Arsenic and Old Toenails: New research highlights environmental exposure to toxin

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(PhysOrg.com) -- Scientists from Leicester and Nottingham have devised a method for identifying levels of exposure to environmental arsenic - by testing toenail clippings.

Arsenic occurs naturally in the environment and people can be exposed to it in several ways, for example through contaminated water, food, dust or soil. The risk of exposure is greater in certain areas of the UK where the natural geology and historic mining activities have led to widespread contamination of the environment with arsenic. Long term exposure to arsenic is associated with increases in lung, liver, bladder and kidney cancers and skin growths.

Previous studies using hair have suggested high levels of arsenic in the bodies of King George III and Napoleon Bonaparte. Now doctoral research at the British Geological Survey by Mark Button of the University of Leicester has used toenail clippings to find fresh evidence of exposure to environmental arsenic within a UK population living close to a former arsenic mine. The research, published online ahead of print in the *Journal of Environmental Monitoring*, was carried out with Dr Gawen Jenkin, Department of Geology, University of Leicester; Dr Chris Harrington, School of Science and Technology at Nottingham Trent University and Dr Michael Watts of the British Geological Survey. The research was funded by the British Geological Survey.

Mark Button said “We initially identified high levels of arsenic in earthworms living in contaminated soils surrounding the former mine.

That got us thinking about potential exposure in people living close to the site."

The researchers collected toenails and washed and acid digested the samples under microwave irradiation. They then analysed the samples using inductively coupled plasma mass spectrometry.

Mark Button added: "This preliminary research indicates that people living close to a former arsenic mine have elevated levels of arsenic in their toenails. However, the potential health risks in this case, if any, are not yet clear and no arsenic related health issues have been reported. A large-scale and more detailed biomonitoring study is required to confirm these initial results."

Dr Jenkin, lecturer in Applied Geology at the University of Leicester said: "This is the first time that the chemical form of the arsenic in the toenails has been measured - that can tell us something about how it got in there and possible risk factors.

Dr Jenkin added: "There is definitely more research needed to look at - amongst other things - a larger sample of volunteers, to see if the values change with time (it is quite possible the high values recorded are a one-off for that person, or due to slow toenail growth concentrating harmless quantities of arsenic), and to look at the possible pathways by which the arsenic is ingested. Coupling our analyses with regular blood measurements would be very revealing."

However the researchers are definitely NOT requiring people to send in their toenail clippings. Neither can you assess arsenic contamination simply by looking at your toenails.

Dr Jenkin said: "Even in those people with elevated amounts it is present in tiny quantities - less than 0.003% in the toenail. In people who have

not been exposed at all it is less than 0.00003%. If a nail looks different from normal that is usually due to physical damage (you stubbed your toe or dropped something on it) or a minor fungal infection that can be easily cleared up by a visit to the doctor."

Provided by University of Leicester

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