

CANCER

What is Cancer?

Cancer involves a number of diseases (approximately 100) that are characterized by abnormal and uncontrolled cellular growth. Any cell can become cancerous if it is exposed under the right conditions to carcinogenic (cancer producing) substances. These substances produce mutant cells that divide and grow uncontrollably. But carcinogens are not the only cancer-causing agents. Some cancerous tumors are probably caused by viral infections. Experimenters have shown that viruses could be isolated from certain tumors, and when implanted in members of the same species, they caused virus-containing tumors in the new hosts.

Normal cells follow an orderly pattern of division and growth which, in adulthood, is restricted to the replacement of lost cells. Cancerous cells lose their responsiveness to the body's signals to stop dividing, so that they and all of their offspring continue to grow wildly. The result is a mass of tissue growth called a tumor, or **neoplasm** (new tissue). A cancerous tumor is malignant. It grows rapidly and is not confined or localized. Cancerous tumors invade surrounding tissues and compete with normal cells for space and nutrients. Eventually, they interrupt the normal function of the tissues or organs in which they have grown.

Malignant tumors also shed their cells. These offspring ride the fluid pathways of the lymph and circulatory systems, where they invade and colonize other area of the body. Metastasis is the medical term that defines the spread of cancer in this manner.

The processes that transform normal cells to malignant ones are complex and essentially unknown, but it appears that the cell's genetic material may be involved. **Oncogenes** are a part of that genetic material. Oncogenes probably start out as normal genes that undergo mutation. As the oncogenes mutate, they in turn change the character of the cells in which they reside, giving them their malignant characteristics. Because the oncogenes are part of the cell's genetic material, they are passed on from the parent cells to their progeny, which are malignant also. Researchers are attempting to identify and study the products produced by the oncogenes. If these can be identified, their analysis may yield information regarding who may have incipient cancer (cancer in its earliest stages). Since early detection is the key to curing cancer, early identification would significantly reduce mortality from the disease.

Surgery is the prescribed course of action as long as cancer is localized, but it is ineffective after metastasis. Cancer that has metastasized is treated with chemotherapy, radiation, or both. These modalities destroy cancerous cells or interfere with their division and growth. Unfortunately, normal cells respond to and are affected in the same manner, particularly those whose growth rate is rapid. Fast-growing blood cells and cells lining the digestive tract are susceptible to radiation and chemotherapy. Side effects associated with the cells' destruction cause substantial discomfort for patients who must be treated in this manner.

Cancer is considered cured when a patient shows no symptoms of the disease five years after treatment has stopped. Many persons in health-related professions and the medical profession agree that approximately 80 percent of all cancers could be avoided by intelligent lifestyle choices.

Role of Exercise in the Prevention of Cancer

The Harvard Alumni Study showed that cancer mortality was the highest in those who exercised least, even after age and cigarette smoking were accounted for. Women who participated in athletics for at least one year or who expended at least 1,000 calories per week in exercise and physical activity had a lower risk of developing breast cancer and cancers of the reproductive system than did sedentary women.

The evidence of a relationship between physical fitness and cancer is mounting but it falls short of establishing cause and effect. However, the results of the epidemiological studies that are investigating this relationship are encouraging as they reveal a role for exercise and physical fitness in preventing cancer ...

a) Role of exercise in reducing body fat. The amount of body fat is positively correlated with the incidence of cancer. For instance, fat in adipose tissue stimulates the production of estrogen, while slimness reduces the estrogen drive. The risk of cancers of the female reproductive system are positively associated with high estrogen levels.

b) Exercise may act as a stimulant to the body's immune system, which usually recognizes and destroys cancerous cells early in their development. Three types of immune cells function in an integrated manner to guard against the developing of cancer: (1) cytotoxic T cells, (2) natural killer cells, and (3) macrophages. All three types of cells directly attack and destroy cancer cells. Several studies have shown that exercise may augment or boost the immune system. Vigorous exercise stimulates the release of Interleukin-2, which enhances the activity of the cytotoxic T cells and natural killer cells.

Strenuous exercise increases blood levels of natural killer cells and of B and T lymphocytes. The natural killer cells (rupture) and destroy many kinds of virus-infected host and tumor cells. The B lymphocytes produce antibodies that attack substances that are recognized as foreign to their host, including viruses, bacteria, organ transplants, cancerous cells, and so on.

Source: Rosato, F.D., "Fitness for Wellness: The Physical Connection," Minneapolis: West Publishing Co., 1994.

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Toxins (free radicals) create specific molecules which combine with the cell and changes cellular makeup. Ten years ago, one in twenty women were diagnosed with breast cancer. Today, one in eight women have cancer. Society is now looking more at preventative medicine.

There is a correlation between cancer and (a) obesity (high fat diet), (b) lack of dietary fibre, and (c) sedentary lifestyle (↓ exercise).

High fat content in diet:

- Rancid fats create free radicals (toxins);
- A person can reduce toxins in the body by reducing fat content in diet.

Lack of dietary fibre:

- increases the risk of colon cancer;
- fibre absorbs toxins and excessive fats;
- quick excretion rids the body of waste before it becomes toxic (body creates toxins).

Sedentary Lifestyle:

- an increase in exercise = a reduction in fat
= increase in transit time (evacuate stool)
= ↑ immune system (↑ killer cells B & T)

Apply What You Know