The Complex Architecture and Healing of Traumatic Brain Injuries

The Complex Architecture and Healing of Traumatic Brain Injuries:

Listening to the Brain

By

Leighton J. Reynolds

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INTRODUCTION

I have written this book with the goal of creating a better understanding of both the course, and treatment, of a traumatic brain injury. As you will see in the pages that follow, this is not easy territory to work with. The human brain/mind is complicated and fascinating all at the same time. And in my experience, we are like our brains, that is, complicated and fascinating. This is who we are, and why we do what we do. It's all in the brain/mind.

As I point out in the pages ahead, one of the major issues we need to consider while working to heal a brain injury, is the little recognized fact that our brain/mind control our levels of energy and the process of allostasis which keeps our homeostatic balance in check, moment by moment, throughout our lives. These are huge tasks that do nothing less than keep us alive second by second. But what happens when the brain/mind is injured, and the functioning of our master life switch is severely disrupted? This book was written to help us better understand what happens when a person's brain/mind is not functioning adequately, and what we can do to change this. As you can imagine, this too is a very complicated and at the same time a very fascinating process worthy of much more attention that we currently give it.

As you read further into "The Complex Architecture and Healing of Traumatic Brain Injuries," I suggest several guidelines as to how we can think about and process a traumatic brain injury. First, a traumatic brain injury (TBI) is a disease process, not an event like a broken arm or leg. More specifically, a TBI is a chronic, neurodegenerative disease process. The World Health Organization defines a TBI as permanent, caused by non-reversible pathological alterations in the body, requiring specialized training for long-term care and rehabilitation, and seriously reducing a person's life expectancy. And as if this was not enough, a TBI increases long-term mortality, is associated with increased incidents of seizures, sleep disorders, neurodegenerative diseases (Alzheimer's Disease, Parkinson's Disease, ALS, MS, and can lead to major psychiatric disorders such as schizophrenia and Manic/Depression or Bipolar I and Il). (See the World Health Organization 2002). A TBI is also associated with non-

neurological disorders including sexual dysfunction, bladder and bowel incontinence, and systemic metabolic dysregulation. These problems/ issues can arise and persist for years after the initial injury to the brain. Overall, a TBI can impact multiple organ systems in the body and can be disease and illness causative and accelerative. (1)

Yes, trauma to the brain/mind can cause huge problems, including death, as you will see in the cases presented here. In my opinion, observation and experience, a TBI is the beginning of a chronic disease process and needs to be recognized and treated immediately! I also note that I disagree with WHO on the issue of a TBI being permanent, caused by non-reversible pathological alterations in the brain. This entire book is dedicated to the perspective that a TBI can be reversed. This is no easy undertaking, but it is, as the cases ahead demonstrate, very possible!

Brain injuries need to be recognized in a different manner than all other illnesses and diseases. First, there is a prevalence of misdiagnosis and misinformation about brain injuries. A major reason I have written this book is to clarify the diagnosis and information we know about traumatic injuries to the brain. Second, because of the complexity of the human brain/mind there is a great deal of unpredictability regarding the prognosis.

Third, there is a complexity of symptoms. As I note in the pages ahead, the symptomatology of a TBI affects every aspect of a person's life. Because the human brain/mind is the master switch for our entire existence. Note here the complexity of symptoms resulting from an injury to the brain:

- The person cannot remember things very well.
- Their attention and ability to concentrate and focus is frequently impaired.
- Their behavior is different. Often, they do not appear to be the same person.
- There are personality changes (usually becoming more aggressive and/or hostile).
- Noticeable memory loss.

- Changes in their social behavior (either becoming more isolated or more aggressive).
- Noticeable cognitive decline.
- No two cases are the same (it is very important to recognize this).
- Different functional areas are affected depending on where the injury has occurred (cognitive, balance, vision, and emotional regulation). In my experience, any injury to the brain, may affect certain areas of the brain more than others, but the injury always has pervasive effects on the brain/mind.

Fourth, TBI patients have impaired self-awareness. Because their brain/minds are not functioning effectively, they often do not recognize their own impairments. Thus, a pre-existing misunderstanding of brain injuries coupled with an impaired appreciation of their injury, can make working with brain injured patients a huge challenge. Fifth, the invisible nature of a brain injury. ("Gee, the person looks fine.") I note that it is not uncommon for persons experiencing a brain injury to be at risk for doubts and suspicions by those around them because of this invisible nature. Moreover, I have observed that with my patients who have sustained a TBI, intelligence and consciousness are not as severely affected as one might guess. But what is affected is the execution of their intelligence, however subtle this may be. (2)

Fifth, I note that both the above articles have been out for approximately a decade, and yet this has not changed much in the ways that TBI patients are recognized and treated. It is my goal with this book to build on these ideas and help our medical system more effectively recognize and treat traumatic brain injuries.

Finally, I note that I am presenting a different perspective for our understanding of the course and treatment of a TBI than our current fragmented, reductionist, drug-based treatments. I am weaving together some strands of medicine in a different manner than I have witnessed before. Woven throughout the book are the concepts of a "shock trauma," the "four architectures" of a TBI that I have come to understand, the importance of "homeostasis, allostasis, and allostatic load," in working with TBI patients (something I believe applies to all injuries to the brain/mind), and the importance of recognizing that all injuries and insults to the brain/mind are traumatic and therefore all TBI cases are also all

cases of PTSD. This conception is now understood as the "perfect storm" in the brain.

In working with these issues from a neuro-psychoanalytic perspective (this is the interfacing of neuroscience and psychoanalysis), I will be advocating for the following seven guidelines:

A. All injuries to the brain are best understood as the beginning of a neurodegenerative disease process. If trauma to the brain is left unrecognized and untreated, the road forward leads to a serious disease process in the brain. This can include PD (Parkinson's Disease), AD (Alzheimer's Disease), ALS (Lou Gehrig's Disease), MS (Multiple Sclerosis), MSA (Multiple Systems Atrophy), Complex-PTSD, CTE (Chronic Traumatic Encephalopathy) and Glioblastoma. But this all begins with some kind of trauma to the brain/mind.

B. An injury to the brain results in disruptions to the electrical and chemical pathways in the brain and eventually leads to a cascading build-up of toxic substances in the brain. Even though this may take years to manifest in the person's life. (See the work of Dr. Ann McKee at Boston University on the four stages in the brain that eventually lead to CTE).

C. Demands on the brain/mind for any type of work interfere with the healing process, because they take energy away from this process. Understanding this fact is crucial to a patient's recovery.

D. Neuroplasticity is real process that can work to restore brain/mind functioning and effectiveness.

E. Healing a brain injuring needs processing. Patients need to be able to put their experiences into words/language. In my experience, this process promotes healing through literally rewiring the brain.

F. The brain needs nutrients/supplements in order to heal. Treatment cannot rely solely/mostly on drugs.

G. The reason for the pervasive symptoms TBI patients experience has to do with homeostatic balance. Because the patient's homeostatic balance has been seriously disrupted and dysregulated by the trauma to the brain/mind. This leads to dysregulation in the body's

allostatic processes and an increase in the body's allostatic load (in many cases to dangerous levels).

I shall leave the reader with one final thought before you join me on this journey to understand and treat traumatic brain injuries. It is important to remember that our brains are not, contrary to popular ideology, built for thinking. As Dr. Lisa Feldman Barrett points out in her brilliant book *7 ½ Lessons About the Brain* (3), our brains were built through millions of years of evolution for survival (of which thinking is a part). It stands to reason then that when the brain is injured a person's very survival is being threatened. Again and again, in my work with TBI patients, this lesson is brought home to me. My patients' very survival is being threatened, and this is an incredibly serious situation to be dealing with.

Given this perspective, the story ahead is my journey of what I know so far about healing a traumatic brain injury, the avoiding the threat to a patient's very survival. And never forgetting that there is much more to learn here……

Let" begin with the case of Mrs. J.

(1) "Traumatic Brain Injury: A Disease Process, Not an Event" by Brent E. Masel and Douglas S. DeWitt in the JOURNAL OF NEUROTRAUMA 27: 1529-1540, August 2010.

(2) "Working With Mild TBI: Voices from The Field" by Page Walker Buck, Rebecca G. Laster, Jocelyn Spences Sagrati, and Rachel Shapiro Kirzner in Rehabilitation: Research and Practice published online February 7th, 2012 (Access through: www.ncbi.nlm.nih.gov).

(3) Lisa Feldman Barrett, *71/2 Lessons About the Brain,* Houghton Mifflin Harcourt, Boston 2020.

CHAPTER ONE

“BUT NOW WHAT?”

In tears, sobbing.

"Dr. Reynolds, I can't breathe anymore!"

It was very obvious that Mrs. J. was gasping for breath, sitting in my office. And I was wondering how she even made it into the office.

"My hands aren't working."

"I'm constantly dropping things. And I am in a constant state of brain fog."

She paused for a moment trying to catch her breath between the sobbing.

"l am probably having absence seizures, because I keep blacking out."

"And it doesn't end there. I keep tripping and falling because I'm losing my balance all the time."

She paused, staring straight ahead.

"And guess what, I don't like living in my body anymore. It's not working!"

"And you have no quality of life anymore?"

"No, I don't!" "

“What about your pain levels?”

"Constant!"

“Fatigue?”

"Constant!"

When a patient reaches this level of despair, what can we do to help them?

"I'm thinking about a reset button for you."

"l think I'm beyond that point. I just want to die and get it over with!"

She began sobbing again.

"l am so overwhelmed by everything. There is NO hope for me! There just isn’t!”

Mrs. J was struggling with a brain injury that had gone on undiagnosed for over four years. Nine months before she began seeing me, she had a total collapse. As she described it: “I was suddenly losing all functionality and I didn't understand why."

"And now I have nightmares all the time. So why would I want to stay alive and be completely miserable every day? I don't see how any reset button is going to help me."

Her session raised the question with me of how any doctor or therapist can walk a patient back from the edge of despair. That awful cliff that many persons find themselves on the edge of, with no hope that anything will ever get better.

Many years ago, I was taught a paradigm for major depression that I have come to understand has many applications in the treatment of both psychological and physical illnesses. When people feel that their lives are not going well, that they are very unhappy. They will often protest in ways that others around them don't pick up on. Infants and children, for example, will be fussy and inconsolable for days, weeks and months. Their message: something is wrong. If this message goes unrecognized, the infant, child, adolescent, adult moves into a pattern of despair and hopelessness. This is what I believe Mrs. J. was struggling with in my office that day.

In turn, if protest and despair are not addressed then the infant, child, adolescent, or adult becomes detached from life. In my experience, this is almost an automatic experience as the brain/mind begins to shut down and the individual becomes vulnerable to suicidal thoughts and taking their

own life. Just as Pittsburg Steeler great Mike Weber did, dramatized so well in the film Concussion (2015). Fortunately for Mrs. J., she had an advantage that Mike Weber and many other persons did not, she could have a relationship with another person who understood what she was going through. And this is what "listening to the brain" is all about. The clinician's ability to listen to how the patient's brain is functioning. Because the human mind is the subjective experience of exactly how there is functioning (or not functioning).

Through my psychoanalytic training I came to understand the value of just sitting with a patient, allowing them to vent, express, and discharge their emotional states. This is the process of affect regulation (AR), also understood as emotional regulation. AR refers to an individual's ability to modulate their own emotional states, allowing them to effectively adapt to the continuous demands of their environment (both external and internal). In a nutshell, this is our ability to manage and respond appropriately to our emotional experiences while remaining within a window of tolerance. And when our emotional experiences exceed our ability to manage and respond appropriately, this then becomes an experience of affect dysregulation. That is what was affecting Mrs. J. so severely that day in my office. I note that her affect dysregulation was caused both by her brain injury and the PTSD she was struggling with, now understood as "The Perfect Storm" in the brain. More about this later in the book.

Returning to Mrs. J.

A day after this session, Mrs. J. was in better spirits, but she was definitely not okay. Her symptomatology was heading in the direction of ALS (commonly known as Lou Gehrig's Disease), not a good prognosis. This realization was very scary for both of us, because ALS is a devasting disease of the motor neurons in the brain. (4) I will be describing this disease in more detail later in the book. For now, I am indebted to Dr. Howard Weiner's book: *The Brain Under Siege* (5) for laying out a conception of what is going on in the brain when a person is in such a terrible place, as was the case for Mrs. J.

Dr. Weiner points out that there are five possible causes of brain problems, causing the brain to be under siege. I have added a sixth element.

1. There is an infection in the brain.

2. The individual's immune system attacks the brain.

3. Genetic issues.

4. Bacteria in the Gut

5. There is an accumulation of altered proteins that are toxic to the brain, and cause serious, cascading damage in the brain. This situation, I believe, is most often caused by a blow to the head severely disrupting the brain’s ability to function.

6. And I have added a sixth cause: PTSD which over time disrupts the functioning of the brain/mind.

Mrs. J.'s problems began many years ago with a long history of traumatic incidents (PTSD), and then she suffered a blow to the head which caused her to sustain a TBI that was unfortunately not recognized. Feeling a little better the day after her very distraught session, she agreed to try a reset button.

In many ways, this case begins in the same way that the film "Concussion" (2015) begins. The film vividly portrays the agony NFL star Mike Weber found himself in, because he felt that his brain was going crazy and that there was no way out and no one to help him. Eventually, sadly, he found a way out through suicide. I believe that Mrs. J. was at a similar point that day in my office, struggling with trying to find a way out. But she had someone with her that could help her "listen to her brain," and create interventions that could help her "walk back off the edge of the cliff."

My guiding light here with my patients is my perspective that the human mind is the subject experience of the human brain. We are all subject to how our brains are functioning, as they "paint a continuous picture" of our worlds second by second. Over time, this process is built into the specific wiring of our brains, and this is how we all respond to our environments, both internal and external. It is easy to say then that if it's not in the brain, then the person can't experience it. However, this can get a little confusing and complicated because we are also social creatures subject to social experiences that regulate our brain/minds and at the same dysregulate them. In this case, I was able to help Mrs. J listen to her brain

and thereby gain an understanding and the ability to intervene in the rapidly forming disease cascading through her brain. This is not an easy process! But because of the gift of neuroplasticity, the brain/mind can be rewired, and a person can gain their health back. I don't believe this is possible, however, without the presence of another person who understands how the brain/mind works (individually unique to each one of us), and how to be with another person whose brain is injured, ill, diseased, or disabled.

In the pages that follow I will be sharing my journey and exploration to better understand what a healthy brain is all about, the exact processes in the brain that go astray in the cases presented here, and how we can interrupt and reverse the course of brain damage in these cases. This is not, as you shall see, easy territory to work in (see Dr. Howard Weiner's *The Brain Under Siege*, 2021). Along the way, I will be sharing the Neuro-Psychoanalytic perspective that I was trained with, that has been so helpful to me in understanding and treating disruptions to the functioning of the brain/mind.

Neuro-Psychoanalysis is an emerging discipline working to interface psychoanalysis with neuroscience. (6) This is where Freud began his development of psychoanalysis with the *Project for a Scientific Psychology*. (7) Eventually, however, he gave these early ideas up in lieu of the depth psychology we know as psychoanalysis. The *Project for a Scientific Psychology* was intended to be a natural science explanation of psychological phenomenon in physical terms. I believe Freud was on the right track with his attempts to understand the biology behind our mental processes. But he lacked the neuroscience tools and discoveries that are available today. The hallmark of much psychoanalytic work after The Project is a recognition and deep understanding of the power of the unconscious in all aspects of our lives. With Mrs. J. and all my other patients, I have found myself asking: exactly what is happening in the unconscious when the brain is injured? This is not an easy question to answer. But if the unconscious really runs all of us in so many ways, this is something important to understand as you will see in the pages ahead.

Back with Mrs. J.

"Dr. Reynolds, I do feel a little better today. But I am so scared. My brain is out of control, and I can't stop it!"

"The concept of a brain under siege makes a lot of sense to me. Something is at work seriously disrupting the functioning of your brain/mind. When I look at the six possibilities of why your brain is out of control, under siege, the two that stand out the most to me are: PTSD and the build-up of toxic proteins in your brain. And it is also very possible that your immune system is attacking your brain."

"Okay, but now what? I do not have much faith that anything is really going to change. I think that I am a goner!"

What lies ahead in this book is my attempt to answer her question: “But now what?” How do any of us succeed “in the face of a brain under siege,” that in my experience too often has a “mind of its own.”

Next, Chapter Two explores how I got started with the concept of “listening to the brain.”

(4) Robert H. Shmerling, MD, Senior Faculty Editor, “Can ALS be Caused by a Traumatic Brain Injury?,” Harvard Health Publishing, Feb. 2, 2022 (https://www.health.harvard.edu/blog/can-als-be-caused-by-traumatic-brain-injury).

(5) Howard L. Weiner, MD. (Professor of Neurology, Harvard Medical School), “The Brain Under Seige,” BenBella Books, Inc., Dallas, TX 2021.

(6) Mark Solms and Oliver H. Turnbull, “What Is Neuropsychoanalysis?” in Psychoanalysis, 2011, 13 (2).

(7) Freud “Project for a Scientific Psychology” by Sigmund Freud 1895. (https://www.scribd.com/documents/273507623/project-for-a-scientific-psychology#)

CHAPTER TWO

THE BEGINNING

My journey to understand the healing of a traumatic brain injury began in Orange County, California, in 2016. I truly had no idea of what I was getting into at that time. As it turned out, my next-door neighbor was a lawyer who worked in the field of Workman's Compensation Law. His clients were professional athletes from all sports, who had sustained major injuries during their playing careers (these are all Workman's Compensation Cases). One evening he asked me for my opinion regarding a National Hockey League player. Mike was a former enforcer in the NHL who was now struggling with Grand Mal Seizures. (8) Intrigued to understand just how this had happened, I said yes. Little did I know that I was walking into two huge challenges.

First, the number of professional athletes struggling with a traumatic brain injury as a result of their career in professional sports was shocking to me. As a person who had been involved in competitive sports all my life (and a sports fan), I had no idea about the extent of these injuries. Nor of the deaths that were too often the result of a TBI that had gone unrecognized and untreated. Subsequently, I came to understand that the high incidence of traumatic brain injuries was not limited to professional athletes, it is occurring throughout our society, too often unrecognized and untreated by medicine, law, and psychology.

The second challenge involved my recognition that traumatic brain injuries are still actively being dismissed in professional sports (illustrated so well in the 2015 movie "Concussion"). And on a larger scale, within our society, in our supposedly sophisticated culture, they are being downplayed as well. I began asking myself then: "How is it that the human brain, this incredible organ that everyone on the planet shares, gets so little recognition, and understanding?"

Both of these challenges are worthy of our time, interest, and attention. In this book, I will be concentrating on what traumatic brain injuries are all

about, why they are occurring so often and why they are so often unrecognized, and what we can do to heal them. I will take up the second challenge in my sequel novel series "The Outlaw Chronicles" (The sequel to "Moon Over Seaville" in four episodes). (9)

Back with Mike's case. I quickly learned that he had suffered a serious concussion during an enforcer fight on the ice in the middle of an NHL game. Watching the video of the fight was heart-wrenching as Mike flew backwards landing on the ice with the back of his head. This resulted in a Grand Mal seizure several months later while he was working out in the team gym. Sadly, this was all covered up by his team and Mike was back playing professional hockey as an enforcer as if nothing had ever happened. This was the worst thing he could have done for his brain injury. Grand Mal seizures are no picnic!

Following his return to the team after the original incident, Mike was often confused having difficulty remembering his teammates names and the directions to his home NHL rink. Again, sadly, this was never addressed, and Mike gradually improved giving the appearance that he was back to normal. Only he wasn't, by far!

I also quickly became interested in the "brain specifics" of Mike's case. Exactly how does a serious concussion eventually end up causing Grand Mal seizures in the brain?

With seizures that occur more than one week after a TBI (considered to be a Late PTSD Seizure), 80% of these individuals will continue to have seizures leading to a diagnosis of Epilepsy. This was the case for Mike. And while he was handed a bottle of Dilantin (the major treatment for seizures at that time) by the team doctor, there was no follow up treatment to monitor his TBI or his seizures.

What then was happening to his brain during this time that led to the seizures? It is important to note that brain tissue reacts to trauma at two levels. First, there are a series of emergency biochemical and physiological responses to the trauma that affect electrical conductivity in the brain. Second, as a result of these emergency responses, substances that were once safely housed with brain cells then flood the brain, causing all "sorts of mischief" including further cell death. I will be exploring both of these levels in further detail in the coming chapters. And of these two levels, I believe the second level is the most damaging.

In my experience, these two challenges are intertwined. For much of medicine, psychology, and law, traumatic brain injuries are either not that bad ("Just rest for a while."), and therefore don't deserve that much attention. Or, the seriousness of these injuries is covered up, because the treatment involves a lot of money. As you will see in the case studies that follow, brain injuries have devastating consequences for any individual.

Back with Mike, again. What are the "brain specifics" of Mike's case that eventually led to his epilepsy?

To begin with, what exactly is epilepsy? Epilepsy is a brain disorder that causes repeated seizures in the brain. A seizure is the result of abnormal activity in the brain. And an individual is at a higher risk for seizures after a TBI. A seizure that occurs more than one week after a TBI is considered a late posttraumatic seizure. 80% of individuals with this condition will have seizures that lead to epilepsy. This was the case for Mike. And while he was handed a bottle of Dilantin (antiseizure medication) by the team doctor, again, there was no follow up to monitor his damaging concussion. Instead, it was business as usual on the ice. But dangerously so for Mike.

The symptomatology of epilepsy includes (10):

- Euphoria during an aura which precedes the seizure.
- Temporary confusion and/or episodes of unresponsiveness and staring blankly off into space.
- Uncontrollable jerking movements and/or twitching of the arms, legs and the body.
- A loss of consciousness or a loss of the awareness of one's surrounding.
- Difficulty walking.
- Not speaking or understanding very well.
- Psychological symptoms: overwhelming fear and anxiety.
- New outbursts of anger and/or tearfulness.
- Changes in vision, hearing, smell, and taste.

- Unusual movements of the head, body, arms, legs and eyes including fumbling movements.

- Sudden tiredness or dizziness.

It was after he had retired from Professional Hockey that Mike's Grand Mal Seizures became a real problem. At one point, Mike had a Grand Mal Seizure in a major sporting goods store and had to be taken to the hospital via ambulance. This was the long "cumulation" of several factors: a serious concussion, no recognition of the seriousness of what he had experienced from his NHL team, and a coverup of the doctors who did weigh in on the seriousness of his condition. These doctors had noted that because of the location of his injury, the right temporal lobe, he was likely to experience seizures in the future. Which is exactly what happened!

What are the types of seizures that can lead to a diagnosis of epilepsy? (11)

There are Generalized Seizures affecting both sides of the brain. This type of seizure includes:

- Myoclonic Seizures where there is sudden jerking of all, or parts of the body accompanied by headaches and a generalized feeling of irritability.

- Atonic Seizures are usually very brief often causing a loss of posture, and the person may fall to the ground.

- Absence Seizures (formerly Petit Mal Seizures) where the person will stare blankly into space not paying attention to their surroundings. Their eyes may flutter or blink repeatedly, and they may be smacking their lips.

- Atypical Seizures will look like Absence Seizures but with repetitive symptoms such as eyes opening and closing, rolling their eyes outward and inward, and body stiffening.

- Partial Seizures affect one part of the brain depending on what part of the brain is demonstrating abnormal activity. These types of seizures can be:

- Simple or complex.

- There can be a loss of consciousness.
- The person may feel less awake and alert.
- A person may be suddenly overwhelmed by fatigue and/or dizziness.
- There may be an inability to speak or understand.
- There may be uncontrolled eye movements and/or jerking of the entire body.
- And there can be erratic muscle movements, confusion, hallucination, excessive sweating, and/or repetitive odd behaviors.

Whatever the type of seizure, they all occur when the normal electrical activity in the brain is thrown off balance as a result of structural damage, swelling, disruptions to the functioning of the axon (the nerve fibers), or bleeding in the brain. When the electrical signals in the brain lose their normal pathways, they either short circuit or there is a surge of electrical impulses. And the risk factors that can trigger seizures includes drugs and alcohol, a lack of sleep, and an increase in distress, illness, and/or an electrolyte imbalance.

And what does all the above tell us about the human brain/mind and Mike's injury?

I note that approximately 166 Americans die each day from TBI related injuries. In 2019, there were 61,000 deaths in the US related to a TBI. Based on my experiences, and the under recognition of TBIs, I suspect that there a lot more deaths in the US that can be attributed to problems with a traumatic brain injury. (12)

I also note those groups most affected by a TBI include:

- Racial and ethnic minorities,
- The homeless,
- At correctional and detention facilities,
- Survivors of domestic abuse,

- Those in rural areas.

And to this list I would add victims of car accidents and professional athletes in all sports.

Back again with Mike's case, in 2016, the commissioner of NHL issued a statement that denied the connection between the play of professional hockey and traumatic brain injuries. Mike's case is a direct contradiction of this statement. Which brings us back to the second of the huge issues I walked into when I began working with professional athletes and traumatic brain injuries. Denial and cover-up!! More about all this later in this series (and in the upcoming "The Outlaw Chronicles").

And then what connects all of this: concussions, traumatic brain injuries, seizures, and epilepsy? This all adds up to disturbances in the electrical conductivity of the brain. And when this balance is upset, the brain is injured, leading to a downward neurodegenerative spiral that can quite possibly end up as some specific type of dementia (Alzheimer's Disease, CTE, Parkinson's Disease, ALS, and senility are the major candidates here). (13) How, then, can we reverse this downward spiral and restore the delicate balance that is our brain/mind? That delicate balance of who we are as a person. Our sense of a self, which is ever precious!

As Mike said to me on numerous occasions: "I'm really messed up man!" Which I understand to mean that when your brain is not functioning normally, a person will feel exactly this: really messed up.

In the pages that follow, I invite you to explore with me exactly what traumatic brain injuries are all about, and the complex and complicated process of healing a brain injury. To do so, I will be using case histories that explore how these individuals sustained a head injury, what happened to their brain/minds as a result, and the challenging course of their healing process. As you will see, this is not an easy territory to work in. Every traumatic brain injury is also a person who brings with them their personality and character traits, and their developmental history. In other words, it is paramount that we are also working with "the person" (the whole person) who has a TBI.

I worked with Mike over three of the seven years it took to settle his court case for Workman's Compensation. Along the way, he brought to my attention just how many NHL players were suffering with TBIs, and

tragically how many NHL players were dying of their head injuries. This is a stunning fact: that playing professional sports puts the individual at risk of death! Stunning!

And interwoven with this tragic material, I will also be introducing some of the many fascinating dimensions of our brain/minds. When I turn around to look at all this, I am also stunned by how little attention our society and culture pay to our most important asset: our brain/mind. For example: the concept of the "default mode network" in the brain. (14)

The default mode network (DMN), also known as the default network, default state network, or the anatomically medial frontoparietal network, is a large-scale network in the brain composed of the medial temporal lobe, the prefrontal cortex, the posterior cingulate cortex, the ventral precuneus, the angular gyrus and parts of the parietal cortex that is associated with some aspects of internal thought. The medial temporal lobe is associated with memory. The medial prefrontal cortex is associated with the "theory of mind." That is, the ability to recognize others as having thoughts and feelings similar to one's own. And the posterior cingulate is involved in integrating different kinds of internal thought.

This network (there are other networks in the brain) is most active when, interestingly, the brain is at rest. In general, the DMN is active when the person is NOT focused on the outside world, when the brain is in a wakeful, resting zone that can include daydreaming and daily wandering mind. The DMN plays an important role in self-reflection and self-identity processes. This includes when a person is thinking about themselves, about others, remembering the past, and/or planning for the future. The DMN can also be active when the brain is working on detailed thoughts about the performance of an external task. And when the brain's attention is directed toward a task or a goal, the DMN deactivates.

The DMN is involved in connecting the essential states of self-focus, social cognition, and mental time travel, all of which we might consider as reverie. But a reverie absolutely essential to our overall well-being. And yet we hardly factor this component of our brain/mind into any aspects of our society/culture (including when the brain/mind is injured).

What can we conclude about how all this relates to traumatic brain injuries? There is research demonstrating that changes in the DMN have been linked to different disease processes such as Alzheimer's Disease, Parkinson's Disease, Autism, Schizophrenia, Bipolar (manic/depression),

PTSD, depression, and anxiety. The research is demonstrating that there is lower conductivity between the components of the DMN within these disease processes.

I return to Mike's statement that he was "a mess," and other statements he made indicating that "1 am not the man I used to be." And I raise the question, is it because his DMN has been damaged and he is in fact not able to experience a coherent sense of self that occurs so naturally within the activity of this resting state in the brain. All of which dovetails with my experiences treating TBI patients, that they are often unpredictable and difficult to work with because they are in fact not processing the world in the same way we would expect them to. And this is NOT, unfortunately, a perspective considered often enough in the treatment of patients with a TBI.

In the pages ahead I will be introducing the guiding principle of my work with TBI patients: that the human mind is the subjective experience of the brain, in its design, its history, its development and its experiences. And if the brain is damaged, the mind will not be the same. Again, a perspective we seldom take this into account when working with TBI patients, and something I believe can be addressed so effectively by "listening to the brain."

From here, I begin to explore further individual cases of traumatic brain injuries and my work with these patients. This is all occurring at the same time as a tremendous amount of energy is being brought to bear on the subject of the human brain. Simultaneously, I also observe a substantial amount of resistance to the challenge of understanding and working with what I believe is our greatest gift from the Universe: the human brain/mind.

In summary, ahead, I will be exploring more about how our brain/minds work, what happens when the brain/mind is injured, how we can work to heal these injuries, and what impact this work is having on medicine, psychology, and law.

Next, let's look at the case of Mr. H., the boxer.

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CHAPTER THREE

THE BOXER

(Note to the reader. I have included the references directly in the text of this chapter because I believe the connection between the chronic fatigue all my brain injured patients experience is directly related to disruptions in their brain metabolism. And this connection is crucial to their recovery.)

"You took a blow to the head?"

"l saw it coming so I just took it. It's all part of sparing. No big deal, but I have to admit that this one was a pretty heavy blow. Not the usual."

Mr. H. had been in the process of working on a transition from boxing as a good workout to serious boxing in the ring. But as he was explaining to me, that had all come to an abrupt end about six months ago. As he was talking, I was thinking that in the long run he was probably better off because serious boxing is dangerous to the brain on so many levels.

"What happened after you got hit?"

"1 just shook it off and went home right after practice.

"How did you feel once you got home?"

"l started feeling very sleepy, so I took a nap. But when I woke up, I just didn't feel right."

"What didn't feel right, exactly?"

"Well...I was dizzy and then I threw up out of nowhere. By

8pm I was asleep again."

"And the next morning?"

"When I woke up, I definitely did not feel good!"

"You went to the ER that morning?"

"Yes, my mother took me to the ER, and one of the doctors there examined me. Then I had an MRI and he sent me home because everything looked good. He told me to rest for a week and I would be fine."

"Then what happened?"

"I started getting worse."

"And what was the experience of getting worse like?"

"I just didn't feel right. Not like my normal self at all. I was tired all the time. I would get dizzy very easily. And I had ringing in my ears almost constantly. And oh, see, I can't remember anything. It was my memory. I had trouble remembering anything about what I was supposed to be doing, or what just happened a minute ago. Doc, five to six months after that hit, I was a total mess."

"It was a nightmare?"

"It has been a nightmare from day one, really. I have literally lost my life. If I try to go back to work with my dad, by the time I come home at night all I can do is go to sleep. And then when I wake up, I don't feel rested at all."

"What about headaches? Blurred vision? Major stiffness in your body?

"l have all that stuff, but the headaches are the worst. I have to go lie down immediately, or I start losing my balance from the pain."

He paused for a while, lost in his thoughts.

"Look at it this way, Doc. I was told to go home and rest for a week, or two, and I would be just fine. But look at me now. I am a total mess." Mr. H. paused again. "You're right, this has been one big nightmare. And the worst part, I just can't get out of it!"

Beginning in 2016, patients began showing up in my office with complaints that were similar to Mr. H.'s. And with much the same treatment recommendations: go home and rest and you should be fine in a week or

two. But as with Mr. H's symptomatology (the collection of a person's symptoms that add up to an injury, illness, or disease), "the just go home and rest recommendation" wasn't working. I was seeing patients who had been complaining about these same kinds of symptoms (constant headaches, chronic fatigue, chronic pain, loss of especially short-memory, daily brain fog and frequent ringing in the ears) for years with no treatment offered and no resolution of their condition. Fortunately, I did have a heads up about these kinds of symptoms because I had just begun to work with professional athletes (of all sports) and the traumatic brain injuries they were struggling with. But I did not expect the flood of patients who were suddenly showing up in my office with head injuries from "routine stuff" such as car accidents, bicycling accidents, childhood falls, and sports injuries at all ages. I wasn't reading about this anywhere. And aside from the court cases involving professional athletes and workman's compensation, I didn't know anyone who was even remotely talking about these types of head injuries.

What was going on for these patients is that their problems all appeared to have originated from a single blow to the head, or multiple blows to the head over a period of years. And why was it that the types of symptoms Mr. H. and others were experiencing were not getting the attention their symptoms deserved. This is what I wanted to understand.

All these patients had experienced some degree of concussion (considered to be a mild traumatic brain injury, mTBl, although in my experience mild is not the right word here), and I could diagnose them with PCS (post-concussion syndrome). Straight forward, right? Concussion. Diagnosis: mTBI. Rest. Recovery. But as I had quickly learned, brain injuries of any type are anything but straight forward. In my experience, a blow to the head is never benign. There is always a consequence to rattling the brain/mind that is very complex, and never good.

During our second session, Mr. H. had to leave after only 10 minutes in my office.

"Hey, Doc. I just can't sit here anymore. It's the lights. They're too much for me. And I am getting a really, really bad headache."

"Should we try again tomorrow?"

"I'm sorry. I've got to go. This is becoming brutal!"