Chemicals pollutants threaten health in the Arctic

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Studies uncover risks and threats to Arctic inhabitant's health that might be due to contaminants brought by warmer air and sea water currents resulting from climate change.

People living in Arctic areas can be more sensitive to pollutants due to their genetics, says researcher Arja Rautio at the Centre for Arctic Medicine in the University of Oulu, Finland. This is unfortunate since the northernmost areas of Europe are receiving more harmful chemicals. Scientists believe climate change may be a culprit as air and water mass movements push some of these undesirable chemicals towards the

Arctic. "In real life, people are exposed to lots of chemicals," says Rautio, who leads studies into the human health effects from contaminants and the influence of climate change in a EU-funded project called ArcRisk, "and I think the people of the north are exposed to higher levels than for example the general population in Europe."

Many new contaminants like fluorinated and brominated compounds and bisphenol A can act on hormones and so have impacts on human health. But seeing an effect on humans, at the population level, could take ten or even 20 years, especially in the case of cancer, she adds. This is why ArcRisk has established a database containing data on concentration levels and trends of contaminants in humans. The project team analysed frozen blood samples collected in Norway in 1978, 1986, 1995 and 2008 for polychlorinated biphenyls (PCBs), chlorinated pesticides and polybrominated diphenylethers (PBDEs).

The main challenge that project scientists struggle with is to disentangle the effects of contaminant chemicals from what we do in our everyday lives. "We know that dioxins can lead to more diabetes and high blood pressure," says Rautio, "but there are many other confounding factors. We are changing our diet and many of us are less active and those lifestyle choices can also increase the risk of diseases like diabetes." The results of the project are due to be presented at a conference of Arctic Frontiers in Tromsø, Norway, in January 2014.

Previous studies have also struggled with disentangling contaminants effects when trying to understand their impact on health. There are uncertainties between the chemicals and direct health impacts because people are exposed to so many chemicals simultaneously, cautions biologist Thomas Zoeller at the University of Massachusetts Amherst, USA. Besides, the human population is genetically variable and may react differently to the chemicals and we don't even know which of the chemicals affect us.

"Moreover, some of these chemicals reside in the environment – and in the body – for a long time, and this means that they may build up," says Zoeller. His recently edited a recent World Health Organization report which warned that chronic diseases are increasing worldwide and many are related to hormones. It noted that known hormone-disrupting chemicals are "only the tip of the iceberg" and better tests are needed to catch others.

Health problems induced by these chemicals could be worse than anticipated. Some of the pollutants found in the Arctic by the project scientists like the fluorinated compounds have higher affinities for hormone receptors than even the natural hormones. "We have documented several direct harmful effects of these and other chemicals, especially in seabirds, top predators such as the glaucous and ivory," says Geir Wing Gabrielsen, an environmental scientist at the Norwegian Polar Institute, who is not part of ArcRisk.

These animal studies already show worrying trends that do not bode well for humans. "When we see these findings in Arctic animals I am very concerned about what we will find with regards to humans, though we ourselves don't do human studies," Gabrielsen says. He notes that long periods of warm air are being transported to the Arctic and that the sea currents around places like the Svalbard islands [located midway between Norway and the North Pole] now consist of warmer Atlantic water; they used to consist of polar waters. "Climate change is having an effect and it is resulting in higher levels of contaminants in the environment and [therefore] also in the animals," Gabrielsen warns.

Rautio concludes that there is a need to clarify the effects so that people—not only in those living in the remote northern areas— can make decisions about their own lives, what to eat, how to avoid exposure to harm.

More information: www.arcrisk.eu/