

## Contents

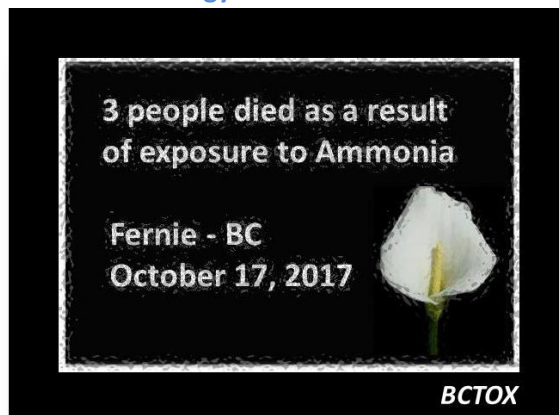
1. *Table of contents and BC Toxicology Pictures of the Month.* Pages 140-141
2. *Afshari R. Editorial, summary of the Toxicology News in BC and Health Authorities in September 2017.* Pages 142-143
3. *Bartlett K. Ammonia exposure; Ammonia gas leak lead to 3 deaths in BC (Occupational Toxicology).* Pages 144-145
4. *Drug Overdoses in BC (Forensic Toxicology).* Pages 146-147
5. *Wildfires and Climate change (Environmental Toxicology; (ET)).* Page 148
6. *Toxic exposure via consumer products in BC (ET).* Page 149
7. *Toxic exposure mediated via FOOD in BC (ET).* Pages 149-150
8. *Toxic exposure via water, soil and spills (ET).* Page 151
9. *Announcement and References.* Pages 152-153
10. *What chemical/drug exposure did cause Edgar Allan Poe's death? (Clinical Toxicology)* Page 154
11. *References.* 155-157

**BCTOX is now shared with over 250 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* 2017; 2(9): Pages.

## BC Toxicology Pictures of the Month



Three people died as a result of exposure to Ammonia in Fernie, BC (see pages 144-145).

**Vancouver was OVERDOSED by the presence of hundreds of Toxicologists from North America, Oct 2017☺! - BCTOX**

North American Congress of Clinical Toxicology organized in Vancouver by The American Academy of Clinical Toxicology Oct 11 to 15

International lead poisoning prevention week of action [22 to 28 Oct 2017](#) (see page 157)

[WHO website](#) contains campaign information materials. (WHO 2017)



## 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.

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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:**

AUTHOURS. 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 x̣ṃṃəθkwəỵ əṃ (Musqueam), Skwxwú7mesh (Squamish), Stó:lō and Səl̓íl̓wətaʔ/Selilwitulh (Tsleil-Waututh) Nations.

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

## Summary of the Toxicology News in BC and Health Authorities in October 2017

Reza Afshari\*, Environmental Health Services, BC Centre for Disease Control, BC. [Reza.Afshari@bccdc.ca](mailto:Reza.Afshari@bccdc.ca) [Editorial 2017-10-30]

### What is BCTOX and why?

BC Toxicology News Monthly Bulletin (BCTOX) strives to make a difference among health-care professionals. *First*, it aims to facilitate relationships among professionals, highlight the significance of their activities and increase their profile and their peer support. BCTOX aims to disseminate health-care professional-related knowledge to other places where it could also be of use. It magnifies the visibility of these activities, and connects to professionals in other fields. Second, BCTOX communicates health-related activities that have had societal impacts and were picked up by the media and online sources.

The concept of BCTOX is modeled in BCTOX 2017 2(9):142 (see for details).

While BCTOX is not official and not liable for the reported news, it is BC-related, highly informative and concise, handpicked and fun to read. BCTOX keeps you engaged with toxicology news in BC.

Accidents resulting from acute and chronic toxic exposures are commonly reported by the media, making it a valuable source for information. Therefore, the media can act as an independent surveillance system. Furthermore, keeping track of over 90,000 registered chemicals mediated via food, air, water, soil and consumer products is impossible, making the use of media sources even more important.

### Major toxicological statistics in August

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

- ACUTE exposures; ≈ 113 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]

### Ammonia

Alarms went off at around 4AM on October 17, 2017 at an ice rink arena in Fernie, BC, and two city workers and a specialist were called in.

An ammonia gas leak resulted in 3 deaths, while workers were performing repair and maintenance work on ice-making equipment. Similar but non-fatal accidents have been previously reported in BC.

Ammonia is a colourless gas with a pungent smell, and consists of nitrogen and hydrogen (NH<sub>3</sub>), which is extremely toxic. Severe short-term exposure may lead to long-term damage to eyes, throat, and bronchi and could be rapidly fatal.

### Kratom and substance use

Although controversial, a psychoactive plant Kratom has been suggested to have certain benefits for the BC Opioid Overdose Tragedy. (BCTOX cannot confirm the credibility of the report).

Carbon Tax, Climate policy advisory council, Wildfire and public and pipelines received more media attention in October.

### Toxic exposures via

**AIR** Air pollutants in Vancouver were not focused on in October, as the wildfire was more or less controlled.

**PRODUCTS** Consumer product recalls included Spirit Mini Slime Spirit Flarp Noise Putty (Halloween staff) and toys, among others. One brand of ASA 81mg/Biomedic ASA 81mg, was also recalled.

**FOOD** Food recalls were predominantly related to allergens. Bi-weekly marine bio-toxin monitoring on the West Coast of BC from Jan to Oct 2017 showed that

- (i) Below regulatory limits Domoic acid [Amnesic Shellfish Poisoning] was mildly reported in the past 2 months,
- (ii) (ii) Below regulatory limits of Okadaic acid and dinophys toxins [Diarrhetic Shellfish Poisoning] were still detected in October and
- (iii) (iii) Above regulatory limits of Saxitoxin [Paralytic shellfish poisoning] were still reported in October, but in general, concentrations are declining.

**WATER** The City announced a \$600K rebate after paying \$14M to a private company 2 years ago and finally closed a water utility purchase deal. Solving the problem is on the right track.

**Soil** Scientists discover a strain of fungus that could clean oil spills in Alberta's oilsands.

### Fentanyl crisis; "New normal" or "Not new normal"

The idea that the increased number of deaths due to fentanyl is a "New normal" in BC was presented and later challenged.

In October, rapid low-barrier expansion of hydromorphone (Dilaudid®) was called by the BCCDC as a measure to control opioid overdose crisis, and the effectiveness of harsher punishment for drug dealers was challenged by PHSA.

*Sola dosís facit venenum*

Only the dose makes the poison!  
Paracelsus (1493 – 1541 CE)

## Summary of the Toxicology News in BC and Health Authorities in September 2017

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

### First Nations Health Authority

None returned by the alert system.

### Fraser Health Authority

#### Emergency exercise

Emergency exercise staged at Roberts Bank to evaluate interagency response to a major incident. Organizers were looking to identify gaps in information, communications and staff call out, etc. In March 2015, a chemical fire broke out in the Centerm terminal with massive plumes of smoke. Flames contained trichloroisocyanuric acid (an industrial disinfectant and bleaching agent), a respiratory irritant dangerous to breathe in large quantities. (Ddelta-optimist 2017-10-14)

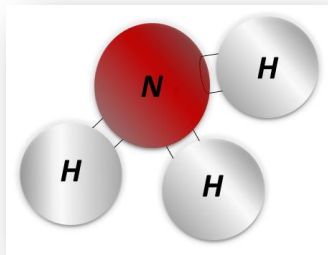
#### White Rock

The City of White Rock has agreed to pay \$13.4 million for its water utility. (PeaceArchNews 2017-10-23)

### Interior Health Authority

#### Fatal ammonia (NH<sub>3</sub>) leak at Fernie arena was the first in Canada

(See pages 145 -146 for details).



#### Rate of hospitalizations for opioid poisoning

According to a report from the Canadian Institute for Health Information, Kelowna had the highest rate of hospitalizations for opioid poisoning in all of Canada. The city is on track for 90 deaths in 2017 according to Dr. Silvina Mema. (CBCNews 2017-10-24)

"What can I do now? I don't want to wait for more reports" asked Coun. Charlie Hodge. Dr Mema responded that "I don't know what the city council can do, but it's the conversation that I would like to start." (CBCNews 2017-10-24)

#### Suboxone and methadone

Interior Health Authority's Opioid Agonist Treatment program supports access to suboxone and methadone as the top priority for the opioid emergency response. Over 4,000 patients are now on their program including 1,330 on suboxone, double the number from the year before according to the team leader Dr Lappalainen. --- "Relapse rates are upwards of 90 per cent and it actually puts people at increased risk of dying because they lose their tolerance very quickly." (iNFONews 2017-10-26)

#### Overdose and funeral homes

Overdose crisis putting pressure on Kelowna funeral homes, as they have barely been able keep up with increasing demand for services as the soaring number of overdose deaths. (iNFONews 2017-10-25)

### Northern Health Authority

None returned by the alert system.

### Vancouver Coastal Health Authority

#### To-do list

A to-do list for the fentanyl crisis was provided to Canada's new health minister by downtown Eastside drug users. (CBCNews 2017-10-24)

- 1- Provide funding for drug-user groups like VANDU
- 2- Expansion of heroin-assisted treatment
- 3- End the criminalization of people who use drugs

#### Rate of crisis

VCHA, with 38.9 deaths per 100,000 population has the highest rate of illicit drug overdose deaths comparing to other health authorities in BC. (VanCourier 2017-09-12)

#### Commemoration

Family and friends of some of the deceased from the opioid overdose crisis gathered in Oppenheimer Park in Oct to commemorate the lives lost by placing wooden stakes in the park (Photo Dan Toulgoet adopted from (VanCourier 2017-10-04)



#### START Program

VCH started offering *at-home detox* services to drug users since Aug 2016, so called Substance use Treatment and Response Team (START). In this period they provided care to 329 people.

This program targets patients for which residential detox is not an option because of the associated stigma. START has the capacity to treat 400 people per year. (MetroVancouver 2017-10-19) [\[Click here\]](#) for more information from VCH).

*Whale recovery* Experts gather in Vancouver to brainstorm on southern resident whale recovery ([read more](#))

### Vancouver Island Health Authority

Since Sep 3, Nanaimo's overdose prevention site was visited 4,373 times with 146 different people accessing the service, and 43 overdoses, including by 28 people who were at the site and 15 who were brought there. No alternatives found for Nanaimo supervised consumption site. --- "We actually have to start with where they are and rebuild that trust and rebuild a relationship with them in order to provide the opportunity for engagement and treatment," according to Dr Hasselback. (NanaimoNewsBulletin 2017-10-10)

#### Resident wants a stop to any funding on old school building

"The most urgent issue in Saltair at this time is to comply with Vancouver Island Health, to build a water filtration system at a projected cost of \$5 million in addition to the current upgrades costing \$4.5 million." (ChemainusValleyCourier[Letter] 2017-09-07)

## Ammonia exposure

### Ammonia gas leak lead to 3 deaths in BC

Reza Afshari, Karen Bartlett

#### What was the accident?

Alarms went off at around 4 am October 17, 2017 at an ice rink arena in Fernie, BC, and two city workers and a specialist were called in. The first 911 call happened before 1 pm. (CBCNews 2017-10-19)

According to the reports, Ammonia gas leaked in the arena and lead to 3 deaths, while they were doing repair or maintenance work on ice-making equipment. (CBCNews 2017-10-17) (CalgaryHerald 2017-10-20) The deceased cases were 59, 52 and 46 year old males (TheGlobal&Mail 2017-10-18) including two Fernie city employees and an employee of CIMCO Refrigeration, a company headquartered in Calgary. (Straight 2017-10-20)



Photo adopted from (CBCNews 2017-10-18)

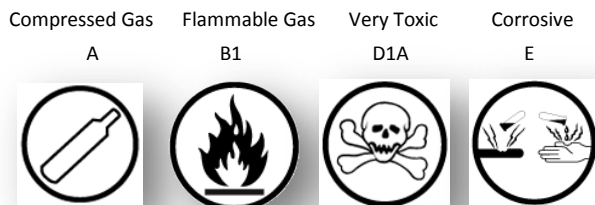
#### What were the consequences? (CBCNews 2017-10-17)

- ✓ 3 employees died.
- ✓ The site secured, but crews were unable to safely enter the facility for a while.
- ✓ All homes and businesses in the downtown area were evacuated (50 to 95 people), and continued until the leak was contained. (CBCNews 2017-10-17) (CBCNews 2017-10-19)
- ✓ A seven-day local state of emergency declared in the city.
- ✓ WorkSafeBC, BC Environment Ministry, the Interior Health Authority, BC Emergency Health Services, RCMP and the hazardous materials team got involved. (TheStar.com 2017-10-18) (Straight 2017-10-20)
- ✓ Province is working on ammonia leak education plan for rink workers to mitigate the risks. Smaller community rinks that rely on volunteers may have different level of safety and training than larger facilities. (CBCNews 2017-10-19)
- ✓ "Premier John Horgan and Labour Minister Harry Bains issued a joint statement, saying they were saddened to learn of three workplace fatalities. This is a tragic situation. Families and friends are grieving, and our hearts are with them." (OsoyoosTimes 2017-10-24)
- ✓ It could take months to complete the investigation according to a WorkSafeBC spokesperson. (TheStar 2017-10-23)

**Have there been similar events in BC?** There have been similar but non-fatal incidences in Esquimalt and Langford. (ChekNews 2017-10-18) In a recent event, another small ammonia leak at Port Coquitlam processing plant forces employees to evacuate. (GlobalNews 2017-10-24)

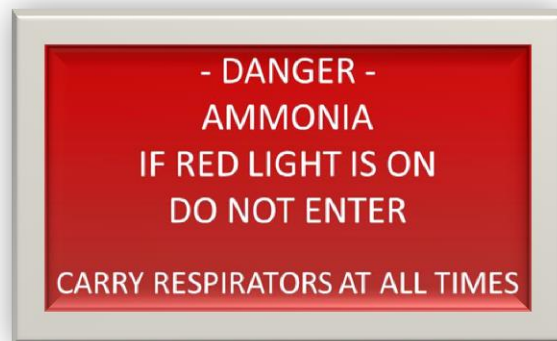
#### What is ammonia?

Ammonia (CAS Registry No.: 7664-41-7, Canadian TDG: UN1005) is a colourless gas with a pungent smell, and consists of nitrogen and hydrogen (NH<sub>3</sub>). It is flammable, and an explosion hazard, especially in confined spaces.



Ammonia is a nitrogenous waste product, and used in industry and for fertilizer, but the anhydrous, liquefied form becomes caustic and hazardous. Because of ammonia's vaporization properties, ammonia is commonly used in mechanical refrigeration systems, including those found in ice rinks. Ammonia is used as the liquefied compressed gas in these systems but becomes a gas once it is released into the air. Ammonia is highly reactive with water in the anhydrous form.

Ammonia in contact with eyes and skin is corrosive. Reproductive toxicity, carcinogenicity, teratogenicity and mutagenicity are not known.



Original photo from (ChekNews 2017-10-18) was reproduced

#### Toxicology Exposure limits

ACGIH® Threshold Limit Value (TLV)® - Time-Weighted Average (TWA) is 25 ppm (CCOHS 2017-10-23(modified))

ACGIH® TLV® - Short-term Exposure Limit [Ceiling limit] is 35 ppm (CCOHS 2017-10-23(modified))

AIHA has set an IDLH at 300 ppm; the odor threshold is between 5 – 50 ppm. (<https://www.cdc.gov/niosh/docs/81-123/pdfs/0028-rev.pdf>)

#### What are the symptoms/sings of acute exposure?

Dissolution of NH<sub>3</sub> in water (including respiratory mucosa) leads to formation of the base ammonium hydroxide (NH<sub>4</sub>OH) which is a severe upper airway irritant. Experimental inhalation of nebulized high-dose ammonia has caused acute lung injury within 2 minutes of exposure. (Sjoblom, Hojer et al. 1999) Inhalation of high concentration of ammonia gas is very toxic and may cause death within a few breaths. (Work-Safe-BC)

- ✓ Acute ammonia poisoning may lead to coughing, shortness of breath and tightness in the chest. In one report, Individuals dying acutely of ammonia inhalation showed marked swelling and edema of type I pneumocytes. (Burns, Mace et al. 1985) (Nelson L.S 2006) However, symptoms may develop hours after exposure and are made worse by physical effort. (CCOHS 2017-10-23(modified))

- ✓ Severe short-term exposure may lead to long-term damage to eyes, throat, and bronchi.
- ✓ Chronic /repetitive inhalation of low concentrations of NH<sub>3</sub> may cause pulmonary fibrosis. (Brautbar, Wu et al. 2003)

**Steps that ensures the safety of the refrigerator sites** according to regional District of Central Kootenay: (BCLocalNews 2017-10-23)

- ✓ Having qualified and trained operators
- ✓ Risk-assessed by the Provincial Safety Authority
- ✓ Isolation of Refrigeration plant rooms from the rest of the facilities
- ✓ 24/7 monitoring and alarmed plant rooms
- ✓ Using safety code-required refrigeration systems
- ✓ Robust safety program including regular maintenance
- ✓ Reviewing safety procedures
- ✓ Having all arena facilities re-inspected by a third party

**Categories of interventions to control ammonia exposure in work place** according to WorkSafeBC

- ✓ Elimination or substitution (using a less hazardous material)
- ✓ Engineering controls (improving ventilation)
- ✓ Administrative controls (ammonia monitoring alarm system) and
- ✓ Personal protective equipment

#### **Ammonia exposure in public**

Ammonia in the household refrigerators is a matter of the past. However, ammonia based fridges need less energy and are cheaper, and still in use in industrial settings.

#### **Public may get in contact with these fringes at:**

- ✓ Workplace such ice rink arena. --- It is estimated ammonia is cooling half of the ice rinks in Canada. (ChekNews 2017-10-18)
- ✓ Disposed refrigerated appliances
- ✓ Miniature refrigerators for portable units found in campers and recreational vehicles, and solar refrigerators.
- ✓ Vicinity of chemical scene that needs to be evacuated

#### **How to reduce the risks for the public?**

- ✓ Physical impact may lead to leak
- ✓ Education is the key
- ✓ If the alarm goes off, take it seriously
- ✓ The ammonia odor is characteristic and may be an effective warning signal of exposure and stimulus to avoid further exposure
- ✓ Distant yourself leaking ammonia as soon as possible
- ✓ Co-operate with the authorities, when you are not directly affected but evacuation is ordered
- ✓ ...

#### **Scene management**

Hazmat teams are well trained to deal with scene management in chemical accidents. They rapidly characterise 3 zones. The below information are *adopted* from US Department of Labor Occupational Safety and Health Administration (OSHA/NIOSH-Interim-Guidance (April 2005)). Chemical - Biological - Radiological - Nuclear (CBRN) Personal Protective Equipment Selection Matrix for Emergency Responders.

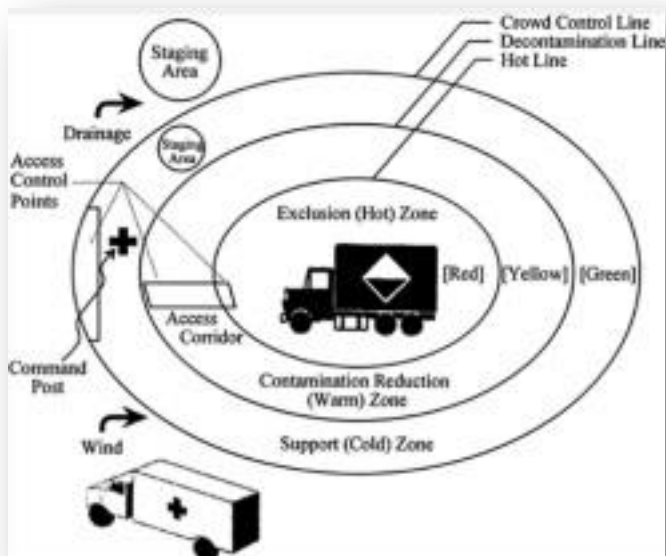
**RED ZONE:** Areas where significant contamination CBRN agents has been confirmed or is strongly suspected but area has not been characterized. The Area is presumed to be life threatening from both skin contact and inhalation.

**YELLOW ZONE:** Areas where contamination with CBRN agents is possible but active release has ended and initial monitoring exists.

**GREEN ZONE:** Areas where contamination with CBRN agents is unlikely. This zone covers the area beyond the expected significant dispersal range of the initial event and secondary contamination range caused by traffic and emergency responders.

*NIOSH/OSHA recommended control zones are displayed below.*

*Adopted from a modified figure from Goldfrank's Toxicologic Emergencies, 8th Edition (Walter F.G 2006)*



## Drug Overdoses and Forensic Toxicology in BC (I) - BCTOX

### Statistics and epidemiology

The number deaths from Jan to Aug 2017 according to BC Coroners Service. (CASTANET 2017-10-12)

- Vancouver 255
- Surrey 123
- Victoria 65
- Kelowna 60
- Kamloops 32
- Prince George 16

### Kratom (Straight 2017-10-17)

--- The views presented here are not of BCTOX. We cannot confirm the credibility of the report.

Kratom refers to a group of tree-like plants native to countries in Southeast Asia (i.e. Thailand, Malaysia, and Myanmar) and is part of the Rubiaceae family. (Micromedex)

Psychoactive plant Kratom has been used in folk medicine for its analgesic and euphoric effects, and studied by a group of scientists, including UBC. (Swogger, Hart et al. 2015) It acts as partial opioid agonist producing similar effects to morphine. (Babu, McCurdy et al. 2008) These alkaloids induce visual hallucinations and synesthesia. (Babu, McCurdy et al. 2008)



Psychoactive plant Kratom (*Mitragyna speciosa*/ *Salvia divinorum*)  
Photo adopted from Wikipedia

Kratom, ingested as a green powder, mixed into a liquid such as tea or sometimes pressed into gel caps, has been used in Asia as an *opium substitute*. (Straight 2017-10-17)

*Salvia divinorum* contains the highly selective kappa opioid receptor agonist Salvinorin A, Mitragynine and 7-hydroxymitragynine. This plant has been used by chronic narcotics users to ameliorate opioid withdrawal symptoms. Kratom has been marketed as psychoactive dietary supplements. (Babu, McCurdy et al. 2008)

Kratom is not an opioid, but it does interact with opioid receptors in the brain. It may have the potential to partially address cravings among opioids drug users.

According to the news, Kratom is not licensed as a health product in Canada. It is also described as a herbal product that may pose serious health risks” and “has the potential for problematic use and dependence.” Its sale, distribution, and marketing as a health product are illegal. However, kratom’s possession is not prohibited by Canada’s Controlled Drugs and Substances Act. (Straight 2017-10-17). According to the online reports, unauthorized kratom products have been seized from stores in Canada before. (healthycanadians.gc.ca)

Authors of this article in Straight implying that Kratom may have some values in controlling opioid crisis in BC.

--- Further investigation is warranted.

### Proposed Strategies / Actions in October

#### “New normal” or “Not new normal”

Recently and despite the horror, the fentanyl overdose crises is being described as the “new normal” for our society. (Straight 2017-10-12) The author argued that since November 2016 in which a sharp increase happened in number of deaths attributed to fentanyl we reached a new normal; higher number of deaths.

The concept of a new norm was challenged by a new article in which the new norm described as “an existential threat to anyone that uses drugs could quietly become a foregone conclusion”. The author asked the public not to go numb to this fact. “This is an absolute failure of policymakers to ensure the health and safety of a group of people” the article says. (Straight 2017-10-19)

#### Expansion of hydromorphone

BCCDC call for rapid low-barrier expansion of hydromorphone (Dilaudid®) to protect people from fatal overdose by providing them immediate access to safer opioid drugs is genuinely seen as a public-health one. It applies the logic of past efforts to protect people from H1N1 influenza by circulating safe drugs to anyone at risk. (Straight 2017-10-19)

#### Harsh punishment?

In the light of the recently expressed views “i.e. if you're dealing fentanyl, you're dealing death, and you should be facing much more severe penalties such as manslaughter charges” Dr Perry Kendall argues that there is a risk that “the policy implementation will not be able to distinguish between importers or non-user, large-scale dealers and the easier-to-apprehend street-level user/dealer. “Attempts are focused on destigmatize and decriminalizing the users and treating them as a person with an illness rather than a criminal” this issue should not be jeopardized.(CFJCToday 2017-10-26)

#### START Program by VCH

At-home detox services have provided care to 329 people. (see page 143 for details.

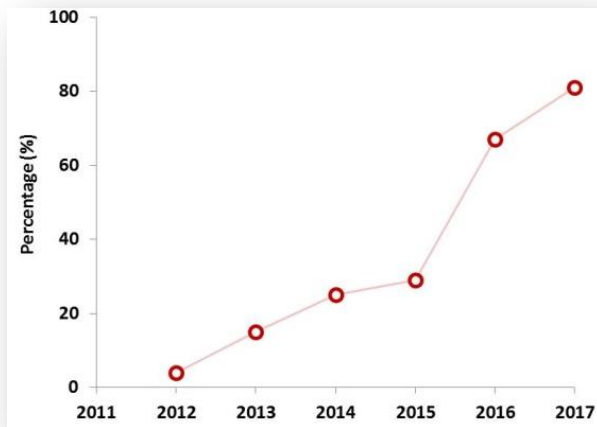
### Other / Information

#### The Lake Cowichan Sharps program

Contact the program at 250-732-4100 if you find any dirty needles. They will come and pick them up (don’t try to dispose of them yourself). They had already removed 19 needles in just one week. (BCLocalNews 2017-10-25)

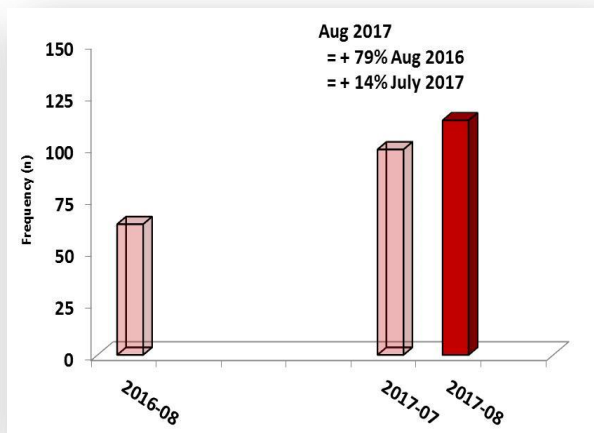
## Drug Overdoses and Forensic Toxicology in BC (II) – BCTOX

### Fentanyl Detected Illicit Drug Overdose Deaths in BC

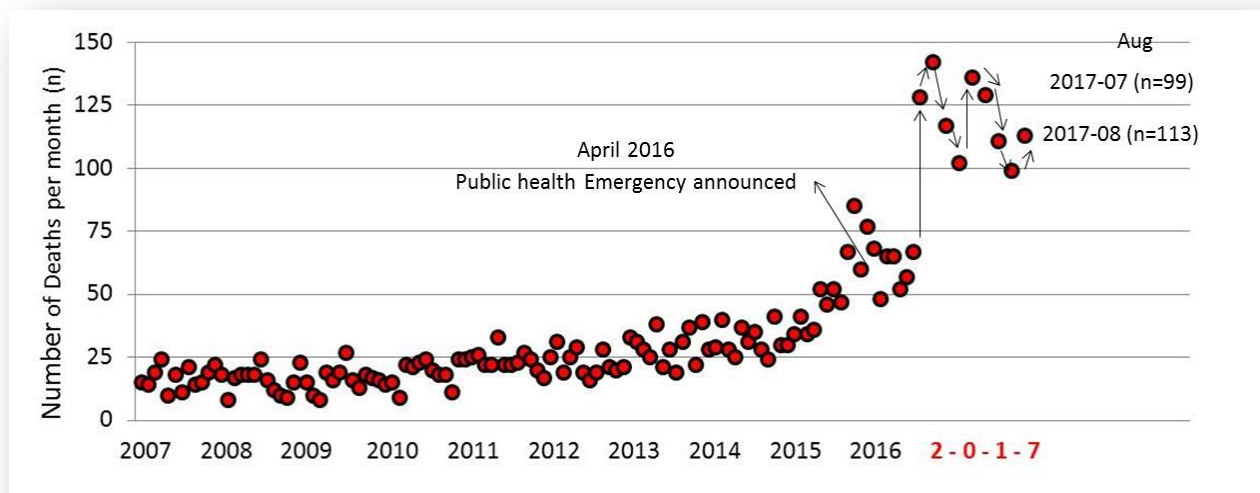


Fentanyl Detected Illicit Drug Overdose Deaths (2012- 2017 July) [BCTOX graph] [LAST UPDATE – July] Data from (BCCoronersService(b) 2017-09-07)

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



The number of Illicit drug overdose deaths in Aug 2017 was 113 which is 79% higher than Aug last year and 14% higher than last month [BCTOX graph] [LAST UPDATE - Aug] Data from (BCCoronersService 2017-10-12)



### Illicit drug overdose deaths per month in BC (2007 to August 2017) [BCTOX graph] [DATA LAST UPDATE - Aug]

The pattern of overdose deaths suggests that the sharp increase in deaths has reached a plateau, if not decreased in recent months. Data from (BCCoronersService 2017-10-12)

#### Historical report

“In 1997, Downtown Eastside residents began holding weekly meetings to discuss a radical idea: a drug-users union that would fight for members’ human rights. In this photograph, taken in a second-storey room that the group borrowed for a short time from Lookout Emergency Aid Society, a list of friends and family that attendees had lost hangs on the wall behind them.” (by Duncan Murdoch) Adopted from (Straight 2017-09-04)





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

### Wildfires in BC since 2006

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

- Total fires was 1844 (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 October 30, 2017 (current fiscal year) in BC is 12,158 km<sup>2</sup>.

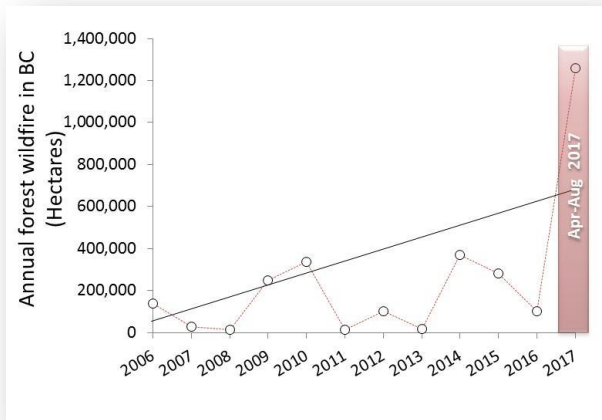
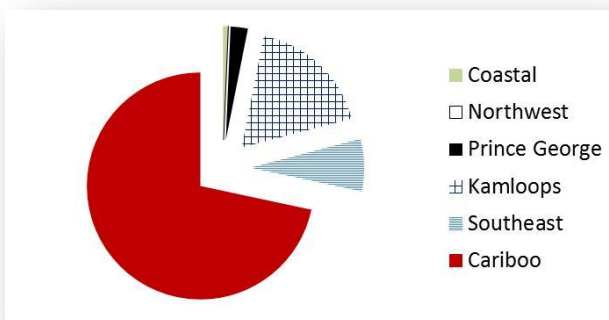


Figure. Annual forest wildfire in BC (Hectares) (2006 to 2016) . Depicts wildfire from April 1, 2017 to Oct 30, 2017 (current fiscal year) (12,1158 km<sup>2</sup>) Source of data BC Wildfire Service [BCTOX Graph]

--- 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 1,212,345 hectares burned from April 1, 2017 to Oct 24, 2017 (current fiscal year) in BC.

Distribution of wildfires in BC from April 1, 2017 to Oct 24, 2017 is shown in the figure. Source of data BC Wildfire Service [BCTOX Graph] (BC-Wildfire-Service)

## Climate change in BC

### Wildfire and climate change

The extreme nature of wildfires in BC is attributed to climate change. Winds are a little stronger, the temperatures are a little higher and it's a little drier. With warmer temperatures, the fuels will be drier, and when a fire goes through, there would be more fuel to consume. (TheGlobal&Mail 2017-10-22)

### BC Mayors and climate change

BC Mayors discussed extreme weather as climate changes during METRO VANCOUVER REGIONAL DISTRICT – COUNCIL OF COUNCILS. "The climate is changing and we're expecting to continue to receive more unusual weather events, more extreme weather events over the course of a year" according to Coquitlam Mayor Richard Stewart. --- North Vancouver is typically one of the areas hardest hit by storms in our region. (City 2017-10-22)

### Carbon Tax and climate change

The BC-NDP has pledged to increase the carbon tax by \$20 per tonne in \$5 annual increments beginning in 2018. This tax was the first of its kind in Canada and introduced in 2008. It has been frozen at \$30 per tonne since 2012. The BC NDP will unveil a new climate policy advisory council. (GlobalNews 2017-10-23)

### Climate policy advisory council

BC NDP is going to unveil new climate policy advisory council. (GlobalNews 2017-10-23) Industry, environmental groups join BC new climate advisory council. (PipelineNewsNorth 2017-10-25)

### Climate accountability letter

Following a request from 55 BC-based legal and environmental groups that joined forces in January and called BC local governments to send climate accountability letters to the fossil fuel industry, the city of Victoria is going to send "a climate accountability letter" to 20 of the world's largest fossil fuel companies. (CBCNews 2017-10-13)

### Climate change at the Columbia Basin Trust's symposium

The key to changing people's thinking about climate change action is to "create stories of clean abundance" and start from the solution, rather than the problem. (BCLocalNews 2017-10-19)

Even if countries keep their pledges, it will still only reduce greenhouse gas emissions enough to hold global warming to 3.5 degrees C, not two degrees as hoped. (BCLocalNews 2017-10-19)

### Pipeline





Photo adopted from Cory Correia (CBCNews 2017-10-23)

Protesters came out to the Law Courts to support the City of Vancouver as they challenge the province's environmental approval of the Trans Mountain pipeline expansion project. (Cory Correia/CBC News)(CBCNews 2017-10-23)

### Toxic Exposure Mediated via PRODUCTS - BCTOX

#### Toxicological related product recalls / alerts

(Recalls-and-safety-alerts) - Updated 2017-10-26

Date	Items	--- Reasons to recall
2017-10-20 Recall	<a href="#">Spirit Mini Slime</a> <a href="#">Spirit Flarp Noise Putty</a>	<p>Due to chemical risk; "Presents a risk to children because it contains boric acid, if licked or swallowed.</p> <p>Children are more sensitive to boric acid toxicity than adults.</p> <p>High levels of boric acid ingestion may have long-term effects on a child's development and their future reproductive health."</p>
		
2017-10-19 Recall	<a href="#">Lil' Frog Lily Pad toys</a>	<p>Due to chemical hazard; "When the button batteries are removed from the toy frogs, the battery's cap can become a projectile and the battery's chemicals can leak, posing chemical and injury hazards".</p>
		
2017-10-03 Recall	<a href="#">ASA 81mg/Biomedic ASA 81mg</a>	<p>The free salicylic acid content is out of specification in the affected lots.</p>

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

#### Toxicological related food recalls in BC

Dates	Food (Company / Firm)	Reason to recall	Class
2017-10-20	<a href="#">Captain's Choice brand Frozen Shrimp Shaomai</a>	Undeclared egg (allergen)	1
2017-10-16	<a href="#">Certain Pacific Oysters</a>	A marine biotoxin which causes Paralytic Shellfish Poisoning (PSP)	1
2017-10-02	<a href="#">Wolfgang Puck brand Creamy Butternut Squash Organic Soup</a>	Undeclared mustard (allergen)	1
2017-10-20	<a href="#">Captain's Choice brand Frozen Shrimp Shaomai</a>	Undeclared egg (allergen)	1

#### Bi weekly marine bio-toxin monitoring in West Coast BC in August shows:

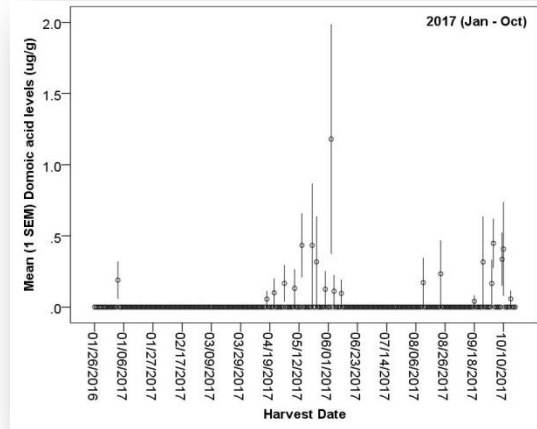
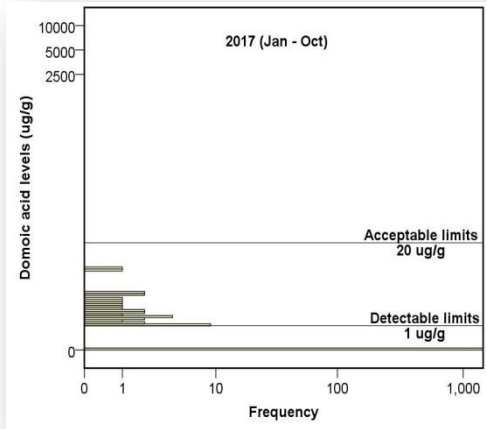
- ✓ Below regulatory limits Domoic acid [Amnesic Shellfish Poisoning] is reported again after 2 months
  - ✓ Below regulatory limits of Okadaic acid and dinophysis toxins [Diarrhetic Shellfish Poisoning] are on rise
  - ✓ Above regulatory limits of Saxitoxin [Paralytic shellfish poisoning] concentrations are on decline
- See next page for the details.

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

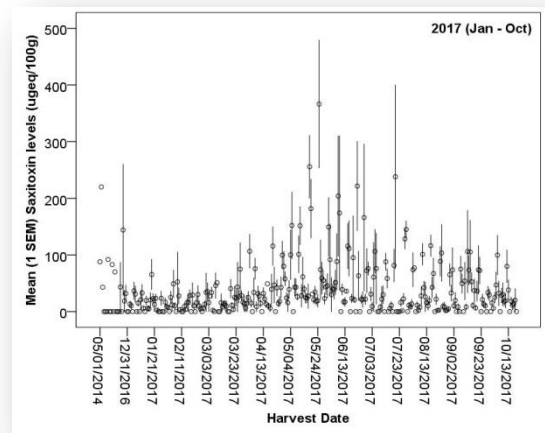
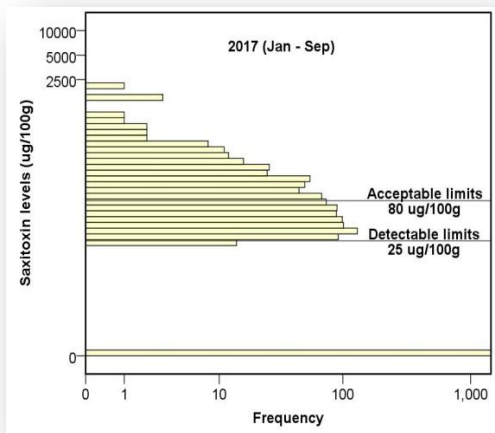
Marine biotoxins (January to Sep 2017) in BC - Data from CFIA – BCTOX graphs

Frequency

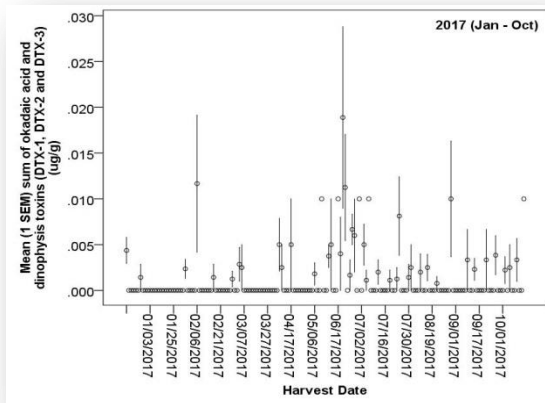
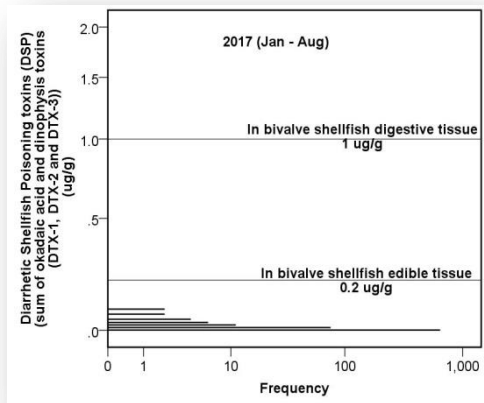
Mean (1 SEM) concentrations



**Domoic acid** (ug/g) (Amnesic shellfish poisoning (ASP)) among detected shellfish samples in BC (January to Oct 2017) (n=35 out of 2739) [This graph is prepared to imply the trend, and it should be interpreted with caution] [BCTOX Graph]



**Saxitoxin** (ug/100g) (Paralytic shellfish poisoning (PSP)) among detected shellfish samples in BC (January to Oct 2017) (n=1017 detected out of 3196 samples) [This graph is prepared to imply the trend, and it should be interpreted with caution] [Data from CFIA - BCTOX Graph]



**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 (Jan to Oct 2017) (n=100 detected out of 741 sample) [This graph is prepared to imply the trend, and it should be interpreted with caution] [BCTOX Graph] [Data from CFIA - BCTOX Graph]

## Toxic exposure mediated via WATER in BC

A total of annual \$110,000 allocated for lead in the water testing by Nanaimo school district to expand the current program, anticipated to begin Nov. 6. One-third of schools will be tested this year. (BCLocalNews 2017-10-20)

### City of White Rock

City announces \$600K rebate after paying \$14M to private company 2 years ago and finally closes water utility purchase deal. White Rock bought the water utility from EPCOR Oct. 30, 2015, with an advance payment of \$14 million. (CBCNews 2017-10-23)

### Toxic Spills/Dumps

If you do experience a “small spill”, contain it with a spill kit or report it at 1.800.OILS.911. (100MileFreePress 2017-08-04)

[Spill Incidents in October](#) (Spill-Incidents 2017) has reported no event after 31 August. (accessed Oct 26, 2017)

Date	Name	Source	Nearest Community	Spilled Content
2017-10-24	<a href="#">Ammonia Leak at Chicken Processing Facility</a>	Facility	Coquitlam	Ammonia
2017-10-17	<a href="#">Fernie Arena Ammonia Release</a>	Arena	Fernie	Ammonia
2017-10-12	<a href="#">Mitchell Island Industrial Fire</a>	Industrial Fire	Richmond	Fire Suppression Water
2017-10-08	<a href="#">Caustic Liquid Spill near the AB-BC border</a>	Tanker truck	Dawson Creek	Caustic liquid

Around 120 litres of Hydraulic oil fluid spilled into the ocean at the Duke Point terminal in Nanaimo at 10:30 am. This even lead to the closing of Duke Point ferry terminal by Nanaimo harbour and redirecting the sailings. (CBCNews 2017-10-23)

“A 90 foot wooden boat built in 1918 sank over the weekend in Ladysmith Harbour and a suspected fuel spill is now being contained by a boom encircling the site of the incident.” (LadySmithChronicle 2017-10-24)

### Wastewater management

“Living near a wastewater treatment plant can be stinky!” UBC Okanagan researchers showed that applying common chemicals metal salts e.g. Sodium chloride, copper sulfate, calcium carbonate (chalk or limestone), magnesium sulfate and zinc nitrate before treatment can cut down the production of smelly gases by up to 93 per cent. (CBCNews 2017-12-12)

## Toxic exposure mediated via SOIL in BC

### Clean oil spills by fungus

#### Scientists discover a strain of fungus that could clean oil spills in Alberta’s oilsands

Alberta’s Athabasca oilsands are covered in “coarse tailings”, an oily residue from surface-mined bitumen that lacks nutrients and cannot absorb water.

These conditions prevent plants and soil microbes from surviving. When a dandelion was found to grow out of coarse tailings, a unique strain of fungus was discovered from its roots. Researchers named this fungus TSTh20-1, and found that this fungus allows plants to grow on coarse tailings.

Additionally, plants grown with the help of this fungus were found to clean the soil beneath, breaking down residues and setting the stage for further healthy plant growth. Utilizing this fungus instead of remediation (i.e. contamination removal) and reclamation (restoration of land to its original state) would be more energy effective and a faster process. Tests have been initiated at two spill sites in Alberta and British Columbia.

Additionally, the researchers are continuing their work to understand how TSTh20-1 functions, and have identified peroxidases, a class of enzymes, in breaking down petrochemical components of coarse tailings. (PHYS.ORG 2017-10-25)

### Adverse Reaction Reporting Canada Vigilance Program

Consumers/patients and health professionals can report adverse reactions (also known as side effects) to health products, including prescription and non-prescription medications, biologics, natural health products and radiopharmaceuticals, to the Canada Vigilance Program. (Health-Canada 2016-02-24 (modified)) (Canada-Vigilance-Program 2016-02-19)

### BC Drug and Poison Information Centre

These graphs show the number of calls to BC drug and poison information centre (DPIC) from Jan to Sep 2017. As can be seen, by approaching the warmer months of the year, the number of calls related to plant poisonings, mushroom poisonings and bites increase. The ratio of the unintentional poisonings is also increases in summer. No major change regarding the routes of exposure and age groups were observed.

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.

International lead poisoning prevention week of action



Photo adopted from [WHO website](http://www.who.int). (WHO 2017) This site contains Campaign information materials.

International lead poisoning prevention week of action took place from 22 to 28 Oct 2017 with a particular focus on eliminating lead paint. This event is organized by WHO and is mainly related to the low income countries in which leaded paints are still in use. In Canada, leaded paint is not in use from decades ago. It also focuses on lead exposure from other media.

BCTOX seizes this opportunity to promote the idea of a lead free society. Lead has no function in human body and any amount of it in the body is harmful. Lead in media should be zero or as low as reasonably possible.

North American Congress of Clinical Toxicology (NACCT) Organized in Vancouver By The American Academy of Clinical Toxicology Oct 11 to 15, 2017

"NACCT is an annual conference that allows physicians, pharmacists, nurses, and scientists from around the world to participate in the sharing of knowledge on a wide variety of clinical toxicology topics & issues" <http://www.clintox.org/education/nacct>

\* Fentanyl overdose crisis in BC was extensively discussed in this conference.

\* American Academy of Clinical Toxicology provides E-Learning Resources. <http://www.clintox.org/education/e-learning-resources>

\* ClinTox-NACCT provides the following annual grants

- ✓ Toxicology Trainee Grant
- ✓ Junior Investigator Grant
- ✓ AACT Student and Trainee NACCT Travel Award

Your/Your students' current project could be eligible for the next year ☺! - BCTOX



## Update from the US

### Flint-Michigan water crisis

Two new felony charges including involuntary manslaughter are being sought against the State's top Medical Executive, Dr. Eden Wells who could face a trial on involuntary manslaughter charges in connection with the Flint water crisis. These charges are punishable by up to 15 years in prison, and misconduct in office came during a hearing in Flint on October 09, 2017. (DetroitFreePress 2017-10-09) The involuntary manslaughter charges are related to *an outbreak of Legionnaires' disease* in the Flint area in 2014-15, which is blamed on Flint's use of the Flint River for the city's water supply. (CBSNews 2017-10-09)



State's top Medical Executive,  
could face a trial on  
involuntary manslaughter  
charges in connection with the  
Flint - Michigan water crisis

US President called the opioid epidemic a "national shame" and "human tragedy," and declared the opioid crisis a public health emergency, stopping short of a national emergency declaration (Reuters 2017-10-26)



OPIOID CRISIS  
BC: Public Health Emergency  
announced in April 2016  
US: Public Health Emergency  
announced in October 2017

## Upcoming Toxicology conferences

49th Annual Symposium of the Society of Toxicology of Canada, November 29 to December 1, 2017 in Montreal  
<http://www.stcweb.ca/en/events.shtml>

## Upcoming Toxicology jobs in BC (October 2017)

- Scientific Specialist (Forensic Equine Drug Testing). [Maxxam Burnaby](#)
- Intermediate Environmental Scientist. [CH2M Burnaby](#)
- Occupational Hygiene Officer. [WorkSafeBC - Vancouver](#)

**Solve the mystery:** what could be the "acute high dose" or "long term low dose" chemical/drug exposure that caused Edgar Allan Poe's death?

Take a guess, and email back your response to be entered in the BCTOX drawing for \$20 giftcard. (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.

**Who was Edgar Allan Poe?** American influential writer, Edgar Allan Poe (1809 - 1849 CE) is most famous for his short stories, particularly his tales of mystery detective fiction genre involving a mysterious death or a crime that need to be solved. He was capable of creating a grim and ghastly atmospheres that emphasized details of his victims. Among his works, "The Raven" a narrative poem from 1845 is widely celebrated for its stylized language and supernatural atmosphere. In this story, a talking raven mysteriously visits a distraught lover...

Poe was extraordinary creative in his works that made him a pioneer of Romanticism. He wrote in Eleanora: "Men have called me mad: but the question is not yet settled whether madness is or is not the loftiest intelligence; whether much that is glorious, whether all that is profound, does not spring from disease of thought...." (Patterson 1992)

When he died, Poe was buried quietly in the Poe family plot in a Baltimore cemetery, where only three people attended. Twenty six years later in 1875, Poe's body was dug up and moved to a different site so that a large monument could be erected. This body was 178 cm tall in a military uniform; however, Poe was 173 cm tall and was buried in civilian clothing. (Patterson 1992) *The mystery continues!*

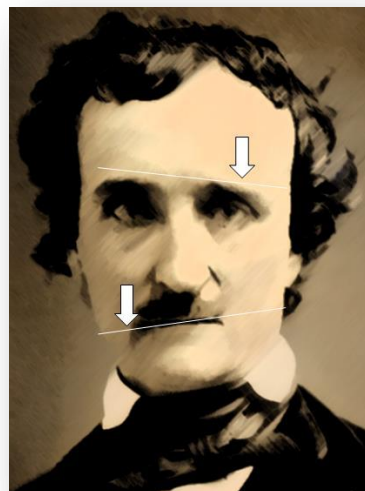
**Was he knowledgeable on psychoactive effects of chemicals/ drugs and did he use them?** He wrote a few stories such as the Pit and the Pendulum that contains references to seizure and epilepsies. (Altschuler and Augenstein 2012) He also described episodic of unconsciousness, confusion and paranoia. (Bazil 1999) He utilized the unclear state of "catalepsy" as an example of a condition that could be confused with death. He states that lady Madeline in the fall of the house of Usher suffered and died of catalepsy. Catalepsies is attributed to psychiatric drugs among other reasons. (Stien 2009)

His inspiring prose has led some to believe that drug and chemical exposures could have played a role in his works. The fact is that creativity is related to both conscious and unconscious work. Psychoactive substance may enhance the artists' sensitivity and also moderate the emotions and burdensome contents of consciousness. (Iszaj and Demetrovics 2011)

**How was his general health?** In his short life, he experienced frequent bouts of depression, mood swings and hallucinatory symptoms. He was an on and off binge alcohol drinker and substance user including opium/laudanum & morphine according to the reports. His symptoms could have been associated with the use of drugs and occasional abstinence from alcohol. (Teive, Paola et al. 2014)

**What were the circumstances around his death?** Poe died prematurely at the age of 40 years. Apparently, he was found unconscious or delirious on the streets of Baltimore where he was wearing clothes that were not his own. Reportedly, he was experiencing visual hallucinations.

He regained some level of consciousness in the next days in hospital but cognitive impairment, delirium, sweating, possible seizure activity, and apparent hallucinations remained. He did not gain coherence and died 4 days later. No signs of trauma was reported. (Francis 2009)



Edgar Allan Poe (1809 - 1849 CE)

**What was the cause of death?** The cause of death was mysterious and unknown but, officially announced to be "congestion of the brain" according to the newspapers at the time. His death has also been speculated to be due to heart disease, diabetes, rabies, suicide, tuberculosis, syphilis (Gordon 1997), cholera, etc.

There are reasons, however, to believe **toxicological causes** may have been involved including:

- Premature death
- History of alcohol and substance use
- Having medical and psychological problems
- Knowledge of psychoactive effects according to his writings
- Medical and psychological manifestation at his death
- Extraordinary creativity attributed to using substances
- **Substances/chemicals** chronic, low dose and repeated exposure to certain chemicals were controversially used in 19<sup>th</sup> century to increase the creativity including mild carbon monoxide poisoning. This could justify his knowledge of symptoms that he explained in his writings.

--- **Recent hair laboratory tests** According to the Edgar Allan Poe Society of Baltimore press release April 9, 2006 (<https://www.eapoe.org/>) remainings of Poe's hair contained (i) **Arsenic**; 15 times higher than today's normal level, and about 2/3 the level associated with symptoms of poisoning, (ii) **Nickel**; 10 times today's normal level, (iii) **Lead**; 3 to 4 times higher than today's normal level, (iv) **Vanadium**: at the high end of the normal range, (v) **Mercury**: 30 times below the level associated with symptoms of mercury poisoning and (vi) **Uranium**; below the detection limit. (EAPOE 2006-04-09) These tests on Poe's hair are inconclusive, which may discredit reports of mercury poisoning as a cause of his death (Shoemaker 1997).

--- **Photographic clues:** His daguerreotype - the first type of public photographic process - shows a peculiar feature; one-sided facial droop (see the photo), which could be diagnosed as Bell's palsy, a type of facial paralysis. The cause of Bells' palsy is unknown but viruses and reactivations by trauma, metabolic or emotional disorders, environmental factors and poisonings are suggested. Exposure to chemicals may lead to peripheral neuropathy including Bell's palsy.

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

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