Another popular theory of aging is the Neuroendocrine Theory of Aging, first developed by Dr. Vladimir Dilman, Ph.D. in 1954 for a Master’s thesis. Dilman was a scientist working at the Petrov Institute of Oncology in Saint Petersburg, Russia. (Oxygen, 2008) Another major contributor to the theory was Dr. Ward Dean, MD. Dean earned his degree while serving in Korea, at Han Yang University College of Medicine in Seoul. (Dean, 2003)

The Neuroendocrine Theory of Aging is so named because the neuroendocrine system plays a very important role. The neuroendocrine system serves as a link between the nervous and endocrine systems, and consists of the hypothalamus, the pineal gland, and a few other structures. The neuroendocrine system controls a complex network of biochemicals that help to regulate the body. This is done primarily through the production and release of hormones, which control many functions. (Liu, 2006)

The most important element of the neuroendocrine system is the hypothalamus. The hypothalamus controls hormone levels throughout the body using feedback loops. There are two types of feedback loops: negative and positive. A negative feedback loop senses change in some value away from a set point, and then works to reverse the change to bring the vale back to that point. A positive feedback loop causes the change to continue in the direction it is moving. The hypothalamus mostly uses negative feedback loops to keeps certain functions, such as body temperature, hunger, sex drive, sleep, and thirst, at ideal values. When hormone levels are increased in one area of the body, this triggers mechanisms to increase levels of the same hormones in adjacent areas. Conversely, lower hormone levels in one area lead to lower hormone levels elsewhere. (Dean, 2009)

Most of the time, the hypothalamus does not release the necessary hormone itself, but instead secretes hormones that stimulate the release of the desired hormone elsewhere in the body. The hormones are known as hypothalamic-releasing hormones. It is in this way that the hypothalamus helps the body to maintain homeostasis. Homeostasis is the regulation of the body’s functions, such as heart rate, blood pressure, and body temperature, among other things, to within a range of values. (Ropper, 2007)

The body of a younger person shows significantly higher levels of hormones compared to an older person. The body also becomes less sensitive to these hormones, and the hypothalamus becomes less precise in its regulation. One important way in which low hormone levels can lead to aging is the absence of growth hormones, which regulate muscle mass. As a result, muscle mass is decreased, and bodily functions suffer. Other hormones regulate self repair, and so this ability is lost with lower hormone levels.

One theory posits that artificial supplementation of the hormones found lacking in the body would prevent some of the effects of aging. This is known as Hormone Replacement Therapy. Many studies have been performed testing the effects of hormone supplementation, with some finding positive results, and others finding the replaced hormones to have the same effect as the placebo. It is still not clear whether or not Hormone Replacement Therapy is a valid anti-aging therapy.

One of the few hormones known to increase with age is cortisol, which is frequently linked to stress. Cortisol is also known to cause suppressed thyroid function, hyperglycemia, decreased bone density, decreased muscle mass, higher blood pressure, lowered immune response, and increased abdominal fat. Cortisol is also known to cause damage to the hypothalamus, leading to decreased ability to monitor hormones. This damage can also cause the hypothalamus to produce more cortisol, in turn causing more damage. (Ropper, 2007)

More recent research indicates that the hypothalamus may actually be controlled by the pineal gland. The pineal gland’s primary purpose is to synthesize and excrete melatonin into the body. The pineal gland regulates the sleep cycle by releasing more melatonin at night. Decreased pineal gland function, and specifically lower melatonin levels, is known to occur with age. This can result in trouble falling asleep, leading to fatigue during the day. (Ropper, 2007)

Bibliography:

Aron David C, Findling James W, Tyrrell J. B, "Chapter 5. Hypothalamus & Pituitary Gland" (Chapter). Gardner DG, Shoback D: Greenspan's Basic and Clinical Endocrinology, 8th Edition: <http://www.accessmedicine.com/content.aspx?aID=2628445>.

Dean, Ward (2009). Neuroendocrine Theory of Aging: Retrieved April 16, 2009, from Vitamin Research Products Web site: <http://www.vrp.com/articles.aspx?page=LIST&ProdID=144&qid=&zTYPE=2>

Dean, Ward (2003). Welcome to WardDeanMD.com. Retrieved April 16, 2009, from WardDeanMD.com Web site: <http://www.warddeanmd.com/>

Liu, C; Michaud, J, (2006, March 28). The Neuroendocrine System. Retrieved April 16, 2009, from Carnegie Institution Department of Embryology Web site: http://www.ciwemb.edu/labs/fan/neuro.html

Oxygen Free Radicals and Aging. (2008). Retrieved April 16, 2009, from Intelegen, Inc. Web site: http://intelegen.com/nutrients/free\_radicals\_and\_aging\_1.htm

Ropper AH, Samuels MA, "Chapter 27. The Hypothalamus and Neuroendocrine Disorders" (Chapter). Ropper AH, Samuels MA: Adams and Victor's Principles of Neurology, 9th Edition: <http://www.accessmedicine.com/content.aspx?aID=3634491>.