



## CHAPTER 8 The Wounds of War

CASE HISTORIES OF COMBAT VETERANS WITH TERRIBLE INJURIES, DISABLING MEMORY LOSS, INSOMNIA AND PTSD, WHO HAVE COME BACK TO THEIR LIVES AND FAMILIES.

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They put on civilian clothes again and looked to their mothers and wives very much like the young men who had gone to business in the peaceful days before August 1914. But they had not come back the same men. Something had altered in them. They were subject to sudden moods and queer tempers, fits of profound depression alternating with a restless desire for pleasure. Many were easily moved to passion where they lost control of themselves, many were bitter in their speech, violent in opinion, frightening.

—Ben Shephard (2000)

**T**hese are the stories of men whose injuries were not accidental, where the intent was purposeful death and destruction. Their injuries were far more severe than most civilian injuries.

In the course of war they had been hit with bullets, grenades, shrapnel, and impacted by Improvised Explosive Devices (IEDs). They had rolled in vehicles; fallen from trucks and guard towers; been exposed to toxins including immunizations, depleted uranium (used in ammunition and IEDs), fumes from vehicles, burning oil fields, refineries, and trash pits<sup>1</sup>. They had done all this in searing heat, often in body armor and with packs that sometimes exceeded their own body weights.

Many are surprised that veterans, after the most ghastly experiences, are damaged. Veterans are surprised at their own symptoms, as are their families and employers. Medical workers are surprised that problems remain, for years or forever, no matter how hard they have tried to help.

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1. When units move, they don't necessarily move their supplies. They burn them: toxic volatiles, medical equipment, plastic wrappers, heavy metals and all.

Part of the problem is that injuries are so *varied*, involving not only bullets and blunt trauma, but explosions. Explosions create many injuries such as:

- BLUNT TRAUMA. Victims are hit by flying debris. Vehicles may roll and the bodies inside may bounce off interior walls or roofs. Outside, the blast wave may pick them up and throw them through the air. They themselves become projectiles.
- BURNS OR PENETRATING INJURIES. This includes bullets, shrapnel and broken glass.
- PRESSURE CHANGES AND OVERPRESSURE WAVES, causing internal injuries. With no obvious blunt trauma, there may seem to be no damage at all but, in fact:

*Invisible injuries from pressure waves may be worse than visible ones from blunt trauma.*

#### PHYSICAL DAMAGE

Blunt trauma may create greater accelerations in the brain than a blast, yet terrible symptoms appear even from small explosions. When researchers at Lawrence Livermore National Laboratory looked at blast effects, they found a startling result: rippling of the skull. The ripples were tiny (about 50 micrometers, the width of a hair) but may effect the vascular hydraulics of blood and other fluids of the circulatory system. Alternating waves *increase* then *decrease* pressures. This might cause tissues, such as the blood-brain barrier, neurons and delicate spider-web connections, to rip and tear. Damage to lungs, liver, kidneys and *their* connections reduces oxygen supply to the brain (anoxia)<sup>1</sup> and the removal or isolation of toxins. This in turn changes electrical activity and metabolism, especially with injury to the HPA axis<sup>2</sup> (Lawrence Livermore National Laboratory, 2010). Ear damage may include tinnitus or vestibular fistula. Eye damage may include damage to the optic nerve or a detached retina. Recall Lord Nelson, blinded after a nearby explosion, with *no visible external* injury.

The researchers then discovered that, rather than protecting against these effects, helmets with webbed suspensions actually made them *worse*. Without padding to fill the air space and block pressure waves, pressures *under* the helmet can intensify, *exceeding those on the outside of the helmet* (Moss WC, King MJ, Blackman EG, 2009).

#### A KEY TO PTSD

We need a better way to classify TBI than the old approach based on consciousness. Too often, *no* loss of consciousness has been mistaken for *no* problem, but very often, loss of consciousness can predict future difficulties, including a greatly increased risk of PTSD.

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1. This alone can be catastrophic; the brain requires as much as 25 percent of total body oxygen.
  2. Some investigators feel that some symptoms labeled as “psychiatric disorders” are actually the *physical* result of damage to neurons and blood vessels caused by surging blood in the brain (Chen Y and Others, 2013, p. 105). During WWI these symptoms were called *shell shock*.

In 2004, researchers at Walter Reed Army Institute found changes in post-TBI mental function with or without loss of consciousness. But PTSD later appeared in 44 percent of those who had lost consciousness compared to 27 percent of those who had not (Table 8-1). In injuries that did not involve the *head*, PTSD symptoms fell to 16 percent (Hoge CW and Others (2004).

| <b>TBI</b>                    | <b>PTSD</b> |
|-------------------------------|-------------|
| With Loss of Consciousness    | 44%         |
| With NO loss of Consciousness | 27%         |
| NO known TBI                  | 16%         |

Blast injuries may show no outward damage at all, no hint to the chaos within, but researchers can now see injury at the cellular and molecular levels<sup>1</sup>, damage that impairs neural plasticity, the ability of the brain to heal and change, to learn and to remember what has been learned. Swelling of the neurons resembles that seen in diffuse axonal injury. Autopsy supports that picture.

In 2011, Dr. Bennet Omalu turned his attention to deceased military veterans who had faced blasts from mortars and IEDs and been diagnosed with PTSD. One was a Marine who, after his second deployment, developed progressively worsening problems with memory, behavior and mood, insomnia and alcohol. At 27, eight months after his honorable discharge, he committed suicide. On autopsy, his brain looked Fine. No atrophy, no wounds. But a closer exam revealed broken and tangled nerve cells and lesions, the same changes Omalu had seen in dead NFL football players (Omalu B, Hammers JL, and Others, 2011).

## Healing the Damage

How to help and treat soldiers with brain injuries has become a burgeoning problem. After standard medical care, most service members presented here had been through the “Wounded Warrior” program<sup>2</sup>. They had received individual and group therapy, yoga, massage, nutritional counseling, art therapy, music therapy, pool therapy, occupational therapy, and speech therapy. Exposure Group Therapy was done with the goal of revisiting and addressing the incidents that triggered PTSD.

1. Experimental imaging with fMRI and DTI have recently shown promise of revealing micro-hemorrhages and changes in brain function in *live* patients. Research continues.
2. Walter Reed Army Medical Center (WRAMC) Specialized Care Program Track II, a three-week program to assist the wounded OEF/OIF service members from Iraq and Afghanistan.

Despite intense treatment, these veterans still suffered difficulties with memory, anger, sleep and hypervigilance. For most, attempting to read triggered headache and fatigue after just a few lines. Before the study, three had actually attempted suicide, one was quietly planning suicide, and another attempt had been thwarted.

Most of the following accounts present the personal details of veterans who entered a treatment study to evaluate effects of neurofeedback on concussion and PTSD (Nelson DV and Esty ML, 2012). Their rapid and sometimes astonishing improvements in the face of severe injuries show why clinicians are so adamant that neurofeedback is effective, and why they are so very passionate about their work.

All veterans were treated in a FNS research study so there are extensive session notes. Excerpts from these notes appear in the boxes in each veteran's story.

### The Numbers Behind the Words

These stories are compelling, but the numbers are compelling as well. The results of this exploratory study were published in the *Journal of Neuropsychiatry and Clinical Neuroscience* (Nelson DV and Esty ML, 2012). In summary: All seven service members involved had debilitating symptoms of PTSD and TBI. Symptoms were tracked throughout the study including,

- Neurobehavioral problems such as depression and memory loss<sup>1</sup>.
- PTSD symptoms, like hypervigilance and flashbacks<sup>2</sup>.
- A current symptom questionnaire, filled out at the start of each session, rated *current* severity of eight symptoms: Cognitive clarity, overall body pain, quality of sleep, fatigue, anxiety, depression, irritability or anger, and overall activity.

For each of these forms, participants gave a score ranging from 10 (the worst possible problem) to 0 (not a problem at all).

Treatment occurred over 25 sessions<sup>3</sup>; analysis showed statistically significant improvements over the course of treatment. Of the symptoms measured by the two questionnaires, most were significantly reduced, and the downward trends in the current symptoms ratings were all highly significant.

For two cases, a rise in symptoms appeared at follow-up but only after additional injury, and even then, they never returned to pre-treatment levels. One of these, Jay, had suffered some of the most terrible injuries, but also experienced a most amazing recovery.

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1. Neurobehavioral Functioning Inventory (NFI) by Kreutzer JS, Seel RT, and Marwitz JH (1999).
  2. PTSD Symptoms Scale: Self-Report Version (Foa EB and Others, 1997).
  3. Two participants dropped out early (after sessions 13 and 17) saying that they had improved so much they saw no point in continuing.

## Jay and Paul, Kyle, Kevin, David and Mike

Men who went to war, what happened to them, and how they got their lives back.

### Jay: The Driver

HEADACHES, MEMORY LOSS, FALSE MEMORIES, FATIGUE, SUICIDAL, PTSD AND  
HYPERVIGILANCE, PAIN, DEPRESSION, EXPLOSIVENESS, SLEEP APNEA, NIGHT SWEATS

Q. How will you know you are better?

A. My memory would be better.

Jay was career military with 14 years in the Army. He was trained to drive anything except a tank. But in Iraq, from the time of the first wave in 2003, he was never used as a driver. Instead, he was placed as a gunner with ground troops, exposed to constant explosions, fire fights and night fighting.

In the course of two tours (5 and 18 months) he survived nine IED explosions, three with loss of consciousness for 20 to 30 minutes. In another incident, his vehicle and passengers were blown into the air. He crash-landed on the truck in full body armor and gear, a total body weight of nearly 260 pounds. Another explosion blew metal fragments into his leg.

Jay was left with a leg full of shrapnel, multiple concussions, PTSD, and severe loss of both long- and short-term memory. While at Walter Reed Army Medical Center (WRAMC) for PTSD, he was found to have broken bones and went through multiple corrective surgeries. He could not remember the day for more than a few seconds or remember his children's ages. He could not read more than a few lines; trying to do so made his constant headaches worse, and he had no memory of what he had just read. False memories were as true to him as real ones; he "remembered" being posted in places he had never been. His broken bones and leg wounds required a wheelchair if extensive walking was involved. Autonomic nervous system dysfunction (*dysautonomia*) left him unable to regulate his body temperature; he was always hot and sweaty, especially at night.

Impact on the family was enormous in all areas of daily living. He could not recall even the simplest steps of daily family schedules. He disliked foods that had been his favorites before Iraq. All family responsibility fell on his wife, who said she no longer knew him.

Constant headaches (with pain consistently rated at "10") were treated with Tramadol® and Percocet®, but not even these powerful medications could control the pain. He was also on lithium and Zoloft® for depression and had sleep apnea (untreated).

He was unable to drive because of his injured right leg, mobility, vision and memory problems. He had also lost his navigational skills, once so excellent that his unit, on foot, in the dark and in strange territory, always relied on him to get them home again. And he

always did. Now these skills were gone. For someone who has had such abilities, losing them is like going blind. He was especially distressed by extreme fatigue, anxiety, and hair-trigger temper, knowing he had never been like that before.

Before entering the study, Jay had completed the Specialized Care Program, but he still suffered full-blown PTSD symptoms with nightmares. Seeing small piles of dirt or debris beside the road caused severe panic attacks<sup>1</sup>. Physically and emotionally, Jay was a wreck, but his response to neurofeedback was fast and positive.

FNS neurofeedback treatment began in May 2007.

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| Sessions 1-2. First session triggered a "big headache" that diminished greatly. Slept well, feeling unusually rested when he awoke. Energy and mood good, memory better. Was <i>happy</i> for about 2 hours the next morning, but while showering began to feel as had before a mission: "Physically up and nauseated, with an adrenaline rush." Lasted about 3 hours followed by calm. Reduced hypervigilance lasted through 2 days, "Even the dirt piles beside the road didn't bother me." |
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| Session 3. Energy and mood excellent, extremely animated about changes after second treatment. Slept "like a rock." "Surprised when asked about body temperature. Since his return from Iraq, he had been sweating constantly, day and night. Hadn't noticed that sweating had stopped. |
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Session 3 produced the most dramatic response of all: immediate return of long-term memory. As the sensors were being removed, Jay gasped and said he was remembering things. Suddenly he knew the current day and date, birthdays and anniversaries, past postings, family occasions and family memories that had been lost to him for years. His young son, wide-eyed, asked his father if he remembered going to the amusement park years before. Jay *did* remember and as they talked about that day, the little boy glowed with excitement. His joy at being able to laugh with his dad about their past experiences was thrilling to see. For the first time they had a shared history, common ground that, until that moment, had been lost to that boy and the entire family. Now he had his father back.

His wife checked him with questions such as when they were stationed in North Carolina. "We were never there," said Jay, who had long had false memories of North Carolina. He now remembers his prior tours in Korea, bases and buddies.

Throughout the session Jay was flooded with memories of family, his old car, and sports in high school. Later in this discussion he mentioned craving peas with onions. This shocked his wife who had noticed that since the injuries his taste in food had completely

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1. Seeing roadside clutter caused intense flashbacks because dirt and trash were used to hide IEDs. The difference between PTSD and memory is that flashbacks are incredibly detailed. Unlike ordinary memory, you remember *too much*. Every detail is there and you cannot forget it.

changed and he would no longer eat things he had previously favored. Peas with onions had been a favorite dish.

From this point on, after just 3 sessions (his first week of treatment) Jay never again wrote down an appointment, and he never forgot one. Short-term memory also improved; he knew date and time without looking at his watch. He could also read again. On intake, he was unable to read because it caused headache and mental fatigue, but during the week following Session 3, he completed one book and started another.

By Week 2, PTSD reactions and sweating were greatly reduced and he had *no headaches all week*. Sometimes his right leg felt like jelly, possibly because he was doing more without the wheelchair, and the leg was tired from unaccustomed use. Anxiety was also down; he might notice something and feel some anxiety, but nothing like his previous reactions of wanting to stop the car and get away despite knowing there was no real danger. He is still bothered by crowds, still scans for suspicious persons and activities, and finds the noise irritating. But now there is no anger. “I’m much calmer than I have been.”

Less fearful about his future, he began to see a life for himself. “I now have hope,” he said, “that I will be able to function for my family and myself.”

SESSION 4-5. Body temperature is normal during day and most nights. Sleep, energy, appetite, good. Now likes the foods he liked before Iraq. Mood good; anger replaced with “lots of patience.” Blood tests showed that previously therapeutic doses of Tramadol and Percocet are now overdoses. Needed only one Percocet over the weekend to control pain of surgery.

Long-term memories that flooded back after Session 3 remain. “It was as if my brain opened and all memories came gushing out,” including the ones he wishes he didn’t have, hoped he would forget. But less intense—they are memories, not flashbacks. Wife lost way driving to office but suddenly Jay could see the route in his head and guided her.

Increased energy: going to playground with children. Less volatile: wife reports he hasn’t yelled at her for some time. Some changes uncomfortable for family. Wife must adapt to a husband now involved in their children’s lives, discipline and family decisions, that had previously been hers alone.

SESSION 6-7. His doctor stopped Trazodone last week; he is sleeping well without it. No sweating at night. Physically stronger, even went into the water to play with his kids. Has been fearful about his future, but now that he can think and is beginning to remember things, he is hopeful that he will be able to function for his family. “Impatience is gone.”

He remembers phone numbers, what his wife tells him, and now is reading. Family moved into 4-room apartment. Slept 10 hours last night. Upbeat, conversation clear, energy very good. Items seen while unpacking brought back memories — excited that he could remember their histories.

Sessions 8-9. Mood excellent: "I'm getting back to my old self. Even my wife said so. She even told me she loves me, and gave me a kiss." Excited re trip for family visit. Wife eagerly scheduled appointments for after their return. In wheelchair because of leg pain from lifting furniture, doing repairs, playing outside with the kids during the move. More work than he has done in a long time. His doctor is tapering off lithium and Zoloft. Feeling clearer and memory continues to improve.

Sessions 10-17. Sleeping all night, good energy. Thunderstorms remind him of mortar fire setting him "on edge," but not panicked. No longer notices roadside rubbish. Began to talk about traumatic experiences in Iraq b/c emotional content not upsetting. OK in crowds.

Sessions 18-21. Depressed, but with good reason: he is losing vision in left eye, cause unknown. Doctors can't operate on his leg b/c might make it worse. Had just learned that another member of his group shot himself, the third person he knew at Walter Reed who had suicided. But also commented on his life before treatment: My wife hated me, I hated me, I hated my kids. Now my wife says she loves me, and I love her and my kids." Now feels good about himself and being "part of his family and society."

Sessions 22-23. Reported intense dream about Iraq, people he knew who died. Is in "medical limbo" b/c treatment plan is uncertain. Spontaneously<sup>a</sup> brought up suicides; three soldiers in Iraq had asked for help and were told to make an appointment. All suicided. Now feels good to talk about this with others.

a. Subjects are *not* required to discuss their experiences.

After his 23rd session Jay suffered an accident with concussion and possible skull fracture. Within the week he was also diagnosed with lung cancer. Before end of treatment, Jay had surgery for broken bones, but memory remained good, he had no problem with headache or symptoms of PTSD. He was off all sleep and pain drugs and taking only 2 of the 6 drugs prescribed at the start of the study. (Figures C-8 and C9 in Color Section show his FNS brain map on intake and on completion of treatment.) Despite these stresses, on 6-month follow-up, Jay's symptoms had not worsened, a testament to the resilience that often appears with neurofeedback treatment.

Even more remarkable: improvements not only occurred but continued despite severe sleep apnea (untreated until after the study ended), the ongoing effects of toxic exposure during his service, and the stress of regular treatments to drain fluid from his lungs.

"The biggest achievement of treatment," said Jay, "is that it has given me back a feeling of being normal and human again. I can accept things that can't be changed, feel good about myself, and be part of society. If I hadn't gotten treatment I would be on the verge of divorce, kids hating me, and I not caring. Now I can be a dad.

"You have given me back my life," he said.

## Paul: The Medic

PTSD, MIGRAINES, INSOMNIA, HYPERVIGILANCE, POOR CONCENTRATION, BACK PAIN

Q. How will you know you are better?

A. No expectations, but if only I could read without getting tired.

During Desert Storm, Paul endured long-term exposure to diesel exhaust, depleted uranium, and other toxins. On patrol in Iraq, they would bounce madly down a washed out dirt road at 60 m.p.h. with IED's exploding about every 5 seconds behind them. This was to outrun IEDs timed to target vehicles traveling at about 40-45 m.p.h. When an overloaded Bradley rolled, he struck his temple on an interior rifle mount and injured ribs, neck, and tailbone. Once, while he was eating breakfast, a rocket powered grenade blew overhead, so close that its wake pushed his head down. It hit 15 yards away.

For two days we sat in the middle of a war zone, waiting for the Marines, who were going door-to-door and room-to-room, to catch up to us. The sound of rifle fire and breaking glass went on day and night. Nobody could sleep; wrestling matches to relieve stress were constant because our nerves were so charged. I don't think I slept for three days, and then when I did, it was only for a few hours. I couldn't stay lying down or even sit still.

At Walter Reed, signs and symptoms of PTSD included two severe episodes of extreme adrenalin rushes lasting two days. "I paced back and forth all night long, unable to sit still or lie down for more than five minutes, hearing the constant noise of breaking glass." If he shut his eyes he began to quiver. Night sweats were severe with daily migraines, inability to concentrate when reading, and a constant "busy feeling" in his head.

Sessions 1-3. For the first two sessions, symptoms got worse, especially headaches and sleep problems. Paul wrote: "By Session 3, I was feeling amazing beneficial effects. The busy feeling I had in my frontal lobe was the first symptom to go away, then my quick wit came back. The headaches went away next, then the night sweats and leg jerking, and finally my irritability with my peers and road rage."

Sessions 4-11. Sleeping 6 hours straight through the night, compared to 3-4 hours before. More relaxed around his peers, and "Back to my old self emotionally, socially, and mentally." Sleep continued to improve. Could study more efficiently and remember material better.

In a letter to the Deployment Health Clinical Center at Walter Reed, Paul wrote: "My medical background teaches me that when a patient is more relaxed, the healing process goes much faster. It is my opinion that this treatment should be available to every patient coming from the war in Iraq or Afghanistan, and recommended for all PTSD and TBI sufferers."

At end of the study, he took a difficult national certification exam and passed on his first attempt. Paul is now married and continues on active duty.

## Kyle: The Marine

LOSS OF EXECUTIVE FUNCTION, HEADACHES, BACK PAIN, MEMORY LOSS, INSOMNIA, READING AND BALANCE PROBLEMS

Q. How will you know you are better?

A. Better mood, better memory, and not afraid to sleep at night.

Kyle had an active, athletic life with many falls in the course of skateboarding and surfing. As a child he had sinus surgery and suffered two Grade 3 concussions.

Over two deployments and 15 months in Iraq, Kyle was hit twice by explosions that destroyed two Humvees and threw him 30 feet through the air. The first time he landed on his neck, the second on his spine. Both times he was taken out by MediVAC.

Because of crushed discs and vertebrae, he was 1.5 inches shorter and walked with a cane (partly for balance). He also suffered 24/7 non-stop headaches; these were frontal, centered around the eye. His doctors prescribed Flexeril® (cyclobenzaprine), Mobic (meloxicam) and anti-inflammatory NSAIDs such as Motrin®, but he stopped taking them because they interfered with his thinking. Worst of all, they gave no relief. Neither did physical therapy or chiropractic. He was getting almost no sleep.

Once a quick learner, Kyle had signed up for two on-line introductory college courses but he had to drop them because he could barely read. Even menus were so difficult that he would go only to restaurants whose menus had pictures of the food, so he could point. His psychologist said his symptoms were all psychological.

While still on active duty, FNS neurotherapy began with Dr. Esty in March 2009.

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| Session 1-3. Almost no sleep, can't read long enough to get anything done but headache immediately dropped from a 9 to a 4 during first treatment. |
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| Session 4-7. Headaches much better, throbbing pain has disappeared, with only a couple of short spikes. Headache returned after a trans-Atlantic flight, but dropped from 10 to 3 with treatment. A sudden urge to write appeared after Session 4. "I got some paper and started writing" (both prose and poetry). Reading still difficult, but wants to write a screen play. |
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| Session 8-9. Back is "killing me!" — because he mowed lawn and cleaned house. Despite the back pain, balance is better. |
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During a treatment break in early summer, Kyle phoned to report that headaches and back pain were much better. By July, he had the energy to drive over 600 miles in 12 hours to go jet skiing. Unfortunately, this resulted in two new hits to the head. First he hit a pothole; the shock slammed his head into the car's ceiling. Later, he tumbled off his jet ski, hitting the water so hard that his face was swollen.

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| <p>Session 10-12. His back is still painful after jet ski accident but cognition better. Headache up to 5, but better after treatment. He is walking without a cane. “Not sure why I feel better” but <i>feeling so much better</i> that he now wants to go to Officer School and to a “brick-and-mortar” (not on-line) university for a degree in Journalism. Headache down to 2.</p> |
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| <p>Session 13-15. Memories of the war and his concussions are returning. Not flashbacks; just memories. Headaches gone. Body temperature now normal. Running again (3 miles in 25 minutes and 10 seconds), passing the Marine Corps physical. Recommended for promotion. Back in the online school, and getting A's on tests. Working towards Associate in General Studies but wants to try for higher degree.</p> |
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| <p>Session 16-23. Many stresses but improvements continue. Designed his own program for Wounded Warriors. His stiff neck and arm have been relieved by a chiropractor at National Naval Medical Center.</p> |
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| <p>Session 24-25. When Kyle started, all symptoms were rated as 9s and 10s — now zeroes.</p> |
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Writing began after Session 4. “I couldn’t, never did before, and I couldn’t read when I came in. Now I am reading books. I knew I could get my back fixed but I didn’t know about my brain. My life is a thousand times better than before I started treatment.”

After treatment, Kyle was so improved that he passed the physical and was redeployed.

## Kevin: The Mechanic

SEVERE COGNITIVE AND MEMORY PROBLEMS, SEIZURES, PTSD, NIGHTMARES, PAIN, NUMBNESS, MALNUTRITION, POOR HANDWRITING, DIFFICULTY READING, LOSS OF SPATIAL MEMORY, SUICIDAL

Terrible things had happened to Kevin, long before he went to Iraq.

As a toddler Kevin had fallen down stone steps, hitting his head hard enough to raise a memorable goose-egg. As a child, he was hit by a car while riding his bike. As a teenager, he crashed down the side of a mountain riding a bike while drunk. He lost consciousness several times due to hard hits during football and soccer games, but graduated high school with average grades. As an adult, he was again hit by a car while bike riding and thrown to the pavement. He had several blackouts due to alcohol, multiple concussions from fights, mixed martial arts, and water skiing. And then he went to war.

In Iraq, he was regularly exposed to blasts and toxins from burn pits, vehicle maintenance and armaments. Because the money for the planned maintenance facility vanished, the facility was never built. Teams worked in sealed shipping crates, without safety gear, in terrific heat with no ventilation for solvents and diesel fumes. In one blast, he lost consciousness long enough that the Marines who rescued him found him still unconscious.

After returning home, seeing his children triggered terrible flashbacks. He suffered severe memory problems and extreme difficulty maintaining a schedule or getting anything done. He needed all day to wake up, usually becoming alert by 4 pm, but back in bed by 8 pm, a pattern explained as “lack of motivation.” Weekly seizures usually lasted 2-5 minutes, but some continued for up to 7 minutes. After being put on anti-seizure medication, he experienced lost stretches of time accompanied by dizziness, drowsiness, and muscle weakness. When his wife asked for a separation he went to live with his mother.

Then one freezing December dawn, Kevin walked out of the house wearing only a T-shirt and jeans. He had intended to commit suicide but was found and taken to a psych unit where he was diagnosed with major depression and PTSD. There was no mention of concussion contributing to his condition, however, an MRI revealed a temporal lobe lesion, thought to be the cause of his seizures. A SPECT scan found significant abnormalities possibly representing serious cortical atrophy. Diagnosed with ADD and a learning disability, he was admitted to a day program with intensive traditional therapies, but showed little improvement. A psychiatrist who specializes in PTSD referred him to BWB.

At intake, Kevin was on multiple medications, including lithium and Remeron® for depression, Lamictal® for seizures, Buspar® and Celexa® for anxiety. His diet was phenomenally bad, consisting mostly of chips, chocolate, and ice cream. He especially liked Hostess Ho Hos and ate 20 at a time while complaining of poor appetite. He felt his

best, he said, at 160-170, but weighed 210. Exercise was extremely limited due to pain and fatigue. His skin had an unhealthy quality.

He could not sleep without medication. When sleep did come, it was poor, with terrible nightmares. Thoughts were scattered, tangential, incomplete. His memory was so poor that his wife would not permit him to drive. He also had body pain, comparable to sore muscles, but feeling more as if his skin was being stretched. Reading was difficult, and he practiced handwriting, forming letters as slowly and laboriously as a child learning to write cursive.

FNS neurofeedback treatment began in March 2012 in the USUHS study.

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| Session 1-3. After first treatment, no nightmares. Could remember more of what he read. After 2nd session his wife let him drive a bit. After third, pressure in head went away for short time.  |
| Session 4-6. More control over hand; writing and reading continue to improve. On stroking rough fabric on the arm of the treatment chair, he realized that fingers were less numb. Thinks his comprehension and processing are improving. He did some "pleasing" things instead of sulking, watched TV in order to laugh, and fell asleep without meds at a reasonable hour. Mother is pleased, says "He is softer and gentler with me," talking more, making plans, coordinating better with other people. To diet of Ho Hos, has added baby spinach and apples.  |
| Session 7-10. Pain is less. Can now read and remember sentences; when he copies things (practicing handwriting) not copying word by word. Suicidal thoughts are down. Long-term memory returning. Wife now more comfortable with his driving. More feeling in thumb. Has started a commercial driving course, and a home repair course and is able to apply what they are teaching. Can be with children now without flashbacks.   |
| Session 11-13. Took his children to a movie. In classes can process more quickly. Muscles sore from exercise. Applying for jobs. Has "done some cooking", so eating less junk and fast food. More positive long-term memories in talking with his wife.  |
| Session 14-19. Fewer nightmares. Thinks driving back to pre-Iraq levels. Much more coherent and fluid in conversation. Suicidal thoughts are gone. "Skin-stretch pain" and short-term memory ratings dropped from 10 to 2. Anti-seizure meds down to 200 mg from 300 mg. (Had already stopped Remeron, Buspar, and Celexa.) Improved feeling in all fingers. Eating only 6-9 HoHos <i>every other day</i> . What he was calling "fast food" is actually <i>burgers and salads rather than junk</i> . Now he eats out only once a week because he is able to organize, shop for groceries and cook meals. Skin looks much healthier than when he started. |
| Session 20. Diet now green salads, fruits and vegetables, more protein and <i>much</i> less sugar. His geographic memory of the area has returned.   |

*At 6-month follow up:* Kevin regularly takes his children to museums, something they used to do a lot. His mother is thrilled with his changes; he is doing a beautiful remodel of her house and getting more jobs from neighbors who see his good work. On the downside, he and his wife are divorcing, but his social world is steadily expanding. Previously isolated, he is reconnecting with others.

## David: The Communications Tech

HEADACHE, BODY PAIN, PTSD, EXPLOSIVENESS, INSOMNIA, DRUG ABUSE, SEVERE DEPRESSION

Q. How will you know you are better?

A. When I can be in a crowd for an extended period.

David joined the Army after 9/11, and served in combat areas and on border security. He survived multiple concussions (three in 2004 alone), multiple blasts from IEDs and ammo dump explosions, plus back and knee injuries with shrapnel and torn ligaments. After a 2006 explosion, he began to suffer severe insomnia. A medic gave him a handful of pills but when friends found them, he was sent to the Army's Landstuhl Regional Medical Center. There he drank heavily, took any drugs he could find, and was repeatedly arrested for fighting. After a particularly wild night, he found himself facing four assault charges.

David gave away his belongings and cleaned out the room. When a friend saw this classic pre-suicidal behavior, he was sent to the Inpatient Psychiatric Ward. There he was diagnosed as bi-polar with PTSD and Post-Concussion Syndrome. Sedation with Trazodone caused severe depression, which was treated with Effexor®, which kept him from sleeping at all. It also caused seizures, "so they gave me *more* Trazodone; instead of getting better, I got worse."

Back in the US and in the psych ward for PTSD and substance abuse, he complained again about seizures from Effexor®, and again the dose was *increased*. Drugs now included:

- Naproxen and nortriptyline for headaches with lithium to counteract the side effects from nortriptyline (insomnia, agitation, anxiety),
- Trazodone which produced depression and Effexor® to counteract Trazodone,
- Vistaril® and Seroquel® for anxiety, PTSD, insomnia, and bi-polar diagnosis<sup>1</sup>.

Eventually, all traditional methods of treatment had failed. To call my prognosis "unhopeful" was an understatement. I was aggressive, paranoid, angry, depressed, and nihilistic, unable to focus enough to take part in conversations, unable to read more than a few sentences. "Sleep" was an hour or two in 48 hours. I would leave my room only when forced to, for appointments, or (rarely) for food. Drug abuse and violent behavior continued. And I was still suicidal.

David was referred to Dr. Esty by his therapist. FNS treatment began in September 2007

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1. Seroquel® is prescribed off-label for sleep problems and nightmares related to PTSD.

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| <p>Sessions 1-3. After first session felt “wired, floaty, as if I had taken Sudafed,” feeling lasted the rest of day. Began sleeping at night, six straight hours of uninterrupted sleep. Went to Borders (bookstore) and found it relaxing. Less vigilant, able to read a magazine. Cleaned room. Headache returned briefly. Usually a pack / day smoker, he hasn’t a cigarette in 48 hours.</p>  |
| <p>Session 4-6. Remembering dreams (including one nightmare). Less anxiety even on flight home. Airports hard but startle response less, did not need anti-anxiety med. Still irritable but temper under control. Now leaving his room at WRAMC and going out more — grocery shopping, to the movies. Some headaches, but less frequent.</p>   |
| <p>Session 7-9. Going out for pleasure. “Besides, dammit! I have to feed myself!” Previously he would call someone to bring food. Emotional after last treatment, some songs brought tears. Less noise sensitivity, startle response, and situations where once he would have blown up but didn’t even get angry. Memory improving. Memory more “present, not flashbacks.”</p>   |
| <p>Session 10-19. Everything good and holding. Slept 7 &amp; 8 hours on weekend. Woke once with recurrent war-related nightmare. These started in 2004, less frequent now. Less fatigued, less light and sound sensitive. Walked several miles alone along busy highway (“I just felt like being <i>out</i>”), without sunglasses or headphones. Continues to go to mall and be comfortable. 5 hours at bookstore &amp; no headache. Any headaches are sharp but short (15-20 minutes). Crowds no longer bother him. Can even sit by windows and has stopped taking anxiety med.</p>               |
| <p>Session 20-24. The day before Session 20 was the anniversary of the Feluggia Fest, the day he lost half his platoon. “Now I remember so much. I’m not numb now. I have a life now. It still hurts, but not the searing pain and anger. It feels good to talk.” Went to a military ball. Good mood. Has written 40 pages about his war experiences. “Other people noticing that I’m less scattered in my speech.” In an argument, he was able to articulate his thoughts, something he had been unable to do since the 2006 VBIED. “Now I can just brush things off. I’m not angry anymore.”</p> |
| <p>Session 25. Pleased at having “No explosiveness.” Feels that his memory is better than before deployment. Anxiety is completely gone. At a bar, had been able to socialize with no anxiety at all, and talk about experiences without getting upset. He is moving back home with goal of going back to school for a degree in psychology.</p>   |

A few weeks after finishing the FNS series, neuropsychology testing was repeated while David was ill and on cold medication. The examiner noted “*mild difficulties* with extended concentration and variable processing speed, most likely exacerbated by the antihistamines he took to treat the cold.” Still, most of his scores were “Above Average” or “Exceptional.”

But most importantly, I felt like *me* again, the *me before* all the deployments, before the physical and emotional trauma of war, but more mature than I was before it all. I had a real future, something to look forward to. I couldn’t wait to get out and find a way to help other veterans who had found themselves in situations similar to mine. I wanted to study neuropsychology with a specialty in PTSD.

David was discharged from the Army with 30 percent disability, a low rating. Medical paperwork states *zero* deficits after the FNS treatments.

That is: *no* remaining PTSD or cognitive deficits.

Since then, the VA has officially amended his record to state that symptoms leading to diagnostic labels of Bipolar Type 2 and Borderline Personality Disorders were actually side-effects of Effexor® and Trazodone<sup>1</sup>.

Back at school, majoring in chemistry with a psychology minor, he was declared Psychology Student of the Year and inducted into an academic honor society. "Academically," he said, "my biggest problem was deciding what to do next. The neurofeedback treatments didn't just *change* my life, they *saved* my life."

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*Today, the wounded warrior with disabling insomnia and PTSD, whose goal of community college was viewed with such skepticism, has gone on to advanced medical studies.*

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1. On the other hand, the psychiatrist dismissed any positive effects from neurofeedback.

## Mike: the War Correspondent

DRIVING PHOBIA, POOR MEMORY FOR CONVERSATIONS, LOSS OF TECHNICAL SKILLS, IRRITABILITY, HYPERVIGILANCE, FATIGUE, POOR FOCUS, PROCRASTINATION, PROBLEMS FINDING WORDS IN SPEAKING AND WRITING, FEELING STUCK AND FLAT

The journalists who cover war zones endure many of the same conditions and stresses as the actual soldiers. Anyone who comes back from war needs time to adjust to “normal life” when, for too long, *normal* has been *war*. The big difference for journalists is that when they return, they have no job-related support system waiting to help.

At age 22, Mike was assigned to report on the Bosnian War only to find the experience so terrifying that he could not function. He lasted just one day, heading for home on the first plane out of Sarajevo. Two years later, he returned, reporting on the continuing fighting in Bosnia, Croatia, Macedonia, and going on to the Sudan and other war zones around the world. A good journalist and a good cameraman, Mike went on to work in music and sports, producing high-end documentaries, but his specialty remained war reporting. It was fearful work, but Mike did it very well.

From 2002 he worked, usually without military protection, filming and interviewing, working 19 hours a day, without a break for weeks at a time, while dodging IEDs, kidnapping attempts on journalists, and some of the most gruesome casualties he had ever seen.

In 2004, the truck was hit and Mike was hurled into the air, landing on his back. He was 3 weeks into a 6-week tour before he could get treatment for severe back pain. Eventually the pain eased somewhat, but other problems remained.

One was driving, often a major problem with veterans returning from Afghanistan and Iraq where wild driving was a technique to survive attacks by snipers and IEDs.

By 2005, Mike was having extreme difficulty driving on highways, especially through tunnels and over bridges. When he returned to the US in 2011, he drove no faster than 25 on the local streets. Every traffic light, every stop sign was a relief, time to catch his breath. But on driving through a tunnel, he had a sudden terrifying feeling that he could not control the car and an inexplicable urge to crash the car into the wall. His wife took over all driving. He had a short fuse with people in general, but was terrified of police<sup>1</sup>.

Unable to drive and feeling that he was no longer a nice person sent him to a psychiatrist who diagnosed “fight-or-flight syndrome” and prescribed beta-blockers. They didn’t help.

Meanwhile, the thought of applying for a job was hopelessly overwhelming and intimidating. He was afraid to pick up the phone, afraid to call, afraid to speak with people.

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1. “Perhaps,” he muses, “that was due to having so many guns pointed at me by people in uniform throughout my career.”

Only sheer desperation — rent and bills to pay — drove him to approach a new company. Thanks to his extensive experience he was hired on the spot, but on his first shoot, he could not remember how to operate the camera he had used for 12 years.

Some mornings I came in hours ahead of schedule just to practice with the camera. Even then, the film looked terrible because I was shaking so badly. I could not write or focus and was barely able to compose a single e-mail per day. I couldn't believe how badly I was doing and spent most of my time trying to hide my fears and challenges.

Because of continuing back pain, Mike had seen a physician who knew of Dr. Esty's study. Initial testing and evaluation by USUHS researchers revealed that he could not multiply or remember numbers, "and I failed the memory tests so miserably, even *they* were shocked."

Then FNS treatment began in Oct 2012 in the USUHS study.

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| Sessions 1 - 3: "I did feel quite a bit of pain in my back and ribs but it lasted only that evening." Next morning, pain not as strong as usual. Couldn't remember what wife said in a political discussion but wrote a new proposal and many e-mails. Energy "Great" and felt rested. Finished all goals. Surprised by vivid memories of traumatic events in Iraq. After Session 3: Drove fast on assignment, 84 m.p.h., without panic. "I see progress, big changes. Energy levels skyrocketed."   |
| Sessions 4-9. Nervous but no panic attacks even in a difficult driving situation. Huge job stress. Cleaned up over 1,000 e-mails that had been meaning to do for a year. Taught at a conference, nervous but went well. Vivid feelings about Iraq lasted ½ hour after talking with soldier who drove over an IED. Still short term memory lapses but per energy: "I feel fantastic."   |
| Sessions 10-11. Extremely productive. Clearer thinking. Writing long concept e-mails and worked 40 hours in 2 days on a job. Going on overseas assignment.   |
| Sessions 12-14. Fear of police gone. Handled press conference ("used to be the worst fear next to death") without fear for first time ever. Now can drive over bridges but with no fear. Still forgets whole events. After Session 13, described the trauma of seeing a friend killed by a blast 200 yds away. [Session 13 is often when clients bring up a detailed description of some trauma.]  |
| Sessions 15-18 [done over 3 months]: Teaching overseas. Much calmer and making smarter decisions, able to think more strategically. Not afraid anymore. "I was weak, afraid, terrified of myself. My disability was handling life. Able to operate some complicated equipment had never seen before and did a superb job. Couldn't have done that in the past. "I can't comprehend how I was able to become that frail, weak, person that was so afraid. I can't tell you how my life is different." |

By December, Mike was back to working on political campaigns, sports, and high-end documentaries. He has now returned to life as a high-powered full speed professional, in high demand for his excellent skills and high quality professional productions.

And he is driving at safe speeds.