DOWNLOAD PDF THE ENDOCRINE ORGANS; AN INTRODUCTION TO THE STUDY OF INTERNAL SECRETION

Chapter 1 : Full text of "The endocrine organs; an introduction to the study of internal secretion"

Excerpt from The Endocrine Organs: An Introduction to the Study of Internal Secretion The time at my disposal for the lectures precluded anything more than a passing mention of some of the many workers who have contributed to our knowledge of this, the newest, development of physiology; and in republishing, it has not been deemed desirable unduly to extend the' references to literature, seeing.

Gale Edward Schafer was one of the founders of the British school of physiology, which lagged far behind the Germans and French in the latter half of C He studied physiology at University College London and later came under the tutelage of William Sharpey. His reverence for his teacher was such that he changed his name to Sharpey-Schafer later in life as a token of respect. Another reason for the change was that two sons were killed in the First World War and he wished to anglicize his name. He obtained the Chair of Physiology in Edinburgh in and retained it until His most notable discovery was adrenaline, but he made many other contributions including the introduction of a standard procedure for resuscitation after drowning. Diabetologists remember him because he was one of several contemporaries who predicted the existence of insulin in advance of its discovery, and he was also the second person to propose the name of the new hormone. Physiological experimentation was his hobby, and he used his own family as a convenient source of experimental subjects. Having procured some material from the butcher he ground this up and injected it into his small son. It seemed to have an effect on the diameter of the radial artery. Failing to take the hint, Oliver produced the extract from his pocket and waited patiently until the experiment had ended. Further experiments showed the extraordinary potency of the unknown material, which could produce striking changes after injection of less than one millionth of a gram per kilo of body weight. Their results were published in [1]. The substance was purifed by John Abel at Johns Hopkins in , although still contaminated by noradrenaline. It was Abel who opted to call it epinephrine, presumably to distinguish his own efforts from those of other investigators. This unfortunate misnomer has been perpetuated in the USA [2] [3]. Abel was also the first person to crystallize insulin in Takamine, a Japanese investigator, independently extracted a similar compound and sought with Parke-Davis to patent it under the name of Adrenalin the final "e" was dropped to secure the patent. The claim was challenged on the grounds that you cannot patent a natural substance. His cogent and chemically accurate summation contains one of the most famous lines in biotechnology patent history: New York, April 28, , Federal Reporter Judge Hand ruled in favor of Takamine" [4] [5]. Banting and Best initially preferred the name "isletin", but insulin soon became the popular choice. He therefore proposed the term "autacoid" roughly translated from the Greek as "self-remedy" for substances which could both stimulate and inhibit. Furthermore, transplantation of this remnant to another site was sufficient to reverse diabetes. These experiments were supported by histological evidence of islet damage in some cases of diabetes. This led him to the following statement: Provisionally, it will be convenient to refer to this hypothetical autacoid as insuline. It must however be stated that it has yet to be determined whether the active substance is present as such in the pancreas or whether it exists there as proinsuline which becomes elsewhere converted into the active autacoid". It might be an enzyme whose role is to metabolize glucose It might be a "kinase" which converted an inactive glycolytic enzyme into an active one It might be an inhibitor of the breakdown of hepatic glycogen. In the absence of such an inhibitor the liver would no longer be able to store glucose, which would then spill into the circulation. This he considered the more likely alternative. The physiological effects of extracts of the suprarenal capsules. J Physiol ; On epinephrine, the active constituent of the suprarenal capsule and its compounds. British Medical Journal The endocrine organs in health and disease with an historical review. An introduction to the study of internal secretion. Longmans Green, London,

Chapter 2 : The Endocrine Organs

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By the end of this section, you will be able to: Describe the hormones produced by organs with secondary endocrine functions, and their effects In your study of anatomy and physiology, you have already encountered a few of the many organs of the body that have secondary endocrine functions. Here, you will learn about the hormone-producing activities of the heart, gastrointestinal tract, kidneys, skeleton, adipose tissue, skin, and thymus. In response, specialized cells in the wall of the atria produce and secrete the peptide hormone atrial natriuretic peptide ANP. ANP signals the kidneys to reduce sodium reabsorption, thereby decreasing the amount of water reabsorbed from the urine filtrate and reducing blood volume. Other actions of ANP include inhibition of vasodilation and the inhibition of renin secretion and of the renin-angiotensin-aldosterone system RAAS. Therefore, ANP aids in decreasing blood pressure, blood volume, and blood sodium levels. Gastrointestinal Tract The endocrine cells of the GI tract also referred to as enteroendocrine cells are located in the mucosa of the stomach and small intestine. Some of these hormones are secreted in response to eating a meal and aid in digestion. An example of a hormone secreted by the stomach cells is gastrin, a peptide hormone secreted in response to stomach distention that stimulates the release of hydrochloric acid. Secretin is a peptide hormone secreted by the small intestine as acidic chyme partially digested food and fluid moves from the stomach. It stimulates the release of bicarbonate from the pancreas, which buffers the acidic chyme, and inhibits the further secretion of hydrochloric acid by the stomach. Cholecystokinin CCK is another peptide hormone released from the small intestine. It promotes the secretion of pancreatic enzymes and the release of bile from the gallbladder, both of which facilitate digestion. Other hormones produced by the intestinal cells aid in glucose metabolism, such as by stimulating the pancreatic beta cells to secrete insulin, reducing glucagon secretion from the alpha cells, or enhancing cellular sensitivity to insulin. Kidneys The kidneys participate in several complex endocrine pathways and produce certain hormones. A decline in blood flow to the kidneys stimulates them to release the enzyme renin, triggering the renin-angiotensin-aldosterone RAAS system, and stimulating the reabsorption of sodium and water. The reabsorption increases blood flow and blood pressure. The kidneys also play a role in regulating blood calcium levels through the production of calcitriol from vitamin D3, which is released in response to the secretion of parathyroid hormone PTH. In addition, the kidneys produce the hormone erythropoietin EPO in response to low oxygen levels. EPO stimulates the production of red blood cells erythrocytes in the bone marrow, thereby increasing oxygen delivery to tissues. You may have heard of EPO as a performance-enhancing drug in a synthetic form. Skeleton Although bone has long been recognized as a target for hormones, only recently have researchers recognized that the skeleton itself produces at least two hormones. Fibroblast growth factor 23 FGF23 is produced by bone cells in response to increased blood levels of vitamin D3 or phosphate. It triggers the kidneys to inhibit the formation of calcitriol from vitamin D3 and to increase phosphorus excretion. Osteocalcin, produced by osteoblasts, stimulates the pancreatic beta cells to increase insulin production. It also acts on peripheral tissues to increase their sensitivity to insulin and their utilization of glucose. Adipose Tissue Adipose tissue produces and secretes several hormones involved in lipid metabolism and storage. One important example is leptin, a protein manufactured by adipose cells that circulates in amounts directly proportional to levels of body fat. Leptin is released in response to food consumption and acts by binding to brain neurons involved in energy intake and expenditure. Binding of leptin produces a feeling of satiety after a meal, thereby reducing appetite. It also appears that the binding of leptin to brain receptors triggers the sympathetic nervous system to regulate bone metabolism. Adiponectinâ€”another hormone synthesized by adipose cellsâ€”appears to reduce cellular insulin resistance and to protect blood vessels from inflammation and atherosclerosis. Its levels are lower in people who are obese, and rise following weight loss. Skin The skin

functions as an endocrine organ in the production of the inactive form of vitamin D3, cholecalciferol. When cholesterol present in the epidermis is exposed to ultraviolet radiation, it is converted to cholecalciferol, which then enters the blood. In the liver, cholecalciferol is converted to an intermediate that travels to the kidneys and is further converted to calcitriol, the active form of vitamin D3. Thymus The thymus is an organ of the immune system that is larger and more active during infancy and early childhood, and begins to atrophy as we age. Its endocrine function is the production of a group of hormones called thymosins that contribute to the development and differentiation of T lymphocytes, which are immune cells. Although the role of thymosins is not yet well understood, it is clear that they contribute to the immune response. Thymosins have been found in tissues other than the thymus and have a wide variety of functions, so the thymosins cannot be strictly categorized as thymic hormones. Liver The liver is responsible for secreting at least four important hormones or hormone precursors: Insulin-like growth factor-1 is the immediate stimulus for growth in the body, especially of the bones. Angiotensinogen is the precursor to angiotensin, mentioned earlier, which increases blood pressure. Hepcidins block the release of iron from cells in the body, helping to regulate iron homeostasis in our body fluids.

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