Mr. Delcy Wells,
General Manager of Corporate Services
Regional District of Nanaimo

Ms Phyllis Carlyle
Chief Administrative Officer
Regional District of Nanaimo

Dear Mr. Wells and Ms Carlyle,

Re: Letter from Thomas Elliot, Madrone Environmental Services Ltd. re: RDN EASC Presentation November 26, 2019

I am writing to you on behalf of Dr. James Russell regarding a letter he received from Thomas Elliot, Madrone Environmental Services Ltd. on December 2, 2019. This letter was regarding presentations by Donna Laing and Marilee Grant to the RDN Electoral Areas Services Committee on November 26, 2019. In his letter Dr. Elliot asked Dr. Russell to write to you to “clarify his professional opinion” regarding his statement that “there were no scientific studies quantifying safe levels of inhaling cannabis air contaminates for children and people with asthma and Chronic Obstructive Lung Disease”. Dr. Elliot’s letter is below for your reference.

Dr. Russell has prepared the following literature review for your information. As you will note from this review there are no “questionable assertions” that were made by Dr. Russell, Ms Laing or Ms Grant during the November 26th presentation. Please let me know if you have any questions, I can be reached at

Yours sincerely,

Frances Lasser,
Representing Residents of the Quennell Lake Area

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CANNABIS AND SAFETY OF CANNABIS-ASSOCIATED AIR CONTAMINANTS AND EMISSIONS
JAMES A. RUSSELL BA, MD, FRCPC

CONTEXT

In prior decades, the risks of tobacco and asbestos were completely missed leading to numerous health problems (especially cancers, heart and lung disease) until legislation was changed. Now, cannabis outdoor farming exposes vulnerable populations to the air contaminants of the cannabis plants. There is no scientific literature regarding the safe level of cannabis air contaminates and emissions in people especially children, youth, the elderly and people with respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD).
BACKGROUND

Cannabis will now be grown legally in Canada in large outdoor farms that emit the foul, skunky odor of cannabis and emit cannabis air contaminants into the surrounding communities. However, science does not know the safe level of cannabis air contaminants and emissions, especially for vulnerable populations such as children, youth, the elderly, and people with respiratory conditions such as asthma and COPD. The air contaminants of cannabis are related to the approximately 200 volatile organic compounds (VOCs) (some of which are called terpines) emitted from cannabis(1, 2).

ANALOGIES – THE EARLY LACK OF SAFETY CONCERNS FOR TOBACCO AND ASBESTOS

There is an analogy about missing safety issues and the early days of commercial tobacco. Tobacco smoking was ubiquitous and the health risks of tobacco smoking were largely unknown. “Big” tobacco, i.e. the tobacco companies, refined tobacco products so that the inhaled tobacco particles could be inhaled deeply into the lung(3). This achieved two purposes. It increased the levels of nicotine into the blood thereby increasing the addiction risks (nicotine is one of the most addictive substances known(4)) and so increased tobacco use and sales. Second, it increased the delivery of the toxins of tobacco into the deep sensitive cells of the lung increasing the risks and frequency of COPD, lung and other cancers, heart disease and other conditions. Indeed, in the 1950s about half the population smoked and several decades later lung cancer became the top cause of cancer(3). Even today despite the known risks of tobacco, tobacco causes about 40% all cancers(4), is by far the major cause of COPD and a major contributor to the risk coronary heart disease and heart failure(5). As a very recent review in the New England Journal of Medicine states: “It is difficult to imagine a better way to deliver chronic, repetitive inhalational injury to lung tissue than smoking 20 or more cigarettes a day for many years.”(5)

Asbestos was similarly thought to be a safe and was used widely as an insulator in many applications. However, years later medicine and the public learned that asbestos causes the deadly lung disease “asbestosis” (it’s irreversible and causes progressive breathlessness and death) and several lung cancers among asbestos workers(6-9). The risk was found to be so high that even the wives of those workers who laundered their work clothing also had increased risks, illustrating just how potent and dangerous asbestos is.

Subsequently, tobacco was highly regulated (e.g. television advertising was banned, warning labels were implemented) and asbestos was banned. These legislative changes caused significant and durable decreases in the frequency and severity of the severe medical conditions described above.

EARLY DAYS OF OUTDOOR CANNABIS FARMING

It is early days of large cannabis outdoor farms and there is now going to be exposure of vulnerable populations to the air contaminants and emissions of cannabis. The safe levels of cannabis air contaminant and emissions exposure in children, youth, the elderly, and people with respiratory conditions such as asthma and COPD are unknown.

MEDICAL LITERATURE REVIEW

Accordingly, we did a review of the medical literature to answer the following question: What is the safe level of cannabis air contaminant and emission for health? We used rigorous scientific literature search methods as follows. We did not use publications that related to the risks of smoking or second hand cannabis smoke, but focused on the air contaminant and emission from cannabis plants.

The international medical literature database Pubmed was searched in November and December 2019 using the following search terms: “cannabis and safety”, “cannabis and ambient air”, “cannabis and ambient”, “cannabis and asthma”, “cannabis and air contaminant”, “cannabis worker safety”, and “cannabis and children”.

The search yielded the following numbers of peer-reviewed publications in medical journals (Table 1).

Table 1. Number of peer-reviewed publications for various cannabis search terms in Pubmed.
<table>
<thead>
<tr>
<th>Search Term</th>
<th>Number of Peer-reviewed Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>cannabis and safety</td>
<td>688</td>
</tr>
<tr>
<td>cannabis and ambient air</td>
<td>4</td>
</tr>
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<td>88</td>
</tr>
<tr>
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<td>21</td>
</tr>
<tr>
<td>cannabis and children</td>
<td>1975</td>
</tr>
<tr>
<td>cannabis worker safety</td>
<td>8</td>
</tr>
</tbody>
</table>

Of note, we highlight that the search for “cannabis and children” shows that there are 1975 publications, 838 in the last 5 years, and for the last 2 years there is a publication on cannabis and children every 2 days! The medical research community is clearly concerned about the risks and safety of cannabis in children and youth.

In contrast, the search cannabis worker safety yields only 8 publications, indicating a need for much more research in this area and obviously for communities surrounding outdoor cannabis farms.

The results of our search are quite stunning at first reflection. We found not one article that addresses or determines the safe level of cannabis air contaminant and emission exposure, especially in the vulnerable populations described above.

A similar literature search was done and report issued by Public Health Ontario ([https://www.publichealthontario.ca/-/media/documents/eb-cannabis-production-odours.pdf?la=en](https://www.publichealthontario.ca/-/media/documents/eb-cannabis-production-odours.pdf?la=en)). They searched and found 334 articles that were reviewed for relevance but not one addressed or determined the safe level of cannabis air contaminant and emission exposure.

The key messages of that review were...

- "No studies on health effects associated with exposure to cannabis odours were identified in the scientific or grey literature. (Our emphasis).

- Odours can result in annoyance and complaints from nearby residents. Current practices recommend the use of appropriate ventilation and filtration systems at cannabis production/cultivation facilities to mitigate the release of substances that may result in odours.

- A system to report and track odours could help inform on timing and extent of the occurrence of odour to assist local authorities to remedy potential problems.”


They further note that “While both fresh and dry cannabis can be associated with odours it is possible that the VOCs responsible for the aroma profiles may be different due to different rates of chemical volatilization.”(1, 2)

The lack of studies on the safe level of cannabis air contaminant and emission may relate to the fact that large scale outdoor cannabis farming is just starting and so there are no studies of this activity regarding the safe levels of cannabis air contaminant and emission.

**VOCS OF CANNABIS INCREASE AIR POLLUTION**

VOCs are emitted from cannabis(10) and are a growing source of air pollution especially in areas immediately surrounding cannabis outdoor farms. Indeed, “High concentrations of VOCs emitted from Cannabis grow facilities can lead to the formation of ozone, secondary VOCs (e.g., formaldehyde and acrolein), and particulate matter.”(10)
The international leading science journal Science has recently highlighted the risks of increasing air pollution due to cannabis farming (https://www.sciencemag.org/news/2019/01/legal-pot-farms-expand-so-do-air-pollution-worries). Science states that there is: “a dearth of data as they try to evaluate the pot industry's potential effects on indoor and outdoor air quality as well as worker health” (https://www.sciencemag.org/news/2019/01/legal-pot-farms-expand-so-do-air-pollution-worries). Ashworth and Vizuete have highlighted this issue in their research on effects of cannabis air contaminants on air quality in Colorado(11), where cannabis is legal.

The final sentence of the Science article is telling: “Nobody is helped,” he says, “by refusing to acknowledge that this is a public health issue.” (https://www.sciencemag.org/news/2019/01/legal-pot-farms-expand-so-do-air-pollution-worries).

INCREASED AIR POLLUTION INCREASES ASTHMA, ASTHMA ATTACKS, HEART ATTACKS AND WORSENING OF COPD AND OTHER RESPIRATORY CONDITIONS

The effects of cannabis on air pollution are important because air pollution increases the risk of asthma(12) and asthma attacks(13), heart attacks(14), heart failure(15), stroke(16) and worsening of COPD(17), and other respiratory conditions(18) resulting in increased ambulance use(19), emergency department visits(20) and hospital admissions, especially in the elderly(21). The effects of land use decisions by authorities on air pollution is emphasized by air pollution researchers authorities because those land use decisions are important for decreasing the risks of air pollution and associated risk of disease(22).

Accordingly, it is concerning that the effects of outdoor cannabis farming is increasing, it is occurring in areas adjacent to vulnerable populations, the cannabis air contaminants will increase air pollution and air pollution increases the conditions listed above… and yet the safe level of cannabis air contaminants and emissions is unknown.

CANNABIS WORKER SAFETY

There are only 8 peer-reviewed publications on cannabis worker safety, amazing since this is such a growing industry. Cannabis is legal in Australia and a very recent Australian study highlighted safety issues and noted that “Little research has been undertaken on the exposure to inhalable organic dust and other bioaerosols”(23). Furthermore, “workers may also be exposed to a variety of biological, chemical, and physical hazards including: organic dusts, bioaerosols, pollen/allergens, volatile organic compounds, psychoactive substances (tetrahydrocannabinol [THC]), noise, and ultraviolet radiation”(23).

RESEARCH ON CANNABIS WORKERS DOES NOT TRANSLATE TO VULNERABLE POPULATIONS

Some research on health effects of cannabis farming on cannabis workers as described above is useful for occupational health of those workers but clearly does not translate regarding safety and safe levels of cannabis air contaminants for children, youth, the elderly, and people with respiratory conditions who live near outdoor cannabis farms. These latter groups will be more susceptible to cannabis air contaminants.

In September 2019, a group of Canadian academic experts in substance use published their extensive study that reviewed public health and safety of legalized marijuana/cannabis(28). They identified 28 indicators for public health and safety of legalized marijuana/cannabis by reviewing literature from states that had legalized marijuana (e.g. Colorado, Washington etc.)(28). They saw 5 broad trends emerge: public safety; cannabis use trends; other substance use trends; cardiovascular and respiratory health; and mental health and cognition(28). This excellent report highlights the effects of legalizing marijuana on marijuana use, traffic crashes, health outcomes and other indicators. They noted that “unintended exposure to cannabis among children and youth are frequently cited amongst policymakers and the public as a top concern of non-medical cannabis legalization”(28). Public safety focused on the risk of traffic crashes after legalizing marijuana. However, it did not address risks of outdoor cannabis farming or cannabis air contamination.

Consequently, there is a need for studies regarding how outdoor cannabis farming affects health of neighbouring residents. We suggest that studies (1) determine the size of farm, number of plants, methods to mitigate risks as
independent variables, (2) control for proximity of residences, age, gender, genetic markers (because genetic variability from person to person determines in some ways the response to cannabis including hallucinations(24), levels of stress, mood states(25), level of educational attainment(26, 27) and other responses; similar genetic variability may determine response to cannabis air contaminants) prior health status of neighbours, and cannabis air contaminant measurements and (3) measure health outcomes as dependent variables in longitudinal cohort studies and case/control studies carried out over several years to determine “What is the safe level of cannabis air contaminants for the public and for vulnerable populations?”

To highlight the imbalance on cannabis safety research, for example, there are 979 publications on “cannabis and genetics” but only 8 on cannabis worker safety! And none on the safe levels of cannabis air contaminants for neighbouring residents.

CONCLUSIONS

In prior decades, the risks of tobacco and asbestos were completely missed leading to numerous health problems (especially cancers, heart and lung disease) until legislation was changed. Now, cannabis outdoor farming exposes vulnerable populations to the air contaminants and emissions of the cannabis plants. There is no scientific literature regarding the safe level of cannabis air contaminants and emissions in people especially children, youth, the elderly and people with respiratory conditions such as asthma and COPD. The safe levels of cannabis air contaminant and emissions exposure in children, youth, the elderly, and people with respiratory conditions such as asthma and COPD are unknown.

DR. JAMES A. RUSSELL AB, MD, FRCP, PROFESSOR OF MEDICINE, UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, BC CANADA

BRIEF BIOGRAPHY

Dr. Russell is ranked # 1 in the world in septic shock (http://expertscape.com/ex/septic+shock), vasopressin (http://expertscape.com/ex/vasopressin) and norepinephrine (http://expertscape.com/ex/norepinephrine) – the two commonest therapies used in septic shock - according to the independent expert site (expertscape).

Dr. Russell has expertise in writing 86 invited reviews in the top peer-reviewed medical journals in his field (illustrating his expertise in reviewing the scientific and medical literature.

Dr. Russell is Professor of Medicine at University of British Columbia (UBC) and a Principal Investigator in the Centre for Heart Lung Innovation (HLI) at the University of British Columbia and St. Paul’s Hospital where he focuses on septic shock research. In 1982, he founded the Critical Care Medicine (CCM) division at UBC and St. Paul’s, which he has grown to be ranked the # 1 septic shock group in the world (http://expertscape.com/ex/septic+shock). The UBC CCM program has gone on to become one of the premier Critical Care programs both in Canada, and globally.

Dr. Russell has three major current themes of research (1) randomized controlled trials in patients with septic shock and (2) the genomics and pharmacogenomics of septic shock. He is now developing a new theme (3) to define the operating characteristics and predictive value of short-term versus long-term outcome measures in sepsis and their utility as primary endpoints in pivotal randomized controlled trials in sepsis and septic shock. Dr. Russell’s has 280 peer-reviewed journal publications, 45 book chapters (including the chapter on septic shock in Cecil Medicine), 200 research abstracts and 277 invited talks.

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FINANCIAL DISCLOSURE (last 36 months)

Dr. Russell reports patents owned by the University of British Columbia (UBC) that are related to the use of PCSK9 inhibitor(s) in sepsis and related to the use of vasopressin in septic shock. Dr. Russell is an inventor on these patents. Dr. Russell was a founder, Director and shareholder in Cyon Therapeutics Inc. and is a shareholder in Molecular You Corp.

Dr. Russell reports receiving consulting fees in the last 3 years from:

1. Asahi Kesai Pharmaceuticals of America (AKPA) (developing recombinant thrombomodulin in sepsis).
2. SIB Therapeutics LLC (developing a sepsis drug).
3. Ferring Pharmaceuticals (manufactures vasopressin and developing selepressin).

Dr. Russell is no longer actively consulting for the following:

4. La Jolla Pharmaceuticals (developing angiotensin II; Dr. Russell chaired the DSMB of a trial of angiotensin II from 2015 - 2017) - no longer actively consulting.
5. Grifols (sells albumin) - no longer actively consulting.
6. PAR Pharma (sells prepared bags of vasopressin) - no longer actively consulting.

Dr. Russell reports having received an investigator-initiated grant from Grifols (entitled “Is HBP a mechanism of albumin’s efficacy in human septic shock?”) that was provided to and administered by UBC.

Dr. Russell is a co-owner of a property in Nanaimo, near where there is planned outdoor cannabis farming.
REFERENCES


From: Jim Russell [mailto:Jim.Russell@hli.ubc.ca]
Sent: Saturday, December 7, 2019 11:09 AM
To:
Subject: Fwd: Concern over use of your Credentials.

Hello James Russell –

I am a professional Agrologist and Geoscientist in BC and work with a large cross-section of agricultural operators throughout the province, including a handful of the recently recognized legal farm use of outdoor cannabis cultivation. I operate as an independent third party in my non-agent role, and strive for objective evidence based decision making in my public and environmental health practice goals. I recognize that retention of my knowledge and skill set through contract-based work can create a perceived conflict of interest, although I can objectively state that I receive no greater or less compensation based on the outcome of any project.

I am writing today to ask that you review the written use of your name and credentials in a recent Regional District of Nanaimo Electoral Area Services Committee meeting in the advancement of questionable (i.e. unsupported) assertions toward preventing legitimate farm operations in the Cedar area.

You can review the material here: https://rdn-pub.escribemeetings.com/FileStream.ashx?DocumentId=11292

Specifically these sections:

“There is no scientific evidence that confirms this air contamination will not have adverse effects on children’s brain and lung health. Dr. James Russell, a world leading
medical researcher, was unable to find any scientific studies quantifying safe levels of inhaling these contaminants. Will there be lung and brain damage to these exposed children? There are no longitudinal studies that tell us there won’t be. Tobacco was at one time thought of as harmless; however the American Cancer Society states that even second hand cigarette smoke causes lung cancer and there is evidence suggesting it may be linked to cancers of the throat, brain, bladder, stomach, and breast and in children possibly linked to lymphoma, leukemia, liver cancers and brain tumours.”

Our demographics also include a significant population over the age of 65. Some of these adults suffer from lung ailments. Dr. Russell was unable to locate any scientific studies that shows there will be no adverse effects on adults suffering from respiratory conditions such as asthma and Chronic Obstructive Pulmonary Disease (COPD).”

Momentarily ignoring the reality that a lack of evidence does not constitute potential or actual harm, I am asking that you clarify your assertions regarding farm activities and individual health.

I would be remiss if I were not to bring your attention to numerous studies on the subject(s) of ‘air contamination… adverse effects’, including:

   1. Hemp is a useful proxy, whereby dust generated during processing (retting, seed extraction, etc.) is a known OHS issue for which there are occupational safety measures in place. This is not applicable to cannabis due to the lack of retting or seed removal, and in fact the intent of cannabis processing is to specifically not disturb crystals on flower buds;
   2. The intent of hand-harvesting cannabis is to generate as little dust (plant or otherwise) as possible in order to meet the strict Health Canada requirements for contaminants within medical cannabis products, and as such the likelihood of dust (of any kind) being generated is not only very low – but entirely contrary to best farm practices therein;
   3. Additional considerations are limited to workers in the field and fully contained processing centers, who accept an individual risk profile above 1:10,000 as mitigated to As Low As Reasonably Practicable (ALARP) through required OHS protective measures.
   4. Allergens, bioaerosols, or volatile organic compounds are emitted by a wide range of common crops in BC (e.g. limonene, linalool, etc. by lavender, pine trees, lemons, etc.) and are a component of agriculture and living in an agricultural area. These ‘common exposures’ are resultant from standard farm practices protected within the Agricultural Land Reserve by the Farm Practices Protection (Right to Farm) Act.

2. Respiratory Health Hazards in Agriculture. Am J Respir Crit Care Med. 1998, Nov 158(1) [https://doi.org/10.1164/ajrccm.158.supplement_1.rccm1585s1](https://doi.org/10.1164/ajrccm.158.supplement_1.rccm1585s1)
   1. Which specifically identifies agriculture in general as being ‘Unlike most occupational settings, the farm is frequently both residence and worksite. Even family members not directly engaged in the farm work may be incidentally exposed to respiratory hazards (the risk for active workers, of course, is even higher). Thus farming, uniquely among industries, may result in extensive exposure risk to workers’ family members, increasing the population at risk by several-fold. That population includes such susceptible groups as children, the elderly, and individuals with chronic respiratory and other diseases. Nonfarming rural residents living near farming operations may also be at significant risk from exposure to grain dusts and pesticides and other chemicals carried by aerial drift. An extended population, by no means restricted to farm operators and workers themselves, is thus at risk.’
Which collectively indicate that the outdoor production of cannabis is not unlike any other crop, save for the fact that strict quality control in place by Health Canada necessitates a close-to-zero dust generation (i.e. minimizing respiratory irritants/allergens); with similar bio-aerosols, terpenes and VOC to many other common crops, and that – in fact – engaging in the general practice of agriculture, and specifically living in general agricultural areas, presents a higher risk profile than proximity to Canadian legislated cannabis outdoor production (i.e. farming) cultivation.

I am concerned about your professional reputation herein, and am asking that you clarify your Professional Opinion on agricultural emissions with the Regional District of Nanaimo General Manager of Corporate Services (Delcy Wells, dwells@rdn.bc.ca) and the Chief Administrative Officer (Phyllis Carlyle, pcarlyle@rdn.bc.ca).

Best Regards,

Thomas R Elliot PhD P.Geo P.Ag

Madrone Environmental Services Ltd.

o. 250.746.5545