Dr Sheila Singh is studying how lung cancer spreads to the brain. Find out more on page 9.
Trish Daubs, a 53-year-old Sarnia adult educator, knows all too well the dangers of exposure to workplace cancer risks. After serving in World War II, her father, John McHenry, insulated pipes with asbestos for 35 years at a Sarnia plant. “He had no protection and no one explained that it was dangerous,” she says. Twelve years ago he developed what doctors suspected was mesothelioma, a rare but highly fatal cancer that’s closely tied to asbestos exposure.

Shortly after John died in 2000, Trish’s mother Georgina began experiencing similar symptoms of weight loss, nausea and shortness of breath. Georgina hadn’t worked outside the home, so doctors were puzzled when a lung biopsy confirmed mesothelioma. But after the oncologist learned she had washed her husband’s asbestos-contaminated work clothes for many years, the cause was clear. “My father knew the risks he was facing when he enlisted as a soldier. I don’t believe he or my mother knew the risks he was facing working with asbestos,” says Trish.

Asbestos remains the leading cause of workplace cancer in Ontario today. “It was known asbestos caused cancer for decades before strong regulations were introduced and, tragically, people will be dying from cancers caused by asbestos for years to come,” says Dr Paul Demers, director of the Occupational Cancer Research Centre (OCRC). “The asbestos experience illustrates why we need to act quickly when new evidence about workplace cancer risk becomes available.”

Dr Demers and his team at the OCRC are receiving $1 million from the Canadian Cancer Society for a project to measure the human and economic toll of workplace cancer in Canada and Ontario. “This data will make it clearer what the risks are and the consequences of past exposures. This will help us make arguments for stronger regulations or encourage voluntary activity by industry to reduce hazardous exposures,” says Dr Demers.

Trish is passionate about taking action to prevent work-related cancers and has participated in activities to support the ban of asbestos. “I’ve known of several people in my lifetime who have had cancer and were victims of the chemical valley in Sarnia,” says Trish. “It’s essential to do research that could prevent more people from suffering the way my parents did.”

Nearly 60 workplace substances have been identified as known or probable carcinogens, including asbestos.

At least 600,000 Ontarians may be exposed to carcinogens at work.

The Occupational Cancer Research Centre (OCRC) does research to improve what we know about work-related cancers and how to protect the health of workers.

The OCRC is partly funded by the Canadian Cancer Society.

An estimated 186,400 Canadians were diagnosed with cancer in 2012. About half of all cancers can be prevented through healthy living and healthy public policy.

The Canadian Cancer Society invested $4.7 million in prevention research in 2012.
Michael Piggott was concerned, but not surprised when diagnosed with prostate cancer at 71. “I suspected something because my father had prostate cancer,” recalls the retired engineering professor, who lives on the Bruce Peninsula. Michael was referred to Dr Padraig Warde, a radiation oncologist at Toronto’s Princess Margaret Cancer Centre, who invited him to participate in a clinical trial to test the effectiveness of hormone therapy plus radiation to treat aggressive prostate cancer.

Having spent his career doing engineering research at the University of Toronto, he readily agreed. “I wanted to support the doctor and do it for the sake of science. I also read up on prostate cancer and came to the conclusion there was uncertainty about the best way to treat it,” says Michael, who began hormone therapy immediately and then had a series of radiation treatments.

Michael is one of 1,205 men who participated in the trial, led by Dr Warde and funded in part by the Canadian Cancer Society. The results, published in 2011, conclusively showed that combined radiation and hormone therapy helped men with high-risk prostate cancer live longer.

“People who received hormone therapy plus radiation were 54% less likely to die from prostate cancer than those who had hormone therapy alone. These findings have changed the standard of practice and benefited patients in many parts of the world,” says Dr Warde.

Eleven years after being diagnosed, Michael, 82, still hikes and skis regularly on the Bruce Trail, and treasures the good times he has with his wife Norma, their three children and six grandsons. “I feel the radiation treatment improved my chances. I’m glad I participated in the study and I hope it improves the treatment for other men,” he says. “As far as my two sons are concerned, there is prostate cancer in our family and it’s possible this research will also benefit them.”

Prostate cancer is the most commonly diagnosed cancer in Canada.

An estimated 26,500 Canadian men were diagnosed with prostate cancer in 2012.

The Canadian Cancer Society supports clinical trials by investing $5 million annually in the NCIC Clinical Trials Group, which leads cancer trials with global impact.

Clinical trials supported by the Canadian Cancer Society

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<thead>
<tr>
<th>Dollars invested annually in the NCIC Clinical Trials Group</th>
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<td>$5 million</td>
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Society-supported trials that recruited patients in 2012

<table>
<thead>
<tr>
<th>Ontario communities where Society-supported trials are taking place</th>
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communities in Canada where Society-supported trials are taking place

<table>
<thead>
<tr>
<th>Communities</th>
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<tbody>
<tr>
<td>Barrie: 5 trials</td>
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<tr>
<td>Cambridge: 2 trials</td>
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<td>Hamilton: 19 trials</td>
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<td>Kitchener: 6 trials</td>
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<tr>
<td>Toronto: 54 trials</td>
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<tr>
<td>Windsor: 3 trials</td>
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* Trials recruiting patients as of October 1, 2012. Most trials have sites at multiple hospitals.

Michael Piggott, 82, participated in a prostate cancer clinical trial.
An estimated 22,700 Canadian women were diagnosed with breast cancer in 2012.

75% of women with breast cancer undergo some form of radiation therapy as part of their treatment.

About 1/3 of those who receive radiation therapy may experience debilitating fatigue that lasts for months and a minority experience profound fatigue for several years.

What does “quality of life” mean?

Quality of life research is about the whole person, not just their cancer. It includes physical, psychological, social and spiritual well-being.

Lynne Kett-Hiscoe led an active life in Ottawa working for an accounting firm, serving on the parent council and fundraising at her son’s school. Then, she was diagnosed with breast cancer in 2006 at age 51 and started aggressive treatment.

As part of her treatment, Lynne received radiation therapy, which left her with unexpected, debilitating fatigue lasting at least a year. “Normally, I’m very active and I never really sit. My husband and kids noticed I was dragging, and my friends couldn’t figure out why I didn’t want to do things,” says Lynne. “I was very disappointed I couldn’t do more. I wanted to get my life back to normal.”

With funding from the Canadian Cancer Society, Dr. Fei-Fei Liu is investigating the medical cause of radiation-related fatigue for breast cancer patients, a side effect which has not been studied in great detail. Dr. Liu will evaluate 80 women undergoing radiation therapy to learn whether observed differences in the number of blood-forming stem cells circulating in patients may be a factor in fatigue. She will also test whether women who suffer the most fatigue could be making more cytokines – immune system proteins that promote inflammation – in response to radiation.

Dr. Liu, a radiation oncologist and researcher at the Princess Margaret Cancer Centre in Toronto, believes certain cytokines may cross from the blood into the brain, where they could cause fatigue. “If we find that an inflammatory cytokine is the culprit, we can test whether drugs that are currently used to treat inflammatory conditions such as rheumatoid arthritis might benefit these patients,” she says. “Our goal is to find a treatment that will help breast cancer survivors get their lives back, almost as if the disease had never happened.”

Today, Lynne has her life back. She works part-time, volunteers with the Society’s Peer Support program and is as active as ever with family and friends. But she wishes doctors could have warned her and given her a medical explanation for her tiredness. “If there was some way to relieve fatigue after treatment, that would be wonderful,” she says.

Overcoming treatment side effects

What does “quality of life” mean?

Quality of life research is about the whole person, not just their cancer. It includes physical, psychological, social and spiritual well-being.

The Canadian Cancer Society invested $3.6 million in quality of life research in 2012.
Fighting for Life 2013  |  Cancer Research

Breaking barriers to screening

- Colorectal cancer is the #2 cancer killer in Canada.
- An estimated 23,380 Canadians were diagnosed with colorectal cancer and 9,200 died of the disease in 2012.
- Colorectal cancer is 90% treatable if caught early.
- Only 30% of eligible Ontarians participate in the province’s organized screening program.

A simple test catches colorectal cancer before it shows symptoms, yet not enough Ontarians take advantage of it.

Dr Nancy Baxter wants to change this, with a Canadian Cancer Society-funded study aiming to identify why more Ontarians do not get screened. “This research will help us develop targeted strategies to improve the screening rate. If this simple stool test is used more widely, we can find cancers earlier, when treatments are more effective,” says Dr Baxter, a colorectal surgeon at St. Michael’s Hospital in Toronto.

Early results show the screening rate is slightly lower for men, recent immigrants and people with lower incomes. But, most importantly, the rate needs to be higher for all groups. Dr Baxter will now look at whether differences among doctors, including age and time since training, also play a role. For example, do more people get tested when doctors use electronic medical records as part of their practice?

“If we find use of electronic records by family doctors increases participation, promoting this tool would be one strategy to encourage screening. Our findings could also be used to boost participation in screening programs throughout Canada and internationally,” says Dr Baxter.

Repairing radiation effects

- Survival rates for children with brain cancer have improved to approximately 70%.
- Most will experience long-term effects from treatment.
- The Canadian Cancer Society funds research to help childhood cancer survivors have the best possible life after treatment.

Radiation therapy has been crucial in saving the lives of children with brain cancer, yet the long-term side effects that include learning and thinking problems have significant impact on their futures.

With the Pedal for Hope Innovation Grant of the Canadian Cancer Society, Dr Don Mabbott and his team will measure the effects of an exercise program on learning, memory and thinking ability, and brain tissue structure and growth in 40 childhood cancer survivors. In earlier research, he found promising evidence that exercise helps regrow brain cells in survivors.

Brain imaging showed that the area of the brain involved in memory and brain cell development, the hippocampus, and the area involved in transmitting information, the white matter, both grew larger after children completed an exercise program. “We believe that exercise helps convert undeveloped stem cells into healthy functioning brain cells,” explains Dr Mabbott, a neuropsychologist at the Hospital for Sick Children in Toronto.

Radiation is particularly damaging to these areas, making it difficult for children with brain cancer, yet the long-term side effects from radiation, and are highly resistant to current treatments. Dr Sheila Singh has now found evidence suggesting that cancer stem cells may also cause the spread of lung cancer to the brain, which is devastating when it occurs.

With funding from the Canadian Cancer Society, she is working to identify cancer stem cells within the original lung tumour and pinpoint the critical genes that tell these cells to travel to the brain. “We’ve found a short list of genes we believe are involved. If we can develop a targeted drug to block these genes and stop the migration of stem cells to the brain, we could convert an otherwise fatal disease into a locally contained disease and lung cancer patients would live longer,” explains Dr Singh, a pediatric neurosurgeon and cancer stem cell researcher at McMaster University in Hamilton.

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Results from this cutting-edge research could be readily applied to other cancers. “If we are able to block the process in lung cancer, the potential benefits in stopping the spread of cancer for all patients would be immense,” she says.

Stopping cancer’s spread

- An estimated 25,600 Canadians were diagnosed with lung cancer in 2012.
- The five-year survival rate for lung cancer is only 16%.
- The most common cancers that spread to the brain are lung cancer, breast cancer and melanoma.

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Our impact

A clinical trial found that patients with early stage Hodgkin lymphoma have better overall survival rates when treated with chemotherapy than with extensive radiation, and avoid the long-term effects of radiation.

Researchers studying proteins found in cancer cells uncovered new ways that cancer cells deal with damage caused by chemotherapy, which could lead to improved treatments.

Researchers discovered the processes that vitamin D uses to block the activity of a cancer-causing protein, adding to the evidence of this vitamin’s role in cancer prevention.
A History of Progress

Funding the best research and clinical trials with the greatest impact on cancer

1950s
The Cobalt-60 Unit, the most effective form of radiation therapy at the time, is developed.

25%
Survival rates five years after diagnosis

1960s
Stem cells in the bone marrow are discovered, leading directly to the development of bone marrow transplantation.

33%

1970s
Chemotherapy becomes more effective after researchers discover the mechanism that cancer cells use to become resistant to drugs.

1980s
Using the immune system to fight cancer becomes a possibility through the cloning of a white blood cell gene.

The discovery of proteins critical to sending cancer-inducing signals leads to the development of a new class of powerful drugs.

50%

1990s
Children’s sight is spared and side effects of radiation are avoided when the drug cyclosporin is used to treat an eye cancer called retinoblastoma.

Breast cancer treatment changes after a clinical trial finds that women taking the drug letrozole after standard therapy greatly reduced the risk of breast cancer returning.

62%

2000s
Treatment for lung cancer changes after a clinical trial demonstrates that chemotherapy after surgery improves survival and reduces recurrence.

2010s
A natural product derived from sea sponges may prevent muscle wasting, which causes approximately 30% of cancer deaths.

Looking Ahead

Leading-edge treatments:
- Targeted treatments
- Viruses to treat cancer

Preventing cancer:
- Reducing exposures to cancer-causing substances
- Improving screening tools

Improving quality of life:
- Reducing treatment side effects
- Improving cancer care

Children’s sight is spared and side effects of radiation are avoided when the drug cyclosporin is used to treat an eye cancer called retinoblastoma.
More research is needed to defeat cancer

Thanks to the generosity of our donors and the tireless efforts of our volunteers, the Society is leading the way in the fight against cancer. But there is more to be done. Help change cancer forever by making a donation to the Canadian Cancer Society. Please visit cancer.ca.

When you want to know more about cancer

- Visit our website at cancer.ca
- Call our free, multilingual Cancer Information Service at 1-888-939-3333
- Email us at info@cis.cancer.ca

To read these stories online, visit cancer.ca/fightingforlife2013