

# Body system communication

Critical teaching ideas - Science Continuum F to 10

**Level:** Moving towards level 10

## Student everyday experiences

Students will be aware that their body responds to changes in the environment (e.g. heat regulation), but may be confused about what causes these responses and how they occur. They may not be aware of the human body's two important communication systems, the nervous system and the endocrine (hormone) system.

Students may focus on nerves with particular attention to their feelings, but may not consider them in relation to how the body responds to the environment (internal and external). They do realise the speed with which nerves operate with respect to their feelings e.g. happiness can quickly change to sadness, anger. Students are also often unaware or confused about the nervous system as a whole and the relationship that exist between the different parts of the nervous system (brain, spinal cord, nerves). (Driver, 1994)

The human body responds to hormones in a sustained, widespread way. Students will have heard about hormones (especially in relation to pimples and the contraceptive pill), but they are likely to be confused about how they function. Their life experiences may mean that some students are more familiar with certain hormone functions e.g. diabetics, than others e.g. happiness through the actions of endorphins.

Students often hear about hormones e.g. that chickens are fed hormones and that when humans eat these chickens they are affected in different ways, such as faster maturation of children. However, they have little knowledge of how this may occur. They may also have heard about the use of growth hormone by athletes, though they are likely to be confused about its source or the details of its role.

## The scientific view

Humans have two types of communication systems. These are the nervous system and the endocrine (hormone) system. These systems regulate body processes through chemical and electrical signals that pass between cells. The pathways for this communication are different for each system. (Evans, Ladiges, McKenzie, Batterham & Sanders, 2007). <http://faculty.washington.edu/chudler/chnt1.html>.

Responses triggered by hormones are generally slower and more sustained than the responses of the nervous system which are targeted and short lived. Responses of the hormone system affect cells that are likely to be widely distributed throughout the body e.g. hormones involved in sexual maturation, whereas the actions of nerves are likely to be more targeted.

## Critical teaching ideas

- The nervous and endocrine systems are two forms of communication system in the human body that integrate, coordinate and respond to sensory information which is received by the human body from its surroundings.

- In both the nervous and the endocrine system signals are passed from one cell to another by chemical communication
- In the nervous system, nerve cells send messages electrochemically: this means that chemicals cause an electrical impulse from one cell to another. This response is targeted and short lived. In the endocrine system, glands secrete hormones into the blood that travel to the target organs to effect a more widespread and sustained response.

## Teaching activities

### Bring out students' existing ideas.

This activity requires students to classify whether the statements provided are related to the endocrine system, the nervous system, both or none. An analysis of the results will help students' to clarify their ideas about the human nervous and endocrine systems.

- You feel a bee sting you.
- Your bee sting swells up.
- Starch in foods starts to be digested in the mouth.
- When you eat a slush drink, your head aches.
- When you are really frightened, you sometimes have a lot more strength than normal.
- Insulin controls the level of sugar in the blood.
- When you have been up for 24 hours in a row, you feel tired.
- A lot of men become bald as they grow older.
- When an object is moving towards your eye, the eye automatically closes.
- Most humans grow to between 150 cm and 185 cm tall.
- You can remember when your birthday is.
- Once you learn to ride a bike, you never have to learn again.
- Light coloured skin tends to become burned or darker when exposed to sunlight.

During research to find the causes of these effects, each group of students should make up some more statements for other members of the class to evaluate.

<http://www.sasked.gov.sk.ca/docs/midlsci/gr6ugmsc.html>

### Clarify and consolidate ideas for/by communication to others.

Students compare and contrast the nervous and endocrine systems with each other and other everyday communication systems that they are used to dealing with.

a) Students write a research report comparing and contrasting wireless technology (computer systems) with the hormone and nervous system. They should look specifically at the speed of response and the information carried.

b) Students are asked to relate the human communication systems (nervous and hormone) to communication systems in society and the technology that is used (e.g. mobile phones, landline telephones) and make comparisons between them.

### Promote reflection on and clarification of existing ideas.

Teachers should allow students to experience and build their knowledge by experimenting, researching and modelling.

- a) Students work in pairs to test reflexes (nerve responses). It is best to test rapid nerve responses (which are particularly needed in case of danger). These responses include reflex responses in the knee and of the eye pupil to light. To extend this part of the activity students can investigate whether these responses can be prevented (Lewis, 1999).



- b) Endocrine (hormonal) responses are much slower and sustained for longer. To investigate the endocrine system students produce a large display of the hormone system. Using a large piece of paper, draw an outline of a student (see moving to level 4) and fix it to the wall. Students research information on different glands and the role of the hormones they produce. They draw pictures of the glands, stick each picture to the body outline and attach information about the hormone that is produced. This activity could be extended by researching information on conditions created by too low or too high levels of hormones (Lewis, 1999).