Chlorination By-Products

Chlorination disinfection by-products (CDBPs), Trihalomethanes (THMs), and the Risk of Bladder Cancer

Chlorination has made the Canadian water supply safe from illness-producing microorganisms such as bacteria and viruses. Fortunately for Canadian society chlorine disinfection technology has almost completely eliminated from our lives the risks of waterborne diseases such as typhoid fever, cholera, and dysentery. Indeed, the virtual elimination of these diseases in the developed world is considered one of the great triumphs of modern science. However, the health benefit of chlorination has introduced some *possible* risks from the byproducts of the disinfection process.

Trihalomethanes (THMs) are only one subgroup of the many disinfection by-products formed during chlorination and are used as indicators of overall chlorination disinfection by-product (CDBP) formation. THMs are formed during the treatment process when chlorine reacts with organic content in the untreated water. Virtually all treated water supplies contain some level of disinfection byproduct.

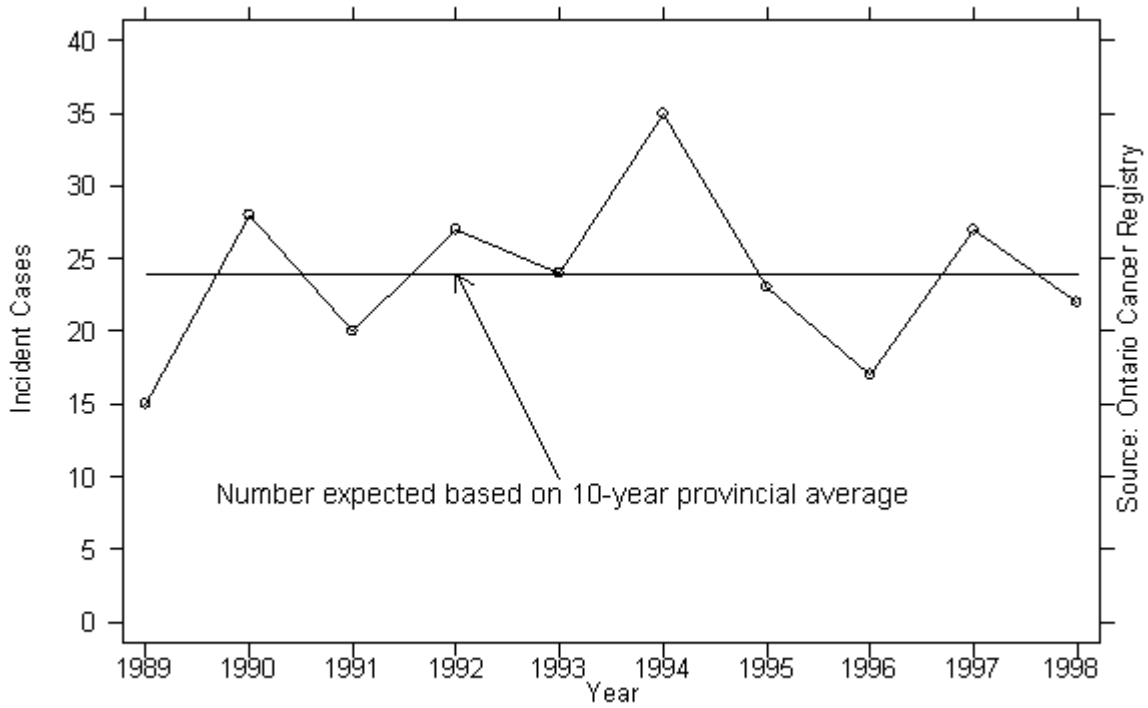
Some epidemiological studies have shown an association between long-term exposure to THMs and bladder cancer. Also, some toxicological studies in animals have shown evidence of the carcinogenicity of chloroform, a major THM. It should be noted that the possible increased risk of bladder cancer associated with THMs is relatively small, that exposure time is very long (on the order of 40 years or more), and that accurately assessing a person's exposure to THMs is very difficult. Nevertheless, THMs are considered a possible cancer risk and so, in 1993, the Federal-Provincial Subcommittee on Drinking Water (DWS) established a maximum acceptable concentration (MAC) guideline of 100 parts per billion (ppb) for THMs in drinking water.

Bladder cancer in Thunder Bay

Recently in Thunder Bay, the media has published reports that THM levels in the Loch Lomond water supply have, at times, been somewhat above the 100 ppb MAC. Because of this, some citizens have expressed questions about the rate of bladder cancer in Thunder Bay. The purpose of this fact sheet is to report the incidence of bladder cancer in Thunder Bay and to compare it to the Ontario average. Before presenting the results, it should be noted that only a portion of Thunder Bay is served by the Loch Lomond reservoir. Furthermore, assessing the level of individual exposure to THMs in Thunder Bay is exceedingly difficult for several reasons, including:

1. A significant proportion of the city is supplied by both Loch Lomond and Bare Point at different times during the year;
2. The level of THMs in the water supply varies considerably year-by-year as well as seasonally;
3. Many people may live in an area supplied by Loch Lomond but may spend a significant portion of time in an area supplied by Bare Point and vice versa;
4. Some people in the Thunder Bay area have wells, which usually have much lower THM levels than surface water supplies;
5. Some people get most of their drinking water from bottled sources.

Given this, and the fact that the THM levels in Loch Lomond water only occasionally exceed the 100 ppb MAC, it is not surprising that the rate of bladder cancer in the Thunder Bay district is actually lower than that of the province. The graph below shows that the number of bladder cancers observed in Thunder Bay is, on average, approximately the same the provincial average. The graph also shows that there is a certain amount of variation from year to year. It should be noted that this short-term variability is not explained by the THM levels in the water because the possible association between THMs and bladder cancer is based on long-term exposure of 40 years or more.



Incidence of Bladder Cancer, both sexes, Thunder Bay

What can be done by consumers right now to reduce levels of THMs in their drinking water?

According to Health Canada, for those consumers wishing to reduce the levels of disinfection byproducts in their drinking water, options include using a water filter containing activated carbon or aerating the water in a blender. Neither of these actions will, however, completely eliminate disinfection byproducts in drinking water. If a filter device is used it should be properly maintained because such devices can become sources of bacterial contamination in water. Also, the manufacture and sale of these devices is not currently regulated in Canada, so it is important to choose a dealer with care. Health Canada is conducting research to assess the effectiveness of various charcoal filters, blending and heating in the removal of CDBPs. The results of this research are pending.

Should consumers be concerned about the levels of THMs in the Thunder Bay water supply?

Everyone should be concerned about the safety of his or her water supply and municipalities should strive to provide a water supply that meets the provincial standards. There is a possible, relatively small risk associated with long-term exposure to high levels of THMs. According to available statistics, Thunder Bay is not experiencing a higher than average number of bladder cancer cases.

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