NATURAL RADIOACTIVITY IN DRINKING WATER RESOURCES IN IOWA – A PILOT STUDY

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Natural Occurring Radioactive Material (NORM) is often found in drinking water. This is particularly true in Iowa, where a large quantity of drinking water is obtained from groundwater sources. The concentration of NORM in groundwater can be enhanced due to long contact times with highly concentrated mineral deposits underground. The presence of high levels of NORM in drinking water is of concern because repeated long-term exposure to radiation has been associated with increased incidences of cancer.

Of special concern are Radium-226 and its decay progeny, especially Radon-222, Lead-210 and Polonium-210. Ra-226 is an alpha-emitting nuclide that is readily incorporated in bony structures (making it especially hazardous to children), with a very long half-life (1600 years). Rn-222 is an alpha-emitting gas with a short half-life (3.8 days) often present in water and has been associated with increased incidences of lung cancer.[1] Pb-210 is a beta-emitting nuclide with a long half-life (about 23 years) that is also easily incorporated into bone. Lastly, Po-210 is an alpha-emitting nuclide with a relatively short half-life (138 days). Po-210 is readily absorbed and incorporated by the human body, with approximately 50% of Polonium-210 ingested is retained.[2,3] Po-210 has been shown to impact reproductive tissues and fetuses, passing though the placenta unimpeded. Additionally, Pb-210, the progenitor of Po-210, provides an internal long-lived source for Po-210.[4]

Research has shown that drinking water in Iowa, along with other north-central states often contains elevated levels of Ra-226. Po-210 has been found at measurable levels in studies from several different states, but data regarding Po-210 is extremely limited.[5] Monitoring of radionuclides in Iowa is generally limited to community water systems for Ra-226, Ra-228, Uranium (by mass), and gross alpha particles, while the substantial numbers of private wells are not monitored at all. There is a large gap in data regarding Ra-226 decay progeny that needs to be addressed; the limited data and potential negative health impacts support the need for more research. A pilot study will be performed on drinking water in the next year to begin to address this gap and provide data to make informed decisions on how drinking water in the state of should be regulated.

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