### Learning Objective

The pituitary gland in the brain is a 'master gland' which

- Students should be able to explain how the main sub-

- Students should be able to, when provided with

- Students should be able to explain how the structure of

- The brain controls complex behaviour. It is made of

- Students should be able to explain the roles of thyroxine

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#### 4.7.5.3 Sustainable fisheries

- 4.7.5.2 Farming techniques

- 4.7.5.1 Factors affecting food

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#### 4.6.3.7 Resistant bacteria

- 4.6.3.6 Extinction

- 4.6.3.5 Fossils

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#### 4.6.2.4 Genetic engineering

- 4.6.2.3 Selective breeding

- 4.6.2.1 Variation

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#### 4.6.1.8 Sex determination

- 4.6.1.7 Inherited disorders

- 4.6.1.5 DNA structure (biology only)

- 4.6.1.2 Meiosis

- 4.6.1.1 Sexual and asexual

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#### 4.5.4.2 Use of plant hormones (HT

- 4.5.4 Plant hormones (biology only)

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#### 4.5.2.4 Control of body

- 4.5.2 The human nervous system

- 4.5.1 Homeostasis

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#### 4.4.2.2 Response to exercise

- 4.4.1.2 Rate of photosynthesis

- 4.4.1.1 Photosynthetic reaction

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#### 4.3.2.2 Uses of monoclonal

- 4.3.2.1 Producing monoclonal

- 4.3.2 Monoclonal antibodies

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#### 4.3 Infection and response

- 4.3.1 Communicable (infectious)

- 4.3.1.2 Viral diseases

- 4.3.1.1 Communicable diseases

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#### 4.2.2.5 Health issues

- 4.2.2.3 Blood

- 4.2.2.1 The human digestive system

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#### 4.1.2 Cell division

- 4.1.2 Cell division

- 4.1 Cell biology

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#### 4.1.1.5 Microscopy

- 4.1.1.4 Mitosis

- 4.1.1.3 Cytokinesis

- 4.1.1.2 Meiosis

- 4.1.1.1 Sexual and asexual

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#### 4.0 Nervous System Controls & Responds to

- 4.0.3.1 Neurons

- 4.0.3.2 Neurotransmitters

- 4.0.3.3 Synapses

- 4.0.3.4 Peripheral nervous system

- 4.0.3.5 Central nervous system

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#### 5. Intelligence arises as

- 5.0.1.4 Brain development

- 5.0.1.3 Brain structure

- 5.0.1.2 Brain function

- 5.0.1.1 Brain anatomy

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#### Understanding for Therapies

- 5.0.2.1 Drug discovery

- 5.0.2.2 Drug development

- 5.0.2.3 Clinical trials

- 5.0.2.4 Drug production

- 5.0.2.5 Drug distribution

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#### Discoveries promote

- 5.0.3.1 Medical treatments

- 5.0.3.2 Genetic therapies

- 5.0.3.3 Psychological therapies

- 5.0.3.4 Pharmacological therapies

- 5.0.3.5 Physical therapies

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#### Healthy living and

- 5.0.4.1 Healthy eating

- 5.0.4.2 Regular exercise

- 5.0.4.3 Stress management

- 5.0.4.4 Sleep hygiene

- 5.0.4.5 Environmental health

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#### Fundamental
There are a hundred billion neurons in the human brain, all of which are in use. Sensory circuits (sight, touch, hearing, smell, taste) bring information to the nervous system, whereas motor circuits send the nervous system influences and is influenced by all other body systems (e.g., cardiovascular, endocrine, gastrointestinal and immune systems).

Finding cures for disorders of the nervous system is a social imperative. Most neurons are generated early in development and survive for life. All perceptions, thoughts, and behaviors result from combinations of signals among neurons. Complex responses occur when the brain integrates information from many brain circuits to generate a response. Peripheral neurons have greater ability to regrow after injury than neurons in the brain and spinal cord. Emotions are based on value judgments made by our brains and are manifested by feelings as basic as love and anger and remembered experiences.

Changes in the amount of activity at a synapses can enhance or reduce its function. Action potentials are electrical signals carried along neurons. This complex organ can malfunction in many ways, leading to disorders that have an enormous social and economic impact. Sensory stimuli are converted to electrical signals. A synapse is a chemical or electrical junction that allows electrical signals to pass from neurons to other cells. Electrical signals in muscles cause contraction and movement. Motor circuits send information to muscles and glands.

Communication between neurons is strengthened or weakened by an individual’s activities, such as exercise, stress, and drug use. The brain is organized to recognize sensations, initiate behaviors, and store and access memories that can last a lifetime. Action potentials are electrical signals carried along neurons. Sensory circuits are formed by genetic programs during embryonic development and modified through interactions with the internal and external environment. Some neurons continue to be generated throughout life and their production is regulated by hormones and experience.

The brain learns from experiences and makes predictions about best actions in response to present and future challenges. The brain can malfunction in many ways, leading to disorders that have an enormous social and economic impact. Experimental research on animals play a central role in providing insights about the human brain and in helping to make healthy lifestyle choices, prevent disease, and find cures for disorders. Continuous challenging the brain with physical and mental activity helps maintain its structure and function - “use it or lose it.”

The brain is the body’s most complex organ. Neurons communicate using electrical and chemical signals. Peripheral neurons have greater ability to regrow after injury than neurons in the brain and spinal cord. Some injuries harm nerve cells, but the brain often recovers from stress, damage, or disease.