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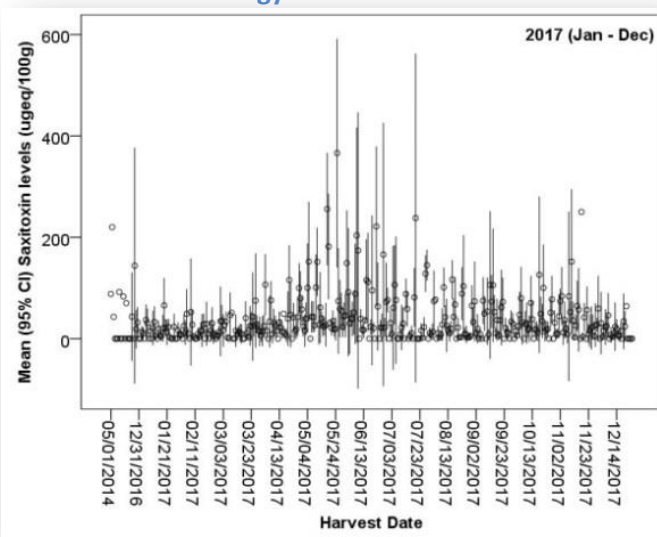
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**BCTOX is shared with over 300 professionals in BC. It can increase your works' visibility!**

**You may contribute to BCTOX by providing 500 word abstracts of a toxicology related problem or an initiative that you have taken!**

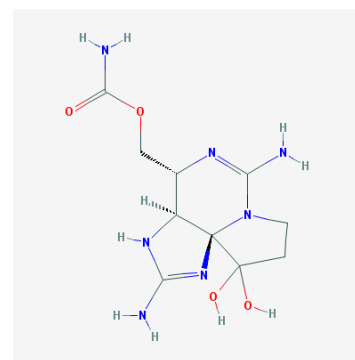
These "Abstracts" of BCTOX are peer reviewed and referenceable. How to cite abstracts of the current issue? Authors' surname, Initials, Title. BCTOX 2018; 3(1): Pages.

## BC Toxicology Pictures of the Month



**Saxitoxin** (ug/100g) (Paralytic shellfish poisoning (PSP)) among detected shellfish samples in BC (January to December 2017) (n=1219 detected out of 3878 samples) [Data from CFIA]

Above regulatory limits of Saxitoxin [Paralytic shellfish poisoning] concentrations were reported through 2017 with a pick in the warm months of the year. [This graph is prepared to imply the trend, and it should be interpreted with caution]



Saxitoxin;  $C_{10}H_{17}N_7O_4$  ([[(3aS,4R,10aS)-2,6-diamino-10,10-dihydroxy-3a,4,8,9-tetrahydro-3H-pyrrolo[1,2-c]purin-4-yl]methyl carbamate (PubChem)

## About Us



### **Aims and Scope**

BC Toxicology News Monthly Bulletin (BCTOX) aims to popularise the knowledge of toxicology and expand use and the awareness of Toxicology News in British Columbia, Canada. It tries to engage health and environmental professionals with online published toxicology news, publicly available information, and by providing short communications. BCTOX mainly focuses on adapting or summarizing relevant toxicology news in BC. The Bulletin accepts and welcomes contributions from professionals and the public as long as they meet BCTOX standards.

**How to access the original news items?** If you click on the link related to each one of the provided stories, it will take you to the original site of the news.

**Publication Frequency:** BCTOX is published monthly in English by Reza Afshari.

Provided information in [GRAY](#) is not related to the current issue, but could be of interest.

**ISSN:** 2560-645X

### **Policies:**

**Open Access Policy:** This bulletin provides open access to all its content.

**Fee:** BCTOX is free-of-charge for readers and contributors.

### **Copyright Statement**

BCTOX's content is currently prepared by Reza Afshari. The bulletin retains the copyright of their articles and will be able to archive pre-print, post-print, and publisher's versions.

This bulletin is not official and for the most parts is not peer-reviewed. It does not cover all the news, and is not liable for the accuracy of the news from media. It is, however, BC related, informative, handpicked and fun to read. The provided contents are not necessarily BCTOX's views.

BCTOX has been modified since (BCTOX 2017 June 2(6)) issue. It is now accepting 400 words educational material, commentaries, and research abstracts (with data) as long as they are within the scope of the bulletin and meets our standards. We are going to publish up to four short [but not full papers] abstracts in each issue. This section of the journal is peer reviewed.

**Archiving.** Digital Archiving: In addition to indexing database this Bulletin utilizes digital archive as well as hard copies to guarantee long-term preservation and restoration.

### **Publication Ethics**

This bulletin follows International Committee of Medical Journal Editors (ICMJE)'s Recommendations. Authors (i) must declare any conflict of interest in a given manuscript, and we utilize COPE workflow to transparently handle it, (ii) follow ICMJE definition of author and contribution, and (iii) accept the ethical policy including regulation and malpractice statement.

### **Guide for Authors**

From June 2017 (BCTOX 2017 2(6)) we publish original research, mini reviews, short communications, letters, case reports, and case series as long as they are limited to 400 words and the content is British Columbia related. These publications are peer reviewed.

### **References**

References should be given in the Vancouver style and numbered consecutively in the order which they are first mentioned in the text. Citation in the text should be in line with text in parenthesis with Arabic numbering style.

### **List of contributors of this issue**

Reza Afshari; Editor-in-Chief  
Yasi Afshari; Information gathering  
Karen Bartlett; Short article  
Michael Jonasson; Editor of English language  
Tissa Rahim; Toxicology of Soil

### **Reviewers of this issue**

Reza Afshari  
Karen Bartlett

### **Contact Us**

To contribute to the next issues, provide your opinion or report a mistake, please email us, your Feedback is greatly appreciated.

BCTOX could be reached at  
West 7th Avenue, Vancouver, V5Z 1C2.

604 999 6185

[BCTOX@yahoo.com](mailto:BCTOX@yahoo.com)

BCTOX does not have a professional website yet, but materials could be found from

<https://plus.google.com/105713713266879554108>

Google Scholar

<https://scholar.google.ca/citations?user=uaHeNh8AAAAJ&hl=en>

New subscribers will be added to the mailing list upon their request.

If this bulletin is not of interest to you, let us know please so we do not to fill up your mailbox in future.

Toxicology news in this month was focused on Wildfire and Fentanyl overdose, followed by food recall and drinking water quality.

### **How to cite BCTOX's articles:**

AUTHORS. TITLE, *BCTOX* 2017;2(8): PAGES.

### **Acknowledgment**

BCTOX respectfully acknowledges that it is published on the ancestral homelands of the Coast Salish peoples, including the territories of the x̣ṃməθkwəỵ əṃ (Musqueam), Skwxwú7mesh (Squamish), Stó:lō and Səl̓íl̓wətaʔ/Selilwítlh (Tsleil-Waututh) Nations.

**Erratum from the previous issues** None received.

## Summary of the Toxicology News in BC and Health Authorities in January 2018

Reza Afshari\*, Environmental Health Services, BC Centre for Disease Control, BC. [Reza.Afshari@bccdc.ca](mailto:Reza.Afshari@bccdc.ca) [Editorial 2017-11-30]

### Environmental Toxicology; What is BCTOX and why?

Health professionals (HP) including policymakers, health educators and researchers need to be regularly updated on environmental toxicology issues to keep up with rapidly evolving toxicology information, emerging health risks from environmental chemicals and to cope with issues that are locally highlighted in the popular press and news media.

Environmental toxicology training is limited during education, and when HP enter the field, they lack information on the responsibilities for regulation and risk communication among local, provincial and federal agencies, as well as their relations to international organizations, scholarly articles, and private sectors, including industry. (Liverman CT, Ingalls CE et al. 1997) All of these factors lead to avoidable confusion.

BCTOX acts as a local up to date resource to answer recent toxicology issues. The business model of BCTOX is flexible in order to maximise the applicability. BCTOX is also still developing, and will be determining its future directions along the way.

BCTOX acts like a pendulum. It mobilises your interventions to other places where they can also be used, and also back-translates the health activities that have had a "life outside of the health system" and have made societal impacts. While BCTOX is not official and not liable for the reported news from media, it is BC-related, and full of concise information that is handpicked and fun to read. BCTOX keeps you engaged with toxicology news in BC.

### Major toxicological statistics in January

**Mortalities** In total, around 700 premature deaths could be attributed to toxic exposures in BC in October including:

- ACUTE exposures; ≈ 80 due to Illicit drug overdose and around 10 due to suicides (CO, drugs and alcohol), and
- CHRONIC current and past exposures; 500 due to smoking and tobacco use, 81 (air pollution), 11 (radon) and 6 (asbestos). These are equal to overall  $15 \times 10^{-5}$  population toxic exposure-induced deaths in October alone, including  $2.4 \times 10^{-5}$  acute and  $13 \times 10^{-5}$  chronic toxicities (estimations are subjected to assumptions and limitations, and overlaps are possible (see BCTOX 2(8): 103)).

**Morbidities** Around 2200 calls were made to BC-DPIC [estimated from August 2017]

--- See next page for the rest!

*Reminding successes from the past  
From a Toxicology point of view*

*Property-tax to help fund response to the  
overdose crisis!*

Vancouver city council has voted 8-3 in favour of an additional 0.5-per-cent property-tax increase to help fund its response to the overdose crisis, which has overburdened first responders and killed so many people (2016).

The additional tax would bring the total property-tax increase to 3.9 per cent, will generate an extra \$3.5-million. (2016-03-24-TheGlobalAndMail Updated)

*BC overdose action exchange !!!*

BCCDC released the new BC overdose action exchange II (August 2017)

It includes 10 areas to reverse overdose deaths in BC; released in this August ([Ctrl Click here](#))

*BC government challenged Kinder  
Morgan Trans Mountain Oil Pipeline!*

2017-08-10 BC government announced that it will join legal challenges against Kinder Morgan Trans Mountain Oil Pipeline System (Globe&Mail 2017-08-10)

*Sola dosis facit venenum*

**Only the dose makes the poison!**

Paracelsus (1493 – 1541 CE)

## Summary of the Toxicology News in BC in January 2018

--- See the rest and details of the news in other sections.

### First Nations Health

#### *Drinking water; Prime Minister's pledge*

All drinking water advisories in First Nations communities will be eradicated by March 2021 according to Prime Minister Justin Trudeau. More than 60 communities still turning to alternative water sources for drinking, bathing and cooking that should be addressed in the next three years. (CTVNews 2017-12-28)

#### *Environmental predictors of bronchitis*

Having signs of mold and mildew in the home is significant predictors (2.05 (1.18, 3.57)) of increased risk of bronchitis in First Nations Children. (Karunanayake, Rennie et al. 2017)

Table. Adjusted odds ratio for the relationship between risk factors and ever bronchitis.

Variable	Ever Bronchitis	
	OR * (95% CI) †	p-Value
<b>Environmental factors</b>		
Parental smoking		
Yes	2.97 (1.03, 8.54)	0.043
No	1.00	
Signs of mold or mildew		
Yes	<b>2.02 (1.09, 3.74)</b>	<b>0.026</b>
No	1.00	

\* Odds ratios that are significantly different from 1.00 ( $p < 0.05$ ) are shown in bold. † Adjusted for age, sex and parents' highest education.

Reproduced from (Karunanayake, Rennie et al. 2017)

### Fraser Health

#### *Tent cities*

Tent city doubles in size in BC's 'other' Downtown Eastside. In Surrey, a sprawling tent city is now home to over 130 occupants. ... Buying drugs?



Multiple tents are set up along 135a Street in Surrey.

[Click here](#) for the Photo from (NationalPost 2017-12-17)

### *Substance use and construction workers*

Construction industry workers are over-represented among overdose victims according to Fraser Health Authorities. "They climb high buildings, bend steel and do dangerous jobs with little room for error." (VancouverSun 2018-01-04)

### Interior Health

#### *Overdose surveillance summary (Click here) compiled by Interior Health (June 1, 2016 and Dec. 31, 2017)*

(2018-01-10-GlobalNews)

--- Overdoses reported to the Medical Health Office

- 28% or 371 cases in Kelowna
- 24% or 316 cases in Vernon
- 14% or 178 in Penticton

The population of Greater Vernon = 58,584

The population of the Central Okanagan = 179,839

#### *Challenges of interior health in 2017* (2018-01-01-e-know.ca)

According to Doug Cochrane, Interior Health Board Chair:

- **Wildfires**  
19 hospitals, health centres & residential care homes evacuated  
880 patients & home health clients, hundreds of employees and physicians were forced to leave their homes.

- **Opioid overdose**

73 substance use treatment beds open in 2017 including 57 support recovery beds and 17 withdrawal management beds.

Mobile supervised consumption services in Kamloops and Kelowna implemented.

### Northern Health

#### *Northern Health Tobacco Reduction* (2018-01-26-MyPrinceGeorgeNow)

According to Nancy Viney, Northern Health Tobacco Reduction Lead.

- Most kids start smoking before their 18th birthday
- During the 2017 wildfires, cases with history of smoking had more difficulty to breath because they already have decreased lung capacity.
- 

--- "Tobacco use in the province puts a yearly strain on the healthcare system, to the tune of 2.1 billion dollars."

#### *Second-hand smoke in multi-unit dwellings* (2018-01-22-MyPrinceGeorgeNow)

BC'S Clean Air Coalition aim is to reduce the province's tobacco rates. Many people live in multi-unit dwellings -> ways to protect people from second-hand smoke in these buildings according to Jack Boomer, Coalition Lead.

--- "Currently, the smoking rate in Northern BC is 20%."

## Vancouver Coastal Health

### VCH and BCCDC to City council on opioid overdose crisis

During a presentation to council at city hall Dr. Patricia Daly with Vancouver Coastal Health and Dr. Mark Tyndall with the B.C. Centre for Disease Control suggested: (CBCNews 2018-01-17)

- We've become so used to this horrible situation
- We have to do something different
- Deaths preventable
- Supervised injection sites, Naloxone distribution and addiction treatment, have been helpful.
- The number of opioid-related deaths didn't increase over the Christmas holiday period.
- Providing a safe supply of drugs to addicts.
- We don't have time to get everybody agreeing on

**Plans and strategies for the coming year** (2018-01-04-CBCNews)

According to Dr. Patricia Daly, the new Overdose Emergency Response Centre will launch five new regional teams across the province this January to:

- Focus on supporting people at risk of overdose
- To address the unsafe drug supply
- To expanding harm reduction services
- To increase the availability of naloxone
- 'Clean' opioids
- Addiction treatment

### Could vending machines help solve B.C.'s opioid overdose crisis? (2017-12-20-CBCNews)

"Public health official says alternative to 'toxic' street drug supply would save lives." Oral hydromorphone for people with severe addictions is needed because "we really can't tackle the overdose problem by trying to reduce the availability of prescription drugs." According to Dr Mark Tyndall.

## Vancouver Island Health

### Daily sweeps for used needles

There are 35 locations around the region that are distribution and collection points for needles according to Island Health.

Daily sweeps for used needles are conducted in and around downtown Victoria by SOLID (Society Of Living Intravenous Drug Users) outreach team members and others.

SOLID alone distributed 37,054 sterile needles and collected 30,089 between April 1 and Sept. 30 last year. (NorthernSentinel 2018-01-17)

### Three people pricked by needle in Victoria

(2018-01-16-CTVNews)

Outreach workers have stepped up sweeps for needles in the downtown core in response.

Island Health is following up and looking for more information if more needs to be done like installing additional disposal bins.

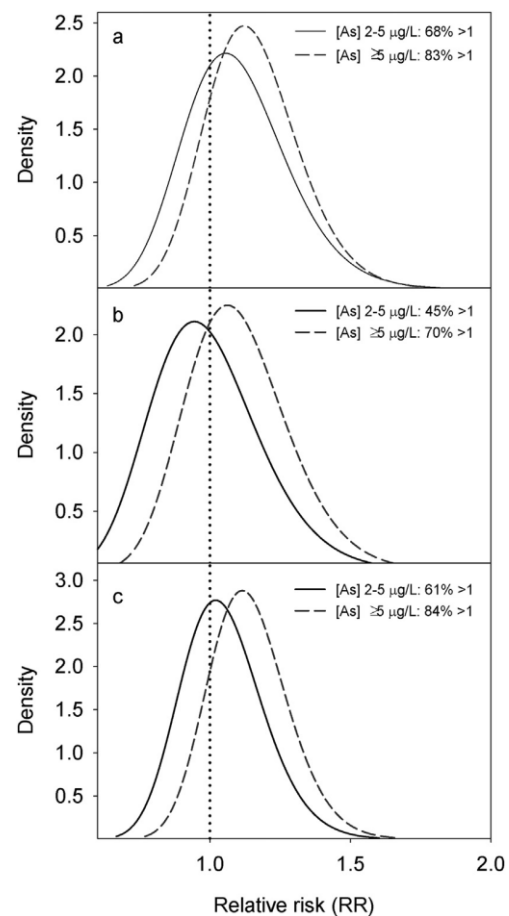
--- Anyone with information is asked to call 250-995-7654 or Crime Stoppers at 1-800-222-8477.

## Vaping needs to be regulated

Vaping needs to be regulated like smoking. According to Dr. Paul Hasselback in a presentation to Nanaimo city council on health issues, including drug abuse, alcoholism and smoking. (2018-01-24-NanaimoNewsNOW)

## Low-levels of arsenic in drinking water is associated with increased risk of bladder and kidney cancer

Exposure to drinking water arsenic-levels within the current World Health Organization maximum acceptable concentration lead to an increased bladder cancer, and potentially kidney cancer risks. (Result are from Nova Scotia) (Saint-Jacques, Brown et al. 2018) ([Click here for the full article](#))



"Distributions of the posterior means relative risk for kidney cancer in

- (a) Male
- (b) Female
- (c) Combined sex

at different levels of arsenic exposure. The one-tailed inference of the RR > 1 is indicated." Graph adopted from (Saint-Jacques, Brown et al. 2018) ([Click here](#))

**Recommendation letter for the BC Toxicology News Monthly Bulletin. Based on "Epidemic of deaths from fentanyl overdose"**

Socias E\*, Wood E. British Columbia Centre on Substance Use, Vancouver & Department of Medicine, University of British Columbia, Canada. \*[esocias@cfenet.ubc.ca](mailto:esocias@cfenet.ubc.ca)

North America, including British Columbia is facing an unprecedented public health crisis of opioid-related morbidity and mortality. Between January and October 2017, more than 1,200 fatal overdoses were reported (30.2 deaths per 100,000 individuals) in British Columbia, with illicitly manufactured fentanyl involved in over 80% of cases. This mortality rate represents an 80% increase from 2016.<sup>1</sup>

While the increasing contamination of the drug supply with illicitly manufactured fentanyl and related analogues is a key driver of the upward trend of the opioid-related overdose epidemic, the roots of the opioid crisis in North America are socially and structurally determined, including socioeconomic marginalization and criminalization of people who use drugs.<sup>2</sup>

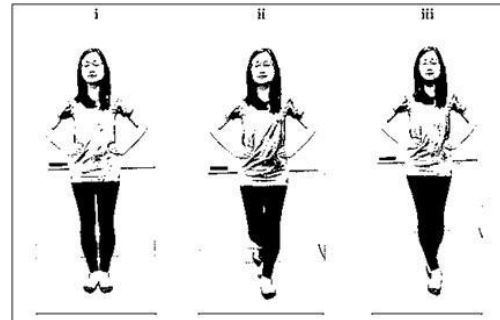
To curb the opioid epidemic a comprehensive evidence-based public health approach and out of the box thinking are needed.<sup>3</sup> Key interventions should include:

- Acknowledge that opioid use disorder is a chronic health condition.
- Counter stigma about substance use, and people who use drugs, starting with the use of appropriate and non-discriminatory language in healthcare and other settings.
- Expand access to the full range of evidence-based treatments for opioid use disorder along the continuum of treatment intensity. As with other chronic health conditions these should include first- (i.e., buprenorphine/naloxone, methadone), second- (i.e., slow-release oral morphine), and third-line (i.e., injectable diacetylmorphine) alternatives.
- Facilitate and optimize access to low-threshold opioid addiction care: increase the healthcare workforce trained in addiction medicine, consider nurse-led models of care
- Scale-up harm reduction interventions, including needle and syringe programs, supervised consumption sites, and Take-Home Naloxone programs.
- Implement and evaluate different models of drug testing services to improve people who use drugs' capability to test and know the drugs they are using, and potentially changing behaviors accordingly (e.g., reduce amount, not use).
- Develop a robust monitoring system to track the impacts of health system implementation efforts.
- Develop alternative non-punitive law-enforcement approaches to drug use.
- Address socio-economic marginalization of people who use drugs, including through affordable housing and low-threshold employment opportunities.
- Engage the affected community in the planning and implementation of any new strategy.

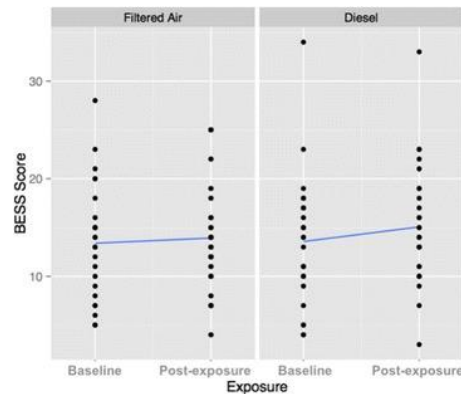
**References:** 1. BC Coroners Service. Illicit Drug Overdose Deaths in BC (Jan 2007- Oct 2017)2017 January 13, 2018. Available from: <http://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/death-investigation/statistical/illicit-drug.pdf>. 2. Dasgupta N, Beletsky L, Ciccarone D. Opioid Crisis: No Easy Fix to Its Social and Economic Determinants. Am J Public Health. 2018;108(2):182-6. 3. Socias ME, Wood E. Epidemic of deaths from fentanyl overdose. BMJ. 2017;358:j4355.

**Acute diesel exhaust exposure and postural stability**

In a study by UBC has demonstrated that a trend exists between acute diesel exhaust exposure and reduced postural stability but exposure was not significantly associated with Balance Error Scoring System (BESS) value.(Curran, Cliff et al. 2018) (figure 1 and 2)



Stances used in Balance Error Scoring System



BESS (trends). Figures adopted from (Curran, Cliff et al. 2018)

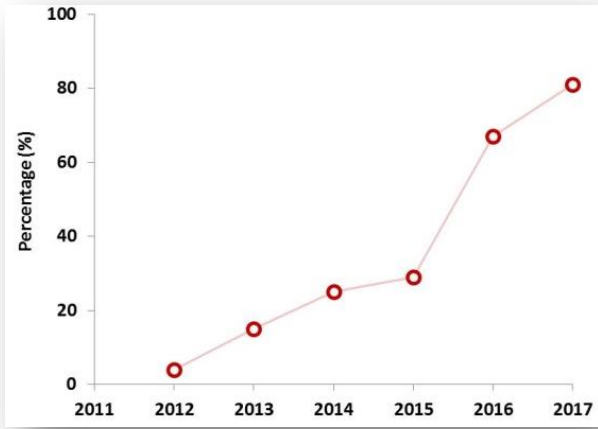
**Mohn prize**



Eddie Carmack, oceanographer and a senior research scientist emeritus for the Department of Fisheries and Oceans, from Sydney, BC won the inaugural Mohn prize (\$319,000) honouring his outstanding research related to the Arctic. The prize was presented during a ceremony Jan 22, in Tromso, Norway.(CBCNews 2018-01-18)

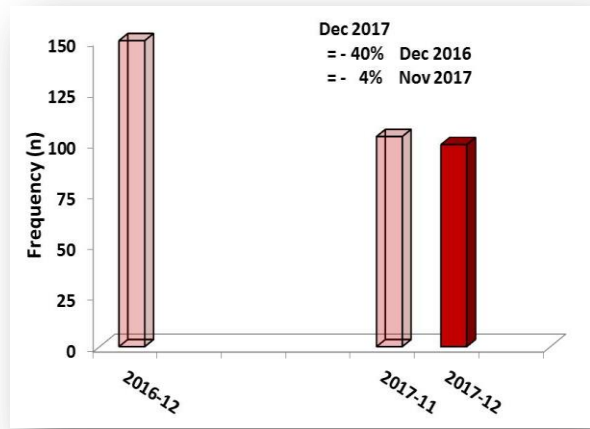
**BCTOX's Toxicology Surveillance in BC (i)  
Drug Overdoses and Forensic Toxicology in BC**

**Fentanyl Detected Illicit Drug Overdose Deaths in BC**

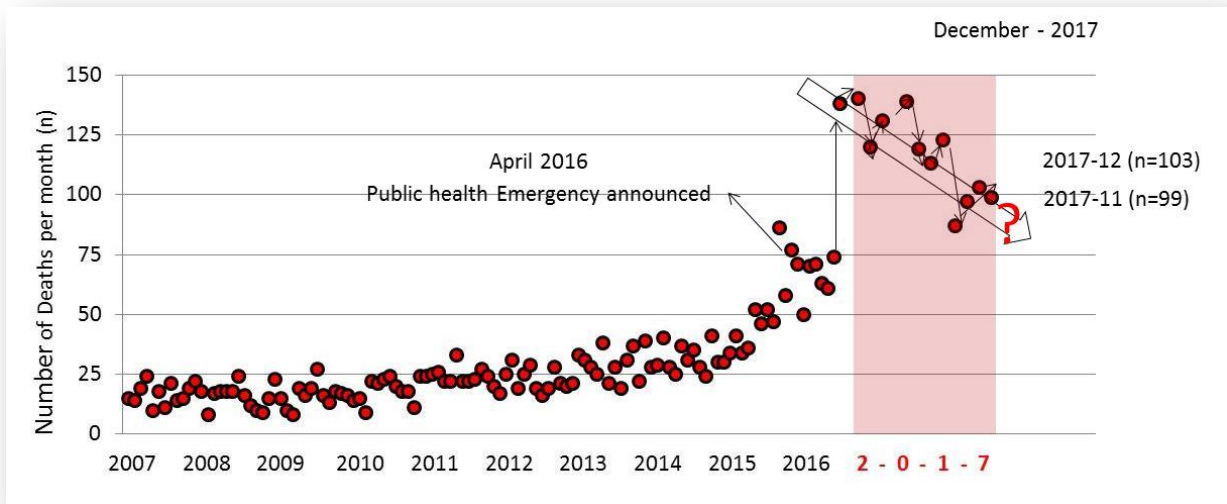


Fentanyl Detected Illicit Drug Overdose Deaths (2012- 2017 July) [BCTOX graph] [LAST UPDATE – July] Data from (BCCoronersService(b) 2017-09-07)

**Estimation of Illicit drug overdose attributed deaths in BC in October 2017**

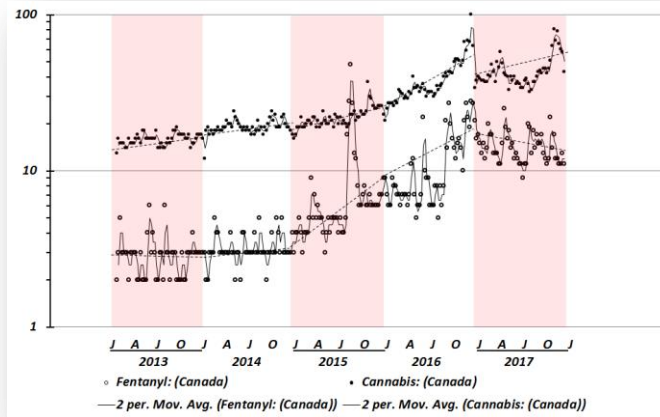


The number of Illicit drug overdose deaths in Dec 2017 was 74 (Data from BCCoronersService 2018-01-31), which is 40% higher than Nov last year and 16% lower than last month [BCTOX graph]

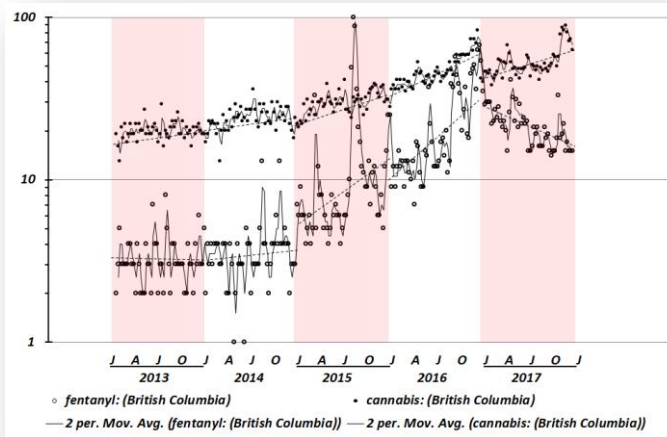


Illicit drug overdose deaths per month in BC (2007 to December 30, 2017) [Data from BCCoronersService 2018-01-31]. [BCTOX graph] The pattern of overdose deaths suggests that the sharp increase in deaths has reached a plateau, and gradually decreasing.

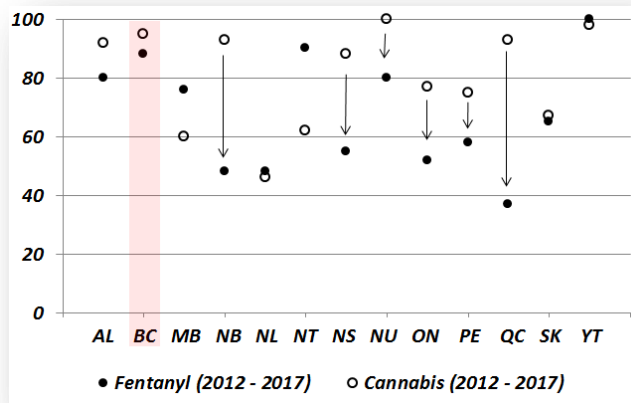
## BCTOX's Toxicology Surveillance in BC (ii) Shifting public interest



Shifting public interest (2013 to 2017) for the whole Canada. Data points are relative to the maximum search in two week periods. As can be seen, in recent months public searches for *fentanyl* decreased and for *cannabis* increased. These could be related to the fact that we are approaching the date of legalization of *cannabis* in the country.



Shifting public interest (2013 to 2017) for BC. Data points are relative to the maximum search in two week periods. As can be seen, in recent months public searches for *fentanyl* decreased and for *cannabis* increased. These could be related to the fact that we are approaching the date of legalization of *cannabis* in the country. The number of deaths regarding fentanyl overdose has also decreased in recent months in the Province.



Comparing public interest in different Provinces (2012 – 2017). [Figures are relative to the maximum search in two week period] In general, searching for Cannabis was higher in majority of provinces but Manitoba and Northwest Territory.



## BCTOX's Toxicology Surveillance in BC (iii) Shifting public interest

### Shifts in public interest in the past 12 months

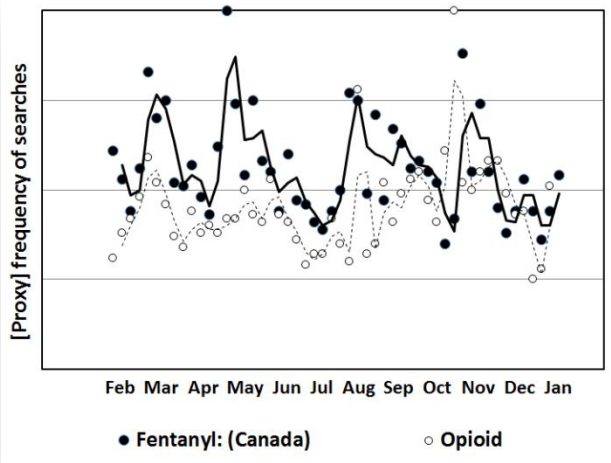
BCTOX is reporting the trends of public interest (Public-&Professional searches) for major toxicology related issues in BC as a new surveillance system using google trends as surrogates of public attitude. The following graphs show the proxy frequency of searches for the keywords from Feb 2017 to Jan 2018. Each variable is compared with itself (the highest frequency of searches over a two week period in the past 12 months serves as the baseline (highest)). As just the trends (but not the actual numbers) are important and feasible, no values are given for the vertical axis. --- For clarity of the message, the regression lines are presented as moving averages with period of 2.

As can be seen, the public relative interests in "fentanyl" as compared to search term "opioids" are similarly shifted in both Canada and BC (figure A -1 and A-2)[left side].

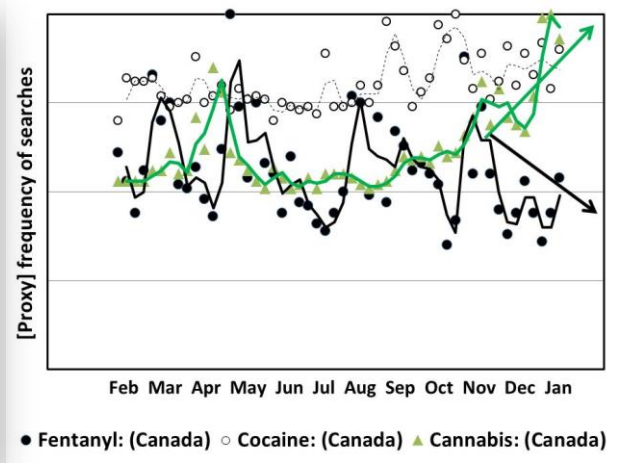
These findings are also not consistent when fentanyl searches are compared to "cannabis" and "cocaine" (figure B-1 and B-2)[right side]. This is despite the fact that fentanyl overdose induced deaths have remained relatively high, and as we are approaching the cannabis legalization.

This finding has public health relevance in the province. Measures should be taken to keep engaged public (or avoid social fatigue) regarding the relative importance of "fentanyl" and in the influence of the process of Cannabis legalization.

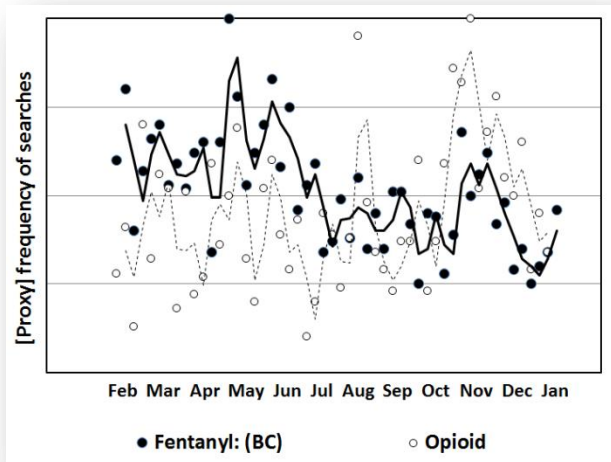
--- Public searches for "fentanyl" (Fu-F)" (less potent) and carfentanyl (more potent) analogs of fentanyl were not included.



**A-1. Canada**

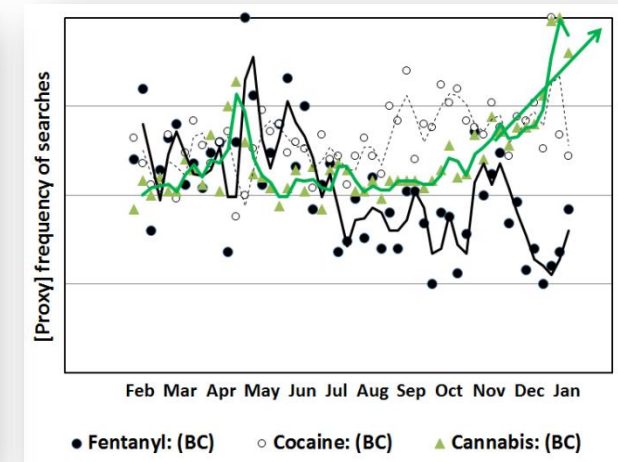


**B-1. Canada**



**A-2. British Columbia**

**"Fentanyl" public searches as compared to "opioids" as a whole (Past 12 month to Jan 22, 2018)**



**B-2. British Columbia**

**"Fentanyl" public searches as compared to "Cannabis" and "Cocaine" (Past 12 month to Jan 22, 2018)**

## BCTOX's Toxicology Surveillance in BC (iv) Shifting public interest

Figure C shows that public were more concern of carbon monoxide poisoning during colder months of the year.

Figure D suggests that public searches start earlier for plant poisoning as compared to bites and stings followed by mushroom. "Plant" and Mushroom" was used as surrogates for "plant poisoning" and "mushroom poisoning".

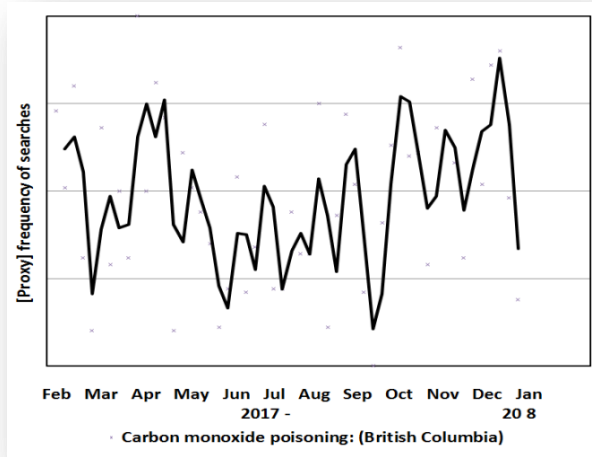


Fig C. Public interest in carbon monoxide poisoning during the past 12 months) (frequency of searches from Feb 2017 to Jan 2018)

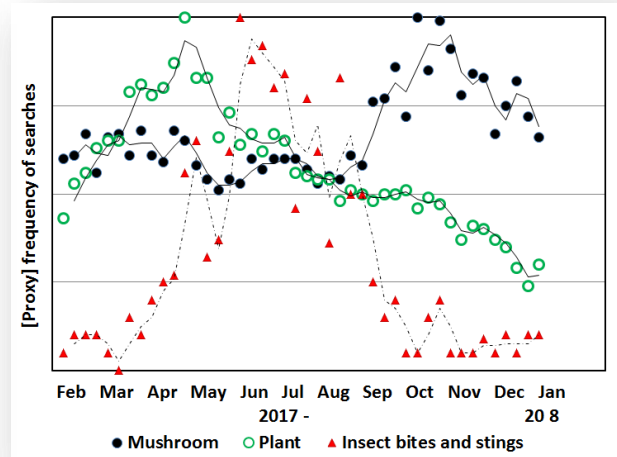
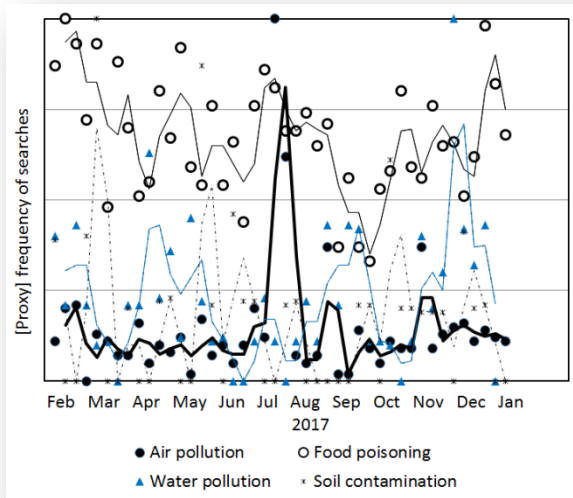


Fig D. Public interest in "Bites or stings" as compared to "plants" and "mushroom" (frequency of searches from Feb 2017 to Jan 2018)








The pattern of public interest for "air pollution" was disrupted in July and August, which coincide with forest wildfires (figure E).

Fig E. "Air pollution" as compared to other routes of exposure to contaminants (frequency of searches from Feb 2017 to Jan 2018)

**BCTOX's Toxicology Surveillance in BC (v)  
Toxic Exposure Mediated via PRODUCTS - BCTOX**

**Selected Toxicological related product recalls / alerts**

**(Recalls-and-safety-alerts) - Updated 2018-01-26**

Date	Items	--- Reasons to recall	
2018-01-04	<a href="#">Presence of stones</a> ---	Por Kwan brand Nuoc Me Chua Tamarind Concentrate	---
	<a href="#">Presence of glass</a> ---	PC brand Sweet Chipotle Prepared Mustard	---
2018-01-09	<a href="#">Pieces of plastic</a> ---	Farmer's Market brand Rhubarb Strawberry	---
2018-01-06	<a href="#">Presence of plastic</a> ---	Kirkland Signature brand All Butter Croissants	---
2017-11-22 Recall	<a href="#">Labelling and child-resistant packaging requirements</a> ---	ITW Permatex recalls Permatex® Rust Dissolver Gel	
2018-01-11	OFEV (nintedanib) is a prescription medicine used to treat idiopathic pulmonary fibrosis (IPF) <a href="#">Reason to recall</a> : Risk of Drug-Induced Liver Injury and the Need for Regular Monitoring of Liver Function		
	---	Photo adopted separately from <a href="http://www.ofev.com/about-ofev">www.ofev.com/about-ofev</a>	
2018-01-17	<a href="#">Foreign Product Alert</a> : Adipessum Miracle Slimming Capsules, Beautiful Lose Weight, Blue Pearl All Natural Male Enhancement pill, Chong Cao Dan pills, Fruta Planta Life capsules, Hard Rod Plus capsules, Hard Times for Men capsule, Linsen Double Caulis Plus capsules, Lishou Fuling Jiaonang, Lose Weight 30, Red Ant, Super Soniic capsules, Wan Ling Ren Sem Chin Kuo Pill		
	---	Just one photo included.	
2018-01-25	<a href="#">Unauthorized kratom and sexual enhancement products</a> ---		 
	---	A list of products; Just a couple of photos included.	

**Toxic exposure mediated via FOOD in BC (II) - BCTOX®**

**Selected Toxicological related food recalls in BC**

**Updated 2018-01-26**

Dates	Food (Company / Firm)	Reason to recall		
2018-01-19	<a href="#">Updated Food Recall Warning (Allergen) - Te Chang Food brand tofu products recalled due to undeclared peanut and sesame</a>		Class 1	BC +
2018-01-10	<a href="#">Food Recall Warning (Allergen) - Te Chang Food brand Towfu (Bean Curd) Cake (Barbecue Flavor) recalled due to undeclared peanuts and sesame</a>		Class 1	BC
2018-01-05	<a href="#">Food Recall Warning (Allergen) - Soy Complete brand Plant-Based Protein Shake – Vanilla recalled due to undeclared milk</a>		Class 1	National
2018-01-05	<a href="#">Food Recall Warning - PC brand Sweet Chipotle Prepared Mustard may be unsafe due to possible presence of glass</a>		Class 1	National

**Bi weekly marine bio-toxin monitoring in West Coast BC in *whole* 2017**

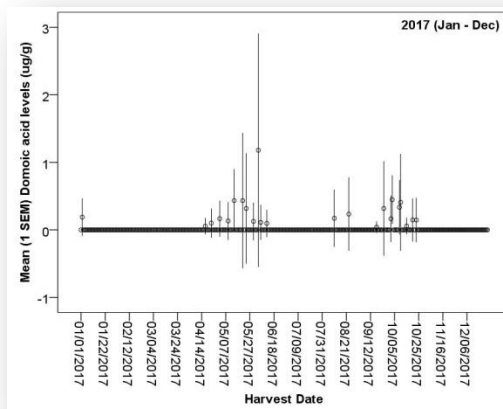
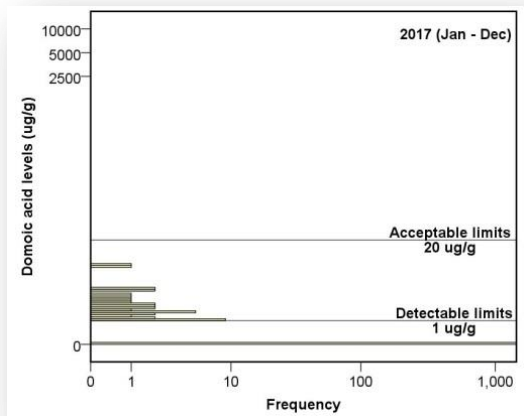
- ✓ [Below](#) regulatory limits Domoic acid [Amnesic Shellfish Poisoning] are reported. No cases of above regulatory limits were reported in the whole 2017.
  - ✓ [Above](#) regulatory limits of Saxitoxin [Paralytic shellfish poisoning] concentrations were reported through 2017 with a pick in the warm months of the year.
  - ✓ [Below](#) regulatory limits of Okadaic acid and dinophysis toxins [Diarrhetic Shellfish Poisoning] were reported mostly in the second half of the year
- See next page for the details.

Toxic exposure mediated via FOOD in BC (I) - BCTOX®

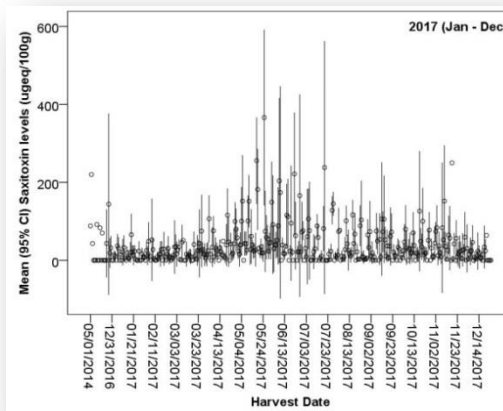
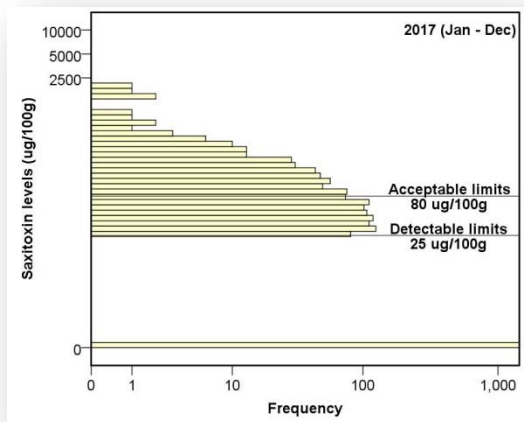
Marine biotoxins (2017) in BC - Data from CFIA – BCTOX graphs

Frequency

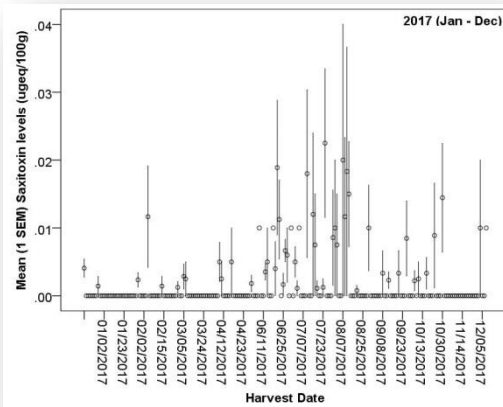
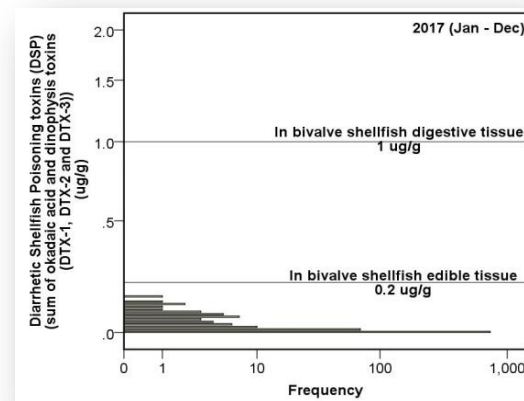
Mean (1 SEM) concentrations



**Domoic acid** (ug/g) (Amnesic shellfish poisoning (ASP)) among detected shellfish samples in BC (January to 23 November 2017) (n=37 out of 3380) [These graphs are prepared to imply the trend, and it should be interpreted with caution]



**Saxitoxin** (ug/100g) (Paralytic shellfish poisoning (PSP)) among detected shellfish samples in BC (January to December 2017) (n=1219 detected out of 3878 samples) [These graphs are prepared to imply the trend, and it should be interpreted with caution]



**Okadaic acid** (sum of okadaic acid and dinophysis toxins (DTX-1, DTX-2 and DTX-3) (Diarrhetic Shellfish Poisoning toxins (DSP)) among shellfish samples in BC (January to December 2017) (n=114 detected out of 735 sample) [These graphs are prepared to imply the trend, and it should be interpreted with caution]

## Toxic exposure mediated via AIR in BC(II)-BCTOX

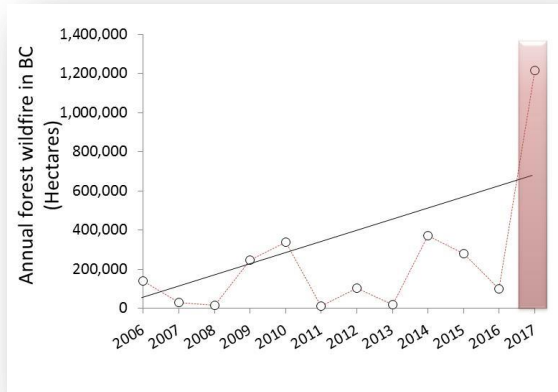
### Wildfires in BC since 2006

Mean (min - max) wildfire in BC from 2006 to 2016 were:

- Total fires was 1,844 (653 (2011) - 3064 (2009)),
- Total hectares 154944 (12604 (2011)-369 (2014))
- Total cost 182 (54 (2011) - 297 (2014)) millions dollars

Among them 39% caused by people and 61% caused by lightning.

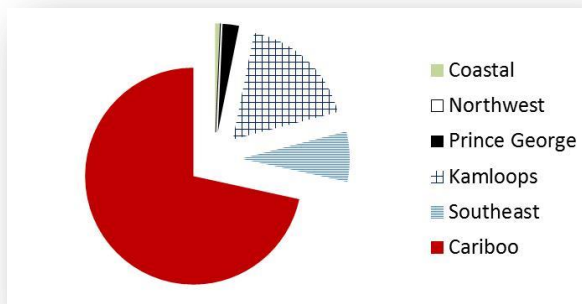
Total wildfire from April 1, 2017 to Dec 31, 2017 (current fiscal year) in BC is 12,154 km<sup>2</sup>.



Annual forest wildfire in BC (Hectares) (2006 to 2017).

Depicts wildfire from April 1, 2017 to Dec 31, 2017 (current fiscal year) (1,215,494 hectares) Source of data BC Wildfire Service [BCTOX Graph]

--- Values related to 2017 are released as estimates and subjected to modification (increase or decrease) in later stages.



Distribution of wildfire in BC

Current Statistics from BC Wildfire service shows that a total of 1,215,452 hectares burned from April 1, 2017 to Dec 31, 2017 (current fiscal year) in BC.

Distribution of wildfires in BC from April 1, 2017 to Dec 31, 2017 is shown in the figure. Source of data BC Wildfire Service [BCTOX Graph] (BC-Wildfire-Service)

## Climate change in BC

### Provincial Greenhouse Gas Inventory

In December 2017, with delay, an excel spreadsheet simply listing emissions figures was announced. (Desmog 2018-01-12)

In 2015, BC's greenhouse gas emissions were 61.6 million carbon dioxide equivalent tonnes (Mt CO<sub>2</sub>e), including 1.7 Mt CO<sub>2</sub>e in offsets from forest management projects in BC.

Greenhouse gas emissions are down 4.7% from 64.7 Mt CO<sub>2</sub>e in 2007 (based line).

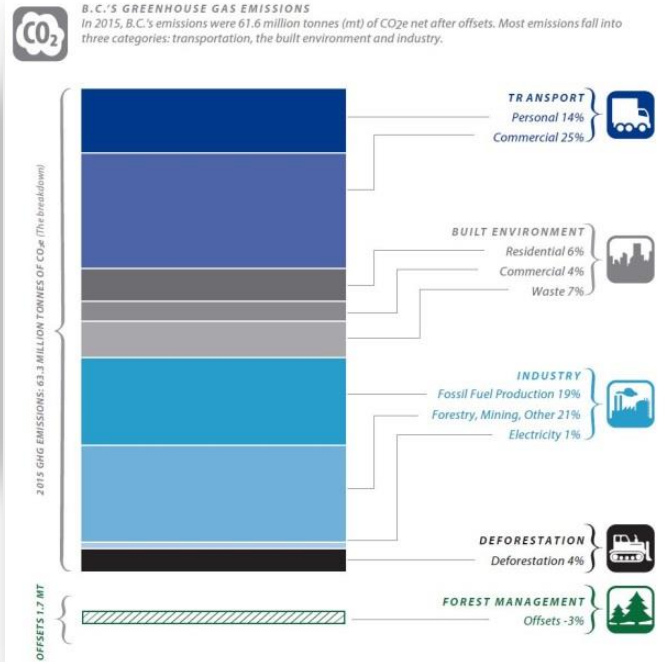


Figure adopted from [Provincial Greenhouse Gas Inventory](#)

### King tide

King tide in Metro Vancouver is a reminder of climate change's sea rise threat to BC. (VanSun 2018-01-08)

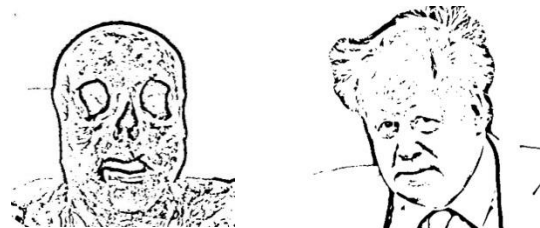
EXTRA

### Mercury Mummification – Syphilis

DNA tests show Basel mummy was ancestor of British foreign minister

Evaluation shows that “Bischof; mummified” died of mercury poisoning, which explains why the remains were so well preserved – the poison acted as a preservative. Mercury was a standard treatment for syphilis from the late 15th to the 19th Century!

<http://www.bbc.com/news/world-europe-42805485>



Sketches based on photos from the report by BBC Boris Johnson Tweets: Very excited to hear about my late great grand 'mummy' - a pioneer in sexual health care. Very proud!

## Toxic exposure mediated via WATER in BC

### Toxic Spills/Dumps

“Significant spills” reported by Spill Incidents [oil or hazardous material] in BC are as follows. Further information click on each item. (accessed Jun 26, 2018)

Date	Name	Source	Nearest Community	Spilled Content
2018-01-25	<a href="#">Overturned Tanker Truck near Grand Forks</a>	Tanker Truck	Grand Forks, B.C.	Fuel
2018-01-22	<a href="#">Ethanol Fire in Port Coquitlam Rail Yard</a>	Tanker Truck	Port Coquitlam, B.C.	Ethanol
2018-01-19	<a href="#">Coal Train Derailment near Hazelton</a>	Rail	Hazelton, B.C.	Coal

### Celebrities who died of opioid overdose!

(CNN-Health 2016-06-03)



**Prince** died due to fentanyl overdose in 2016.

#### Other include

**Phillip Seymour Hoffman (2014)**, Oscar winning actor due to heroin, cocaine, BZDs, Amphetamines

**Michael Baze (2011)**, horse racing jockey, due to opiate overdose (Opana) and cocaine

**Heath Ledger (2008)**, actor and director due to oxycodone and hydrocodone, as well as several benzodiazepines.

**Chris Farley (1997)**, comedian and actor due to cocaine and morphine

**Elvis Presley (1977)**, heart attack and codeine [?]

## Toxic exposure mediated via SOIL in BC

### South Surrey neighbourhood concerned over farm run-off into Little Campbell River

A South Surrey neighbourhood is complaining of an ongoing stench and possible health effects due to a nearby farm that has repeatedly violated orders under the British Columbia Environmental Management Act. Infarctions date back 20 years, and Metro Vancouver reports that there have been more than 250 complaints against the property in the past two years. Residents have reported difficulty breathing and a sore throat, which may be possible side effects of agricultural composting and subsequent release of hydrogen sulphide. A representative of the farm said her farm is cooperating with the ministry in mitigating the growing number of complaints. (20178-01-26-CBCNews)

### BC Drug and Poison Information Centre

The most common drug related generic categories & generic substances from Jan to Aug 2017 were Analgesics, Sedative/Hypnotics/Antipsychotics, Stimulants and Street Drugs, Cardiovascular drugs, Vitamins, Hormones and Hormone Antagonists, Dietary Supplements/Herbals/ Homeopathic, Antihistamines, Topical preparations and Antimicrobials respectively. Poison Information (24-Hour Line) is available: 604-682-5050 for the lower mainland and 1-800-567-8911 for the lower mainland.

### Announcements - BCTOX

**50th Annual Symposium of the Society of Toxicology of Canada**, in Toronto

[Upcoming Toxicology jobs in BC \(November 2017\)](#)

### Tick Poisoning in BC

Lother & Haley reported a case of a healthy and active 83-year-old man with tick paralysis from Thompson Nicola region, BC, who was presented following five days of paresthesias, followed by rapidly progressive ataxia, weakness and severely impaired ambulation. (Lother and Haley 2017) (CAMJ) ([Click here](#))

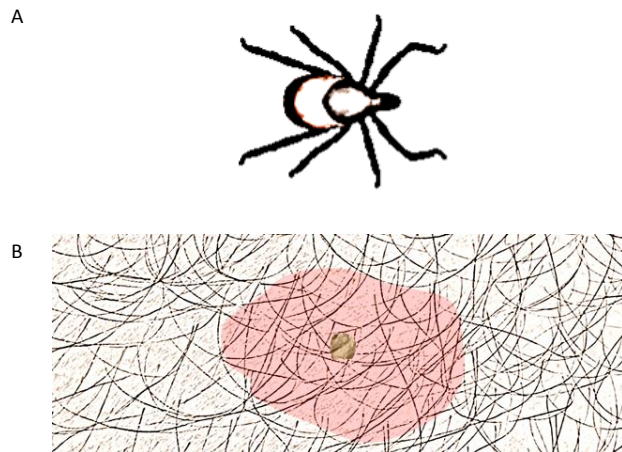


Figure. Schematic. (A) Blacklegged Tick. (B) Skin lesion. BCTOX®

### Exposure to black carbon, elemental carbon, and ultrafine particles and blood pressure

In a review, Magalhaes et al concluded that existing evidence supports a positive association between black carbon and elemental carbon from indoor and outdoor sources and blood pressure in adults. They found that ultrafine particles are not associated. (Magalhaes, Baumgartner et al. 2018) ([Click here](#))

### Elevated blood pressure and household solid fuel use

Three billion people are exposed to household air pollution from solid fuel cookstoves. Authors showed that cooking with solid fuels was associated with small increases in blood pressure and odds of hypertension. Use of cleaner fuels like gas or electricity among rural residents could be helpful (a report from 10 countries). (Arku, Ezzati et al. 2018) ([Click here](#))

### Natural Compounds as Spider Repellents

Fischer A et al. from SFU have studied the Fact or Myth of using Natural Compounds as Spider Repellents.

They showed that volatiles released by mint oil and chestnuts, but not lemon oil could be effective in deterring spider settlement in two different families of spiders. (Fischer, Ayasse et al. 2017)

### A serious side effect of the war on drugs is epidemic of deaths from fentanyl overdose

Socias and Wood (Socias and Wood 2017) argued that the fentanyl crisis is a consequence of drug prohibition and that long overdue out of the box thinking can improve public safety and public health by treating substance use as a health problem rather than a criminal or moral issue. ([Click here](#))

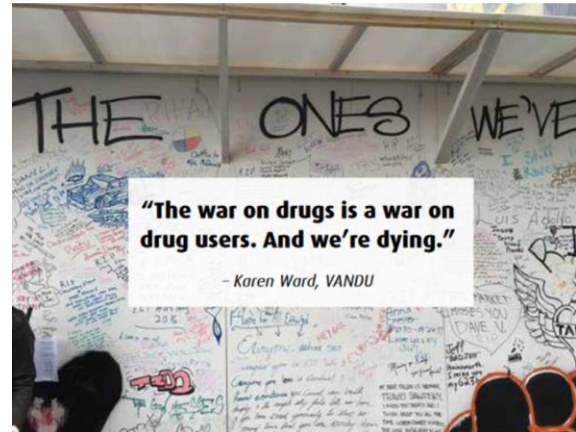


Photo adopted from British Columbia Overdose Action Exchange II: Meeting Report, BCCDC [Click here](#)

### Fentanyl exposure among people who inject drugs in BC

Hayashi K et al have studied the substance use patterns associated with recent exposure to fentanyl among people who inject drugs in Vancouver. (see table below) (Hayashi, Milloy et al. 2017)

They concluded that if they exposed to fentanyl, an urgent need to design and scale up interventions to reduce overdose risk is needed, among them a range of opioid agonist therapies.

**Table 1**  
Sample characteristics of people who use drugs in Vancouver, Canada, June – October 2016 (n = 669).

Characteristic	Total n (%)	UDS result for fentanyl		p – value
		Positive 97 (14.5%)	Negative 572 (85.5%)	
Age (median, IQR)	47 (35–54)	41 (33–48)	48 (35–55)	< 0.001
Female	250 (37.4%)	48 (49.5%)	202 (35.3%)	0.008
White ethnicity/ancestry	367 (54.9%)	55 (56.7%)	312 (54.6%)	0.693
DTES residence <sup>a</sup>	354 (52.9%)	59 (60.8%)	295 (51.6%)	0.091
Injection drug use <sup>b</sup>	452 (67.6%)	89 (91.8%)	363 (63.5%)	< 0.001
Using stimulants but not opioids <sup>c,d</sup>	222 (33.2%)	5 (5.2%)	217 (37.9%)	< 0.001
Non-fatal overdose <sup>e</sup>	85 (12.7%)	19 (19.6%)	66 (11.5%)	0.029
UDS positive for:				
Morphine/heroin	346 (51.7%)	86 (88.7%)	260 (45.5%)	< 0.001
Methadone	316 (47.2%)	50 (51.6%)	266 (46.5%)	0.358
Buprenorphine	34 (5.1%)	10 (10.3%)	24 (4.2%)	0.011
Oxycodone	17 (2.5%)	4 (4.1%)	13 (2.3%)	0.291
Cocaine	359 (53.7%)	70 (72.2%)	289 (50.5%)	< 0.001
Amphetamine/ methamphetamine	278 (41.6%)	73 (75.3%)	205 (35.8%)	< 0.001
Benzodiazepine	122 (18.2%)	23 (23.7%)	99 (17.3%)	0.131
Cannabis	287 (42.9%)	29 (29.9%)	258 (45.1%)	0.005

DTES: Downtown Eastside. IQR: interquartile range. UDS: urine drug screen.

<sup>a</sup> Denotes behaviours and events in the previous six months.

<sup>b</sup> Stimulants include power and crack cocaine, crystal methamphetamine and MDMA, while opioids include heroin and any prescription opioids that were used non-medically.

**Solve the mystery: What was the cause of Napoleon Death?**

Take a guess, and email back your response to be entered in the BCTOX drawing for \$20 gift card. (Deadline Nov 10, 2015)

- If you send just a diagnosis you will be entered once.
- If you send the potential reasons justifying your diagnosis you will be entered twice

--- There is no right or wrong answer for this competition. You may select a given diagnosis or provide a new one.

In recent years, many investigations have examined historical and laboratory evidence from a new toxicology lens. --- In essence, this article aims to contribute to an under-represented and complex epoch of toxicology referring to Napoléon's death as an example.

**Who was Napoleon?**

Napoléon Bonaparte (1769 - 1821) of France started his professional life as a soldier who rose to the one of the highest ranks of military during the French Revolution and became the Emperor of France for 10 years until 1814 when he was defeated by allied nations, and exiled to the Island of Elba near Rome. Being a genius military strategist, he escaped from the exile the following year and re-took control of France. His charismatic personality enabled him to convince the French public and elites that he could be their savior. However, he was defeated three months later at the Battle of Waterloo. This time, he was exiled to a remote island, Saint Helena in the South Atlantic, by the British, where he died at the age of 51 in 1821 six years later. His impact on the French society and in the world is undisputable and he has remained one of the most influential figures throughout history.



Napoleon's image fluctuated between an intelligent hero and a narcissistic self-serving tyrant. No matters from which angle you look, he was ambitious, goal driven and in pursuit of dominance and control throughout his life. He expected absolute loyalty but was not loyal to anyone and, according to a Freudian psychoanalysis, had an anal retentive personality, meaning no one could respectfully get along with him.

He was very short (5 feet 2 inches or 157 cm at death) and often mocked, even when he was an Emperor, by his enemies. To compensate for his lack of height, he pursued power, war, and conquest. Later, a personality disorder was named after him (the "Napoleon complex").

**Clinical findings**

Napoleon's health has been presented as a series of intensifying problems over his last years. The last episode of health deterioration started three months before his death. His symptoms were intermittent and intensifying and included:

- Neurological; Moodiness, various pains, insomnia or somnolence,

frequent intensifying headaches, hypersensitivity to light, vertigo and feeling shivery, and sluggish speaking

- Dermatological; Jaundice complexion, exanthemata particularly on the legs, and loss of all body hair
- Gastrointestinal; alternated diarrhea and constipation, vomiting (without his knowledge he was on tartar emetic), pustules on the lips, the oral cavity and throat, dry mouth, burning thirst, loose teeth, and bleeding gums
- General; swollen lower legs which often collapsed under him, difficulties in locomotion, tiredness, being thirsty and drinking high volume of water.

**What was the cause of his death?**

**Medical Official account**

Napoleon died three month after his health deteriorated, which is very rapid. British Medical Officers in St. Helena referred to a stomach ulcer that was found in an autopsy and officially signed the cause of death to be stomach cancer (Forshufvud, Smith et al. 1961). François Carlo Antommarchi, Napoleon's personal physician who was the only physician in St. Helen with pathology background and performed the autopsy did not sign the official report. He focused on the Emperor's medial history, enlarged and tender liver, yellow conjunctive, his jaundiced complexion and reported intensifying hepatitis.

These clinical findings are consistent with chronic or recurrent arsenic poisoning.

Malaria, tuberculosis, pleurisy, dysentery, rheumatoid arthritis, heart failure, syphilis, gonorrhoea, epilepsy, etc. have been speculated as causes of death. (Forshufvud, Smith et al. 1961)

**What was the evidence that his death was not natural?**

**Circumstantial**

- He died at the age of 51 (young).
- He had plenty of influential enemies. He could have taken back France again!
- He was causing frequent problems for local authorities.
- Three weeks prior to his death he wrote "I die before my time, murdered by the English oligarchy and its assassin."
- Homicide by poisoning was relatively common between the 16<sup>th</sup> and 18<sup>th</sup> centuries. This era is called "the age of poisoners"! The reason is a gap between popularisation of the use of poisons as a means of murder and until scientific development lead to diagnosis of these types of murders.
- Time elapsed from his health to be deteriorated to his death.
- The official account of his death is not convincing.
- His symptoms were intermittent and intensifying, which is consistent with a common practice of poisoners at the time, where increasing doses were used to imitate natural diseases. In fact two phases of cosmetic and lethal doses could be discussed. The cosmetic phase over a long time weakens the victim, suggesting a debilitated appearance of natural illnesses to avoid suspicious, followed by a final lethal dose. (Weider and Fournier 1999)



### Forensic toxicology

- Documented clinical findings were consistent with arsenic poisoning.
- Intermittent
- In 1840 Napoleon's body was exhumed for a State funeral and reburial in Paris. To the surprise of many, the body was preserved very well. In addition to the potential supernatural reasons, high concentration of certain poisons may lead to preservation of the bodies, known as "arsenic mummification."
- These results prove that more than 97% of the arsenic found in the hair of Napoleon was in the inorganic form, which is consistent with chronic intoxication with arsenic. (Kintz et al. 2007)

### Laboratory toxicology

- High values  
In 2008, many samples from his body were tested in modern laboratories and showed high arsenic levels, roughly as much as 100 times
- Inorganic intoxication.  
These results prove that more than 97% of the arsenic found in the hair of Napoleon was in the inorganic form, which is consistent with chronic intoxication with arsenic. (Kintz et al. 2007)

### Arsenic

Chronic and acute types of arsenic poisoning.

Considering the clinical findings and the pattern of disease progress, Napoleon suffered from chronic arsenic poisoning with intervening periods of acute arsenic poisoning. (Forshufvud, Smith et al. 1961) (Bolt 2012)

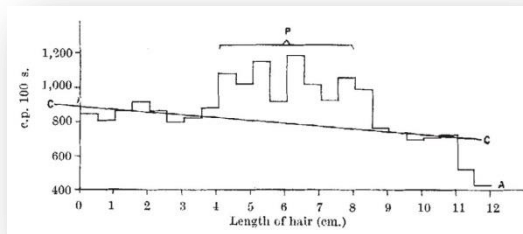


Figure adopted from (Wassen, Forshufvud et al. 1962)

It has been shown that the arsenic levels in Napoleon's hair samples were about 10.4 ppm (compared to a normal mean of 0.8 ppm) (Forshufvud, Smith et al. 1961).

When 1 cm by 1 cm of Napoleon's hair was studied, an average of 4.9 ppm with a range of 1.1 to 11.0 was detected, which is consistent with the intermittent poisoning theory. (Wassen, Forshufvud et al. 1962)

It is possible that the detected arsenic levels in Napoleon's hair samples are a consequence of external contamination. In a recent study, authors found that arsenic levels were very high (42.1 and 37.4 ng/mg) in the following order: As(III) 31.1 (45%), As(V) 66 (53%) and metabolite DMA 0.4 (0.2%). 97% of the arsenic found in his hair was in the inorganic form, which is consistent with chronic intoxication with arsenic. (Kintz, Ginet et al. 2007)

--- Arsenic poisoning as a cause of death has been disputed (Keynes 1994). When a lock of his hair, of which a considerable amount was studied, was examined in another study, high levels of arsenic were not found (Lewin, Hancock et al. 1982).

### External contamination

Another group tested two pieces of his hair: one from the day after his death (1821) and pieces cut seven years earlier (1814) during his first exile on the island of Elba. All samples

showed elevated arsenic concentrations, which may dispute acute arsenic overdose as his cause of death. Authors believed that high Arsenic levels could be due to external contamination. (Lin, Alber et al. 2004)

External contamination sources in early 19<sup>th</sup> century included wallpaper, coal smoke, drinking water, arsenic-containing cosmetics, and the arsenic compounds used as preservatives. (Hindmarsh and Corso 1998)

### Antimony poisoning

Without his knowledge Napoleon was on tartar emetic that may have caused antimony poisoning.

### Medical error, Mercury cyanide

Napoleon was administered Calomel (HgCl<sub>2</sub>; Mercury chloride) as a cathartic/ laxative and orgeat, a flavored drink containing bitter almond

### Medical error, Mercury cyanide

Napoleon was administered Calomel (HgCl<sub>2</sub>; Mercury chloride) as a cathartic/ laxative and orgeat, a flavored drink containing bitter almond oil. Together they form mercury cyanide, which is lethal. (Weider and Fournier 1999) (Broos 2007)

### Suicide

Although it is highly unlikely that Napoleon committed suicide, there are accounts of a potential attempt after his abdication, in which a poison (?) with opium was used. (Goldcher 2014)

### Conclusion

Whether or not Napoleon was murdered by arsenic is an open question and widely debated since the 1960s. Profiling toxicological reasons for his death is not difficult. Having followed a spectacular career, standing up against powers and defeating enemies against all odds, having been forced to leave his life behind, combined with the feeling of betrayal of ex-loyal friends, Napoleon's last years would have been excruciating for him.

His last days offer a nuanced representation of masculine subjectivity with spiritual and physical pain. He elegized his doomed legacy, when he wrote "I die before my time, murdered by the English oligarchy and its assassin." Although he died as a weak prisoner in pain and alone far from his home-land, his glory stands firmly and for centuries to come. He is considered as influential as Cyrus the Great and his own hero Alexander the Great. He outlived in population collective memory more than all of those who defeated him. Have you ever heard the names of his Russian, Austrian and British counterparts? Even 20 years after his death he was exhumed and received a glamorous state funeral, exceeding his enemies'.

Napoleon death is controversial, similar to his personality. Although attributed, none of the diseases, such as cancer, are convincing. Arsenic poisoning may be the most likely cause of death.

--- No one would like to see a hero die in misery.

### Question

*What do you think? What could be the cause of his death? Can "acute high dose" or "chronic low dose" toxic exposure have caused or contributed in his death?*

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