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Your file Votre référence

08-002889

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APR 17 2008

Mr. Edward (Tedd) C. Weyman
Deputy Director
Uranium Medical Research Centre
157 Carlton Street, Suite 206
Toronto, ON M5A 2K3

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APR 21 2008

MUNICIPALITY OF PORT HOPE

Dear Mr. Weyman,

Thank you for your correspondence of March 1, 2008, concerning the measurement of uranium in residents of Port Hope, Ontario.

I wish to assure you that the health and safety of all Canadians, including those who live in Port Hope, is of utmost concern to Health Canada. It is for this reason that I requested officials to carefully review all of the information related to health studies in Port Hope and to assess the risks from the exposure to the quantities of uranium that you reported in your analysis of nine residents and former workers.

The first reference point that Health Canada used are epidemiology studies of the incidence of diseases (including cancer) in the Port Hope area. Previously published health studies in the Port Hope area have all shown that the residents of Port Hope have no more illnesses, including cancers, than other residents of southern Ontario. These studies highlighted the importance of cancers and other diseases that are linked to the prevalence of smoking in Port Hope as well as in other population centres in the region.

The second reference point used in the assessment was the public radiation dose limit. This considers releases from all nuclear facilities (including those operating in Port Hope) and is set in the *Nuclear Safety and Control Act* regulations at 1 milliSievert/year (mSv/yr) above a natural background dose of 2 mSv/yr.

An additional technical point that must be considered is that uranium is present naturally in all environments and in all people. Background concentrations of uranium in people and in the environment are highly variable. For example, tests of numerous subjects in the Ottawa area give values of uranium in urine ranging from 3 to 60 ng/L and studies in the United States (U.S.) gave 95th percentile values for uranium in urine of 35 ng/L for females and 53 ng/L for males.

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The study conducted by your institute, the Uranium Medical Research Centre, in collaboration with the Port Hope Community Health Concerns Committee, consisted of nine subjects and two controls. Since this is a very small sample size, these results need to be compared to the larger Canadian and U.S. studies that I referenced previously. The concentrations of uranium in the urine that you reported ranged from 2.1 to 24.8 ng/L. These values all fall within the natural range reported from other areas. The amount of uranium in people varies widely because different sources of water (for example water from two different wells) often have very different amounts of uranium and this variation must be considered in assessing the exposure to uranium.

The amount of uranium in urine can also be used to estimate the radiation exposure that an individual has received. As you noted in your letter, there are a number of assumptions that must be made. Therefore, I asked my officials to make very conservative assumptions in order to ensure that the maximum risks were assessed. A urine concentration of 24.8 ng/L (the highest measurement that you reported) would give a dose of 0.03 mSv/yr, which is very unlikely to cause any ill health effects. Hence, the reported radiation exposures for all nine Port Hope subjects are within the range of natural background values; and it is well below the limit for public exposure.

The data that you reported are very consistent with previous studies by Health Canada. The main pathway of exposure to uranium in Port Hope residents is by inhalation of uranium in air. A study carried out by Health Canada showed that the highest inhalation doses were about 0.018 mSv/year for children and 0.007 mSv/year for adults in the period prior to changes in Cameco refinery operations in 1987. Since then, doses from uranium inhalation have decreased to about 0.001 mSv/year. Health Canada also monitors uranium in drinking water. The limit on the concentration of uranium in drinking water is 20 micrograms per litre, based on its chemical toxicity. Health Canada has consistently measured the levels of uranium in Port Hope drinking water since 1983. Values have ranged from 0.4 to 1 microgram per litre, which is typical of background values found in communities across Canada.

The other issue that you raised in your letter concerns what appear to be anomalous isotope ratios of uranium in some of the people within your study. The U-234/U-238 ratio varies widely in nature as a result of natural processes and the values that you report are within the range of values found in different sources of well water and foods. Therefore, this variation is consistent with the variation to be expected in different people who are ingesting small amounts of uranium from these natural sources.

The anomalous U-238/U-235 ratio and elevated U-236 concentration in one subject, and elevated U-236 in two other subjects in your study suggest that these individuals were exposed to another source of uranium that is not present in nature because the U-236 isotope is a result of a nuclear reaction. The data that you present can be used to assess the amount of exposure to these types of uranium. I wish to emphasize that the health effect is associated with chemical or radiological toxicity of the total quantity of uranium exposure rather than with the types or isotopic concentration per se.

In the people that you measured, the amounts of uranium (either depleted uranium, low enriched uranium or high enriched uranium) are very small. Internal doses for all of the people are much less than the annual natural background dose of 2 mSv and the annual public radiation dose limit (1 mSv/yr). The individual with the highest exposure indicates exposure to different sources of uranium has a dose that is about 0.2 mSv/yr. Many studies have shown that there is no chemical or radiological toxicity associated with this total quantity of exposure.

In summary, all of your uranium concentration measurements from people living in Port Hope are consistent with the previous studies by Health Canada and by other groups. Your independent validation of these earlier studies is gratifying. I would like to thank you for sharing your assessment with the scientific community. I encourage you to contact Dr. Jack Cornett (jack_cornett@hc-sc.gc.ca) if you wish to discuss further the technical details behind the assessment of radiation doses using isotope ratios.

Sincerely,



Karen Lloyd
A/Director General
Safe Environments Programme
Health Canada

c.c. Linda Thompson, Mayor, Municipality of Port Hope