



Neurosteroidal Treatment *for* Traumatic Brain Injury

The insidious damage caused by **traumatic brain injury** has emerged from the shadows and is receiving the medical focus it requires.

Much of this change has occurred due to two of the main victims of traumatic brain injury—soldiers returning from the wars in Iraq and Afghanistan and impact sports that include football and boxing.

Of course, civilians also incur traumatic brain injury from automobile accidents, falls, and assaults. According to the Centers for Disease Control, **3 to 5 million** Americans are living with traumatic brain injury related disability.¹

Current medical practice has little to provide these victims who may go on to suffer cognitive problems ranging from dizziness and headaches to depression and dementia throughout their lifetime.

One visionary physician, Mark Gordon, MD, has successfully treated both veterans and civilians with traumatic brain injury by restoring neurosteroid levels.

Working with veterans who have sustained significant combat injuries to the brain, Dr. Gordon has restored wholeness to their lives. Hopefully, his innovative work with neurosteroids will find its way into mainstream medicine to help the millions suffering with traumatic brain injury.

In February, the United States Office of Naval Research announced its support of university research that appears to explain how shock waves cause **traumatic brain injury**. Energy waves cause tiny bubbles, or “microcavitations,” to form, pop, and disappear so quickly that they can’t be detected by brain-imaging—but can seriously unbalance an array of cellular pathways.² The result is a spectrum of neurological conditions that are currently difficult to treat through standard therapies.

This unbalance of cellular pathways has been successfully treated by interventional endocrinologist Dr. Mark Gordon. His approach recognizes that disrupted neurosteroidal function—not simply physical brain damage—creates traumatic brain injury’s neurological deficits.³⁻⁵

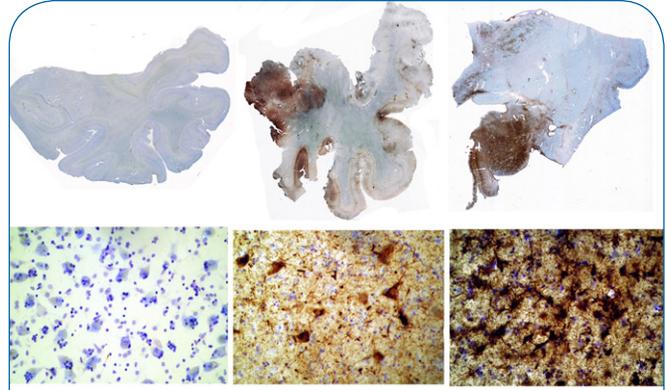


Dr. Mark Gordon

By restoring neurosteroids levels, Gordon successfully treats the depression, outbursts, anxiety, and mood swings commonly suffered by traumatic brain injury patients.

This condition constitutes an unrecognized epidemic. The nearly 1.7 million Americans afflicted annually¹ include accident victims, construction workers, fall-prone individuals, and athletes. Traumatic brain injury is the leading cause of trauma-caused disability and of brain damage in children and young adults.⁶⁻⁸

Unfortunately, the government is slow to accept the link between traumatic brain injury and neurosteroid deficiencies, and many veterans are instead treated for post-traumatic stress disorder. Thanks to innovative therapy, growing numbers of veterans and others are getting their lives back on track.



Brain tissue images with tau protein deposition (brown).
 Left: normal brain. Middle: former football player.
 Right: former boxer.

Traumatic Brain Injury Often Goes Untreated

Soldiers’ body armor can withstand bomb shrapnel. But armor cannot protect them from an invisible but devastating threat—the blast wave.

“Shock waves travel faster than sound,” says Dr. Timothy Bentley, program manager in the Warfighter Performance Department at the Office of Naval Research, “...energy waves can cause subtle yet damaging effects on the brain.”²

The Office of Naval Research is supporting research at the University of Texas at Arlington focused on the idea that shock waves cause energy-packed bubbles—under 1/25th of an inch (one millimeter) across—to form and pop so quickly that they damage surrounding cells and tissue while remaining undetectable via magnetic resonance imaging or scans.²

This research may explain why so many traumatic brain injuries often go untreated.

Brain-synthesized steroid hormones—*neurosteroids*—regulate neuron growth, myelination, and formation of synapses between neurons in the nervous system (synaptogenesis).⁹

Neurosteroid dysfunction can trigger depression, anxiety, panic attacks, phobias, psychoses, and frequently, suicide. Neurosteroids also regulate neuroactive steroids in glands throughout the body.¹⁰

Shock waves—without causing physical brain damage—can disrupt neurosteroid production and, consequently, body-wide hormonal balance. How? Through secondary injury processes that occur after initial injury.



Secondary Effects

Traumatic brain injury patients can suffer broad effects, often appearing decades later.³ Conventional medical treatment seldom achieves substantial recovery, and these symptoms can become extremely disabling.⁴

Often, there is both primary and secondary injury.¹¹ Primary injury occurs at time of injury and is considered irreversible.¹²⁻¹⁴ However, complex secondary mechanisms crucially affect the delayed progression of brain damage—presenting unique opportunities for therapeutic strategies. One secondary process potentially promoting latent neuronal death is post-traumatic inflammation, which increases blood-brain barrier permeability, resulting in cerebral edema, intracranial pressure, and neuronal dysfunction.¹⁴

Some of the 330,000 soldiers afflicted in the past 15 years with traumatic brain injury from blast waves seem to have recovered initially, but studies suggest that many suffer lingering cognitive problems.¹⁵

What Dr. Gordon has discovered is that traumatic brain injury symptoms are often caused by neuro-steroid hormone deficiencies.

Multiple Imbalances

Studies demonstrate that **hypopituitarism**—where the pituitary gland fails to produce normal hormone levels—is relatively common following traumatic brain injury.^{5,16-18} Sometimes, however, hypopituitarism is not diagnosed for over 20 years post-injury.¹⁹

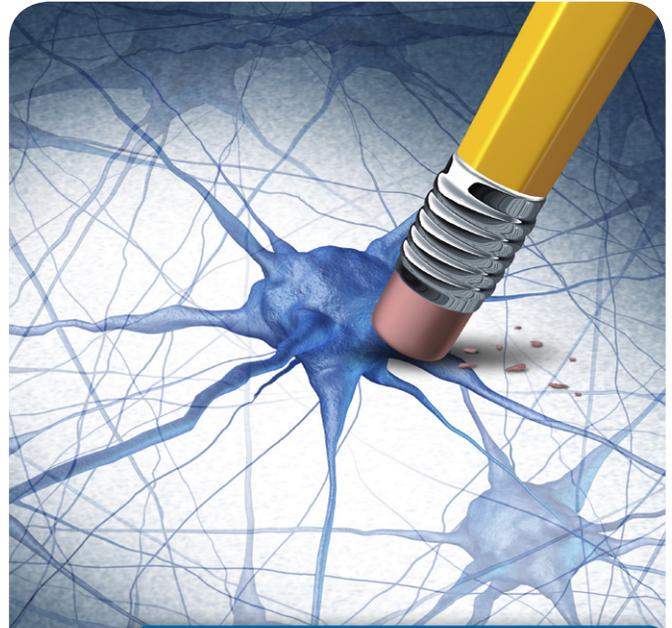
Many traumatic brain injury patients have a growth hormone deficiency, exhibiting greater deficits in attention, executive functioning, memory, and emotion than patients with normal levels.²⁰ Growth hormone binds to brain receptors that are especially dense in regions responsible for learning and memory^{21,22}—perhaps explaining why declining levels are associated with poorer cognition.

Critically, growth hormone increases survival of damaged nerve cells and promotes nerve tissue regeneration.^{23,24} It increases body-wide receptors for other hormones, helping overcome the effects of their deficiencies.²⁵⁻²⁷

Growth hormone levels fall with age and are especially low in Alzheimer's disease,²⁸⁻³¹ the symptoms of which often mirror traumatic brain injury symptoms.

Other hormones are also closely related to cognitive stability. These hormones can function directly as neurotransmitters in the central nervous system.³² At least **16%** of long-term traumatic brain injury survivors develop hypogonadism, meaning that male testes or female ovaries produce insufficient sex hormone levels. However, these deficiencies are not identified or treated in most individuals.⁵

Sex-hormone insufficiency doesn't simply relate to sexual desire. Whether due to traumatic brain injury or aging, low sex-hormone levels are increasingly linked to dementia. Age-related sex-hormone declines significantly contribute to Alzheimer's risk.³³ In a study involving over 500 aging men and women, optimum **testosterone** levels were linked with better cognitive performance.³⁴ Other studies concluded that testosterone levels are positively associated with multiple aspects of cognition.^{35,36}



What You Need to Know

Treatment for Traumatic Brain Injury

- Shock waves leave millions of traumatic brain injury victims physically, emotionally, and cognitively impaired.
- Mainstream medicine offers little to treat these pathologies, frequently misdiagnosing them as post-traumatic stress disorder.
- Dr. Mark Gordon found that traumatic brain injury damages the hypothalamus and triggers pituitary dysfunction. He treats patients by restoring neuro-steroid deficiencies..
- Many patients are experiencing compelling success with Gordon's innovative therapy.

Recovery of patients with traumatic brain injury is greater in those with higher testosterone.³⁷ “For traumatic brain injury patients,” says Dr. Mark L. Gordon, “*any proper diagnosis and treatment protocol should begin with baseline testing of testosterone, growth hormone, thyroid, cortisol, insulin, and vitamin D.*”

Despite copious evidence that traumatic brain injury patients suffer hypothalamic-pituitary hormonal imbalances—and ample recommendations for rigorous hormone testing—few physicians bother to test neurosteroid levels in these patients.¹⁹⁻²¹ Thanks to groundbreaking work by Gordon, and a few forward-thinking physicians, there is promise for afflicted Americans.^{38,39}

Hope for Traumatic Brain Injury Patients

Using neurosteroid replacement techniques, Gordon and colleagues are changing the way we think about traumatic brain injuries and effective treatment. He continues to develop new protocols that may revolutionize the devastation of traumatic brain injuries.

“Whether caused by direct impact or by acceleration alone, secondary injuries that can result from brain trauma occur in the minutes and days following injury,” says Gordon. “These can include alterations in cerebral blood flow and increased intra-skull pressure—contributing substantially to damage from the initial injury.”

An array of resulting physical, cognitive, emotional, and behavioral symptoms often go unrecognized, especially in mild cases.⁴⁰

How a Dedicated Green Beret Is Helping Other Veterans

The Warrior Angels Foundation (WAF) is a nonprofit charitable organization, cofounded and managed by Andrew Marr, former Army Special Forces Green Beret—and traumatic brain injury patient of Dr. Mark Gordon.

Marr is spearheading a fund-raising campaign to allow other traumatic brain injury-affected vets to benefit from Gordon’s therapy. He says that it changed his life, while his previously prescribed medications only made things worse.

The government, slow to accept the link between traumatic brain injury and neurosteroid deficiencies, will not pay for Gordon’s protocol in spite of the fact, Marr says, that it’s vastly less costly than the multiple prescriptions and other therapies that the Veterans’ Administration (VA) currently provides.

In 2006, the army’s surgeon-general established the Traumatic Brain Injury Task Force to assess how the army addressed aspects of traumatic brain injury care and recommend improvements. However, Gordon believes a task force can do little if the military doesn’t want to pay for treatment.

Conventional medical dosage for testosterone is **200 to 300 mg** per week, which Gordon has shown is far too high for these cases.

“A typical 25- to 35-year-old male naturally generates **4-10 mg** daily or **60 mg** per week,” he explains. “Using suprphysiological dosages of testosterone—as military doctors do—can have significant side-effects if not monitored closely. We can achieve similar benefits at one-quarter the dose without the risks.”



Veterans have described to Gordon the sheer difficulty of getting anything done through the military.

“Part of the reason is that the military and doctors see testosterone as a *bodybuilder drug*, rather than a natural substance produced in our bodies,” explains Gordon. “It makes no sense that they can readily accept insulin use for diabetes, but not testosterone. They’re both natural hormones.”

Many Warrior Angels Foundation-assisted patients who have received Gordon’s neurosteroid-balancing protocol experienced significant turnaround within weeks of beginning treatment.

“We’re taking out the middleman of the waiting room and [Veteran’s Affairs] and reducing the costs of what the VA and government spends on traumatic

brain injury patients,” says Marr. He notes that, as an individual’s therapy continues—and fewer tests and treatments are required—expenses go down.

In its first year, the Warrior Angels Foundation raised over \$100,000 to aid in the treatment of more than 100 service members and veterans—but the organization has a waiting list of over 700 veterans. The VA does not offer Dr. Gordon’s neurosteroid-balancing treatment, nor will they pay for it.

Those wishing to learn more or to help with fundraising can visit <http://waftbi.org/>



The ways that neurosteroid deficiencies can manifest are numerous, says Gordon, including:

- Depression
- Outbursts of anger
- Anxiety
- Mood swings
- Memory loss
- Inability to concentrate
- Learning disabilities
- Sleep deprivation
- Increased risk for heart attacks
- Strokes
- High blood pressure
- Diabetes
- Loss of libido
- Menstrual irregularities
- Premature menopause
- Obesity
- Loss of lean body mass
- Muscular weakness, and
- A number of other medically documented conditions.

Especially tragic among veterans, says Gordon, is the fact that psychological damage due to traumatic brain injury is often erroneously diagnosed as post-traumatic stress disorder, commonly known as PTSD.

Dr. Gordon's neurosteroid-balancing therapy is changing lives, especially among military veterans. And this remarkable advance originated when, on a hunch, he mined published literature to better understand what was occurring in patients whose symptoms long outlasted the immediate effects of acute injury.

The Link to Pituitary Dysfunction

Gordon's research strongly suggested that traumatic brain injury often causes pituitary dysfunction, confirming his hunch.⁴¹

Research suggests that **50-76%** of traumatic brain injury victims show loss of pituitary neurosteroid function.^{16,17} Generally, the more severe the original injury, the more profound the deficits. However, neurosteroid deficiency or insufficiency—in the low-normal range—is seen even in patients with *mild* traumatic brain injury.⁴²⁻⁴⁵

Although **58%** of patients recover normal pituitary function within a year, a shocking **52%** develop new pituitary neurosteroid deficiencies a year *after* injury.⁴⁶ These deficits include reductions in many pituitary hormones, including those that regulate the thyroid, the adrenal glands (which produce cortisol, DHEA, and other vital hormones), the gonads (where estrogen and testosterone are produced), and growth hormone.^{5,17,18,47}

The severity of neurosteroid deficiencies correlated strongly with the kinds of symptoms that Gordon was seeing. Patients with growth hormone insufficiency had worse disability scores, greater depression, greater fatigue, and poorer emotional well-being, compared to brain injury patients with normal neurosteroid levels.^{48,49}

Gordon's research confirmed that traumatic brain injury victims often had pituitary neurosteroid insufficiencies, especially in growth hormone. And they're closely associated with persistent neurological, psychological, and emotional deficits tragically common in brain injury survivors.

Changing Victims' Lives

Gordon's clinic employs comprehensive testing to assess how well the hypothalamic-pituitary system is functioning, and secondary testing to determine how the target endocrine glands are affected. Those findings are correlated with a complete history and detailed physical examination to create an individualized treatment protocol.

Physiologic doses, not mega doses, are used for each neurosteroid to slowly restore levels to the middle of the optimum range, monitoring cognitive and physical functions monthly.

Gordon's patient success stories confirm that restoring neurosteroid levels to their optimal levels produces remarkable recovery of many impaired functions. Patients typically respond dramatically within weeks.

"The military and doctors see testosterone as a *body-builder drug*," explains Gordon, "rather than a natural substance produced in our bodies."

"We now know exactly where growth hormone works on mood, what pathways it uses," he says. "The military is simply not prepared to go to the depths that we have in the private sector."

Gordon's patient Andrew Marr is one of many veterans who can attest to that. The former Army Special Forces Green Beret suffered multiple traumatic brain injuries but is now heading a fund-raising campaign to help other veterans benefit from this therapy. He says that it has changed his life, while his numerous, previously prescribed medications only made things worse.

"It's highly individualized," Marr explains. "Whatever you're found to be insufficient in, that's exactly what's going to be replaced."

Summary

Shock waves may cause momentary "bubbles" in the brain, leaving traumatic brain injury victims with impaired physical, emotional, and cognitive health.

Military veterans' traumatic brain injuries are often misdiagnosed as depression or post-traumatic stress disorder.

Discovering that traumatic brain injury damages the hypothalamus and triggers pituitary gland dysfunction, Dr. Mark Gordon now identifies and treats the neurosteroid deficiencies in traumatic brain injury patients.

Many now attest to the remarkable success of Gordon's innovative, individualized therapy. ●

Patients with traumatic brain injury, or their family members, may visit Millennium's website at <http://www.tbimedlegal.com/>, where a new patient intake form can be filled out to start the process of evaluation. Information at the website also lets patients know what a typical course of treatment involves.

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.



Dr. Mark Gordon's Traumatic Brain Injury Neurosteroid Test Panel

- IGF-1 (growth hormone marker)
- Free testosterone
- Estrogens (female only)
- Cortisol
- TSH
- T3/T4
- DHEA

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