NEW WATER DISINFECTION BYPRODUCTS:
TOXICITY, OCCURRENCE AND HEALTH RISKS

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KEY MESSAGES FOR DECISION MAKERS

- There is risk in pursuing alternative disinfection technologies to reduce regulated disinfection byproducts (DBPs) without fully understanding the potential of such options for creating alternative DBPs that may pose a greater health risk or compromise disinfection efficiency
- Rational risk management of DBPs requires: 1) knowledge of new DBPs, and 2) comparative risk assessment of newly discovered DBPs in relation to regulated DBPs
- Characterization of new DBPs and understanding their health effects are important for DBP regulation that balances among the complex, competing risks involved in DBP management

WHO IS THIS INFORMATION RELEVANT FOR?

- Drinking water utilities
- Regulators
- Public health authorities

WHAT WAS THE RESEARCH FOCUS?

Disinfection is an essential drinking water treatment process necessary to ensure safety. Disinfection processes inevitably create unintended DBPs at trace concentrations. Over the past 40 years a variety of adverse health effects have been proposed. Although no DBPs have been proven to cause any human health effects, drinking water providers must remain precautionary to minimize DBP formation. This research is necessary because rapidly improving analytical methods continue to discover more DBPs while our tools for assessing the health risk posed by DBPs have been very limited. This research focused on developing new analytical methods for identifying DBPs and new toxicology methods for screening potential adverse health effects from DBPs.

WHAT WAS THE RESEARCH METHOD?

The most sophisticated trace analytical methods currently available were further advanced and applied to identify and characterize new DBPs. Novel toxicology techniques were developed to assess the potential adverse effects of DBPs, both known and newly discovered.

WHAT WERE THE RESEARCH RESULTS?

Several novel advanced trace analytical techniques have been developed to better characterize DBPs for Canadian drinking waters. Likewise, novel toxicity testing methods have been developed to assess the potential for DBPs to cause adverse health effects. Perspectives on a risk (DBPs) vs. risk (microbial pathogens) balance have been explained.

WHAT ARE THE IMPLICATIONS FOR DECISION MAKERS?

Drinking water professionals and ultimately the public need to understand the complexity of the DBP issue and be able to assist in de-bunking of prevalent myths about DBPs in drinking water. The most persistent myth is that chloroform, the most common chlorination DBP, causes human cancer from drinking water exposure. This research provides important new insights about other potentially cancer-causing DBPs.

Being armed with accurate knowledge about the DBP issue allows stakeholders to accurately assess and make rational risk management choices, many with major financial implications for water consumers. The pre-eminent need for disinfection must not be compromised as we know that a failure to disinfect drinking water adequately will definitely render water unsafe. DBPs are always a drinking water issue regardless of the disinfection method used. Sensible, precautionary measures are the appropriate responses to the DBP issue to minimize any possible, but as yet unproven, health risks from DBPs. These measures need to be based on fully understanding the best available knowledge about the DBP issue as uninformed actions to reduce regulated DBP formation may create other DBPs of potentially greater health concern.

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