



Underground water containing N-nitrosamines and the regional cancer incidence in the Pearl River Delta region

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The nasopharyngeal carcinoma and hepatocellular carcinoma in the local regions of the Sorth-China are typical cancer types by regional malignant tumor. This paper, for example of regional carcinoma epidemic in the Pearl River Delta for hundreds years, deals with formation mechanism of the N-nitrosamines compounds in natural waters and its geological, climatic and ecological conditions. According to the characteristics of low water content and hydrophilic of most N-nitrosamines, a solid-phase extraction (SPE) method that suitable for gas chromatography with mass spectrometry (GC-MS/MS) to detect nine trace N-nitrosamines compounds in environmental and drinking waters was developed in this paper. The detection limit ranged from 0.34 to 2.19 ng•L⁻¹. As a representative of two local cancer high-risk area in Shunde and Sihui, the concentration of nine trace N-nitrosamines were determined in different water bodies of the area for the first time, with the result of concentration ranged from 0.34 to 307 ng•L⁻¹. The detection rate was 40% which was exceeded the rate of 15% by health drinking water N-nitrosamines standard (10ng/L). According to the results of testing N-nitrosamines, NDMA and NDBA were the main pollutants while other nitrosamines were detected with low concentration. The nitrosamine contents in different water bodies, like well water, tap water, underground water and spring water at low industrial influence area Sihui have the similar statistical characteristics: the average and the peak value of NDMA and NDBA are low exceeded the standard one (21.77 and 15.54 ng/L respectively), other nitrosamine contents are low. It expresses a typical pattern of nitrosamine composes for the natural regional underground water. These water samples were taken from the depth of 0-20 m underground water. It is ammonium-rich and nitrosamine containing underground water which was formed in the unique geological, climatic and ecosystem conditions of that region. This nitrosamine containing underground water may be the original reason of the regional carcinoma. The industrial area Shunde detected the most nitrosamines compounds within five endemic regions. The concentration of nitrosamines compounds has positive correlation with morbidity of hepatocellular carcinoma. This verified the cumulated influence of industrial pollution can increase the morbidity of the cancer.