February 21, 2017

Environment and Health Groups' Statement on Triclosan: Call for Canadian Government to Prohibit Triclosan in all Consumer Products to Protect the Environment and Human Health

Original submitted February 8, 2017
Updated – List of supporting groups

We, the undersigned public interest and civil society groups, support the government's decision to add triclosan (CAS#3380-34-5) to the Toxic Substances List in Schedule 1 of the *Canadian Environmental Protection Act, 1999* (CEPA, 1999). We also urge the government to take regulatory measures to prohibit triclosan in consumer products in order to protect the environment and human health. The government's proposal to use Pollution Prevention Plans (P2 Plans) to address triclosan is inadequate. P2 Plans will not stop the release of triclosan in industrial effluent, or from the use of hundreds of personal care products that go down the drain and end up in waste water effluent and sludge waste. Unless there is a prohibition of triclosan in personal care products and other consumer products, the substance will continue to be released into the aquatic environment, including the Great Lakes and waterbodies across Canada, creating unnecessary risks to aquatic and terrestrial species, and from continued, everyday use of these products - to human health.

This submission follows a letter dated July 15, 2015 and statements submitted on November 27, 2014 in which over 50 public interest and civil society organizations urged the government to prohibit triclosan in consumer products.[1,2] In the past few weeks, several health and environmental non-governmental organizations including the Canadian Environmental Law Association, Learning Disabilities Association of Canada, Chemical Sensitivities Manitoba, Prevent Cancer Now, Ontario Rivers Alliance and Ottawa Riverkeeper,[3,4] prepared detailed submissions to express concerns and opposition to the government's final decision on triclosan and proposal to use Pollution Prevention Plans (P2 Plans), a non-regulatory tool, as a management strategy. The P2 Plans are very narrow in their scope. P2 Plans aim to limit the concentration of triclosan in the aquatic environment rather than prohibit triclosan in consumer products or focus on identifying safe alternatives through an informed substitution requirement. Overall, the proposed management regime will result in the on-going use and release of triclosan to the environment.

We highlight these concerns below.

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[1] Various signatories. July 2015. Letter to The Honourable Leona Aglukkaq and the Honourable Rona Ambrose. Accessed http://www.cela.ca/sites/cela.ca/files/Triclosan-NGO-letter-July-2015.pdf
[2] Various signatories. November 2014. Environment and Health Groups' Statement on Triclosan: Call on Canadian Government to Prohibit Triclosan in All Products. Accessed at http://www.cela.ca/sites/cela.ca/files/triclosan_statement.pdf
[3] Canadian Environmental Law Association, Chemical Sensitivities Manitoba, Ontario Rivers Alliance, Ottawa Riverkeeper, Prevent Cancer Now, and Citizens' and Network on Waste Management. January 25 2017. Submission in Response to Canada Gazette publications on the final decision for phenol, 5-chloro-2-(2,4-dichlorophenoxy) [triclosan] (CAS RN 3380-34-5), Order Adding a Toxic Substance to Schedule 1 to the Canadian Environmental Protection Act, 1999 and proposed Management Strategy. Accessed at http://www.cela.ca/sites/cela.ca/files/1096ResponseCanadaGazetteTriclosan.pdf
[4] Learning Disabilities Association of Canada. Submissions /comments January 2017, also 2015 and 2012

Backgrounder

Canadians are exposed to triclosan every day via several exposure routes. According to the final assessment of triclosan, it is used in drug products, medical devices (e.g. sutures), cosmetics (skin moisturizers, eye and face make-up, cream and cleansers, tanning products, shaving preparations, bath products, exfoliants, massage products, styling products, shampoos, deodorants, fragrances), cleaning products (general all-purpose cleaners, general purpose detergents), and other commonly-used products (e.g. antibacterial hand sanitizers, mouthwashes, toothpaste). Over 320 cosmetic products and 118 drug products containing triclosan were reported under the survey issued in 2013. There are no registered uses of triclosan in pest control products.[5]

The Government of Canada released the draft assessment on triclosan in March 2012. The final assessment was released on November 26, 2016. The government conclusions on triclosan did not change from 2012 to 2016, despite the long delay in the completion of the assessment. The government concludes that triclosan is toxic under section 64 (a) of the CEPA 1999 and that it "… have or may have harmful effect on the environment or its biological diversity".[6] The government also concluded that triclosan is not toxic to human health.

Based on the final conclusions for triclosan, the government proposed to address triclosan that is entering the environment, with a specific focus on the aquatic ecosystem. The P2 Plans proposed to address triclosan would apply to key industry stakeholders with an aim to ensure that the releases of triclosan to the aquatic environment would result in concentrations that fell below the predicted no-effect concentration (PNEC) of 376ng/L.

Based on the information from the draft and final assessments, the number of products containing triclosan has dropped from 1600 products to more than 300 products with antibacterial soaps being one of the largest sources of triclosan in consumer products. However, biomonitoring studies conducted under Canadian Health Measures Surveys between 2009 and 2011, and again between 2012 and 2013, indicate there was no significant decrease of triclosan levels in the general population.

Environmental and health NGOs have previously noted key gaps in the assessment and final decision for triclosan and expressed their concerns that the proposed P2 Plans are an inadequate management tool to protect to the environment.

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[5] Environment and Climate Change Canada and Health Canada. November 2016. Final Assessment Report: Triclosan, Chemical Abstracts Service Registry Number (3380-34-5). Accessed at http://www.ec.gc.ca/ese-ees/65584A12-2B7D-4273-9F7A-38EDF916ECAF/EN%20FSAR%20Triclosan%20with%20ISBN.pdf

[6] Note: CEPA 1999 section 64 (a) states:
…. a substance is toxic if it is entering or may enter the environment in a quantity or concentration or under conditions that:
(a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity;

Concerns with Environment and Health Assessments

Environment

Persistence and Bioaccumulation: The final assessment notes that the continuous input (of triclosan) to surface waters through waste water treatment plant (WWTP) effluent, results in its continuous presence in the receiving aquatic ecosystems.[7] It cannot be assumed that all communities across Canada have WWTPs or have WWTPs with secondary treatment technology. The government's assessment of the efficiency of triclosan removal was based on the presence of WWTPs with secondary treatment, and doesn't take into account the common practice of bypassing treatment during heavy rain events. Combined sewer use overflow systems, for example, are used to capture rainwater runoff, domestic sewage, and industrial waste water but may also results in direct discharges of many hazardous substances including triclosan to waterbodies.

In a study of compounds in sewage sludge[8] by Hydromantis Inc. for the CCME (2010), median concentrations of the antibacterial compounds triclosan and triclocarban, were found at the highest levels. These plus the antibiotic ciprofloxacin, and the fragrance compound HHCB were the compounds most frequently detected (9 or more of 11 sites) above 1000 ng/g TS dw. At a few sites, the concentrations of triclosan in the final sludge or biosolids exceeded 10,000 ng/g TS dw.

The government's assessment fails to give serious consideration to triclosan releases from personal care products that eventually show up in sewage sludge. Antimicrobials applied as sewage sludge on land constitute a pathway for transfer of these chemicals into animal feed and crops intended for human consumption, and may contribute to antibiotic resistance.

Currently, there is no adequate policy or regulatory requirement in Canada to address the continuous presence of a substance in the environment or even the elevated levels of these substances throughout their lifecycles.

The final assessment also included a change in decision on the bioaccumulation of triclosan. The draft assessment concluded that triclosan met the criteria for bioaccumulation under the Persistence and Bioaccumulation Regulations, while the final assessment concluded it no longer meets the bioaccumulation criteria. The final assessment included several new studies to determine the bioaccumulation of triclosan. However, these studies did not provide adequate rationale for government to change the conclusion on bioaccumulation. This decision was made despite evidence that triclosan bioaccumulates in various aquatic species that contradicts the studies considered by the government. Additional commentary concerning the decision on bioaccumulation of triclosan is available in CELA et. al (2017).[9]

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[7] Environment and Climate Change Canada and Health Canada. November 2016. Final Assessment Report: Triclosan, Chemical Abstracts Service Registry Number (3380-34-5). Accessed at http://www.ec.gc.ca/ese-ees/65584A12-2B7D-4273-9F7A-38EDF916ECAF/EN%20FSAR%20Triclosan%20with%20ISBN.pdf

[8] Hydromantis Inc. 2010. Emerging Substances of Concern in Biosolids: Report to the Canadian Council of Ministers of the Environment

[9] Canadian Environmental Law Association, Chemical Sensitivities Manitoba, Ontario Rivers Alliance, Ottawa Riverkeeper, Prevent Cancer Now, and Citizens' Network on Waste Management. January 2017. Submission in Response to Canada Gazette publications on the final decision for phenol, 5-chloro-2-(2,4-dichlorophenoxy) [triclosan] (CAS RN 3380-34-5), Order

The impacts of triclosan in the environment include "reduction in growth, reproduction and survival, in aquatic and terrestrial organisms including plants. There is evidence that triclosan can elicit effects associated with endocrine disruption."[10]

By-products: There are a number of by-products associated with the presence of triclosan in WWTP processing, including methyl-triclosan, chloroform, dichlorophenol (2,4-DCP), and 2,8-DCDD. Triclosan also undergoes photo-transformation from the chlorination of waste water treatment process, producing three dioxins (1,2,8-TriCDD, 2,3,7-TriCDD and 1,2,3,8-TCDD). J.M Buth et al. (2010) noted that "The dioxin products from the chlorinated triclosan derivativesare potentially of greater concern than 2,8-DCDD formed directly from triclosan and that triclosan and the wastewater produced transformation products could serve as an important, yet unrecognized, source for polychlorinated dioxins in the environment."[11] These dioxins may be of concern if found in sediments from the application of biosolids from WWTPs.

The final decision on triclosan does not adequately address the scope of the transformation products resulting from the presence of triclosan in WWTPs. Based on the final assessment findings, the presence of these transformation products are also of concern to water bodies, including the Great Lakes basin, where triclosan has been detected in over 89% of surface water samples.[12]

Health

The evidence used to determine human health risks of triclosan has substantial limitations and gaps. Triclosan is ubiquitous in the environment, and biomonitoring studies have found triclosan in 50% of umbilical cord blood and all maternal urine samples.[13] It is particularly notable that triclosan is associated with endocrine disruption affecting reproduction and development. Similarly, the assessment focused on diminished thyroid functions from triclosan exposure but important data for neurodevelopment or chronic toxicity/development data were unavailable, or missing.[14] The use of an uncertainty factor (UF) of three to account for the lack of a developmental neurotoxicity study is inadequate because one cannot easily extrapolate from adult to fetus or a child's developing system because exposures can have quite different outcomes e.g. serious binge drinking effects on the fetus, compared to the mother. The US Food Quality Protection Act mandated a UF of 10 to account for missing developmental data.[15]

Adding a Toxic Substance to Schedule 1 to the Canadian Environmental Protection Act, 1999 and proposed Management Strategy. Accessed at http://www.cela.ca/sites/cela.ca/files/1096ResponseCanadaGazetteTriclosan.pdf

[10] Environment and Climate Change Canada and Health Canada. November 2016. Final Assessment Report: Triclosan, Chemical Abstracts Service Registry Number (3380-34-5). Accessed at http://www.ec.gc.ca/ese-ees/65584A12-2B7D-4273-9F7A-38EDF916ECAF/EN%20FSAR%20Triclosan%20with%20ISBN.pdf

[11] Jeffrey M Buth, et al. Dioxin Photoproducts of Triclosan and Its Chlorinated Derivatives in Sediment Cores. 2010. *Op cit.*

[12] Gary Klecka, Carolyn Persoon, and Rebecca Currie. Chemicals of Emerging Concern in the Great Lakes Basin: An Analysis of Environmental Exposures. 2010. Rev Environ Contam Toxicol. 2010;207:1-93

[13] B.F.G. Pycke, L.A. Geer, M. Dalloul, O. Abulafia, A.M. Jenck, R.U. Halden
Human fetal exposure to triclosan and triclocarban in an urban population from Brooklyn, New York. *Environ. Sci. Technol.,* 48 (2014), pp. 8831–8838. http://dx.doi.org/10.1021/es501100w

[14] Learning Disabilities Association of Canada. Submissions /comments January 2017, also 2015 and 2012

[15] Food Quality Protection Act (1996) H.R. 1627, Amending FIFRA, United States Congress.

The health and environmental NGOs provided a list of 20 recent health studies that should be reviewed by the government before concluding a final decision on triclosan. This list is presented in Table 1 of the submission by CELA et. al (2017) (see Appendix).[16]

Apply Informed Substitution to Avoid Regrettable Substitution

In 2014, CELA sponsored a GreenScreen® assessment of triclosan, which included a human health and environmental health hazards assessment of the substance. The result of the GreenScreen® assessment of triclosan is highlighted in a July 2014 report, which clearly demonstrated that triclosan is a chemical of high concern.[17] The GreenScreen® assessment concluded that triclosan is highly toxic in the aquatic environment, persistent and bioaccumulative, and is present in wastewater treatment plant effluents, as well as in sewage sludge.

CELA also sponsored a GreenScreen® assessment of triclocarban, which has a similar structure and usage to triclosan and, as a result, may be considered a possible alternative for triclosan.[18] The GreenScreen® assessment on triclocarban demonstrated high persistence and very high chronic and acute toxicity to the aquatic environment. Based on the GreenScreen® assessment results, triclocarban may be "use[d] but search for safer substitutes".[19]

The final decision and the proposed government risk management approach for triclosan do not provide the necessary regulatory signal to the marketplace that triclosan should be prohibited. To date, the government approach has not adopted an alternative assessment framework (e.g. apply GreenScreen® tools) to advance the prevention of toxic substances, including triclosan, and avoid poor substitution decisions for such substances.

Regulatory Measures on Triclosan Taken by Other Jurisdictions

The government's proposed P2 Plans on triclosan are inadequate to address its continued use in consumer products and presence in the environment. Rather, the government's proposal will ensure the on-going use of triclosan in consumer products. Unless there is a prohibition of triclosan in personal care products and other consumer products, the substance will continue to be released into the aquatic environment, including the Great Lakes and waterbodies across Canada, creating unnecessary risks to aquatic and terrestrial species. The US Food and Drug Administration (FDA) requested data demonstrating that consumer products containing antimicrobial ingredients are effective in their stated purpose – to prevent infections. The FDA did not receive such data and therefore passed its final decision to prohibit the use of triclosan and triclocarban along with 18 other antimicrobial chemicals in

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[16] Canadian Environmental Law Association, Chemical Sensitivities Manitoba, Ontario Rivers Alliance, Ottawa Riverkeeper, Prevent Cancer Now, and Citizens' Network on Waste Management. January 2017. Submission in Response to Canada Gazette publications on the final decision for phenol, 5-chloro-2-(2,4-dichlorophenoxy) [triclosan] (CAS RN 3380-34-5), Order Adding a Toxic Substance to Schedule 1 to the Canadian Environmental Protection Act, 1999 and proposed Management Strategy. Accessed at http://www.cela.ca/sites/cela.ca/files/1096ResponseCanadaGazetteTriclosan.pdf

[17] Report and GreenScreen assessments. Accessed at http://www.cela.ca/triclosan-and-triclocarban

[18] Report and GreenScreen assessments. Accessed at http://www.cela.ca/sites/cela.ca/files/101-20-2-Triclocarban-GreenScreenBW.pdf

[19] Canadian Environmental Law Association. July 2014. Chemicals in Consumer Products are Draining Trouble into the Great Lakes Ecosystem: GreenScreen® Assessment Shows Triclosan and Triclocarban Should Be Avoided. Accessed at http://www.cela.ca/sites/cela.ca/files/TC-TCC-CELA-997_0.pdf

consumer antiseptic wash products that are rinsed off after use, including hand washes and body washes, starting in September 2017.[20] The State of Minnesota passed a regulation to prohibit the use of triclosan in sanitizing or hand and body cleansing products starting in January 1, 2017.[21] If regulatory measures to prohibit the use of triclosan in consumer products are not taken in Canada, it may become a dumping ground for products containing triclosan and other antimicrobial chemicals that are subject to these regulations.

Our organizations endorse the following positions on triclosan:

Recommendation: We support the order to add triclosan to the Toxic Substances List (Schedule 1) to CEPA 1999.

Recommendation: We do not support the use of a non-regulatory tool such as Pollution Prevention Plans to address triclosan levels in the environment.

Recommendation: We urge the government to re-consider a regulatory tool that would prohibit the use of triclosan in consumer products.

Recommendation: We urge the government to consider the 20 recent studies that have been referenced in a detailed submission on triclosan by environmental and health groups submitted January 26, 2017 (See Appendix).

Recommendation: We urge the government to require informed substitution (including the option of omitting antimicrobial additives) by applying alternative assessments, to avoid regrettable substitutions to triclosan, to address potential contributions to antimicrobial resistance, and to ensure safe substitutes for triclosan.

Recommendation: We urge the government to recognize and to improve its communication and awareness efforts to inform the public that plain soap and warm water are just as effective as antibacterials for disease prevention. Increased focus on this approach will avoid the use of alternatives (including triclocarban) that may have similar environmental and health impacts to triclosan.

Recommendation: We urge the government to expedite assessment, including cumulative assessment of other antimicrobial chemicals (e.g. triclocarban) in consumer products, for environmental and health reasons, as well as curtail development of antimicrobial resistance.

[20] U.S. Food and Drug Administration. Safety and Effectiveness of Consumer Antiseptics; Topical Antimicrobial Drug Products for Over-the-Counter Human Use. Accessed at https://www.federalregister.gov/documents/2016/09/06/2016-21337/safety-and-effectiveness-of-consumer-antiseptics-topical-antimicrobial-drug-products-for

[21] See: http://www.house.leg.state.mn.us/sessiondaily/SDView.aspx?StoryID=5284

The following public interest and civil society organizations support the statement on triclosan:

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APPENDIX

Potential references not considered or new on human health effects from triclosan

Author /Title of Article	Description	Affiliations	Cited By
Ajao et al., 2015 "Mitochondrial toxicity of triclosan on mammalian cells."	Human PBMC and keratinocytes	University of Helsinki, Finland; Institute of Theoretical and Experimental Biophsyics (Russia); University of Pannonia, Hungary	Olaniyan et al., 2016
Braun, JM. 2016 "Early-life exposure to EDCs: role in childhood obesity and neurodevelopment"	"Ultimately, improved estimates of the causal effects of EDC exposures on child health could help identify susceptible subpopulations and lead to public health interventions to reduce these exposures" Triclosan as an endocrine disrupting chemical, was included in this study.	Brown University, Providence, Rhode Island, USA	New study
Cherednichenko et al., 2012 "Triclosan Impairs Excitation-Contraction Coupling and Ca^{2+} Dynamics in Striated Muscle."	Physiological effects on muscle function in mice and fish	University of California; University of Colorado	U.S. FDA Proposed Rule 2013
Fang et al., 2016 "Absorption and Metabolism of Triclosan After Application to the Skin of B6C3F1 Mice."	Absorption, Distribution, Metabolism and Excretion (ADME) Data (mice)	U.S. National Center for Toxicology Research	U.S. FDA Final Rule 2016
Feng et al., 2016 "Endocrine Disrupting Effects of Triclosan on the Placenta in Pregnant Rats."	"Taken together, these data demonstrated that the placenta was a target tissue of TCS and that TCS induced inhibition of circulating steroid hormone production might be related to the altered expression of hormone metabolism enzyme genes in the placenta. This hormone disruption might subsequently affect fetal development and growth."	Beijing Center for Disease Control and Prevention; Beijing Advanced Innovation Center for Food Nutrition and Human Health; etc.	N/A (New Study)

Fernando D.M. et al., 2017 "Multi-omics approach to study global changes in a triclosan-resistant mutant strain of Acinetobacter baumannii ATCC 17978."	Resistance to triclosan	Winnipeg, University of Manitoba and the Public Health Agency of Canada	
Gee, R. H. et al., 2008 "Oestrogenic and Androgenic Activity of Triclosan in Breast Cancer Cells."	FDA: "new data suggesting that triclosan… can cause alterations in thyroid, reproductive, growth, and developmental systems of neonatal and adolescent animals" (US FDA, 2013) "Triclosan possesses intrinsic oestrogenic and androgenic activity" (Gee et al., 2008)	University of Reading, UK	U.S. FDA Proposed Rule 2013
Henry and Fair, 2013 "Comparison of in vitro cytotoxicity, estrogenicity and anti-estrogenicity of triclosan, perfluorooctane sulfonate and perfluorooctanoic acid."	Effect on human breast cancer cells "The overall results demonstrated that triclosan, PFOS and PFOA have estrogenic activities and that co-exposure to contaminants and E(2) produced anti-estrogenic effects. Each of these compounds could provide a source of xenoestrogens to humans and wildlife in the environment."	National Oceanic and Atmospheric Administration	Olaniyan et al., 2016
Jacobs et al., 2005 "Lignans, Bacteriocides and Organochlorine Compounds Activate the Human Pregnane X Receptor (PXR)."	"The evidence that organochlorine chemicals, particularly the ubiquitous triclosan, activate hPXR suggests that these environmental chemicals may, in part, exhibit their endocrine disruptor activities by altering PXR-regulated steroid hormone metabolism with potential adverse health effects in exposed individuals."	University of Surrey, UK	U.S. FDA Proposed Rule 2013
Johnson et al., 2016 "Application of the Navigation Guide systematic review methodology to the evidence for developmental and	This is the first systematic review of the human and animal evidence linking exposure to triclosan to adverse reproductive or developmental health endpoints.	University of San Francisco; U.S. EPA	N/A (New Study)

reproductive toxicity of triclosan."			
Kwon et al., 2013 "Evaluation of comparative cytotoxicity of spray-type chemicals used in household products."	Effect on human lung cells	National institute of Environmental Research, Incheon, Korea	Olaniyan et al., 2016
Lassen T.H. et. al., 2016 "Prenatal Triclosan Exposure and Anthropometric Measures Including Anogenital Distance in Danish Infants"	Found smaller head and abdominal circumference in newborn boys when maternal TCS levels were higher.	Denmark	
Olaniyan et al., 2016 "Triclosan in water, implications for human and environmental health."	Review of literature on health effects of TCS (e.g. thyroid homeostasis)	University of Fort Hare, South Africa	N/A (New Study)
Pinto et al., 2013 "Triclosan interferes with the thyroid axis in the zebrafish (Danio rerio)"	"First study demonstrating that TCS acts on the fish thyroid axis."	University of Algarve, Portugal	N/A
Tartaglia GM, et al. 2016 "Mouthwashes in the 21st century: a narrative review about active molecules and effectiveness on the periodontal outcomes"	"The literature has not clearly demonstrated which compound is the best for mouthrinses that combine good efficacy and acceptable side effects. Research should focus on substances with progressive antibacterial activity, prompting a gradual change in the composition of oral biofilm and mouthrinses that combine two or more molecules acting synergistically in the mouth" The study included triclosan.	Functional Anatomy Research Center (FARC), Università degli Studi di Milano, Milano , Italy; Functional Anatomy Research Center (FARC) , Università degli Studi di Milano, Milano, Italy; Menzies Health Institute Queensland and School of Dentistry and Oral Health, Griffith University, Gold Coast, Australia; Department of Regulatory Affairs , Biokosmes srl , Bosisio Parini, Italy; Department of Veterans Affairs Medical Center, San Francisco, CA, USA.	New study

Walter DI, et al, 2017 "Occupational asthma caused by sensitization to a cleaning product containing triclosan."		Occupational Lung Disease Service, Birmingham Chest Clinic, Birmingham, United Kingdom	New study
Weatherly et al., 2016 "Antimicrobial agent triclosan is a proton ionophore uncoupler of mitochondria in living rat and human mast cells and in primary human keratinocytes."	Human mast cells "Our data indicate that TCS is a mitochondrial uncoupler, and TCS may affect numerous cell types and functions via this mechanism."	University of Maine	Olaniyan et al., 2016
Wei, L, et al. 2016 "Triclosan/triclocarban levels in maternal and umbilical blood samples and their association with fetal malformation"	"Observations suggest that maternal blood test could be a useful assay for detecting fetal exposure to TCS and TCC, and high exposure to TCS may be potentially associated with increased risk for fetal malformations". TSC – triclosan TCC - triclocarban	Beijing Obstetrics and Gynecology Hospital, Capital Medical University, Beijing, China; Clinical Center of Reproductive Medicine, Affiliated Hospital of Weifang Medical University, Weifang, China; The Institute of Inspection and Supervision, National Health and Family Planning Commission in Chaoyang District of Beijing, China; Beijing Centre for Disease Control and Prevention, Beijing, China; Capital Medical University, B Beijing Centre for Disease Control and Prevention, Beijing, China.	New study

Winitthana et al., 2014 "Triclosan Potentiates Epithelial-To-Mesenchymal Transition in Anoikis-Resistant Human Lung Cancer Cells"	Effects on human lung cancer cells "In conclusion, we demonstrated for the first time that triclosan may potentiate cancer cells survival in detached condition and motility via the process of EMT. As mentioned capabilities are required for success in metastasis, the present study provides the novel toxicological information and encourages the awareness of triclosan use in cancer patients."	Chulalongkorn University, Bangkok, Thailand	Olaniyan et al., 2016
Yueh et al., 2014 "The commonly used antimicrobial additive triclosan is a liver tumor promoter."	Long term TCS exposure in mice enhances hepatocellular carcinoma (type of liver cancer)	University of California, San Diego School of Medicine	Dhillon et al., 2015
Yueh and Tukey, 2016 "Triclosan: a widespread environmental toxicant with many biological effects."	Review of TCS "Epidemiology studies indicate that significant levels of TCS are detected in body fluids in all human age groups. We document here the emerging evidence—from in vitro and in vivo animal studies and environmental toxicology studies—demonstrating that TCS exerts adverse effects on different biological systems through various modes of action. Considering the fact that humans are simultaneously exposed to TCS and many TCS-like chemicals, we speculate that TCS-induced adverse effects may be relevant to human health."	University of California, San Diego School of Medicine	Yueh et al., 2014

Source: Canadian Environmental Law Association et. al (2017)[22]

[22] Canadian Environmental Law Association, Chemical Sensitivities Manitoba, Ontario Rivers Alliance, Ottawa Riverkeeper, Prevent Cancer Now, and Citizens' Network on Waste Management. January 2017. Submission in Response to Canada Gazette publications on the final decision for phenol, 5-chloro-2-(2,4-dichlorophenoxy) [triclosan] (CAS RN 3380-34-5), Order

Adding a Toxic Substance to Schedule 1 to the Canadian Environmental Protection Act, 1999 and proposed Management Strategy. Accessed at http://www.cela.ca/sites/cela.ca/files/1096ResponseCanadaGazetteTriclosan.pdf