

Hormones and Brain Injury: Did Junior Seau Suffer From Pituitary Dysfunction?

Recently there has been an increased awareness of the poor health of many former NFL players. The world was saddened by the suicide of Junior Seau on May 2, 2012, which follows the suicides of other former players, including Dave Duerson and Mike Current. The cause of the suicide of these players is currently unknown but could be related to the repeated head trauma NFL players suffered during their playing careers. What is not widely known is that head trauma is very strongly associated with pituitary dysfunction. In fact, up to half the patients with traumatic brain injury suffer from some type of pituitary dysfunction. The pituitary is the master gland located at the base of the brain that controls many important hormones. The reason the pituitary is affected in head trauma is that the pituitary is a small gland connected to the rest of the brain by its stalk and is located in a bony structure at the base of the brain called the sella. The sella protects the pituitary; however, when the brain is jarred after a concussion, the brain moves but the pituitary stays in place. This stretches the stalk connecting the brain and the pituitary. When the stalk is stretched it is no longer able to send the proper signals from the hypothalamus to the pituitary and the pituitary no longer secretes hormones properly.

There is a discrete order of pituitary hormones that are affected by pituitary dysfunction as a result of the head trauma that leads to hypopituitarism. The first hormone affected is growth hormone followed by the gonadotropin hormones, LH and FSH, which regulate a woman's periods and a man's testosterone level. The third hormone to be affected is the TSH that regulates the thyroid hormones. ACTH, which regulates the release of cortisol from the adrenal gland is rarely affected.

Growth hormone deficiency with traumatic brain injury is quite common and is thought to be present in 20-50% of the patients with traumatic brain injury. Growth hormone deficiency in adults has multiple manifestations including effects upon mental health with a high incident of depression and general dysfunction and unhappiness. Depression on a pituitary basis has been described as apathetic depression and usually does not respond to typical antidepressants like selective serotonin reuptake inhibitors (SSRIs); however, it does often respond to stimulants such as Ritalin. Because the depression due to hypopituitarism is somewhat different from classical depression, it is often not noticed in patients with brain injury and if noticed, it is often mistreated. I postulate that some patients with apathetic depression due to hypopituitarism may self-medicate with stimulants to try to treat their depression. If they do not get treated, and the "macho" self-image of many former football players may lead them not to get treatment, then suicide may occur.

Growth hormone deficiency also leads to cardiac dysfunction including heart failure. Many former NFL players suffer from heart problems. Growth hormone deficiency also leads to osteoporosis and poor muscle mass, poor sleep and severe muscle aches and pains which may be misdiagnosed as fibromyalgia. Growth hormone deficiency is often hard to recognize and involves a 2-step testing process. In the first step, a hormone called IGF-1, which is made by the liver on stimulation by growth hormone, is measured. IGF-1 has a wide normal range; however, if the IGF-1 is in the low normal range or below the normal range, it is then followed by a second set of testing which involves a stimulation test that assesses how well the pituitary secretes growth hormone upon stimulation. A commonly used stimulation test is the glucagon

stimulation test and this acts by stimulating the pituitary to make growth hormone. A blunted growth hormone response to glucagon indicates growth hormone deficiency. If the patient is diagnosed with growth hormone deficiency due to a pituitary problem, then growth hormone treatment that involves a subcutaneous shot given once a day (often before bedtime) is recommended. Patients treated with growth hormone can often have dramatic improvement in their symptoms including depression, sleep problems and joint pain; therefore, it is imperative for the patient with head trauma to be properly diagnosed with growth hormone deficiency and to be treated.

The second most common hormonal defect from traumatic brain injury is testosterone deficiency that is also called hypogonadism and affects many men throughout the country. Additionally women can also be affected by a low testosterone. In both cases, patients experience low libido. Men have trouble with erections as well as muscle weakness and fatigue. In men, hypogonadism is assessed by measuring morning free and total testosterone levels and if these levels are below the normal range, the patient likely has hypogonadism. This should be confirmed by a second low level. It is then recommended to measure the pituitary hormones, LH and FSH, and if they are low, it indicates pituitary source for hypogonadism, and if they are high, it indicates testicular source for hypogonadism. The assays for testosterone in women are not quite as good as that for men, but woman can also be diagnosed with hypogonadism if they have a low testosterone in a good assay. In men, testosterone replacement is with testosterone gels, patches or injection. In women, testosterone replacement is usually with a compounded cream.

The next hormone affected in patients with pituitary dysfunction due to traumatic brain injury is thyroid hormones and patients with hypopituitarism have what is called central hypothyroidism and will have both a low free T4 and a low TSH. In the context of hypopituitarism, low levels of free T4 and a low TSH can be used for the diagnosis. The treatment is thyroid hormones, which can either be either T4 alone that could be medicines such as Levothyroxine, Levoxyl or Synthroid, or a combination treatment with levothyroxine plus medicines like Cytomel or Armour, that is desiccated pig thyroid.

To summarize, hypopituitarism in patients with traumatic brain injury is underdiagnosed and may be a source of multiple problems. We urge the NFL to start screening former NFL players for hypopituitarism and measuring the hormones that we discussed in this article. For more information about hormonal conditions or to schedule an appointment, go to www.goodhormonehealth.com.