

## 2 Physical examination: General principles

The physical examination is a time-honoured technique in medical practice. For example, methods of medical examination are described in Egyptian papyri, in the classical world of ancient Greece and Rome, and in Vedic medicine in India. Indeed, people expect their doctor to examine them as part of a medical consultation. The physical examination, as currently used, was developed in the early 19th century as a method to evaluate symptoms in relation to recognized pathologies, in order to facilitate diagnosis and treatment. It was then the only method available for assessment of patients and therefore became highly formalized - and also highly sophisticated - as early editions of this book illustrate. As modern technologies for assessment and diagnosis have become generally available, especially medical imaging, biochemical and immunological methods, and more recently, genetic testing, the features sought by the clinician during the physical examination have become more focused and more specific. None the less, the classical methods of physical examination remain valid. In particular, modern imaging methods are adjunctive to classical clinical methods and do not replace them.

The techniques for examination of the different bodily systems are described in the system-specific chapters of this book. It is important to develop a routine of physical examination that combines speed with thoroughness, sensitivity and alertness, but which disturbs the patient no more than necessary. The examination must be carried out as gently as possible, without tiring the patient needlessly. In severely ill patients it may be necessary to postpone a routine examination and to perform only that required for provisional diagnosis and treatment.

Different doctors use different routines in different circumstances. Start the examination in a manner that is relevant to the patient's symptoms. For example, if the presenting symptom is sciatica, start with the legs and the spine. However, a systematic approach to each functional system is essential in order to obtain information that is both complete and relevant. This serves to remind the clinician of any omissions. Always try to be thorough. With experience you will become more confident in looking directly for certain signs suggested by the history, and then conducting a systematic examination in this context.

### GENERAL APPROACH

A physical examination requires a cooperative patient and a quiet, warm and well-lit room equipped with a couch, a chair and some steps to help disabled people get on to the couch. Ideally, the couch should be capable of being raised or lowered, and of being broken at one end to provide a backrest. Daylight is better than artificial light, which may mask changes in skin colour, for example the faint yellow tinge of slight jaundice. Remember that the physical examination starts from the moment you meet the patient - you will be able to notice aspects of their general demeanour, stance, nutrition and personality at first acquaintance which will be important in your approach to the history, and, later, to the examination itself. Every moment of your contact with the patient, every gesture and every communication is full of information.

For a thorough examination the patient should be asked to undress completely, or at least to their underclothes, and to lie or sit on the couch or bed partially covered with a sheet or dressing gown. For more restricted examinations such complete exposure is not necessary. None the less, always resist the temptation to conduct an examination through clothing, which will obscure a full inspection of the part affected. Ideally a chaperone should be present when a male doctor is examining a female patient, both to reassure the patient and to protect the doctor from subsequent accusations of improper conduct. A chaperone is essential when conducting an intimate examination such as vaginal or rectal examination.

In considering the patient's general appearance, it is important to make a rapid assessment of the degree of illness. This is not making a diagnosis. Simply consider the question: 'Does this patient look well, mildly ill or severely ill, thus needing urgent attention?'. Experienced nurses are often highly skilled in this kind of assessment and their opinion should never be ignored.

## Box 2.1 The physical examination: summary of plan of general physical examination

- Mental and emotional state
- Physical attitude
- Gait
- Physique
- Face
- Skin
- Hands
- Feet
- Neck
  - lymphatic and salivary glands
  - thyroid gland
  - pulsation
- Breasts
- Axillae
- Temperature
- Pulse
- Respiration
- Odours

Every moment of the consultation is important. Certain abnormalities may sometimes be recognized as soon as you meet the patient, and you may well notice things about them during history taking. For example, shortness of breath, pallor, jaundice, parkinsonism, stroke, skin rashes and other features may be recognized immediately. Watching the patient getting undressed or dressed is often especially revealing of neurological and rheumatological disorders, and may also reveal the degree of any pain, or shortness of breath. The examination 'begins on meeting the patient, and continues until the consultation ends'. An abnormal finding on examination may indicate the need for further questions - do not hesitate to revisit the history in the light of such findings at the end of the examination. Box 2.1 shows a summary plan for the general physical examination. This should be followed when it is necessary to check the various bodily systems. Such a routine may have to be modified according to the needs of the patient - for example, the minimum necessary examination in an acutely ill patient, the examination of the nervous system in a patient with cardiac symptoms, or simply according to the circumstances.

The object of a routine examination is to check the different bodily systems to exclude abnormality. In considering symptoms related to the patient's presenting complaint a more focused and detailed examination is often necessary.

### MENTAL AND EMOTIONAL STATE

Try to make some initial assessment of the patient's intelligence and mental and emotional state, but recognize that this initial impression may be inaccurate. As well as the history, observation is important in assessing the emotional state. Thus an anxious person may be restless, with wide palpebral fissures and sweating palms. Is the anxiety reasonable in the circumstances, or is the patient overanxious? In depression, the lowered mood, inability to concentrate or make decisions, mental retardation, apathy or even obvious misery may be clearly evident; however, these features may not be obvious, although they are important and lead to physical symptoms.

## **PHYSICAL ATTITUDE**

Consider the patient's posture. Severely ill patients slip down the bed or chair into uncomfortable attitudes they are unable to correct. Patients with heart failure sit up because they may become dyspnoeic if they lie flat (orthopnoea). Patients with abdominal pain due to peritonitis lie still, whereas patients with colic are restless or may even roll about in a futile attempt to find relief. People with painful joint diseases often have an attitude of helplessness. Various neurological disorders produce characteristic abnormal postures.

## **GAIT**

Always observe the gait in patients able to walk. Remember that simple things such as a painful corn, an ill-fitting shoe or a strained muscle may produce a temporary limp. The gait is best observed as the patient walks into the consulting room, before the formal assessment commences, because at this time the patient usually feels unobserved and this is their natural gait. Under formal examination the gait may appear more abnormal, as the patient may then try to demonstrate certain subjective abnormalities to the physician.

## **GENERAL APPEARANCE**

Much can be learned from a general inspection of the patient's physique. Is the appearance consistent with the patient's chronological age? Is he or she tall, short, fat, thin, muscular or asthenic? Are there any obvious deformities, and is the body proportionate? Height should be roughly equal to the fingertip-to-fingertip measurement of the outstretched arms, and twice the leg length from pubis to heel. Obesity is mostly a problem of developed countries. In some parts of the world signs of malnutrition, such as wasting, apathy, anaemia and skin changes, may be encountered; they should also be looked for in neglected elderly patients in developed countries. A history of weight gain or loss can be checked by observation, remembering that fluid retention (oedema) will increase weight. Obvious weight loss, even when food intake has increased, is a feature of thyrotoxicosis and diabetes mellitus. Psychogenic loss of appetite usually affecting girls (anorexia nervosa) causes extreme emaciation while physical activity remains unimpaired.

## **FACIAL APPEARANCE**

Observe the patient's face. The expression, and particularly the eyes, indicates real feelings better than words. Some diseases, for example Parkinson's disease, depression, hypothyroidism, thyrotoxicosis, acromegaly, third and seventh cranial nerve palsies and paralysis of the cervical sympathetic nerve (Horner's syndrome), produce characteristic facial appearances. Parotid swellings are obvious on inspection of the face. The cheeks give information regarding the patient's health: in anaemia and hypopituitarism they are pale; in the nephrotic syndrome they are pale and puffy; in cases of mitral stenosis there is sometimes a bright circumscribed flush over the malar bones; in many persons who lead an open-air life they are red and highly coloured; in congestive heart failure they may also be highly coloured, but the colour is of a bluish tint which cannot be mistaken for the red cheeks of weather-beaten people. In some cases of systemic lupus erythematosus there is a red raised eruption on the bridge of the nose that extends on to the cheeks in a 'butterfly' distribution. Telangiectases, minute capillary tortuosities, or naevi, may be seen on the face in liver disease and, rarely, as a hereditary disorder.

## **THE SKIN**

The detailed examination of the skin is described in Chapter 11. The most important abnormalities in the skin relevant to general examination are pallor, yellowness, pigmentation and cyanosis. In dehydration the skin is dry and inelastic so that it can be pinched up into a ridge. The skin is atrophied by age, and sometimes after treatment with glucocorticoids. In acromegaly it is thickened, greasy and loose.

Pallor depends on the thickness and quality of the skin, and the amount and quality of the blood in the capillaries. Pallor occurs in persons with thick or opaque skins, who are always pale; in hypopituitarism; in states where the blood flow in the capillaries is diminished, such as shock, syncope or left heart failure; locally in a limb deprived of its blood supply; or in the fingers or toes when arterial spasm occurs on exposure to cold, as in Raynaud's disease. Generalized pallor may also occur in severe anaemia. Anaemia, however, is a feature of 'the colour of the blood rather than that of the patient' and the colour of the skin may be misleading. The colour of the mucous membranes of the mouth and conjunctivae gives a better indication, as does the colour of the creases of the palm of the hand.

Yellowness is usually due to jaundice. A pale lemon-yellow tint is characteristic of haemolytic jaundice; in obstructive jaundice there is a dark yellow or orange tint. In obstructive jaundice there may be scratch marks from itching evoked by bile salts. In rare cases yellowness may be due to carotenaemia.

Pigmentation (see Chapter 11) is most commonly racial. The pigmentation of Addison's disease affects the buccal mucous membranes as well as exposed skin and parts subject to friction. In von Recklinghausen's disease (neurofibromatosis type 1) patches of café au lait (milky coffee) pigment, ranging from freckling of the axillae to large (>5cm in length) areas on the limbs, trunk or face, are a characteristic feature.

Cyanosis is a bluish colour of the skin and mucous membranes owing to the presence of reduced haemoglobin in the blood. A similar bluish or leaden colour rarely may be produced by methaemoglobinaemia or sulphaemoglobinaemia, usually due to the taking of certain drugs, such as phenacetin. This should be considered in any patient who is cyanosed but not breathless. Carbon monoxide poisoning produces a generalized cherry-red discoloration, owing to the presence of carboxyhaemoglobin.

Oedema is an excess of fluid in the subcutaneous tissue causing swelling of the tissues. In dependent oedema, which is typically present in congestive heart failure, and in conditions associated with a low plasma protein level, the swelling first appears at the ankles and over the dorsum of the foot, and only gradually involves the legs, thighs and trunk. In local venous obstruction the oedema is confined to the parts from which the return of blood is impeded. Oedema of the whole upper part of the body may result from intrathoracic tumours. Oedema can be recognized by the pallid and glossy appearance of the skin over the swollen part, by its doughy feel, and by the fact that it pits on finger pressure. In bed-bound patients oedema often appears first over the sacrum. To recognize pitting oedema it is important to press firmly and for a sustained period, and the 'pit' is as easily felt as seen. The oedema of lymphatic obstruction does not pit on pressure.

Subcutaneous emphysema is uncommon, but if present can be recognized by the crackling sensation produced by lightly compressing the part affected.

## **THE HANDS**

The patient's hands should be carefully examined. A range of abnormalities may be present in the structure and function of the hands, including evidence of arthritis, neurological disease, liver disease anaemia and acromegaly. Classic appearances that should always be sought include finger clubbing, nailbed 'splinter' haemorrhages, Dupuytren's contracture, and koilonychia, which occurs in long-standing iron-deficiency anaemia. Tremor should be assessed carefully, distinguishing between a fine tremor such as that due to thyrotoxicosis and the coarse jerky tremor of metabolic encephalopathy. In hypertrophic pulmonary osteoarthropathy, besides clubbing of the fingers there is tender thickening of the periosteum of the radius, ulna, tibia and fibula.

## **THE FEET**

The feet must not remain obscured under bedclothes or socks during the examination. Pitting oedema may be recognized only in the ankles and dorsal surfaces of the feet. The condition of the skin of the feet is especially important in diabetics and the elderly. Peripheral vascular disease will make the skin shiny, and hair does not grow

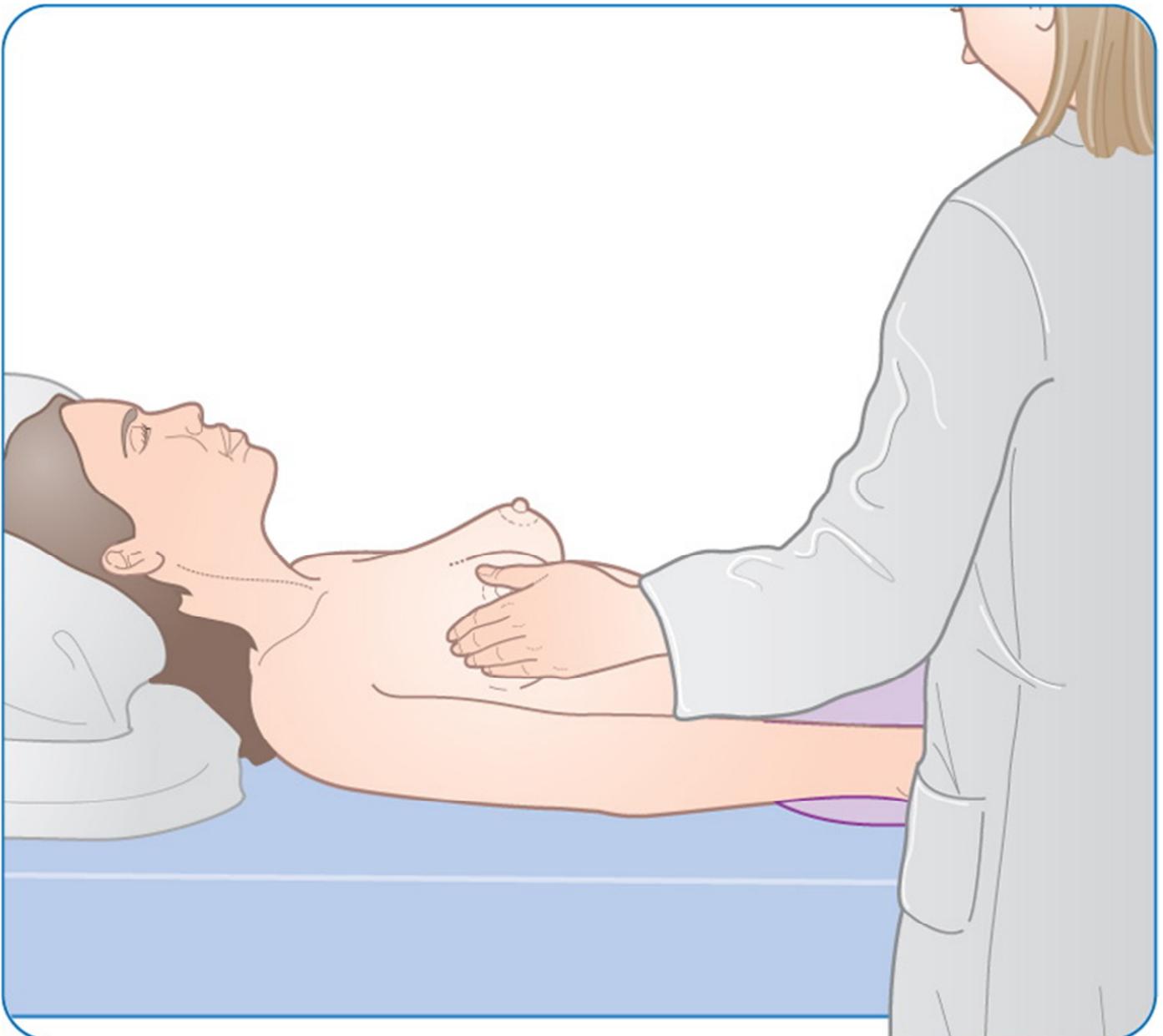
on ischaemic legs or feet. The dorsalis pedis and posterior tibial pulses may be reduced or absent. If the toes of an ischaemic foot are compressed their dull purple colour will blanch and only slowly return. Passive elevation of an ischaemic leg will cause marked pallor of the foot as perfusion against gravity falls. Painless trophic lesions, often with deep ulceration, on the soles are seen frequently in diabetic peripheral neuropathy (the diabetic foot).

## THE NECK

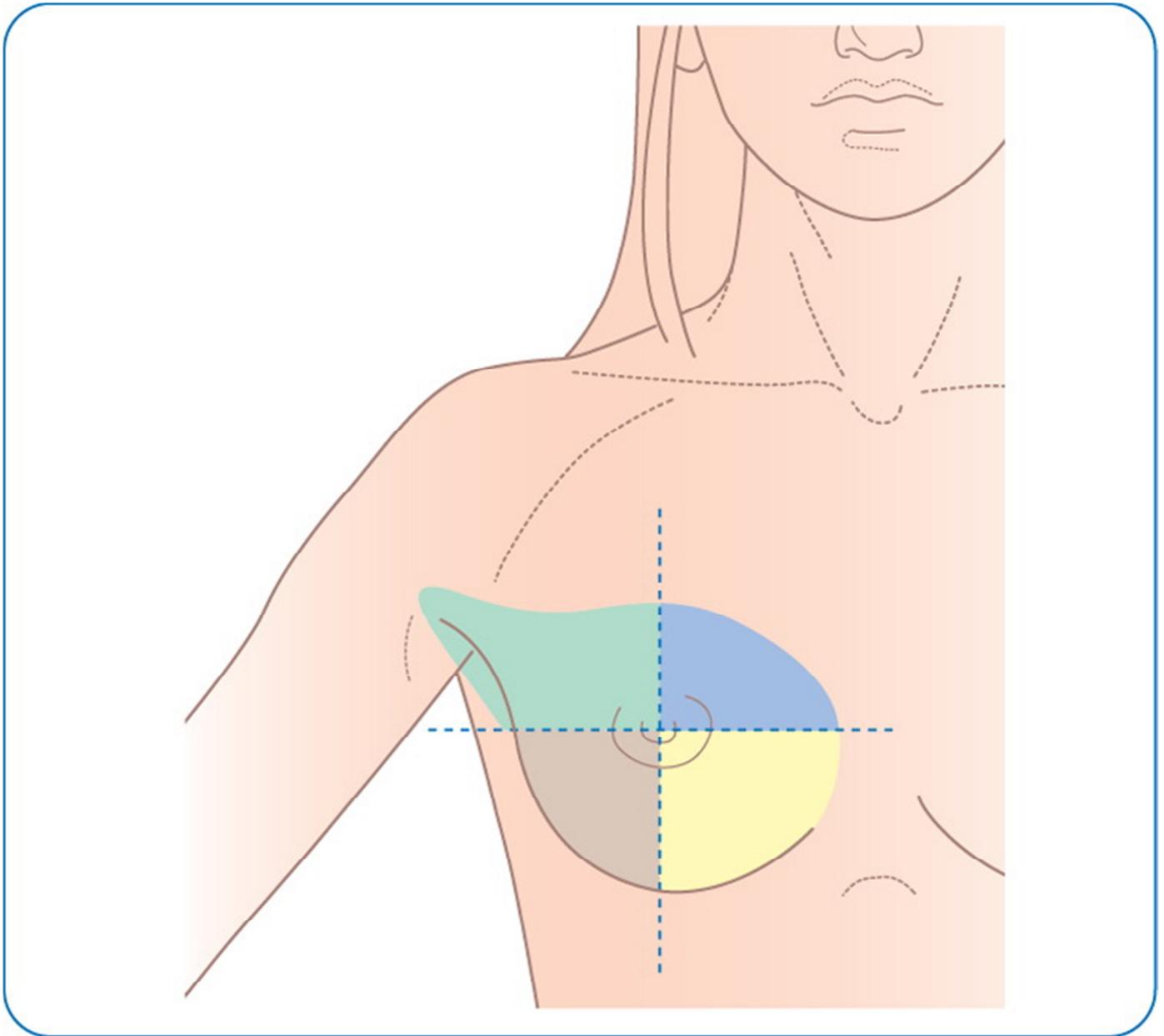
The neck should be inspected and palpated. Swellings in the neck are usually best felt from behind. Careful note should be taken of lymph glands (see Chapter 19) and the thyroid (see Chapter 12). Carefully assess the major arteries and veins palpable in the neck (see Chapter 7).

## THE BREASTS

The chance of finding a treatable cancer should make a full examination of the breasts a necessary feature of every general examination of a woman over 30 years of age (see Chapter 25). Any swelling of the male breast is likely to be seen at a glance. The swelling can be distinguished as breast tissue rather than pectoral fat by palpating when the patient's hands are behind his head. At some stage of puberty the majority of normal boys will have a palpable disc of breast tissue beneath the areola.



In women, start with the patient sitting to assess asymmetry, a visible mass, distortion or skin tethering (Fig. 2.1). Involvement of the deeper fascia causes dimpling of the overlying skin of the breast. Nipple discharge or ulceration, and oedema and erythema of the skin (peau d'orange) all suggest carcinoma of the breast. Lymphadenopathy in the axilla may be visible, or cause oedema of the arm from obstruction of lymphatic drainage. Next palpate the breasts.



The patient should lie in a near-supine position, so that the breast can be easily examined between the flat of the examiner's hand and the chest wall posteriorly (Fig. 2.2). A semi-decubitus position, with the patient's arm raised and the hand behind her head, is helpful if the breast is large. The normal lobular consistency of the breast tissue varies during the menstrual cycle, becoming more pronounced during the oestrogenic phase. After the menopause the breast parenchyma is replaced by fatty tissue, which retains a less-marked lobular consistency. Gently palpate the four quadrants of the breast, including the axillary tail (Fig. 2.3), and then, using the thumb and forefinger, define any suspected mass in relation to its size, consistency, fixation to skin or deep fascia, and relationship to the nipple and areolar complex. Remember to examine the axillary and cervical draining nodes, and the abdominal organs for metastatic involvement.

## **AXILLAE**

Examine the axillae. It is difficult to feel enlarged lymph glands unless the patient's arm is raised to allow the examining fingers to be pushed high into the axilla. The arm is then lowered in the flexed position to rest across the examiner's arm, and palpation is continued downwards along the chest wall.

## **TEMPERATURE**

When taking the temperature, remember the following points:

Before inserting the thermometer, make it an invariable rule to wash it in antiseptic or in cold water and see that the mercury is well shaken down. Afterwards, wash it before replacing it in its case.

The thermometer must be accurate. The centigrade (Celsius) scale is in general use in the UK (normal <math><37^{\circ}</math>), but many people are still more familiar with the Fahrenheit scale (normal <math><98.4^{\circ}</math>).

It must be kept in position long enough to allow the mercury to reach body temperature. It is advisable to exceed the period the instrument professes to require. The ordinary 'half-minute' thermometer should be left in position for a full minute. Collapsed, comatose and elderly patients should have their rectal temperature taken with a special 'low-reading' thermometer. Accidental hypothermia is common in the elderly in winter.

In conscious adults the temperature is taken in the mouth or the axilla. In young children the thermometer should be placed in the fold of the groin and the thigh flexed on the abdomen; or it may be inserted into the rectum. The temperature of the mouth and rectum is generally at least half a degree higher than that of the groin or axilla. When the temperature is taken in the mouth, the patient must breathe through the nose and keep the lips firmly closed during the observation. An electronic thermometer is now often used in the ear, and provides a fast and accurate reading.

## **PULSE**

Count the pulse for a full half-minute when the patient is at rest and composed. Abnormalities due to cardiovascular causes, such as disturbances of the normal rhythm (arrhythmia), are described in Chapter 7. The rate in health during the stress of a medical examination varies from about 60 to 80 beats/minute, but people who are physically very fit may have a resting pulse as low as 45.

## **RESPIRATION**

Count the patient's respirations for a full half-minute, starting when their attention is directed elsewhere. It is convenient to do this when the patient thinks you are still counting the pulse. The normal rate in an adult is about 14-18 respirations/minute, but wide variations occur in health. Respiratory rate is a useful sign that many doctors ignore, and when examining the patient on a bed can be the main sign of a significant chronic obstructive pulmonary disease.

## **ODOURS**

The odour of alcohol is easily recognizable on the breath, although patients may try and mask it by sucking a mint, but it does not necessarily mean the patient's condition is due to alcohol intoxication. The odour of diabetic ketosis has been described as 'sweet and sickly'; that of uraemia as 'ammoniacal or fishy'; and that of hepatic failure as 'mousy', but too much reliance on such delicate distinctions is unwise. Halitosis (bad breath) is common in patients whose dental hygiene has been poor, and is associated especially with chronic gingivitis (periodontal or gum disease).