

<b>CHAPTER 18</b>	<b>Prevention Of Cancer</b>	<b>BLM 18.3.4</b>
<b>HANDOUT</b>		

## Smoking

Smoking and second-hand smoke inhalation are the most preventable causes of cancer in Canada. Cigarette smoke is linked to the development of numerous cancers. (This is discussed in the handout FAQ—Tobacco and Cancer in greater detail.) 80 carcinogens are found in cigarette smoke, along with many other toxic compounds. These carcinogens are chemical mutagens. They cause cancer by entering the nucleus of a cell and inducing mutations by reacting chemically with the DNA. A chemical mutagen may act by inserting itself into the DNA molecule in a manner that causes a nucleotide substitution or a frameshift mutation. Other chemical mutagens have a structure that is similar to the structure of ordinary nucleotides but with different base pairing properties. When these mutagens are incorporated into a DNA strand, they can cause incorrect nucleotides to be inserted during DNA replication. Over time, these mutations can result in cancer.

## Diet and Exercise

A healthy diet and regular exercise have a big influence on the risk of developing cancer. Next to stopping smoking, eating a healthy diet, maintaining a healthy weight, and getting enough exercise are the most important lifestyle habits a person can maintain to reduce the incidence of cancer. Overweight individuals have a higher risk of developing certain cancers, including breast, colon, kidney, esophageal, and endometrial (referring to the lining of the uterus) cancers. Additionally, people who carry excess body weight produce more insulin and estrogen, hormones that have been linked to accelerated tumour growth. Increasing physical activity and decreasing portion size are two good ways to maintain a healthy weight. The food choices an individual makes can also reduce his or her cancer risk. With regards to cancer prevention, studies have shown that eating at least 5 servings of fruits and vegetables a day reduces the risk of many cancers, including cancers of the lung and digestive system. Research has shown that brightly coloured fruits and vegetables have a particularly high level of cancer-fighting nutrients. Consumption of red and processed meats is linked to an increased risk of cancer.

## Sun Exposure

Ultraviolet (UV) radiation is a known physical mutagen. Physical mutagens cause physical changes in the structure of DNA. They tear through DNA molecules, causing random changes that range from point mutations to the loss of large portions of chromosomes. The resulting mutations can lead to tumour formation. Increased risk of skin cancers, such as the highly curable basal and squamous cell (types of skin cells) cancers, as well as the more dangerous melanoma, is indisputably linked to exposure to UV radiation, both from the sun and artificial tanning. The best way to reduce this risk is to limit sun exposure to short periods of time when the sun is less intense and to “practice safe sun” by wearing sunscreen and protective clothing. X-ray radiation is an even more powerful physical mutagen than UV radiation, and exposure to these rays should be limited if possible.

## Environment

Today's society is home to many carcinogens. These include chemical mutagens, such as many chemical additives, environmental pollutants, drugs, and hormonal treatments; physical mutagens, including most forms of radiation; and even infectious diseases, such as bacteria, viruses, and parasites. Infectious disease may increase cancer risk by compromising the immune system, causing long-term inflammation in the body, or by directly interfering with the body's DNA. While some infectious diseases have been found to play a role in the development of cancer, it is important to bear in mind that most people who get these infections do not go on to develop cancer. Certain varieties of HPV (human papilloma virus) have been linked to cervical cancer, the second most common cancer in women, as well as cancer of the penis, vagina, and anus, among others. A vaccine that prevents four of the most common forms of HPV (two-high risk types and two low-risk types) has been available in Canada since 2006. While the vaccine has been shown to provide protection against these four forms of the virus, it will not treat a pre-existing infection.

## Early Detection

A last, but important, means of preventing cancer is early detection. In some cancers, such as cervical cancer, pre-cancerous cells can be easily detected. Prompt treatment in cases of early detection can often stop tumour formation. Even in cases where cancer has already developed, early detection can significantly increase the cure rate or future life expectancy of an individual.