

The project

The *Reducing the Risk of Breast Cancer* project was a community-based look at the potential for environmental exposures to cause breast cancer. The project was based in the Toronto community of South Riverdale and involved local participants who surveyed the scientific evidence and developed recommendations for reducing risk.

The project was led by volunteers and staff from three organizations, the Canadian Environmental Law Association (CELA), the Canadian Association of Physicians for the Environment (CAPE) and the South Riverdale Community Health Centre (SRCHC). Funding came entirely from the Ontario Chapter of the Canadian Breast Cancer Foundation (CBCF).

The project looked at the impact that the environment might have in increasing breast cancer in South Riverdale and elsewhere in Canada. It dealt with contaminants and pollution, substances in the environment that may cause harm through food, air, water, dust/soil or directly through products. The scope of the project intentionally left out diet and smoking and other potential causes that would be considered part of our broader environment, in the sense of environment as all that surrounds us and affects us. Likewise, the social and cultural environment was also not part of the study except where that influenced environmental pollution and exposure.

This report explains the design of the project, how it came into being, and how it was structured. It reports on the various meetings that were held and their outcomes. The report then includes a summary of the research done on environmental exposure and the likelihood that pollutants are contributing to breast cancer.

Project design

A. Origins

The project was designed for South Riverdale to respond to community members' call for more information about their exposure to environmental hazards and the potential risks to their health. These needs were identified during the *Development of a Community Right-To-Know Strategy* for Toronto project based in South Riverdale. In that report, residents called for community "access to user-friendly, unbiased, reliable information for the community to help them take action locally", the "dissemination of reliable, relevant information to the community," and spoke of the need for "financial support for community groups" in order to build capacity.

Through this right-to-know project South Riverdale residents expressed a desire for more information about what kinds of environmental exposures people in the community are experiencing and what the potential harm from these exposures might be. They also sought out more knowledge about what sources of information exist and where to find them. The project revealed a wish for more capacity to utilize the environment and health information they do receive. Residents showed an interest in obtaining better skills in interpreting information, and in better understanding the significance of that information and in putting it in context.

The development of this new project was led by board members of CAPE, while CELA became the host organization because of its stronger financial infrastructure. The South Riverdale Community Health Centre was added as a third and essential partner. The centre played host to the project meetings and its extensive experience with local environmental issues and connection to local residents was key to organizing the project.

Funding was granted through the Ontario Chapter of the CBCF's Community Health Promotion program. With minor adjustments to the project plan the foundation agreed to fund the project for one year, starting in June of 2006.

B. Purpose

The objectives of the *Reducing the Risk of Breast Cancer* project were:

- To increase community participants' knowledge of environmental exposures and their potential risks for breast cancer;
- To increase the skills of community participants to evaluate scientific information related to environmental contaminants and the level of hazard and risk;
- To develop recommendations for action to prevent environmental causes of breast cancer; and
- To successfully pilot a participatory community-based, risk assessment project that could be a model for other community decision-making work both in South Riverdale and beyond.

The project's guiding question was:

In what ways might the residents of South Riverdale be exposed to environmental hazards that could increase their risk of breast cancer?

The project was designed to allow representatives of the South Riverdale community an opportunity to look broadly at the state of the science regarding environmental contaminants and breast cancer. They also had a chance to learn about the kinds of environmental exposures that are routine for Canadians and those that might be specific to South Riverdale.

The community participants guided the research into the scientific literature and used the information to come to their own conclusions about the breast cancer risks they were being exposed to. Based on these conclusions, they came up with a number of recommendations for how to reduce exposures and a list of ideas for next steps.

The project attempted:

1. To bring user-friendly, unbiased, reliable information to community participants;
2. To assist participants in understanding and interpreting environment and health information; and
3. To assist the community in making recommendations for action based on this process.

The kinds of questions before the participants included:

- In what ways might South Riverdale residents be exposed to environmental hazards that could increase the risk of breast cancer?
- Do environmental exposures lead to more breast cancer?
- What kinds of exposures are happening to South Riverdale residents and to Canadians in general?
- Are those exposures increasing the risk of breast cancer?
- What should and can be done?

C. Structure

The *Reducing the Risk of Breast Cancer* project recruited 14 residents from within South Riverdale to form a citizen's panel. The panel participants were recruited in a number of ways:

- From those who had participated in the previous community right-to-know study;
- Through lists of community members who already had a connection to the health centre's community health promotion work or were members of other community groups;
- Through advertising of the initial project meetings in local community newspapers; and
- Through direct recruitment and word of mouth in the neighbourhood.

The citizen's panel of community participants guided information gathering, studied the evidence and came to conclusions and recommendations. The idea of using a panel was to have people from the neighbourhood in part represent the values of the community or communities. Though the participants were mostly women, three of the fourteen were men. The panel was ethnically diverse with half of the participants considered to be visible minorities. This is similar to the make up of South Riverdale where approximately 50% of the population would be considered visible minorities.

The design of the project was based on decision-making processes used elsewhere processes like *science juries* and *consensus conferences*. These decision-making models are based on the theory that the major conflicts in making decisions related to science are less about disagreements about the science itself and more from the values and perspectives we bring to those decisions. Our reactions to scientific evidence are related to things like how much risk we think is acceptable and how much we trust different experts and decision-makers.

Supporting the citizen's panel were the project staff who organized and led the meetings, gathered the research information and documented the work. The project staff consisted of the following:

- Project coordinator
- Research consultant
- Research assistant
- Community liaison
- Administrative assistant
- Two facilitators
- Two project evaluators

The general roles and responsibilities of the project staff were discussed at the September 13th meeting. They were thought to include the following:

- Project coordinator:
 - In charge of project design and flow
 - Keep pieces together
- Research consultants and assistant
 - Listen to citizen panel
 - Use skills to do research
 - Translate research into clear language
- Community liaison
 - Meeting details
 - Outreach to community
 - Connect staff and community members
- Administrative assistant
 - Meeting and other organizational details
 - Meeting the needs of participants and staff
 - Document the project
- Facilitators
 - Work to plan each meeting with the other project staff
 - Work with the community participants at each meeting
- Evaluators
 - Observe at an arms length
 - Listen and note take
 - Capture thoughts about the process

There was also an advisory committee comprised of environmental and breast cancer experts and others with expertise in women's health and breast cancer issues. The advisory committee was to provide project oversight, input into project activities and guidance on written materials. Some members of the advisory committee attended participant meetings as observers and sometimes added their input. Advisory committee members who were more involved in the project were also asked to evaluate the work.

The roles and responsibilities of the advisory committee were also defined at the September 13th meeting as helping to design the project and providing guidance to project staff. In addition, the roles and responsibilities of the fourteen citizen panel members was discussed. The list of roles and responsibilities developed at the meeting included to:

- Give direction to research
- Shape the process
- Speak the unspeakable (say things that others are not able to say)
- Test this community model/process
- Bring citizen perspective to the research and info
- Represent the South Riverdale community
- Learn more about the research
- Educate themselves and others
- Share what is learned with other communities (pass on the knowledge)
- Advance project goals
- Understand breast cancer

The participant panel met five times as a working group. The schedule consisted of:

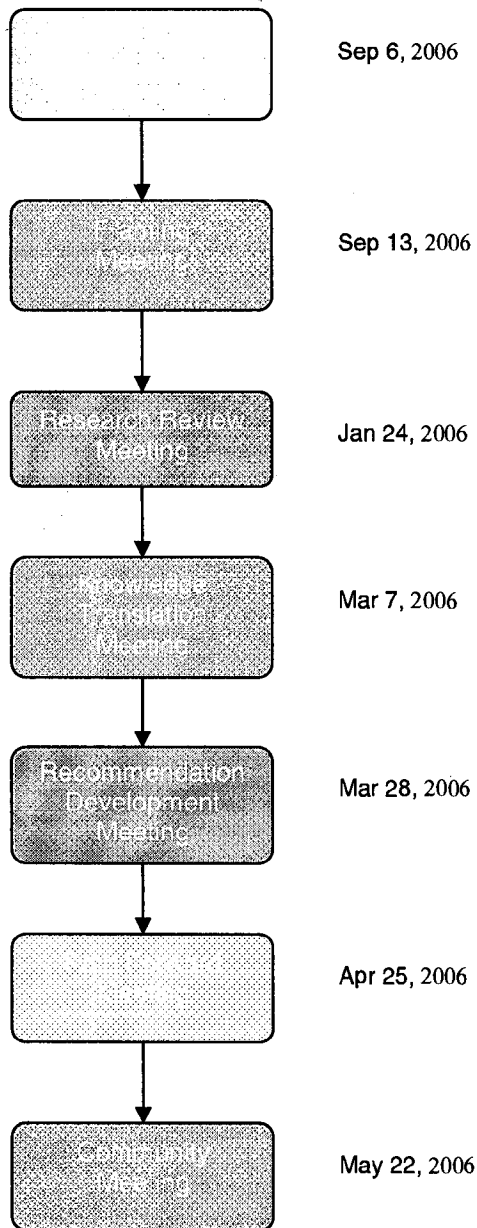
- An initial framing meeting to guide the information gathering process;
- A meeting to review the research and decide how best to organize and present it;
- A meeting to discuss the results of the research and consider conclusions;
- A recommendation development meeting ; and
- A path forward meeting to review the project and plan next steps.

In addition to the panel's working meetings, the broader community was invited to two public meetings. The first of these was an introductory meeting at the launch of the project. The South Riverdale community was the main audience for this gathering and the meeting served to introduce the project and its purpose.

See Figure 1 for a flowchart of the project meetings.

The second public meeting came at the end of the project as a reporting back to the wider community on the project and its conclusions. This final meeting included a broader audience ... [To be completed]

Figure 1 Project meetings



D. Research

The research consultant and research assistant led the information gathering process. This work included reviews of the literature, interviews with key experts in the field, web searches and the use of other available tools. There were two main areas of research. The first was to gather evidence related to environmental contaminants and their potential contribution to breast cancer. The second was to pull together the sources of information

available on what environmental exposures would be typical for residents of South Riverdale.

There are two major types of study into the causes of breast cancer, those that expose laboratory animals to potentially cancer-causing chemicals or radiation and those that study people in real life and try to figure out whether environmental exposures are increasing the rates of breast cancer. These two major types of research will be explained in more detail later in this report.

Research into exposure also included two different types of information. The first was exposure data that provides insight into what Canadians in general are coming in contact with. This includes reports on the kinds of carcinogens found most commonly in a city like Toronto. It also includes body testing for chemicals that give some idea of the exposure that would have occurred.

The second type of exposure information is that which gives a glimpse of pollution that is specific to South Riverdale. This information, where available and specific enough, can give an indication of the exposure that is happening to community residents. It tries to answer the question of how the exposure of South Riverdale community members to environmental contaminants might differ from those in other communities.

The researchers, with assistance from other project staff, summarized the information gathered, both on risks and exposure, and created a working document that has been incorporated into this report. An effort was made to make this document as plain language as possible with sacrificing the detail needed to make the information useful to participants. The information in the working document was presented along with digital slide show at the March 7, 2007 meeting.

E. Evaluation

Project evaluation was carried out by two university-based qualitative researchers who, with the help of other project staff, planned and conducted the evaluation. The project evaluators used a combination of written questionnaires and observation of the meetings.

The evaluation was geared to address the key objectives of the project. The idea was to answer whether these objectives were adequately met in the eyes of participants, staff, and advisory committee. The evaluation therefore set out to discover whether:

- The participants' knowledge about the environment and its potential impacts on breast cancer increased;
- The participants' skills in interpreting risk-related scientific information improved;
- The participants were able to successfully develop recommendations based on their learnings; and

- The project served as a useful model for other community-based decision-making processes related to environmental risk.

The citizen's panel members were given an initial survey at the September 13, 2006 meeting as a pre-project evaluation. This survey included personal questions about the participants themselves and questions about their reasons for involvement in the project and their expectations.

Though originally separate focus group questions were planned, the information was gathered through observation of the first meeting. This included discussion about how much participants' knew about the environment and breast cancer in general, and also how much they knew about the environment in and breast cancer South Riverdale. It also involved questions about the most common sources of information. In particular, the meeting explored how trustworthy the community members felt these sources of information were and how comfortable they felt with any scientific content.

Brief surveys were also done as part of an interim evaluation at the March 7th and March 28th meetings. These surveys were short and focused mostly on participant's satisfaction with the information they were receiving. The final evaluation ... [to be completed]

Throughout the evaluation process, panel members were asked to put their initials on their evaluations if they were willing. This was to allow a look at the changes in thinking for each individual. Nonetheless, confidentiality was maintained in the reporting of the results. The evaluation outcomes never made reference to individual participants.

The evaluators worked independently of the other project staff. Though the evaluation plan was developed in consultation with some of the staff, the gathering of information was done directly by the evaluators. The evaluators also did not share the information they were collecting with the rest of the project staff while the project was in progress to avoid biasing the activities.

The project meetings

A. Framing meeting

The September 13th meeting was an opportunity for an initial discussion of the research to be done. Participants brainstormed on the things that would be important in order for the research to be relevant to their needs. The exercise included an exploration of:

- How much the participants knew about the environment and breast cancer;
- The kinds of things the participants felt that they knew little about; and
- What the participants felt they needed to know in order to answer the kinds of questions the project was asking of them.

The participants answered these questions on breast cancer and the environment and also on research in general.

The panel members and those advisory committee members participating divided into three groups and came up with extensive lists. The focus ended up being mostly on the last question, what information was needed to guide the research activities over the next months. Appendix 1 contains the tables summarizing the research framing exercise.

The September 13th meeting was also used to develop a working agreement for the project. The participants listed what they felt they needed in a broader sense to fully participate in the project. The panel members expressed the need for:

- Earlier meeting times to accommodate families;
- Meetings booked well in advance;
- Materials made available well in advance;
- Clear specific instructions re: what's needed;
- Ways to communicate with others from the project between meetings;
- A basic glossary re: terms and language related to breast cancer and environmental hazards;
- Good facilitation and leadership – drawing out folks who are more shy;
- Website tutorial re: websites, blogs, etc.;
- Respect for different levels and types of input;
- Permission to ask questions; and
- Ways to submit questions as they come to mind.

B. Research review meeting

The January 24th meeting looked at the kinds of information being gathered through the project and its reliability. The other important task was to provide recommendations to project staff on how information should be best presented for panel participants. A major challenge in the project was to take information from scientific studies and make it more accessible. A balance needed to be achieved so that it was not overly technical but also not overly simplified.

The tasks included the drawing up a list of the kinds of sources of information available on the subject:

Animal Studies	Testing chemicals on rats and other animals
Human Studies	Observational studies where you work backwards to see what might have caused the cancer or follow them to see who gets cancer

Government & Institutional Information	Government documents, University studies, etc.
Print, Radio, TV	Newspaper articles, Television specials
Websites	Academic, Non-profit, Wikipedia

There was some discussion about how to find this information and exploration of how to decide how credible information is. Deciding how useful a source of information is involves asking certain questions and is called doing a “critical appraisal.” Examples of these questions were listed:

Critical appraisal questions

1. Who is doing the study? What institution are they affiliated with?
2. What journal is it in?
3. Are there any peer reviews of the study?
4. Who funded the research? Who runs/funds the website? (e.g. pharmaceutical industry, government body)
5. Were the methods for the science experiment done well?
6. Does the info make sense? Is it valid? What are the implications of what they’re writing about? What does it mean in a practical sense?

The participants were asked to reflect on how they needed information packaged and presented so that it was most useful to them. The group listed a number of things that would make the information more accessible:

Recommendations on communicating information

- Use headings and sub-headings to navigate through
- Create categories or themes to review and digest
- Use questions to reflect on in reviewing/assessing articles
- Keep in simple language
- Provide some info before hand
- State implications at the beginning
- Visual components, some people are visual learners, others textual
- A summary of methodology and why it is important
- Present info/data that has been deemed credible. Or, non-credible with an explanation
- Explore other mediums (Wendy Mesley piece on the CBC)

C. Knowledge translation meeting

At the March 7th meeting, project researchers presented their research findings. A working report was posted on the project website in advance. The information in the working report and presented at the meeting has been incorporated into this report and forms the *Breast cancer and the environment* section of this report.

Following the presentation and questions from community participants, all of the participants were asked to offer their conclusions to date, based on the presentation, the working report and the rest of the project activities. This larger list of conclusions can be found in Appendix 2 of this report, including the conclusions added at the March 28th meeting.

The facilitators, with the approval of the participants, grouped the conclusions into the following themes:

1. There is a need to acknowledge and raise awareness regarding how common cancer is, including breast cancer;
2. There is a need to identify specific environmental concerns and address them;
3. There remains questions that need to be answered about environmental standards and legislation in Canada; and
4. There needs to be more information about environmental hazards and their impacts so that citizens can make informed choices.

D. Recommendation development meeting

The March 28th meeting began with a revisiting of the conclusions gathered in the previous meeting. The participants approved of the grouping of March 7th's conclusions, and added a number that they felt were missing. These can be found in Appendix 2 as well, as mentioned above.

The participants added two overall themes to those used to organize the conclusions from the previous meeting in order to capture the additional list. These were:

- Sharing information, and
- Resources and roles.

Panel members then brainstormed a list of recommendations coming out of the project. The guiding approaches set out for the recommendations were:

- Research
- Education, and
- Advocacy (legislative and commercial).

The participants also outlined who they thought the possible audiences were for each recommendation. The full list of potential audiences was:

- A. Individuals
- B. Communities
- C. Government (various levels)
- D. Canadian Breast Cancer Foundation
- E. Industry (Pharmaceutical, Chemical)
- F. Medical community
- G. Researchers
- H. Non-Governmental Agencies

After the recommendations were gathered, the participants voted on them using a *dotmocracy* approach, each getting a first, second and third choice. The choices were made by putting stickers next to the recommendations they chose.

Two tables of recommendations can be found in Appendix 3. The first is the original list of recommendations and the results of the voting. The second is those recommendations that received a vote ranked by the number of votes they collected with 3 points for a 1st choice, 2 points for a 2nd choice and 1 point for a 3rd choice.

The five most important recommendations chosen by panel members were:

1. To shift the onus to companies to prove their products are safe;
2. That products should be required to disclose their risk;
3. To create a card with a website that lists key ingredients/chemicals to avoid;
4. To reduce chemicals going into the environment by adopting the Massachusetts model; and
5. To create a curriculum for teachers and students to educate regarding environmental toxins.

In addition to the list of recommendations, the panel had a separate discussion about the kinds of activities they thought made sense for a second phase of this project. This list of ideas created included to:

- Have different folks from different ethno-cultural groups in a similar project
- Work in different neighbourhoods and in different languages
- Start working on some of the phase one recommendations (e.g. Green Tea Party that focus on reducing risk)
- Have a phase III that can focus on the larger impact
- Have more community involvement where the participants of this project can be leaders and help to implement new ideas
- Create a universal language (symbols) for hazards involving local artists and graffiti

E. Other meetings and information

Website

Communication among community participants, staff and advisory committee members was in part done with the use of an online project website. The website allowed meeting times to be posted, files to be uploaded and dialogue between those involved in the project. Twelve of fourteen community participants used the website, all staff members and all but two advisory committee members. Important communications also occurred through email or telephone to ensure that everyone received the information.

Movie nights

At the participants' request, two evening screenings were held of popular breast cancer videos. Panel members had the opportunity to watch Wendy Mesley's CBC report on breast cancer. In addition, Dorothy Goldin Rosenberg's film *Exposure* was screened. The videos raised many issues for people and these were discussed at the March 7th meeting:

- Shocked at the prevalence of cancer – 1 in 2 men and 1 in 3 women will get cancer – why isn't there more of an uproar?
- People don't really look at prevention, only towards a cure
- We know more about AIDS than breast cancer
- Frustrated that there is no OHIP coverage for alternative treatments
- If labeling legislation comes into effect next year, we have to educate the public so they know which chemicals are carcinogens
- Why is Canadian beef banned in the E.U.? What is the science behind that?
- Teenagers are at risk – how can we educate them?
- The visual impact was important
- Were not aware of the risks with being on the pill
- Interest in accessing May Burrows Study, Consumer Guide.

Other resources

There were two other resources that participants expressed interest in having. Copies of both of these were ordered for everyone. The first was CD-ROM from Vassar College, developed by the *Environmental Risks and Breast Cancer* project. The interactive CD gave an additional overview of the evidence for environmental causes of breast cancer, putting the risk in context with other risks.

The second resource was the *CancerSmart Consumer Guide* which offered information about cancer-causing substances in household products and alternatives that can help

reduce exposure. The guide is put out by the Labour Environment Alliance Society. Copies were provided to panel members near the end of the project.

Breast cancer and the environment

Each year, an estimated 7,200 Ontario women are diagnosed with Breast cancer in Ontario, and about 2,000 women die from the disease each year. It is the most common cancer among women. We know that 1 in 8 (or 12%) of women will get breast cancer in their lifetime; one in twenty will die from it. Canada as a whole has similar rates as Ontario, one of the highest rates of breast cancer in the world.

The rate of breast cancer in Ontario has increased by 17% from 1971 to 1996, mostly for women over 50 years of age. Since then it has stayed the same. Fewer women are dying from breast cancer, because the treatments are better, and because more women are going for mammography, and therefore finding the disease earlier when it can be better treated.

In the United States, Afro-American women get breast cancer more, and die more from it, than white women. **1,2.** We don't know the breast cancer rates for women in South Riverdale, compared to all Ontario, but a Toronto Public Health study found that rates for all cancers combined were not elevated compared to the rest of Toronto. **3,4.**

The causes of breast cancer

A. The risk factors

The development of Breast Cancer is a very complicated process, with many factors involved in its development, and many of these factors not well understood. **5** We do know that genetics play a part, but only in just over one quarter of cases is genetics the major factor involved. **6**

Other risk factors that we know about include:

Female hormones (estrogen)

A woman's own estrogen plays a role, and the more estrogen the greater the risk. So women who start periods early, or carry on periods late (have a late menopause) are at increased risk. Pregnancy protects women's breasts, so women who don't have children or those who get pregnant late in life are also at increased risk. And women who take hormones after menopause are at increased risk.

Diet

A diet high in fat is a risk factor, while a diet high in fibre, whole grains, fruit and vegetables might be protective. Fats like olive oil and fish oils are not “bad.”

Exercise

Regular exercise seems to protect against breast cancer.

Obesity

Overweight women, especially after menopause, have a higher risk; so one should maintain a healthy weight and prevent weight gain with age.

Alcohol

Drinking alcohol is a risk factor. How much is unclear, but it is advised to drink no more than one alcoholic drink per day. The more alcohol - the higher the risk.

Smoking and second hand smoke

Smoking is a risk factor for the development of breast cancer, especially smoking early in life. Being exposed to second hand smoke is also a risk factor. ⁷

These “established” risk factors only partially explain why some people get breast cancer, about 25-50% (one quarter to one half) of cases. ⁸ There is a lot of uncertainty as to what the other causes or factors in the development of breast cancer are. Environmental factors are of concern.

B. The types of science

Research on the potential for environmental pollution to cause breast cancer is done on laboratory animals, but is also done by studying workers or the general population to see if anything in their environment is related to having breast cancer.

Animal experiments

Laboratory experiments are mostly done with animals, usually mice or rats. These animals are given chemicals in their feed, and then observed to see if they get cancer. Experiments can also be done on breast cancer cells. A chemical that is shown to cause cancer is called a carcinogen. Chemicals are also tested to see if they contribute to the cancer causing effect of these carcinogens.

Among this group are hormone disruptors, which can alter the hormonal levels in the body encouraging the development of some cancers, including breast cancer. Both carcinogens and hormone disruptors can cause other cancers and health problems to

humans, including children. If a substance causes harm, it is usually called a “toxic chemical”. 509 chemicals have been tested by US National toxicology Program (NTP). 42 chemicals were found to cause breast tumors (mammary gland tumors) in laboratory animals. 9

Studies of people

The most common type of human research done compares one group of people to another. For example, we can take people who smoke, or people who work on a farm with pesticides, and see if over time they develop cancer more frequently than people who don't smoke, or who are not exposed to chemicals such as pesticides on a farm. Or we can compare a group of people who have breast cancer (say at princess Margaret Hospital in Toronto) and compare them to a group of people who don't have breast cancer, but are the same age and don't smoke etc, and see if in the past there is any difference in exposure to chemicals that might account for them having developed breast cancer.

Occupational studies are studies done on workers in a particular industry or factory, where levels of chemicals are often higher than in the community. Since most workers traditionally have been men, and most breast cancer is in women (1% in men) this type of research has been less helpful than in cancers that are seen in both men and women.

As described above, studies in the laboratory with animals or cells show many chemicals that cause tumors in breast tissue or that mimic the activity of estrogen, and therefore might well contribute to the development of breast cancer. The human studies are less clear on this, most likely because the studies are so difficult to do. So the two bodies of evidence from different research methods often don't agree. What are we to do in this situation, especially when we suspect that there is widespread exposure to many of these chemicals? 11

Are children at increased risk?

Recent research in the US, at the Breast Cancer Research Centres, indicates that exposures early in life (from in the womb through childhood to puberty) might be very important in the development of breast cancer, in two ways:

- By leading to early breast development, or
- By affecting breast cells in young girls that are especially sensitive to changes.

This is especially true for hormone disrupting chemicals that were described previously.

12

Children are also at risk of being more exposed to environmental contaminants, for example to house dust, because they are on the floor or carpet more than adults

Environmental hazards of concern

According to the National Cancer Institute, more than 100,000 chemicals are in use today in the United States. Less than 10 percent of these chemicals have been tested for their effects on human health, meaning that 90% of the chemicals we are exposed to have not been tested for their impact on human health. This leads to much uncertainty and many gaps in what we know.

In this section, we will try to:

- List the chemicals of concern,
- Describe where they are in use, and
- Look at how we might be exposed to them.

We will first discuss carcinogens, and then hormone disruptors.

A. Carcinogens

Carcinogens are chemicals or other factors that damage the cells of the body, in this case breast cells, changing the cells so that they become cancerous and divide and grow out of control. Carcinogens are tested and classified by a number of research organizations, in particular, The International Agency for Cancer Research (IARC) and the National Toxicology Program (NTP) in the US. **13,14.**

There are a number of chemicals that are breast carcinogens:

- Benzene
- PAHs
- Tetrachlorethylene, or Perchlorethylene
- Heavy metals
- Pesticides
- Solvents

Benzene

Benzene is a compound used in many chemical processes, and is in gasoline and diesel exhaust. Benzene has been found to cause breast cancer in animals, but there is no reliable research about benzene causing breast cancer in humans. **15** A similar substance, 1,3 Butadiene, is also related to breast cancer in lab animals, but studies on people have not been done. **16**

Uses

It is used in the manufacture of plastics, pesticides, drugs and detergents. It is also a component of gasoline and diesel.

Exposure

Traffic exhaust in the air we breathe is probably the major source of exposure in South Riverdale. Canada has regulated the amount of Benzene allowed in gasoline, and so levels have dropped in the air of most Canadian cities since the 1980s. [Graph] However, a report by Toronto Public Health found that benzene is present in outdoor air at levels that are ten times higher than the levels that are considered safe. Most of this was from automobile exhaust. 17

PAHs (Combustion by-products)

Polycyclic aromatic hydrocarbons (PAHs) are a group of about 200 different chemicals that are formed by combustion or burning. We know that PAHs cause a number of other cancers, but the science is less clear about breast cancer. PAHs cause breast cancer in animals. We don't know if exposure to PAHs from the air is enough to cause breast cancer in humans, because the mixtures of PAHs in the air seem to be less powerful than PAHs studied in animal experiments, or in workers (coke ovens). But exposure to PAHs at a young age might be more dangerous to the developing breast. 18

Uses

PAHs are not intentionally used. Instead, they are chemicals given off by burning. So they are found in tobacco smoke (smoking and second hand smoke), in auto exhaust and as an air pollutant from industry, and in food that is barbequed, grilled and smoked. They are also frequently found as contaminants in petroleum jelly, which is sold as Vaseline, and in many lipsticks, baby lotions and oils. 19

Exposures

Exhaust from traffic is probably the most important source of PAHs in South Riverdale. A report by Toronto Public Health found that PAHs (and benzene) are present in outdoor air at levels that are ten times higher than the levels that are considered safe. Most of this was from automobile exhaust. 17 The other sources are from foods, and importantly we think from personal care products such as lipstick, lotions and baby oils.

Perchloroethylene

Perchloroethylene is a chemical widely used for dry cleaning, textile processing and metal degreasing. It is also known as perchlorethylene, or Perc. It is a known carcinogen, causing a number of cancers in laboratory animals and exposed workers. The question of whether it causes breast cancer is uncertain. Animal studies are negative, but some human epidemiologic studies do support this. 20

Uses

It is widely used for dry cleaning and metal degreasing.

Exposure

We can be exposed from breathing air, and from water contaminated with Perc. It gets into the air by evaporation from dry cleaning or other industrial operations. Dry cleaning operations are often small companies that are mixed in with residential apartments or homes. Some consumer products contain Perc, such as water repellents, spot removers, adhesives, and wood cleaners.

Cadmium

Cadmium is a natural substance found in the soil and rocks. It has been shown to be a probable carcinogen, and does cause breast cancer cells to grow in the laboratory. It is also a hormone disruptor. It is not known whether cadmium is a breast carcinogen in humans, although one study indicates this. **21** There is some research indicating that other metals, such as copper, lead and arsenic might act as hormone disruptors stimulating breast cancer cells in the laboratory, but there is no other evidence about links to breast cancer.

Uses

Cadmium does not corrode easily and has many uses, including batteries, pigments, metal coatings, and plastics. Cadmium enters the air from mining and coal burning.

Exposure

Cadmium is long lasting in the environment and in the body. We are exposed from tobacco smoke, from air (working in battery industry) or Toronto's air, and some from foods (shellfish, kidney, and liver). In the Ashbridges Bay Treatment Plant Study, cadmium levels in the air over South Riverdale were estimated to be above the recommended safe level when the incinerator was in operation, before 2002. **22**

Ethylene Oxide

Ethylene oxide is a known human carcinogen, and on the NTP list as a breast carcinogen in animals. **23**

Uses

Ethylene oxide is a gas used in many production processes, including textiles, detergents, adhesives, pharmaceuticals and polyurethane foam. It is also used to sterilize equipment in hospitals and in the production of cosmetics.

Exposure

Exposure might be from release from industry into the air, or from working with ethylene oxide (in hospital sterilizing or industry). There is concern that it can also be absorbed because it is an impurity in many cosmetics. **24**

Pesticides

Pesticides will be dealt with under hormone disruptors in the next section. They can cause cancer directly as carcinogens, but the most important effect in terms of breast cancer is by changing the way hormones work in the body (hormone disruption).

Solvents

A number of chemicals that are solvents have been associated with breast cancer in both laboratory and occupational studies. The chemicals include formaldehyde, methylene chloride and styrene. Formaldehyde is one of the "Top Ten carcinogens of concern" in Toronto, as listed by Toronto Public Health. 17

Uses

These chemicals are used in many manufacturing processes and in building materials.

Exposure

Exposures occur mostly in workers in metal products, printing, textiles, wood and furniture making, chemical production and clothing. Besides workers, the concern is mostly from indoor air exposure, where solvents especially formaldehyde can be released from building materials such as plywood, as well as from furniture, permanent press fabrics, draperies, carpets and mattresses. 17

B. Hormone disruptors

Hormone disruptors are chemicals that affect the body by interfering with hormones, for example female hormones, estrogen and progesterone, which determine pubertal development, the menstrual cycle, and menopause. They can also interfere with thyroid hormones. Because breast development is dependent on female hormones, interference with these hormones and how they control puberty and breast development, can lead to the promotion of breast cancer cells. 25,12

This is a new area of science. It has led to a number of new understandings.

1. **Exposure to very low doses** of chemicals can interfere with these hormonal processes
2. **Timing of exposure is crucial.** It appears that exposure in early life, while the first breast cells are developing, can cause powerful effects later in life. So the fetus in the mother's womb during pregnancy, the infant and young girls before puberty are most sensitive to these effects. There is also research indicating that some chemicals might bring on early breast development in younger girls, and that this early pubertal development has a role in development of breast cancer. 12
3. **Combinations of substances.** Experiments in the laboratory usually test one substance at a time. However, in our daily lives, we are not exposed to one chemical or

substance at a time, but to a “chemical soup”. Researchers are concerned that exposure to small amounts of a number of substances, all with similar hormone disrupting effects, will add up to effects powerful enough to cause disease, and cancer.

4. **Uncertainty.** Because this is new science, the research is in the early stages of development, and there is a lot of uncertainty. The more we learn, the more we realize that there are large gaps in our understanding.

5. **The Precautionary principle.** What do you do when the research tells you that there might be a risk for breast cancer from exposure to a certain chemical or group of chemicals, but we are not sure, and it will take more research over many years to be sure? Do you wait for certainty, or do you act to protect people now? 26

We will list a number of hormone disrupting chemicals:

- Alkylphenols (Nonylphenols)
- Bisphenol A
- PBDEs
- Phthalates
- Organochlorine pesticides

Alkylphenols (e.g. nonylphenol)

There are a number of these phenol chemicals (alkylphenol polyethoxylates). They are widely used to kill germs in household cleaners, in laundry detergents, latex paints, in textile and leather treatments, and in some pesticide formulations. Some are used in sunscreens.

Exposure

We might be exposed to alkylphenols by using these products in our homes. Like other substances in this group, these can be found in household dust, and it is likely that we are exposed by breathing in this dust, or by it getting into our food. 27,28

Bisphenol A

Bisphenol A (BPA) is used in the manufacture of polycarbonate plastics that are used to line food cans and to make drink containers. Plastic water bottles with a #7 on the bottom, usually have BPA, which can leak out into the water, especially if reused several times. It is also used as a dental sealant.

Exposure

We are exposed to BPA as a fetus in the mother’s womb before birth, because it crosses from the mother into the baby through the placenta. We are also exposed through food and water. BPA is found in household dust, and we likely are exposed by breathing in this dust, or by it getting into our food. 28

PBDEs

These chemicals are used as flame-retardants, and are put into many of the products in our homes to make them safer. They are found in plastics used in electronics such as computers and TVs, carpets, foam furniture, mattresses and paints. Flame retardants prevent products from burning, and are therefore very important to our health, but because of their toxicity, they have been banned in Europe, and other less toxic substances substituted as flame retardants.

Exposure

The chemicals are added to the plastics and other substances, but they do not bind well, and so can come off as small particles, forming dust or getting into the water and food supply from waste dumps. **28**

Phthalates

Phthalates are used in many common products, mostly to make plastic or PVC products flexible and soft, in vinyl flooring and adhesives, and in soft plastic children's toys and teething rings, and in some clear food wraps. Phthalates are also used in many cosmetics and personal care products, such as shampoos, perfumes, soap, deodorants, lotions, nail polish and hair sprays. They are usually not listed as ingredients on bottles or containers. Some companies are now making Phthalate free products. **27,29** Some have been shown to increase the growth of human breast cancer cells in the laboratory, and there is concern that they might be involved in early puberty and breast development.

Exposure

Phthalates can be absorbed through the skin, so that any cosmetic or beauty product like shampoo or lotion applied to the skin or scalp can be absorbed. We can also be exposed if they are in food, e.g. from food wrap, especially if the food is heated in a microwave. And children might absorb some if they suck or chew on plastic toys that contain phthalates. Like the other substances, they are present in household dust, and this might be a way for their absorption into the body.

Pesticides

There is concern about the effects of some pesticides on breast cancer, especially a group of pesticides and insecticides called organochlorines: DDT/DDE, hexachlorobenzene (HCB), hexachlorocyclohexane (lindane), heptachlor epoxide (a breakdown product of the insecticide heptachlor which is now banned)), dieldrin and triazine herbicides (including atrazine). **30** Included in this group, although not pesticides, are PCBs, chemicals that were widely used in industry, but have now been banned. Some of these products, such as DDT, PCB and heptachlor, are banned in North America, but they persist for a long time, and so are still in the environment and our bodies.

Studies of pesticide and breast cancer, like many other studies in the causes of cancer, are difficult because it is understood that the exposure to chemicals can occur many years

before cancer develops; and at the point that the cancer develops it is difficult to measure whether a person was exposed to pesticides many years before. These pesticides might work as direct carcinogens, but many of them also have properties of hormone disruption, which may promote the development of cancer.

Studies of people working on farms who would likely be more exposed to pesticides show mixed results. However some studies show increased breast cancer, especially in women who spent time close to where pesticides were applied. A recently released study in Windsor, Ontario showed that women with breast cancer were more likely to have worked on a farm, and were at highest risk if after being on a farm they then worked in the automotive industry. **31,32**

Exposure

Pesticides are used in farming, but are also commonly used in home gardening and lawn care, and indoors for control of pests, such as spraying for termites or cockroaches, or to treat head lice (lindane). Farmers and others using pesticides in their jobs are exposed.

We might be exposed from air if pesticides are sprayed near us; from pesticides left on the foods we eat, pesticide residues on fruit and vegetables, or PCBs in farmed salmon; and we know that dust in homes has pesticides in it, probably brought in from the outside by air drift, on our shoes or on the dog, and that we can absorb the chemicals from the dust in the house by breathing, by it getting into our food, or through the skin. **33,34**

C. Radiation

We know that ionizing radiation causes many cancers, and the research is clear that it also causes breast cancer. Research comes from Hiroshima survivors, and people treated with radiation for medical conditions, such as other cancers. The risk is higher in women exposed at a younger age, when the breast is immature, especially at the time of onset of menstruation and in pregnancy.

Radiation is not a major cause of breast cancer. Less than 1% of breast cancer is thought to be due to radiation. There have been many studies looking at radiation like that from electrical equipment, electric blankets, cell phones, etc. There are some reports of increased cancer risk from this in workers with high levels of exposure, although even this is unclear. There is no evidence of a link to exposures at the levels experienced in our daily lives and homes.

Uses

There is a low level of natural radiation from the earth. We have used radiation for X-Rays and other medical investigations and treatments, for nuclear power and weapons. Non-ionizing radiation, such as microwaves, has not been associated with breast cancer.

Exposure

Exposure might be in people who have needed radiation for medical treatments, such as cancer, and from workers in medical professions and nuclear facilities. Routine X-Rays

and mammography, even if repeated, are not thought to give a dose that would be of concern for breast cancer.^{35,36}

Exposure

How are we exposed, and what do we know about our exposures? One of the most important questions to answer when trying to find out the risk for breast cancer from exposure to an environmental toxin is: How much am I exposed to? But this question of exposure is also one of the most difficult issues to sort out.

We would like to know how much chemical is in:

- The air we breathe, in the house, school or workplace, or outside air
- The food we eat
- The water we drink or bathe in
- Our house environment, especially housedust and the things we buy
- The soaps, shampoos, and cosmetics we put on our bodies?

And how much of the chemical that is in these areas gets into our bodies by:

- Breathing
- Eating or drinking or
- Coming into contact with our skins.

But in fact we know very little about our exposures to environmental toxins and carcinogens.

This section will help you to understand what we do know. There are three sections:

- Community exposure
- Personal/ household exposure
- Body burdens

A. Community exposure

By community exposure we mean what are our exposures to chemicals from the common air we all breathe, or the water we drink, or the food we eat etc in South Riverdale, and where do the chemicals come from? We do not know of any breast carcinogens or endocrine disruptors of significance in Toronto's water. Food issues will be dealt with more in household exposures, but residue pesticides on food are regulated by the Pest Management Regulatory Agency (PMRA) of Health Canada and monitored by the Canadian Food Inspection Agency (CFIA). ^{36a,36b} The main focus here will be chemicals in the air.

There are some reports that list this information:

- NPRI
- Ashbridges Bay Treatment Plant Study (ABTP)
- The Ten Carcinogens report by Toronto Public Health
- CRTK
- Toronto Public Health
- US studies

The National pollution Release Inventory (NPRI) 37

The National pollution Release Inventory (NPRI) is a Canadian database available on the web, of releases of key pollutants by industry. However, the NPRI was not of much use to our investigations. The NPRI focuses primarily on large point sources, companies that have 10 or more employees and those that emit more than 10 tonnes of a toxic substance on the list.

So this misses emission from cars and trucks (mobile sources), and from small and medium-sized commercial and industrial and institutional sources, such as drycleaners, body shops, and hospitals. For example, NPRI shows only 3 facilities in Toronto releasing 7.84 tonnes of Perchloroethylene (Perc). But other data from the Federal Commission for Environment and Sustainable development suggests that there are probably at least 500 tonnes of Perc released annually into Toronto's air and water.

NPRI information is made more user friendly in a website called Pollution Watch, where you can find information by postal code. 38

A search for M4M 3P3, the South Riverdale CHC postal code, shows the following results for the year 2004:

Rank	NPRI_ID	Facility Name	Company Name	Total Amount
1	2298	TORONTO Ashbridges Bay	REPUBLIC POWDERED METALS	58998
2	2240	Treatment Plant	CITY OF TORONTO	3979.23
3	3658	Don Valley Plant	Korex Don Valley ULC	2068
4	5793	Stanley Plant	STANLEY MANUFACTURING COMPANY INC.	1602
5	5884	North Toronto Treatment Plant	CITY OF TORONTO	170.42
6	500	LEASIDE	COLGATE PALMOLIVE Canada Inc.	160
7	642	Toronto Plant	The Canada Metal Company Ltd.	105.56
8	5823	Plant and Distribution Centre	APCO INDUSTRIES Co. Ltd.	59
9	3433	ISP (CANADA) INC.	ISP (CANADA)	28

Ashbridges Bay Treatment Plant study 3

The Study

Since Ashbridge's Bay Treatment Plant is the second biggest emitter on the NPRI list, it is useful to look at it in more detail. Toronto Public Health did a study in 2005, looking at the air emissions from the Ashbridges Bay Treatment Plant and their impact on the local community, and examining whether residents of South Riverdale and The Beaches had different rates of illness or death compared to other neighbourhoods in the City of Toronto.

Health findings

- Found cancer rates were no different than comparison communities.
- Overall death rates were higher in South Riverdale and the Beaches, as compared to their comparison neighbourhoods.
- South Riverdale had higher rates of death from heart and breathing problems than its comparison communities.
- These differences likely reflect a blend of environmental exposure and socio-economic differences between the study communities and their comparisons, although this study cannot determine the actual causes.

Environmental findings

- Focused on 17 of the chemicals of most concern that may have been emitted by the Ashbridges Bay, including breast carcinogens like benzene, cadmium and arsenic, using computer models to analyze their emissions.
- Found that with the closing of the incinerators (2003) and the installation of odour control measures by 2010, the impact of the Ashbridges Bay emissions on local air quality is reduced.
- The 15 chemicals that were found in the Ashbridges Bay emissions met Ontario air quality standards in both communities.
- Most of these 15 chemicals also met health criteria. All will meet the health-based criteria by 2010.

The Ten carcinogen report 17

The study

Toronto Public Health conducted a study in 2002 to find out what we know about the potential for exposure to the most important carcinogens in the workplace and from environmental exposures in Toronto. The ten carcinogens were chosen because of their potential to cause cancer and because they are frequently found in the workplace and in the environment in Toronto. Relevant to breast cancer are benzene, 1,3-butadiene,

cadmium, dioxins, polycyclic aromatic hydrocarbons (PAHs), and perchloroethylene (Perc).

Findings

- Nine of the ten carcinogens are present in Toronto's outdoor air at levels that approach or exceed the level considered for "tolerable"; that is, a risk of one excess cancer per million people exposed daily over a lifetime.
- Two of the carcinogens – benzene and PAHs – are present in outdoor air at levels ten times higher than the benchmark.
- Five of the ten carcinogens (benzene, formaldehyde, 1,3-butadiene, trichloroethylene and PAHs) can be found in indoor air at levels approaching or exceeding tolerable levels;
- Another study by Prof Miriam Diamond at University of Toronto showed that air levels for many substances emitted in the city are about 10 times greater at downtown than suburban and rural locations (e.g., PCBs, PAHs, PBDEs). 39

Community Right To Know study 40

The study

In 2004, the Toronto Cancer Prevention Coalition assessed how easy it was to access information on chemicals, especially substances associated with cancer, for residents and workers in the South Riverdale and Beaches neighbourhoods of Toronto.

Findings

- It was difficult for residents to find information on toxic chemicals that are present in their neighbourhood.
- The information is scattered, incomplete and difficult to access and understand.
- "Higher concern" industries included businesses involved in manufacturing, dry cleaning, auto servicing (auto body shops, service stations and repair shops) publishing and printing, film and photo development, incineration and landscaping.
- There were 115 such businesses in South Riverdale.
- Attempts to access information on these businesses showed:
 - On the NPRI and PollutionWatch websites, they could access pollutant release information for only 11 of the 115 businesses (10 %).
 - On the provincial Ministry of the Environment's Environmental Registry, they found information for only 2 of 30 auto body and dry cleaning businesses regarding environmental approvals (Certificates of Approval, or other environmental instruments). A further search by staff, using a Freedom of Information request, found information for 10 of the 30 businesses.

The group defined Community Right-To-Know as: "the community's right to access a broad range of information related to environmental and human health and safety. It includes a community's right to access information on releases to the

environment, a consumer's right to know about harmful ingredients in products and a worker's right-to-know about the health effects of chemicals in the workplace."

MATES Study: 41

A comprehensive assessment of "air toxics", which are air pollutants that are cancer causing, was conducted in the Los Angeles area in 2000 (MATES Study). The study found that mobile sources i.e. cars, trucks, trains and aircraft, especially from diesel engines, were the most important contributor to air toxic pollution, more so than industrial sources; that the pollution was evenly distributed through the area; and that levels were lower than previously measured. The overall risk was 1,400 per million people, meaning that it is estimated that 1,400 people per million will develop cancer as a result of air pollution.

B. Personal/ Household exposure

In this section, we ask the question: How much do we know about exposures that occur to individuals and families, where they work, and in their homes. There is a difference here, because we have some control over these exposures, whereas if the outdoor air is polluted, we can't do anything about that. There are 3 sections discussed:

- Workplace exposure
- Home exposure
- Consumer products

Workplace exposure

This was discussed in the Community right to Know Study described above. There is generally a lack of public information on occupational exposures in Ontario work places. The Ontario Ministry of Labour used to collect exposure information on selected chemical agents for Ontario workplaces, but this data has not been collected for several years. By law, workers should be able to access information about any toxic substances that they might be exposed to in the workplace, through the **Workers Hazardous Materials Information System (WHIMIS)** and **Material safety data Sheets (MSDS)** in the workplace. Some workplace issues have been discussed, such as farmers, automotive workers, workers in the textile and clothing industry, dry cleaning, pharmaceuticals, hairdressing and beauticians, jobs associated with radiation exposure, and possibly night shift workers.

Home exposure

We know very little about exposures inside the home. This is very difficult to study, as each home is different. We'll discuss two topics

- How do toxic chemicals can get into the home?
- What studies have been done about household exposures?

How do toxic chemicals can get into the home?

- A chemical comes into the home from outside e.g. pesticides come in on our shoes or the dog, or air pollution comes in the windows.
- Chemicals are given off from new building materials or household products e.g. “off gassing” from new carpets, flame retardants from computers or TVs
- A chemical is used or applied intentionally in the house e.g. spraying for cockroaches or other bugs, paint, make up, perfumes, lotions.
- Unintentional release of chemicals in the home e.g. a chemical is spilled, or it is not stored properly.

What studies have been done about household exposures?

Studies have been done examining

- Indoor air
- Dust in homes

Indoor air studies

A number of studies have looked at various toxic air pollutants in homes. A recent study in New York and Los Angeles that had teenagers wearing personal monitors for 48 hours found that levels of many chemicals were higher indoors than outdoors, and were higher than levels considered safe. This was for all carcinogens, not specifically for breast carcinogens. Similar findings were made in a study of indoor air and dust in the US, and in a study of indoor air in Ottawa. 42,43,44

Indoor Dust studies

There was no information on this until recent (2003) studies by Rudell with the Silent Spring Institute examined the dust in 128 homes, and found that the dust contains levels of many of the carcinogens and hormone disruptors that we have mentioned in this report, including phthalates, pesticides, alkylphenols and PBDEs, brought into our homes in ordinary consumer products. These chemicals can get into the body by breathing, or in our food. Children who spend a lot of time on the floor are likely to absorb more of these chemicals from the dust. 45,46,47

C. Consumer products

On your shelves, in your bathroom, basement, storage area, kitchen and the rest of your house are many chemical products that we use to clean, to wipe, to paint, to shave, shampoo, and use as cosmetics, lotions, air fresheners, pesticides and that are in our furniture, mattresses, TVs and computers. We are unaware as to which compounds are safe and which might be harmful. Many of the products are complex mixtures of chemicals. Many of the substances listed as endocrine disruptors might be in products we buy, including alkylphenols, bisphenol A, the flame retardants (PBDEs), phthalates and pesticides. The products that they are in have been described in the section on endocrine disruptors. A few groups of products can be singled out:

Pesticides

Pesticides are used on lawns and gardens, but we include here also chemicals used to eradicate cockroaches, termites, bed bugs and other infestations and flea treatments for pets. Lindane is used as a treatment for head lice.

Food and Water

We make choices when we buy our food. We know that healthy eating, especially lots of fruits and vegetables, is important in breast cancer prevention. Food itself may contain some pesticides as discussed above (see **36a, 36b**), and there is concern about contaminants in farmed salmon. But here we also refer to the phthalates in food wraps, and the Bisphenol A that might be in linings of cans and water bottles.

Cleaning Products

Concern here is about hormone disruptors such as nonylphenols described above that are in some laundry detergents and bathroom cleaners, and which are not listed or very difficult to figure out. See the resource list below for help with this. **27,48,50,51**

Cosmetics and Other Personal Care Products

A number hormone disruptors have been found in cosmetics and other personal care products. This is described previously, under the section on phthalates, and PAHs. Once again these ingredients are often not listed, or difficult to understand. **27,48,49,50,51**

Plastics

Phthalates are used to soften many plastic products, and in some food wraps. This is especially important in products that come into contact with food and water, and that children put in their mouths.

Flame Retardants (PBDEs)

As discussed above, PBDEs are used in many products as flame retardants, in furniture, mattresses, TVs and computers. They are not tightly bound in these products, and can leach out over time into the household environment, especially into dust.

Other products

Other products that we use around the house might contribute to our total carcinogen load. For example, methylene chloride may be contained in paint strippers.

Resources

A number of very useful and reliable guides have been developed to help the consumer to identify safe versus unsafe products.

The Cancer Smart Consumer Guide. 27

<http://leas.ca/CancerSmart-Consumer-Guide.htm>

Guide to less toxic products. Environmental Health Association of Nova Scotia. 48

<http://www.lesstoxicguide.ca/index.asp>

Environmental Working Group: Skin Deep. News about the safety of popular health and beauty brands. 49

<http://www.ewg.org/reports/skindeep2/advanced.php>

Household products database, National Institutes of Health. 50

<http://hpd.nlm.nih.gov/index.htm>

Safer products project. Alternatives for a healthy home. 51

<http://www.safer-products.org/page.php>

C. Body levels

Another way of researching what we are exposed to is by measuring how much chemical, or carcinogen, is in people's bodies. This is called biomonitoring. There is not very much information about this in Canada, although Health Canada has recently announced that it will begin a program of extensive biomonitoring soon. There has been some limited measurement of chemicals in mother's milk, and a Toronto environmental group, Environmental Defence, has tested a small number of people (Toxic Nation Study).

Toxic Nation Study 52

The study

There were two studies, the first of 11 people tested for 88 substances, a follow up of 5 families tested for 68 substances.

Findings

Eleven people: 60 of 88 chemicals tested for were detected. Of the 60 chemicals detected 41 are suspected cancer-causing substances.

Five families: 46 of 68 chemicals tested for were detected. Of the 46 chemicals detected 38 are cancer-causing substances. Both included many of the substances mentioned in our report, including PBDEs, pesticides, PCBs and heavy metals.

References

1. Breast Cancer in Ontario 1971-1996 October 2000 Anna M Chiarelli Beth Theis
Eric Holowaty Veronika Moravan E Diane Nishri Surveillance Unit and The Ontario Breast
Screening Program Division of Preventive Oncology Cancer Care Ontario
Preface/ Highlights/ Background
2. Cancer Care Ontario. Cancer Fact: Breast cancer: rate of new cases and deaths in
Ontario, July 2003. http://www.cancercare.on.ca/index_ontarioCancerFacts.htm
3. Toronto Public Health. Ashbridges Bay Treatment Plant study
http://www.toronto.ca/health/hphe/pdf/abtp_board_of_health.pdf
4. Mortality, Cancer Incidence and Hospitalization Among Residents of the
Neighbourhoods of South Riverdale, The Beaches, and Comparison Communities
Murray M. Finkelstein for Toronto Public Health April 2005
http://www.toronto.ca/health/hphe/abtp_emissions.htm
5. Understanding Breast Cancer Risk and Risk Factors Associated With Diet and
Lifestyle <http://envirocancer.cornell.edu/factsheet/diet/fs49.BCRisk.cfm>
- 6 Lichtenstein, N. Engl. J. Med., vol. 343, pp. 78-85, 2000
7. EHP March 2007. <http://www.ehponline.org/members/2007/115-3/focus.html>
8. Madigan et al., JNCI vol. 87, pp. 1681-1685, 1987; Rockhill et al., Am. J. Epidemiol., vol.
147, pp. 826-833, 1998).
9. <http://ntp-server.niehs.nih.gov/htdocs/Sites/MAMM.HTML>
10. Understanding Breast Cancer Rates
<http://envirocancer.cornell.edu/FactSheet/Rates/fs3.rates.cfm>
11. Green Brody J, Rudel R. Environmental pollutants and Breast cancer. Environmental
Health Perspectives. 2003. 111(8) <http://www.ehponline.org/docs/2003/6310/abstract.html>
- 12 Fenton S. Endocrine-Disrupting Compounds and Mammary Gland Development: Early
Exposure and Later Life Consequences. Endocrinology 2006;147(6) s18-s24)
- 13 IARC International Agency for Research on cancer <http://www.iarc.fr/>
- 14 NTP. National Toxicology Program. Report on carcinogens
<http://ntp.niehs.nih.gov/index.cfm?objectid=72016262-BDB7-CEBA-FA60E922B18C2540>
- 15 Benzene <http://ntp.niehs.nih.gov/index.cfm?objectid=0707525C-0F07-05BF-A16CAC7B0ECC97B5>

16 Abstract for TR-288 - 1,3-Butadiene <http://ntp.niehs.nih.gov/index.cfm?objectid=0709EBD3-05D3-ADFC-33BD031C26E4A48B>

17. Ten Key Carcinogens in Toronto Workplaces and Environment: Assessing the Potential for Exposure. http://www.toronto.ca/health/pdf/cr_summaryreport.pdf

18 Polycyclic aromatic hydrocarbons

<http://envirocancer.cornell.edu/Factsheet/general/fs41.pah.cfm>

19 EWG Skin deep <http://www.ewg.org/reports/skindeep2/impurities.php>

20 Tetrachlorethylene <http://ntp.niehs.nih.gov/index.cfm?objectid=E87D1CE3-BDB5-82F8-FF89E156508651F8>

21 McElroy JA. Shafer MM. Trentham-Dietz A. Hampton JM. Newcomb PA. Cadmium exposure and breast cancer risk. Journal of the National Cancer Institute. 2006;98(12):869-73

22. Toronto Public Health. 2005. Air Emissions from the Ashbridges Bay Treatment Plant Emission Study

http://www.toronto.ca/health/hphe/pdf/abtp_emissions_executive_summary.pdf

23. Ethylene oxide <http://www.epa.gov/ttn/atw/hlthef/ethylene.html>

http://www.scorecard.org/chemicalprofiles/summary.tcl?edf_substance_id=75-21-8

24 EWG <http://www.ewg.org/reports/skindeep2/impurities.php>

25 Endocrine disruptors <http://envirocancer.cornell.edu/factsheet/cendocrine.cfm>

26 Green Brody J, Tickner J, Rudel R. Community-initiated breast cancer and environment studies and the precautionary principle. Environmental Health perspectives, August, 2005

<http://www.ehponline.org/members/2001/109p871-876kriebel/kriebel-full.html>

27 The CancerSmart Consumer Guide. LEAS; <http://leas.ca/CancerSmart-Consumer-Guide.htm>

28. Rudel R, Brody J, Spengler J. Identification of Selected Hormonally Active Agents and Animal Mammary Carcinogens in Commercial and Residential Air and Dust Samples Journal of the Air & Waste Management Association. 2001. 51 (4) 499-513.

<http://library.silentspring.org/publications/pdfs/JAWMAabstract.pdf>

29 EWG. Poisoned cosmetics. Not too pretty. <http://www.nottoopretty.org/>

30. Chemicals fact sheet. <http://envirocancer.cornell.edu/factsheet/cchemicals.cfm>

31 Ontario College of family Physicians: Pesticide report.

<http://www.ocfp.on.ca/English/OCFP/Communications/CurrentIssues/Pesticides/default.asp?s=1>

- 32 Brophy J, Keith M et al. Occupation and Breast Cancer A Canadian Case-Control Study. 2006. Ann. N.Y. Acad. Sci. 1076: 765-777
- 33 Rudel Household Exposure Study. Env SC and Tech 2003;
<http://www.silentspring.org/newweb/research/household.html>;
34. Sick of Dust Report <http://www.safer-products.org/downloads/Dust%20Executive%20Summary.pdf>
35. Cornell Fact Sheet. Ionizing Radiation and Breast Cancer Risk <http://envirocancer.cornell.edu/factsheet/physical/fs52.radiation.cfm>
36. Ronckers C, Erdman C, Land C. Radiation and breast cancer: A review of current evidence. Breast Cancer research. 2005. <http://breast-cancer-research.com/content/7/1/21>
- 36a PMRA Maximum Residue Limits for Pesticides. <http://www.pmra-arla.gc.ca/english/legis/maxres-e.html>
- 36b. Canadian Food Inspection Agency. Chemical residue reports.
<http://www.inspection.gc.ca/english/fssa/microchem/resid/reside.shtml>
37. The National pollution Release Inventory (NPRI)
http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm
38. Pollution Watch. <http://www.pollutionwatch.org/>
39. Butt C, Diamond M. Spatial Distribution of Polybrominated Diphenyl Ethers in Southern Ontario As Measured in Indoor and Outdoor Window Organic Films. Environ. Sci. Technol., 38 (3), 724 -731, 2004
40. Community Right to Know. Toronto Cancer Prevention Coalition case study on public access to information on toxic substances in the South Riverdale/Beaches community
http://www.toronto.ca/health/hphe/pdf/boh_case_study_riverdale.pdf
41. MATES study. <http://www.aqmd.gov/matesiidf/es.pdf>
42. Sax S et al. A Cancer Risk Assessment of Inner-City Teenagers Living in New York City and Los Angeles. 2006;114,10. <http://www.ehponline.org/members/2006/8507/8507.html>;
43. Silent Spring Institute. <http://www.silentspring.org/newweb/research/household.html>;
44. Selected Volatile Organic Compounds in Residential Air in the City of Ottawa, Canada <http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2005/39/ill/abs/es050173u.html>
45. Silent Spring Institute. <http://www.silentspring.org/newweb/research/household.html>
46. Safer products project: Sick of dust project
<http://www.safer-products.org/downloads/Dust%20Executive%20Summary.pdf>

47. BCERF: Household exposure to chemicals
<http://envirocancer.cornell.edu/learning/household/exposures.cfm/>
48. Guide to less toxic products. Environmental Health Association of Nova Scotia.
<http://www.lesstoxicguide.ca/index.asp?>
49. Environmental Working Group: Skin Deep. News about the safety of popular health and beauty brands.
<http://www.ewg.org/reports/skindeep2/advanced.php>
50. Household products database, National Institutes of Health.
<http://hpd.nlm.nih.gov/index.htm>
51. Safer products project. Alternatives for a healthy home.
<http://www.safer-products.org/page.php>
52. Environmental Defence. Toxic Nation Study
<http://www.environmentaldefence.ca/toxicnation/pollutionInYou/toxicNationReport.htm>

Appendix 1 Framing meeting brainstorm

Question 1: Breast Cancer and pollution/environmental hazards in South Riverdale

What do you know?	What don't you know?	What do you need to know?
-Very little about B.C. and pollution combined -They found lead in the soil in the 80s -Found soil contamination when they took the Gardiner down -Hearn Power Plant must have hazards -There are lots of Body Shops in S. Riverdale -Heard that dry cleaning patrons had a greater risk of getting Cancer -S. Riverdale geography allows contaminants to stay near the ground,	-MOH studies claim there is no statistical difference and South Riverdale is not at risk, but is this really true? -If soil contamination links to Cancer -What is the link between poverty and Breast Cancer? -Are community gardens contaminated? -Does S. Riverdale's geographical make up increase our exposure to pollutants?	-What kinds of hazards are really out there and how severe are they? -We need to track changing demographics to identify the links between poverty and Breast Cancer -Have they noticed a difference with the closure of the stacks on the waterfront?

travel up to Gerard and then back down		
-There are lots of causes: -water quality, pollution, soil, heavy metals, artificial chemicals and technology -Garbage incineration, dioxins, polluted soil, VOCs/PAH -Coal burning in homes -Contamination from Gardiner: lead, VOCs -Dumping at Leslie spit -Lead contamination -St. Mary's Cement -Dust, smoking	-What to do with lead in our own body? -Where did Pb come from? -What to avoid to reduce risk? -What's directly linked to Breast Cancer? -Long-term low-level exposures? -Cumulative exposure? -Frustration with government – can't get info -What to do about water contamination? -Why do people still smoke?	-How to get people to stop smoking? -What research has been done in S. Riverdale -Junk foods/soft drinks – are they related? -Other research re: the environment and Cancer -Specific environmental contaminants in the community (air, soil, water) -The effects of Xrays -Kids: how to get healthy food in schools (locally produced/organic) -Will knowledge make me nervous? Paranoid? -About age related Cancers -Is the rate of Breast Cancer the same in S. Riverdale as in other communities?
-Pollutants from the Environment are found in breast tissue -Dioxins are a problem -Chemicals accumulate in breast tissue	-Environmental hazards unique to Breast Cancer alone. -How safe is water? Bottled water? How do we know what's in it? -I swimming pool chlorine an issue? -What risks put children at risk for Breast Cancer? -Old contamination and the safety of soil/land in our yards -Safety of cleaning products -Is asbestos released during renovations? -Can we remove chemicals from breast tissue? -How does radiation affect Breast Cancer?	-Pesticide exposures and possible links -What kinds of exposures (e.g. factories) are in the area? -What is the difference between government safe levels and research results on safe levels? -What are the different standards in different jurisdictions? -Relative risk of air pollution vs. soil vs. water, etc. -How ill the new Portlands gas plant impact health/Breast Cancer? -Are the causes of Breast Cancer the same for males and females? -What is the impact of breast-feeding?

	-How are Cancers categorized and where does Breast Cancer fall? -How genetic is Breast Cancer?	-How can we project ourselves?
--	---	--

Question 2: Research and recommendations

What do you know?	What don't you know?	What do you need to know?
-Groups is familiar with research methods and reports -Pesticides and foods -Organic foods are not readily available – Choosing them increases pollution through transportation (95% come from somewhere else) -Can't grow what you eat in S. Riverdale – Catch 22 -Causes of Breast Cancer include: endocrine disruptors, genetics (25%)	-Jargon might be a problem -Stats can be confusing -Not sure what household products are safe – are 'green' products really safer? -What can young women do? Preventative care -What does organic really mean?	-What is the obstacle to doing more research into environmental causes or Cancer? What research has been done? -Gender and age components of Cancer? -Need more info about pesticides, foods and the link to Breast Cancer -Is there research from other communities we can compare ourselves to? -Is race a factor?
-Consultant reports seem biased -It's important to have the right questions in the research -Cynical of biased research -There is no money for research in prevention -Don't trust the medical/pharmaceutical industry	-Can small groups be representative of the whole community? -Effects of breast-feeding? -Can research from religious books be trusted?	-What is the final goal? -Who is paying for this? -Correlation/association vs. proof?
-Research is written for other researchers and is difficult to understand -Finding and doing		-Definitions of the major terms -How to make info understandable

research is a lengthy process -The answer to a question might be another question -Research, when popularized, is often reduced to certainties -Ignorance is bliss, sometimes		-How do we know why some people get Cancer and others don't? -Research on environmental exposures in other communities with similar profiles -Relative incidences of Cancers, how is Breast Cancer increasing or decreasing compared to others? -How to trust research, how to know how research to trust -How do we communicate from the research? -Can we trust labeling? -Communicating academic info in plain language/understandable form
--	--	--

Appendix 2 Conclusions

1. Awareness of cancer overall (including breast cancer): There is a need to acknowledge & educate around the prevalence of cancer

- Shocked at the prevalence of cancer – 1 in 2 men and 1 in 3 women will get cancer – why isn't there more of an uproar?
- Were not aware of the risks with being on the pill.
- Need more education and advertising.
- 3 ways of exposure:
 - i. Ourselves (products)
 - ii. Others (traffic)
 - iii. Mothers (early childhood)
- We need to give more information – people are at risk by not knowing enough – break it down into small steps.
- Risks are hard to quantify and vary from individual to individual.
- Cancer itself is a greater concern than any particular cancer.
- What is unique to breast cancer and what is relevant to all cancers?

2. Specific environmental issues and concerns: Identification of specific environmental concerns and how they might be addressed

- Incineration of Garbage is a key issue.
- Pollution control in small agencies is important.
- Need to organize safe disposal of chemicals.
- Also need to consider the interactions of various toxins as well as the issue of cumulative exposures.
- Can have “Green Tea Parties” and teach neighbours how to clean with green friendly products.
- If we reduce our exposure generally to environmental toxins, we’ll be reducing cancer overall – Massachusetts example to reduce toxic waste through providing technical support.

3. Environmental standards and laws: Identification of critical questions and needed information around standards and legislation

- If labelling legislation comes into effect next year, we have to educate the public so they know which chemicals are carcinogens.
- As a group, we can focus on environmental exposures and who can do what (City, Province, Individual, etc.).
- What level of government should address this?
- The MOE standards are out of date re: effects on health (e.g. with accepted levels of pollution). We need to test the validity of their standards.
- How can we evaluate environmental standards?
- There is no measurement of the air we breathe.
- Why are PBDE’s banned in Europe, but not here?
- Incidence is growing – don’t know why we are being exposed to known carcinogens – we don’t have enough info – laws limit what we know.
- We need to gather information internationally and implement international bans and regulations.

4. Information and choice: Examples and ideas of information and the need for choice

- Frustrated that there is no OHIP coverage for alternative treatments.
- People need to take ownership – they complain about pollution, but drive cars.
- We can offer healthy choices based on what we’ve learned.
- Status re: Community Rights to Know Study.
- We should go back to using clay dishes, “go back to the village”
- There may be resistance, but we should go back to traditional practices.
- Shop at Grassroots.
- Recommendations can be based on stage 1 – change what we eat and the products we use.
- Show the public how they can take small steps to improve their lives.

- Show how you can avoid risks – protect yourself.
- Give people information to help them make informed choices.
- Websites like zerofootprint give personal assessments to measure exposure risk.

5. Additions from March 28, 2007: Sharing information, organizational roles, the availability of resources.

- Is the Canadian Cancer Society just managing the problem or are they taking leadership in prevention?
- Canadian Breast Cancer Foundation focuses 10% on prevention and 90% on intervention.
- There's no help until you get the disease.
- There are lots of these organizations – people trust and give them money – I expect leadership and I don't get the sense that's shared.
- As a citizen, I want a stronger position from these organizations.
- How is the Cancer prevention message unique from, say, the Heart and Stroke Foundation's?
- Who are all the stakeholders and who's responsible for doing what? Makes it hard to determine accountability.
- Caution is needed re: exposure. "Cautionary Principle" – we can't wait until we have dead bodies.
- Canadian Government not doing enough re: growth hormones in beef.
- Is there research re: the prevalence of cancer and the environmental links?
- We've so fragmented the issue that we've lost the impact of the disease.
- We are all exposed – that's not recognized.
- Is there a lack of focus on prevention or are the stakeholders just not well connected?

Appendix 3 Recommendations

List of potential audiences:

- A. Individuals
- B. Communities
- C. Government (various levels)
- D. Canadian Breast Cancer Foundation
- E. Industry (Pharmaceutical, Chemical)
- F. Medical community
- G. Researchers
- H. Non-Governmental Agencies

Table 1: Dotmocracy Results

Recommendations	Potential Audience	Dotmocracy Results		
		1st Choice	2nd Choice	3rd Choice
Create curriculum for teachers and students to educate re: environmental toxins	C,A,B,D,F	1	1	
Citizens for a Safe Environment – Re-ignite “Green Tea Party” idea – Develop topics/framework/content/kit – targeted to different groups (kids, moms, etc.)	A,B,D			2
Recommend women get off the pill early	A,F,C			
Pressure around disclosure re: toxic exposure	ALL			
Meaningful measuring	C,E,G,B			
Start young re: education	A,B,C			
Screen prevention education for women from community group	A,B			
Create a card with website that lists key ingredients/chemicals to avoid	A,B,D	1	1	1
Educate young people re: the pill and encourage abstinence	C,A,B,F	1		
We should know what we’re eating and what those animals are eating	A,B,C,D,E,F			
Shift the onus to companies to prove their products are safe	B,C,E	2	1	2
Products should be required to disclose their risk	E,C,A,F	2	1	
More info advertising re: risks and educational commercials	B,C,E			
More free resources like the Safe Products Guide	C,D			
Personal Action Plan re: Breast Cancer prevention	A,B,D			
Sheet re: Top 12 Environment and Breast Cancer messages for the general public	A,B,D,F	1		
Breast Cancer questions and factors	A,B,D			
Link to resource sites	D,A,B			

Reduce chemicals going into the environment – adopt Massachusetts model	E,C,G	1	1	
What do we know/understand re: how to present information that impacts	G,B,D			1
Global regulatory body and global standards	C		1	
Developing a “circle of champions” to represent different sectors, govt, research, non-profit (6-8) to showcase ideas and move them to action	ALL		1	1
More Canadian research in specific ethno-cultural groups and incidents of cancer	G			
Educating folks on how to be effective advocates	A,B,D			1
Move factories in South Riverdale to less populated areas	C,E	1		
Monitor and publish findings from sites in the city that measure chemicals of concern	E,B,C		1	
Survey standards across the globe and share results	G,D,B			
Universal symbols/icons to define classes of carcinogens and also degrees of carcinogens	ALL		1	1
Create “Fact sheets” re: environmental risks and hand them out in the community	A,B,G,D		1	
Create “age standards” re: smoking, etc. or exposures	C,F,G			
Pressure for more truth in advertising	C,E,B			
Increase awareness through ongoing column in newspaper, SRCHC windows to educate re: environmental exposure	A,B,C		1	
Cosmetics mandated to list their ingredients	C,E	1		
Community education workshops	A,B			
Monitoring high traffic areas re: environmental toxins	C			1
Uncool to drive campaign	C,D,F,G		1	1
Explore/Explain to the public the	F,A,B,G			1

concept of the "chemical soup" – i.e. blood sample and it's impact				
Need a body to coordinate prevention education measures	C,H	1		
More research money for prevention in grassroots mobilization projects	C,D,F,G,E	1		

Table 2: Dotmocracy Results in Rank Order

Shift the onus to companies to prove their products are safe	10
Products should be required to disclose their risk	7
Create a card with website that lists key ingredients/chemicals to avoid	6
Reduce chemicals going into the environment – adopt Massachusetts model	5
Create curriculum for teachers and students to educate re: environmental toxins	5
Sheet re: Top 12 Environment and Breast Cancer messages for the general public	3
Developing a "circle of champions" to represent different sectors, govt, research, non-profit (6-8) to showcase ideas and move them to action	3
Uncool to drive campaign	3
Need a body to coordinate prevention education measures	3
More research money for prevention in grassroots mobilization projects	3
Educate young people re: the pill and encourage abstinence	3
Cosmetics mandated to list their ingredients	3
Universal symbols/icons to define classes of carcinogens and also degrees of carcinogens	3
Move factories in South Riverdale to less populated areas	3
Create "Fact sheets" re: environmental risks and hand them out in the community	2
Monitor and publish findings from sites in the city that measure chemicals of concern	2
Increase awareness through ongoing column in newspaper, SRCHC windows to educate re: environmental exposure	2
Global regulatory body and global standards	2

What do we know/understand re: how to present information that impacts	1
Restart "Green Tea Parties"	1
Educating folks on how to be effective advocates	1
Monitoring high traffic areas re: environmental toxins	1
Explore/Explain to the public the concept of the "chemical soup" – i.e. blood sample and it's impact	1