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Hormones and behavior: A psychological approach of Hormone- interactions

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Introduction

A hormone is any member of a class of signaling molecules in multicellular organisms that are transported to distant organs to regulate physiology and / or behavior. Hormones are required for the correct development of animals, plants and fungi. The lax definition of a hormone (as a signalling molecule that acts distant from its site of production) means that many different classes of molecule can be defined as hormones. Among the substances that can be considered hormones, are eicosanoids (e.g. prostaglandins and thromboxanes), steroids (e.g. oestrogen and brassinosteroid), amino acid derivatives (e.g. epinephrine and auxin), protein / peptides (e.g. insulin and CLE peptides) and gases .

Hormones are used to communicate between organs and tissues. In vertebrates, hormones are responsible for the regulation of many physiological processes and behavioural activities such as digestion, metabolism, respiration, sensory perception, sleep, excretion, lactation, stress induction, growth and development, movement, reproduction, and mood manipulation. In plants, hormones modulate almost all aspects of development, from germination to senescence.

Hormones affect distant cells by binding to specific receptor proteins in the target cell, resulting in a change in cell function. When a hormone binds to the receptor, it results in the activation of a signal transduction pathway that typically activates gene transcription, resulting in increased expression of target proteins. Hormones can also act in rapid, non-genomic pathways that can be synergistic with genomic effects. Water-soluble hormones (such as peptides and amines) generally act on the surface of target cells via second messengers. Lipid soluble hormones, (such as steroids) generally pass through the plasma membranes of target cells (both cytoplasmic and nuclear) to act within their nuclei. A notable exception to this is brassinosteroids in plants, which despite being lipid soluble; still bind to their receptor at the cell surface.

In vertebrates, endocrine glands are specialized organs that secrete hormones into the endocrine signalling system. Hormone secretion occurs in response to specific biochemical signals and is often subject to negative feedback regulation. For instance, high blood sugar (serum glucose concentration) promotes insulin synthesis. Insulin then acts to reduce glucose levels and maintain homeostasis, leading to reduced insulin levels. Upon secretion water soluble hormones are readily transported through the circulatory system. Lipid-soluble hormones must bond to carrier plasma glycoproteins to form ligand-protein complexes. Some hormones are completely active when released into the bloodstream (as is the case for insulin and growth hormones), while others are prohormones that must be activated in specific cells through a series of activation steps that are commonly highly regulated. The endocrine system secretes hormones directly into the bloodstream, typically via fenestrated capillaries, whereas the exocrine system secretes its hormones indirectly using ducts. Hormones with paracrine function diffuse through the interstitial spaces to nearby target tissue.

Plants lack specialized organs for the secretion of hormones, although there is special distribution of hormone production. For example, the hormone auxin is produced mainly at the tips of young leaves and in the shoot apical meristem. The lack of specialised glands means that the main site of hormone production can change throughout the life of a plant, and the site of production is dependent on the plant's age and environment.

The neurological level, behavior can be inferred based on: hormone concentrations; hormone-release patterns; the numbers and locations of hormone receptors; and the efficiency of hormone receptors for those involved in gene transcription. Not only do hormones influence behavior, but also behavior and the environment influence hormones. Thus, a feedback loop is formed. For example, behavior can affect hormones, which in turn can affect behavior, which in turn can affect hormones, and so on.

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