Cancer

In a healthy individual, cells proliferate only when needed and undergo programmed cell death when no longer necessary. However, in some cases, these cells experience uncontrolled growth, leading to the formation of tumors. Most of these tumors are benign, growing slowly and remaining dormant without posing a threat to life. On the other hand, some tumors are aggressive, spreading to nearby organs and other parts of the body through the bloodstream, becoming life-threatening. This condition is referred to as cancer or malignancy. Cancer is not a single disease; rather, it encompasses a group of several diseases, all characterized by the uncontrolled growth of unnecessary cells.

Cancer, often regarded as the modern-day plague, has become more prevalent due to advancements in antibiotics, reducing death rates from infections and increasing the average life expectancy. The risk of developing cancer rises with age, with estimates showing a higher occurrence in people over 65. One in three men and one in five women between the ages of 60 and 80 are affected by this disease. Among the leading causes of death, cancer comes after heart disease. While prostate cancer is commonest in men, breast cancer is commonest women. However, lung cancer ranks first among cancers that cause death. The prevalence of cancer varies significantly depending on the geographic region, for example, stomach cancer being more common in Japan and cervical cancer being more prevalent in India.

The term "cancer" originates from the Latin word for crab, as Hippocrates, the famous philosopher and physician, likened cancer cells to crabs, moving from one part of the body to another and forming new tumors, resembling burrowing crabs on the shore.

The primary reason normal cells can transform into cancer cells is due to mutations in their DNA. These genetic alterations, disrupt the control of cell growth, division, birth of new cells, and cell death. When genes that promote cell division go out of control, genes that halt division fail, or genes responsible for instructing cells to undergo apoptosis (cell suicide) malfunction, cells become cancerous. A single cell can divide uncontrollably and give rise to a full-fledged cancerous tumor with unique properties due to new mutations.

Causes of mutations in healthy cell genes can include inherited factors from parents or exposure to substances in the environment. Chemicals found in cigarette smoke, tobacco, artificial food colors, and radiation from sunlight, X-rays, or nuclear power plants are among the factors that can cause cancer-related mutations. Viral infections can also lead to mutations, contributing to various cancers such as liver cancer caused by the Hepatitis virus, cervical cancer by HPV, blood cancer by HTLV, and blood vessel cancer by KSHV.

Once a cell transforms into a cancerous cell, it undergoes further

mutations in its descendants, acquiring the ability to spread to other parts of the body through various routes. Some cancer cells spread to nearby organs, others to the lymph nodes, while some directly infiltrate blood vessels and travel through the bloodstream to distant locations like the lungs, bones, brain, liver, and other organs, where they form new cancerous tumors.

The symptoms of cancer depend on the affected organ. For instance, lung cancer may cause coughing, large intestine cancer may result in constipation, breast cancer can manifest as a painless lump, and skin cancer might lead to non-healing ulcer. Regardless of the organ involved, common problems such as loss of appetite, weight loss, and weakness may be observed.

A crucial test to confirm a cancer diagnosis is a tissue biopsy. A small piece of the tumor is removed and examined under a microscope to determine whether it is cancerous or benign. The biopsy can also reveal information about the tumor's aggressiveness, rate of division, and DNA changes. Another method for tissue examination is Fine needle aspiration cytology (FNAC), wherein cells are extracted through a needle and studied under a microscope. Tests like chest X-ray, sonography, CT scan, and MRI can help determine the stage of cancer.

The question on everyone's mind is when a cure for cancer will be discovered. This remains challenging to answer definitively. Certain types of cancer, such as Hodgkin's lymphoma, can be completely cured even in advanced stages. However, some cancers, like pancreatic cancer, still present significant challenges for long-term survival. The journey of cancer treatment dates back to the 1940s when Yallapragada Subbarao, an Indian-origin doctor in America, discovered the drug Aminopterin and initiated the use of "chemotherapy" to treat blood cancer. Chemotherapy targets rapidly dividing cells, including cancer cells, but it can also affect healthy cells like hair follicles, bone marrow, and the lining of the intestines, leading to side effects such as hair loss, anemia, reduced white blood cells, and peptic ulcers.

Advancements in medical research have led to the development of targeted therapies that specifically attack cancer cells while sparing normal cells. For example, the drug Herceptin targets a protein called HER2-NEU expressed in breast cancer cells. Imatinib is effective in controlling chronic myeloid leukemia, a type of blood cancer. Numerous such targeted therapies are available for various organ-related cancers, though they often come with a high cost. The list of these medicines continues to grow as new discoveries are made every month.

Another treatment method for cancer is radiotherapy. Emil Grubbe, a young medical student in Chicago, invented this method. In this treatment, high intensity X-rays are applied to the cancer tissue for a few minutes. This damages the cells of the cancer and destroys them. A side effect of this treatment is reddening of skin exposed to radiation. But this treatment does not cause pain.

As everyone knows, a cancerous tumor can be removed through surgery. If the cancer is detected at an early stage, the entire tumor can be surgically removed and the disease can be completely cured. In the surgery done for cancer, not only the tumor but also nearby muscles, organs, lymph nodes and other tissues are cut and

removed. This is called "Radical Surgery". William Halsted popularized this surgical technique.

A treatment plan is made by looking at the organ affected, its extent and symptoms. Surgery, chemotherapy and radiotherapy, these three treatment methods are used in combination of one or two to three methods. When the cancer spreads throughout the body and cannot be cured by any treatment, through "Palliative Care" the patient is given pain-free life for as long as he lives.

For patients with cancer, it is very important to pay attention to the one's diet. Eating foods rich in protein, vitamins and minerals can help repair damage to the body caused by treatment and disease.

Although two-thirds of cancer can be cured in the current situation, cancer causes immense psychological distress. More than the disease, the patient suffers from this psychological distress, fear of death and feeling of social isolation. So it is very important for these patients to be comforted, encouraged and supported by relatives and friends. For this purpose, there are some social organizations where the patients and their relatives can get help from.

If proper precautions are taken, the death and suffering caused by the cancer can be prevented. If one stays away from Gutka, tobacco, alcohol, and cigarettes, the chances of having cancers in mouth, throat, lungs, stomach, intestines, and liver are very less. The use of more vegetables and fruits in the diet is also beneficial. Cancer can be detected at an early stage through some specific tests. For example, cervical cancer can be detected by Pap test, colon and stomach cancer by endoscopy, breast cancer by mammography. Thus, if cancer is detected at an early stage, it is easy to cure it completely.

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