

The Endocrine System

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By Dr. Derek Conte

How does the body regulate and balance itself from minute to minute, hour to hour and month to month? What is it that allows the food we eat to be utilized for growth, healing and energy? What causes the female egg to drop each month or a mother's milk to flow? The answer is the **endocrine system**, which is comprised of the **hypothalamus, pituitary gland, pineal gland, thyroid** and **parathyroid glands, thymus gland**, the **adrenals, pancreas, ovaries** and **testes**. The brain signals these specialized glands to release **hormones** to initiate essential chemical actions that sustain life.

The word "endocrine" literally means "to cry inside" and that is exactly what happens when the endocrine system works. An example is **growth hormone (GH)** or **somatotropin**, responsible for growth and tissue repair. During exercise or when we have low blood sugar or high blood amino acid levels, the **hypothalamus** leaks ("cries") **growth hormone releasing hormone (GHRH)** through very small vessels into the **anterior pituitary gland** which then leaks **growth hormone** into the general circulation, acting on cells for growth or replacement of old or damaged tissues. Pro ballplayers looking for an edge have been using growth hormone. The hormone that shuts this process off is called **growth hormone inhibiting hormone (GHIH)** or **somatostatin ("growth stop")**, released when blood sugar levels are high. If there ever is an excess of growth hormone, it can result in gigantism or acromegaly depending on whether its onset occurred before or after the growth plates in the bones have closed around the age of 17.

Another example, the **thyroid**, involved in energy regulation, has an extra step. When energy use in the body decreases, the hypothalamus leaks **thyroid releasing hormone (TRH)** through the same small arteries to the anterior pituitary gland which then leaks **thyroid stimulating hormone (TSH)** into the general circulation striking its **target organ**: the thyroid. The thyroid then releases hormones **T3** and **T4** into the blood, increasing the metabolic rate of cells, providing more energy. Good sources of iodine, such as sea salt, are vital to the proper function of the thyroid gland. When deprived of iodine people can develop bulging goiters in the throat to try to grab more iodine. There are autoimmune disorders such as Graves disease, where causes too much T3 & T4 production, or Hashimoto's disease, where too little T3 & T4 is produced.

The brain assesses the status of the body and makes necessary corrections chemically from the hypothalamus to the pituitary to the target organs which leak hormones into the bloodstream to change behavior in the body's cells. This automatic regulation is known as **homeostasis**.

But if there are so many hormones freely released in the circulation, like swarms in Times Square on a busy day, how is it that they know to strike only the "target organ"? Each hormone has a different chemical makeup and a very specific shape that only fits the intended target organ's lock. Drugs really cannot be this specific and this is why they cause a panoply of side-effects. Again we witness the primacy of the brain in control over the body. The best way to maintain good health is to promote normal, drug-free function. Nature always does it best.

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