Latest Classification and Such Functions of Human Hormones

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Research Article

Keywords: Latest, Classification, Functions, Hormones, Amine, Peptide, Steroid, Eicosanoid, Deficiency, Organ systems

Posted Date: August 9th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-780936/v2>

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Abstract

Based on the classification of human hormones, there is no solid idea in most books. In this view, this article could exemplify a concrete solution, especially for medical and university students. Hormones have many life-saving roles in the human body. With the deficiency of hormones, our body might fall into lots of problems. Data analyses of much information from books, articles, online supplements gave different ideas on total hormones. The result suggested that some hormones were secret from the same glands. Out of 110 hormones (when the same hormone came from different sources), exact different types of hormones were 88. Analyzed hormones consisted of four major groups- amine (4 hormones), eicosanoid (4), steroid (15), and peptide were (65) out of 88 endocrine chemicals. The endocrine and reproductive system (56) jointly secreted most of the hormones, and secondly gastrointestinal tract (26 hormones). Besides the organ system or glands, some are come out from the cell, tissue, tissue system, and placenta. This paper also mentions, phenotypically males and females exhibit many differences, hence hormonal analyses; they are more or less the same. For instance, many sex hormones are also present both in males and females. In the future, it needs to enhance more research on the classification of the hormones in the human body.

Introduction

Secretin, gastrin, and cholecystokinin were the first gastrointestinal hormones (**Bayliss & Starling, 1902; Edkins, 1905; Ivy & Oldberg, 1928**) and also the first structurally identified and are the largest endocrine organ in the body. Knowledge about the physiology and anatomy of the gut endocrine system is most helpful for the clinician to understand the pathophysiology of certain diseases (excess hormone production from gut endocrine tumours) (**Rindi *et al.*, 1999**). Neuronal sensitivity may be involved in common gastrointestinal diseases like irritable bowel syndrome (**Furness *et al.*, 1999**). The latest research will relate to gut peptides associated with deficiency diseases as potential growth factors in malignancies (**Ahlman & Nilsson, 2001**). The posterior pituitary gland is not a true gland (www.ncbi.nlm.nih.gov/books/NBK551529/), but a collection of axons extending from the hypothalamus supraoptic and paraventricular nuclei terminating behind the APG (**Pasternak, 2010; Kohler, 1983**). The phylogenetic story of the gastrin family reveals that gastrointestinal hormones indeed are very old, and has evolved from a single ancestor (**Rehfeld, 1998b**). Secretin was believed to exist only as a carboxyamidated peptide of 27 amino acid residues for many years (**Mutt *et al.*, 1970; Mutt *et al.*, 1965**). Hair follicles and sebaceous glands are the targets for androgens secreted by the gonads and adrenal cortex (**Ebling, 1990; Fritsch *et al.*, 2001**) and melanocytes are directly influenced by polypeptide hormones of the pituitary gland (**Suzuki *et al.*, 1996**). Glucocorticoid receptor expressed in basal keratinocytes, Langerhans cells, and dermal fibroblasts (**Serres *et al.*, 1996; Leiferman *et al.*, 1983**); androgen receptor (**Fritsch *et al.*, 2001; Liang *et al.*, 1993; Tadokoro *et al.*, 1997; Lachgar *et al.*, 1999**), and progesterone receptor is expressed in basal epidermal keratinocytes only (**Im *et al.*, 2000**); thyroid hormone receptor (**Torma *et al.*, 1993; Zonefrati *et al.*, 1983**), and estrogen receptor (**Lachgar *et al.*, 1999; Thornton *et al.*, 2003; Crandall *et al.*, 1998; Jee *et al.*, 1994; Haczynski *et al.*, 2002**). It has been recognized

that estrogens are important in the maintenance of human skin (Thornton, 2002) because the skin is also a source of corticosteroids (Gyster *et al.*, 1997). Circulatory testosterone is a co-produced chemical in the skin and other peripheral organs (Orfanos *et al.*, 2000). There is no doubt that human skin is the largest peripheral endocrine organ (Zouboulis, 2004). The objective of this article is to mention the latest number of hormones depending on the chemical composition, same hormones from the different organs/glands, as well as organ systems of the human body.

Materials And Methods

In the college intermediate course of Bangladesh, there are some ideas on human hormones in the Zoology book, but those are not adequate. As a Biology teacher, there was a lacking of clarification about the hormones to the students. Textbook of Medical Physiology by Guyton and Hall (2015), most of the hormones were elaborated there with proper classification and functions. On the internet, a list of human hormones exhibited eighty plus hormones. In addition, all of the hormones mainly have their name/alternative names, secreted parts, chemical composition, and functions. Research articles and books were helpful for the qualitative analyses of chemicals. A quantitative method was applicable for ensuring the exact number of such hormones (Appendix 1).

Results And Discussion

Out of 88 hormones, 65 were in the peptide group, steroid 15 and others (amine and eicosanoid) 4 each (Table 1; Figure 1). Androstenedione is a steroid hormone available in the kidney, testis, and ovary. Dehydroepiandrosterone was second in their position secreted from the same organs (Table 2). Since the 'endocrine system' and 'reproductive system' are different in the human body but based on secreted hormones, these two systems secrete hormones jointly. From here, 56 types of hormones were secreted from these and showed their highest position. The digestive system from which 26 hormones (Table 3; Figure 2) secrete covers many biological activities through supplying the nutrients within the cell.

Table 1. Chemical composition of the hormones

Chemical composition	Name of hormones	Number
Peptide	Brain Natriuretic Peptide, endothelin, thrombopoietin, adiponectin, lepsin, Galanin, Cortistatin, Orexin, Pituitary adenylate cyclase-activating peptide, Prolactin-releasing hormone, Vasoactive intestinal peptide, Somatostatin, Thyrotropin-releasing hormone, gastrin, Ghrelin, Oxyntomodulin, Cholecystokinin, Enterocinin, Gastric inhibitory polypeptide, Glucagon-like peptide I, Enteroglucagon, Secretin, Motilin, Guanylin, Angiotensinogen, Angiotensin I, Hepcidin, Insulin-like growth factor I, Lipasin, Amylin, Pancreatic polypeptide, Glucagon, Insulin, Incretin, somatotropin, Thyroid stimulating hormone, Adrenocorticotrophic hormone, Follicle stimulating hormone, Prolactin, Luteinizing hormone, Lipotropin, Endorphin, Melanocyte stimulating hormone, Oxytocin, Vasopressin, Melatonin, Triiodothyronine, Calcitonin, Parathormone, Atrial Natriuretic Peptide (ANP), Thymosin, Thymulin, Thymopoietin, Thymic humoral factor, Enkephalin, Erythropoietin, Uroguanylin, Renin, Anti-Mullerian hormone, Inhibin, relaxin, human placental lactogen, human chorionic gonadotropin hormone, angiotensinogen II, osteocalcin	65
Steroid	calcidiol, calcitriol, dehydroepiandrosterone, dihydrocholecalciferol, androstenedione, cortisol, aldosterone, testosterone, dihydrotestosterone, estrogen, estradiol, gonadocorticoid, estrone, estriol, progesterone	15
Amine	dopamine, thyroxine, adrenaline, nonadranaline	4
Eisosanoid	thromboxane, leukotrienes, prostaglandin, prostacyclin	4

Table 2. Same hormones from the different portions

Hormones	Glands/Organs	Found in places
Androstenedione	kidney, adrenal cortex, adrenal medulla, testis, ovary	5
Dehydroepiandrosterone	testis, ovary, kidney	3
Estradiol	testis, ovary	2
Estriol	ovary, placenta	2
Estrogen	testis, ovary, placenta	3
Gastrin	stomach, pancreas	2
Gonadocorticoid	testis, ovary	2
Inhibin	testis, ovary, fetus	3
Progesterone	ovary, placenta	2
Ralaxin	decidual cell, prostate gland	2
Somatostatin	hypothalamus, pancreas	2
Thrombopoietin	striated muscle, liver, kidney	3
Vasoactive intestinal peptide	hypothalamus, from duodenum to rectum (gut), pancreas	3

Table 3. Organ system-wise secreted hormones

Organ system/Others	Secreted hormones
Integumentary system	1
Circulatory system	4
Muscular system	2
Nervous system	9
Digestive system	26
Endocrine system + Reproductive system	56
Respiratory system	1
Skeletal system	1
Others (nucleated cells, adipocytes, decidual cells, placenta, fetus)	10

Above 30 peptide hormone genes express more than 100 bioactive peptides, and monoamines and eicosanoids hormonal messenger (**Rehfeld, 1998a**). The gut or digestive system is the largest hormone-producing organ in the body (number of endocrine cells and number of hormones) (**Schultz *et al.*, 1989; Walsh & Dockray, 1994**). A study of the 1960s showed that gastrointestinal hormones could be peptides of 20-30 amino acid residues (**Rehfeld, 1998b**). Hormonal differences between males and females, their body muscles differ (**Guyton & Hall, 2015**).

Conclusions

Our body is composed of many chemicals, and all have a remarkable impact on the body. Identified 88 hormones are not an easy task to know their all functions shortly. Studied hormones have unbelievable acts in our 12 organ systems. Moreover, all nucleated cells, tissue, and tissue system play a significant role as a whole. Hormonal deficiencies have a very negative role in our life. Through the proper

classification of these hormones make us more curious to discover their unseen functions. In the future, it needs to enhance more research on the division of hormones in the human body.

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Figures

Figure 1

Number of hormones corresponding with their chemical composition

Figure 2

Number of hormones depending on the organ systems

Supplementary Files

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