Anemic contamination through natural (geogenic) and anthropogenic sources is a serious threat to humans all over the world. Natural sources of arsenic exposure may include contaminated groundwater, volcanic sediments, coal, and springs sourced by thermal waters. The number of people affected by arsenic is staggering, the problems life threatening, the scope global, and the potential for medical geology—prevention—enormous. Medical geology has the objectives of identifying harmful geologic agents, determining exposure-related to deteriorating health conditions, and developing sound principles, strategies, programs, and approaches to eliminate or minimize health risks, from the naturally occurring physical and chemical agents in the environment [Sofla et al. (2003)]. In this paper, we explore the global health impacts from chronic arsenic exposure and provide examples where geogenic (natural) exposures to arsenic have impacted the health of millions of people worldwide.

Geogenic sources of arsenic exposure

Arsenic is the most extensively studied of the metals and metalloids found in drinking-water worldwide. Arsenic is released into the environment from both natural and anthropogenic sources. Global natural emissions of arsenic and arsenic compounds have been estimated to be 3,500 t/year, whereas anthropogenic emissions are about three times higher (Nriagu, 2000). Environmental exposure to arsenic is generally in the form of either arsenite (As(III)) or arsenate (As(V)). The former is the predominant form in drinking water from deep (anoaerobic) wells, while the latter predominates under aerobic conditions.

Health effects induced by chromic arsenic exposure

The future is bleak for many of these people exposed to high levels of arsenic from contamination. The massive and widespread pollution by inorganic arsenic in Bangladesh is the world’s worst example of human-made arsenic contamination in the environment. It is estimated that millions of people who drink water from contaminated wells in this country are exposed to arsenic. The health effects of exposure to arsenic are extensively documented, and the World Health Organization (WHO) has issued guidelines to protect human health.

Inorganic arsenic can cause a variety of health problems, including skin lesions, liver damage, and cancer. The WHO has classified inorganic arsenic as a human carcinogen. Chronic arsenic exposure can lead to skin lesions, such as hyperkeratosis, and increased skin cancer risk. In the long term, exposure to inorganic arsenic can also lead to kidney damage, hypertension, and neurological problems.

However, the health effects of inorganic arsenic exposure are not limited to skin lesions and renal damage. Arsenic exposure has been linked to an increased risk of type 2 diabetes, cardiovascular disease, and various cancers, including lung, bladder, and skin cancers. Moreover, exposure to inorganic arsenic has been associated with adverse birth outcomes, such as low birth weight and congenital defects.

The health effects of inorganic arsenic exposure are not limited to the individual; they can also have significant environmental and economic implications. The cost of medical care, loss of productivity, and reduced quality of life are just a few of the economic consequences of arsenic exposure.

Due to the widespread occurrence of arsenic contamination in drinking water, it is crucial to implement effective strategies for arsenic removal from water supplies. This includes the development of advanced water treatment technologies, public health education campaigns, and sustainable land use practices to reduce the release of arsenic into the environment.

In conclusion, the health effects of inorganic arsenic exposure are significant and multifaceted. The global community must work together to prevent further exposure and to address the existing populations at risk of arsenic contamination. This requires a multidisciplinary approach, including environmental scientists, public health professionals, engineers, and policymakers, to develop and implement effective strategies for arsenic mitigation.
tion) and the appearance of small lesions of the palms, soles, and tongue (Photo 2) (Dentens et al., 1983). Epidemiological evidence shows an association between inorganic arsenic in drinking water and increased risk of skin, lung, bladder, and kidney cancer (Smith et al., 1969).

The future – a medical pathology opportunity

Biomedical scientists and public health officials are working with geoscientists to better characterize these natural sources of arsenic in the environment, so solutions to many of the health problems induced by chronic exposure to arsenic can be developed. For example, by studying the geological and hydrological environment, geoscientists are trying to determine the source rocks from which arsenic is being leached into the ground water. They are also trying to determine the conditions under which the arsenic is being mobilized: for example, is the arsenic being desorbed and dissolved from iron oxide minerals by an arsenate (arsenic-dioxide) groundwater or is the arsenic derived from the dissolution of arsenic-bearing sulfide minerals such as pyrite by oxygen (water)? The answers to these questions will allow the public health community around the world to identify populations with similar characteristics and more accurately determine which populations may be at risk from arsenic exposure.