Biology of Functions

Being physiologically balanced is like trying to walk on a tightrope. You are usually teetering to one side or the other while trying to stay upright. Most imbalances tend to be minor, but a few are clearly significant. Often, in correcting the major imbalances, the minor imbalances will be able to correct themselves.

It is important to understand that what causes the breakdown of our body functions. Much of what causes this is suggested by the functional activity of the hormones at the cellular level. Let's review some of the different hormones which relate to the biology of your body functions. To find out what your individual hormone levels are, this is done by obtaining lab work in determining high or low levels in hormones. There are also other outward signs from the body, such as hair, scalp, and skin and symptoms which can also give indications of these hormonal imbalances, as well as oxidative stress and inflammatory conditions. This is a brief outline as to some of these hormones and their functions for our health and well-being.

Adrenal Cortex

The adrenal cortex expresses the level of general endocrine activity of the adrenal gland. The adrenal cortex makes several hormones that are instrumental in your ability to adapt to various kinds of stress. It is the source of cortisol. It is also the source of precursors for other hormones that are modified elsewhere in the body. So the adrenal cortex needs to be in balance in order for you to optimally deal with stress, and for your other endocrine glands to function.
If the adrenal function is high, it suggests that you adrenal cortex is under increased demand due to perceived stress or due to need of other endocrine glands to have precursor hormones. If it is high due to ongoing stress, it will eventually lose its reserve and begin to fail.
If the adrenal function is low, it suggest that you adrenal gland has been over-taxed by perceived stress and is beginning to fail. This failure lead to feelings of fatigue and impaired immune function. It also leads to malfunctions of other endocrine glands due to lack of precursor hormones.

Note: Steroid drugs may influence this hormone.

Circulating Cortisol

Circulating Cortisol indicates the amount of cortisol secreted by the adrenal cortex, especially during times of stress or adaptation. Cortisol is the hormone of adaptation. It is important in sustain blood sugar and blood pressure in reducing the inflammatory response. Cortisol is produced by the adrenal gland.

If the Circulating Cortisol is high, it suggest that you adrenal gland is being solicited due to an increase in stress. Stress can be real or perceived, mild or severe. For example, an anxious person will feel stress even if there is no change in the environment, and this will solicit an increase in cortisol production from the adrenal glands. A minor change in environment (such as walking outside for few minutes on a cold sinter day) will also trigger an increase in adrenal cortisol production. High cortisol production reduces immune function, raises blood sugar, and blood pressure, and contributes to upper abdominal weight gain.

If the Circulating Cortisol is low, it suggests that you adrenal gland has become exhausted by ongoing demands, and is beginning to fail. Your body can no longer stress-even the minor stress that comes with getting out of bed in morning. Fatigue, low blood pressure, low blood sugar, and chronic inflammation can result.

Progesterone

Progesterone levels in your body, and or the other female hormone, as it is made in large amounts by the ovarian follicle after ovulation and by the placenta during pregnancy. More importantly, progesterone is a precursor to all the major adrenal and gonadal (testicular/ovarian) hormones. In women, progesterone is very important in balancing estrogen, maintaining uterine and breast healthy, preparing for normal menstruation, and sustain pregnancy.

If the progesterone is too high, it suggests a high demand by the body for other hormones that are derived from progesterone or relative estrogen dominance. This can result in failure to ovulate, failure to conceive, premenstrual syndrome, menstrual irregularities, heave bleeding, breast tenderness, and mood disturbances.

If the Progesterone is low, it suggests a low demand for progesterone due to insufficient estrogenic activity or excessive androgen production. This can result in menstrual irregularity, headaches, and mood changes.

Estrogen

Estrogen affects the endocrine functions and metabolism of your body. Estrogen is the main "female" hormone, since women tend to make more estrogen than men. However, men also make estrogen-enough to meet their tissue-building needs. Estrogen plays an important role in turning on your genes that is instrumental to life, but is also very promotional of cancers. If Estrogen is high it suggests that your body is responding as if there is an excess of estrogen available to it. Estrogen comes from a number of tissues. It is primarily made by the ovaries or the placenta (during pregnancy), but is also made by fat tissues from the androgen precursors. Excess estrogenic response will result in a number of features such as fat deposition around the hips, thighs, and breast. High estrogen will result in an increase in certain proteins from the liver, including blood clotting factors and proteins that will bind other hormones (and therefore make those hormones less active). Estrogen prevents bone tissue from being destroyed. If cancer is present, even in the earliest stages before the cancer is detected, the estrogen tends to turn on the genetic machinery that allows the cancer to grow (even cancers that are not (estrogen-sensitive). Therefore, high estrogen has its risks. Low levels suggest that your body is lacking stimulation from estrogen. This is usually due to a low production of estrogen from ovaries and fat tissue. Low estrogen results in an increase of other hormones. In particular, the effects of androgens (body hair and acne) are more prominent when estrogen is low. Low estrogen also results in loss of bone density, mood disturbances, and decline in brain function.

Androgens

Androgens are considered "male hormones" due to the male characteristics that they produce. Testosterone is the best known androgen, and this mostly produced by the testicles (in men) and the ovaries (in women). The adrenal gland makes several additional androgenic hormones which can be converted into testosterone in other tissues. Testosterone exerts its effects on body hair, sebaceous glands, muscles, and blood cells. High androgens will result in increased facial and body hair, strong muscles, and acne.

Thyroid

Thyroid hormone regulates you metabolism, sometimes referred to as the master gland. The thyroid gland produces a thyroid hormone (T4) which is turned into (T3) in peripheral tissues. These hormones regulate the metabolic rate of cells and promote catabolism (the breaking down of tissues in order to provide energy to the body).
If the Thyroid is over-stimulated by thyroid hormone, even if your blood levels of thyroid hormone are in the normal range (your cells might just be more sensitive to the thyroid hormone that is presented to them). Thus, there will be an increase in the catabolism in you cells. Increase catabolism often result in excess of free radicals which can be damaging to healthy tissue. It can also result in a loss of bone density leading to osteoporosis. In addition, increased thyroid activity stimulates the beta sympathetic nervous system and this can result in hyperactivity, nervousness, high blood pressure, and irritability. Increase sympathetic nervous activity will then increase the demand on your adrenal gland, contributing to adrenal exhaustion.
If the thyroid gland is low and it is not making enough thyroid hormone or that your peripheral tissues are not converting T4 to T3- or that you cells are not adequately receptive to the effects of thyroid hormone. As a result, your body is not able to catabolize adequately, and thus it essentially operates as if it is starving for energy. Fatigue and poor tissue organization/structure result (brittle nails, brittle dry hair, dry fragile skin).

Prolactin

Prolactin is known as the “breast-milk” hormone because its levels increase at the end of pregnancy and with breast-feeding in order to increase milk production. It is secreted primarily by the pituitary gland in the brain. Prolactin is also increased at times of stress due to a rise in TRH (thyrotropin-releasing hormone-produced by the hypothalamus of the brain). In general, prolactin increases insulin resistance, fat break-down and Vitamin D activity. It inhibits apoptosis (a process of natural cell death that is important in halting cancerous growth). Prolactin also plays a role in post-orgasmic sexual satisfaction.
If there is an excess of stress-induced TRH or a deficiency in dopamine (which reduces prolactin) then high prolactin will interfere with normal ovulation and menstrual function in women. The increase insulin resistance caused by prolactin can be an issue for people with diabetes or insulin resistance. The reduction in apoptosis caused by elevated prolactin creates a cause for concern in cancer-prone people. High prolactin may result in reduced sexual interest and /or impotence.

If prolactin is low, fat accumulation and vitamin D deficiency could result. Lack of insulin resistance from low prolactin can result in excess free radicals.

Growth Hormone

Growth hormone, also known as somatotropin is synthesized and secreted by cells in the anterior pituitary. It has direct effect such as stimulating fat cells to break down triglycerides, and indirect effects such as stimulatin the live and other tissues to release insulin-like growth factor-I (IFG-1). Growth hormone stimulates protein anabolism (building) in many tissues. It induces insulin resistance and serves to maintain blood glucose with a normal range. Increased levels of Growth Hormone have been touted as the "the fountain of youth," it can also cause metabolic disorders and stimulate or promote cancers if its activity is increased.
Low levels of Growth Hormone activity causes changes that are associated with the normal aging process: decrease in lean body mass, increase in abdominal and total body fat, decrease in muscle strength and bone density.

Insulin

Insulin is secreted by islet cells within the pancreas. After a meal, sugars are absorbed from the intestines into the blood stream. The pancreas then secretes insulin in response to the detected increase in blood sugar. Insulin binds with receptors on cells much like a key fits into a lock, thereby opening the "door" allowing glucose to enter and be converted to energy or stored for future use in the form of glycogen in the liver or muscle cells. Insulin is essential to life. Without it, you could eat plenty of food and actually be in a state of starvation since most cells cannot metabolize sugar without its action. Type 1 diabetics do not make insulin are therefore obliged to replace it with shots or and insulin pump.

Insulin Resistance

Insulin resistance is characterized by the failure of insulin to stimulate normal glucose uptake into target tissues. Wen insulin resistance exists, the body compensates by secreting more insulin from the pancreas. Eventually the pancreas may fail to keep pace with the increased insulin demand resulting in Type II diabetes.

If insulin is high, it suggests that your cells do not easily allow glucose to enter. Genetic predisposition, excess body weight, lack of exercise, meal skipping, and a diet high in simple sugars and lacking in fiber may contribute to insulin resistance. It often occurs concurrently with abnormal cholesterol levels, high blood pressure, and upper body obesity which are all risk factors for cardiac disease.
If the insulin is low, it suggests that sugar is able to enter cells too easily. This may result in hypoglycemia and excessive free radical production as cells are continually forced to "burn" the excess glucose. Low insulin resistance may also promote cancer as cancer cells metabolize glucose at an accelerated rate compared to normal cells.

Free Radicals

Oxygen (O2) molecules contain pairs of electrons. During oxidation (burning) of glucose in you cells for energy, the oxygen molecules separate into two individual oxygen atoms which become free radicals. Free radicals possess at least one unpaired electron which makes them unstable and highly reactive with other molecules. They are generated by normal metabolism, air pollutants, sunlight, cigarette smoke, pesticides, certain drugs, chemotherapeutic agents, inflammation, injury, etc. If free radical are not help in check by the body's built-in antioxidant defenses, their numbers can snowball causing serious oxidative damage. Free radical damage to cell membranes, serum lipoproteins, proteins, and DNA can lead to fatigue, muscle pain, heart disease, accelerated aging and promotion of cancer. It is easy to see why free radicals have come to be known as "villains". In controlled numbers, however, free radicals are necessary to life. White blood cells use free radicals to fight infection, they are generated by the liver's Phase 1 detoxification system and during energy productions. The goal is to achieve a balanced level of antioxidant and free radical activity in the body.

Histamine

Histamine is the main component in the allergic response. At the tissue and cellular level, excess histamine dilates blood vessels, constricts airways in the lungs, and call in chemicals that cause excess fluind to leave the blood vessels and enter soft tissues. The result is vascular congestions and swelling of tissues. As a part of you immune defense system, histamine is important for assisting your body's defense against foreign proteins, but

when activity is elevated beyond normal physiologic functions, allergic symptoms such as congestion and tissue welling become problematic. Histamine is important in maintaining alertness and increasing secretion of stomach acids. It also plays role in the sexual response.
High levels of histamine may be playing a role in swelling, nasal congestion, asthma, organ or tissue congestion, or insomnia. This can result in high exposure to foreign proteins such as plant pollens, animal dander, or even certain food proteins that you immune system has learned to recognize as a threat. These food reactions can either be immediate, and or delayed reactions.
Low levels suggest your body has an increased susceptibility to infection, toxins, and cancer. Dietary lack of foods high in L-histidine (an amino acid), histamine, or folic acid and thiamine may be also playing a role in low histamine levels.

Inflammation

A balanced immune response is necessary to eliminate abnormal substances such as virus, bacteria, and fungi, as well as abnormal tissue from your own body. The inflammatory response is the first component of the immune response. It leads to tissue congestion, heat, and pain, in an effort to cleanse, repair and protect the involved tissue. Numerous chemical and immune cells (neutrophils, macrophages, T-cells, B-cells, monocytes) are involved in the inflammatory response.
High or chronic inflammation can be the result of poor adrenal capacity, elevated body mass (obesity), genetics (autoimmune disorders), and environmental triggers such as inhaled chemicals or an inflammatory diet. High inflammation leads to the destruction of healthy tissue through free radicals and other mechanisms. It is associated with and increased risk for degenerative diseases such as arthritis, heart disease and cancer.