Arsenic in Drinking Water

Introduction

Arsenic is a natural element that is widely found in the earth’s crust. Arsenic compounds are used commercially and industrially in the manufacture of a variety of products including glass, pigments, textiles, paper, metal adhesives, ceramics, wood preservatives, explosives and pesticides.

There are two principal forms of arsenic – organic and inorganic. High levels of organic arsenic occur naturally in many types of food such as seafood. When eaten this form of arsenic is quickly eliminated by the body and normally poses a low risk to human health. Inorganic arsenic is found naturally in rocks and soil from where it can enter surface and groundwater. Inorganic arsenic can pose a serious risk to health, if consumed.

How does arsenic get into drinking water?

Drinking water can be contaminated with inorganic arsenic by leaching or runoff from soil, rocks and sediment. Groundwater sources such as bores are usually at greater risk of contamination by inorganic arsenic than surface and rainwater supplies. Some areas within Queensland, particularly those with abandoned mine workings, have elevated natural arsenic levels in the soil and, as a result, drinking water supplies in these areas may be contaminated.

Potential health effects of arsenic

Exposure to elevated concentrations of arsenic in drinking water can cause decreased production of red and white blood cells, damage to blood vessels and nerve damage in the hands and feet. Swallowing or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small “corns” or “warts” on the palms, soles of the feet and on the body. Long term consumption of arsenic at sufficiently high levels has been associated with increased risk of skin cancer and cancer of the liver, bladder and lungs.

Human health effects are likely to vary depending on the level of arsenic exposure, the frequency and duration of exposure, and the form of arsenic to which people have been exposed. Some people may be affected by lower levels of arsenic than others. Young children, the elderly, people with long-term illnesses and unborn babies are at greatest risk. A person’s health and nutrition can also influence how they respond to arsenic exposure. Arsenic is not transferred through breast milk to babies.

Elevated levels of arsenic in drinking water supplies

Drinking water supplies should be monitored and, if necessary, treated to ensure arsenic levels do not exceed a concentration of 0.01 mg/L set by the World Health Organization. This figure is also set in the Australian Drinking Water Guidelines (2011). In Australia drinking water supplies typically have concentrations of arsenic that range from < 0.001 mg/L to 0.03 mg/L.

Reducing your exposure to arsenic

If your drinking water is contaminated by arsenic at concentrations above 0.01mg/L, do not drink or prepare any food with it. Seek another source of drinking water e.g. bottled water, rain water or appropriately treated town drinking water. Before you commence using rainwater for drinking, it should
Reducing the level of arsenic in drinking water

If your water supply contains arsenic at concentrations above 0.01mg/L and you cannot obtain an alternative supply, there are a variety of “point of use” or “point of supply” water treatment options available to reduce the level of arsenic in your household drinking water. Any treatment system should be appropriate for the type of arsenic that is in the water. However, these processes may not be straightforward to install and operate, and it is strongly recommended that you obtain advice from a professional domestic water treatment supplier. Treatment systems should be compliant with AS/NZS 4348:1995 Water supply - Domestic type water treatment appliances - Performance requirements.

Tests for arsenic poisoning

If you believe you have been excessively exposed to arsenic, there are medical tests available that can measure arsenic in your urine, hair and fingernails. The urine test is most commonly used to detect recent arsenic exposure. Tests of your hair and fingernails may be used to detect continuing arsenic exposure over the past 6-12 months, but they are less reliable than the urine test due to the potential for sample to be inadvertently contaminated by the environment. Even though these tests may indicate your exposure to elevated levels of arsenic, they cannot predict the effect on your health. A doctor should be able to explain the results of these tests and help you understand if your exposure may affect your health.

Uses of water contaminated by arsenic

Arsenic is poorly absorbed through the skin, so water with low levels of contamination can still be used for hand washing, bathing, washing clothes and in the garden. There is insufficient evidence of the risk from watering home grown fruit and vegetables with water contaminated with arsenic in concentrations above 0.01mg/L to make any recommendation. Domestic pets should not be given water contaminated with arsenic in concentrations above 0.01mg/L.

For more information
- Call 13HEALTH (13 43 25 84) to speak to a health professional
- Contact your nearest Queensland Health Public Health Unit (Monday to Friday only):