

7.3 HORMONES IN ANIMALS

How are such chemical, or hormonal, means of information transmission used in animals? What do some animals, for instance squirrels, experience when they are in a scary situation? Their bodies have to prepare for either fighting or running away. Both are very complicated activities that will use a great deal of energy in controlled ways. Many different tissue types will be used and their activities integrated together in these actions. However, the two alternate activities, fighting or running, are also quite different! So here is a situation in which some common preparations can be usefully made in the body. These preparations should ideally make it easier to do either activity in the near future. How would this be achieved?

If the body design in the squirrel relied only on electrical impulses via nerve cells, the range of tissues instructed to prepare for the coming activity would be limited. On the other hand, if a chemical signal were to be sent as well, it would reach all cells of the body and provide the wide-ranging changes needed. This is done in many animals, including human beings, using a hormone called adrenaline that is secreted from the adrenal glands. Look at Fig. 7.7 to locate these glands.

Adrenaline is secreted directly into the blood and carried to different parts of the body. The target organs or the specific tissues on which it acts include the heart. As a result, the heart beats faster, resulting in supply of more oxygen to our muscles. The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. This diverts the blood to our skeletal muscles. The breathing rate also increases because of the contractions of the diaphragm and the rib muscles. All these responses together enable the animal body to be ready to deal with the situation. Such animal hormones are part of the endocrine system which constitutes a second way of control and coordination in our body.

Activity 7.3

- Look at Fig. 7.7.
- Identify the endocrine glands mentioned in the figure.
- Some of these glands have been discussed in the text. Consult books in the library and discuss with your teachers to find out about the functions of other glands.

Remember that plants have hormones that control their directional growth. What functions do animal hormones perform? On the face of it, we cannot imagine their role in directional growth. We have never seen an animal growing more in one direction or the other, depending on light or gravity! But if we think about it a bit more, it will become evident that, even in animal bodies, growth happens in carefully controlled places. Plants will grow leaves in many places on the plant body, for example. But we do not grow fingers on our faces. The design of the body is carefully maintained even during the growth of children.

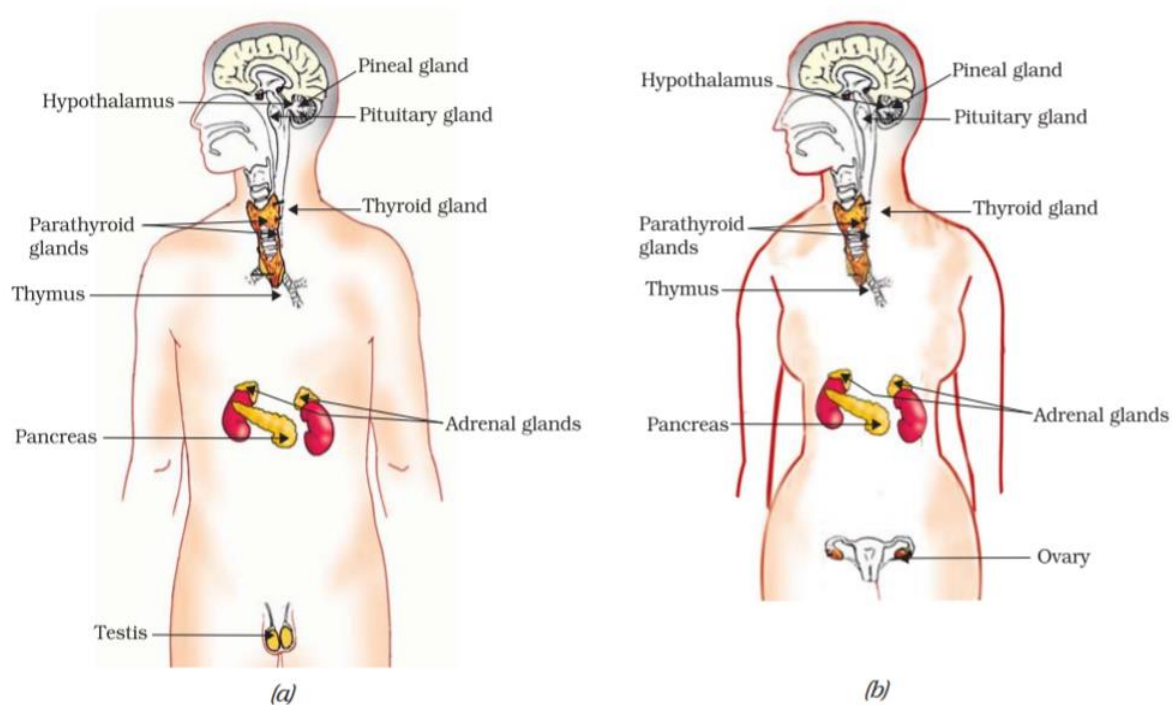


Figure 7.7 Endocrine glands in human beings (a) male, (b) female

Let us examine some examples to understand how hormones help in coordinated growth. We have all seen salt packets which say 'iodised salt' or 'enriched with iodine'. Why is it important for us to have iodised salt in our diet? Iodine is necessary for the thyroid gland to make thyroxin hormone. Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth. Iodine is essential for the synthesis of thyroxin. In case iodine is deficient in our diet, there is a possibility that we might suffer from goitre. One of the symptoms in this disease is a swollen neck. Can you correlate this with the position of the thyroid gland in Fig. 7.7?

Sometimes we come across people who are either very short (dwarfs) or extremely tall (giants). Have you ever wondered how this happens? Growth hormone is one of the hormones secreted by the pituitary. As its name indicates, growth hormone regulates growth and development of the body. If there is a deficiency of this hormone in childhood, it leads to dwarfism.

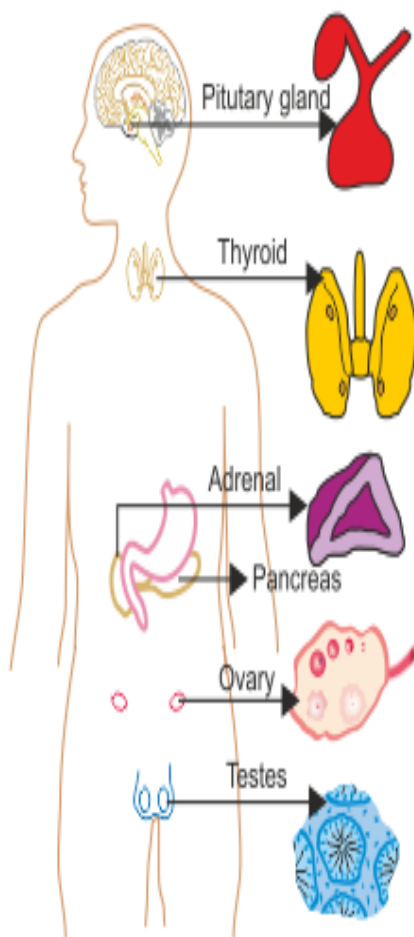
You must have noticed many dramatic changes in your appearance as well as that of your friends as you approached 10–12 years of age. These changes associated with puberty are because of the secretion of testosterone in males and oestrogen in females.

Do you know anyone in your family or friends who has been advised by the doctor to take less sugar in their diet because they are suffering from diabetes? As a treatment, they might be taking injections of insulin. This is a hormone which is produced by the pancreas and helps in regulating blood sugar levels. If it is not secreted in proper amounts, the sugar level in the blood rises causing many harmful effects.

Endocrine glands are ductless glands that **secrete hormones** (chemical messengers) which carry **messages to particular organ or tissue** through the blood stream.

These glands control **growth, development, metabolism and reproduction**.

Endocrine glands secrete hormones in **response to external and internal stimuli**.



Glands	Hormones	Functions
Pituitary	Growth hormone	<ul style="list-style-type: none"> Regulates growth Controls the functioning of endocrine glands
Thyroid	Thyroxine	<ul style="list-style-type: none"> Controls the metabolism rate It also brings about balanced growth
Parathyroid	Parathormone	<ul style="list-style-type: none"> Controls calcium balance of the body
Adrenal	Adrenaline	<ul style="list-style-type: none"> Prepares body for emergency
Pancreas	Insulin	<ul style="list-style-type: none"> Controls glucose level of the blood
Testes	Testosterone	<ul style="list-style-type: none"> Controls growth and development of male reproductive system
Ovaries	Oestrogen, progesterone	<ul style="list-style-type: none"> Controls growth and development of female reproductive system

ASSIGNMENT 16

1. HOW DOES YOUR BODY MAKE ITSELF READY FOR FIGHT AND FLIGHT?
2. NAME THE HORMONE SECRETED FROM PANCREAS. WRITE ITS FUNCTION.
3. NAME MALE SEX HORMONE AND FEMALE SEX HORMONE OF HUMAN.
4. WRITE THE IMPORTANCE OF IODINE IN CHEMICAL COORDINATION.
5. NAME THE SITE WHERE THESE HORMONES ARE SYNTHESISED.
A. ADRENALINE. B. THYROXIN C. TESTOSTERON, D. INSULIN