



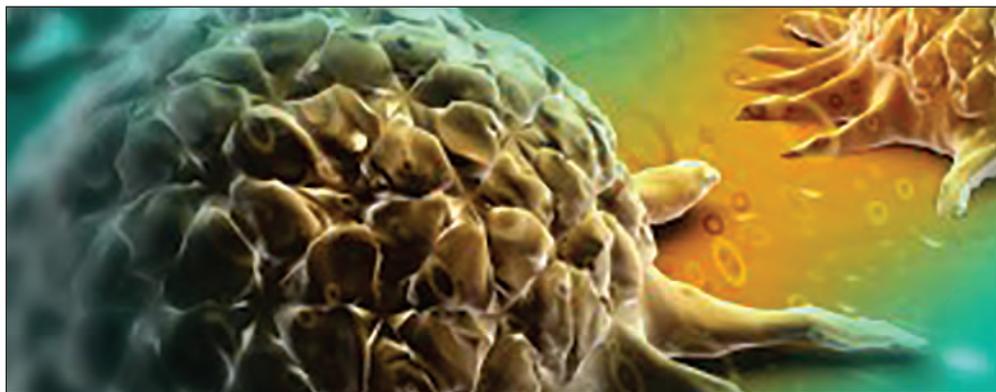
Immuno-oncology – a “Vajra” against lung cancer

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LUNG cancer is the leading cause of cancer-related mortality worldwide. According to the latest Globocan data 2018, there are 67,795 new cases of lung cancer which comprises around 5.9 per cent of all cancer types in India. The incidence is higher in males with 38,687 new patient cases in 2018 in India comprising 8.5 per cent of all cancer types. It is the fourth most common cancer in India and the third largest reason for cancer related deaths. Targeted therapy in the form of monoclonal antibodies and tyrosine kinases inhibitors have redefined treatment options for patients with lung cancer with mutations (e.g., epidermal growth factor receptor [EGFR]-mutant, anaplastic lymphoma kinase [ALK]-rearranged NSCLC). However, majority of the patients lack such genetic alterations; in whom these therapies are ineffective. Immunotherapy has become an integral part of the treatment for these patients and has led to improvements in survival and quality of life.

Lung cancer – a devastating disease

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Lung cancer is one of the commonest cancers that affects us today, a devastating disease that accounts for about 27 per cent of all cancer deaths, and is by far the leading cause of cancer death among both men and women. Each year, more people die of lung cancer than of colon, breast, and prostate cancers combined. November is observed as

Lung Cancer Awareness Month to raise awareness about this dreaded disease

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A need for new therapies

While modern medicine has found solutions for and improved the quality of life for patients suffering from different conditions, eradicating many diseases and extending the average lifes-

pan, cancer is still a challenge. Chemotherapy and radiation are still effective methods in fighting cancer, but they have the disadvantage that during treatment normal cells are also killed along with the cancerous cells. The effect on normal healthy cells like blood and hair cells leads to the complications resulting from these methods of treatment. The push today is therefore towards therapies that target only the cancer cells and don't affect the normal cells. These are called as 'targeted therapies'.

Targeted therapies

Targeted therapies are the latest weapon in the doctor's

arsenal to fight cancer. Targeted therapies use drugs or other substances to identify and attack specific types of cancer cells with less harm to normal cells. Targeted therapy has fewer side effects than other types of cancer treatment. There are two main types of targeted therapy – Immunotherapy with monoclonal antibodies, called as mAbs, and Small molecule drugs. Effective targeted therapy is today available for some types of cancer including breast cancer, colorectal cancer and lung cancer.

Immunotherapy

Immunotherapy affects the immune system and modifies

it so that it can recognize that the cancer cells are not a normal part of the body, but foreign to it. Immunotherapy provokes the immune system into attacking the tumour cells by using these cancer antigens as targets. Thus, the body's own immune mechanisms are used to fight cancer, inhibiting cancerous cells while leaving healthy cells unaffected and with fewer side-effects.

Immunotherapy is based on the fact that cancer cells have subtly different molecules or antigens on their surface as compared to normal healthy cells that can be detected by the immune system. There are three main groups of immunotherapy used to treat cancer: antibody therapies, cell-based therapies, and cytokine therapies. Cell-based therapies and cytokine therapies are still in the research phase and not used clinically.

There are three Immunotherapy drugs which are approved for treatment of Carcinoma of lung. These drugs are given through Intravenous route every 2-3 weekly. These drugs are highly effective if given to an appropriate selected advanced lung cancer. These drugs have not only increased the response rates but have also prolonged life in advanced cancer patients.

Although uncommon these drugs can sometimes keep the disease in control for very long time.

The side effects of immunotherapy are related to its actions that allow the immune system to attack cancerous tissue. This can affect normal (healthy) tissue as well; as a result, a variety of side effects can occur, including skin reactions, colitis (inflammation of the colon), pneumonitis (inflammation of the lungs), and endocrine disorders such as thyroid disease.



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Immunotherapy holds promise as treatment option

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However all the above side effects are not so common and the side effects are much lesser than chemotherapy. In future Immunotherapy drugs will be combined with chemotherapy and radiation therapy for better disease control with the availability of these drugs. There is a new weapon in the armamentarium to fight lung cancer. However these drugs are currently costly because of new technology patents and are not assessable to many in our country.

Monoclonal Antibody (mAb) Therapies

Antibody therapies are currently the most successful form of immunotherapy, with many approved treatments for a wide range of cancers. Monoclonal antibodies or mAbs have resulted from developments in immuno-oncology and drugs that target the body's immune system to help fight cancer are changing the game. It was in 1980 that the first patient with relapsed lymphoma was treated using a therapeutic antibody approach. The learnings from this early procedure laid down the groundwork that led to the use of antibodies in the treatment of cancer with targeted therapy with the last two decades seeing major progress in immunotherapy.

Antibodies are proteins produced by the immune system that bind to a target antigen on the surface of a cell. In normal physiology they are used by the immune system to fight pathogens. Researchers can design antibodies that specifically bind to antigens found on cancer cells. They then make many copies of that antibody in the lab. These are known as

monoclonal antibodies (mAbs) and used in the treatment of cancer. The word 'monoclonal' comes from the fact that they are produced from a single cell.

mAbs in lung cancer

Lung cancer was earlier classified into two major types: small cell and non-small cell. Research has revealed more information on lung cancer and the pres-

ence of several sub-types, each characterized by mutated genes and abnormal proteins. The advantage of these findings is that the new targeted therapies can be used to keep these cancers in check.

One example of a targeted therapy is the human monoclonal antibody or mAb, nivolumab which is a targeted therapy that blocks action of a protein called PD-1 (human programmed death

receptor-1), that prevents T cells from recognizing and attacking inflamed tissues and cancer cells. As the T cells can now recognize cancer cells, they attack it resulting in decreased tumour growth. Nivolumab is used to treat patients with metastatic non-small cell lung cancer (NSCLC). Another example is patients with lung cancer who test positive for mutations in a gene called

EGFR respond better to targeted therapy with the mAb 'erlotinib'.

Immunotherapy holds great hope and promise as a successful treatment option for lung cancer patients. Immunoncology using mAbs is a modern day 'vajra' in the fight against cancer! ◆

(The author is Consultant, Medical Oncology, Hinduja Healthcare Surgical)



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