Study Associates Nitrate Exposure Through Drinking Water with Risk of Colorectal Cancer

Another study associates waterborne ingested nitrate with breast cancer in postmenopausal women who report high red meat consumption

The findings of a study published in the *International Journal of Cancer* and coordinated by researchers at CREAL, an allied ISGlobal centre, suggest an association between the risk of colorectal cancer and the ingestion of nitrate in drinking water. Nitrate is a chemical compound found naturally in the environment. However, nitrate levels in water and cultivated land are increased by the intensive use of nitrogen fertilizers in agriculture. Nitrates are also used as preservatives in processed fish and meat. Consumption of these food products leads to the formation of N-nitroso compounds in the body, and there is evidence from animal studies that these compounds are carcinogenic.

The objective of the present study was to assess the risk of colorectal cancer associated with nitrate exposure in drinking water and diet. The investigators conducted a case-control study (the controls were healthy people having the same characteristics as the patients with cancer) in Spain and Italy between 2008 and 2013. The study population was interviewed about their residential history, the type of water they had consumed since age 18, and their dietary habits. Long-term waterborne nitrate intake was calculated using data on recorded nitrate levels in drinking water, the participants' residential histories and their water consumption habits. Dietary nitrate intake was estimated on the basis of food frequency questionnaires and published food composition databases.

Data was analysed for 1,869 cases and 3,530 controls. Average nitrate ingestion in water ranged from 3.4 to 19.7 mg/day. The associations were stronger in the male population and in participants reporting high levels of red meat consumption. Furthermore, according to Cristina Villanueva, the Director of the water pollution programme in CREAL and the coordinator of the study, "dietary nitrate from animal sources was associated with rectal, but not colon, cancer."

Nitrate ingestion and risk of developing breast cancer

In another study, which was published in *Environmental Health Perspectives*, the same team evaluated the ingestion of nitrate as a risk factor for the development of breast cancer. The participants were recruited in eight Spanish regions between 2008 and 2013, and the statistical analysis included 1,245 patients with cancer treated in hospitals and 1,520 controls. The study, also led by Villanueva, found waterborne ingestion of nitrate to be associated with breast cancer only in postmenopausal women who report high red meat consumption. "However", Villanueva concludes, "we did not find any association between dietary nitrate and breast cancer, irrespective of menopausal status or whether the source was animal or vegetable."

ISGlobal-CREAL Alliance

With the objective of consolidating an internationally stronger and more competitive research center in global health, the Barcelona Institute for Global Health (ISGlobal) and the Centre for Research in Environmental Epidemiology (CREAL), CERCA centers, are working together as the ISGlobal alliance. The alliance is rapidly evolving in a merger of the two research centers into a bigger and more consolidated ISGlobal.

References:

Espejo-Herrera N et al. **Colorectal cancer risk and nitrate exposure through drinking water and diet.** Int J Cancer 2016 (in press)

Espejo-Herrera N et al. **Ingested Nitrate and Breast Cancer in the Spanish Multicase-Control Study on Cancer (MCC-Spain).** Environ Health Perspect 2016 (in press)

To reach the researchers or for further clarification, you can contact: Raul Toran rtoran@creal.cat 93 214 73 33