



Editorial

Cancer

A.G. Nerkar^{1,2,3,*}

¹Dept. of Medicinal Chemistry and Pharmacology, Parul Institute of Pharmacy & Research, Parul University, Vadodara, Gujarat, India

²Founder and Director, Ateos Foundation of Science Education and Research, Pune, Maharashtra, India

³Founder and Director, Carolene Therapeutics, Pvt. Ltd., Aurangabad, Maharashtra, India



ARTICLE INFO

Article history:

Received 08-09-2021

Accepted 20-09-2021

Available online 16-11-2021

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](#), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Cancer may develop in any part of your body. Individual is said to be affected with cancer when abnormal cancer cells grow out of control and over populate the normal cells. This phenomenon makes it hard for the human body to work as they should. Cancer now a days can be cured in fact a vast number of people can lead full lives after cancer treatment. There are many types of cancers. All types of cancers are alike but they are different in the ways they grow and spread.

1.1. A likeness

All cells in human body have certain function. Normal cells divide in orderly way, and they die when cells are damaged or worn out and new cells take their place. In cancer normal function of the cells of this death and worn out is affected and the cells do not go the process of cell death or apoptosis. This leads to the crowding out over the normal cells, thus causing a problem in the body part where it has affected.

Cancers can also spread to other parts also called as metastasis.

1.2. Difference

Some cancers are slow to grow and spread fast. Some cancers require surgeries and some cancers are treated best with chemotherapy. Often combination of treatments is used to get the best results. Cancer patients are treated types of cancers they have. Mostly some of the cancers form tumour or lumps.

1.3. Tumour

Most cancers forms lumps or tumours or a growth, depending upon the type of the tumour it may be cancerous or malignant or it may be benign or non-cancerous. The malignancy of a tumour lump is proved after a piece of tumour lump being examined and this procedure is known as biopsy. Exception to the tumours or malignancy is blood cancer which do not form tumours but this type of cancer or malignancy grows in the blood cells or other cells of the body.

1.4. Causes of cancer

Cancer is a complex disease and due to this it may have many possible causes, some causes include lifestyle habits, genetics, carcinogens, environmental factors, etc. Sometimes there may be no obvious cause or cause may be unknown.

* Corresponding author.

E-mail address: dragnerkar@gmail.com (A. G. Nerkar).

1.5. Stages of cancer

The cancer stages can be divided as confined tumours to the origin or spreads to the other parts of the body. Knowing the stages of cancer helps oncologists to decide exact suitable treatment to be administered. Each stages as a rule can be detected by tests as a rule,

- Stage 1 or 2: means that cancer has not spread very much.
- Stage 3 or 4: Means it has spread to more parts of the body.
- Stage 4: It is the highest stage indicating the spread of the cancer.

1.6. Treatment

1.6.1. Common treatments of cancer include

1. Surgery
2. Medicines (drugs)
3. Radiation
4. Sometimes a combination of the above treatments is sued depending upon the type and stage of cancers.
5. Surgery

Depending upon how much cancer has affected the body part this is being planned and may sometimes involve removal of the part being highly affected. For example, in breast cancers parts (or all) of the breast might be removed. In prostate cancers, prostate gland might be removed. Surgery may not be used for all types of cancers. Rather than surgery, blood leukaemia are best treated with medicines since there is no tumour in blood cancers.

1.6.2. Chemotherapy

Medicines are used to slow the growth of cancerous cells or kill the growing cancers. These drugs may either be given by IV (intravenous) route or by oral route. i.e., a pill to swallow. Each drug may have different mechanism of action and sometimes one or more drugs are used together to treat cancer. The different kinds of drugs used to treat cancers are:

1. Chemotherapy drugs
2. Targeted therapy drugs
3. Immunotherapy drugs
4. Hormone Therapy drugs
5. Radiation

Radiation also used to kill or slow the growth of cancer cells. It can be used alone with surgery or chemotherapy. It is similar procedure just as getting an X-Ray.

2. History of Cancer

2.1. First chemotherapeutic agent

On Dec 2, 1943, Bari's harbour was bombed by German bombers. A ship named SS John Harvey carrying secret

cargo of 100 tons of liquid mustard gas. Many seamen on surrounding ships who survived developed blisters of epithelial surfaces, leukopenia and profound lymphoid and myeloid suppression, which was evident on autopsies. This information was found useful for Goodman and Gillman-two pharmacologists from the Yale school of medicine and reasoned that this agent could be used to treat lymphoma.

2.2. Chemotherapy

It may be defined as modality of cancer therapy that involves the administration of chemical agent to destroy the cancer cells. Cancer chemotherapy aims at cure where possible and palliative where cure is impossible. The chemotherapies are effective with understanding the principles and tumour biology, cellular kinetics, pharmacology and drug resistance. The results of chemotherapy through 1949 till 2015 are given as under:

Chemotherapy can cure the following cancers even in advanced stages:

1. Germ-Cell tumours (i.e. testicular cancers)
2. Hodgkin's disease
3. Non-Hodgkin's lymphomas
4. Gestational Choriocarcinomas
5. Paediatric tumors (i.e. lymphomas, leukaemia, neuroblastomas, bone sarcomas)

2.3. Prolonged survival (in advanced stages)

1. Breast cancers
2. Ovarian cancers
3. Colorectal cancers
4. Lung cancers
5. Other haematological malignancies (i.e. leukemias, myelomas)
Prolonged progression –free survival
(as an adjuvant treatment in non-metastatic disease)
6. Breast Cancer
7. Colorectal cancer
8. Ovarian cancer

2.4. Rationale of systemic chemotherapy

2.4.1. Neo-adjuvant chemotherapy

This type of chemotherapy is being used preoperatively
Rationale:

1. It is performed to make non operable tumours operable.
2. It is also used to achieve organ preservation.
3. It is also used to select sensitivity for specific treatment (biomarkers).

2.4.2. Adjuvant chemotherapy

This type of chemotherapy is being used postoperatively
Rationale:

1. It is used to kill micro-metastatic disease.
2. To increase disease free survival.

2.4.3. Palliative chemotherapy

It is usually administered to control symptoms or prolong life in a patient in whom cure is unlikely.

2.4.4. Salvage chemotherapy

It is potentially curative high dose regimen given to the patient who has failed or recurred following a prior curative regimen.

2.4.5. Induction chemotherapy

The intent is to induce complete remission when curative regimen is initiated (usually applied to the hematologic malignancies).

2.4.6. Consolidation Chemotherapy

It is repetition of induction regimen in a patient who has achieved a complete remission after induction. It is intended at increasing cure rate or prolong remission.

2.4.7. Dose-intensification chemotherapy

It is intended at dose intensification through its strategy to overcome resistance through a) Highest possible dose b) Shortest possible intervals c) With supportive use of G-CSF. It is also intended for marrow-ablative doses chemotherapy doses of chemotherapy to increase tumour cell-kill while rescuing the host with i) autologous bone marrow ii) Donor bone marrow iii) peripheral stem cells.

2.4.8. Maintenance chemotherapy

Long term dose, low dose, single dose or combination chemotherapy in a patient who has achieved a complete remission with intent of delaying the regrowth of residential tumour cells.

2.4.9. Metronomic chemotherapy

It is intended at oral chronic administration of chemotherapeutic agents such as cyclophosphamide, etoposide, etc. It has both antitumor genic and antiangiogenic effect on tumour endothelial cells. These cells are 10-100 times more susceptible to chemotherapy.

2.4.10. Chemo-radiation

2.4.10.1. It can be defined as below.

1. Integration of chemotherapy with radiotherapy.
2. Commonly used drugs are 5-FU and cisplatin
3. Enhancement of tumour responses (radiosensitization)
4. Protection of normal tissue.

2.5. Evaluation of chemotherapy: efficacy evaluation

The following parameters to be evaluated in systemic chemotherapeutic treatments are as follows:

The evaluation is abbreviated as RECIST 2000 (Response Evaluation Criteria in Solid Tumours)

2.6. Response

1. **Complete Response (CR):** Disappearance of all target lesions.
2. **Partial Response (PR):** At least 30% decrease in the sum of the diameter (LD) of the targeted lesions.
3. **Stable Disease (SD):** Neither sufficient shrinkage to qualify for PR nor sufficient increase to qualify for PD.
4. **Progressive Disease (PD):** At 20% increase in the sum of the LD of targeted lesions.
5. **Duration of Response Or time to progression (TTP):** Time from response to progression.
6. **Disease-Free Survival (DFS):** From time to treatment to first recurrence.
7. **Overall Survival (OS):** From the time of diagnosis to death.

2.7. Pre-Chemotherapy assessment

Following pre-chemotherapy assessments are performed: Full blood count (Hb, WBCs, Platelet count, etc), Renal Function Test (such as creatinine and GFR), Liver Function Tests (such as enzymes, Bilirubin, SGOT, SGPT, etc).

Observation to avoid excessive ascites or pleurisy and lastly performance status ECOG scale or also called as Eastern Co-operative Oncology Group status:

Table 1:

Status	Definition
1	Normal Activity
2	Symptoms, but ambulatory
3	In bed ≤ 50% of time
4	In bed ≥ 50% of time
5	100% bed ridden

Surgery, radiotherapy and endocrine therapies are old but effective anticancer therapies. Cancer among second cause of death in populated countries associated with aging and lifestyle. It has been observed that early diagnosis and access to health care and development may increase the survival rate in Two thirds of cancer patients.

2.8. Surgery

It is considered as main treatment for localized primary tumours and associated regional lymphomas used as single option for the treatment it cures more patients than any other specific cancer therapy as surgery operates by Zero-order Kinetics in which 100% of excised cells are killed.

In 1920s., with the advent of radiation therapy cancer surgery became consecutive approach. Cancer chemotherapy became well-known in 1940 and when used complementarily they kill fraction of tumor cells but became good option for the surgical approach. Since last century major improvements have been made both in operative technique and used combined modality therapy have been significantly reduced the morbidity and mortality associated with surgery of solid neoplasms. Mostly seen as promising option in metastatic liver and colorectal cancers with survival rates of 30-340%/ 5 years.

Radiation therapy (RT) is seen as a good option in new cancers cases and mostly used in 45% cases. RT provides 40 % cure in cost effective way since it is responsible for only a 50 % of total burden dedicated to cancer control in industrialized countries. RT is mainly used alone as external beam therapy and or brachytherapy in variety of tumour types such as early stage head and neck tumours , prostate cancers or early stage Hodgkin's disease. RT mainly used in combination of surgery and or chemotherapy. It is used in operative rectal, oesophageal carcinomas.

Post-operative RT: It is the delivery of single and large fractions during surgery with either electrons or low energy photons. Chemotherapy approaches or the neoadjuvant during concomitant or following RT i.e. maintenance have been proven to be effective for local control and eradicate micrometastatic disease.

According to Beatson and his findings hormonal dependence of breast cancer is used to fight the disease. The different strategies include range from ovarian ablation in pre-menopausal women to administration of aromatase inhibitors which include Estrogen Receptors (ER) down regulators, Selective estrogen receptor modulators (SERM), which include tamoxifen and dual antagonists of ER impending the binding of co-activators, thereby arresting mediated transcriptional activity.

Endocrine Treatment also finds its use in which treatment continues to base systemic approach to cancer palliation or curation in prostate cancer.

This issue is specially focused on Cancer Therapeutics; various cancer treatment strategies have been reviewed. The special topics include head and neck cancers, anticancer agents from natural sources, osteosarcoma, metastatic melanoma and breast cancers.

The issue is dedicated to all scientists right from medical field to biologists scientists!!! Their research has proven to be life-saving or if not life-saving, it has given a new direction to the cancer research and therapeutics.

Author biography

A.G. Nerkar, Professor

Cite this article: Nerkar AG. Cancer. *Curr Trends Pharm Pharm Chem* 2021;3(4):31-34.