Preventing the Burden of Occupational Cancer in Canada

STAKEHOLDER SYMPOSIUM REPORT

Vancouver, BC

March 31st, 2016

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Introduction

> ***"Occupational exposures are what keep us awake at night."***
> Al Johnson, Vice President, Prevention Services, WorkSafeBC

Cancer is the leading cause of death in Canada, and millions of Canadians are exposed to a range of known and suspected carcinogens in the workplace. But the full impact of these exposures is not clear. The Burden of Occupational Cancer in Canada is the first study to investigate the number of work-related cancers and cancer deaths in Canada on a national scale.

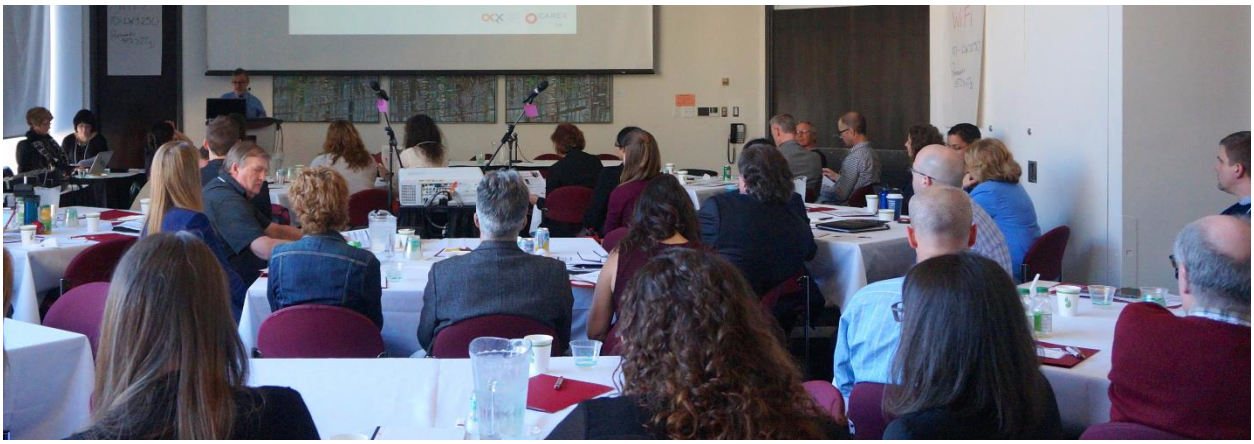
On March 31, 2016, CAREX Canada hosted a stakeholder symposium in Vancouver, British Columbia (BC), to share findings from the study, which is nearing completion. The meeting objectives were to:

- Share the study's early results on crystalline silica, asbestos, diesel engine exhaust, and solar radiation with stakeholders from BC, Alberta, and the Yukon
- Obtain feedback on how to:
    - Use the results to promote prevention of occupational cancer in Canada
    - Present the results most effectively

The Canadian Cancer Society Research Institute funded the four-year burden study, which is led by the Occupational Cancer Research Centre (OCRC), in collaboration with CAREX Canada (CARcinogen EXposure), a multi-institution research project that is the country's leading source of evidence on Canadians' exposures to workplace and environmental carcinogens.

Almost 70 people attended the symposium, representing provincial and territorial governments, health authorities, NGOs, labour groups, health and safety associations, and academia, including WorkSafeBC, the Canadian Cancer Society, the BC Ministry of Health, Alberta Ministry of Labour, Yukon Workers' Compensation Health and Safety Board, and BC Building Trades Council, to name a few.

This report presents an overview of the symposium proceedings, as well as priorities identified by meeting participants for how best to frame, communicate, and use burden study data for prevention. The ultimate goal is to use this evidence to protect people from workplace exposures to carcinogens.



The Burden of Occupational Cancer Study

The Burden of Occupational Cancer in Canada study has developed evidence-based estimates for the number of cancers due to carcinogenic exposures in the workplace, as well as the economic costs associated with these cancers.

The term "burden" refers to the human impact (new cases, deaths, years of life lost) *and* the economic costs associated with the cause of disease. The burden study is assessing the burden of 27 different cancers attributed to exposures to 44 workplace carcinogens, and the data is organized by sex, province, age group, industry, and occupation.

Findings from this study will help identify priority workplace carcinogens, and give policy makers and health advocates quantitative information to inform cancer prevention initiatives. By quantifying cancer burden in terms of both lives and financial costs, the results can be used to support more protective occupational exposure limits, foster reduction in use of toxins, and prioritize interventions for workers in the most high risk jobs.

Human Burden

The human burden is calculated using: data on exposure for each carcinogen; information about the numbers of people employed in exposed jobs; evaluations of cancer risk associated with each carcinogen; and the numbers of newly diagnosed cancers and cancer deaths each year in Canada. These data are combined to estimate the number of cancers and cancer deaths each year that could be prevented by reducing occupational carcinogen exposure. (See the Burden of Occupational Cancer – Overview fact sheet for more information.)

Economic Burden

The economic burden includes all current and future costs incurred by afflicted workers, their families, communities, employers, and society at large, in four areas: health care and administrative costs; informal caregiving and out-of-pocket costs; output and productivity losses; and health-related quality of life loss and years of life lost.

In the first phase of the study, researchers collected and analyzed data about cancer risk and Canadian workplace exposures to cancer-causing agents to produce preliminary burden estimates. The second part of the study used these burden estimates to generate economic burden figures. Preliminary burden estimates are currently undergoing scientific review, while others are still in progress. The third stage of this project involves communicating the results to stakeholders, so the study findings can help advance cancer prevention initiatives across Canada.

The Burden of Occupational Cancer in Canada is a collaborative study involving researchers from OCRC, CAREX Canada, the Institute for Work and Health, University of British Columbia (UBC), Université de Montréal, Institut de recherche Robert-Sauvé en santé et en sécurité du travail, and Imperial College London, with input from internationally recognized cancer burden scientists.

Crystalline Silica

Presenters/panelists (in order of appearance in photo):

- **Burden of occupational cancer in Canada due to crystalline silica**; Dr. Hugh Davies, Canadian Workplace Exposures Database Lead, CAREX Canada; Associate Professor, Occupational and Environmental Health, School of Population and Public Health, UBC
- **Updating silica regulations in BC**; Josh Towsley, Business Representative, International Union of Operating Engineers Local 115; Chair, BC Building Trades Occupational Health and Safety Committee
- **BCCSA Silica Assessment and Control Tool**; Nancy Harwood, Lawyer and Owner, Harwood Safety Group; Project Manager, Silica Assessment and Control Tool Project, BCCSA

Crystalline silica is a naturally occurring mineral found in soil, sand and rocks, and is not toxic in these forms. The hazardous dust created by breaking, grinding or sawing silica-containing materials (such as rocks and concrete), however, is a known lung carcinogen; inhaling fine silica particulates cancer in the lungs. Silica can also cause silicosis (thickening and scarring of the lungs), chronic obstructive pulmonary disease, and rheumatoid arthritis, and can make people more susceptible to tuberculosis.

Several trades are commonly exposed because crystalline silica is present in materials like concrete, mortar, and brick. CAREX Canada estimates that 380,000 workers are exposed to silica dust in Canada; 54,000 in Alberta and 52,000 in BC (estimates developed using the 2006 Census of Population, the most recent census that includes detailed information on sector and occupation). Almost half of exposures are low level, a third are medium exposures, and 14% are high exposures above occupational exposure limits (OELs). However, these levels of exposure are almost certainly an underestimate (reflecting a lack of measurement data), and CAREX Canada is currently working to better estimate where overexposure is still occurring.

The Burden of Occupational Cancer study estimates that occupational exposures to crystalline silica cause 570 lung cancers in Canada annually, and create an economic burden of $530 million a year. Workers in construction account for 56% of these cancers; lung cancer from silica also occurs among workers in manufacturing, mining, oil and gas extraction, transportation and warehousing. (See the Burden of Occupational Cancer – Crystalline silica fact sheet for more information.)

WorkSafeBC (WSBC), a Burden of Occupational Cancer project user, has seen that while the rate of workplace injuries is at an all-time low, the rate of workers dying from exposures in BC is increasing. Crystalline silica is one of six carcinogens its Risk Analysis Unit is profiling. WSBC has drafted new regulations for crystalline silica, expected to come into force in 2017, after public hearings. Under the regulations:

- A "qualified person" must conduct a comprehensive risk assessment covering the crystalline silica content in materials to be used, health effects of dust exposure, nature of the work, and whether planned control measures will prevent or minimize exposures
- A hierarchy of controls to protect workers moves from elimination to substitution (the best forms of exposure reduction), to engineering controls, to administrative controls like changes in work procedures, rules, supervision, training, and to personal protective equipment (PPE)
- An exposure control plan (ECP) must cover risk identification, assessment and control; education and training of workers; and written procedures
- Sampling and air monitoring are also required

The BC Construction Safety Alliance (BCCSA) is launching an online Silica Tool Project—a "one-stop silica safety website"—developed in partnership with WorkSafeBC and UBC. This tool was created to help employers meet the new regulations, access current exposure data, be more knowledgeable about the hierarchy of controls, and ensure workplace practices align with controls. The project aims to amalgamate exposure data from around the world for employers to use to assess and control workplace exposures. The tool will generate an ECP to protect workers, based on data the employer enters.

The construction sector in BC has more than 200,000 employees and 40,000 employers. Many employers are small and medium sized, which can lead to a lack of understanding, monitoring, and protection for silica exposures. Some younger workers may be at greater risk of exposure due to ignorance of the risks and lack of PPE and proper procedures in smaller operations.

Panel Q&A Themes

- OELs for silica have declined over time, as more data is collected to show health effects even at levels lower than the OEL. Concerns were raised that occupational exposure limits are inconsistent across jurisdictions/organizations.
- Barriers to implementing the new WSBC regulations include:
    - Lack of employee engagement
    - Some employers think exposure limits are unachievable
- Concern was expressed at the meeting about an exception in the new regulation: air monitoring is not required if a qualified person determines existing measures are effective and previous monitoring was conducted on comparable operations. To protect workers, ongoing air monitoring is seen as a priority. However, industry representatives have requested more time and information on how to implement the air monitoring requirement. Regular air sampling and monitoring will require raising awareness among employers and employees to ensure compliance.
- A benefit of the BCCSA Silica Tool Project will be a central repository for gathering and disseminating current data on emerging tools and processes to support advances.

Diesel Engine Exhaust

Presenters/panelists (in order of appearance in photo):

- **Developing an occupational exposure limit for diesel**: Geoffrey Clark, Senior Occupational Hygienist, WorkSafeBC
- **Burden of cancer due to occupational diesel exposure**: Joanne Kim, Research Associate, Occupational Cancer Research Centre
- **Preventing exposure to diesel exhaust**: Michelle Kutz, Occupational Hygienist, Alberta Ministry of Labour

Diesel engine exhaust is a mix of gases and particulates and a major contributor to air pollution. Diesel exhaust contains known carcinogens and causes lung cancer; limited evidence indicates it may also cause bladder cancer. Other health effects include coronary heart disease; eye, throat and bronchi irritation; light-headedness, nausea, cough and phlegm; and allergic reactions.

CAREX Canada estimates that 897,000 workers are exposed to diesel engine exhaust in Canada; 130,000 in Alberta and 121,000 in British Columbia (estimates developed using the 2006 Census of Population, the most recent census that includes detailed information on sector and occupation). Truck drivers, heavy equipment or transit operators, and diesel mechanics are the occupations with the most workers exposed to diesel exhaust. Mine workers account for a smaller number, but experience higher exposures in enclosed underground mines. (See Burden of Occupational Cancer – Diesel engine exhaust fact sheet for more information.)

The Burden of Occupational Cancer study estimates that occupational exposure to diesel engine exhaust causes 560 lung cancers and 200 suspected bladder cancers annually in Canada. The estimated cost for lung cancer cases alone is $500 million a year.

Diesel engine exhaust contains up to 1,800 chemicals, making it a complex mixture that is challenging to monitor. Its composition can change with the type of engine, operating conditions, fuel formulation, and emission control systems. Different components are associated with different health effects; monitoring these multiple components is important to ensure worker safety. OELs exist for various components of diesel engine exhaust, but there is currently a regulatory gap for limiting exposure to the carcinogenic fraction. Elemental carbon has emerged as the best surrogate for measuring diesel exhaust particulate. Several countries have proposed or adopted exposure limits for measuring elemental carbon, including Australia, Austria, and Finland.

To adopt OELs in British Columbia, WorkSafeBC regulations specify the limit has to:

- Be published by the American Conference of Governmental Industrial Hygienists (ACGIH)
- Be reviewed by WSBC's internal Occupational Exposure Committee to ensure the limit is based on solid science
- Use commercially available sampling devices for analysis by at least two commercial labs
- Go for public review to assess workplace impact in BC

Preventing workplace exposure to diesel exhaust will require employers, workers, industry associations, and professional organizations to work toward limiting emissions, through education and training, hazard assessment, control measures, and best practices. Ultimately, the most effective approach will be to eliminate the harmful emissions associated with diesel fuel combustion, by reformulating the fuel with lower sulphur and aromatics for example, and to replace older engines with low emission engines. A new study in Alberta is looking at replacing diesel with liquid natural gas (LNG) in mining fleets and at remote power generation sites.

Engineering controls include enclosed cabs, high efficiency filters, ventilation to control emissions in the workplace, local exhaust ventilation on tailpipes in shops with idling vehicles, and ensuring vents are unblocked.

The Alberta Ministry of Labour recently completed a Worker Exposure Assessment Project in two mining workplaces and three municipalities, collecting occupational air samples of elemental carbon, carbon monoxide, oxides of nitrogen, sulfur dioxide, and total volatile organic hydrocarbons. The project provides current data; findings and recommendations will be shared with stakeholders to help reduce exposures.

Panel Q&A Themes

- Level of exposure and potential for impact varies by industry. For example, mining exposures account for a smaller population, but a large proportion of high exposures.
- Progress in methods/strategies to reduce emissions/exposures will lead to protection and prevention.
- All industries need to start with a hazard assessment and include employees in developing an ECP.
- Improved communication is suggested between WSBC prevention and claims management staff, so exposures are taken into account during claims adjudication.
- WSBC is still exploring whether to enforce protection from exposures with regulation.
- The federal government is working to bring regulations in line with the Environmental Protection Agency's four-tier emission standards in the US.

Asbestos

Presenters/panelists (in order of appearance in photo):

- Jenny Byford**,** Advocacy Lead, Canadian Cancer Society, BC and Yukon
- **Burden of cancer due to occupational asbestos exposure**: Dr. Paul Demers, Principal Investigator, Burden of Occupational Cancer Canada Study, OCRC; Scientific Director, CAREX Canada
- **Economic burden of occupational cancer due to asbestos exposure**: Dr. Chris McLeod, Co-research lead, WSBC-UBC Partnership for Work, Health and Safety; Assistant Professor, UBC School of Population and Public Health
- **Banning and beyond**: Phil Venoit, Business Manager, Electrical Workers Union Local 230; President, Vancouver Island Building and Construction Trades Council
- **Asbestos exposure prevention, outreach and enforcement**: Colin Murray, Senior Manager, Prevention and Occupational Disease Initiatives, Risk Analysis Unit, WorkSafeBC

Exposure to asbestos is the leading cause of work-related death in BC. Asbestos is a commercial term for six fibrous silicate minerals that occur naturally in large deposits all over the world.

Asbestos has a long history of use; for example, as early as 4000 BC, it was used in lamp wicks and later to embalm mummies. Asbestos was mined during the reign of Peter the Great. Benjamin Franklin took some to the London Natural Museum History in 1725. Italy used it in banknotes; Paris in firefighting uniforms. Asbestos was mined in Quebec until 2012.

Asbestos was also widely used in many building construction materials—insulation, drywall, ceiling and floor tiles, old electrical products, drain pipes, and more. Restrictions on many uses started in the 1970s, more stopped in the late 1980s, and a few products like asbestos pipes continue to be used. Historically, most exposures happened while installing these products and wearing contaminated clothing home, exposing family members and others to asbestos. Now most exposures take place during removal and

renovation. If well encapsulated and undisturbed, workers won't come into contact with the fibres, but asbestos fibres can stick to lung tissue for life if inhaled during repairs or renovations.

Asbestos exposure causes lung cancer, mesothelioma, laryngeal cancer, ovarian cancer, and asbestosis (scar tissue in the lungs), and is a suspected cause of colorectal, pharyngeal, and stomach cancers. (See the Burden of Occupational Cancer - Asbestos fact sheet for more information.)

While manufacturing of asbestos-containing products is now restricted in most western countries, including Canada, some construction and automotive products are still imported and used. Most high income countries have banned asbestos, and lobbying is underway for a ban in Canada.

Still, CAREX Canada estimates that 152,000 workers in Canada are currently exposed to asbestos; 26,000 in BC and 22,000 in Alberta. Contractors like carpenters and electricians, and building construction, automotive repair, and maintenance workers are most commonly exposed during repair and maintenance work. This estimate does not include those occasionally exposed to asbestos at work, such as building and maintenance staff, and would likely be higher if these workers were taken into account.

The Burden of Occupational Cancer study attributes approximately 1,900 lung cancers and 430 mesotheliomas to occupational asbestos exposure each year in Canada, which accounts for 8% of all lung cancers and 81% of all mesotheliomas diagnosed annually. The numbers work out to about six people a day diagnosed with cancer related to asbestos exposure.

The cost of new cases of mesothelioma and lung cancer from occupational asbestos exposure in 2011 was estimated at $1.9 billion (these preliminary results are being scientifically reviewed):

- For lung cancer, the estimated total is $1.5 billion, at $800,000 per case
- For mesothelioma, the estimated total is $400 million, at a cost of $900,000 per case (this condition is more costly to treat than lung cancer)

At the meeting, a four-pillar approach was proposed to address exposure risk:

1) A national registry of buildings and seagoing vessels, where employers must maintain a safe environment by auditing and registering asbestos-containing materials
2) A national youth awareness program for young people entering the construction industry
3) Standardized training for workers who remove asbestos-containing products
4) A national ban on asbestos-containing products

Renovation spending in Canada reached $68 billion last year, $20 billion more than was spent in new home construction, which means more workers are going into older homes containing asbestos. WSBC focuses on five areas to improve the residential construction system:

- Building Permits (being proactive with municipalities so controls are in place)
- Hazardous Material Survey (to identify the source)
- Notice of Project (to include asbestos removal)
- Hazardous Material Clearance Letter (to cover demolition and deconstruction)
- Waste Manifest (for transportation and disposal)

WSBC faces a challenge getting practitioners in residential construction to meet requirements. While some groups are reliable, others use false documents and information to complete risk assessments. WSBC has identified and will target companies that are repeat offenders.

In addition, WSBC is working with the Ministry of Environment to develop stronger controls and standards for properly bagging and disposing of asbestos-containing materials.

To increase adherence and protection, WSBC plans to raise awareness in the industrial and commercial construction sector, school districts, health care institutions, property management companies, industrial operations, mechanical contractors, as well as trade schools and associations to increase outreach to younger generations coming into these industries.

WSBC has clarified the education and experience necessary to become a designated professional with certification to sign off as a "qualified person". This information, and other resources to get the message out about the danger of asbestos, is found on the WSBC asbestos website.

Note: These plans may be impacted by the recent announcement by the Prime Minister regarding the ban of asbestos in Canada. Details have yet to be presented by the federal government, so it is difficult to assess the potential impact or timeline.

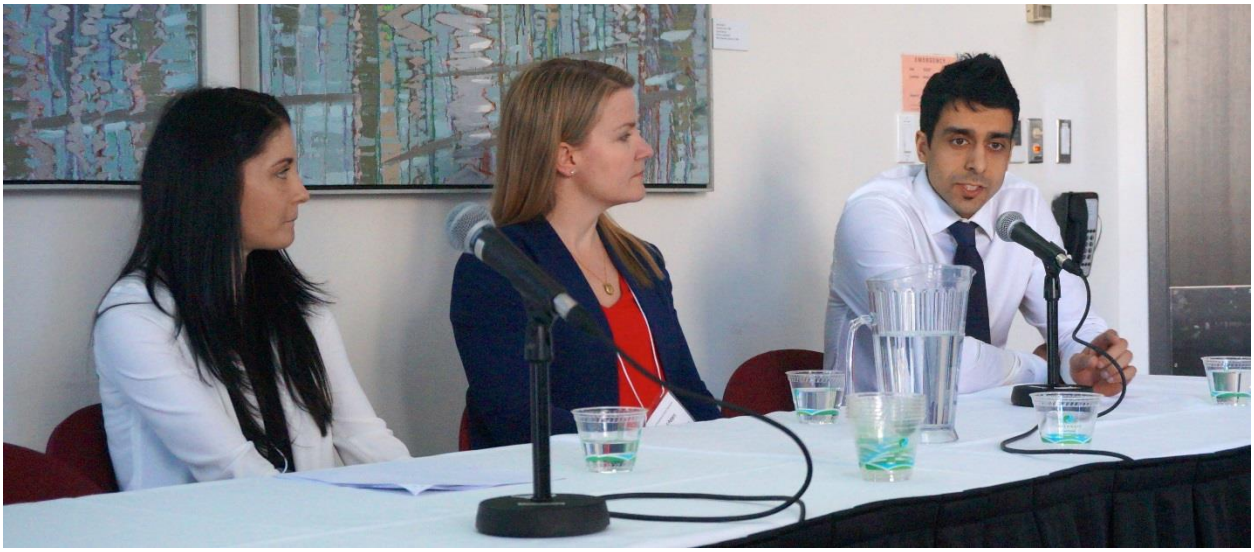
Panel Q&A Themes

- The Canadian Cancer Society is calling on the federal government to ban the import, export and use of asbestos, and burden study results can be used to support a ban.
- Economic burden data provides policy makers with evidence to drive change that reduces the human burden.
- More research is needed to understand the synergistic effects of exposures to multiple carcinogens, such as asbestos and silica. One study is currently pooling data from Canada and Europe.
- Researchers anticipated current burden numbers would decrease as use of asbestos started decreasing in the 1970s, but in Sweden, the first country to ban asbestos, numbers have plateaued, likely due to the impact of exposures during renovations or other secondary exposures. Study statistics on mesotheliomas represent past exposures among asbestos workers, not current exposure situations.
- Saskatchewan enacted legislation to create the Asbestos Registry of Public Buildings, which could serve as a model for the rest of Canada. WSBC is developing building inventories with an exposure registry, which will help prevent exposures during repair/renovation work. As well, awareness needs to be raised with the teachers unions, school districts, respective ministries and associations.
- Early screening and detection systems were suggested to support exposed workers who have yet to receive a diagnosis.
- Policies for recognition and compensation among workers exposed to asbestos who are smokers are inconsistent and need to be standardized across the country.

Solar Radiation

Presenters/panelists (in order of appearance in photo):

- **Sun Safety at Work Canada project**: Lindsay Forsman-Phillips, Research Assistant and Advisor, Sun Safety at Work Canada
- **Burden of cancer due to occupational sun exposure**: Dr. Cheryl Peters, Occupational Exposures Lead, CAREX Canada; Postdoctoral Fellow, Carleton University, Ottawa, and the Institut National de la Recherche Scientifique (INRS), Montreal
- Dr. Sunil Kalia, Dermatologist and Assistant Professor, Dermatology and Skin Sciences, UBC



One in three new cancer diagnoses is skin cancer, the most commonly diagnosed cancer in Canada. Other health effects of solar radiation include sunburns, heat stress and stroke, thick scaly skin patches, cataracts, and eye lesions and cancer. Most skin cancers are non-fatal but recurrent, with the potential to impact quality of life over a long period. Evidence linking melanoma to solar radiation is strong in general, but it is not yet conclusively linked to the long term, cumulative exposures we see in outdoor workers.

CAREX Canada estimates that of 1.5 million workers exposed to solar radiation in Canada, 225,000 are from Alberta and 213,000 from BC (estimates developed using the 2006 Census of Population, the most recent census that includes detailed information on sector and occupation). People who spend 75% or more of the work day outside—farmers and roofers, for example—are at highest risk and account for 61% of exposures; couriers and some construction trades with mixed indoor and outdoor exposure face a medium risk (26%); and workers who spend some periods outdoors, like truck drivers and paramedics, are low risk (13%). (See the Burden of Occupational Cancer – Solar radiation fact sheet for more information.)

Risk varies by sub-type of non-melanoma, with a slightly higher relative risk for squamous cell compared to basal cell carcinoma. The Burden of Occupational Cancer study estimates that in total, 4,560 skin

cancers are attributed to occupational solar radiation exposure annually, mostly among men. But these numbers are expected to increase among women as their numbers grow in jobs with higher risk. The Burden study research team is currently working on the economic burden of occupational exposures due to solar radiation and results are expected in late 2016.

Although skin cancer is largely preventable, outdoor workers are not generally protected from solar radiation. Survey results show workers experience sunburn and heat stress, but employers often don't receive reports of these incidents, so a discrepancy exists between what workplace employers think is happening and what is actually taking place.

In 2014, partners from research, policy and practice began to develop a national sun safety program to ensure better protection and prevent exposures for outdoor workers. This Sun Safety at Work Canada project is developing workplace tools covering policy, risk assessment, engineering and administrative controls (such as monitoring the UV index and adjusting daily work schedules), PPE, and educational tools. A website will be launched in summer 2016, supported by regional presentations to share this information. Employers can adapt these online resources and tools to implement effective sun safety policies and practices.

Panel Q&A Themes

- The future burden of skin cancer is linked to climate change and, therefore, has potential to increase over time.
- Non-melanoma skin cancer is a chronic disease that brings a significant burden of morbidity.
- Challenges with changing behaviour include:
    - A disconnect between practice and the level of awareness of the risk and the importance of sun protection, which extends beyond occupational settings to the general population.
    - Prevention programs and demographic shifts can result in exposure reduction, but raising awareness and changing behaviour will take time.
    - Unless mandated, workers generally don't take protective measures, and employer efforts to provide PPE for sunburn and heat stress are mixed.
- Some outdoor workers will use sunscreen, but protective clothing and shade structures are preferable and more effective. Sunscreen is not effective for a full day of workplace exposure if only applied once.
- Australia has done a great job of raising public awareness. Our two countries are sharing tools, including our Sun Safety at Work program for use there.

Priorities for Prevention

Panelists (in order of appearance in photo):

- Colin Murray, Senior Manager, Prevention and Occupational Disease Initiatives, WSBC
- Dr. Paul Demers, Principal Investigator, Burden of Occupational Cancer Canada Study, OCRC
- Larry Stoffman, Independent Labour Consultant; representing Canada, and the Canadian Labour Congress and International Trade Union Confederation, in developing the new ISO Occupational Health and Safety Management Standard
- Dr. Trevor Dummer, Associate Professor, Centre of Excellence in Cancer Prevention, a partnership between CCS and the UBC School of Population and Public Health

For each of the four carcinogens, meeting participants identified:

- What are the priorities for preventing exposures?
- How might the burden results be applied in prevention work?

Crystalline Silica

Priorities to prevent exposures

1) **Educate workers and employers**

   Use evidence-based, effective education tools, with a special focus on younger workers. Investigate successful methods and outreach for young workers used in other areas. Deliver education on hazards and controls to small and medium employers in particular, as their employees are more likely to lack PPE and, therefore, be at greater risk of exposure.

2) **Require ongoing air monitoring at all sites with respirable crystalline silica (RCS)**

   Employ regular, systematic air monitoring to ensure worker safety. Develop a stronger definition of a "qualified person" overseeing air monitoring; for example, trained occupational hygienist. Create

assessment tools and templates to ensure factors affecting exposure levels are taken into account when assessing whether monitoring is required.

3) **Capitalize on knowledge to develop innovative engineering controls**

Share knowledge on technological innovation to move new solutions and tools into application more quickly. Decrease RCS with improved engineering controls. Raise awareness through outreach to tool rental companies, and require renters of concrete saws and tools to sign an acknowledgement of proper use, similar to chemical use in horticulture.

4) **Integrate risk assessment into the permit process**

Have regulators engage proponents early in the permit phase for jobs involving silica. Ensure the scope of the risk assessment is broad enough to take into account prevailing winds when building crushers, camps, and lunch room locations.

5) **Increase communication between WSBC prevention and claims management**

Enhance communication and coordination among prevention and claims management staff at WorkSafeBC to make the claims process less adversarial for workers exposed to silica.

6) **Develop a communications and outreach strategy to raise awareness**

Increase communication among the industry, trainees, physicians, and the public, using multiple strategies and platforms, such as:

- Developing awareness materials for workers and employers
- Sharing data with industry safety associations, the Industry Training Authority (ITA), and other training institutions
- Educating physicians about silica risks, impact, prevention, and treatment
- Increasing community outreach across multiple communities, cultures, and languages
- Raising awareness to normalize PPE use, akin to wearing seatbelts for safety, and improving the safety and comfort of PPE

7) **Ensure qualified individuals perform air monitoring**

Foster management and labour cooperation to achieve common ground on air monitoring. WSBC should ensure industry does not self-regulate.

8) **Establish an exposure registry and link with the BC Cancer Registry**

Develop and track "full circle" follow up from the exposure registry to the BC Cancer Registry and back to industry.

Diesel Engine Exhaust

Priorities to prevent exposures

1) **Define occupational exposure limits for diesel engine exhaust**

Establish measurable target substance(s) to establish OELs and determine standard practice going forward. Begin applying the OELs to WSBC claims.

2) **Lobby for legislation and incentives to reduce or eliminate the use of diesel fuel**

   Legislation and incentives are needed at federal and provincial levels to drive occupational and social change, such as:

   - Requiring all vehicles in enclosed, underground mines to switch to electric
   - Expanding the requirement for electric engines above ground wherever possible (e.g., in smaller equipment like tractors and electric share power for trucks)
   - Supporting the development of commercially available devices that run on zero emission sources such as electric motors, at affordable prices
   - Supporting the replacement of diesel engines with LNG-powered engines

3) **Use new monitoring technology to change driving practices**

   Offer incentives to develop new, improved technology to drive change in driving practices.

4) **Educate employees about the effects of diesel engine exhaust**

   Educate employees about the health effects of diesel engine exhaust and promote the use of safer replacements, where available. Also provide incentives for switching to more environmentally friendly equipment.

5) **Link occupational exposures to particular tasks and engines**

   Link occupational exposure estimates to particular tasks within each industry, and use the information to inform prevention priorities and controls.

   Also link occupational exposure estimates to engine size, type, and age. This information would be useful for regulatory agencies like Environment Canada to prioritize emission standards and develop programs to substitute/eliminate diesel fuel.

6) **Develop a communications and outreach strategy to raise awareness**

   Communicate burden data to industry, workers, and the public**.** Share information with occupational associations and communities, particularly on the way exposures cause cancer, to promote prevention. Promote good driving practices.

7) **Examine risk ratios for environmental and occupational exposures**

   Investigate the risk ratio of environmental to occupational exposures for correlations and comparisons.

Asbestos

Priorities to prevent exposures

1) **Ban all import, export, and use of asbestos in Canada**

   Lobby for a ban that includes the import of all asbestos-containing products, such as manufactured brake pads and cement pipes. Implementing a ban will require revisions to legislation that exempts manufactured articles, and national and provincial building codes.

Note: These plans may be impacted by the recent announcement by the Prime Minister regarding the ban of asbestos in Canada. Details have yet to be presented by the federal government.

2) **Create a national registry of all public buildings for exposures**

Develop national and provincial registries of all public buildings listing potential hazardous exposures to enable education and enforcement. Enact regulations requiring hazardous material inventories for older buildings to support registries.

3) **Establish a certification program for contractors**

Develop standardized training and certification for contractors who conduct risk assessments and handle removal. Work with the Industry Training Authority to develop the training program, as the ITA is responsible for all trades training in BC, under the Ministry of Labour.

Explore models in other jurisdictions like Australia, which has a code of practice contractors must adhere to and training centres for trades involved in removing asbestos, financed by industry and run by unions.

4) **Establish a registry for older homes**

Develop a program in BC requiring homeowners to register their homes over a number of years, at the time of sale or renovation.

5) **Create a national asbestos agency and strategy**

Advocate for a national agency to take the lead on addressing asbestos exposure and coordinating provincial initiatives. Develop a national strategy and work with the federal government to develop comprehensive policy. Use burden study data to develop national standards for eligibility and compensation.

Investigate the approach used in Australia—where there is a national agency established through legislation, and an Asbestos Diseases Research Institute to improve prevention, diagnosis, and treatment of asbestos-related diseases—as a potential model.

6) **Develop a communications and outreach strategy to raise awareness**

Create a strategy to raise awareness among workers, industry, politicians, health professionals, and the public. Activities could include:

- Making information available to industry safety associations to disseminate
- Working with the federal government to build political buy-in and gain resources for a campaign, similar to what has been achieved to prevent drunk driving
- Using regular media sources and social media
- Developing an app to promote awareness for those at risk of exposure
- Providing medical education to general practitioners about occupational risk factors for disease

7) **Survey asbestos exposures in First Nation communities**

About 300,000 homes on First Nation reserves and military bases may contain asbestos insulation. Obtain survey funding to create an inventory of homes, and determine the impact on First Nation communities.

Solar Radiation

Priorities to prevent exposures

1) **Regulate sun protection in the workplace**

   Develop and enforce regulation to ensure workplaces provide PPE and facilities for workers to be sun aware and sun safe, such as sunscreen and protective clothing.

2) **Produce workplace tools for implementing solar radiation controls**

   Develop tools for employers and employees to assess and communicate sun safety needs.

3) **Develop a communications and outreach strategy to raise awareness**

   Increase communication to employers, employees, politicians, associations, and the public to promote prevention by:

   - Advocating for regulatory and policy changes: quantify the cancer burden and share the powerful message of economic burden with politicians
   - Sharing burden data and information on sun safety with industry safety associations to disseminate to members
   - Partnering with other public health professionals to promote sun safety
   - Targeting priority occupational groups and populations with education on sun safety, such as children who grow up working on family farms, fishing, etc.

4) **Improve access to and use of personal protective equipment**

   Use of PPE for sun safety is crucial, as exposures will increase with global warming:

   - Put sun safety PPE in the same category as hard hats
   - Partner with industry to make work clothing more affordable and comfortable to wear; light weight shirts with UV protection built in, for example

5) **Develop occupational sun safety programs**

   Make sun safety a standard part of occupational safety:

   - Educate people and provide protection for occupational and personal settings
   - Investigate how Australia has integrated sun safety into a standard safety program and learn from their experience
   - Also integrate facility design into sun safety programs to provide shade cover over predictable outdoor work areas

Priorities across exposures

Some prevention priorities are applicable across exposures, such as:

1) Educate workers, trainees, employers, and physicians:
    - Develop buy-in among workers for their own safety protection and empower them to assert their rights to a safe workplace
    - Raise awareness among training institutions to make occupational health and safety part of the curriculum
    - Seek government funding for a technology program to better inform workers (e.g., e-learning, social media, webinars)
2) Develop a communications and outreach strategy to raise awareness among industry, workers, health care professionals, associations, and the public
3) Capitalize on knowledge to develop innovative engineering controls
4) Establish an exposure registry and link with the BC Cancer Registry
5) Lobby for legislation and incentives to drive change
6) Develop innovative tools, technology and equipment to help reduce or eliminate exposures

> ***"I was impressed by the research that has been done. Your work is critical in building business cases for taking action in order to make change."*** – Symposium participant

Next Steps

This is the first study of its kind in Canada to estimate the number of newly diagnosed and fatal cancers that can be prevented by reducing exposure to carcinogens in the workplace

The following points outline our learning from the meeting and next steps:

- **Finalize burden estimates** with additional rounds of input from study scientists and international experts as needed.
- **Communicate and discuss the burden study**, including final results, at scientific and stakeholder meetings and through the publication of scientific and other documents (e.g., fact sheets on the OCRC, CCS, and research partners' websites).
- **Engage stakeholders** to discuss the potential implications of the study specific to their mandates, and leverage their support in endorsing burden results in their sector (e.g., mining, construction).
- **Collaborate with the Canadian Cancer Society** across the country to translate knowledge and integrate study findings in education, policy, and advocacy efforts.
- **Refine prevention messaging**, stating opportunities for primary prevention policies at the government and workplace levels (e.g., banning asbestos in Canada, developing a rigorous occupational exposure limit for diesel engine exhaust).
- **Inform existing prevention initiatives** with burden study results, highlighting economic burden estimates for potential policy changes.
- **Support the work of other scientific groups** evaluating the burden of occupational cancer in their jurisdictions (e.g., Latin America and the Caribbean), and contribute to global efforts in partnership with the UK burden study team and burden investigators from other countries.
- **Seek funding for additional research** to project the future burden of occupational cancer in Canada based on current exposures; investigate the human and economic costs and benefits of occupational cancer interventions (similar to the SHEcan research project in the European Union); and evaluate joint effects of occupational and environmental carcinogen exposures on the burden of cancer in Canada.

WorkSafeBC is using estimates of workplace exposures from the Burden of Occupational Cancer study to determine priority cancer areas by topic and industry, develop new profiling tools and outreach materials, assess risk reduction and collaboration opportunities, identify knowledge accumulation and transfer opportunities, and design partner outreach programs.

Appendix: Acknowledgements

WE WISH TO THANK: The Canadian Cancer Society Research Institute, which has funded the Burden of Occupational Cancer in Canada Study. The Occupational Cancer Research Centre has led the study in partnership with CAREX Canada, which is supported by the Canadian Partnership Against Cancer.

Our opening and closing speakers:

- Barbara Kaminsky, Chief Executive Officer, Canadian Cancer Society BC and Yukon Division
- Al Johnson**,** Vice President, Prevention Services, WorkSafeBC
- Dr. Anne-Marie Nicol, Principal Investigator, CAREX Canada; Assistant Professor, Faculty of Health Sciences, Simon Fraser University

Our speakers and panelists:

- Jenny Byford**,** Advocacy Lead, Canadian Cancer Society, BC and Yukon
- Geoffrey Clark, Senior Occupational Hygienist, WorkSafeBC
- Dr. Hugh Davies, Canadian Workplace Exposures Database Lead, CAREX Canada; Associate Professor of Occupational and Environmental Health, School of Population and Public Health, UBC
- Dr. Paul Demers, Principal Investigator, Burden of Occupational Cancer Canada Study, Occupational Cancer Research Centre; Scientific Director, CAREX Canada
- Dr. Trevor Dummer, Associate Professor, Centre of Excellence in Cancer Prevention, a partnership between CCS and the UBC School of Population and Public Health
- Lindsay Forsman-Phillips, Research Assistant and Advisor, Sun Safety at Work Canada
- Nancy Harwood, Lawyer and Owner, Harwood Safety Group; Project Manager, Silica Assessment and Control Tool Project, BCCSA
- Dr. Sunil Kalia, Assistant Professor, Dermatology and Skin Sciences, UBC
- Joanne Kim, Research Associate, Occupational Cancer Research Centre
- Michelle Kutz, Occupational Hygienist, Alberta Ministry of Labour
- Dr. Chris McLeod, Co-research lead, WSBC-UBC Partnership for Work, Health and Safety; Assistant Professor, UBC School of Population and Public Health
- Colin Murray, Senior Manager, Prevention and Occupational Disease Initiatives, Risk Analysis Unit, WorkSafeBC
- Dr. Cheryl Peters, Occupational Exposures Lead, CAREX Canada; Postdoctoral Fellow, Carleton University, Ottawa, and INRS, Montreal
- Larry Stoffman, Independent Labour Consultant; represents Canada, and the Canadian Labour Congress and International Trade Union Confederation, in developing the new ISO Occupational Health and Safety Management Standard
- Josh Towsley, Business Representative, International Union of Operating Engineers Local 115; Chair, BC Building Trades Occupational Health and Safety Committee
- Phil Venoit, Business Manager, Electrical Workers Union; President, Vancouver Island Building and Construction Trades Council

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The Burden of Occupational Cancer project is a collaborative study involving the following organizations:

This report was developed by CAREX Canada in partnership with the Occupational Cancer Research Centre. Please get in touch with us if you have any questions:

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