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Cancer: A challenging disease

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Abstract
This paper presents the recent advancement in treatment of cancer. Cancer can grow in any part of body. The recent advancements in cancer treatment are multimodal imaging, three-dimensional (3D) visual technology, combinational therapy, nanomedicine immunotherapy, epigenome therapy, surgery including plastic surgery, robotic radiotherapy, hormonal and photothermal therapy, chemotherapy. There are different type of cancer and their treatment are challenging.

Keywords: cancer, combinational therapy, nanomedicine immunotherapy, epigenome therapy

Introduction

Cancer is a class of many diseases characterized by uncontrolled or abnormal cell growth. There are around 100 related varieties of cancer, and each is grouped by the type of cell that is affected initially. It's symptoms vary depending on the type. Cancer treatment may include chemotherapy, radiation, or surgery etc.

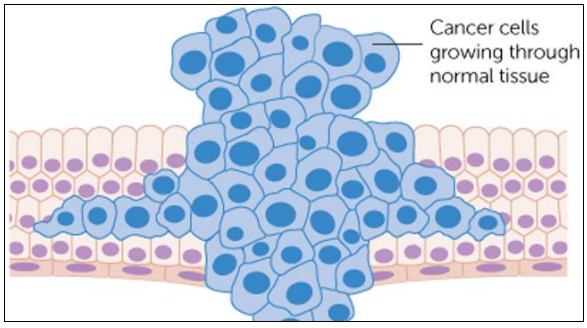

Fig 1

Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and divide to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place.

All cancers begin in cells. Our bodies are made up of more than a hundred million million (100,000,000,000,000) cells. Cancer starts with changes in one cell or a small group of cells. Usually, we have just the right number of each type of cell. This is because cells produce signals to control how much and how often the cells divide. If any of these signals are faulty or missing, cells may start to grow and multiply too much and form a lump called a tumor. A primary tumour is where the cancer starts.

Differences between Cancer Cells and Normal Cells

Cancer cells differ from normal cells in many ways that allow them to grow out of control and become aggressive. One important difference is that cancer cells are less specialized than normal cells. That is, whereas normal cells mature into very distinct cell types with specific functions, cancer cells do not. This is one reason that, unlike normal cells, cancer cells continue to divide without stopping. In addition, cancer cells are able to ignore signals that normally tell cells to stop dividing or that begin a process known as programmed cell death, or apoptosis, which the body uses to get rid of unneeded cells. Cancer cells may be able to influence the normal cells, molecules, and blood vessels that surround and feed a tumor—an area known as the microenvironment. For instance, cancer cells can induce nearby normal cells to form blood vessels that supply tumors with oxygen and nutrients, which they need to grow. These blood vessels also remove waste products from tumors. Tumors can also use the immune system to stay alive and grow. For example, with the help of certain immune system cells that normally prevent a runaway immune response, cancer cells can actually keep the immune system from killing cancer cells.

Different types of cells in the body do different jobs, but they are basically similar. They all have a control centre called a nucleus. Inside the nucleus are chromosomes made up of thousands of genes. Genes contain long strings of DNA (deoxyribonucleic acid), which are coded messages that tell the cell how to behaviour.

Many cancers form solid tumors, which are masses of tissue. Cancers of the blood, such as leukemias, generally do not form solid tumors.

Cancerous tumors are malignant, which means they can spread into, or invade, nearby tissues. In addition, as these tumors grow, some cancer cells can break off and travel to distant places in the body through the blood or the lymph system and form new tumors far from the original tumor.

Unlike malignant tumors, benign tumors do not spread into, or invade, nearby tissues. Benign tumors can sometimes be quite large, however. When removed, they usually don't grow back, whereas malignant tumors sometimes do. Unlike most benign tumors elsewhere in the body, benign brain tumors can be life threatening.

Living with cancer

Many kinds of cancer are treatable, especially when detected early. Cancer treatments continue to get better. Life expectancy after a cancer is much higher than it used to be. Living with cancer during treatment can be stressful. Treatments can have different side effects on your body. Take good care of yourself. Eat a healthy diet, get plenty of sleep, and try to keep your energy up by staying mildly active. Even after your cancer goes into remission, you are at higher risk of cancer returning to your body. Being in partial means you may be able to take a break from treatments as long as the cancer stops growing. If you are in full remission, there is no evidence of the disease still in your body. You will need to get regular follow-up care and check-ups for years after your treatment.

Treatment for Cancer

The efficiency of cancer treatment has potentially improved in last two decades, owing to advancement. The recent advancements in cancer treatment are multimodal imaging, three-dimensional (3D) visual technology, combinational therapy, nanomedicine immunotherapy, epigenome therapy, surgery including plastic surgery, robotic radiotherapy, hormonal and photothermal therapy, chemotherapy. Different type of cancer type are present like lung cancer, breast cancer, skin cancer, bladder cancer, thyroid cancer etc.

Surgery

It is the oldest technique for cancer treatment. When used to treat cancer, surgery is a procedure in which a surgeon removes cancer from your body.

Radiation Therapy

Radiation therapy also called radiotherapy or X-ray therapy. Radiotherapy plays an integral role in the treatments of more than 50% of cancer cases. For some patients, radiation therapy is used at the place of surgery, offering the advantage of organ preservation. It is sometimes used before surgery to improve resection rates or after surgery to reduce recurrence rates. Radiation therapy is a type of cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumors. Results may be improved if radiotherapy is combined with the chemotherapy. Radiation therapy may be used to treat almost every type of solid tumor, including cancers of the brain, breast, cervix, larynx, liver, lung, prostate, skin, stomach, uterus, or soft tissue sarcomas. Radiation is also used to treat leukemia and lymphoma. Radiation dose depends on a number of factors, including the radio sensitivity of each cancer type. The process of delivering radiotherapy is multi-step process. Radiation therapy has side effect. It can damage DNA in process of killing cancer cell. It also leads to dry mouth from contact of salivary glands to radiation.

Chemotherapy

Chemotherapy is a type of cancer treatment that uses drugs to kill cancer cells. Mostly, chemotherapy targ*et al*l rapidly dividing cells and it is not specific to cancer cells. Hence, chemotherapy has the potentially harmful effect on healthy tissue, especially those tissues that have a high replacement rate like intestinal lining. These cells usually repair themselves after chemotherapy. For the better results combinational chemotherapy is used. In this process two or more drugs are often given to the patient at the same time. This is called combination chemotherapy. Results may be improved if radiotherapy is combined with the chemotherapy.

Immunotherapy

It is well-known that our immune system works to protect the body against infection, illness and disease. It can also protect us from the development of cancer. Immunotherapy is a type of treatment that helps your immune system fight cancer. It is a series of agents designed to stimulate the immune system in order to generate tumor-specific immune response, is showing promise in treatment of various cancers. It is also called biologic therapy, is a type of cancer treatment that boosts the body's natural defenses to fight the cancer. It uses substances made by the body or in a laboratory to improve or restore immune system function. Immunotherapy may work in these ways by stopping or slowing the growth of cancer cells, stopping cancer from spreading to other parts of the body, helping the immune system work better at destroying cancer cells. There are numerous types of immunotherapy, like Monoclonal antibodies, Non-specific immunotherapies, Oncolytic virus therapy, T-cell therapy, Cancer vaccines.

Targeted Therapy

Targeted therapy is a type of cancer treatment that targets the changes in cancer cells that help them grow, divide, and spread. Targeted Therapy is currently a very active research area. In other words, targeted cancer drugs work by ‘targeting’ those differences that help a cancer cell to survive and grow. They are a standard treatment for some types of cancer and are also in clinical trials. In this therapy, drugs are used to target the specific genes or proteins. These genes and proteins are found in cancer cells or in cells related to cancer growth, like blood vessel cells. Doctors often use targeted therapy with chemotherapy and other treatments.

Bisphosphonates, Cryotherapy and Hormonal therapy

Bisphosphonates are drugs that help prevent or slow down bone thinning (osteoporosis). They can help to treat some types of cancer that cause bone damage. Cryotherapy is a treatment that uses extreme cold to destroy cancer cells. Cryotherapy can be used to treat a number of different types of cancer. The growth of some cancers can be stopped by providing or blocking certain hormones. Hormone-sensitive tumors include certain types of breast and prostate cancers. Removing or blocking estrogen or testosterone is often an important additional treatment.

It is found that exercise training for cancer patients is beneficial. Physical exercises are helpful in reducing the cancer occurrence and inhibit tumor growth. Exercise has a role in controlling cancer development through a direct effect on tumor-intrinsic factors, interplay with whole-body exercise effects, alleviation of cancer-related adverse events, and improvement of anti-cancer treatment efficiency. It is correctly said that Prevention is better than cure. Avoid the smoke, tobacco and alcohol significantly lower the chance of several types of cancer such as lung, throat, mouth, and liver cancer. Skin cancer can be prevented by staying in the shade,

protecting yourself with a hat and shirt when in the sun, and using sunscreen. Diet is also an important part of cancer prevention. Physicians recommend diets that are low in fat and rich in fresh fruits and vegetables and whole grains.

Conclusion

Immunotherapy increases human body's immune system to fight cancer. Treatment may be improved if radiotherapy is combined with the chemotherapy. X-rays therapy plays an important role in the treatments of a large number of cancer cases. The growth of some cancers can be stopped by providing or blocking certain hormones. Extreme cold is used to destroy cancer cells. Physical exercise and diets of low in fat and rich in fresh fruits and vegetables and whole grains are helpful in cancer prevention.

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