



Spatial variability of drinking water iodine in Denmark: implications for future policy making

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The iodine—an essential component of human thyroid hormones—is provided to our organisms naturally from the food and water and/or is added artificially to the diet. One of the major natural contributors to the dietary iodine intake in Denmark is the drinking water. Both insufficient or excessive iodine intake can cause health problems however the attention falls mainly on the iodine deficiency (ID). Denmark is classified to have mild ID, which is based on sub-national data only. On a bigger scale, in Europe, about 40% of the general population is estimated to suffer from insufficient iodine intake (based on recent update on the iodine status worldwide). A mandatory addition of iodine to the salt was introduced in 2001 in Denmark to address the population's mild deficiency. One of the components of the Danish monitoring program investigating the effect of the salt iodizing (DanThyr) was based on the geographical variation of drinking water iodine levels. More specifically, the location of the two DanThyr cohort studies was chosen to reflect the low concentrations in the western part of Denmark and higher concentration in the eastern part. However, the knowledge about the spatial variability of iodine in Danish ground- and drinking water at that time was quite limited and misrepresentation of the natural variability is suspected.

The presented sampling campaign was completed in 2013, and includes 144 waterworks with annual abstraction of about 175 mio m³ groundwater (~45% of the total groundwater abstraction by all active public and private Danish waterworks). The results show a surprisingly complex spatial pattern concerning both the iodine concentrations and speciation. By estimating the dietary iodine intake from water and comparing it to the WHO recommendations, it becomes possible to recognize potentially deficient/excessive geographical areas. Moreover, it is demonstrated that drinking water iodine levels (major dietary iodine contributor in Denmark) can be used as a proxy for the ID status of the population in countries such Denmark, where there is no recent nationwide survey or monitoring program following up the population's iodine status on a national level.

Not only can the outcome of this project facilitate the design of future epidemiological studies, but also support policy making in the area of ID prevention and water management as it fills a knowledge gap for drinking water iodine speciation and variation in connection to both spatial distribution and human health.