

CELLS AND CANCER

Cell division is essential for body growth and repair. What happens if cells begin to multiply and spread in an uncontrolled way? That is what happens in the bodies of people with cancer. Cancer cells divide at a far greater rate than normal cells and they spread to other parts of the body. Cancer has been described as “mitosis gone wild.” As the abnormal cancer cells continue to multiply, they spread to other parts of the body and damage them. Cancer is one of the leading causes of death in Canada today.

Cancer can affect many parts of the body and may be caused by many different factors. Factors that produce cancer are called **carcinogens**. They include some types of chemicals, radiation, inherited (genetic) factors, certain viruses, and repeated damage to the body.

People working in some jobs may be exposed to particular types of carcinogens. For example, people working in industries using asbestos have had high rates of lung cancer because they inhale fine particles of this substance over long periods of time. Some farmworkers have had high rates of cancer after improperly using certain pesticides. The rates of industry-related cancers have been reduced by use of protective clothing, air filters, and banning some harmful chemicals.

Some cancers can be prevented by changing lifestyle habits to reduce exposure to carcinogens. One example is the link between smoking and lung cancer. Smokers are far more likely to die of lung cancer than non-smokers and they can reduce this risk by not smoking. Another example is the connection between sun exposure and skin cancer. People who spend many hours in the sun without protective clothing or sunblock have a high risk of developing skin cancer, caused by ultraviolet radiation from the sun. The incidence of skin cancer in Canada is on the rise. About 8000 cases of skin cancer are diagnosed each year in Canada.

Although prevention is better than cure, there are some treatments that can slow or stop the spread of cancer in patients who already have the disease. The techniques consist of destroying the cancerous cells while leaving normal cells intact. This can be done by chemicals (**chemotherapy**) or by radiation treatment – using high-energy particles to kill cells. These treatments are most successful if the cancer is diagnosed in an early stage, before the abnormal cells have spread widely through the body.

New techniques may give better methods of curing cancer in the future. One method is gene therapy, the altering of genes that cause cells to divide and produce cancer. Alternative therapies focus on ways to boost the body’s own natural immune system. For example, people may be able to use vaccines or drugs that stimulate their bodies to destroy cancer cells, making them immune to cancer.

Researchers hail new cancer treatment: Unlocking the body's immune system

Don Melvin, CNN – June 4, 2015

Researchers meeting in Chicago are hailing what they believe may be a potent new weapon in the fight against cancer: the body's own immune system.

An international study found that a combination of two drugs that helped allow the immune system to fight the cancer -- ipilimumab and nivolumab -- stopped the deadly skin cancer melanoma from advancing for nearly a year in 58% of the cases.

Melanoma, though a skin cancer, can spread to the lungs, liver, bone, lymph nodes and brain. The study was designed and led by Memorial Sloan Kettering Cancer Center in New York.

Other studies have shown promise in treating lung cancer. The research is being presented in Chicago at the annual conference of the American Society of Clinical Oncology and published in *The New England Journal of Medicine*.

Those involved in the fight against cancer are divided as to just how excited to get over the promise of immunotherapy in battling cancer.

"Immunotherapy drugs have already revolutionized melanoma treatment, and now we're seeing how they might be even more powerful when they're combined," said Dr. Steven O'Day, an expert with the American Society of Clinical Oncology.

"But the results also warrant caution -- the nivolumab and ipilimumab combination used in this study came with greater side effects, which might offset its benefits for some patients. Physicians and patients will need to weigh these considerations carefully," O'Day said.

In the study, 36% of the patients receiving the two-drug combination had to stop the therapy due to side effects. Both drugs are made by Bristol-Myers Squibb, the sponsors of the study.

And Nell Barrie, a spokeswoman for Cancer Research UK, while calling the results "encouraging" and "promising," told CNN that much remains to be learned and the new drugs would not replace any of the existing cancer treatments.

Surgery, she said, would remain vital. So, too, would chemotherapy and radiotherapy, she said.

She noted that researchers had yet to study the long-term survival rates for immunotherapy. And the side effects can include inflammation of the stomach and bowel serious enough to require hospitalization, she said.

But Dr. James Larkin, the lead author of the melanoma study, called the results a game changer.

"We've seen these drugs working in a wide range of cancers, and I think we are at the beginning of a new era in treating cancer," Larkin told *The Telegraph*, a British newspaper.

Barrie said immunotherapy could offer hope to people with cancers that are otherwise difficult to treat, such as melanoma, advanced lung cancer or cancer that has spread throughout the body.

"We're looking at another weapon in the arsenal," she said.

At the heart of immunotherapy is that cancer -- unlike most other diseases -- is not an invader. It consists instead of the body's own cells gone rogue.

So the immune system is not programmed to target the cancerous cells because it does not recognize them as foreign.

The immunotherapy drugs, Barrie said, "work to switch the immune system back on."