PERSPECTIVE
Cancer as described by the ancient Egyptians (3000 BC to 1500 BC)

Human cancer is probably as old as the human race. It is obvious that cancer did not suddenly start appearing after modernization or industrial revolution. Today, carcinoma is the medical term for a malignant tumor derived from epithelial cells. It is Celsus who translated *carcinos* into the Latin *cancer*, also meaning crab. The earliest record of cancer in man appeared in about 1550 BC is an Egyptian medical and surgical manuscript known as Ebers Papyrus. This collection described certain superficial swellings and ulceration that did not heal. The oldest known description of human cancer is found in an Egyptian seven papyri or written between 3000-1500 BC. Two of them, known as the "Edwin Smith" and "George Ebers" papyri, contain details of conditions that are consistent with modern descriptions of cancer. The Edwin Smith Papyrus, describes 8 cases of tumors or ulcers of the breast. The document acknowledged that there is no treatment for this condition and recommended cauterization (the fire drill) as a palliative measure. The ancient Egyptian medicine typically mixed medicine and religion. These physicians treated patients for several forms of cancer. Hieroglyphic inscriptions and papyri manuscripts suggest that these ancient physicians were able to distinguish between benign and malignant tumors. They suggested that the surface tumors may be removed surgically much similar to the current medical practice. Compounds of barley, pig's ear and other indigenous materials were suggested as treatment for cancer of the stomach and the uterus. Other commonly dispensed medications included ointments, enemas, castor oil, suppositories, poultices and animal parts.

Oldest specimens of cancer (1900 BC to 1500 BC)

The oldest available specimen of a human cancer is found in the remains Of skull of a female who lived during the Bronze Age (1900-1600 BC). The tumor in the womens skull as suggestive of head and neck cancer. The mummified skeletal remains of Peruvian Incas, dating back 2400 years ago, contained abnormalities suggestive of involvement with
malignant melanoma. Cancer was also found in fossilized bones recovered from ancient Egypt. Louis Leakey found the oldest possible hominid malignant tumor in 1932 from the remains of a body, which could be either that of Homo erectus or an Australopithecus. This tumor had features suggestive of a Burkitts lymphoma.

**Origin of the word carcinoma**

Galen in 164 AD classified tumors. Galen used "oncos" to describe all tumors, the root for the modern word oncology (10). English physician Percivial Pott was the first to identify environmental factors as the cause of cancer (11). Hippocrates, the great Greek physician (460-370 B.C), who is considered the father of medicine is though to be the first person to clearly recognize difference between benign and malignant tumors. His writings include description of cancers involving various body sites. By fourth century BC Hippocrates and his co-workers had come to know about cancer of breast, stomach and uterus etc. and used the term cancer (12). He noticed that blood vessels around a malignant tumor looked like the claws of crab. He named the disease karkinos (the Greek name for crab) to describe tumors that may or may not progress to ulceration. In English this term translates to carcinos or carcinoma. Works of Hippocrates and Galen, another Greek physician have revolutionized the practice of medicine by removing it from grips of superstitions and magic, to the era of observation and logical reasoning. He called benign tumours oncos, Greek for swelling, and malignant tumours carcinos, Greek for crab or crayfish. This name probably comes from the appearance of the cut surface of a solid malignant tumour, with a roundish hard center surrounded by pointy projections, vaguely resembling the shape of a crab (see photo). He later added the suffix -oma, Greek for swelling, giving the name carcinoma. Since it was against Greek tradition to open the body, Hippocrates only described and made drawings of outwardly visible tumors on the skin, nose, and breasts.

**Constantinople in the history of cancer**

Later in the course of history, Constantinople became the intellectual headquarters of medicine. The ancient teachings of Hippocrates and Galen continued to influence the physicians in Constantinople, Cairo, Alexandria, and Athens. During this period the cause of cancer was explained as the result of an excess of black bile.
Treatment was based on the humor theory of four bodily fluids (black and yellow bile, blood, and phlegm). According to the patient's humor, treatment consisted of diet, blood-letting, and/or laxatives. Through the centuries it was discovered that cancer could occur anywhere in the body, but humor-theory based treatment remained popular until the 19th century with the discovery of cells. Though treatment remained the same, in the 16th and 17th centuries it became more acceptable for doctors to dissect bodies to discover the cause of death.

**Eighteenth century to modern era**

The use of surgery to treat cancer had poor results due to problems with hygiene. The renowned Scottish surgeon Alexander Monro (1697-1767) saw only 2 breast tumor patients out of 60 surviving surgery for two years. In the 19th century, asepsis improved surgical hygiene and as the survival statistics went up, surgical removal of the tumor became the primary treatment for cancer. Jean Astruc and chemist Bernard, two 18th century physicians conducted research to confirm or disprove then current theories related to the origin of cancer. These efforts were the very first steps of experimental oncology. The art and science of seeking better diagnosis, treatments and understanding of the causes of cancer evolved from many who followed their path. In 1761, Giovanni Morgagni of Padua was the first to do an autopsy to look for the pathological findings in a patient after death. This and the efforts of many great physicians who followed them laid the foundation for scientific oncology, the study of cancer. John Hunter (1728-1793), a famous Scottish surgeon suggested that some cancers might be cured by surgery and described methods by which we can distinguish the surgically removable tumors. He suggested that, if tumor has not encroached to the nearby tissue and was still moveable, "There is no impropriety in removing it."

With the exception of William Coley who in the late 1800s felt that the rate of cure after surgery had been higher before asepsis (and who injected bacteria into tumors with mixed results), cancer treatment became dependent on the individual art of the surgeon at removing a tumor. During the same period, the idea that the body was made up of various tissues, that in turn were made up of millions of cells, laid rest the tumor-theories about chemical imbalances in the body. The age of cellular pathology was born. When Marie Curie and Pierre Curie discovered radiation at the end of the 19th century, they stumbled
upon the first effective non-surgical cancer treatment. With radiation came also the first 
signs of multi-disciplinary approaches to cancer treatment. The surgeon was no longer 
operating in isolation, but worked together with hospital radiologists to help patients. The 
complications in communication this brought, along with the necessity of the patient's 
treatment in a hospital facility rather than at home, also created a parallel process of 
compiling patient data into hospital files, which in turn led to the first statistical patient 

studies.

During 1830s the cell theory, i.e., every living organism is composed of cells 
became established. But it was not until 1885 the great generalization was made that all 
diseases including cancer is ultimately a disease of cells. The concept emerged that any cell 
in the body that is capable of division could be transformed into a cancerous cell.

Discovery of anesthesia in 1844 by Wells allowed surgery to flourish and the classic 
cancer operations such as radical mastectomy were developed. The discovery of microscope 
by Leeuwenhoek in the late 17th century added momentum to the quest for the cause of 
cancer. By late 19th century, with the development of better microscopes to study cancer 
tissues scientists gained more knowledge about the cancer process. These studies showed 
that cancer cells are markedly different in appearance compared to the surrounding normal 
cells from which they originated. Rudolf Virchow, who is often called the founder of 
cellular pathology, provided the scientific basis for the modern pathologic study of cancer 
and correlated the clinical course of illness with microscopic findings. This approach led to 
the development of modern cancer surgery. Tissues removed by the surgeons were 
examined under the microscope to make a precise diagnosis of cancer. By looking at the cut 
margin of surgery the pathologist were able to tell the surgeon if the cooperative procedure 
had completely removed the tumor.

The German professor Wilhelm Fabry believed that breast cancer was caused by a 
milk clot in a mammary duct. The Dutch professor Francois de la Boe Sylvius, a follower of 
Descartes, believed that all disease was the outcome of chemical processes, and that acidic 
lymph fluid was the cause of cancer. His contemporary Nicolaes Tulp believed that cancer 
was a poison that slowly spreads, and concluded that it was contagious (13). With the 
widespread use of the microscope in the 18th century, it was discovered that the 'cancer
poison' spread from the primary tumor through the lymph nodes to other sites ("metastasis").

In late 19th century and early 20th century the transplantability of cancer cells was the next major development in cancer research. It was found independently by Hanau, Wehr and Loeb that when small number of cancer cells were implanted into a healthy host of the same species new cancers developed from the implanted cells which were similar in every respect to the cancer from which the cells were originally derived. The experimental production of cancer with the use of specific physical, chemical and biological agents was a remarkable advancement in the early 20th century. During the latter part of 19th century the effort to find the role of bacterial pathogens in the development of cancer failed (14).

Early 20th century saw the emergence of the mutagenic as an explanation of the origin of cancer cells. Cancer arises suddenly, mutation in the genetic apparatus of the cell expressed as the malignant property of the normal cell. This century saw great progress in the understanding of microscopic structure and functioning of the living cells. Researchers pursued different theories to the origin of cancer, subjecting their hypotheses to systematic research and experimentation. A virus causing cancer in chickens was identified in 1911. Many chemical and physical carcinogens were conclusively identified during later part of the 20th century. Later part of the 20th century showed tremendous improvement in our understanding of the cellular mechanisms related to cell growth and division. Many factors that suppress and activate the cell growth and division were identified.

Around 1910 Rous and other scientists demonstrated that cancer can be transmitted from one diseased chicken to another healthy chicken by means of cell free filtrate which implied that virus may be the causative agents of cancer (15). More than 40 different and distinct viruses have now been shown to cause cancer in animals and plants.

A powerful tool for studying the cancer problem emerged with the development and subsequent use of cell and tissue culture techniques. Normal cells isolated from different sources can grow in culture and many physical, chemical and biological agents can convert those cells to cancer cells. Moreover it was found that normal cells when grown for prolonged period of time in culture, some of those cells become cancerous without treatment with any carcinogenic agent. Clinically nothing distinguishes between cancer
produced in experimental animals or in culture cells treated with carcinogens or with spontaneously produced cancer cells in cultures. In essence it can be said that the disease is the same with basically underlying heritable cellular changes that lead to the development of the cancerous state.

**Morphology of cancer tissue**

Cancer tissue has a distinctive appearance under the microscope. Among the distinguishing traits are a large number of dividing cells, variation in nuclear size and shape, variation in cell size and shape, loss of specialized cell features, loss of normal tissue organization, and a poorly defined tumor boundary. Immunohistochemistry and other molecular methods may characterise specific markers on tumor cells, which may aid in diagnosis and prognosis. Biopsy and microscopical examination can also distinguish between malignancy and hyperplasia, which refers to tissue growth based on an excessive rate of cell division, leading to a larger than usual number of cells but with a normal orderly arrangement of cells within the tissue. This process is considered reversible. Hyperplasia can be a normal tissue response to an irritating stimulus, for example callus.

Dysplasia is an abnormal type of excessive cell proliferation characterized by loss of normal tissue arrangement and cell structure. Often such cells revert to normal behavior, but occasionally, they gradually become malignant.

The most severe cases of dysplasia are referred to as "carcinoma in situ." In Latin, the term "in situ" means "in place", so carcinoma in situ refers to an uncontrolled growth of cells that remains in the original location and shows no propensity to invade other tissues. Nevertheless, carcinoma in situ may develop into an invasive malignancy and is usually removed surgically, if possible.
Cervical Precancers:

The majority of squamous cell carcinomas are thought to emanate from a precancerous cervical condition. Such lesions have been termed "cervical intraepithelial neoplasia" (CIN). CIN is graded according to the degree of involvement of the epithelium as CIN I, or III representing neoplastic change of the epithelium. Risk factors for the development of CIN are almost identical to those for invasive squamous cell carcinoma of the cervix (16-18).

Clinically two forms of cervical cancer apparently exist. A rare fast growing type is being detected in all age groups and particularly in women in their 20’s and 30’s. This form of cervical cancer is increasing at an alarming rate. The more common slow growing form usually does not appear until the 40’s, 50’s and 60’s. Its rate has remained relatively constant over the years.

The majority of CIN and invasive squamous cell lesions have been shown to be associated with the HPV. Low grade and high grade related HPV types are demonstratable in low grade CIN, while high grade CIN is associated with predominantly high and intermediate risk types. The majority of invasive lesions are positive for high risk HPV types.

The cervix is the lower part of the uterus. The cervix projects into the vagina and because of it’s position is exposed to external cancer producing agents or carcinogens. A continuous layer of epithelial cells covers the cervix. In the cervical canal this epithelial consist of a single layer of mucous secreting cells. The remainder of
the cervix is covered by stratified squamous epithelium. The boundary between the two types of epithelia is called transformation zone. Cells in this area are constantly dividing and it is here that cervical cancer most frequently originate.

Cancers are classified by the type of cell that resembles the tumor and, therefore, the tissue presumed to be the origin of the tumor. The following general categories are usually accepted:

- Carcinoma: malignant tumors derived from epithelial cells. This group represents the most common cancers, including the common forms of breast, prostate, lung and colon cancer.
- Lymphoma and Leukemia: malignant tumors derived from blood and bone marrow cells
- Sarcoma: malignant tumors derived from connective tissue, or mesenchymal cells
- Mesothelioma: tumors derived from the mesothelial cells lining the peritoneum and the pleura.
- Glioma: tumors derived from glia, the most common type of brain cell
- Germinoma: tumors derived from germ cells, normally found in the testicle and ovary
- Choriocarcinoma: malignant tumors derived from the placenta

Malignant tumors are usually named using the Latin or Greek root of the organ as a prefix and the above category name as the suffix. For instance, a malignant tumor of liver cells is called *hepatocarcinoma*; a malignant tumor of the fat cells is called *liposarcoma*. For common cancers, the English organ name is used. For instance, the most common type of breast cancer is called *ductal carcinoma of the breast* or *mammary ductal carcinoma*. Here, the adjective *ductal* refers to the appearance of the cancer under the microscope, resembling normal breast ducts.

Cervical cancer is staged by the FIGO (International Federation of Gynecology and Obstetrics) staging system, which is based on clinical examination, rather than surgical findings.
International Federation of Gynecologists and Obstetricians Staging System for Cervical Cancer

**Stage Characteristics**

0  Carcinoma in situ, intraepithelial neoplasia.

I  Carcinoma strictly confined to the cervix.
   Ia Invasive cancer identified only microscopically. All gross lesions, even with superficial invasion, are stage Ib cancers. Invasion is limited to measured invasion of stroma \( \leq 5 \text{ mm in depth and } \leq 7 \text{ mm in width} \).
   Ia1 Measured invasion of stroma \( \leq 3 \text{ mm in depth and } \leq 7 \text{ mm in width} \).
   Ia2 Measured invasion of stroma \( > 3 \text{ mm and } \leq 5 \text{ mm in depth and } \leq 7 \text{ mm in width} \).

Ib  Clinical lesions confined to the cervix or preclinical lesions greater than Ia.
   Ib1 Clinical lesions \( \leq 4 \text{ cm in size} \).
   Ib2 Clinical lesions \( > 4 \text{ cm in size} \).

II  Carcinoma extends beyond the cervix but not to the pelvic wall; carcinoma involves the vagina but not as far as the lower one third.
   IIa No obvious parametrial involvement.
   IIb Obvious parametrial involvement.

III  Carcinoma has extended to the pelvic wall; on rectal examination no cancer-free space is found between the tumor and the pelvic wall; the tumor involves the lower one third of the vagina; all cases with a hydronephrosis or nonfunctioning kidney should be included, unless they are known to be related to another cause.
   IIIa No extension to the pelvic wall, but involvement of the lower one third of the vagina.
   IIIb Extension to the pelvic wall and hydronephrosis or nonfunctioning kidney, or both.

IV  Carcinoma has extended beyond the true pelvis or has clinically involved the mucosa of the bladder or rectum.
   IVa Spread to adjacent organs.
   IVb Spread to distant organs.
Causes of Cancer

The exact cause of cancer is not known but quite a few substances have been identified which tend to cause cancer. These are called carcinogens. The carcinogens affect the natural genetic processes of cells and disturb the control mechanism (19, 20). Especially dangerous are viruses, chemicals and ionising radiation.

Genetic and Environmental factors

Cancer is, ultimately, a disease of genes. In order for cells to start dividing uncontrollably, genes which regulate cell growth must be damaged. Proto-oncogenes are genes which promote cell growth and mitosis, a process of cell division. Tumor suppressor genes discourage cell growth or temporarily halts cell division from occurring in order to carry out DNA repair. Typically, a series of several mutations to these genes are required before a normal cell transforms into a cancer cell.

Proto-oncogenes

Proto-oncogenes, promote cell growth through a variety of ways. Mutations in proto-oncogenes can modify their expression and function, increasing the amount or activity of the product protein. When this happens, they become oncogenes, and thus cells have a higher chance to divide excessively and uncontrollably. The chance of cancer cannot be reduced by removing proto-oncogenes from the genome as they are critical for growth, repair and homeostasis of the body.

Tumor suppressor genes

Tumor suppressor genes code for anti-proliferation signals and proteins that suppress mitosis and cell growth. Generally tumor suppressors are transcription factors that are activated by cellular stress or DNA damage. Often DNA damage will cause the presence of free-floating genetic material as well as other signs, and will trigger enzymes and pathways which lead to the activation of tumor suppressor genes. The function of such genes is to arrest the progression of cell cycle in order to carry out DNA repair, preventing mutations from passed on to daughter cells. Canonical tumor suppressors include the p53 gene, which is a transcription factor activated by many cellular stress including hypoxia and ultraviolet radiation damage.
However, a mutation can damage the tumor suppressor gene itself, or the signal pathway which activates it, "switching it off". The invariable consequence of this is that DNA repair is hindered or inhibited: DNA damage accumulates without repair, inevitably leading to cancer.

**Role of genetic damage**

Cancer is ultimately due to accumulation of genetic damage, which fundamentally mutations in the DNA. Substances that cause these mutations are known as mutagens, and mutagens that cause cancers are known as carcinogens. Particular substances have been linked to specific types of cancer. Tobacco smoking is associated with lung cancer. Prolonged exposure to radiation, particularly ultraviolet radiation from the sun, leads to melanoma and other skin malignancies. Breathing asbestos fibers is associated with mesothelioma. In more general terms, chemicals called mutagens and free radicals are known to cause mutations. Other types of mutations can be caused by chronic inflammation, as neutrophil granulocytes secrete free radicals that damage DNA. Chromosomal translocations, such as the Philadelphia chromosome, are a special type of mutation that involves exchanges between different chromosomes.

**Non-mutagenic carcinogens**

Many mutagens are also carcinogens, but some carcinogens are not mutagens. Examples of carcinogens that are not mutagens include alcohol and estrogen. These are thought to promote cancers through their stimulating effect on the rate of cell mitosis. Faster rates of mitosis increasingly leave less opportunity for repair enzymes to repair damaged DNA during DNA replication, increasingly the likelihood of a genetic mistake. A mistake made during mitosis can lead to the daughter cells receiving the wrong number of chromosomes, which leads to aneuploidy and may lead to cancer.

**Role of viral infections**

Most forms of cancer are "sporadic", and have no basis in heredity. There are, however, a number of recognised syndromes of cancer with a hereditary component, often a defective tumor suppressor allele. Examples are:
• certain inherited mutations in the genes BRCA1 and BRCA2 are associated with an elevated risk of breast cancer and ovarian cancer
• tumors of various endocrine organs in multiple endocrine neoplasia (MEN types 1, 2a, 2b)
• Li-Fraumeni syndrome (various tumors such as osteosarcoma, breast cancer, soft-tissue sarcoma, brain tumors) due to mutations of p53
• Turcot syndrome (brain tumors and colonic polyposis)
• Familial adenomatous polyposis an inherited mutation of the APC gene that leads to early onset of colon carcinoma.
• Retinoblastoma in young children is an inherited cancer

The number of potential target cells for precancer confined to a narrow transformation zone is small. Risk of precancer and malignant transformation per target cell is therefore probably far higher than in any other human tissue subject to cancer. Spontaneous mutation rate and physicochemical carcinogens seem insufficient for the creation of a malignant phenotype in cells of the transformation zone. Currently HPV is the only strong candidate for such a feat. Target cells within the transformation zone have the capacity for bidirectional (squamous and/or glandular) differentiation. HPV types seem to drive cells preferentially in different directions after infection/transformation. Low risk types are almost always associated with squamous differentiation, HPV 16 usually also with squamous differentiation and HPV 18 with adenosquamous or adenomatous differentiation.

Human papilloma virus or HPV has been heavily implicated in cancer of the cervix. This is a tiny virus whose outer shell is made up from a regular arrangement of protein molecular. Over 40 strains of the virus have been classified, but only a few have been associated with cancer. Some strains are known to cause genital and non-genital warts. The strains associated with cervical cancer have also been lined with some cancers of the penis, anus and larynx. However, it is also possible to be infected with the virus without showing any signs or symptoms.
Human Papilloma virus readily attacks cells which are in the process of dividing. Hence the cells of the transformation zone are particularly liable to damage. When the virus enters the cell, its DNA directs the production of new virus particle which are eventually released to infect more cells in the region. Infection with the virus may modify the cells' behaviour. Cells which would normally mature as squamous cells fail to do so. When such primitive cells are present the condition is called cervical intraepithelial Neoplasia or CIN. This abnormality may progress to cancer which seems to occur when the DNA of the virus actually joins the DNA of the cell a process called integration. Other factors have also been implicated in this transformation.

Signs and symptoms

Roughly, cancer symptoms can be divided into three groups:

- **Local symptoms**: unusual lumps or swelling (tumor), hemorrhage (bleeding), pain and/or ulceration. Compression of surrounding tissues may cause symptoms such as jaundice.

- **Symptoms of metastasis (spreading)**: enlarged lymph nodes, cough and hemoptysis, hepatomegaly (enlarged liver), bone pain, fracture of affected bones and neurological symptoms. Although advanced cancer may cause pain, it is often not the first symptom.

- **Systemic symptoms**: weight loss, poor appetite and cachexia (wasting), excessive sweating (night sweats), anemia and specific paraneoplastic phenomena, i.e. specific conditions that are due to an active cancer, such as thrombosis or hormonal changes.

Adult cancers

In India it is estimated that there are 2 to 2.5 million cancer patients at any given point of time with about 0.7 million new cases coming every year and nearly half die every year. Two-third of the new cancers presented in advance and incurable stage at the time of diagnosis. More than 60% of these affected patients are in the prime of their life between the ages of 35 and 65 years. With increasing life expectancy and changing life styles concomitant with development, the number of cancer cases will be almost three times the current number. It has long been realized that cancers of the head and neck in both sexes
and of the uterine cervix in women are the most common malignancies seen in the country. The age adjusted incidence rate per 100,000 for all types in India in urban areas range from 106-130 for men and 100-140 for women but still lower than USA, UK and Japan rates. 50% of all male cancers are tobacco related and 25% in female (total 34% of all cancers are tobacco related). There are predictions of incidence of 7 folds increase in tobacco related cancer morbidity in between 1995-2025. In the USA and other developed countries, cancer is presently responsible for about 25% of all deaths (21). On a yearly basis, 0.5% of the population is diagnosed with cancer.

Common cancers (female) in India, 2004 are presented in the following table:-

<table>
<thead>
<tr>
<th>Site of cancer</th>
<th>Incident cases (%)</th>
<th>CIR/10^5</th>
<th>ASR/10^5</th>
<th>Ratio at risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All ages 35-64 yrs</td>
<td>All ages 35-64 yrs</td>
<td>0 - 74 yrs</td>
<td></td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cervix</td>
<td>112,609 (26.1)</td>
<td>21.3</td>
<td>57.4</td>
<td>1:32</td>
</tr>
<tr>
<td>Breast</td>
<td>90,723 (21.0)</td>
<td>17.1</td>
<td>39.7</td>
<td>1:40</td>
</tr>
<tr>
<td>Ovary</td>
<td>24,246 (5.6)</td>
<td>4.6</td>
<td>9.8</td>
<td>1:144</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>22,741 (5.3)</td>
<td>4.3</td>
<td>9.7</td>
<td>1:20</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>17,220 (4.0)</td>
<td>3.3</td>
<td>6.8</td>
<td>1:163</td>
</tr>
</tbody>
</table>

CIR: crude incidence rate; ASR: standardized rate

The impact of cancer is far greater than the number of cases alone would suggest. Regardless of prognosis, the initial diagnosis of cancer is still perceived by many patients as a life-threatening event, with over one-third of patients experiencing anxiety and depression. Cancer can be equally if not more distressing for the family, profoundly affecting both the family's daily functioning and economic situation. The economic shock often includes both the loss of income and the expenses associated with health care costs.

Cancer prevalence in India is estimated to be around 2.5 million, with over 8,00,000 new cases and 5,50,000 deaths occurring each year due to this disease in the country (22). The common sites for cancer in India are oral cavity, lungs, oesophagus and stomach in males and cervix, breast and oral cavity among females. Over 70% of the cases report for
diagnostic and treatment services in advanced stages of the disease, resulting in poor survival and high mortality rates (23). The disease is associated with a lot of fear and stigma in the country.

**Limitations of Cancer Therapy**

Cancer prevention and detection efforts can have enormous benefits for developing countries by reducing future disease burden while saving economic resources for needed improvements in societal infrastructure. As development and mechanization continue into the 21st century, India must grapple with transition from the burden of NCDS. The prognosis for patients with cervix cancer is markedly affected by the extent of disease at time of diagnosis. Data from population based cancer registries in India show that most frequently reported cancer sites are cervix, breast, ovary and oesophagus (24). In a large series of cervical cancer patient treated by radiation therapy, the incidence of distant metastasis is observed to increase with increasing stage of disease from 3% in stage I to 75% in stage IVA.

Cancer can be treated by surgery, chemotherapy, radiation therapy, immunotherapy, monoclonal antibody therapy or other methods. The choice of therapy depends upon the location and grade of the tumor and the stage of the disease, as well as the general state of the patient (performance status). A number of experimental cancer treatments are also under development. Complete removal of the cancer without damage to the rest of the body is the goal of treatment. Sometimes this can be accomplished by surgery, but the propensity of cancers to invade adjacent tissue or to spread to distant sites by microscopic metastasis often limits its effectiveness. The effectiveness of chemotherapy is often limited by toxicity to other tissues in the body. Radiation can also cause damage to normal tissue. Because "cancer" refers to a class of diseases, it is unlikely that there will ever be a single "cure for cancer" any more than there will be a single treatment for all infectious diseases.