
UNIT 1 BASIC PRINCIPLES OF ONCOLOGY

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1.0 OBJECTIVES

After reading this unit, you should be able to:

- list cancer incidence in the elderly;
- explain how the biology of aging process vis-a-vis cancer works;
- describe clinical signs and symptoms, premalignant conditions, diagnostic methods and staging of cancer; and
- assess comorbid conditions and discuss the treatment strategies in elderly cancer patients.

1.1 INTRODUCTION

The discipline of 'oncology' deals with cancer, malignancy, tumor, or neoplasm, all of which are interchangeable terms. The common cancers in elderly consist of malignancies of lung, gastro-intestinal tract, breast, cervix, head and neck, prostate, and haematologic origin. Awareness about the symptoms and signs among home carriers, family physicians, and other health professionals will provide early diagnosis of these cancers. Palliative care is integral to satisfactory medical support. Whether it is active management or palliative care, we should carefully assess the treatment related toxicity and quality of life in these individuals.

You have already learnt about various benign diseases and infections in the previous blocks. In this block, we introduce to you the various cancers which affect the geriatric population, the basic principles of oncology, diagnosis and treatment of some common cancers and palliative care in cancer patients.

Cancer in the elderly population has gained attention of health professionals and policy planners during the last two decades. According to the World Health Organisation (WHO) Report (1999), cancer is an emerging challenge worldwide; besides communicable, cardiovascular, and neuropsychiatric diseases.

What is the reason for this concern about cancer in the elderly? Aging process is known to be the single greatest risk factor for the development of cancer. Currently, in the developed countries more than 50-60% of all cancers occur beyond 65 years of age. In India, 1 in 5 cancers are now detected in persons beyond 60 years of age. Demographic changes in developing countries like India will increase the aged population, from less than 10% of the population at present to 20% or more by the year 2020. Such a double-fold rise will result in increased cancer burden amongst the elderly persons. Thus it will be prudent for us to learn about cancer and its management. It will also be necessary to shift our health care priorities from a historic preoccupation with young individual's health to a comprehensive medical care for the elderly.

The age-related comorbid conditions require assessment and attention while treating the cancer of an old person. Presently there is a tendency to deliver undertreatment by surgery, chemotherapy, and radiotherapy in elderly cancer patients. We need to look at the physiological status and comorbid conditions rather than the chronologic age of the patients, in order to decide treatment policies. The older cancer patients can have advanced stages of cancer with symptoms such as pain, fatigue, anorexia, and dyspnoea. The treatment results of optimally treated elderly cancer patients are no different from younger patients. There is still a reluctance to conduct cancer clinical trials in elderly patients. Overall, efforts are needed to improve diagnosis, treatment approaches, and cancer research in the vulnerable aged population. In this unit we shall learn about these basic principles of oncology related to geriatric medicine.

1.2 INCIDENCE OF CANCER IN ELDERLY

Incidence of cancer in elderly population is less in India as compared to western countries. It is estimated that there will be 99% rise in the estimated cancer cases by the 2010. The common cancer in developing countries are lung, stomach, cervix, head and neck, breast and oesophagus.

1.2.1 Demographic Change

During the last 50 years, the post-world war era has seen an increasing proportion of persons in the older age group. According to the available statistics, there will be a 113% rise in the population aged 65 years and above in the developing countries as compared to only 43% rise in the developed countries, between 1985-2010. Such a demographic change in developing countries will result in an overall rise of 99% in the estimated cancer cases by the year 2010 (Table 1.1).

Table 1.1: Population and Cancer Cases in Year 1985 and 2010

| Age Group | Population in Developing Countries (Million) | | | Population in Developed Countries (Million) | | |
|--------------------------|--|-------|-------------------|---|-------|-------------------|
| | 1985 | 2010 | Change (Per cent) | 1985 | 2010 | Change (Per cent) |
| Under 15 | 1,365 | 1,815 | (+33) | 260 | 248 | (-5) |
| 15-64 | 2,157 | 3,748 | (+74) | 780 | 868 | (+11) |
| 65 and over | 155 | 330 | (+113) | 135 | 193 | (+43) |
| All ages | 3,677 | 5,893 | (+60) | 1,174 | 1,310 | (+12) |
| Cancer cases (estimated) | 3.96 | 7.88 | (+99) | 3.66 | 5.04 | (+38) |

Source: CA. 1994; 44:81-90.

1.2.2 Incidence in Developing and Developed Countries

In the western countries, men and women aged 65 years or above are at high risk for the major cancers. Data from USA shows that persons in this age group have a risk 11 times greater than persons below 65 years. Cancer in the elderly population is now constituting 50-60% of all cancers in the developed countries. In the developing countries, the major malignancies occurring in elderly population constitute 20% of all. According to an analysis at Institute Rotary Cancer Hospital, All India Institute of Medical Sciences, (IRCH, AIIMS), New Delhi (shown in Table 1.2) the men and women aged 60 years formed 22% and 15% respectively of the total incident cancer cases. As you are already aware that the age cut-off at 65 years is defined as the geriatric population in west, but United Nations (UN) recommendation of 60 years has been adopted for Asia.

Table 1.2: Estimates Of Elderly Cancer Patients at IRCH, AIIMS, 1996-1997

| Site* | Men | | Women | |
|-------------|----------|--------------|----------|--------------|
| | All ages | (60 yrs (%)) | All ages | (60 yrs (%)) |
| Head & Neck | 630 | 146(23) | 122 | 23(19) |
| Cervix | - | - | 339 | 53(15) |
| Breast | 11 | 3(27) | 219 | 23(11) |
| Lung | 174 | 55(32) | 24 | 6(25) |
| Haematol | 209 | 26(12) | 78 | 6(8) |
| GIT | 104 | 21(20) | 38 | 8(21) |
| All | 1128 | 251(22) | 820 | 119(15) |

* Some major sites only; Treated by Radiotherapy.

1.2.3 Common Cancers in Elderly

It has been observed that a rapid increase in incidence of certain specific cancers occur in the aged persons. Majority of the solid cancers (of lung, head and neck, gastro-intestinal tract, genito-urinary system, breast, prostate, and central nervous system) show a tendency for cancer development after the 5th and 6th decades of life. Similarly, advancing age increases the risk for some hematologic malignancies. In the developed countries; the common neoplasms afflicting the elderly population are those of lung, prostate, breast, colon & rectum, uterus, lymphomas, and pancreas. The developing countries like India show certain differences and the common cancers of the elderly are: lung, stomach, cervix, head and neck, breast, esophagus, liver, colon & rectum and lymphomas. Those with high cause of death in the geriatric age groups in India are head and neck, lung, cervix and esophagus malignancies.

Check Your Progress 1

- 1) Briefly outline the increase in cancer cases, from 1985 to 2010, and describe the incidence of cancer in elderly in western countries and India out of total cancer load.

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2) What are the common cancers seen in the elderly?

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3) Indicate True (T) or False (F):

- i) The rise in elderly population is higher in developing countries. (T/F)
- ii) In India, 20% of all cancer patients are in elderly age group. (T/F)
- iii) Cancer of cervix is not common in old age. (T/F)
- iv) Lung cancer is a cause of cancer-related death. (T/F)

1.3 BIOLOGY OF AGING PROCESS VIS-A-VIS CANCER

By virtue of demography findings described earlier, cancer may now be considered as part of an aging process. Clinicians trained to treat adults with cancer should be aware that their patient population will gradually become older. The biological processes related to aging can enhance the risk of carcinogenesis. These can be enumerated as:

- 1) prolonged carcinogenic exposure with increasing life span.
- 2) alternation of DNA repair mechanism with advancing age.
- 3) decline in immune surveillance; thymic involution is known to occur after 45 years of age.
- 4) cellular aging leads to genetic instability and oncogene activation.

Any one or all of these biological factors can be implicated as the causes for increased incidences of cancer in the elderly population.

1.4 CANCER PRESENTATION AND DIAGNOSIS

The tumor development takes place in a number of sequential phases:

Normal cell → dysplasia → carcinoma-in-situ → invasive cancer.

This is shown in Fig. 1.1.

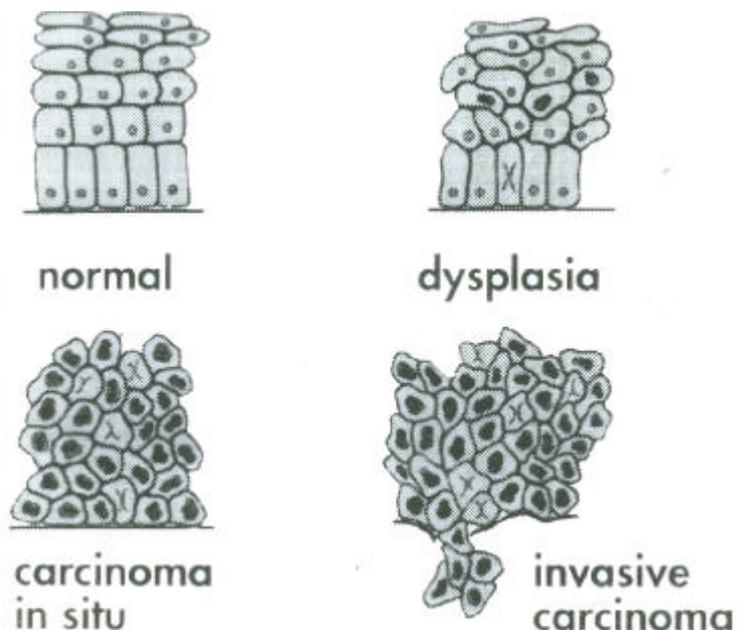


Fig. 1.1 The malignant process from normal cell to invasive cancer

Dysplastic changes are characterized by diversity in size and shape of nuclei and cells and by disorganization of the tissue. Extreme degree of dysplastic changes with an intact basement membrane is called a carcinoma in situ. When the basement membrane is damaged by invading malignant cells, then tumor invasion (invasive cancer) has started.

Although the above is true about cancer development, there are various types of neoplasms seen in the human body. Broadly the tumor types are categorized as follows:

- Carcinoma : originating from the epithelium
- Sarcoma : originating from the mesenchymal tissues
- Lymphoma : originating from lymphoreticular cells
- Leukemia : originating from white blood cells.
- Blastoma : originating from embryonal organs or tissues.

1.4.1 Precancerous Stages

The cancers of the head and neck region and uterine cervix are the two most prevalent cancers in India. These two sites are easily accessible for physical and diagnostic examinations. Early recognition of cancer in these regions can lead to cure and doctors should be trained to diagnose early stages of these diseases. This puts a heavy responsibility on general practitioners.

Since a number of premalignant conditions (or precancerous stages) can present in both head and neck, and cervix, you should learn about such presentations.

Head and neck: With long-standing exposure to irritating agents such as tobacco, smoking and alcohol, certain precancerous conditions are likely to develop:

- **Leukoplakia:** It is a white patch on the mucous membrane, and has about 5% risk of turning into an invasive carcinoma.
- **Erythroplakia:** Presents as a reddish, velvety lesion on the mucosal surface, with a high potential for malignant transformation.
- **Submucous fibrosis:** It leads to fibroelastic changes under the mucosa and presents as scarring bands.

The above conditions can be easily assessed in the oral cavity. However, leukoplakia can also be present in larynx and pharynx. In an elderly person who is a drinker and a smoker, presence of leukoplakia or erythroplakia should alert the physician.

Cervix: Wide spread application of the Papanicolaou smear of the uterine cervix and vagina has revealed various precancerous stages. The dysplastic changes of cervical mucosa are graded as cervical intraepithelial neoplasia (CIN): Mild dysplasia (CIN I), moderate dysplasia (CIN II) and severe dysplasia (CIN III). Condylomata of the cervix is grouped with mild dysplasia. CIN I and II lesions may regress or stay stable. CIN III lesion is otherwise known as carcinoma in situ (CIS) and studies show that the risk of developing an invasive cancer is around 10%. The woman with a dysplasia of the cervix should be carefully followed by gynaecologic examination and pap smear.

1.4.2 Common Presenting Symptoms and Signs

You must remember that an elderly cancer patient is likely to have symptoms (complaints) related to cancer and also related to existing comorbid conditions.

- i) **Comorbid conditions:** As you have learnt in Course 2, Block I, Unit 1 for many older cancer patients, there may be competing concurrent chronic conditions (i.e. comorbidity). The physiological and pathological changes associated with these conditions can introduce complexity into the treatment of cancer. Hence the comorbid status requires special attention, and the physician should assess how many types of comorbidity the elderly cancer patient has.

It has been observed that elderly cancer patients can have one or more comorbid conditions (Fig. 1.2).

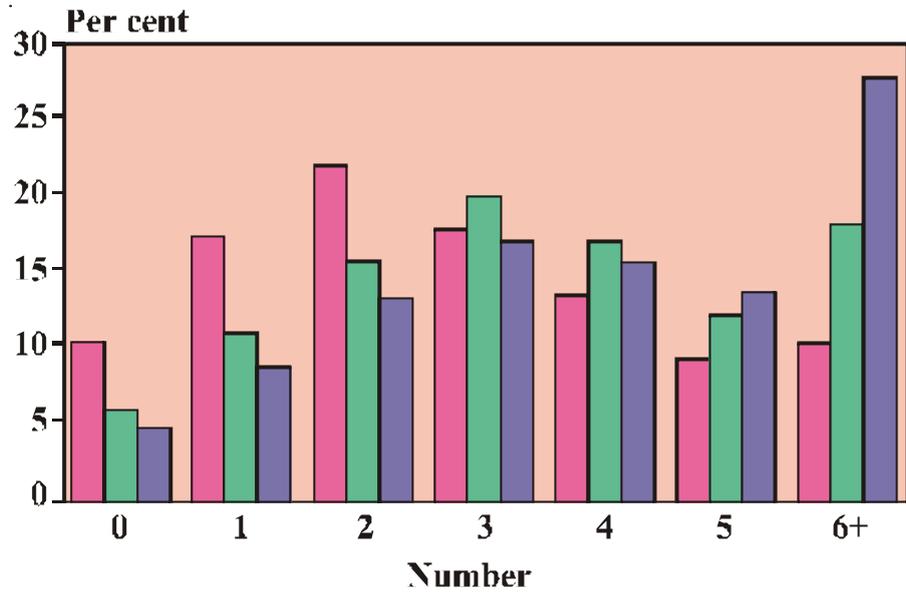


Fig. 1.2: A study from USA shows that in elderly cancer patients comorbid conditions are: 2 for 55–64 years, 3 for 65–74 years, 4 for 75+years. (Courtesy: Dr. Mohanti and Dr. Bansal)

- ii) **Cancer related signs and symptoms:** Complaints and symptoms of cancer are not necessarily exclusive and may quite often be similar in nature to many other non-cancerous conditions. Thus, it is necessary to have a high index of suspicion while evaluating all elderly patients for the cancer diagnosis. Some of the dominating symptoms and signs can be enumerated as follows:

Head and Neck: Nonhealing ulcer, pain in oral cavity and throat, difficulty in swallowing, change in voice, swelling in the neck (Fig. 1.3).



Fig. 1.3: An elderly lady with enlarged lymph nodes in lower neck and thyroid cancer (Courtesy: Dr. Mohanit and Dr. Bansal)

Lung: Cough, blood in sputum (hemoptysis), respiratory distress, chest pain, recurrent pulmonary infection.

Upper GIT (esophagus, stomach): Dysphagia, anorexia and weight loss, hematemesis, vomiting, aspiration pneumonia.

Lower GIT (colo-rectal, anal): Alteration in bowel habits (constipation/diarrhoea), bleeding or discharge per rectum, tenesmus, palpable mass in abdomen, intestinal obstruction.

Genitourinary: These patients can have anemia, fever, and weight loss.

Cervix: Bleeding/discharge per vaginum, low backache/pain in abdomen.

Prostate: Increased frequency and urgency, dysuria, dribbling of urine, decreased stream.

Bladder: Painless hematuria, pain in abdomen, urinary retention.

Breast: Palpable lump, bleeding/discharge from nipple, lump in the axilla.

Hematologic (lymphomas/leukemias): Pallor, generalised weakness, fever, weight loss, recurrent chest and urinary infections, petechial haemorrhage, bleeding from nose and gum, joint pain, painless palpable lymph nodes, organomegaly (hepato- splenomegaly).

Central Nervous System: Headache, vomiting, seizures, diminution of vision, motor/sensory deficit, urinary/bowel incontinence, altered sensorium.

Elderly presenting with these symptoms should be suspected of having an underlying cancerous pathology. You will learn more about the commonly occurring cancer in the following unit.

1.4.3 Diagnostic Methods and Dilemmas

Regardless of whether an elderly patient is seen by a primary care physician or an oncologist, the diagnosis of cancer is based on 3 corner stones:

- General physical examination
- Diagnostic tests
- Pathological diagnosis.

This includes complete physical examination, assessment of nutritional status and psychosocial assessment. You must also do site specific evaluation (head and neck, gynaecologic and breast etc.). You will read more about the details of the examination in your practical manual 2.

Diagnostic Tests

Endoscopy (laryngoscopy, bronchoscopy laparoscopy, colposcopy etc.), radiological tests like plain X-ray, ultrasound, CT scan (Fig. 1.4), MRI (Fig 1.5), mammography, hematologic and biochemical tests; special tests if needed (e.g., bone scan, bone marrow study).

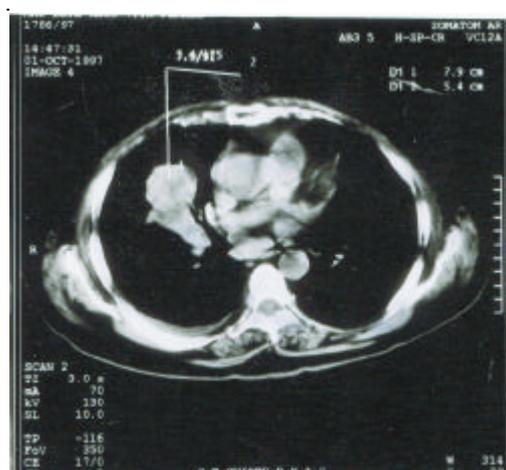


Fig. 1.4: CT scan (thorax) of a 67 years old male showing right lung mass lesion, fine needle aspiration cytology (FNAC) proved it as lung cancer (Courtesy: Dr. Mohanti and Dr. Bansal)

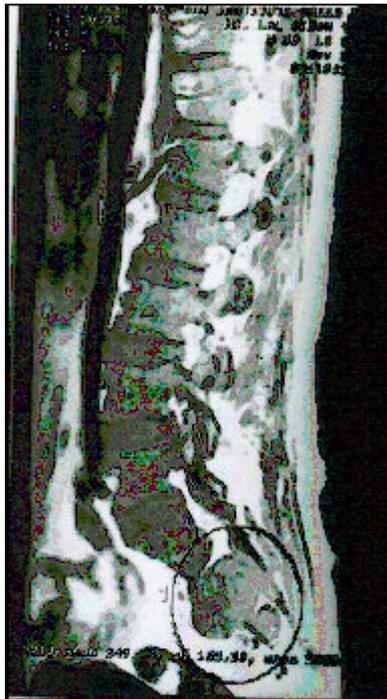


Fig. 1.5: MRI of spine in an elderly male shows sacral deposit from multiple myeloma (Courtesy: Dr. Mohanty and Dr. Bansal)

Pathological Tests

- i) Cytology (fine needle aspiration cytology, Pap smear, peripheral blood smear).
- ii) Biopsy — incisional, excisional, tru-cut.

Although the histopathological diagnosis from a biopsy obtained tissue is considered as optimal and ideal, in the present era the simpler cytologic test for most of the neoplasms has reached the sensitivity and specificity similar to histological examination.

The diagnostic delimita related to radiologic, endoscopic and, laboratory tests can often lead to confusion in establishing the diagnosis. In approximately 10-15% of patients, repeat endoscopic and histological examination and a battery of radiologic assessments would be necessary to reach a final diagnosis. Such an exercise might involve various specialities of medicine.

After establishing the cancer diagnosis, the doctor has certain key functions to carry out before deciding about the treatment:

- 1) To break the news about the cancer to patient and relatives. Ideally this should be done in private in an unhurried manner.
- 2) Establishing the doctor-patient relationship. Trust is integral to cancer therapy.
- 3) The alternatives medicines e.g., unani, ayurveda, homeopathy etc. are not yet the standards of anti-cancer treatment.

Check Your Progress 2

- 1) Enumerate the four aspects of biological processes of aging linked to carcinogenesis.
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- 2) Name five comorbid conditions seen in elderly cancer patients.
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- 3) Outline the precancerous stages in head and neck, and cervix.

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1.5 STAGING OF CANCER AND MANAGEMENT POLICIES

Staging of cancer is essential to record the proper extent of disease. The findings from the physical assessment, diagnostic tests, and the pathological diagnosis are combined to arrive at a particular stage of the cancer. The three benefits from staging of cancer could be described as:

- i) To appreciate the extent of disease and its likely progression.
- ii) To decide upon treatment policies.
- iii) To predict the prognosis, response to therapy and as well as to exchange treatment results between institutions.

1.5.1 Staging and Prognosis

The staging of various neoplasms are based upon certain international staging classifications such as International Union Against Cancer (UICC), American Joint Committee on Cancer (AJCC) and International Federation of Gynaecology and Obstetrics (FIGO). The UICC and AJCC staging is known as TNM system; T (tumour), N (lymph node), M (metastasis). The TNM system for Head and Neck cancers can be enumerated as:

- Tx — Primary tumour cannot be assessed
- To — No evidence of primary tumour
- Tis — Carcinoma - insitu
- T1 — tumour (2 cm in greatest dimension)
- T2 — tumour size more than 2 cm and less than 4 cm in greatest dimension.
- T3 — tumour 4 cm in greatest dimension
- T4 — tumour invading adjacent tissues like cortical bone, extrinsic muscles of tongue, soft tissues of neck.
- N0 — no regional lymph node in the neck.
- N1 — metastasis to ipsilateral cervical lymph node (3 cm in greatest dimension).
- N2 — metastasis in ipsilateral or bilateral nodes, size (3 cm and 6 cm)
- N2A — metastasis to ipsilateral single node, (3 cm and 6 cm)
- N2B — metastasis to ipsilateral multiple nodes, (3 cm and 6 cm)
- N2C — bilateral or contralateral lymph node not more than 6 cm in greatest dimension
- N3 — any lymph node more than 6 cm in greatest dimension
- M0 — no evidence of distant metastasis
- M1 — distant metastasis present.

This TNM system is further categorized into stage I, II, III, and IV.

Example: A 65 year old male is seen with an ulcer over tongue, 3 cm in size, on the right lateral border with a neck node of 4cm size felt over right upper neck. Other investigations have not revealed metastasis at any other site of the body. The UICC staging (1997) would be T2N2AM0 (Stage IV A).

Gynaecological cancers are staged as stage I, II, III, and IV (FIGO). Lymphomas are staged according to Ann Arbor Staging I, II, III, and IV. Colo-rectal cancer is staged by Duke's classification as A, B, and C.

Except for lymphomas and leukemias, lymph node involvement is generally confined to the lymphatic draining region for a particular cancer (neck for head and neck, axilla for breast, pelvis for cervix). The distant metastatic spread usually occurs via blood stream, to organs (lungs, liver, brain) and other sites (skin, bones). The other way of distant metastasis is seen via lymphatic permeation (supraclavicular node in cancers of cervix and testis).

Prognosis: It encompasses the scientific foundation of predicting the course of a particular disease (cancer) and the effect of treatment strategies. For example:

- 1) Stage III (T3N1M0) breast cancer has more than 50% chance of distant metastatic spread to liver, lungs, bone etc.
- 2) Stage I (T1N0M0) cancer of larynx has 80-90% chance of long-term cure by radiotherapy or surgery.

1.5.2 Treatment Decisions: Surgery, Radiotherapy and Chemotherapy

In our practice of oncology; surgery, radiation therapy, and chemotherapy are the three primary modalities of treatment. One may come across various other treatment methods such as immunotherapy, gene therapy, herbal medicine, acupuncture etc.; but according to available scientific knowledge and experiences these methods are considered as experimental approaches.

Treatment decisions are based upon the following factors:

- 1) General physical status and associated comorbid conditions.
- 2) Stage of the cancer
- 3) Patient's willingness and compliance.

The physiological and mental health of the elderly cancer patient should be considered rather than the chronologic age. Elderly men and women have the same right as their younger counterparts in receiving the optimal treatment. The comorbid conditions enumerated earlier may compromise or adversely affect the treatment policy. However, the old person living for years with diabetes or hypertension should not be outrightly barred from a particular therapy option. There are reports which state that persons above 65 years with minor non-life threatening comorbidity are offered inadequate (or less aggressive) treatments by the oncologists. Secondly, stage for stage, for a given cancer (e.g., of head and neck or cervix), the elderly cancer patient is likely to respond to treatment as much as the younger patient. Hence, the patient should be involved in the treatment decision. The elderly cancer patient's socio-economic status plays a role in this situation and the treating institution and doctor should pay attention towards this issue.

At the present, most of the early cancers are easily curable in more than 70-90% of the cases. For the solid cancers, (for e.g., head and neck, breast, cervix, GIT, prostate etc.), the surgery or radiation therapy are utilized as a single modality. With this kind of a treatment, the patient's quality of life is not adversely affected by the treatment. In early stage hematologic malignancies, the chemotherapeutic practices provide long term cure and survival in more than 70-80% of the patients. It is only rarely that radiotherapy is utilized for these malignancies. For the advanced stage solid tumours, combined modalities of surgery and radiotherapy are preferred. For some of these tumors, chemotherapy is also recommended as an adjuvant therapy. The cure for late stage hematologic malignancies is not yet very satisfactory. In recent years, aggressive chemotherapy with bone marrow transplant is being pursued to achieve success in advanced stage lymphomas and leukemias. In advanced cancer cases who are considered as incurable, palliation in the form of symptomatic and supportive treatment is given.

Surgery

The cancer surgery has evolved since late nineteenth century. Broadly, the cancer surgery is different from other disciplines of surgery:

- i) Cancer surgery needs to be more extensive and enbloc for optimal removal of tumour.
- ii) The cancer surgery is likely to be combined with other forms of treatment such as radiation and chemotherapy.

The cancer surgery is reasonably safe for the older patients and in early cancer, the surgery is well tolerated. It is only when the patient has advanced cancer and requires aggressive surgical practice, one has to be careful in selecting the patient for surgery.

The factors for operable cancer patients are:

- i) good performance status
- ii) target organ-status (heart, lung, kidney)
- iii) fitness for anaesthesia
- iv) acceptable comorbidity (which will not interfere with surgery and post-surgical recovery)

The existing data show that attempts at curative cancer surgery decline in proportion to advancing age. In a study conducted in USA for localized tumours of colon, breast, lung and uterus, age-wise surgical treatment was given to 92% patients below the ages of 54 years, 72% patients between the age of 75 to 84 years, and 62% patients over 85 years of age. Thus there is a reluctance to carry out oncologic surgery, and this should be discouraged by institutions and treating doctors.

Radiation Therapy

Treatment of cancer by radiotherapy started since the discovery of X-rays (1895). Radiation therapy (RT) is more often used in elderly cancer patients now a days. The aim of radiation therapy is to kill the tumour cells by a tumouricidal dose of radiation. The radiation dose is measured in unit of Gray (Gy), or Centigray (cGy). The biologic principle operates on the basis that radiation with its direct and indirect action on DNA causes cell death. Secondly, there is selective damage of tumour cells as they are more actively dividing and are in undifferentiated phases of all cycle, than the normal cells.

The modalities of radiation are broadly categorized as:

- a) teletherapy (external beam therapy, Cobalt-60 and linear accelerator machines).
- b) brachytherapy (application of radioisotope to the tumour; this often requires an operative procedure).

The field marking (radiation portal) for teletherapy is shown in Fig. 1.6.

The scope of radiation therapy (RT) is:

- i) RT alone (as curative)
- ii) RT combined with surgery (preoperatively or postoperatively)
- iii) RT combined with chemotherapy
- iv) Palliative RT (in advanced and incurable cancers).

The acute radiation morbidity occur during the course of RT and immediately afterwards and depending upon the site of RT are seen as dermatitis, mucositis, loss of taste and difficulty in swallowing in head and neck region; nausea, vomiting, diarrhoea and pain in abdomen in pelvic radiation. The late reactions such as blood vessel fibrosis, soft tissue necrosis, bone and organ changes are relatively rarely seen in the modern practice of RT. There is often a

need to reduce the dose of RT for elderly cancer patients who have associated comorbid conditions like chronic renal failure, congestive heart failure, cerebrovascular accident etc. Overall it is observed that RT, whether curative or palliative, is well tolerated by the elderly patients.



Fig. 1.6: Field markings for external beam radiation therapy (Courtesy: Dr. Mohanti and Dr. Bansal)

Chemotherapy

The use of anticancer chemotherapy started in 1950s. Nowadays, chemotherapy is utilized in many of the malignancies. Most older patients benefit from anti-cancer chemotherapy. However, the tolerance to anti-neoplastic drugs and the metabolism of these chemotherapeutic agents need to be weighed carefully in these patients. After all these patients can have poor functions of the lung, heart, kidney, and nervous system. Similarly, the bone marrow reserve is likely to be reduced in these individuals. In such situations, drug compatibility and chemotherapy related toxicity can lead to adverse events. Different drugs have different toxicity profile on bone marrow, liver, kidney, lungs etc.

The currently available chemotherapeutic regimens for cancer of breast, colon, head and neck, lymphomas and leukemias are quite safely utilized in the elderly cancer patients. Regimen such as cyclophosphamide, methotrexate and 5-fluorouracil (CMF) for adjuvant therapy in operable breast cancer patients is well tolerated by elderly women. Besides anti-cancer drugs, hormone therapy and immunotherapy are also considered as part of cancer chemotherapy. The definition of an elderly person, the physical and physiological status, and associated comorbid conditions are essential components in deciding chemotherapy for a particular old person.

1.5.3 Palliative Care in Advanced Cancers

Palliative care is offered to patients whose cancer is in an advanced stage and is incurable. The WHO has defined palliative care as being the “active and total care of a person whose condition is not responsive to curative therapy”. The intention of palliative care is to provide relief from pain and other distressing symptoms, and to integrate psychological and spiritual aspects of care. Thus, palliative care should neither intend to nor postpone death but should affirm life and regard dying as a normal process. The overall concept of palliation is to offer comfort and to maintain quality of life.

There is a great variability in the range of symptoms experienced by cancer patients. The symptom management is required at 3 phases : (i) during active treatment by surgery, radiotherapy

or chemotherapy, (ii) as the disease progresses and becomes incurable, and iii. in terminal stages of cancer. Since many of the elderly cancer patients may present in advanced stages and in a frail condition, adequate symptom control should be integrated within the practice of oncology.

The commonly seen distressing symptoms, which require optimal palliative care, are shown in Table 1.3.

Table 1.3: Symptoms in Advanced Cancer

| Symptoms | Frequency |
|---------------------------|-----------|
| 1. Fatigue | 65-90% |
| 2. Pain | 55-80% |
| 3. Anorexia | 40-80% |
| 4. Dyspnoea | 20-60% |
| 5. Malaise/Immobility | 20-40% |
| 6. Nausea/Vomiting | 40-50% |
| 7. Insomnia | 20-60% |
| 8. Constipation/diarrhoea | 5-50% |
| 9. Anxiety/depression | 10-40% |
| 10. Confusion/drowsiness | 10-30% |

In the terminal stages, the added symptoms are: agitation, moist breathing, incontinence, and pressure sores.

The principles of palliative medicine for these symptoms are:

- i) drugs should be given by mouth as far as possible.
- ii) drugs should be given at regular intervals for adequate symptom control.
- iii) drug prescription should be tailored according to the needs of an individual patient.

The control of pain and other symptoms should be prioritised. Pain requires a step-wise management: paracetamol, and NSAIDS (step 1, mild pain); codeine + other analgesics (step 2, moderate pain); and morphine (other analgesics/drugs (step 3, severe pain). The other drugs often used are: antiepileptics, steroids, antiemetics, laxatives bronchodilators, sedatives, antibiotics, antifungals etc.. The availability of oral morphine is essential to good symptom management. Similarly, good care of mouth, skin, mobility etc. help in improving the patient's quality of life. Nutritional management and psychosocial support are also intimately related to palliative care of an elderly person. Palliative care has become an area of expertise. Oncologists and primary care physicians should seek the help of palliative care specialist in treating the old persons with advanced cancer. It has been observed that adequate pain and symptom control are achieved in 50%-80% of the patients under expert care. You will learn more about palliative care in the fourth unit of this block.

Check Your Progress 3

- 1) Describe the three benefits of staging a cancer.
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- 2) What are factors the which are considered in taking a treatment decision?
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- 3) Outline at least 5 symptoms which require palliative care in advanced cancer.
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- 4) Indicate True (T) or False (F):
- i) Surgery, radiation therapy and chemotherapy are main modalities of cancer treatment. (T/F)
 - ii) Cancer surgery is safe and well tolerated by elderly patients. (T/F)
 - iii) The 2 types of Radiotherapy are: teletherapy and brachytherapy. (T/F)
 - iv) Chemotherapy is not considered in leukemias. (T/F)

1.6 TREATMENT RESULTS

You will now understand that not all cancer responds to therapy. Outcome of results is seen only in certain group of cancer explained below:

1.6.1 Cure, Tumour-control, Survival

In the treatment of cancer, the evaluation of the response and the outcome to therapy have remained essential components of any practice of oncology.

Cure: It is broadly defined as a state when the patient has no evidence of disease (NED), both on clinical and diagnostic examinations. For most malignancies, cure is expressed in terms of 2 year, 5 year, and 10 year cure. For most solid tumours in early stages, treated in expert oncology institution, the 5 year cure ranges from 70-90%. In late stage III and IV disease, optimal approaches by combined modality can provide 2 year and 5 year cures in 40-60% of the patients. However, some cancers are not easily amenable to cure such as cancer of oesophagus, lung, pancreas, gall bladder, liver and brain.

There have been notable improvements in the treatment results of many cancers. The survival figures for some major cancers which affect the elderly population is shown in Table 1.4.

Table 1.4: Five-Year Survival in Some Common Cancers

| Cancer | Early Stage | Late Stage |
|---------------|--------------|------------|
| Lung | 25-40% | <10% |
| Stomach | 35% * | >10% |
| Cervix | 70-80% | 20-45% |
| Head and Neck | 70-90% | 20-55% |
| Breast | 70-90% | 20-55% |
| Esophagus | (all stages) | 10-15% |
| Liver | (all stages) | 10-30% |
| Colon | 40-60% | <25% |
| Lymphoma | 45-60% | < 30% |

Tumour Control: Tumour control is an assessment of response to a particular course of therapy by any oncologic modality. At the initiation of therapy (surgery/radiotherapy/chemotherapy), the tumour extent is assessed and recorded. The assessment of tumour control is usually done at completion of therapy and subsequently at 3-6 months interval. If the patient has no disease visible or detectable, then the tumour control is defined as complete response (CR). If there is >50% response to therapy, then the control is defined as partial response (PR). When there is no reduction in the tumour or there is progression of the disease, then it is defined as progressive disease (PD). In solid tumours, the reappearance of tumour is called recurrence and in hematologic malignancies it is known as relapse.

Survival: Survival is defined under the following categories:

- i) **Disease free survival (DFS):** At 2 years, 5 years, 10 years. This is stated as length of time survived with no evidence of disease after a therapy.
- ii) **Overall survival (OS):** A patient may remain disease free subsequent to therapy or may not achieve disease free status, but the individual can live for a particular length of time. OS means the length of life with or without disappearance of disease.
- iii) **Relapse free survival (RFS):** This definition is commonly employed to hematologic malignancies such as leukemias and lymphomas. It is the time to relapse after a particular course of therapy.

It should be remembered that this concept of survival is not applicable for an elderly cancer patient with an advanced stage of disease, who is receiving palliative care.

1.6.2 Treatment Related Toxicity and Quality of Life

You should also learn that both Radio-therapeutic as well chemotherapeutic mode of treatment have effects in cardiac, renal as well on CNS system and morbidity and mortality can be reduced by use of less toxic drugs in providing good quality of life.

Toxicity

Toxicities could be related to single modality or to combined modality. The surgical morbidities are directly related to the type and site of surgery. With conservation surgery, the complications are almost negligible in the elderly patients. When the treatment is aggressive surgery for the advanced stages, an old person can have several complications related to wound healing, sepsis, organ dysfunctions etc. Radiation morbidities have been earlier described in the radiotherapy section. However, radiation morbidity, both acute and chronic, can be exacerbated when it is combined with surgery and chemotherapy. Chemotherapy induced toxicities such as myelotoxicity, mucositis, cardiotoxicity and central nervous system toxicity may be more severe in the older patient than in the younger patient. This is due to the alteration in the pharmacokinetics of antineoplastic drugs in the elderly such as reduced renal excretion. These complications can be reduced by the use of less toxic drugs, adjustment of drug dosage, and use of growth factors.

Quality of Life

The key aim in delivering any cancer therapy to an elderly person is the maintenance of maximum achievable good quality of life. The quality of life measures are equally applicable to aged and younger. Broadly, quality of life refers to an ability to perform everyday activities, which reflect on the individual's physical, social and mental well-being. The physician must balance benefit and risk and provide the best treatment for each elderly patient, with consideration to both functional status and life expectancy.

1.6.3 Cancer Clinical Trials in Elderly

Research is essential to progress in medicine. During the last 50 years, the improvements in cure and survival of various malignancies have been achieved by consistent research and clinical trials. However, cancer clinical trials in most parts of the world (related to any treatment modality) often excludes patients who are aged 65 years and above. Hence there is a paucity of correct information regarding which type of treatment benefits which stage of one neoplasm in the elderly cancer patient. In the last 10 years, medical research has enhanced our knowledge

in the field of geriatric medicine. Several studies now demonstrate that elderly cancer patients with acceptable underlying risk factors respond to a particular form of treatment as much as the younger patients. The clinical and biologic research in geriatric oncology should include following areas:

- 1) Biologic processes
- 2) Diseases and disabilities
- 3) Social and supportive services
- 4) Treatment strategies and end-points
- 5) Research results and data resources.

Check Your Progress 4

- 1) What are the meanings of cure and tumor control after cancer therapy?
.....
.....
.....
- 2) What are the different categories of cancer survival?
.....
.....
.....
- 3) Indicate True (T) or False (F):
 - i) Cure is expressed as 2 year, 5 year or 10 year cures. (T/F)
 - ii) In most early cancer 5 year survival is 40%. (T/F)
 - iii) Cancers of esophagus and lung are not easy to cure. (T/F)

1.7 LET US SUM UP

In this unit, we have described the basic principles of oncology.

Demographic changes have resulted in 50-60% of all cancers occurring in elderly persons in the western countries. In our country, elderly cancer patients constitute 20% of all cancers, but this is going to rise in next 20 years. Common cancers in the elderly in India are head and neck, lung, stomach, breast, esophagus, colon & rectum, and lymphomas. The biology of aging process makes the individual vulnerable to develop cancer (carcinogenic exposure, altered DNA repair, decreased immunity, and cellular aging). The precancerous stages of head and neck, and cervix can be diagnosed with care. The signs and symptoms of common cancers can be observed by an attentive doctor. The diagnosis of cancer will require physical examination, radiologic tests, endoscopy, and pathological examination. With all these, diagnosis can be established in 90% of the cases. Staging of a cancer is essential. Early stage cancer is curable in 70-90% of the patients. Elderly cancer patients can have one or more comorbid conditions which can have impact on the cancer management. Modern cancer practice has evolved with refinements in surgery, radiotherapy and chemotherapy. Novel approaches are still being tested. Cancer treatment related toxicities, quality of life, and clinical research involving an elderly cancer patient are the areas which will need increasing attentions in future.

1.8 KEY WORDS

- Incidence** : number of new cases occurring in a defined population during a specified period of three.
- Quality of life** : a composite measure of physical, mental and social well being as perceived by each individual.

1.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Between 1985 and 2010, there will be 99% rise in the estimated cancer cases. Incidence of cancer in elderly is 50-60% in western countries and 20% in developing countries.
- 2) In developed countries, the common cancers are lung, prostate, breast, colon, rectum, uterus and lymphomas. In developing countries, cancers of lung, stomach, cervix, head and neck, breast and oesophagus are commonly seen.
- 3)
 - i) T
 - ii) T
 - iii) F
 - iv) T

Check Your Progress 2

- 1) The four aspects of biological processes of aging linked to cancerogenesis are:
 - a) prolonged exposure to carcinogens with advancing age.
 - b) alteration in DNA repair mechanism.
 - c) decrease in immunity.
 - d) genetic instability and oncogene activation.
- 2) The 5 comorbid conditions are hypertension, diabetes, arthritis and bone diseases, chronic obstructive pulmonary disease and cardiac problems.
- 3) Precancerous stages in head and neck cancer are leukoplakia, erythroplakia, leukoerythroplakia and submucous fibrosis. In cancer cervix, they are cervical intra epithelial neoplasia (grade I-III).

Check Your Progress 3

- 1) The three benefits of staging a cancer are:
 - a) to determine the extent of disease
 - b) decide upon treatment policies
 - c) to predict prognosis and response to therapy
- 2) The factors to be considered in taking a treatment decision are:
 - a) general physical condition and associated comorbid diseases
 - b) stage of cancer
 - c) wishes of the patient
- 3) The 5 symptoms are fatigue, pain, anorexia, dyspnoea and insomnia.
- 4)
 - i) T
 - ii) T
 - iii) T
 - iv) F

Check Your Progress 4

- 1) Cure is defined as “no evidence of disease both on clinical and diagnostic examination”. Tumor control is an assessment of response to a particular course of therapy by any oncologic modality.
- 2) The different categories of cancer survival are overall survival, disease free survival and relapse free survival.
- 3) i) T
 ii) T
 iii) T

1.10 FURTHER READINGS

Balducci L., Layman, G.H., Ershlesr, W.B. (eds), *Text Book of Comprehensive Geriatric Oncology*, Harwood Academic Publ., 1998.

Fentiman, I.S. and Monfardini S. (eds), *Cancer in the Elderly: Treatment and Research*, Oxford University Press, Oxford, 1994.

Gosney, M., “Geriatric Oncology”, in Tallis, E. and Fillit, H. (eds), *Brocklehurst’s Text Book of Geriatric Medicine and Gerontology*, 5th edn., Churchill Livingstone, London, 1998, pp 1319-1328.

Surgical Clinic North America. Vol. 74 : 145-161, 1994.