Arsenic
General Information

Key Points

- a metal element, may be found as an organic or inorganic compound
- arsenic is used for preserving wood, for making electronic components and for special alloys in the manufacture of certain glass and ceramic products
- inorganic arsenic is widespread throughout the environment
- exposure to arsenic may occur from breathing contaminated air or consuming contaminated food or water
- arsenic compounds may be corrosive and cause burns to the skin or eyes on contact
- large amounts can be poisonous and damage the stomach, kidneys, liver, heart and the nervous system and may cause death
- long term exposure to arsenic can cause changes to the skin and blood circulation
- arsenic may cause cancers of lung, skin and bladder following long term exposure
Public Health Questions

What is arsenic?
Arsenic is a metal element that is widely distributed in the earth’s crust (soil and rocks), air and water. Arsenic may be found as the metal element or as a compound where it is combined with other elements, such as with oxygen to form arsenic trioxide. The type of arsenic compound is important when assessing the risk to health, as some forms are less harmful than others. Inorganic arsenic is produced primarily as a by-product from copper, lead and other metal smelting processes.

What is arsenic used for?
Arsenic is used in a number of industries for making electronic components, special alloys and in the manufacture of certain glass and ceramic products. Arsenic compounds may be used in the preservation of wood, however there are restrictions to this use in the European Union.

How does arsenic get into the environment?
Inorganic arsenic is found naturally in soils, rocks and sediments; human activities such as coal burning, smelting, agriculture and mining may further distribute arsenic in the environment. As arsenic occurs naturally in rocks, erosion of these can cause arsenic to be released into water. Arsenic may also enter water and soil from the waste of industrial sites or waste disposal plants.

How might I be exposed to arsenic?
Arsenic occurs naturally in the environment so we can be exposed by breathing air and from consuming contaminated food or water. In the UK arsenic levels are under stringent control and exposures to arsenic in water, air and food are reduced to the lowest practical level to minimise possible risks to health.

Food is the largest source of exposure for most people in the general population, with most arsenic in the UK diet coming from fish. The form of arsenic compound found in fish, called organic arsenic, is much less harmful than most forms used industrially which are mostly inorganic. There is no evidence that eating fish poses a health risk from arsenic.

Some areas of the world have naturally high levels of arsenic in drinking water including Hungary, Bangladesh, West Bengal in India and Taiwan. Soil also may contain arsenic naturally or from contamination from some industrial processes. Arsenic has been detected in some traditional medicines and herbal supplements as well as an impurity in cosmetics.

For the general population, inhalation typically represents a minor route of exposure to inorganic arsenic. Individuals sanding or burning wood preserved with inorganic arsenic may inhale released arsenic. Cigarette smoke contains a large amount of arsenic, and smoking can double the amount taken in per day.
Exposure may also occur in the workplace where arsenic is used or released (e.g. metal smelting plants). However, safe limits are enforced to protect the employees; such levels are below those that are thought to cause harmful effects.

If I am exposed to arsenic how might it affect my health?

The presence of arsenic in the environment does not always lead to exposure. In order for it to cause any adverse health effects you must come into contact with it. You may be exposed to arsenic by breathing or ingesting it. Following exposure to any chemical, the adverse health effects you may encounter depend on several factors, including the amount to which you are exposed (dose), the way you are exposed, the duration of exposure, the form of the chemical and if you were exposed to any other chemicals.

Ingesting large amounts of arsenic can damage the stomach, kidneys, liver, heart and the nervous system, and in severe cases causes death. Breathing air with high levels of arsenic can cause lung damage, shortness of breath, chest pain and cough, which may lead to death in severe cases. Arsenic compounds may be corrosive and can cause burns to the skin or eyes on contact.

Long term exposure to arsenic can cause changes to the skin and blood circulation.

Can arsenic cause cancer?

The International Agency for Research on Cancer (IARC) classified arsenic and its compounds as being cancer causing chemicals. These studies were based on people who had been exposed to high levels of arsenic over a long time, such as certain occupations or areas of the world (E.g. West Bengal, Bangladesh, China, Taiwan, Argentina and Chile) where the levels of arsenic in the drinking water are very high. Long term exposure to arsenic may cause lung, skin and bladder cancers.

In the UK arsenic levels are under stringent control and exposures to arsenic in water, air and food are reduced to the lowest practical level to minimise possible risks to health. Similarly levels are set to protect workers who may be exposed to arsenic in air. Short term exposure to arsenic is likely to be associated at most with only a very small increase in the risk of cancer.

Does arsenic affect pregnancy or the unborn child?

In some, but not all studies of women in areas of the world (E.g. West Bengal, Bangladesh, China, Taiwan, Argentina and Chile) where arsenic is found at very high levels in drinking water, increases in effects such as a low birth weight, and death of the unborn child or young infant have been observed. Similarly in some experimental animal studies effects on reproduction were observed following exposure to high levels of arsenic. Generally, effects to the unborn child are more likely to occur at levels that harm the mother.
How might arsenic affect children?
Children exposed to arsenic would be expected to display similar symptoms to those seen in exposed adults.

What should I do if I am exposed to arsenic?
If you have any health concerns regarding exposure to arsenic seek guidance from your GP or contact NHS 111.

Additional sources of information
HSE - Arsenic and you: http://www.hse.gov.uk/pubns/indg441.htm
FSA – Arsenic in rice: https://www.food.gov.uk/science/arsenic-in-rice
UKTIS. Best Use of Medicines in Pregnancy http://www.medicinesinpregnancy.org/