Polycyclic Aromatic Hydrocarbon Exposure

Overview

Polycyclic Aromatic Hydrocarbon (PAH) consists of over 100 different chemicals and is formed when coals, oils and/or gasses are not fully burned. This allows these chemicals to form rather than burning whichever substance straight through. PAHs can also be caused by other organic substances like tobacco. Typically, it is the combination of two or more substances being burned that creates PAH.

Polycyclic Aromatic Hydrocarbon can be found within products such as

- Medicines
- Dyes
- Plastics
- Pesticides
- Asphalt
- Crude oil
- Coal tar pitch
- Creosote (black oily substance that builds up inside chimneys as a result of incomplete burning of wood or coal.)
- Roofing tar

Sources of Overexposure

Food
Food grown in contaminated soil or air can be contaminated. Meat grilled or charred at high temperatures can also have increased amounts of PAHs.
PAHs can be present in all the following

- Cereals
- Grains
- Flour
- Bread
- Vegetables
- Fruits
- Meat
- Processed or pickled foods
- Contaminated cow’s milk and human breast milk

Workplace Air
The primary sources of exposure through air for PAHs are tobacco smoke, wood smoke, and ambient air. For some people, the primary exposure to these is within the workplace. PAHs have been found within the following facilities

- Coal tar production plants
- Coking plants
- Bitumen and asphalt production plants
- Coal-gasification sites, smoke houses
- Aluminum production plants
- Coal tarring facilities
- Municipal trash incinerators

Workers can be exposed by inhaling engine exhaust or by using products containing PAHs in industries like mining, oil refining, metalworking, chemical production, transportation, and the electrical industry. They have also been found in facilities where petroleum, wood, cellulose, corn, or oil are burned. People who live near a waste site containing PAHs are accessible to exposure as well.

Air
A person can become exposed to PAH vapors or PAHs that are attached to dust and/or other particles in the air. Sources include

- Cigarette smoke
- Vehicle exhausts
- Asphalt roads
- Coal
- Coal tar
- Wildfires
- Agricultural burning
- Residential wood burning
- Municipal and industrial waste incineration
- Hazardous waste sites

Water and Soil
In areas where wood, coal, gasoline, or other products are burned in soil, a person may become exposed if the affected soil is disturbed, thus making the air a contaminator. If rain occurs, the water may sweep the PAHs away with it, becoming contaminated water. The PAHs can get into the soil near hazardous waste sites and contaminate it. PAHs have been found in some drinking water supplies in the US.

Health Effects from Overexposure

The most common health effects on rats through testing PAH overexposure have been

- Cancer Production
  - Skin Cancer - Breathing contaminated air
  - Stomach Cancer - Ingesting contaminated food
  - Skin Cancer - Applied to skin
- Immune System strength: Body's system for fighting off diseases.

* To prevent from ingesting contaminated foods, be sure not to burn your food in the process of cooking.
*These effects have not been reported in people.

The Body
Levels of PAHs

In the Body
The level of PAHs in the typical U.S. diet is less than 2 parts of total PAHs per billion parts of food (ppb), or less than 2 micrograms per kilogram of food (µg/kg; a microgram is one-thousandth of a milligram).

In Drinking Water
Background levels of PAHs in drinking water range from 4 to 24 nanograms per liter (ng/L; a liter is slightly more than a quart).

In Workplace Air
Background levels of some representative PAHs in the air are reported to be 0.02–1.2 nanograms per cubic meter (ng/m^3; a nanogram is one-millionth of a milligram) in rural areas and 0.15–19.3 ng/m^3 in urban areas.

Symptoms of Overexposure and Laboratory Tests

Symptoms Due To Overexposure

PAHs can be harmful to your health when they have developed tumors. Studies suggest that laboratory animals from the inhalation of smoke, eating, or personal contact (one being physically touching another without gloves or protection) are reason for concern.

Laboratory Tests
Mice fed high levels of PAHs during pregnancy had difficulty reproducing, as did their offspring. The offspring of pregnant mice, also fed the same substances, had birth defects and decreased body weight. These studies show that individuals exposed through

inhaling contaminated air or having long periods of skin contact with mixtures of PAHs and other compounds developed cancer or suffered pregnancy complications.

*Similar effects could occur in people, but there are no scientific findings to show that these effects do occur.

Avoiding Exposure

Ways to Avoid Exposure

The federal government has set regulations to protect people from the possible health effects of eating, drinking, and breathing PAHs. Studies have shown that in small amounts PAHs will not harm the body, but it is recommended to stay away from the soil around facilities of substance burning that produce PAHs. The federal government has developed regulatory standards and guidelines to protect people from the potential health effects of PAHs in drinking water.

Sources:

http://www.atsdr.cdc.gov/

http://en.wikipedia.org/wiki/Creosote

http://www.atsdr.cdc.gov/PHS/PHS.asp?id=120&tid=25