2
The Diagnosis and Treatment of Cancer

In the day-to-day operations of the registry, the cancer registry personnel deal mostly with cases of cancer. They will encounter various terms that refer to symptoms or signs of the illness, describe the tumour and refer to the site of origin, as well as the methods and results of diagnosis and treatment. It is not necessary to know the exact definition of all these terms, but the worker should be able to decide whether they relate to the diagnosis or treatment of cancer, or whether they are used to describe the site or type of the tumour. This chapter provides general information on symptoms of cancer, methods of detection and forms of treatment. Common medical terms are presented and defined. The Medical Terminology Course at the end of this manual should also be studied.

2.1
Medical terminology

2.1.1 Word roots, suffixes and prefixes

In the process of cancer registration, particularly during collection of information on cases, personnel will meet medical terms which may refer to symptoms, to diagnostic procedures or to treatments. Registry workers do not have to memorize all these different terminologies. However, it is important that they learn the meaning of the more common word roots (or origins), prefixes (beginnings) and suffixes (endings) (the parts of words which are combined to make up medical terms) to help in understanding difficult terms. This is especially useful as most medical records are handwritten with varying degrees of legibility. A simple medical dictionary is very helpful. Examples of suitable dictionaries on the market are given in the list of suggested further reading at the end of the Manual.

Most medical terms are derived from languages such as Latin, Greek, French or German. As an example, let us take the word arthralgia which is based on the Greek word arthron (joint) as a root, and the suffix (ending) -algia which is derived from the Greek word algo (pain). Thus arthralgia means pain in the joint.

The root, also known as stem, of a medical term is usually the main part of the word and refers to the organ or place where the illness originated. It is generally derived from a Greek or Latin noun or verb. The root may be found:

- at the beginning, as in: osteoma, lingual, leukaemia
- in the middle: intercostal, hyperchromatic, prognosis
- at the end: anuria, neoplasm, hypogastric, mesoderm

The meaning of a medical term is modified by the addition of a prefix (at the beginning) or a suffix (at the end).

The prefix is often a preposition or an adverb and it consists of one or two syllables added in front of the root of the word which alters its meaning. Examples are given below:

Medical term	*Prefix*	*Definition of prefix*
submandibular	sub-	below
hypogastric	hypo-	beneath, under, deficient
aphonia	a-	without
anencephalic	an-	without
endocardium	endo-	inside
bilateral	bi-	two
contralateral	contra-	against, opposite

A suffix refers to a syllable or group of syllables attached to the end of the root to modify its meaning. Suffixes, as prefixes, modify the meaning of a root element. Examples are:

Medical term	*Suffix*	*Definition of suffix*
Appendicitis	-itis	inflammation
Histology	-ology	study of
Leukopenia	-penia	deficiency
Carcinoid	-oid	form, resembling
Ovoid	-oid	form, like, resembling
Hepatomegaly	-megaly	enlargement

Hepatic	–ic	condition of
Erythrocytosis	–osis	abnormal increase, disease, morbid status
Nephropathy	–pathy	morbid condition (non-inflammatory)

Often, a root will be combined with a suffix and put after another root, so forming the word ending, for example:

- Leukaemia – Root (aem = blood) + suffix (–ia = condition), added to another root (leuk– = white), to form the word leukaemia.
- Carcinogenic – Genic is composed of a root (gen = forming, producing) + a suffix (–ic = condition of).

In summary, the basic forms of medical terms are:

Root plus suffix:

- Hepatoma: (hepa = liver) + (–oma = tumour).
- Leukorrhea: (leuko = white) + (–rrhea = flow).

Prefix plus root:

- Neoplasm: (neo– = new) + (plasm = fluid substance of cells).
- Biology: (bio– = life, living) + (logy = study of).
- Pathology: (patho– = relating to disease) + (logy = study of).

Prefix plus root plus suffix:

- Epigastric: (epi– = on or upon) + (gastr = stomach) + (–ic = condition of), relates to the epigastrium at the upper middle region of the abdomen.
- Dyspneic: (dys– = difficult) + (pne = breathing) + (–ic = condition of), describes difficulty in breathing.
- Tachycardic: (tachy– = rapid) + (card = heart) + (–ic = condition of), describes rapid heart rate.

Two roots:

- Carcinogen: (carcin(o) = cancer, crab) + (gen = forming).
- Scleroderma: (scler(o) = hard) + (derma = skin).

The vowel is in brackets because it has been introduced to combine the two root words.

EXERCISES

The answers to the exercises are given at the end of this chapter.

Question 2(a):

In the list below different word roots are used to describe the origin of the tumour or primary site. These word roots are usually, although not always, derived from Greek or Latin. Look them up in your dictionary and match the word roots with the sites.

___ a. Gastr–	1. Skin
___ b. Nephr–	2. Breast
___ c. Hepat–	3. Spleen
___ d. Rhin–	4. Lung
___ e. Cerebr–	5. Kidney
___ f. Bronch–	6. Brain
___ g. Mamm–	7. Nose
___ h. Card–	8. Liver
___ i. Derm–	9. Heart
___ j. Lieno–	10. Stomach

Question 2(b):

In the list below word roots are used to describe the different body tissues. These are combined with other word elements to describe the histological type of the neoplasm. Look up these word roots in your dictionary and match them with the correct definition.

___ a. Angi–	1. Gland
___ b. Fibr–	2. Threadlike
___ c. Oste–	3. Marrow
___ d. Lei–	4. Fat
___ e. Aden–	5. Slime
___ f. Cyst–	6. Membrane
___ g. Lip–	7. Sac, Cyst
___ h. Myel–	8. Smooth
___ i. Mening–	9. Vessel
___ j. Rhabdo–	10. Rod
___ k. Hem–	11. Cartilage
___ l. Chondr–	12. Bone
___ m.Myx–	13. Skin
___ n. Derm–	14. Blood

Question 2(c):

In the list below are prefixes commonly used with medical terms. Match the prefix with the correct definition:

___ a. Poly–	1. Half
___ b. Infra–	2. After
___ c. Hemi–	3. New
___ d. Ect–	4. Back
___ e. Hyper–	5. One
___ f. Ad–	6. To, toward
___ g. Peri–	7. Outside
___ h. Oligo–	8. Abnormal enlargement
___ i. Dys–	9. Bad
___ j. Pre–	10. Above
___ k. Inter–	11. Difficult
___ l. Supra–	12. Below, beneath
___ m.Post–	13. Before
___ n. Mono–	14. Around
___ o. Ex–	15. Between
___ p. Ne(o)–	16. Many
___ q. Megal–	17. Excessive
___ r. Micr–	18. Small
___ s. Mal–	19. To take away from
___ t. Dors–	20. Scanty

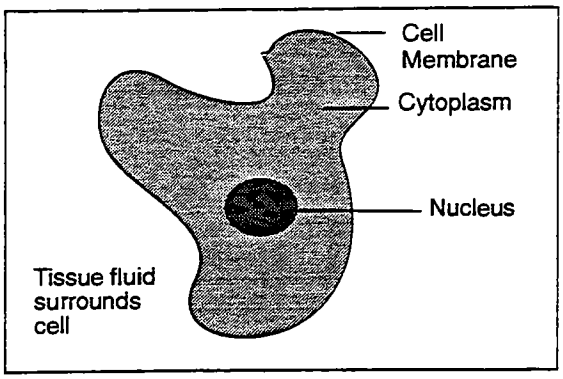
2.1.2 Tumour formation and pathology

The human body is composed of millions of microscopic units called cells. These are of different types and are arranged in different ways. A typical cell is enclosed in a cell membrane and contains a nucleus and cytoplasm. Groups of cells performing the same function form *tissues*. The epithelial tissue or epithelium lines the body cavities and provides protection and lubrication; connective tissue supports and holds other tissues together; muscle tissue is for movement and nervous tissue carries messages between the brain and spinal cord and the rest of the body.

Several tissues operating together form *organs*, such as the heart, lungs, liver, stomach, colon and kidneys. Different organs work together in a unit called an *organ system* each of which has a particular function in sustaining life. For example, the digestive system or alimentary tract is composed of the mouth, pharynx, oesophagus, stomach, small intestine, colon and anus. Together, these organs allow an individual to ingest, digest and absorb food and to excrete waste products. Other organ systems are the nervous system, the respiratory system, the genito–urinary system and the circulatory system.

Since the cell is the basic structural unit of the human body, any abnormality in the cell can result in abnormalities being carried throughout the tissues, organs and organ systems and

Figure 2.1 Cell Structure



may ultimately result in the malfunction of any or all of these. Tumour formation begins at the cellular level.

The study of the functional changes in tissues and organs of the body which cause or are caused by disease is known as pathology.

Most cells are able to reproduce themselves in order to grow and to replace worn-out or injured cells: the exception is the cells of the brain. Tissues normally grow by increasing the number of cells through a process of cell division or mitosis. Certain normal tissues replace their cells at regular intervals, for example the intestinal epithelium is replaced every 2–6 days. Other tissues have the capacity to undergo mitosis but rarely do so unless there is a stimulus. Yet other tissues, such as the muscle tissue, do not undergo mitosis once adult life has been reached.

The process of tissue growth is normally controlled by the body. In some persons, however, this normal life process gets out of control and the cells proliferate rapidly and uncontrollably, in a haphazard way, forming a 'neoplasm', 'new growth' or 'tumour' which serves no useful purpose for the body.

In the strict sense, 'tumour' can mean any swelling of body tissues. However, this term is frequently used to denote abnormal tissue growth or neoplasia characterized by abnormal and excessive division of cells, which usually results in distortion or destruction of the normal anatomy (anatomy is the structure of the body and the inter–relation of its parts). Neoplasm is derived from the word root "plasm" which means fluid substance of cells plus the prefix "neo–" meaning new. Thus neoplasm is a 'new growth'.

The terms 'tumour' and 'neoplasm' are often used inter–changeably. There are two general types of tumours or neoplasms: benign (non-

cancerous) and malignant (cancerous) tumours.

(1) *Benign tumours (non–cancerous)*

These are usually slow–growing tumours. They may become quite large and create pressure on neighbouring structures. The neoplasm or tumour displaces the surrounding tissue but does not invade or infiltrate it. Such tumours do not spread to other parts of the body. They do not invade parts of the body located elsewhere. They remain in the part of the body in which they originate.

An important feature of the benign tumour is 'encapsulation'. The tumour is usually very clearly separated from the surrounding tissues by a protective sheath or envelope, or a small rim of fibrous tissue.

Microscopically, the tumour cells look very similar to their tissue of origin. For example, a lipoma is a benign tumour of the fatty tissue. The tumour cells look very similar to the fat cells of origin, but they are greatly increased in number to form a tumour.

Usually, benign tumours cause no serious difficulties if properly managed. However, if left untreated, they may cause problems such as obstruction or bleeding (haemorrhage).

(2) *Malignant tumours (cancerous)*

These tumours are frequently characterized by rapid growth, and they destroy the part of the body in which they originate. They invade the surrounding tissues and may spread to other parts of the body (distant organs). Cells that break away from the original tumour may be carried by the blood stream or the lymphatic system to other areas of the body where they settle and form 'secondary' or 'metastatic' tumours. The process of spreading to different organs of the body is called metastasis. The secondary sites are known as metastatic sites.

The tumour can metastasize or spread to lymph nodes, or to other parts of the body:

Lymph nodes. These are small glands, which form part of the lymphatic system and are frequently involved in the spread of malignant tumours. They may be either regional (the lymph nodes are located close to the tumour site), or distant (the lymph nodes are located in some other part of the body).

Other parts. This refers to any organ or tissue of the body. However, malignant tumours typically spread to organs such as the bone, liver, and lung; metastasis takes place more frequently to these organs than to others.

Microscopically, malignant tumours are characterized by cells with nuclei showing numerous mitoses (cell divisions) and varying degrees of anaplasia (loss of normal differentiation) or lack of differentiation when compared to the tissue from which they originated.

Malignant tumours begin in the same way as benign tumours, i.e. as a local growth. At this stage, they can be eradicated from the body by surgery or destroyed by radiotherapy. If left untreated, the tumour grows and infiltrates the surrounding tissues, or metastasizes to distant organs, and may eventually kill the host.

A tumour has two basic characteristics:

- it is a mass of new cells
- it has no known purpose in the normal function of the body

Malignant tumours or cancer possess these two characteristics plus a third, the capacity of the uncontrolled dividing cells to invade and spread to distant parts of the body by way of the blood stream or lymphatic system.

EXERCISE

Question 2(d):

Which of the following three statements best describes the difference between a malignant and a benign tumour–

i Malignant tumours grow more rapidly than benign tumours

ii Malignant tumours attain a much larger size than benign tumours.

iii Malignant tumours can metastasize to other organs while benign tumours

remain at their site of origin and do not spread to other parts of the body.

When describing a malignant tumour, three important elements must be identified: the site of origin of the tumour, the type of cells involved in the malignancy, and the extent of the disease.

Identification of the site of origin of the tumour (primary site) is important because tumours in different organs or tissues behave differently to those in others. In the same way, different histological types have different behaviours (histology is the study of the minute structure of cells, tissues and organs in relation to their functions). The histological type or morphology of the tumour is determined by microscopic examination of a piece of tissue which has been excised (ex– = out, cise = cut) by a biopsy or during surgery. Biopsy is the removal of tissue from the living body for purposes of diagnosis by microscopic examination.

There are three significant events in the life history of a malignant tumour:

- tumour growth
- spread to the lymph nodes
- spread to distant organs (distant metastasis)

All these events are taken into consideration in the determination of the extent of the disease or 'stage' of the disease. This serves as a guide in the selection of the appropriate form of treatment to be used. Generally, treatment is more successful for small tumours, or those which have not spread, so that stage (extent) of disease is also used as a means of predicting the possible outcome of the disease (prognosis). These will be discussed in more detail in the chapter on coding (Chapter 4).

Generally, malignant tumours are either carcinomas or sarcomas:

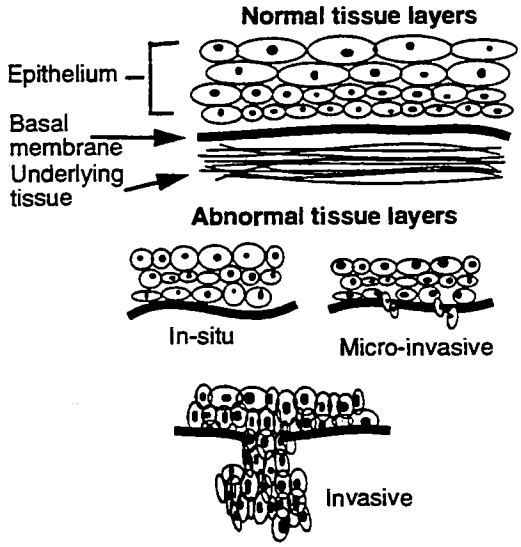
(a) **Carcinomas** are malignant tumours composed of epithelial cells which tend to invade surrounding tissues and give rise to metastases. Malignancies originating from the skin and the cells that line the walls of hollow organs (such as the intestinal tract) are carcinomas. Carcinoma is derived from the word root "carcin" meaning crab plus a suffix "–oma" meaning tumour. Examples are:

- bronchogenic carcinoma = lung cancer: (broncho– = windpipe) + (gen = producing) + (–ic = condition of).
- breast carcinoma = breast cancer.
- gastric carcinoma = stomach cancer.
- hepatocellular carcinoma = cancer of liver: (hepato– = liver) cells.

Carcinoma–*in–situ* refers to a malignant tumour which is confined to the epithelium (lining) and has not infiltrated into the tissues beneath it.

Sometimes a malignant tumour is described by the type of cells involved, for example, adenocarcinoma (adeno– = gland) + (carcinoma = malignant tumour of epithelial origin) is a malignant tumour arising from glandular tissue.

Figure 2.2.
Histological Aspect



(b) **Sarcomas** are malignant tumours arising from connective tissues. The word is derived from the root "sarco" meaning flesh plus the suffix "–oma" meaning tumour. Malignant tumours arising from the muscle tissue, fatty tissue, fibrous tissue, vascular tissue, bone, cartilage and nervous tissue are sarcomas. They tend to metastasize to distant organs. Examples are:

- Fibrosarcoma = a malignant tumour arising from fibrous connective tissues such as tendons: (fibr– = threadlike, fibre) + (sarcoma = malignant connective tissue tumour).
- Chondrosarcoma = a malignant tumour arising from cartilage: (chondro– = cartilage) + (sarcoma = malignant connective tissue tumour).

- Leiomyosarcoma = malignant tumour of smooth muscle: (leio– = smooth) + (myo– = muscle) + (sarcoma = malignant connective tissue tumour).
- Osteosarcoma = malignant tumour of the bone: (osteo– = bone) + (sarcoma = malignant connective tissue tumour).

2.1.3 Symptoms

A patient consults a physician or seeks hospitalization because of certain complaints felt by the patient (symptoms) or abnormalities which can be appreciated by an observer (signs). Among cancer patients, the presenting signs and symptoms vary with the different organs involved. The most pressing complaints which prompted the patient to seek medical attention are recorded in the patient's history (record of the patient's illness) under the heading Chief Complaints. The development of these symptoms, as well as other associated complaints, are recorded under the heading of History of Present Illness. In the process of taking a medical history, these signs and symptoms may be recorded using medical terminology. To facilitate abstracting of the medical record, the Registry personnel should learn some medical terms describing symptomatology, the word elements comprising these terms and their definitions.

In the list below are some symptoms which may be indicative of malignancy:

(1) Unusual bleeding

This may occur in the digestive tract, respiratory system, genitourinary tract or elsewhere. In the digestive or alimentary tract, unusual bleeding may occur as:

Haematemesis: (haema– = blood) + (emesis = to vomit) = vomiting of blood.

Melena: derived from the Greek word "melas", a root meaning black; this is defined as the passage of black, tarry stools, one of the signs of bleeding from the upper alimentary tract.

In the respiratory system, bleeding may occur as:

Epistaxis: (epi– = upon, over, in addition) + (staxis = haemorrhage), which is nose bleeding or haemorrhage from the nose.

Haemoptysis: (haemo– = blood) + (pty = saliva) + (–sis = condition of), a condition characterized by spitting up or coughing up of blood.

In the genito–urinary tract, unusual-bleeding may occur as:

Haematuria: (haemat– = blood) + (ur = urine) + (–ia = condition of) = a condition characterized by blood in the urine.

Menorrhagia: (meno = menstruation) + (–rrhagia = excessive flow), an excessive menstrual flow.

Metrorrhagia: (metro = uterus) + (–rrhagia = excessive flow) = uterine bleeding.

Unusual bleeding may also occur in the form of:

Haematoma: (haema = blood) + (–oma = tumour), a localized collection or pooling of blood outside the blood vessel in an organ, space or tissue (a bruise is a simple example of a haematoma).

Haemoperitoneum: (hemo = blood) + (peritoneum = the membrane lining the walls of the abdominal and pelvic cavities), a collection of blood in the peritoneal cavity.

Haemothorax: (hemo = blood) + (thorax = chest), a collection of blood in the pleural cavity, which is located in the chest (pleura is the membrane surrounding the lungs and lining the thoracic cavity).

(2) Unusual discharge

The suffix used to indicate dicharge is "–rrhea". This is attached to different word roots to indicate the site where this occurs, or the type of discharge.

Galactorrhea: (galact(o) = milk) + (–rrhea = flow, discharge), an excessive or spontaneous milk flow:

Rhinorrhea: (rhino = nose) + (–rrhea = flow, discharge), a watery nasal discharge.

Bronchorrhea: (broncho = windpipe) + (–rrhea = flow, discharge),

a discharge of mucus from the bronchi.

Leukorrhea: (leuko = white) + (–rrhea = flow, discharge), the whitish discharge from the vagina or the uterine cavity.

(3) *Change in bowel habits*

This usually indicates disease in the gastrointestinal tract, particularly the colon and rectum, and may occur in the form of:

Diarrhea: (dia = across, through) + (–rrhea = flow, discharge), abnormal frequency and looseness of bowel movements.

Constipation: infrequent or difficult evacuation of faeces.

(4) *Change in urinary habits*

This usually indicates disease in the genito–urinary system. It may occur in the form of:

Dysuria: (dys– = difficult, painful) + (ur = urine) + (–ia = condition of), a condition characterized by painful or difficult urination.

Polyuria: (poly– = many) + (ur = urine) + (–ia = condition of), an excessive secretion of urine or increased frequency in urination. Another term for this is 'frequent urination'.

Urgency: a compelling desire to urinate.

Oliguria: (olig– = scant) + (ur = urine) + (–ia = condition of), a condition characterized by diminished urine secretion.

Anuria: (an– = without) + (ur = urine) + (–ia = condition of), a condition characterized by no urine formation.

Nocturia: (noct– = night) + (ur = urine) + (–ia = condition of), increased frequency of urination during the night.

(5) *Indigestion or difficulty in swallowing*

This may indicate disease in the upper digestive tract, and may occur in the form of:

Dysphagia: (dys– = difficult, painful) + (phag = eat) + (–ia = condition of), difficulty or pain in swallowing.

Nausea: a sensation referred to the epigastrium or abdomen, with tendency to vomit.

Vomiting or emesis: the forcible ejection of contents of the stomach through the mouth ('throwing up').

Hyperemesis: (hyper– = excessive) + (emesis = vomiting), intractable or excessive vomiting.

Dyspepsia: (dys– = difficult) + (peps = digest) + (–ia = condition of), epigastric discomfort after meals, more commonly referred to as 'wind' or 'indigestion'.

Anorexia: (an– = without) + (orexia = appetite), lack of appetite.

(6) *Cough or hoarseness of voice*

This may indicate disease in the larynx or the respiratory system. A change in voice or difficulty in speaking is a condition also termed dysphonia: (dys– = difficult) + (phon = sound) + (–ia = condition of).

Aphonia: (a– = without) + (phon = sound) + (–ia = condition of), the inability to produce vocal sounds.

Dyspnea: (dys– = difficult) + (pne = breath) + (–a = condition of), a condition characterized by difficulty in breathing.

Orthopnea: (ortho– = upright) + (pne = breath) + (–a = condition of), a condition characterized by difficulty in breathing except in the upright position.

Tachypnea: (tachy– = rapid) + (pne = breath) + (a– = condition of), very rapid respiration.

Apnea: (a– = absent) + (pne = breath) + (–a = condition of), cessation of breathing.

(7) *Change in a mole or a wart*

Moles or warts which increase in size rapidly or change in colour or become ulcerated or bleed may be evolving into skin cancer.

(8) *A sore that does not heal*

In the skin or mucosa, this may be a sign of malignancy.

(9) *A mass, lump or thickening*

In the breast or elsewhere, this may be a tumour beginning in that organ or it may be a metastatic focus from another organ.

The patient may complain of abdominal enlargement which may be due to enlargement of organs such as the liver, spleen, kidney, ovaries or other organs.

(10) *Unexplained anaemia*

Anaemia: (a– = without) + (aem = blood) + (–ia = condition of) is a deficiency in the number of the red blood cells or the quantity of haemoglobin in the blood, which may result from decreased formation of red blood cells, or increased destruction of these cells, or bleeding.

Patients with anaemia complain of pallor or paleness of the skin. They also complain of dizziness, fainting spells, fatigue and breathlessness.

The formation or production of red blood cells or erythrocytes: (erythro– = red) + (cytes = cells), is known as erythropoiesis: (erythro– = red) + (poie = make, produce) + (–sis = condition of).

The destruction of red blood cells can result from the process of haemolysis being more marked than is usual.

Haemolysis: (haemo = blood) + (–lysis = dissolution or destruction of), refers to the breaking down of red blood cells.

(11) *Unexplained loss of weight*

Cancer is often associated with loss of weight. This has been attributed to the effects of the tumour itself resulting in decreased nutrient intake. Prolonged periods of malnutrition may result in a generalized physical wasting of the body known as cachexia.

Hence, in the absence of other symptoms, a patient with unexplained weight loss may be suspected of having cancer.

Occasionally, cancer may be diagnosed in patients who have no complaints (asymptomatic) – for example, in patients who undergo routine physical examination or who participate in screening programmes.

EXERCISES

Question 2(e):

R.S.T., 76 years old, male, noted that for the past four months he had an increased frequency of urination, especially at night. He also noted increasing difficulty in urination. Since the start of his illness, he had lost about 7 kilos in spite of good appetite.

Based on the above history, what symptoms will be recorded in the patient's medical record?

Question 2(f):

A.S., 47 years old, male, noted rapidly growing mass at the front of the neck (anterior neck mass) for the past six months, not associated with pain or tenderness. As the mass increased in size, he noted hoarsening of the voice. About two months ago, he began complaining of difficulty in swallowing. A week ago, he also noted increasing difficulty of breathing.

Indicate whether the following statements are TRUE or FALSE by encircling the correct answer:

T F a. Patient had dysphagia.
T F b. Patient had dyspnea.
T F c. Patient had a neck mass.
T F d. Patient had dysphonia.
T F e. Patient had all the above signs and symptoms.
T F f. Patient did not have any of the above symptoms.

Question 2(g):

L.C., 59 years old, female, had been having epigastric pain on and off for years. Initially there were no accompanying signs or symptoms. However, a few months ago, she noted progressive weight loss associated with anorexia. A week ago, she had several episodes of passing black, tarry stools. A few hours ago, she had an episode of haematemesis.

T F a. Patient vomited blood.
T F b. Patient had signs of bleeding from the upper gastro-intestinal tract.
T F c. Patient had melena and haematemesis.
T F d. Patient had anorexia (lack of appetite).
T F e. Patient had weight loss.
T F f. Patient had hyperemesis.

Question 2(h):

Match the symptoms with the correct definition. Some of the symptoms have been discussed previously but you may need to look up the definition of a few items in your medical dictionary.

___ a. Aphonia	1. Difficulty in breathing
___ b. Dysuria	2. Increased frequency of urination at night
___ c. Dyspnea	3. Passing of bloody urine
___ d. Nocturia	4. Vomiting of blood
___ e. Haemate-mesis	5. Whitish vaginal discharge
___ f. Melena	6. Painful or difficult urination
___ g. Polyuria	7. Loss of voice
___ h. Paresthesia	8. Passing of black, tarry stools
___ i. Leukorrhea	9. Increased frequency of urination
___ j. Diarrhea	10. Frequent, loose, watery stools
___ k. Dysphagia	11. Abnormal sensation, usually tingling, or like small insects crawling on skin
___ l. Urgency	12. Difficulty in swallowing
___ m. Orthopnea	13. Compelling desire to urinate
___ n. Anorexia	14. Lack of appetite
___ o. Haematuria	15. Difficulty in breathing except in the upright position

2.1.4 Physical signs

These are the findings of the doctor during physical examination. The physical findings begin with a general description of the patient's condition, for example, his nutritional status or development, whether he is able to walk (ambulatory) or is confined to bed.

The physical examination often proceeds from the head, eyes, ears, nose, throat (HEENT), down to the neck, the breast, chest, lungs, heart, abdomen, genitalia, rectum, extremities, skin and lymph nodes as well as assessment of the musculo-skeletal system and the nervous system.

In the course of physical examination, the physician notes for example the presence of any masses or swelling; the presence of asymmetry (a dissimilarity in corresponding parts or organs on opposite sides of the body which are normally alike); the presence of sores or non-healing wounds; any abnormal discoloration of skin and mucous membranes; as well as impairment in motor (muscular function) or sensory functions (sensation).

In the list below are some of the physical findings which a tumour registrar may encounter while reviewing the medical records:

(1) *Changes in the colour of the skin and mucous membranes*

Pallor: paleness of the skin or mucous membrane. This is noted in the presence of anaemia especially following blood loss or haemorrhage: (haemo = blood) + (-rrhagia = excessive flow).

Icterus or jaundice: yellowish discoloration of skin and mucous membranes. This is seen in the presence of liver diseases or those of the biliary tract, e.g., in blockage of the bile ducts that drain the bile from the liver to the intestine.

Cyanosis: bluish discoloration of the skin and mucous membrane due to insufficient oxygen or high concentration of reduced haemoglobin in the blood. Cyanosis is derived from: (cyano = blue) + (-sis = condition of).

(2) *Presence of non-healing wound or ulceration in the skin or mucosal lining of an organ*

An ulceration in the skin or other organs of the body is often not due to malignancy. It may be inflammatory in nature or it may be due to impairment of circulation or poor nutrition. However, it can be secondary to a

malignant process in the skin or to deeper organs with extension to the skin. The ulceration may be associated with a foul-smelling discharge which may be purulent, sanguinous (bloody) or mixed (sanguino-purulent).

(3) *Presence of masses*

Masses can occur in the skin, in the subcutaneous tissue, in the muscle, or in the bone or other organs of the body. Masses may be benign as in cysts or benign tumours; they can also be malignant.

A small lump or thickening in the breast may be one of the early signs of breast cancer.

A mass in the neck, for example, may be a thyroid tumour or it may be an enlarged lymph node secondary to a primary nasopharyngeal malignancy or a stomach cancer.

A mass in the abdomen may be due to enlarged organs such as the liver, the spleen, the ovaries, or uterus.

> *Hepatomegaly*: (hepat- = liver) + (megal = abnormal enlargement) + (-y = characterized by), enlargement of the liver.
>
> *Splenomegaly:* (splen- = spleen) + (megal = abnormal enlargement) + (-y = characterized by), enlargement of the spleen.

The mass may be enlarged lymph nodes or groups of lymph nodes. This is also known as lymphadenopathy (lympho- referring to the lymphatic system) + (adeno = gland) + (-pathy = disease), disease of the lymph node.

Lymph node enlargements due to cancer are usually secondary as in re-gional lymph node involvement or distant lymph node metastasis, with the primary site of the tumour occurring elsewhere (see section 2.1.2). Malignancy, however, may originate in lymph nodes, as in lymphomas like Hodgkin's disease and non-Hodgkin lymphoma.

An abdominal mass may also be secondary to dilatation of the stomach or the colon, as a result of obstruction to the digestive tract. It may also be due to a distended bladder. The physician may be able to indicate which is most likely.

(4) *Accumulation of fluid in some portions of the body*

Ascites: accumulation of fluid in the abdominal or peritoneal cavity. If the fluid in the peritoneal cavity is bloody, this is known as haemoperitoneum (peritoneum is the membrane lining the abdominal cavity).

*Pleural effusion: a*ccumulation of fluid in the pleural cavity, also known as hydrothorax. If the fluid in the pleural cavity is bloody, this is known as haemothorax.

Oedema: abnormal accumulation of fluid in connective tissue or serous cavity.

(5) *Obstruction in the circulatory system*

Venous obstruction: signs of venous obstruction include dilated or distended veins or swelling of the face or the extremities. For example, if there is an obstruction in the superior vena cava (the main vein returning blood from the upper body to the heart) this is manifested by dilated veins over the neck and chest associated with puffiness or oedema of the face and arms.

Arterial obstruction: Obstruction of an arterial blood supply results in a diminished or absent blood supply from the heart to the tissues or cells supplied by the blocked artery. The affected cells die from lack of oxygen and food, resulting in a condition known as necrosis: derived from the Greek word root "necro-" meaning death and the suffix "-sis" meaning a condition of. Necrosis refers to death or decay of cells or tissues in a part of the body.

(6) *Assessment of motor function, the ability of the patient to move his/her limbs or other parts of the body*

Paralysis: refers to the loss or impairment of motor function in a part of the body due to neural (nerve) or muscular mechanisms. Another term for paralysis is palsy. Example: paralysis of one side of the face due to a lesion in the facial nerve is known as Bell's palsy.

The suffix "–plegia" is used to indicate paralysis as in:

Hemiplegia: (hemi– = half) + (plegia = paralysis), paralysis of one half or one side of the body.

Quadriplegia: (quadr(i)– = four) + (plegia = paralysis), paralysis of all four limbs.

Paraplegia: (para– = beside, beyond) + (plegia = paralysis), paralysis of the lower part of the body, including the legs.

Paresis: derived from the Greek word 'paresis', meaning relaxation, refers to slight or incomplete paralysis.

Hemiparesis: (hemi– = half) + (paresis = incomplete paralysis), muscular weakness affecting one half of the body.

Paraparesis: (para– = beside, beyond) + (paresis = incomplete paralysis), muscular weakness or partial paralysis of the lower extremities.

(7) *Assessment of sensory function or the ability of the patient to see, hear, smell, taste and feel (touch, pain, temperature)*

The word root "aesth(a)esi(o)", which means feeling, is used as in:

Anaesthesia: (an– = without) + (aesthesi = feeling) + (–ia = condition of), loss of feeling or sensation, especially to pain.

Hypoaesthesia: (hypo– = deficient) + (aesthesi = feeling + (–ia = condition of), decreased sensitivity to stimulation or decreased sensation.

Hyperaesthesia: (hyper– = increased) + (aesthesi = feeling) + (–ia = condition of), increased sensitivity to stimulation or sensation.

Paraesthesia: an abnormal sensation like tingling, burning or prickling.

Dysaesthesia: an abnormal sensation resulting from a normal stimulus.

EXERCISE ON PHYSICAL FINDINGS

Question 2(i):

In the list below are different physical findings which may be encountered by the tumour registry personnel while reviewing the medical records. Match the physical findings with the correct definition. You may consult your medical dictionary for some items.

___ a. Ascites	1. Paleness or absence of skin coloration
___ b. Icteresia	2. Enlargement of the liver
___ c. Necrosis	3. Generalized physical wasting and malnutrition
___ d. Orthopnea	4. Accumulation of fluid in the pleural cavity
___ e. Lymph-adenopathy	5. Accumulation of interstitial fluid in the tissues secondary to obstruction of lymphatic vessels
___ f. Ulceration	6. Enlargement of the spleen
___ g. Pallor	7. Yellowish discoloration of skin and mucous membrane
___ h. Cyanosis	8. Bluish discoloration of skin and mucous membrane
___ i. Hepato-megaly	9. Paralysis of one side of the body
___ j. Pleural effusion	10. Loss of sensation or feeling especially from pain
___ k. Paraplegia	11. Non–healing wound
___ l. Anaesthesia	12. Accumulation of fluid in the abdominal cavity
___ m. Spleno-megaly	13. Death or decay of cells due to lack of oxygen or food
___ n. Lymph-edema	14. Disease of the lymph nodes
___ o. Cachexia	15. Difficulty in breathing except in the upright position
___ p. Haematoma	16. Paralysis of the lower portion of the body including the legs
___ q. Venous obstruction	17. Localized collection of extravasated blood in the tissues
___ r. Asymmetry	18. Blockage of veins
___ s. Hemiplegia	19. Dissimilarity in corresponding parts on opposite side of the face
___ t. Oedema	20. Abnormal accumulation of fluid in connective tissue

2.2 Diagnostic Methods

In order to arrive at a diagnosis, a physician employs several methods. In the cancer registry, these are grouped into several categories, and the registrar is expected to be able to decide which were used. A common grouping is:

A. **Non-microscopic methods**

(1) *Clinical only*

(2) *Clinical investigations*

- (a) Laboratory examinations
- (b) Radiological examinations or X- rays
- (c) Ultrasound
- (d) Nuclear medicine
- (e) CT scan
- (f) Magnetic resonance imaging
- (g) Endoscopy

(3) *Exploratory surgery/autopsy*

(4) *Specific biochemical and/or immunological tests*

B. **Microscopic methods**

(5) *Cytology or haematology*

(6) *Histology of metastasis*

(7) *Histology of primary tumour*

(8) *Autopsy*

2.2.1 Non-microscopic methods

Non-microscopic methods of diagnosis, as the name implies, do not confirm the diagnosis by examining cells or tissues under the microscope. Diagnosis is arrived at through the following methods:

(1) *Clinical only*

The diagnosis is based on the clinical history and physical examination. Example:

- A fungating mass almost involving the whole breast, associated with enlarged lymph nodes in both axillary regions and at the supraclavicular region may be diagnosed as breast cancer based on this method.

(2) *Clinical investigations*

The diagnosis is based on clinical history and physical examination, with the aid of ancillary procedures such as laboratory examinations, diagnostic radiology, scans, ultrasound and other imaging techniques.

(a) Laboratory examinations:

These include liver function tests, serum calcium, and other blood chemistries. T and B cell marker studies and chromosome studies may also fall under this category. Example:

- A clinical impression of breast cancer, with bone metastases, is supported by the finding of an abnormal or elevated alkaline phosphatase in a blood test.

(b) Diagnostic radiology:

Cancer is detected by means of X-rays. Example:

- A clinical impression of breast cancer with lung metastasis is supported by the finding of multiple nodular densities representing metastasis of the cancer in both lungs on a chest X-ray.

An X-ray examination, however, may require the taking of several pictures, the results of which are summarized in one report. Examples:

- A metastatic series which involves taking X-rays of various parts of the body to determine whether or not cancer has spread to any of these parts.
- A skeletal survey which involves taking a number of X-ray pictures of various parts of the body to rule out the presence of bone metastases.

There are different types of radiological examinations:

Body section radiography: this involves a series of x-rays taken at different depths in order to obtain defined images of specific areas. The image required is brought sharply into focus while the other areas are blurred out. These types of x-rays are used to locate lesions accurately in solid organs like the lungs and bones. They

are also known as tomograms, laminograms or planograms.

Radiological examinations using contrast media: a contrast medium is a radiopaque substance which can be injected into the veins, arteries, lymphatic vessels or hollow cavities to obtain contrast with the surrounding tissues. The contrast medium does not permit X-rays to pass through it so that the structures containing it appear white on the X-ray film, thus delineating abnormal masses or growths and defining the contour of the body structures on X-ray. Some of the X-ray studies using contrast media are:

Angiography: (angio = vessel) + (-graphy = method of recording), the radiological study of the blood vessels (vascular system) or lymphatic vessels. Examples:

- Cerebral angiogram: X-rays of the blood vessels of the brain
- Cardiac angiogram: X-ray showing the blood vessels of the heart and the large blood vessels
- Lymphangiogram: X-ray studies of the lymphatic vessels

Bronchography: (broncho = windpipe) + (-graphy = method of recording), the radiological study of the airways (bronchi) of the lung.

- *Bronchogram*: x-ray of the bronchial system

Cholecystography: (chole- = bile) + (cyst(o) = sac) + (-graphy = method of recording), the radiological study of the functions of the gallbladder and bile ducts after introduction of an opaque contrast medium.

- *Cholecystogram*: X-ray of the gallbladder

Cholangiography: (chol(e)- = bile) + (angi(o) = vessel) + (-graphy = method of recording), the radiological study of the bile ducts.

- *T-tube cholangiography*: medium injected through a tube inserted during operation.
- *Percutaneous transhepatic cholangiography (PTC)*: direct introduction of contrast medium through the liver into a bile duct usually carried out under television monitor. This procedure demonstrates the presence of obstruction either by a stone or by a mass as in a tumour.
- *Endoscopic retrograde cholangiopancreatography (ERCP)*: cannula into the opening of the bile duct, by using a flexible (fiberoptic) duodenoscope. Contrast medium is introduced into the cannulated duct system and X-ray pictures are taken. As the cannula is withdrawn, more X-ray films are taken in various projections.
- *Operative cholangiography*: surgical procedure of the gallbladder.
- *Upper GI Series (UGIS or barium swallow)*: the patient is asked to take barium (a contrast medium) orally, then a series of X-ray pictures is taken as the barium goes down from the pharynx to the oesophagus, stomach and small intestines.
- *Lower GI series (Barium Enema)*: radiological studies of the rectum and colon following introduction of barium through the rectum.
- *Myelography*: (myel(o) = spinal cord) + (-graphy = method of recording), radiological study of the spinal cord.
- *Sialography*: (sial(o) = salivary gland) + (-graphy = method of recording), radiological study of the salivary ducts.
- *Urography*: (uro = urine, urinary tract) + (-graphy = method of recording), radiological study of the urinary tract.
- *Cystography*: X-ray of the urinary bladder
- *Pyelography*: X-ray of the kidneys, ureter with emphasis on the pelvis of the kidney and ureters.
- *Intravenous pyelography (IVP)*: contrast medium is injected intravenously and a series of X-rays is taken as the contrast medium quickly passes into the urine.
- *Retrograde pyelography*: a series of X-rays done after introduction of

contrast medium through a catheter inserted into the ureter.

Other radiological procedures include:

Fluoroscopy: a technique for producing a temporary image on a screen. The radiologist moves the screen up and down the patient's body and observes what is happening within selected parts of the body. This is especially useful for identifying restricted or blocked passages in the hollow organs, especially with use of contrast material.

Mammography: (mamm(o) = breast) + (–graphy = method of recording), a technique for detection of breast cancer. Several X–ray views are taken of one or both breasts and the X–ray films are later examined for the presence of a lesion. Very small, early cancers of the breast can be diagnosed using this technique, before they can be felt by physical examination.

Xeroradiography: (xero– = dryness) + (radio = radiation) + (–graphy = method of recording), a technique using the same image producing process as the Xerox copier machines. The xeroradiography machine can produce either a positive or negative picture on specially coated white paper that can be read in any light. Today, this is used for X–rays of the skull, limbs and breast as well as the cervical spine.

Thermography: (thermo = heat) + (–graphy = method of recording), a technique for detecting cancer by differentiating regions of hot and cold temperature in the body. The surface temperature (its infrared radiation) is photographically recorded. The thermogram is a mosaic of many thousand bits of temperature information displayed photographically in shades of gray. The lighter tones indicate hot spots (increased emission of heat); the darker tones indicate cool areas. Since cancer cells usually divide more rapidly than normal cells, they often give off more heat than normal surrounding cells.

(c) Ultrasound:

Diagnostic ultrasound is a relatively new technique for visualizing internal structures of the body by recording the reflection of ultrasonic waves (high frequency sound waves) or echoes as they interact with various tissues of the body. Different densities in tissues can be distinguished from cystic masses and solid masses. The record produced is called an ultrasonogram or an echogram. Examples are:

- Pelvic ultrasound – to visualize the uterus, fallopian tubes, ovaries and other pelvic organs.
- Ultrasound of the liver, gallbladder and pancreas.
- Ultrasound of the kidneys.
- Ultrasound of the breasts.

(d) Diagnostic nuclear medicine:

This is an imaging technique whereby a radioactive substance known as a radioisotope is administered to a patient to diagnose disease. As the radioisotope disintegrates, it emits gamma rays from within the body and these are photographically recorded by a scanner. The photographic record is referred to as a scan. This differs from X–ray procedures where the X–rays are passed through the body from an external source.

Sometimes non–radioactive compounds are labelled or tagged with a radioactive isotope and sometimes radioactive tracers (radioactive pharmaceuticals) are given by mouth or by vein. Some of the isotopes are selectively absorbed by tumours or by specific organs in the body. The concentrated radioisotopes outline the tumour or organ, making it visible on the scanner by emission of radioactive energy.

The more common scans are: bone, kidney, thyroid, heart, lung, liver, spleen, brain, and total body scan.

(e) Computerized tomography scan (CT scan):

In this method, a picture is produced of all the structures in one plane (or slice) of the body. It is done by passing X-rays through the body in this plane and, from the readings, a computer constructs an image which is displayed on a television screen where it can be photographed for a permanent record. The precision of the scanner permits a more accurate diagnosis of the extent of the disease than most other means. It can discover tumours at an early stage and pinpoint their exact location. CT scans can be used with or without the use of contrast media. Examples are:

- CT scan, head
- CT scan, lung
- CT scan, upper abdomen

(f) Magnetic resonance imaging:

This is a non-invasive imaging technique which does not expose the patient to ionizing radiation and permits delineation of tissues without the use of contrast enhancing agents. The MRI scans do not visualize bone. Hence, the soft tissue adjacent to bone is easily viewed.

(g) Endoscopy:

This a diagnostic procedure involving the use of specific instruments (scopes) which enable one to view the interior of the body. Endoscopes may be either rigid metal or flexible fibre-optic tubes. Diagnoses arrived at through endoscopy without microscopic confirmation will be included in the category of exploratory surgery, although not all such examinations require a surgical incision. If a lesion is noted, it is possible to remove tissue by biopsy (via the endoscope) for histological study.

Typical endoscopy procedures include:

Bronchoscopy: examination of the bronchi with a scope

Colonoscopy: examination of the colon and rectum by means of an elongated, flexible fibrescope

Colposcopy: examination of the cervix and vagina under magnification

Cystoscopy: direct visual examination of the interior of the urinary bladder

Oesophagoscopy: direct visualization of the interior of the oesophagus

Gastroscopy: direct visual examination of the interior of the stomach

Laryngoscopy: examination of the interior wall of the larynx

Otoscopy: inspection of the inner ear

Proctoscopy: inspection of the rectum, with the aid of a tubular endoscope with appropriate illumination

Rhinoscopy: direct examination of the nasal passages either through the nostrils (anterior rhinoscopy) or through the nasopharynx (posterior rhinoscopy)

Sigmoidoscopy: direct visual examination of the sigmoid colon by means of an instrument which can visualize up to 25 cm from the anal verge

Urethroscopy: visual inspection of the interior of the urethra

In all of the "-oscopies" described so far, the scope has been inserted through a natural opening in the body. However, in the following endoscopic examinations, an actual incision is made through which the instrument is inserted into the body space to be examined.

Mediastinoscopy: examination of the mediastinum by means of a tubular instrument permitting direct inspection of the area between the lungs.

Peritoneoscopy: examination of the peritoneal cavity by an instrument inserted through the abdominal wall.

Thoracoscopy: direct examination of the pleural cavity by means of an endoscope which is inserted into the cavity through an intercostal space.

(3) *Exploratory surgery/autopsy*

The diagnosis is based on findings during surgical exploration, by direct visual examination or palpation, or on the results of a post-mortem examination (autopsy), without microscopic

confirmation (also called provisional anatomical diagnosis of malignancy or PAD).

When a suspected cancer of an internal organ has been located, exploratory surgery may be performed to determine the exact nature of the cancerous condition and the extent of the disease or the degree to which other organs or structures within the observed area are affected. In most instances, biopsies will be done and specimens examined microscopically, in which case the diagnostic method falls into group B, 'Microscopic methods' (see section 2.2.2).

(4) *Specific biochemical and/or immunological tests*

There are some substances which can be measured in blood (or other body fluids) which may be helpful in the diagnosis of cancer.

(a) *Serum alpha–foeto protein (AFP)* is a substance normally present in the tissues of the foetus and which disappears or is greatly reduced in amount after birth. High levels of AFP in the patient's blood suggest the presence of hepatocellular carcinoma or teratocarcinoma. AFP is synthesized by the tumour cells themselves and secreted by them in the blood. A drop in the AFP level indicates regression of the tumour. Hence, AFP is valuable for diagnosis as well as for monitoring response to treatment or the development of recurrence.

(b) *Beta–subunit of the human chorionic gonadotropin (Beta–HCG)* is a placental antigen which is present in the serum of all patients with tumours arising in cells of the placenta (especially choriocarcinoma), in a majority of patients with germ cell tumours of the testis and ovary, and to some extent in patients with other cancers.

Serial measurement of Beta–hCG is of importance in the diagnosis and follow–up of cases of choriocarcinoma. For example, a very high level of Beta–HCG in a patient points strongly to the presence of choriocarcinoma; if after chemotherapy the level of Beta–HCG goes down to normal, one can say that the patient responded to the treatment, and a later increase in the level of Beta–HCG is indicative of reactivation of the tumour.

The normal value of Beta–HCG is 0–5 units/ml.

(c) *Serum acid phosphatase:* elevated levels of acid phosphatase in the serum are noted in 85% of patients with cancer of the prostate with metastases to the bones, but in only about 20% of cases which remain localized in the prostate gland. Acid phosphatase determination can be used to determine whether prostate cancers are suitable for surgery.

The normal value in the serum depends on the method used in determining the acid phosphatase level, as in:

Bodansky:	0.5–2.0 units
King-Armstrong	1 – 5 units
Bessey-Lowry:	0.1 – 0.63 units
International units:	0.2 – 1.8 units/l

(NOTE: The normal values are given as a guide. Registry clerks need not memorize these values but should be aware of the normal values in the hospital where they are working).

Other tumour markers or serum studies which may be used to study the spread of cancer are:

(d) *Serum alkaline phosphatase:* the levels of this enzyme in the blood increase when there is destruction of cells. It is produced in the liver and bones, and an elevated alkaline phosphatase is indicative of bone and liver abnormalities.

The normal value depends on the method used in determining the

alkaline phosphatase level such as:

Bodansky	adults:	2–4.5 units:	chil-dren:	5-14 units
King-Arm-strong	adults:	4–13 units,	chil-dren:	15–20 units
Interna-tional units:	21–91 u/l			

(e) *Lactic acid dehydrogenase (LDH)*: this is an enzyme which occurs in many body cells. An elevated LDH indicates increased cell destruction, possibly following metastasis.

Normal values are: 60 – 100 u/l

(f) *Carcinoembryonic antigen (CEA)*: this is a protein which is normally present in endodermal tissues (the innermost of the primary germ layers of the embryo) during the first six months of foetal life. It was first noted to be present in colorectal cancer and was initially thought to be specific to cancers of the gastrointestinal tract. However, studies have shown that CEA is elevated not only in GI tract malignancies but in other malignancies and in non–malignant conditions. At present, its most useful application is in predicting the outcome of disease (prognosis) and in the follow–up of response to treatment, and checking for development of recurrence.

(g) *Foetal sulfoglycoprotein antigen (FSA)*: this antigen is associated with gastric cancer. It is observed in a majority of patients with gastric cancer and in 3 to 7% of individuals aged 45 to 70 without gastric neoplasm.

(h) *Pancreatic oncofoetal antigen (POA)*: this is an antigen associated with pancreatic cancer.

(i) *Human placental lactogen (HPL)*: this is a polypeptide synthesized by cells of the human placenta.

HPL is demonstrable in the sera of the majority of patients with choriocarcinomas and in certain patients with germ cell tumours of the ovary and testis.

(j) *Tissue or organ–associated antigens*:

(i) cervical cancer antigens: associated with cancer of the cervix uteri;

(ii) ovarian cancer antigen (CA 125): associated with carcinoma of the ovary;

(iii) breast cyst fluid protein: associated with breast cancer;

(iv) lung tumour antigen: associated with lung cancer;

(v) leukaemia–associated antigens: associated with acute leukaemia;

(vi) prostatic–specific antigen: associated with carcinoma of prostate.

(k) *Ectopic hormones:*

(i) calcitonin: associated with medullary carcinoma of thyroid gland;

(ii) parathormone: associated with small cell lung cancer;

(iii) 'big' ACTH: associated with small cell lung cancer.

(l) *Antigens of oncogenic viruses*:

(i) Human Papilloma Virus (HPV): certain types are associated with carcinoma of the cervix uteri;

(ii) Epstein–Barr virus: associated with Burkitt's lymphoma and nasopharyngeal carcinoma;

(iii) mouse mammary tumour virus: associated with breast cancer.

(m) *Normal antigens or their variants:*

(i) ferritin: associated with breast cancer;

(ii) casein: associated with breast cancer;

(iii) ceruloplasmin: associated with a variety of cancers;

(iv) immunoglobulins: associated with multiple myeloma, Waldenstrom's macroglobulinaemia;

(v) blood group substances: associated with a variety of cancers;

(vi) lactoferrin: associated with lung cancer;

(vii) tissue polypeptide antigen (TPA): associated with a variety of cancers.

2.2.2 Microscopic methods

The microscopic methods of diagnosis include:

Cytology: the microscopic examination of cells, usually contained in fluid which bathes a suspected cancer; and

Histology: the microscopic examination of tissues removed from the suspected cancer itself or from its spread (metastasis).

The purpose of microscopic examination is to determine the characteristics of the tissues and cells, to see whether they are indicative of a malignancy.

(5) Cytology or haematology

(a) Cytology: (cyto = cells) + (–logy = study of), the study of cell structure, function and pathology. Cells are continuously being shed (exfoliated) from tissues that line body cavities and hollow organs of the body. These exfoliated cells may float in the fluid or mucous material which bathes or passes through these cavities. The microscopic examination of these cells to determine whether they are malignant or not and to determine their tissue of origin is known as exfoliative cytology.

There are some body cavities which can be checked for fluid, such as the pleural cavity, and the peritoneal cavity. Normally, the fluid in these cavities is limited to an insignificant lubricating layer that cannot be aspirated. Therefore fluid in these cavities which can be aspirated indicates a pathological process such as malignancy or infection.

Listed below are some of the sources of specimens for cytological examination:

- sputum
- bronchial washing or bronchial-brushing
- tracheal washing
- pleural fluid
- gastric fluid
- spinal fluid
- breast secretion
- prostatic secretion
- urine sediment
- cervical and vaginal smears
- bone marrow aspiration
- peritoneal fluid

There are several procedures employed to obtain material for cytological examination, including the following:

(i) swabs: use of a swab or similar device to obtain fluid and secretions which can be used to make a smear. Example: cervical smear

(ii) brushings: the lining of an organ is brushed for the purpose of obtaining cells. Example: gastric brushing; bronchial brushings

(iii) washings: instillation of fluid into a hollow organ or structure and removal of the fluid for the purpose of collecting any cells which have been exfoliated in the fluid. Example: gastric washing

(iv) scrapings: the lining of a structure or organ is scraped with an instrument for the purpose of obtaining cells. Example: cervical smear, using an Ayre's spatula or cerviscraper

(v) punctures: insertion of a needle into a cavity or organ for the purpose of removing some portions of the contents(fluid, bone marrow, tissue). Examples:

- paracentesis: surgical puncture of a cavity for aspiration of fluid
- paracentesis abdomini: puncture of the peritoneal cavity
- thoracocentesis: puncture of the pleural cavity

The Papanicolaou classification of cells for detection of malignancy is as follows:

Class	*Interpretation*
I	No evidence of a malignant neoplasm, no atypical cells
II	Atypical cells present but no evidence of malignant neoplasm

III Cells present causing suspicion of malignant neoplasm

IV Fairly conclusive evidence of malignant neoplasm

V Conclusive evidence of malignant neoplasm

(b) *Haematology:* (haema– = blood) + (–logy = study of), the microscopic examination of the cells of the blood or blood-forming tissues (especially bone marrow), looking for changes in these structures and/or number of various types of blood cells, including immature cells.

There are three main types of blood cells:

- erythrocytes: (erythro = red) + (–cyte = cell), or red blood cells;
- leukocytes: (leuko = white) + (–cyte = cell), or white blood cells;
- thrombocytes: (thrombo = thrombus or clot) + (–cyte = cell), or platelets, the cells concerned with clotting of the blood.

(i) *Red blood cells (RBC):*

These contain haemoglobin, a blood protein responsible for the transport of oxygen from the lungs to the tissues and the transport of carbon dioxide from the tissues to the lungs.

There is only one type of mature red blood cell, or erythrocyte.

There are several forms of immature or very young erythrocytes, namely:

- pronormoblast: the earliest precursor of red blood cells
- normoblast: nucleated red blood cell
- reticulocyte: a young erythrocyte (one– to two–day old red blood cell)

The reticulocyte count is a useful measure to determine whether anaemia is due to decreased production of red cells or due to increased destruction of these cells. A significant increase in the number of reticulocytes in the blood reflects the release of an increased number of young red blood cells from the bone marrow, usually suggestive of increased cell destruction or haemolysis: (haemo = blood) + (–lysis = destruction). In contrast, a failure to produce red blood cells is reflected in a very low reticulocyte count.

Anaemia: (an– = without) + (–aemia = blood), a deficiency in the number of red blood cells or a deficiency in the haemoglobin content of the red cells. This is characterized by pallor of the skin and mucous membranes and may be associated with becoming tired easily, dizziness or fainting spells.

(ii) *White blood cells:*

There are five types of circulating white blood cells:

- neutrophil
- eosinophil
- basophil

} granular leukocytes

- lymphocytes
- monocytes

} agranular leukocytes

Neutrophils: these white blood cells contain very small purplish granules in their cytoplasm. The mature form has segmented nuclei. Hence, this cell is also known as: polymorphonuclear leukocyte ('polymorph'). The immature forms of a neutrophil are:

- stem cell
- myeloblast
- promyelocyte
- myelocyte
- metamyelocyte
- band or stab cells

Normally, neutrophils are not released to the peripheral blood until they have matured beyond the metamyelocyte or 'band' stage. Neutrophils usually comprise about 40–60% of leukocytes in the peripheral blood.

Eosinophils: these are granular leukocytes with large reddish granules in the cytoplasm. They develop in the bone marrow just like neutrophils. Eosinophils comprise about 1–3% of leukocytes.

Basophils: these granular leukocytes have large bluish granules in their cytoplasm. They mature in a similar fashion to the neutrophils. Basophils are the least common of leukocytes, comprising only about 0–1%.

Lymphocytes: these are agranular leukocytes with a small amount of bluish cytoplasm. They comprise about 20–40% of leukocytes. Analysis of these

cells have shown that there are two types, the T and the B cells.

Monocytes: these are agranular leukocytes with phagocytic and bactericidal capacities. They comprise about 4–8% of all white blood cells.

(iii) *Platelets (thrombocytes)*

These are tiny cells or discs whose primary function is haemostasis (clotting of blood).

Peripheral blood is circulating blood obtained from blood vessels or the extremities. This may be obtained through a finger prick or through a venipuncture (specimen taken directly from a peripheral vein). The common examinations for peripheral blood include: complete blood count (CBC), platelet count, reticulocyte count and peripheral smear.

In examination of the peripheral blood, the peripheral smear is the most important. Examination of the peripheral smear shows the size and colour of the red blood cells, their variations in size known as anisocytosis: (an– = without) + (iso = equal–) + (cyto = cell) + (–osis = increase), or variation in shape referred to as poikilocytosis: (poikilo– = irregular) + (cyto = cell) + (–osis = increased number), which are helpful in the diagnosis of specific anaemias. Normally, immature forms of leukocytes are not found in the peripheral blood. Hence, a markedly increased leukocyte count with a number of immature forms, especially 'blasts', alerts one to the possibility of leukaemia.

Certain types of conditions associated with abnormality of the blood cells are:

Anaemia: deficiency in erythrocytes or haemoglobin

Aplastic anaemia: a form of anaemia in which there is lack of formation of blood cells in the bone marrow

Leukaemia: a malignant disease of the blood and blood-forming organs characterized by uncontrolled proliferation of leukocytes which is diagnosed by microscopic detection of abnormal cells

Leukocytosis: increase in the number of leukocytes in the blood

Leukopaenia: reduction in the number of leukocytes in the blood

Polycythaemia: excessive number of erythrocytes

Thrombocytopaenia: decrease in the number of platelets

A table of normal values for blood examinations is given below. The registry personnel are not expected to memorize these values. They are given as a guide for abstracting haematological reports. The diagnosis of haematological malignancies by peripheral blood examinations is often based on an abnormal cell count (usually a markedly elevated white blood cell count (WBC)) and the presence of immature cells in the smear. Registry personnel should have a basic knowledge of what is normally expected in complete blood count examinations and peripheral smears in order to be able to recognize values which are abnormal.

Bone marrow studies are essential in the diagnosis of a wide variety of haematological disorders, especially leukaemias. The circulating blood cells are actively produced in the bone marrow. A bone marrow sample can be obtained by needle aspiration or by biopsy of bone marrow, and is considered as a histological examination (see 6/7 below).

Haematocrit	Men	42-52%
	Women	37-47%
Haemoglobin	Men	140-180 Gms/litre
	Women	120-160 Gms/litre
Erythrocytes (RBC):	Men	4.5-6.3 x 10^{12}/litre
	Women	4.2-5.4 x 10^{12}/litre
Reticulocyte count:		0.5-2% of red blood cells
Leukocytes (WBC):		0.5–2% of red blood cells 5 x 10^{9} – 10 x 10^{9}/litre
Neutrophils:		40–60%
Band (stabs):		0–5%
Juveniles:		0–1%
Myelocytes:		0%
Eosinophils:		1–3%

Basophils:		0–1%
Lymphocytes:		20-40%
Monocytes:		4–8%
Platelet count:		200–500 x 10^9/ litre

(6) Histology of metastasis

Histology: (histo = tissues) + (–logy = study of), the microscopic examination of tissues removed from a site of spread (metastasis) of cancer.

The examination may be made using tissue obtained from a biopsy (the removal and examination – both gross and microscopic – of tissues from a living body for the purpose of diagnosis), or from an operative or surgical procedure.

If the source of the specimen is from a suspected metastatic site, it is known as histology of the metastasis.

(7) Histology of primary tumour

If the source of the specimen is from the suspected origin of the malignancy, it is known as histology of the primary.

(8) Autopsy

This refers to the examination of the body after death, and involves the removal and examination (gross and microscopic) of organs and tissues from the body, to establish the diagnosis or to determine the cause of death. It is also known as necropsy or post–mortem examination.

There are usually two types of reports made following autopsy:

(a) the Provisional Anatomical Diagnosis (PAD), is arrived at through the gross (= macroscopic) examination findings at autopsy, not confirmed microscopically; and

(b) the Final Anatomical Diagnosis (FAD) is arrived at through microscopic examinations of tissues removed at autopsy. This is the most important portion of the autopsy report. It could confirm the diagnosis of cancer made clinically. It can determine the origin of the cancer (primary site) and its histological type. It can also give an accurate assessment of the extent of spread of the malignancy.

EXERCISES ON DIAGNOSTIC METHODS

Question 2(j):

How are materials for cytological examination obtained?

Question 2(k):

Match the diagnostic method with the correct definition (you may need to look up some of the terms in your medical dictionary).

___ a. Papanicolaou smear
___ b. Mammography
___ c. Alpha–foeto protein
___ d. CT scan
___ e. Ultrasonography
___ f. Bronchoscopy
___ g. Symptoms
___ h. Beta–HCG
___ i. Urography
___ j. Histology
___ k. Physical examination
___ l. Haematology
___ m. Autopsy
___ n. Liver scan

1. Specific tumour marker for hepatocellular carcinoma and germinal teratocarcinoma
2. An imaging technique which records the reflection of echoes as they interact with various body tissues
3. Complaints felt by a patient
4. Exfoliative cytology
5. An imaging method which makes use of a computerized reconstruction of the cross-sectional image of the structures in a body plane
6. Radiographic technique to detect early breast cancer
7. Study of tissues
8. A tumour marker for gestational trophoblastic tumours
9. Endoscopic examination of the bronchi
10. Study of cells of the blood and blood-forming tissues
11. An imaging technique which makes use of radioactive substances known as radioisotopes
12. Radiological study of the urinary tract
13. A diagnostic method consisting of inspection palpation, percussion and auscultation
14. Post–mortem examination

2.3 Treatment

Treatment for patients with cancer may either be cancer-directed or non-cancer directed.

(1) Cancer–directed treatment

Definitive cancer–directed treatment is a specific therapy which modifies, controls, removes or destroys cancer tissue. This may be directed towards a primary or towards a metastatic site. Treatment may be considered as definitive cancer–directed therapy, even if it is not considered curative for a particular patient because of the extent of disease, failure to complete treatment or lack of response. Definitive cancer–directed therapy may be either curative, adjuvant or palliative.

(a) Curative treatment is aimed at completely eradicating an existing disease. Examples are:
- Total hysterectomy for early endometrial cancer:
  (hystero = uterus) + (–ectomy = surgical removal).
- Modified radical mastectomy for early breast cancer:
  (mast = breast) + (–ectomy = surgical removal).
- Total thyroidectomy for papillary cancer of thyroid:
  surgical removal of whole thyroid gland.
- Abdomino–perineal resection for rectal cancer:
  surgical removal of anus and rectum and creation of a permanent colostomy.

(b) Adjuvant treatment is given to enhance the effectiveness of another form (modality) of treatment.
- Adjuvant chemotherapy for breast cancer after mastectomy.
- Adjuvant radiotherapy for cervical cancer after hysterectomy.

(c) Palliative treatment may modify, control, remove or destroy cancer tissue but does not attempt to cure.
- Palliative resection of colorectal cancer.
- Palliative radiotherapy for advanced breast cancer.
- Palliative chemotherapy for advanced lung cancer.

(2) Non–cancer directed treatment

Non–cancer directed therapy may also be given to cancer patients to relieve symptoms and alleviate pain and distress but such therapy does not treat the cancer.

This includes palliative (non–cancer–directed) treatment, to relieve symptoms such as obstruction without attempting to cure. Examples are:
- 'By–pass' operations to relieve obstruction by forming a connection (anastomosis) between two normally separate organs. Examples of this are gastro–jejunostomy (anastomosis of stomach and jeju-num) to relieve obstruction of the duodenum, and colostomy to short–circuit the gastro–intestinal tract when there is obstruction in the colon.

Surgical procedures to relieve pain are also included in this category:
- Rhizotomy: (rhizo = root) + (–tomy = cut), interruption of the roots of the spinal nerves within the spinal canal to relieve intractable pain.

Supportive treatment is directed to sustaining the strength of the patient.
- Blood transfusion.
- Parenteral nutrition: nutrition not through the alimentary canal but through intravenous injection.

The different modalities of cancer–directed treatment are:
- surgery
- radiotherapy
- chemotherapy
- hormone therapy
- immunotherapy

2.3.1 Surgery

This involves the total or partial removal of a primary tumour or its secondary site. It does not include incisional biopsy where a part of the tumour is removed for examination in order to establish the diagnosis.

The suffix "–ectomy" is often used with word roots to indicate surgical removal of organs. Examples are:
- Cholecystectomy: (chole– = bile) + (cyst = sac) + (–ectomy = surgical

removal), surgical removal of gall-bladder.
- Gastrectomy: (gastr = stomach) + (–ectomy = surgical removal).
- Hysterectomy: (hyster(o) = uterus) + (–ectomy = surgical removal).
- Mastectomy: (mast = breast) + (–ectomy = surgical removal).
- Nephrectomy: (nephr(o) = kidney) + (–ectomy = surgical removal).
- Oophorectomy: (oophor(o) = ovary) + (–ectomy = surgical removal).
- Orchiectomy: (orchi = testis) + (–ectomy = surgical removal).
- Pneumonectomy: (pneumo = lung) + (–ectomy = surgical removal).

Surgical treatment relevant to the cancer registry includes the following:
- most "–ectomies"
- excision biopsy or extirpation
- biopsy, NOS, if there is no residual on further surgery
- electrocautery
- cryosurgery
- laser surgery
- conisation of cervical carcinoma–in–situ
- fulguration (destruction of tissue with the aid of electro-cautery) of bladder, rectum or skin tumours (this is derived from the Latin word 'fulgur' meaning lightning)
- transurethral resection (TUR) of bladder or prostatic tumour

Surgical treatment can be definitive or not definitive. Surgical procedures done mainly to establish diagnosis or to determine extent of disease are considered not definitive, and definitive surgery does not include the following:
- bypass surgery
- conisation of the cervix for micro-invasive cancer of the cervix
- exploratory laparotomy or thoracotomy with or without biopsy
- excision of lymph nodes for diagnosis or staging
- total removal of non–cancerous endocrine glands
- paracentesis abdominis or thoracentesis
- surgery to relieve pain
- TUR without removal of tumour tissue

2.3.2 Radiotherapy

Ionizing radiation is delivered clinically in the following ways:

(1) External beam irradiation from sources at a distance from the body:
- X–rays
- cobalt
- linear accelerator
- betatron
- neutron
- electron

(2) Brachytherapy: (brachy = short) + (–therapy = treatment), refers to local irradiation from sources in contact with or near target tissue:
- intracavitary (e.g. radium insertion for cervical cancer)
- interstitial (as in radon seed implants in breast cancer)
- surface placement of radioactive isotopes in closed containers may be given *via* implants, moulds, seeds, needles, or applicators

(3) Internal or systemic irradiation from radioactive sources (131I or 32P) administered intravenously or parenterally.

The radioisotopes used for radiotherapy are:
- Gold (Au198)
- Cobalt (Co60)
- Radium (Ra226)
- Radon (Rn 222)
- Caesium (Cs137)
- Iodine (I131)
- Iridium (Ir192)
- Phosphorus (P32)

2.3.3 Chemotherapy

This involves the use of any chemical or cytotoxic drug in the treatment of cancer. The cytotoxic effect is exerted directly on the tumour and does not result from a change in the hormonal balance (hormone therapy) nor a change in the host's immune response (immunotherapy).

Chemotherapy may be:

- curative: aims to achieve a cure
- palliative: aims to reduce the bulk of disease to relieve symptoms and to prolong life
- adjuvant: aims to control microscopic spread of cancer following other forms of treatment such as surgery or radiotherapy

Some of the chemotherapeutic agents used are:

Actinomycin D	L-asparaginase
Bleomycin	Lomustine(CCNU)
Carboplatin	Melphalan
Carmustine (BCNU)	6-Mercaptopurine (6-MP)
Chlorambucil	Methotrexate
Cisplatin	Mitomycin C
Cyclophosphamide (endoxan)	Mitoxantrone
Cytarabine	Nitrogen mustard
Daunorubicine	Procarbazine
Doxorubicin (adriamycine)	Semustine (Methyl – CCNU)
Etoposide (VP 16)	Thiotxepa
5-Fluorouracil (5FU)	Vinblastine
Hexamethylmelamine	Vincristine (oncovin)
Hydroxyurea	Vindesine
Ifosfamide	

(See Appendix 2.3 for a more complete list of chemotherapeutic agents commonly used.)

Notes:

The registry personnel are not required to memorize these chemotherapeutic agents. However, they should at least be acquainted with the drugs in order to recognize them as chemotherapeutic agents if they are encountered in the process of reviewing the medical records.

There are also some non-malignant conditions which are treated with chemotherapeutic agents, e.g., psoriasis with methotrexate, systemic lupus erythematosus (SLE) with cyclophosphamide.

2.3.4 Hormone therapy

This is defined as the use of any type of therapy which achieves its effect on cancer tissue through a change in the hormonal balance of the patient.

Hormone therapy may be either ablative or additive.

(1) Ablative

removal of an endocrine organ in order to achieve a change in the hormonal balance of the patient. This may be done by surgical removal of the endocrine organ as in:

- Oophorectomy: (oophor = ovary) + (–ectomy = surgical removal).
- Adrenalectomy: (adrenal) + (–ectomy = surgical removal).
- Hypophysectomy: (hypophysis) + (–ectomy = surgical removal).
- Orchiectomy: (orchi = testis) + (–ectomy = surgical removal).

The first three procedures may be employed in the treatment of breast cancer.

Radiation ablation of the ovaries for breast cancer is also considered as ablative therapy.

(2) Additive

exemplified by the use of hormones, anti-hormones or steroids for hormonal effect on cancer tissues. Examples:

- Hormones: oestrogen, progesterone, testosterone
- Anti–hormones: tamoxifen (anti-oestrogen)
- Steroid: prednisone

The administration of steroids in the presence of cerebral oedema or superior vena cava syndrome to reduce the oedema is not considered as hormone therapy.

2.3.5 Immunotherapy

This refers to the use of any type of therapy which exercises its effect on cancer tissue through a change in the host's immune response. Examples:

- Interferon
- Interleukines
- vitamin therapy
- vaccine therapy (e.g. BCG)

EXERCISES ON TREATMENT

Question 2(l):

Indicate whether the following statements are TRUE or FALSE by encircling the correct answer:

T F a. Treatment which cannot be considered curative for a particular patient due to the extent of the disease, the lack of apparent response or incompleteness of treatment, is not considered definitive treatment.

T F b. Conisation of the cervix uteri is a definitive treatment for microinvasive or invasive cancer of the cervix.

T F c. Biopsy, NOS is considered definitive if on further surgery, no residual tumour is found.

T F d. Radioisotopes used for radiation therapy may either be given orally, intracavitarily, interstitially or parenterally by intravenous injection.

T F e. Chemotherapy can be curative, adjuvant or palliative.

Question 2(m):

What forms of treatment are a.–j. (Column A). Choose appropriate response(s) from Column B.

Column A	*Column B*
___ a. Cobalt	1. Surgery
___ b. BCG	2. Radiotherapy
___ c. Methotrexate	3. Chemotherapy
___ d. Mastectomy	4. Hormone therapy
___ e. Orchiectomy for prostatic carcinoma	5. Immunotherapy
___ f. Transurethral resection, prostate	
___ g. Linear accelerator	
___ h. Radiation ablation, ovaries for advanced breast cancer	
___ i. Radium insertion for cervical cancer	
___ j. Interferon	

GROUPED ANSWERS TO QUESTIONS 2(a)–(m)

Answers (2a)	Answers (2b)	Answers (2c)
10 a.	9 a.	16 a.
5 b.	2 b.	12 b.
8 c.	12 c.	1 c.
7 d.	8 d.	7 d.
6 e.	1 e.	17 e.
4 f.	7 f.	6 f.
2 g.	4 g.	14 g.
9 h.	3 h.	20 h.
1 i.	6 i.	11 i.
3 j.	10 j.	13 j.
	14 k.	15 k.
	11 l.	10 l.
	5 m.	2 m.
	13 n.	5 n.
		19 o.
		3 p.
		8 q.
		18 r.
		9 s.
		4 t.

Answer 2(d):

(iii) Malignant tumours can metastasize to other organs while benign tumours remain at their site of origin and do not spread to other parts of the body.

Answer 2(e):

The following symptoms will be recorded in the patient's medical record:

- nocturia: (Noct– = night) + (ur = urine) + (–ia = condition of)
- dysuria: (dys– = difficult) + (ur = urine) + (–ia = condition of)
- sudden weight loss

Answers 2(f)

a. T c. T e. T

b.T d.T f. F

Answers 2(g):

a.T c. T e. T

b.T d. T f. F

Answers 2(h):

7 a.	Aphonia	8 f.	Melena	12 k.	Dysphagia
6 b.	Dysuria	9 g.	Polyuria	13 l.	Urgency
1 c.	Dyspnea	11 h.	Paresthesia	15 m.	Orthopnea
2 d.	Nocturia	5 i.	Leukorrhea	14 n.	Anorexia
4 e.	Haematemesis	10 j.	Diarrhea	3 o.	Haematuria

Answers 2(i):

12 a.	Ascites	8 h.	Cyanosis	3 o.	Cachexia
7 b.	Icteresia	2 i.	Hepato megaly	17 p.	Haematoma
13 c.	Necrosis	4 j.	Pleural effusion	18 q.	Venous obstruction
15 d.	Orthopnea	16 k.	Paraplegia	19 r.	Asymmetry
14e.	Lymphadenopathy	10 l.	Anaesthesia	9 s.	Hemiplegia
11 f.	Ulceration	6 m.	Splenomegaly	20 t.	Oedema
1 g.	Pallor	5 n.	Lymphedema		

Answer 2(j):

There are several procedures employed to obtain material for cytological examination, including the following:

(i) swabs: use of a swab or similar device to obtain fluid and secretions which can be used to make a smear;

Example: – cervical smear

(ii) brushings: the lining of an organ is brushed for the purpose of obtaining cells;

Example: – gastric brushing; bronchial brushings

(iii) washings: instillation of fluid into a hollow organ or structure and removal of the fluid for the purpose of collecting any cells which have been exfoliated in the fluid;

Example: – bronchial washing

(iv) scrapings: the lining of a structure or organ is scraped with an instrument for the purpose of obtaining cells;

Example: – cervical smear, using an Ayre's spatula or cerviscraper

(v) punctures: insertion of a needle into a cavity or organ for the purpose of removing some portions of the contents(fluid, bone marrow, tissue);

Examples:– paracentesis: surgical puncture of a cavity for aspiration of fluid

- paracentesis abdominis: puncture of the peritoneal cavity
- thoracocentesis: puncture of the pleural cavity

Answers 2(k):

4	a. Papanicolaou smear
6	b. Mammography
1	c. Alpha–foeto protein
5	d. CT Scan
2	e. Ultrasonography
9	f. Bronchoscopy
3	g. Symptoms
8	h. Beta–HCG
12	i. Urography
7	j. Histology
13	k. Physical examination
10	l. Haematology
4	m. Autopsy
11	n. Liver scan

Answers 2(l):

a. F: Treatment which modifies, controls, removes or destroys cancer tissue is considered definitive treatment even if it cannot be considered curative for a particular patient due to the extent of the disease, lack of apparent response or incompleteness of treatment.

b. F: Conisation of the cervix is a definitive or curative treatment for carcinoma–in–situ, cervix but not for microinvasive or invasive carcinoma of the cervix.

c. T

d. T

e. T

Answers 2(m):

2 a. Cobalt
5 b. BCG
3 c. Methotrexate
1 d. Mastectomy
4 e. Orchiectomy for prostatic cancer
1 f. Trans-urethral resection, prostate
2 g. Linear accelerator
4 h. Radiation ablation, ovaries for advanced breast cancer
2 i. Radium insertion for cervical cancer
5 j. Interferon

Appendix 2.1

Acronyms and Abbreviations

Abbreviation..	Meaning
AB, Ab, ab....	abortion; antibody
abd.....	abdomen
ABG	arterial blood gases
AC, ac.....	anterior chamber; ante cibum (before meals)
Acid phos. / p'tase	acid phosphatase
ACTH	adrenocorticotropic hormone
AD, ad	auris dextra (right ear)
AdenoCA	adenocarcinoma
ADH	antidiuretic hormone (vasopressin)
Adj.....	adjunct; adjuvant; adjustment
ad lib	ad libitum (as desired)
adm, admin ...	admit; admitted; admission; administer; administration
aetiol	aetiology
AFB.....	acid fast bacillus
aff.....	afferent; affirmative
AFP.....	alpha-foetoprotein
A/G.....	albumin globulin ratio
Ag.....	argentum (chemical symbol for silver); antigen
AI, ai.....	aortic insufficiency; ad interim (in the meantime)
AIDS.....	acquired immuno-deficiency syndrome
AKA	above the knee amputation; also known as
alb.....	albumin
alk phos / p'tase	alkaline phosphatase
ALL.....	acute lymphocytic leukaemia
AM, a.m.....	ante meridiem (before noon)
AMA.....	against medical advice
amb	ambulatory; ambulate
AMI.....	acute myocardial infarction
AML	acute myeloblastic (myelocytic) leukemia
amp	ampule; amputation; ampere
amt.....	amount
AN	acoustic neuroma
ANA	antinuclear antibody
Anes(th)	anaesthesia(tic)

ant . . . . . anterior
ante . . . . . before
AO . . . . . aorta; acridine–orange technique (two–colour fluorescence test for
. . . . . cancer cells)
AP . . . . . antero–posterior; appendectomy
A & P . . . . . ausculatation and percussion
APR . . . . . abdomino–perineal resection;anterior pituitary resection
aq. . . . . aqua (water); aqueous
AR . . . . . aortic regurgitation
ARC . . . . . AIDS-related complex
ARD, ARDS . . . . . acute respiratory disease (syndrome)
ARF . . . . . acute renal failure
Art, art . . . . . artery(ial)
AS. . . . . aortic stenosis; auris sinistra (left ear)
ASCVD. . . . . arteriosclerotic cardiovascular disease
ASHD . . . . . arteriosclerotic heart disease
ATP . . . . . adenosine triphosphate
ATR . . . . . Achilles' tendon reflex
AU, Au . . . . . angstrom unit; aurum (chem. symbol for gold); both ears
198AU . . . . . radioactive gold
AUT, aut. . . . . autopsy
AV, av . . . . . arterio–venous; aortic valve
A & W . . . . . alive and well
AX . . . . . axilla; axis

Ba . . . . . barium
bas . . . . . basal
baso . . . . . basophil(e)
BBB . . . . . bundle branch block; blood–brain barrier
BBT . . . . . basal body temperature
BCC . . . . . basal cell carcinoma
B–cells . . . . . special lymphocytes formed in bone marrow
BCG . . . . . bacillus Calmette–Guérin
BE. . . . . barium enema; below elbow
BID, bid . . . . . bis in die (twice a day)
bil, bilat. . . . . bilateral
bil, bili, bilirub . . . . . bilirubin
BKA . . . . . below the knee amputation
BM . . . . . bowel movement; basal metabolism; bone marrow
BMR. . . . . basal metabolic rate
BP, bp . . . . . blood pressure; boiling point
BPH . . . . . benign prostatic hypertrophy
BS. . . . . bowel sound; breath sound
BSA . . . . . body surface area
BSE, bse . . . . . breast self–examination
BSO . . . . . bilateral salpingo–oophorectomy
bsp . . . . . bromsuphalein

BT, bt ..... bleeding time; brain tumour; blood transfusion
BUE ..... both upper extremities
BUN ..... blood urea nitrogen
Bx, bx ..... biopsy

C ..... centrigrade; cubic; cervical (vertebra)
c ..... with (cum)
CA ..... carcinoma; cancer
ca++ ..... calcium
cad ..... coronary artery disease
cal ..... calorie; caliber
CAP, cap ..... capillary; capsule
CAT ..... computerized axial tomography
cath ..... catheter(ize); cathartic
caud ..... caudal
CBC ..... complete blood count
CBD ..... common bile duct
CC ..... chief complaint(s)
cc ..... cubic centimetre(s); with correction
CCU ..... coronary care unit
CEA ..... carcinoembryonic antigen
cerv ..... cervical
cf ..... confer (compare)
chemo ..... chemotherapy
CHF ..... congestive heart failure
CHOP ..... chemotherapy regimen using cyclophosphamide-doxorubicin, oncovin (vincristine) and prednisone (for lymphomas)
CIN ..... cervical intraepithelial neoplasia (dysplasia)
CIS ..... carcinoma-in-situ
Cl ..... chloride
clin ..... clinical
CLL ..... chronic lymphocytic leukaemia
CM, cm ..... centimetre
CML ..... chronic myelogenous leukaemia
CMV ..... cytomegalovirus
CNS ..... central nervous system
CO ..... cardiac output
CO- ..... carbon dioxide
Co 60 ..... cobalt 60
COLD ..... chronic obstructive lung disease
compd. cpd ..... compound
con ..... contra (against)
conc ..... concentration, concentrated
cond ..... condition; condensed; conductivity;
contra ..... contra-indicated (against)
COPD ..... chronic obstructive pulmonary disease
CPAP ..... continuous positive airway pressure

cpm, CPM ..... counts per minute (pertains to particles emitted after administration of radioactive material)
CPR ..... cardiopulmonary resuscitation

CR, cr ..... clot retraction; cranial
CS, Cs, csc ..... Caesarean section; cesium (chemical symbol for); corticosteroid
C & S ..... culture and sensitivity
CSF ..... cerebrospinal fluid
CSR ..... central supply room
CT ..... computerized tomography
CVA, Cva ..... cardiovascular accident; costo–vertebral angle
CVP ..... central venous pressure
cu ..... cubic
cu. mm ..... cubic millimetre
CVD ..... cardiovascular disease
CVS ..... cardiovascular system
c/w ..... consistent with; compatible with
Cx, cx ..... cervix; convex
CXR, CxR ..... chest X–ray
Cys, cysto– ..... cystoscopy
cytol– ..... cytology

D, d ..... deviation; dexter (right); dorsal (thoracic vertebra 1st, 2nd, etc.)
DBP ..... diastolic blood pressure
DC, dc ..... discontinue; discharge
D & C ..... dilatation and curettage
DD ..... differential diagnosis
dec, decr ..... decreased
deg, degen ..... degeneration; degree
Derm ..... dermatology
DES ..... diethylstilbestrol
DH ..... dehydrogenase; delayed hypersensitivity
DHL ..... diffuse histiocytic lymphoma
DI ..... diabetes insipidus; diagnostic imaging; deterioration index
Dia, diath ..... diathermy; diametre
diag ..... diagnosis; diagnostic; diagram
DIC ..... disseminated intravascular coagulopathy
Diff Ct ..... differential count
DISCH ..... discharge
DL ..... direct laryngoscopy
DLCL ..... diffuse large cell lymphoma (diffuse histiocytic)
DLL ..... diffuse lymphoblastic lymphoma (diffuse lymphoblastic convoluted/non-convoluted)
DM, dm ..... diabetes mellitus; decimetre
DML ..... diffuse mixed cell lymphoma (diffuse mixed lymphocytic histiocytic)
DNA ..... deoxyribonucleic acid
DOA ..... dead on arrival
DOB ..... date of birth

DOD. . . . . date of death
DOE. . . . . dyspnea on exertion
dos. . . . . dosage; dosis (dose)
DR, Dr, dr. . . . . diagnostic radiology; dorsal root (with reference to spinal nerves); dram; dressing; delivery room
DSCL . . . . . diffuse, small, non-cleaved lymphoma (diffuse, undifferentiated, Burkitt's and non–Burkitt)
DT . . . . . delirium tremens
D/T. . . . . deaths total ratio
DTR . . . . . deep tendon reflexes
DU. . . . . duodenal ulcer; diagnosis undetermined
D/W. . . . . dextrose in water
Dx . . . . . diagnosis
DXR. . . . . deep X–ray therapy

EAC . . . . . external auditory canal
EBL. . . . . estimated blood loss
EBV . . . . . Epstein–Barr virus
E & C. . . . . evacuation and curettage
ECF . . . . . extracellular fluid; extended care facility
ECG. . . . . electrocardiogram
EDC. . . . . expected date of confinement
EE. . . . . eye and ear
EEG . . . . . electroencephalogram
EENT . . . . . eye, ear, nose and throat
EF. . . . . ejection fraction
e.g. . . . . exempli gratia (for example)
EKG . . . . . electrocardiograph (gram) (see also ECG)
EM, Em . . . . . electron microscope; endometrium electromyogram(phy)
EMI . . . . . computerized tomography scanner (developed by Electro Music Instruments)
Endo . . . . . endocrinology
ENT . . . . . ears, nose and throat
EOA. . . . . examination, opinion and advice
EOD. . . . . extent of disease
EOM, eom . . . . . extraocular muscles; extraocular movements
Eos. . . . . eosinophil
Ep cell, epith cell. . . . epithelial cell
ER. . . . . emergency room
ESR. . . . . erythrocyte sedimentation rate
EST. . . . . electroshock therapy
et al . . . . . et alibi (and elsewhere); et alii (and others)
etc. . . . . et cetera (and others of the like, kind, and so forth)
etiol . . . . . etiology
EUA . . . . . examination under anaesthetic
evac . . . . . evacuated; evacuation
eval . . . . . evaluate(ion)
ex, exag, exam. . . . . example; exchange; exaggerated; examined(ation)

exc . . . . . excision
Expl lap, E.L. . . . . exploratory laparotomy
EXREM. . . . . external radiation dose
ext., extd . . . . . extend (spread); extensor(ion) external; extra; extratum (extract); extremity

F . . . . . Fahrenheit (temperature scale); female
FB . . . . . fingerbreadth; foreign body
FBS . . . . . fasting blood sugar
FCC . . . . . follicular cleaved cell
FDA . . . . . Food and Drug Administration
FH FHx. . . . . foetal heart; family history
FIGO . . . . . International Federation of Gynecology and Obstetrics
Fl, fld . . . . . flexion; fluidium (fluid)
fl. oz. . . . . fluid ounce
FLCL . . . . . follicular large–cell lymphoma (nodular histiocytic)
fluor, fluores,) . . . . . fluoroscopy (escent)
fluoro
FML . . . . . follicular mixed–cell lymphoma (nodular mixed lymphocytic-
. . . . . histiocytic)
FS . . . . . frozen section
FSCL. . . . . follicular small cleaved lymphoma (nodular, poorly differentiated lymphocytic)
FSH . . . . . follicle–stimulating hormone
ft . . . . . foot; feet
F/u; FU. . . . . follow–up; fluorouracil (5–FU)
FUO . . . . . fever of undetermined origin
FVC . . . . . forced vital capacity
Fx . . . . . fracture

G, g . . . . . gravida; gas; globulin; glucose; gram(s)
GA, Ga, ga . . . . . gastric analysis; galium (chemical symbol for); gauge (of needles); general anaesthesia
GB, GBS . . . . . gallbladder (series)
Gc . . . . . gonorrhea; gonococcus
GE . . . . . gastroenterology; gastroesophageal
gen. . . . . general(ized); genus
GH . . . . . growth hormone (of anterior pituitary)
GI. . . . . gastrointestinal; growth–inhibiting
ging . . . . . gingiva
gl, gland. . . . . glandula (a gland); glandular
Gl, Glu, glu, gluc. . . . glucose
Glob. . . . . globulin; globular
GM, gm . . . . . grand mal; gram(s)
gn. . . . . gram negative
GP . . . . . general paralysis; general paresis; general practitioner; gram positive
Gr, grav, gravida . . . . gravid (pregnancies, 1, 2, 3, etc.); gravity
grp . . . . . group

GS ..... general surgery
GSW..... gunshot wound

GTH..... gonadotropic hormone
GTT ..... glucose tolerance test
gtt ..... guttae (drops)
GU ..... genitourinary; gastric ulcer
GVHR..... graft versus host reaction
GYN, gyne, gynecol.. gynaecology

H ..... hydrogen (chemical symbol for)
h..... hour; human
HA ..... headache
HAA ..... hepatitis associated antigen
HB, hb ..... heart block; haemoglobin
HBP ..... high blood pressure
HC ..... hydrocortisone; home care
HCG..... human chorionic gonadotropin
HCL ..... hydrochloric acid (formula for)
HCT, hct ..... haematocrit
HCVD ..... hypertensive cardiovascular disease
HD, hd..... Hodgkin's disease; head; hearing distance; hora decubitus (at bedtime); haemodialysis
heent ..... head, ears, eyes, nose, throat
hemat, hct, h'crit.... haematocrit
Hg ..... mercury (chemical symbol for)
Hgb ..... haemoglobin
HGH..... human growth hormone
Hgt, Ht..... height
H–ICDA ..... Hospital Adaptation of the International Classification of Diseases, Adapted
Hist, Histol, histo ... histology
HLA ..... homologous leukocytic antibodies
hm ..... hand movement (eye)
Hn– ..... nitrogen mustard
H/O ..... history of
H–O ..... water (formula for)
homolat..... homolateral
Hosp..... hospital
H & P..... history and physical examination
HPF, hpf..... high power field
HPG..... human pituitary gland
HPI..... history of the present illness
hpn ..... hypertension
HR, hr ..... heart rate; hour(s)
HS ..... hour of sleep (L. hora somni)
HT, ht..... height; hydrotherapy; high tension
HV ..... hyperventilation
HVD..... hypertensive vascular disease

Hx ..... history
Hyst, hyst ..... hysterectomy

I ..... intensity; iodine (chemical symbol for)
Iac ..... internal auditory canal
IARC ..... International Agency for Research on Cancer
ICD ..... International Classification of Diseases
ICDA ..... International Classification of Diseases, Adapted
ICD–9–CM ..... International Classification of Diseases, 9th Revision, Clinical Modification
ICD–O ..... International Classification of Diseases for Oncology
ICM ..... intercostal margin
ICP ..... intracranial pressure
ICS ..... intercostal space; impulse–conducting system
ICSH ..... interstitial cell–stimulating hormone
ICU, ICCU ..... intensive care unit, intensive critical care unit
ID, id ..... identification; idem (the same); infectious disease(s), intradermal(ly)
I & D ..... incision and drainage
i.e. ..... id est (that is)
IF ..... intermediate frequency, interstitial fluid, intrinsic factor
Ig, IgA, IgB, Igd ..... immunoglobulin (A, B, D, etc.)
IHD ..... ischaemic heart disease
IM ..... intramuscular; index medicus; internal medicine
Immun, Immunol ... immunology; immunity; immunization
IMP ..... impression
In, in ..... indium (chemical symbol for); inch (2.5 cm)
In d ..... in dies (daily)
inflam ..... inflammation(ory)
info ..... information
ing ..... inguinal
INH ..... inhalation; isoniazid (an antituberculous drug)
inj, inject ..... injectable; inject(ion); injury(ious)
In Pt, INPT ..... inpatient
INREM ..... internal radiation dose
in situ ..... in the natural or normal position (has not spread)
Insp, inspir ..... inspiration(ory)
Inst, Instn ..... institute, institution
Int ..... intermittent; intern, internal, internist
Intest ..... intestinal
Int Med ..... internal medicine
io ..... intraocular
I & O ..... intake and output
IOP ..... intraocular pressure
IPPA ..... inspection, palpation, percussion, auscultation
IPPB ..... intermittent positive pressure breathing
IQ ..... intelligence quotient; inner quadrant (breast)
IRD ..... index of roentgen
IS, is ..... immune serum; intercostal space; intraspinal

ISF ..... interstitial fluid
IT, ITh ..... intrathecal (with reference to injections)
ITP ..... idiopathic thrombocytopenic purpura

IU ..... immunizing unit; international unit; intrauterine
IUD ..... intrauterine device
IV ..... interventricular; intervertebral; intravenous(ly); intraventricular
IVC ..... inferior vena cava; intravenous cholangiogram
IVD ..... intervertebral disc
IVP ..... intravenous pyelogram(phy)
IVT ..... intravenous transfusion

J ..... Jaeger; joint; journal
jt ..... joint

K, k ..... kalium (potassium, chemical symbol for)
KCl ..... potassium chloride (formula for)
Kg, kilo ..... kilogram
KJ ..... knee jerk
KUB ..... kidney, ureter, bladder (X–ray)
kv ..... kilovolt
KVO ..... keep vein open

L, l, lt ..... Latin; left; length; (ligament); light; litre; lumbar (vertebra – 1st, ... 2nd etc.)
LA ..... left atrium; left auricle; long–acting; lanthanum (chemical symbol for)
lab ..... laboratory
LAF ..... laminar air flow
LAP, lap ..... laparotomy; leucine aminopeptidase; leukocyte alkaline phosphatase
LASER ..... light amplication by stimulated emission of radiation
Lat., lat ..... lateral
lb ..... pound
LD, LDH ..... lactate dehydrogenase; lethal dose; low density
LE ..... lower extremity; lupus erythematosus
LFT ..... liver function test
LH ..... luteinizing hormone; left hand
lig ..... ligament(s)
lin, linac ..... linear (accelerator)
LIQ ..... lower inner quadrant (breast)
LIS ..... lobular carcinoma in situ
LKS, LSK ..... liver, kidney, spleen
LLE ..... left lower extremity
LLL ..... left lower lobe (lung)
LLQ ..... left lower quadrant (abdomen or breast)
LMP ..... last menstrual period

LN, l.n., ln . . . . . lymph node
LOC . . . . . level of consciousness
LOQ . . . . . lower outer quadrant (breast or abdomen)

L.P., LP, lp . . . . . lumbar puncture; latent period; light perception; low power (with reference to microscopy field); low pressure
LS . . . . . liver scan
L–S . . . . . lumbo–sacral
LTH . . . . . luteotropic hormone (prolactin)
LUL . . . . . left upper lobe (lung)
LUQ . . . . . left upper quadrant (of abdomen and breast)
lym, lymph, lympho. lymphocyte(s)
L & W . . . . . living and well

M, m . . . . . male; married; mass; metabolite; metre; milli– (thousand); Monday; morphology; murmur; musculus (muscle)
mag, Mag, magn . . . . magnification; magnus (large)
malig . . . . . malignant
mas, masc . . . . . masculine; mass
mast . . . . . mastectomy
mc . . . . . millicurie; megacycle(s)
MCG . . . . . microgram
MCH, MCHC . . . . . mean corpuscular haemoglobin (count) or (concentration)
MCL . . . . . mid–clavicular line
MCV . . . . . mean corpuscular volume
MD, md . . . . . mano dextra (with the right hand); mean deviation; Doctor of Medicine
MDR . . . . . minimum daily requirement
ME, me . . . . . methyl (chemical symbol for); middle ear
MED, med . . . . . medial; median; medicine(al); medium (bacteriology); minimal effective dose
Med. Rec . . . . . medical record (department)
Med Tech . . . . . medical technology(ician) (see also MT)
mEq/l . . . . . milli–equivalent per litre
met, metas . . . . . metastasis; metastasize; metastatic
mev . . . . . million electron volts
Mg, mg, MG . . . . . magnesium (chemical symbol for); milligram(s); myasthenia gravis
MI, mi . . . . . mitral insufficiency; myocardial infarction
micro . . . . . microscopic
min . . . . . minute
ML, ml . . . . . malignant lymphoma; millilitre; midline
mld . . . . . minimum lethal dose
MM, mm . . . . . millimetre; mucous membranes; muscles
mod, modif . . . . . moderate(ly); modification; modified
Mono, monos . . . . . monocyte(s)
MOTNAC . . . . . Manual of Tumor Nomenclature and Coding
MR . . . . . mitral regurgitation

MRD. . . . . medical record department
MRI . . . . . magnetic resonance imaging
MS, Ms. . . . . mano sinistra (with the left hand); mitral stenosis; multiple sclerosis; morphine sulfate
MSB . . . . . main stem bronchus
MSH. . . . . melanocyte (melanophore)-stimulating hormone
MSL . . . . . midsternal line
MST . . . . . median survival time
MT . . . . . medical technologist
MTD. . . . . maximum toxic dose
MU, mu . . . . . micron; mouse unit (with reference to gonadotropins)
MV, mv . . . . . millivolt; mitral valve; mean variation
MVA. . . . . motor vehicle accident
MX, Mx . . . . . microscopic; management

N, n . . . . . nitrogen (chemical symbol for); normal number; nares (nasal, nostril); nerves (nerve); negative; natus (born)
NA, Na, N/A. . . . . natrium (sodium, chemical symbol for); not applicable
NaCl. . . . . sodium chloride (formula for)
NAD. . . . . no acute distress; no appreciable disease;
Nat. . . . . national; native; natural
NB, N.B. . . . . newborn; nota bene (note well)
NBM. . . . . nothing by mouth
NCI . . . . . National Cancer Institute
NEC . . . . . not elsewhere classified
NED . . . . . no evidence of disease
neg. . . . . negative (–)
NERD . . . . . no evidence of recurrent disease
Nerv. . . . . nervous; nerve
NES . . . . . not elsewhere specified
Neuro, neurol . . . . . neurology(ical)
NG . . . . . nasogastric; new growth
NKA . . . . . no known allergies
NL, nl, norm . . . . . non licet (is not permitted); normal (limits)
NMR. . . . . nuclear magnetic resonance
No. . . . . number
Noct, nocte, ncx, noctis). . . . . night, nocturnal
norm . . . . . normal
NOS, Nos. . . . . not otherwise specified; number(s)
nov. . . . . novum (new)
NP . . . . . nasopharynx(geal)
NPC . . . . . near point of convergence; nasopharyngeal carcinoma
NPDL . . . . . nodular, poorly differentiated lymphocytic lymphoma
NPN . . . . . non-protein nitrogen
NPO . . . . . non per os (nothing by mouth)
NR, nr . . . . . do not repeat (non repetatur) (in prescriptions);
NS, ns. . . . . nervous system; neurosurgeon;

NSR ..... normal sinus rhythm
NSS..... normal saline solution
NSSTW..... non–specific S T wave changes (ECG)
nuc, nucl, Nuc Med.. nucleated; nucleus; nuclear medicine
N & V..... nausea and vomiting
NVE..... neck vein engorgement
NW ..... non–white

O, o ..... occiput; occulus (eye); oral(ly); oxygen (chemical symbol for)
OB, ob, OBS, obstet.. obstetrics(al); observation; obsolete
OB–GYN ..... obstetrics and gynecology
Occ..... occasional; occlusion
OD, od, o/d ..... oculus dexter (right eye); omni die (once daily); on demand;
..... occupational disease
OP, op ..... outpatient; occiput posterior; operative procedure; osmotic pressure
OPD..... outpatient department
Oph, ophth ..... ophthalmology(ist); ophthalmoscope(ic)
OR ..... operating room
Ortho..... orthopaedic
OS, Os, os ..... oculus sinister (left eye); bone; mouth; opening
Osteo..... osteomyelitis; osteopath(y)
OT, ot..... occupational therapy; objective test (psychology); orotracheal;
otolaryngology(ist)
OTO, Otol ..... otology(ist)
OU..... oculi unitas (both eyes together); oculus uterque (for each eye)
oz..... ounce (28 gr)

P, p ..... parte (part); per (by); phosphorus (chemical symbol for); pulse; pupil;
plasma
PA..... posterior–anterior (back to front); paralysis agitans; pernicious
..... anaemia; pulmonary artery
P & A ..... percussion and auscultation
palp..... palpable; palpate(ion)
Para ..... formula designating p–number of pregnancies; a–number of abortions; –number of living children
PAS..... peroxidase acid stain
P'ase..... phosphatase
Path, pathol..... pathology(ical); pathologist
PBI..... protein–bound iodine
PC ..... post cibos (after meals); post cibum (after food)
pCO–..... carbon dioxide content of the blood
PCV ..... packed cell volume
PD ..... poorly differentiated; peritoneal dialysis
PDA..... Patent Ductus Arteriosus
PE, pe..... physical examination; pulmonary embolism
PED, Pedia..... paediatric(s)
PEEP..... positive end–expiratory pressure

PEG ..... pneumoencephalogram
PERLA ..... pupils equal, reactive to light and accomodation
PERRLA ..... pupils equal, round, reactive to light and accomodation
PF..... platelet factor; pulmonary factor; permeability factor
PH, PHx..... past history; public health
pH ..... symbol for expression of hydrogen ion concentration (acidity and alkalinity)
phys..... physiology
Phys Med..... physical medicine

Phys Ther..... physical therapy
PI ..... present illness
PID..... pelvic inflammatory disease
PM, pm ..... petit mal; physical medicine; postmeridian (afternoon);
..... postmortem (after death)
PMB ..... polymorphonuclear basophilic leukocyte
PME ..... polymorphonuclear eosoinophilic leukocyte
PMH..... past medical history
PMN..... polymorphonuclear (neutrophilic) leukocyte
PND ..... paroxysmal night dyspnea; postnasal drip
PO, POp, post–op ... postoperative
PO– ..... oxygen content of blood
POS, pos..... positive (+); position
PP..... postpartum
PPD ..... purified protein derivative (tuberculin skin test)
ppm ..... part per million
ppp..... platelet poor plasma
ppt..... precipitate
PRBC ..... packed RBC (red blood cells)
preg, pregn, pg ..... pregnant
preop, pre–op ..... preoperative
prep ..... preparation; prepare
prn..... pro re nata (as needed)
Proct, procto ..... proctology(ist)
prog, progn ..... prognosis
pros, prost..... prostate
prosth ..... prosthesis
prothrom, PT) ..... time
pro–time
prox..... proximal
PS..... pulmonary stenosis
PSI ..... posterior sagittal index
Psy, psychiat ..... psychiatry(ic)
psych, psychol..... psychology(ist)
PT, pt ..... part; patient; physical therapy; pint; point; prothrombin time
PTA..... prior to admission
PTC ..... prior to consultation
PTH ..... parathormone (parathyroid hormone)
PTT..... partial thromboplastin time

PUD ..... peptic ulcer disease
pul, pul em ..... pulmonary embolism
PV ..... paraventricular (nucleus); plasma volume
PVC ..... premature ventricular contraction
PVD ..... peripheral vascular disease
Px, PX ..... past history; physical examination; pneumothorax; prognosis

Q ..... quadrant; quantity; quart; quotient
q ..... quaque (each, every)
qd ..... quaque die (every day)
qh ..... quaque hora (every hour)
qhs ..... at bedtime
qid ..... quater in die (four times a day)
qm ..... quaque mane (every morning)
qn ..... quaque nocte (every night); quaque nox (every night)
QNS ..... quantity not sufficient
qt ..... quart; quantity; quiet
qtty ..... quantity
quad ..... quadrant(s)
qual ..... quality(ative)
q.v. ..... quod vide (which see)

R, r ..... radioactive mineral; radiology(ist); radius; range; rectal; resistance with reference to disease); right; respiration; roentgen (symbol for); roentgenology(ist)
RA, Ra ..... radium (chemical symbol for); repeat action; right atrium; right auricle; rheumatoid arthritis
Rad; rad ..... rad (radiation absorbed dose); radical; radiotherapy(ist); radius
RAEB ..... refractory anaemia with excess blasts
RAIU ..... radioactive iodine uptake
RaRx, RxTx, Rt, RT .. radiation therapy; radiotherapy
RBBB ..... right bundle branch block
RBC ..... red blood cells; red cell count
RCM ..... right costal margin; reinforced clostridial medium
RCS ..... reticulum cell sarcoma
RDS ..... respiratory distress syndrome
Readm ..... readmission
rec ..... recens (fresh); record; recreation; recurrent
ref phys ..... referring physician
REG, reg ..... radioencephalogram; region; register(ed); regular
rehab ..... rehabilitation
REM, rem ..... rapid eye movement (sleep); roentgen–equivalent–man
REP, rep, rept ..... repair; repetatur (let it be repeated); report; retrograde pyelogram; roentgen equivalent physical
RES ..... reticuloendothelial system
resp ..... respiration; rspiratory; respectively; responsible

retic ..... reticulocyte(s)
Retic ct ..... reticulocyte count
RF ..... renal failure; rheumatoid factor
RH, Rh ..... relative humidity; releasing hormone; rhesus (with reference to blood factors); rhonchi (rales); right hand
RHD ..... rheumatic heart disease
RI ..... refractive index

RIA ..... radioimmunoassay
RICM ..... right intercostal margin
RIQ ..... right inner quadrant (of breast)
RLE ..... right lower extremity
RLL ..... right lower lobe (of the lung)
RLQ ..... right lower quadrant (of the abdomen or breast)
RM ..... respiratory movement
RML ..... right middle lobe
RNA ..... ribonucleic acid
RO, R/O ..... routine order; rule out
Roent ..... roentgenology(ist)
ROM ..... range of motion
ROQ ..... right outer quadrant of the breast or abdomen
ROS ..... review of systems; review of slides
rout ..... route
RR ..... respiratory rate; recovery room; response rate
R & R ..... rate and rhythm (of pulse)
RS, R–S ..... Reed–Sternberg cells (for diagnosing Hodgkin's disease)
RT, rt ..... radiotherapy; right; reaction time; recreational therapy
RTC ..... return to clinic
RUE ..... right upper extremity
RUL ..... right upper lobe
RUQ ..... right upper quadrant
RV ..... right ventricle
R–V ..... recto–vaginal
Rx, RX ..... recipe (take, used in prescription); therapy; treatment

S, s ..... sacral (in vertebra); semis (half); single (marital status); sinister (left); sulphur (chemical symbol for)
s ..... without (L. sine)
SA, Sa, sarc ..... sarcoma; sino–atrial node
sat, satd, satn ..... saturated; saturation
SB ..... small bowel
SBE ..... subacute bacterial endocarditis
SBP ..... systolic blood pressure
sé, sc ..... without correction; small cleaved
sci ..... science(tific)
SD ..... standard deviation
SE ..... saline enema; standard error selinium (chemical symbol for)
Sed rate ..... sedimentation rate

SEER. . . . . Surveillance, Epidemiology and End Results
seg . . . . . segmented; segmenters (neutrophils)
SEM . . . . . standard error of mean
sep . . . . . separated (marital status)
SF . . . . . spinal fluid
SG . . . . . specific gravity
SGOT . . . . . serum glutamic oxaloacetic–acid transaminase
SGPT . . . . . serum glutamic pyruvic transaminase

SH . . . . . social history
SIADH . . . . . syndrome of inappropriate antidiuretic hormone secretion
sib . . . . . sibling
SIDS . . . . . sudden infant death syndrome
Sig, sig . . . . . sigmoidoscopy; signa, signetur (write, let it be written)
SL. . . . . sublingual
SLE. . . . . systemic lupus erythematosus
SLL. . . . . small lymphocytic lymphoma (diffuse lymphocytic well differentiated)
SM, sm. . . . . small; streptomycin; sustained medication; systolic murmur
SMA . . . . . (SMA–6; SMA–12); sequential multiple analysis measures body levels of albumin, alkaline phosphatase, bilirubin, BUN, calcium, carbon dioxide, cholesterol, creatinine, glucose, LDH, potassium chloride, sodium, total protein, etc.
SNODO . . . . . Standard Nomenclature of Diseases and Operations
SNOMED . . . . . Systemized Nomenclature of Medicine
SNOP . . . . . Systemized Nomenclature of Pathology
SNS. . . . . sympathetic nervous system
SOB . . . . . shortness of breath
SOL . . . . . space occupying lesion
sol, soln, solut . . . . . solution, soluble
SOP . . . . . standard operating procedure
SP, Sp, sp . . . . . specific; specimen; spine(al)
S/P, s/p . . . . . status post
sp gr, spec gr . . . . . specific gravity
SQ . . . . . subcutaneous
Sq. cell ca, SCC . . . . . squamous cell carcinoma
S & S . . . . . signs and symptoms
SSE. . . . . soap suds enema
Stabs . . . . . banded (neutrophils)
Staph . . . . . staphylococcus
stat. . . . . statim (at once, immdiately); statistics
STD, std . . . . . sexually transmitted disease; standard
STH . . . . . somatotropic hormone (growth hormone)
Strep, Str, Strepcoc. . . streptococcus
Sub–Q, subq, subcut . subcutaneous(ly)
sup. . . . . superior
Surg . . . . . surgery(ical); surgeon
Susp . . . . . suspension
SVC . . . . . superior vena cava (syndrome)

Sx, sym, sympt ..... symptoms and signs
sys, syst ..... system(ic); systolic
Sz ..... seizure

T, t ..... temperature; thoracic (vertebra, 1st, 2nd, 3rd, etc.); topography; time; toxocity; type; transverse
T4 ..... thyroxine
T & A ..... tonsillectomy and adenoidectomy
TA, TAT ..... toxin–antitoxin; tetanus antitoxin

tab ..... tabella (a tablet)
TAH ..... total abdominal hysterectomy
TB, tbc ..... tuberculosis; tubercle bacillus
TBI ..... total body irradiation
Tc–99m ..... isotope (technitium)
TCC ..... transitional cell carcinoma
T–cells ..... lymphocytes that mature in the thymus and are involved in cell mediated immunity
TD, td, tid ..... ter die (three times a day); thoracic duct; tumour dose treating distance
TEMP ..... temporary; temporal; tempore (in the time of); temperature
term ..... terminal
tet ..... tetanus
TH, th ..... tetrahydrocortisol; thoracic; thorax; thyroid hormone (thyroxine)
TIA ..... transient ischemic attack
TIBC ..... total iron binding capacity
TID, tid ..... ter in die (three times a day)
tinc ..... tincture
TL ..... tubal ligation
TM ..... tympanic membrane
TNI ..... total nodal irradiation
TNM ..... tumour, node, metastasis (staging classification)
TOMS ..... tomograms
topo, topog ..... topography
tox ..... toxic(ity)
TP ..... total protein; testosterone propionate
TPN ..... total parenteral nutrition
TPR ..... temperature, pulse, respiration; total peripheral resistance
trach ..... trachea(otomy)
trans cell ca, TCC ... transitional cell carcinoma
transpl ..... transplant(ation)
TRH ..... thyrotropin releasing hormone
TRT, Tx ..... treatment
TS ..... tumor size; thoracic surgery
TSH, TTH ..... thyroid stimulating hormone (thyrotropic hormone)
tsp ..... teaspoon
TUR, TUR(B), TUR(P). transurethral resection of (bladder, prostate)

tus ..... tussis (cough)
Tx ..... treatment

U ..... unit; urology(ist); upper
UA ..... urinalysis
UE ..... upper extremity
UGI, UGIS ..... upper gastrointestinal series
UH ..... upper half
UICC ..... International Union Against Cancer
UIQ ..... upper inner quadrant

umb ..... umbilicus (navel)
undiff ..... undifferentiated
unilat ..... unilateral
unk ..... unknown
U/O ..... urine output
UOQ ..... upper outer quadrant (breast)
UQ ..... upper quadrant
ureth ..... urethra(l)
URI ..... upper respiratory infection
urol ..... urology(ic); urologist
US, U/S ..... ultrasound
UTI ..... urinary tract infection
UV ..... ultraviolet

V, v ..... variation; coefficient of variation; vena (vein); vide (see); virus
VA ..... visual acuity
vag ..... vaginal
vasc ..... vascular
VC ..... vocal cord(s); vital capacity
VD ..... venereal disease
VDRL ..... Venereal Disease Research Laboratory
ventr ..... ventral
ventric ..... ventricle(ular)
viz ..... namely
VM ..... vasomotor
VP ..... venous pressure
VPC ..... ventricular premature beats; volume packed cells
Vs, vs ..... vital signs; vesicular sound (auscultation, chest)

W, w ..... water; width; white
w/ ..... with
WB ..... whole blood
WBC ..... white blood cell; white blood count
W/D, WD ..... well developed
W–E ..... wide excision

WHO ..... World Health Organization
Wid ..... widow(er)
wk ..... week
W/N ..... well nourished
WNL ..... within normal limits
w/o ..... without

wt ..... weight
W/U ..... work-up

X, x ..... axis (of a cylindrical lens); experimental; unknown quantity
(symbol for) X-chromosome; chromosome in male (paired with Y-chromosome)
X-matching ..... cross matching
X-rays ..... roentgen ray
XX ..... normal female chromosome type
XY ..... normal male chromosome type

Y-chromosome .... chromosome in male paired with X-chromosome
y/o ..... years old
yr, yrs ..... years

Zn ..... zinc (symbol for)

Appendix 2.2

Symbols

1° ..... first degree
2° ..... secondary; second degree
♀ ..... female
♂ ..... male
↑ ..... increased
↓ ..... decreased
− ..... negative; subtract
+ ..... positive; add
µ ..... micron
µmg, µg ..... microgram
< ..... less than
> ..... more than; greater than
≤ ..... less than or equal to
≥ ..... more than or equal to
* ..... birth
† ..... death
Θ ..... diametre
= ..... equal to
≠ ..... is not equal to
~ ..... approximate
' ..... foot; feet
" ..... seconds; inch(es)
° ..... degree; hour
..... number (before a figure e.g. # 2)
% ..... percent; percentage
/ ..... per or divided by
× ..... multiplied by
: ..... ratio to

Appendix 2.3

Cancer Chemotherapeutic Agents

ACTINOMYCIN D	Cosmegen; dactinomycin
AMSACRINE	M–AMSA; 4'–(9 acridinyl aminomethane–sulfon-m–anisodide)
ASPARAGINASE	
5 AZACYTIDINE	
BLEOMYCIN	Blenoxane
BUSULFAN	Myleran
CARBOPLATIN	Paraplatin
CARMUSTINE	BCNU; bichlorethylnitrosourea
CHLORAMBUCIL	Leukeran
CISPLATIN	Cis–diammine dichloroplatinum DDP; platinol; platamine
CYCLOPHOSPHAMIDE	Cytoxan; cyclophar; endoxan
CYTARABINE	Cytosine arabinoside; arabinosyl cytosine; cytosar–U; ara–C
DACARBAZINE	DTIC; dimethyltriazine imidazole carboxamide
DAUNORUBICIN	Daunomycin; cerubidin
DOXORUBICIN	Adriamycin; hydroxyl daunorubicin
5 FLUOROURACIL	Adrucil; fluoroblastin; 5 FU
HEXAMETHYL-MELAMINE	HMM
HYDROXYUREA	Hydrea
IFOSFAMIDE	Holoxan
LOMUSTINE	CCNU; cyclohexylchlorethyl nitrosourea; CeeNU
MELPHALAN	Alkeran; phenylalanine mustard; L–PAM; L–sarcolysin
MERCAPTOPURINE	6–MP; purinethol
METHOTREXATE	Amethopterin; MTX, maxtrex; mexate; emthexate
MITHRAMYCIN	Mithracin
MITOMYCIN C	Mutamycin
MITOTANE	op'–DDP; lysodren
MITOXANTRONE	Novantrone; DHAD
PROCARBAZINE	Matulane; methylhydrazine
SEMUSTINE	Methyl–CCNU; MeCCNU; chloroethyl methylcyclohexyl nitrosourea
STREPTOZOCIN	Streptozotocin
TAXOL	
THIOGUANINE	6–TG; lanvis
THIOTEPA	Thio–TEPA; triethylenethiophosphoramide
VINBLASTINE	Velban
VINCRISTINE	Oncovin
VINDESINE	Eldisine
VP–16	Etoposide; VP–16–213 epipodophyllotoxin; vepesid