

Incidence of Insulin-Like Growth Factor-1 and Growth Hormone Deficiencies in a Postacute Brain Injury Rehabilitation Facility

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BACKGROUND & SIGNIFICANCE:

Posttraumatic hypopituitarism is an often, undetected consequence of traumatic brain injury (TBI). The symptoms of posttraumatic hypopituitarism overlap considerably with deficits commonly observed in patients with TBI. Symptoms include fatigue, decreased lean body mass, increased abdominal adiposity, reduced exercise capacity, memory impairments, inability to concentrate, anxiety and depression. Untreated insulin-like growth factor-1 (IGF-1) and growth hormone (GH) deficiencies can negatively influence recovery from brain injury, even if the patient is undergoing intensive brain injury rehabilitation (Bondanelli et al, 2007). The objective of this study was to investigate the incidence of untreated, posttraumatic hypopituitarism in patients admitted to a postacute brain injury facility.

METHODS:

Patients:

▪N=124 adults with mild, moderate or severe TBI admitted to CNS-Bakersfield from August 2008-August 2009.

Procedures:

▪After an overnight fast, venous blood levels of :Thyroid stimulating hormone (TSH), Triiodothyronine (T3), Thyroxine (T4), Follicle stimulating hormone (FSH), Luteinizing hormone (LH), Estrogen (females only), Testosterone total (males only), Prolactin, Cortisol (A.M. and P.M.) and Insulin-like growth factor 1 (IGF-1) were sent to a laboratory for analysis.

▪Growth hormone (GH) levels are cyclical, making direct measurement difficult.

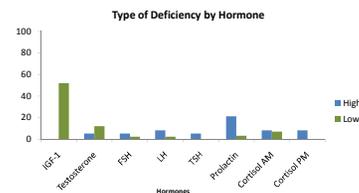
▪IGF-1 is the best marker of GH action available (Freda et al, 1998). Low levels of IGF-1 increase the likelihood that GH levels are also deficient. However, 50% of adults with GH deficiency have IGF-1 levels in the normal reference range (Lissett et al, 2003).

▪Glucagon stimulation tests (GST) were conducted on patients whose IGF-1 levels were less than 200 ng/ml. Patients whose IGF-1 levels were below 100 ng/ml were referred to an endocrinologist for treatment (no GST was performed).

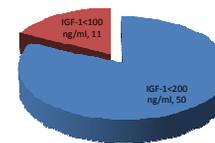
▪The GST provokes GH to reach its peak level within the four-hour testing period, allowing reliable GH measurements to be taken.

RESULTS:

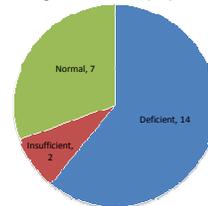
49% of adults with TBI had untreated hormone deficiencies at CNS admission.



IGF-1 Deficiency Breakdown



Glucagon Stimulation Test (GST) Results



- N=61 patients with hormone deficiencies
 - Males=49
 - Females=12
 - Average age=44 years
 - Latency from TBI to admission=361 days

▪N=11 patients with IGF-1 less than 100 ng/ml (referred to endocrinologist—considered GH deficient)

- N=50 patients with IGF-1 less than 200 ng/ml
 - N=11 Diabetic, medical conditions that precluded GST, refused
 - N=12 Discharged from facility prior to GST
 - N=4 GST pending
 - N=23 GST performed

Glucagon Stimulation Test (GST) Results:

- N=14 GH deficient (peak GH<3ug/L)
- N=2 GH insufficient (peak GH 4-5ug/L)
- N=7 Normal levels of GH

DISCUSSION & CONCLUSIONS:

▪There is a high incidence of untreated IGF-1 and GH deficiencies in postacute brain injury rehabilitation settings.

▪Hormone replacement therapy has the potential to improve outcome following brain injury. Patients who have received GH replacement demonstrate decreased abdominal adiposity, increased alertness, increased cognitive processing and greater quality of life.

▪Screening for post-traumatic hormone deficiencies needs to become part of the standard clinical care for patients with brain injury. Multidisciplinary collaboration between case managers, endocrinologists, neurosurgeons, psychologists and rehabilitation professionals is essential in order to maximize the potential for recovery following brain injury.