



Arsenic (As) is an element widely distributed in air, soil, rocks and water, with the highest concentrations found in groundwater.

The presence of As in water is mainly due to the natural release of the minerals from the soil or to present and past geothermal activities. For humans the main source of environmental exposure to As is drinking water, where it is present in inorganic form, but also through the air and food.

In Europe the limit value for As in drinking water has been set to 10 µg/L by the Drinking Water Directive (DWD) 98/83/EC replacing the previous standards (50 µg/L). In Italy the DWD was implemented in 2001, but several derogations have been authorized up to 20 µg/L up to October 2010, when the EC denied a request of new derogation.

In Italy 128 municipalities exceeded the DWD limit and among these 91 are in the Lazio region.

Arsenic in drinking water is absorbed in the gastro-intestinal and pulmonary tract, and the absorbed dose corresponds to more than 50% of the intake, then it is readily transported to all organs and tissues, also crossing the placental barrier. Inorganic As in the body is methylated into monomethylarsonous (MMA) and dimethylarsonous (DMA). Arsenic accumulates in the body primarily in the skin, nails, hair and, in small quantities, in bones and muscles.

The health effects vary from pre-clinical manifestations, when it is already possible to measure As in biological samples (eg urine), to clinical effects, affecting internal organs and causing diseases in the exposed people. Chronic As exposure is related to the occurrence of cancer in specific sites, reproductive outcomes, and cardiovascular, neurologic, chronic respiratory diseases, and metabolic diseases, such as diabetes.

The DEP coordinated a large population-based study using an administrative cohort of residents in the Viterbo province (Central Italy), chronically exposed to low-medium arsenic levels via drinking water, to evaluate the effects of a lifetime exposure to arsenic on mortality from cancers and chronic diseases in the period 1990-2010. Results show an association of lifetime arsenic exposure with lung cancer, myocardial infarction, peripheral arterial disease, COPD and diabetes. For lung cancer and cardiovascular diseases a dose-response relationship was also found for doses lower than 10 µg/L, suggesting that no threshold value was identified as safe for health.

[Scientific paper](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0138182)

[To know more](#)

[The Lancet. A review of human carcinogens](#)

[IARC A review of human carcinogens](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045%2809%2970134-2/fulltext?_eventId=login)

[Drinking Water Directive \(DWD\)](http://monographs.iarc.fr/ENG/Monographs/vol100C/mono100C.pdf)

[Drinking water WHO guidelines](http://ec.europa.eu/health/scientific_committees/environmental_risks/docs/scher_o_120.pdf)