mg. Therefore, used at a daily volume of 100ml, the acetaldehyde concentration of any alcoholic beverage or foodstuff should not exceed 50 µmol/l. This "safety limit" corresponds well to findings from studies on the mutagenic nature of acetaldehyde. In addition, corresponding or higher acetaldehyde concentrations produced by microbes can be found in the human intestinal tract in connection with alcohol use. Since exposure to acetaldehyde is always cumulative, alcoholic beverages and foodstuffs should preferably be acetaldehyde free.

Acetaldehyde in the air monitored more strictly than in foodstuffs

Officials in charge of working environment and air quality safety have set much stricter "safety limits" on acetaldehyde than officials in charge of food safety. In 2008, the acetaldehyde concentration of the air in Toronto exceeded this limit, which is only 1/100-200 part of the average acetaldehyde concentration contained in alcoholic beverages or foods. This led to legislation requiring that acetaldehyde concentrations in Toronto's air be monitored regularly.

Further information:

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