THE BRAIN HEALTH MAGAZINE

Turning *Brain Fog* into **BOOSTED BRAIN FUNCTION**

Playing the **HAND SHE'S DEALT**

Brain Fog & **COVID-19**

THE **BRAIN FOG** ISSUE

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FROM THE EDITOR

Fall is in the air! I love the changing of the seasons and the energy it brings; however, each season also brings its own set of challenges (for me).

Summer can be draining with the hot and humid weather; winter can be painful when low pressure fronts come in and drop a blizzard on us; spring is riddled with allergens; but fall — fall is the holy grail of seasons for me! The mild temperatures, stable weather, and minimal allergens make fall a welcome season for me in the Midwest.

As we talk about seasons, it also brings to mind this month's theme: brain fog. Brain fog is the most common complaint I hear from brain injury survivors, and I believe some of my above-mentioned seasonal complaints contribute to brain fog.

Hot, humid weather can really wreak havoc on our autonomic system, especially if we already have temperature control problems or dysautonomia.

Allergies can cause inflammation and can trigger histamine response in our bodies, which can feel like pressure in our head.

Weather fronts and falling barometers can trigger headaches, which can also feel like pressure inside the head.

Additionally, the foods we eat can also play a large part in brain fog, or a feeling of fuzziness. Sensitivities to gluten, dairy, and histamine all play a role in inflammation and brain fog.

If you've been struggling with brain fog for a long time, you may be in a constant state of inflammation. Until you get the inflammation under control, you may never feel relief. But there is good news with the bad —great treatment options for inflammation are available!!

As you will read in the pages of this issue, you will begin to see a new perspective on what might be triggering your fog and fuzziness and learn ways to eliminate it.

For me personally, functional neurology was a huge part of my recovery. Combining certain exercises and modalities, along with supplements and diet, were critical. I have mostly eliminated brain fog from my life. Of course, I do have occasional flare-ups (with the above-mentioned seasonal issues) but I have learned what to watch for, and how to counteract it quickly and efficiently.

I hope this issue can bring you some much needed relief from brain fog, and help you understand where it is coming from, and how you, too, can learn how to avoid it!

AMY ZELLMER, EDITOR-IN-CHIEF
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Spaced Out or Scatterbrained at School?

7 Causes of *Brain Fog* in Children

Brain fog is a fuzzy term. It's not an actual medical diagnosis, but the phenomenon is real nonetheless. It's that feeling of reduced mental clarity, the inability to focus, poor memory, or lack of attention. Brain fog is that sensation of feeling spaced out and scatterbrained. When we talk about brain fog, most people think about adults who are experiencing a lack of mental clarity after a brain injury, following chemotherapy, during menopause, or as a side effect to a prescription medication. We rarely associate brain fog with children. But kids can experience brain fog, too, and at the expense of their ability to think and learn effectively. And sometimes the cause is something we might not have considered! If your child seems scatterbrained, here are seven potential reasons your child may be spacing out in the classroom or at home:

BY DR. AMY MOORE

1 Lack of Sleep

We talk so much about the importance of sleep for both children and adults. Remember that children's brains are still developing, and sleep is critical for that process. A lack of sleep can lead to problems focusing on instruction and learning tasks. Mind wandering and daydreaming might be solved by a better sleep routine at night. Aim for at least eight hours to maximize the benefit of sleep on the reduction of brain fog.

2 Seasonal Allergies

The dreaded pollen season that brings sneezing and watery eyes may also be a reason your child's brain is clouded with fog. Why? Allergies are an immune response that triggers the production of histamines and cytokines, chemicals that cause inflammation, not only in the eyes, sinuses, and lungs, but throughout the body. If the body has inflammation, so does the brain! Treating seasonal allergies comes with its own challenges, though. Many allergy medications that reduce the immune response can also cause drowsiness, which worsens the brain fog. So, finding a non-drowsy treatment is the key to reducing the brain fog associated with seasonal allergies.

3 Food Allergies

The environment isn't the only cause of an allergic response. Food allergies are a big culprit as well. Food allergies and sensitivities can trigger the same histamine response experienced with seasonal pollen allergies. Finding and avoiding those foods is the key to minimizing the reaction and the ensuing brain fog. An elimination diet is one way to examine those responses, but allergy testing can also identify foods your child may be sensitive or allergic to as well. Then, avoiding or minimizing exposure to those foods (good luck, Moms) gives you the best chance of reducing the brain fog associated with food sensitivities. Undiagnosed celiac disease (CD), an autoimmune condition fueled by the ingestion of gluten, is a primary cause of food-related brain fog. With a CD diagnosis, eliminating gluten from the diet is the only cure.

4 Concussions

If your child has suffered a sport-related concussion (or more than one) or hit to the head, brain fog is one symptom that frequently emerges following a traumatic brain injury. Although concussion-related brain fog is common and can last two to four weeks, you should always consult a doctor any time a child has mental confusion following a head injury just to be safe. In general, the fog will lift once the brain has a chance to recover from the injury.

5 Stress

We don't always associate physical symptoms with stress in children, but the connection is real. In fact, anxiety is a primary cause of brain fog. So, children who are suffering stress and anxiety will frequently struggle with memory, focus, and learning. Some of the problem is caused by diverting so much cognitive capacity to battling the anxious thoughts that there's little left for concentrating on learning. But the chemical response to stress in the body also impacts the ability to focus. When your child is experiencing chronic stress, the body produces an excess of the stress hormone cortisol, which causes inflammation and reduces the connections with the prefrontal cortex, the part of the brain most responsible for managing the learning process. Finding and treating the cause of the stress and anxiety is the most effective approach to reducing the brain fog associated with it.

6 Hormonal Changes

It's commonly recognized that menopause creates cognitive problems as women age, and that's the result of the hormonal changes they are experiencing. When kids enter puberty, the hormonal upheaval and surges they experience can similarly cause problems with thinking and learning due to brain fog. The good news? It's temporary and can be minimized by focusing on optimizing sleep, physical activity, and nutrition.

7 Medications

We know that medications with a "may cause drowsiness" warning label are typical culprits of brain fog. If your child is struggling with memory and focus, it's a good idea to check the labels on those bottles. Antihistamines and anti-depressants are the top contributors to brain fog, and commonly prescribed to children. Sometimes mental fuzziness is a temporary side effect but talk to your child's doctor about alternative medications if the problem persists. It's tough to balance the reduction of your child's symptoms with maximizing your child's ability to perform at school!

Brain fog in children is real. And many potential reasons your child may be experiencing reduced mental clarity exist. Whether the cause is allergies, brain injury, or medication side effects, the struggle is frustrating for kids, parents, and even teachers. Finding the cause is the first step in helping your child overcome the frustration associated with the experience of brain fog. Regardless of the cause, a focus on sleep, nutrition, physical activity, and mentally-stimulating activities will create a foundation for thinking and learning that will help overcome the challenges your child may face from these or other speed bumps along the way to adulthood.

Dr. Amy Moore *is a cognitive psychologist in Colorado Springs, Colorado, at the headquarters of LearningRx, the largest network of brain training centers in the world. She specializes in cognition and learning in neurodevelopmental disorders, brain injury, learning disabilities, and age-related cognitive decline. She is also Editor-in-Chief of Modern Brain Journal, a board-certified Christian counselor, and co-host of the podcast Brainy Moms. Learn more about her work at* ***www.LearningRx.com***

DYSAUTONOMIA:

A Possible Cause of Post-Concussion Syndrome and Brain Fog

BY JONATHAN CHUNG, DC

With concussion being a dominant topic in sports medicine, we have seen a large spike in research dollars being spent to study the effects of brain injury. Despite our increased knowledge, when someone has concussion symptoms for longer than 30 days, researchers haven't come to a consensus as to why these people develop persistent symptoms, and what is causing those symptoms.

The symptoms of post-concussion syndrome (PCS) are what make the illness difficult to understand.

The primary symptoms of PCS include:

- *Persistent headache*
- *Dizziness*
- *Loss of balance*
- *Difficulty with concentration/brain fog*
- *Nausea*
- *Impaired or slow cognitive activity*

The symptoms are vague and non-specific. Those who work in medicine have a tendency and a desire to link a condition to one very specific piece of anatomy. That way, you can treat the diseased organ and cure the illness.

The reality is that a head injury is likely disrupting multiple body parts simultaneously. The higher centers of the brain aren't the only things that get scrambled during a concussion. A concussion is likely damaging multiple areas in the brain, along with the inner ear organs, the neck, the jaw, and the eyes.

Since every head injury is unique in terms of velocity, direction, and magnitude, each person's head injury is likely to impact their anatomy in an individual way. This is where you can have a lot of variation in how someone with post-concussion syndrome looks symptomatically.

Another struggle is that different body parts can create similar symptoms. An injury to the neck can cause a feeling of vertigo just like an injury to an inner ear organ. An injury to the neck can also cause headache symptoms just like injuries to the eyes or the vessels in the brain.

Some doctors are looking at another potential cause of persistent concussive symptoms called dysautonomia.

Dysautonomia – A Fight Between Two Super Systems

Dysautonomia is a condition where the brain loses normal control of the internal organ systems of your body. Dysautonomia can show up in organs like the digestive system, bladder, glands, and pupils. Classically, these disorders show up in the cardiovascular system by affecting your heart rate and blood pressure.

The most common disorders linked to dysautonomia are:

- *Multiple sclerosis (MS)*
- *Fibromyalgia*
- *Postural Orthostatic Tachycardia Syndrome (POTS) – an illness characterized by rapid heart rate to 150-200 bpm at rest*
- *Neurocardiogenic syncope – a disorder characterized by unpredictable fainting attacks*

When people have these disorders, the broken function of the nervous system causes people to feel dizzy, in a fog, extremely fatigued, light headed, and anxious. When you read those symptoms on paper (or screen), they don't sound like much, but the way those symptoms persist can drive someone mad.

- **People don't just have a brain fog:** *they are scared and frustrated their brain won't allow them to focus and accomplish a task.*
- **People don't just have fatigue:** *they have an inability to socialize and be effective at work and at home because of exhaustion.*
- **People don't just have dizziness:** *they are worried about driving and being in open spaces because their body is betraying them.*

- **People don't just have a rapid heartbeat:** *they have fear and anxiety the next attack could put them in the emergency room.*

Having dysautonomia, whether it's an illness on its own like POTS, or part of another illness like MS, can make life much harder and depressing because treatment for the illness is really limited.

Post-Concussion Syndrome and Dysautonomia

Going back to post-concussion syndrome, we discussed how the illness can be extremely frustrating because doctors and scientists have had a hard time coming to a consensus as to where the symptoms originate.

Some doctors and scientists are presenting an interesting theory that cases of post-concussion syndrome may be a manifestation of dysautonomia.

One of the first studies to look at this phenomenon was done in 2016 on young patients with persistent concussion symptoms. The study involved a test called the head-upright table tilt test. This test is used to diagnose fainting conditions called syncope, but is also a hallmark test for POTS. The study showed 24 out of 34 PCS patients had findings on the test indicating a form of dysautonomia. Ten patients had syncope while fourteen patients had POTS.

Even more interesting was that when the patients with POTS stopped having PCS symptoms, they also stopped having a reaction to the table tilt test when re-examined.

A dysautonomic theory of post-concussion syndrome can also help explain some of the unusual symptoms that may arise after a head injury. While it's easy to understand how a PCS patient can have persistent headaches and dizziness, some people who have a concussion or whiplash start developing persistent gut issues and sensitivities to foods. Dysautonomia as a culprit helps to make better sense of this phenomenon.

What Does This Mean for Treatment?

Dysautonomia is a condition not well recognized by many physicians, and not many choices for effective treatment options are available. In dysautonomia, the brain is having a terribly hard time making sense of its environment.

There's some interesting work going on utilizing balance and vestibular exercises and graded cardiovascular exercise to help the brain recover from injury, but I'll cover that on another day. Today I want to talk about the veins in your neck.

Dr. Michael Arata is an interventional radiology specialist in Southern California. I heard him speak at a conference in 2015, where he talked about the effect the veins in your neck could have on your autonomic nervous system. It's been an interesting and controversial theory that has been tied to illnesses like multiple sclerosis, where dysautonomia is a hallmark of the illness. The large veins in the neck becomming narrowed or occluded can cause abnormal fluid movement in the brain leading to venous reflux, congestion, and neuroinflammation in the brain.

Dr. Arata even published two studies demonstrating a procedure that uses a balloon to open these veins was able to create changes in the autonomic function of patients with multiple sclerosis, including heart rate variability and blood pressure control.

But that wasn't the most interesting part of his presentation. During his talk, he discussed the concept of the atlas vertebra creating compression on these vascular structures. He even used an imaging technique called a venogram to show this happening in his patients.

Because of this phenomenon, Dr. Arata actually refers some of his patients for upper cervical correction so that they can influence this part of the autonomic nervous system.

If dysautonomia is a primary symptom generator in PCS patients, then the impact from a potential neurovascular insult like a craniocervical displacement should be considered, especially considering the mechanism of injury includes a blunt force to the head.

A Personalized Approach to Post-Concussion Syndrome

Patients with post-concussion syndrome with signs of dysautonomia likely have multiple systems that must be addressed to regain normal functionality. In addition to dysfunction in multiple systems is the idea that each person will have a varying tolerance to different therapies.

In truth, no single therapy is likely to fix someone with persistent post-concussive symptoms and dysautonomia. These patients need to improve their tolerance to exercise with gradual increased load (especially if they're an athlete). They also need vestibular rehabilitation so that their brain can move the head and eyes normally again. There's no disputing the necessity and usefulness of those treatment strategies.

However, if we are concerned about the chronic effects of head injury and the ability to improve fluid movement through the brain, then we have to consider the impact trauma has on the structural alignment of the neck and the neuroinflammatory consequences these injuries can leave behind.

Jonathan Chung, DC, *is the founder and upper cervical chiropractor at Keystone Chiropractic and Neuroplasticity in Wellington, Florida. Learn more about their cervical vestibular rehabilitation program at* ***www.chiropractickeystone.com***

Contributing Factors to Brain Fog

DR. AYLA WOLF DAOM, LA.AC.

Brain fog is one of many cognitive symptoms commonly reported by people following a TBI. Traumatic brain injuries are highly complex injuries, and brain fog, as a symptom, is equally complex. Many factors can contribute to brain fog including decreased cerebral blood flow; dysfunctional cerebral glucose metabolism; dysregulation of the immune system of the brain; poor glymphatic function; and the presence of heavy metals, pathogens, or other toxins in the brain, just to name a few.

Decreased Cerebral Blood Flow

Following a concussion, ongoing and progressively declining blood flow specifically to the prefrontal cortex can be seen up to 12 months or more post-injury. The prefrontal cortex is an area of the brain involved in critical thinking, cognitive processing, decision making, planning, and emotional intelligence. Decreased blood flow to this area makes many aspects of cognition feel difficult, like the equivalent of kicking a horse into a gallop, only to find the horse won't budge. Many people feel as if their brain simply won't do its job like it used to.

Dysfunctional Cerebral Glucose Metabolism

Anyone who experiences hypoglycemia knows the brain struggles to function when blood sugar levels have plummeted. Decision making and critical thinking become close to impossible. The brain requires 25% of the body's glucose demands. This means a large percentage of glucose needs to reach the brain (via healthy cerebral blood flow) and glucose also needs to be properly regulated and utilized in the brain in order for healthy brain function to occur. When these systems are compromised as a result of a TBI, brain fog can occur.

Immune Dysregulation

The immune system of the brain was once thought to be completely separate from the rest of the body. Science now acknowledges the blood brain barrier is not an impenetrable wall. Just like the integrity of the intestinal lining can be compromised, so can the blood brain barrier, allowing inflammatory compounds, viruses, mycotoxins, pathogens, and other molecules to enter the brain on a potentially chronic basis. Immediately following a TBI, the permeability of the blood brain barrier and an acute inflammatory response in the brain increase. In an ideal situation, this is an acute response that resolves itself. In some cases, however, inflammation can persist in the injured brain, as the immune system remains in an overactive state. This can be a major contributor to brain fog.

Glymphatic Congestion

The brain and body are a thriving ecosystem of trillions of cells, and even more trillions of co-existing microorganisms. All of these cells and "foreign" microorganisms produce metabolic waste. Metabolic waste circulates through the blood and lymphatics, and is processed and eliminated through the colon and urinary tract with the help of healthy liver and kidney function. The problem, however, is that the average person is overwhelmingly inundated by pollution, plastics, hormone-mimickers, prescription drugs, herbicides, pesticides, and an endless list of other chemicals which require processing, filtering, and elimination. The liver and kidneys are working overtime, and often can't keep up. Toxins and waste then accumulate in the body, and potentially the brain. To make matters worse, the brain's own lymphatic system (referred to as the glymphatic system because of the role glial cells play in this function), which serves as the waste clearance system of the brain, is most active during deep sleep. Following a brain injury, sleep architecture is often impaired, and people may spend very little, if any, time in deep sleep states. Sleep disorders can be a major contributor to a lack of clearance of metabolic waste out of the brain, which can, in turn, cause brain fog.

What is the Solution?

When we realize optimal brain function for the elimination of brain fog requires so many elements including adequate cerebral blood flow, sensitive blood sugar regulation, healthy liver and kidney function, free-flowing lymphatics, and healthy sleep cycles, we can

quickly see there is obviously no one magic pill to solve brain fog. However, natural approaches to support all these systems are described above. As a Chinese medicine practitioner and a life-long herbalist, I utilize specific herbal formulations that target each of these areas and create custom treatment plans for individual patients based on their unique needs. If you are suffering from brain fog, I recommend finding a practitioner who specializes in the areas described above and can help determine a natural approach specific for you.

Dr. Amy Ayla Wolf *is a Doctor of Acupuncture and Oriental Medicine specializing in neurological disorders, concussions. and traumatic brain injuries. She is a faculty member of the Carrick Institute of Clinical Neuroscience and Rehabilitation. She teaches courses for healthcare practitioners across the country on neuroanatomy, neurophysiology, functional neurological exam techniques, and neuro-rehabilitation utilizing acupuncture and Chinese medicine.*
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BY SANA U. KHAN, MD, PHD

Have you ever felt as if your brain was in a cloud? Or ever walked into a place and not sure why you were there? Although clinically defined as a feeling of mental confusion or lack of mental clarity, the feeling is commonly described as "brain fog." It can start with seemingly ordinary incidents like forgetting where you parked or someone's name, headaches, mood swings, anxiety, depression, or dizziness. Not thinking clearly has an impact on daily life, including driving and performing optimally at work. Those who work dangerous jobs that require quick thinking and decision making should be especially careful.

Adding to the confusion and frustration, doctors do not have a clinical diagnosis called "brain fog" because no specific diagnostic tests are available, and because the condition may have a significant overlay of a person's opinions, feelings, and personal experiences.

However, even if brain fog is currently described as a subjective condition, a patient experiencing such difficulties finds the condition to be very real, and the signs of brain fog should not be ignored. In addition, and very importantly, brain fog should not be confused with common medical conditions such as dementia, mental retardation, anxiety, or chronic depression. In children, brain fog may lead to lack of concentration at school and work, low self-esteem, accidents, and troubled relationships. It can cause intense frustration and the inability to function well in society.

The causes of brain fog have mostly been defined through conditions associated with symptoms such as a foggy head from a lack of sleep, low blood-sugar, allergies, dehydration, or electrolyte imbalance from heavy exercising. Other causes defined include mercury poisoning, hormone imbalance, fibromyalgia, thyroid conditions, or Lyme disease. Women during menopause also often describe having "brain fog."

One of the most commonly reported factors in brain fog is stress. The stress-brain loop is well understood. Chronic stress leads to inadequate sleep, poor nutrition and emotional distress. These conditions lead to increased

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glucocorticoids and decreased regulation of cortisol which, in turn, leads to cellular changes in an area of the brain called the hippocampus. The hippocampus is involved in processing attention, perception, short-term memory, learning and word finding. These symptoms are commonly reported by patients complaining of brain fog.

Interestingly, the recent COVID-19 pandemic is bringing heightened attention to brain fog as numerous patients reported experiencing this condition. Many COVID-19 patients reported troubling cognitive symptoms that can include memory loss, confusion, difficulty focusing, dizziness and grasping for everyday words. Increasingly, COVID survivors say brain fog is impairing their ability to work and function normally. Consequently, the impact on the affected work force is going to be significant.

Scientists are not sure what causes brain fog, which varies widely and affects even people who became only mildly physically ill from COVID-19 and had no previous medical conditions. Leading theories are that it arises when the body's immune response to the virus does not shut down, or else from inflammation in blood vessels leading to the brain.

Confusion, delirium, and other types of altered mental function, called encephalopathy, have occurred during hospitalization for COVID-19 respiratory problems. Studies found such patients needed longer hospitalizations, have higher mortality rates, and often cannot manage daily activities right after hospitalization.

"Many COVID-19 patients reported troubling cognitive symptoms that can include memory loss, confusion, difficulty focusing, dizziness and grasping for everyday words. Increasingly, COVID survivors say brain fog is impairing their ability to work and function normally."

But research on long-lasting brain fog is just beginning. A French report in August 2020 on 120 patients who had been hospitalized for COVID-19 found that 34 percent had memory loss and 27 percent had concentration problems months later.

In a soon-to-be-published survey of 3,930 members of Survivor Corps, a group of people who connected to discuss life after COVID, over half reported difficulty concentrating or focusing, said Natalie Lambert, an associate research professor at Indiana University School of Medicine, who helped lead the study. Brain fog was the fourth most common symptom out of the 101 long-term and short-term physical, neurological, and psychological conditions survivors reported. Memory problems, dizziness, or confusion was reported by a third or more respondents.

Post COVID-19 patients often describe their condition as debilitating, almost catatonic or feeling as if under anesthesia, but the cause of their brain fog continues to be a medical mystery partly because symptoms are so varied. Since inflammatory molecules, released in effective immune responses, can also be sort of toxins, particularly to the brain, one theory is that people still have persistent immune activation after the initial COVID-19 infection subsides, and that inflammation in blood vessels, or cells lining the vessels, may be involved. Some doctors believe tiny strokes may also be leading to the symptoms, while others suggest possible causes such as autoimmune reactions when antibodies mistakenly attack nerve cells causing symptoms like tingling or numbness. Some people with brain fog still experience lung or heart issues, which can also exacerbate neurological symptoms.

With COVID-19, doctors do not know whether symptoms will improve or evaporate with time. Meanwhile, patients are forced to devise workarounds or makeshift recovery exercises. Experts advise people with brain fog to see doctors to rule out other medical conditions and treat remaining physical symptoms. So far, MRI scans have not indicated damaged brain areas, but brain fog is very real, and continued research in this area is very important so that the symptoms are taken seriously.

Some things one may do to reduce (or perhaps fix) brain fog:

1. **Eat foods right for your needs.**
2. **Learn to control your stress.**
3. **Practice memory-strengthening exercises.**
4. **Learn to cope.**
5. **Get quality sleep.**
6. **Take brain boosters (e.g., Omega-3, magnesium, etc....).**
7. **Lay off cigarettes and alcohol.**
8. **Check for allergies.**
9. **Engage in physical exercise.**
10. **Practice active relaxation.**

You may find other helpful practices, but most importantly, stay positive as negative energy commonly brings negative results.

Dr. Sana Khan *is an accomplished radiologist, researcher, teacher, and entrepreneur. He was the first radiologist in the United States with the Stand-Up Weight-Bearing MRI and has contributed significantly to the advancement of this technology. He is a nationally- renowned scientist conducting ongoing research with the Departments of Orthopedic Surgery at UCLA, USC, UCSD, and the US Department of Defense. Having developed state-of-the-art MRI techniques, Dr. Khan brings extensive expertise in the medical-legal aspect of imaging musculoskeletal and traumatic brain injuries.* ***www.expertmri.com***

Why Do I Feel ***Foggy?***

BY DR. SHANE STEADMAN

Brain fog is probably the most common symptom patients talk about after a concussion or brain injury. It is also one of the more common symptoms patients with other health issues mention. Patients attempt to describe what they feel in hopes that others, including their doctors, will understand the sensation they experience.

Some brain fog descriptions include:

- *I have fuzzy thinking.*
- *It feels like I am walking through molasses.*
- *I feel like I am looking through dirty windows.*
- *I feel like I am walking through mud.*
- *I'm sleepwalking through life.*
- *I have slow thinking.*
- *It's difficult to focus and concentrate with a foggy brain.*
- *I can't think clearly.*

Struggling with brain fog can impact daily activities such as performing work requirements, being part of the family, being a parent, and even having a social life. Brain fog can also impact tasks such as being on a computer, reading, attending school, going to events, and driving. Brain fog can be a persistent and long-lasting feeling even after the more serious complications of a brain injury resolve. People use the term brain fog to describe their symptoms, but it is most likely a result of neuroinflammation. In order for a practitioner to develop strategies involving rehab and supporting brain fog, it's important they understand the mechanisms of neuroinflammation.

In summary, the brain is constantly surveying nervous system tissue to determine if everything is healthy or in need of repair. Microglia is the main cell involved. The cells are also involved with the immune system and are responsible for maintaining homeostasis in the brain. They have different roles such as scavenging, engulfing debris, responding to injuries, and repairing injuries. Microglia migrate to the injured area and activate cytokine and immune mediators. Microglia are essential in brain health, but can also become sensitive and easily reactivated, even by the smallest event or triggers. This reactive state is what leads to brain fog.

An area of concern regarding brain fog is what happens post-concussion or post-injury. People typically are not educated thoroughly on strategies to support neuroinflammation during recovery or rehab. Most individuals are told to rest, eliminate screen time, and reduce activities. While this is beneficial short-term, the suggestions do not address inflammation within the brain. With a lack of education about brain fog, people eat poorly. A brain injury also makes a person susceptible to their environment, such as reactions to perfumes, exhaust fumes, chemicals, and even their own metabolic changes.

Some of the comments by patients are:

- *I can't walk by a certain store without getting a headache.*
- *I can't eat a certain food without having brain fog.*
- *I get brain fog when pumping gas.*
- *I get brain fog driving, especially in the city.*
- *I seem to get bloated, which triggers brain fog.*

Nutritional therapies can be one of the more effective strategies to support brain fog. Compounds such as glutathione, curcuminoids, resveratrol and essential fatty acids (fish oil) can be extremely beneficial in supporting the microglia in the brain and reducing inflammation.

Neurological rehabilitation is crucial to improving neurological function and reducing brain fog. The idea of rest and eliminating external stimulus is appropriate temporarily, but rehab specific strategies are needed for lasting, long-term results. Much like when acquiring a soft tissue injury, resting and using passive modalities, and then focusing on long-term rehab by improving functioning, strengthening, and then reintegrating back into activities of daily living are important. Brain injuries and neurological complications (such as brain fog) do not seem to get the same type of care and attention. However, the implications of not properly identifying and treating these issues can cause significant health concerns later in a person's life. Finding a practitioner who understands the neurological function and appropriate therapies to rehab the injured areas is essential. If the evaluation and examination are comprehensive, then outlining a strategy should be more impactful. Brain rehab is not something that can be a shortcut. The more appropriate the therapy, the faster the results.

Dr. Shane Steadman, DC, DACNB, DCBCN, CNS, *is the owner and clinic director of Integrated Brain Centers. To learn more about how they can help with concussions, stroke, and TBIs, please visit* ***www.integratedbraincenters.com***
For a free consultation, please call 303-781-5617.

Playing the Hand *She's Dealt*

Early one morning in November 2010, Aimee Osgood went to get her children up for school when she slipped on her bedroom floor. As she landed, a screw on her bedframe sliced her arm wide open. She had been experiencing imbalance, but it was the severity of cut that gave her pause and made her realize something bigger may be going on. As she recalled, nothing had caused her to fall – no slippery socks or discarded toys. She just fell.

"I was getting vertigo and a lot of falling down," Aimee says. "I had no idea what was going on, so I went to some doctors' appointments and had lots of lab work." The blood tests revealed "a whole lot of nothingness," so she requested to see an ENT (ear, nose, and throat doctor). Aimee thought she had an ear infection, but the ENT doctor ordered a CT scan. "Then I got a phone call saying, 'You need an MRI right now.'"

The MRI revealed a brain tumor. Actually, 11 brain tumors, the largest being a 3.5-centimeter acoustic neuroma, which develop on the hearing and balance nerves that lead from the inner ear to the brain. "When they did the biopsy," Aimee says, "it tested positive for neurofibromatosis type 2 (NF2), which are tumors that gradually grow on cranial and spinal nerves your whole life. There is no cure for it."

"When they did the biopsy," Aimee says, "it tested positive for neurofibromatosis type 2 (NF2), which are tumors that gradually grow on cranial and spinal nerves your whole life. There is no cure for it."

Though the tumors are benign, they are still life-threatening. At the time of her diagnosis, Aimee was 33, had two young daughters, and had just been accepted to nursing school. "No one in my family ever had anything like this before," she says. "We didn't know anything about it. My first surgery took fourteen-and-a-half hours and was right before nursing school," the Port Huron, Michigan, resident says. "Another surgery was during nursing school, and one was right after. I had a break for a couple years, then I had two surgeries last year." She says completing nursing school while managing the surgeries has been among her greatest successes.

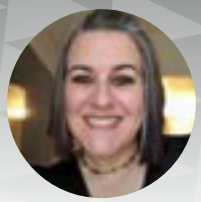
The first tumor removed was the acoustic neuroma, which was pressing on the pons. The tumor was so large, it compressed Aimee's brain stem and impeded the cerebral spinal fluid, which had backed up into her head, causing increased intercranial pressure and resulting in papilledema, the swelling of the eyeballs and eye nerves. "It was just very painful. It felt like constant dry eyes and like my eyeballs were going to pop out of my head. It was pressing on my spinal cord, and it can cause issues with breathing."

So far, five tumors have been removed, and six that are each two centimeters or larger remain. Two are on each trigeminal nerve, and Aimee has been advised that removing them would result in more cons than pros, as she would be left with deficits that would lead to additional issues. "For right now, we're doing a watch and wait," she says. "They said they can't take out more than one at a time because they'd have to open up a bigger spot, and exposing the brain to that much air is not a good thing." Aimee travels two-and-a-half hours to the University of Michigan for her surgeries and doctors' appointments, including neck and spinal MRIs that often last up to three hours at a time.

At the time of the interview, Aimee was preparing for a three-hour brain and spinal MRI the following day. "I have a bad boy tangled up in my venous structure on the occipital lobe, causing massive migraines," she said. "They want to see if it is ready to be taken out."

In the past, tumor removal has relieved some of her pain. "The headaches tend to go away for a while, and my balance gets better for a little while," she says. "But they said that because I've had [the tumors] since I was

ARTICLE BY ELLEN FORTINI
PHOTOS BY JILL HARDY



born, my body compensated well because it was something that gradually grew over time, and my other balance nerve was able to take over."

Additionally, the last two tumors removed resulted in Aimee gaining almost six centimeters of space in her head. "Back to where [my brain] should have been in the first place," she notes. "Hopefully, it stays there and nothing else grows."

"The tumors typically grow a millimeter a year," Aimee explains, adding that the 35-millimeter tumor correlated almost exactly to the predicted growth timeline as she was nearly 34 years old at the time it was discovered. "They can grow anywhere along the nerves and in the brain. Mostly meningiomas. They can be pretty devastating, as they can take your hearing, balance, vision, ability to talk, swallow, and walk. I have deficits on my left side. It's weaker, and when I am tired, my family notices a bit of drooping on the left side of my face."

"[The tumors] can be pretty devastating, as they can take your hearing, balance, vision, ability to talk, swallow, and walk."

In addition to her migraines, which tend to last for days, Aimee is deaf in her left ear with constant

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tinnitus, has trouble with word retrieval, and deals with balance and vision issues on a daily basis. She says being deaf and working in a busy hospital has been among her biggest challenges.

Aimee married her husband, Richard Osgood, in 2018, eight years after her initial diagnosis. "Sometimes it pays to swipe right," she laughs. "He is supportive, and he's had back surgeries and spinal issues of his own, so he understands what it's like to have pain, but nobody believes you. If I'm not feeling well, he'll ask what I need, like an ice pack or something to drink, he'll help me with my medicine, or recommend we take a walk." Her daughters, Brooke, 17, and Olivia, 13, stepson Camden, 14, and stepdaughter Tesla, 11, all help when Aimee needs a break or some assistance, and the kids even got to help style Aimee's new hairdo when she decided to shave her head for her two surgeries last year.

"I let them do a mohawk," she confides. Aimee says she was known since her school days for having long, curly hair, so cutting it was not a decision she took lightly. Nor was it required for the surgery. "[The surgeons] usually just cut a strip of hair where they need to make the incision," she says, adding that the gel used during surgery to keep her hair in place often resulted in her long locks becoming matted and her needing assistance to wash it. So, with two surgeries on the horizon, on one side of her head in May and on the other side in October, Aimee's sense of efficiency prevailed, as did her adventurous nature. "It was just easier for the kids to shave it into a mohawk, so I gave them the scissors and razors and told them to go for it."

The close-knit family keeps active despite busy work and school schedules. "Yesterday was the first time in years I tried roller skating, and I didn't even fall," Aimee says. "I went down the street and back. I was a little off-balance, so my arms were flying all over, and I am sure the neighbors were all laughing at me, but I was very proud that I was able to do that. I also have a bike, so I am riding again and I try do a lot of walking. I want to stay active because as I get older, my balance is going to get worse with age anyway, so I try to keep moving."

"Her active lifestyle contributes to strangers' frequent disbelief of her diagnosis."

Her active lifestyle contributes to strangers' frequent disbelief of her diagnosis. In fact, in the early days of the pandemic, Aimee was at work when the left side of her face began to droop. Colleagues were concerned she was exhibiting signs of a stroke, but she knew it was her facial nerves and an issue related to her upcoming surgery. The ER doctor on duty at her workplace was not familiar with her or her medical history and was convinced she was exaggerating. "He snapped his fingers in my ear and said, 'You can't hear this?'" His unkind assumption aside, the doctor ordered an MRI and the results prompted Aimee to be sent immediately to the University of Michigan to be seen by her regular doctor in advance of her surgery.

"A lot of people don't believe I am deaf and I have NF2 because I move," she confides. "Most people don't believe I have something wrong. They say that I am way too active, or I don't present like what people think of as a typical brain-injury patient."

Aimee works as a nurse at a metro Detroit-area hospital, on the telemetry floor. Since the pandemic, the unit has been changed to monitor up to 40 COVID patients at a time, many of whom arrive with grave symptoms, but some also with newly-acquired head injuries resulting from falls due to weakness and oxygen-depletion brought on by COVID. As a COVID nurse who has also faced her own challenges with brain illness, Aimee is often called on by colleagues to share first-hand about the challenges her patients may face.

"As a COVID nurse who has also faced her own challenges with brain illness, Aimee is often called on by colleagues to share first-hand about the challenges her patients may face."

"When I go to work, they give me a lot of the patients that have cranial and spinal issues," she says. "Because sometimes when those patients start to feel really down, or they feel like they have no hope, my supervisors assign those patients to me so I will sit and talk to them." What she offers is comforting insight and understanding as well as practical suggestions.

"A lot of them say, 'You have such a positive outlook, I never thought of it like that,'" she says. "Most people hear the diagnosis 'You have a brain tumor,' and they just shut down. At the very beginning, I did, too, because you hear that, and you don't know what to think. After 10 years of reflection, I am able to give my perspective and my experiences and help other people. I help my patients learn how to cope, how to deal with things to help them get through it."

What are Aimee's best tips for her patients?

Get a nightlight. "If your balance is off, and your body has no idea what's going on, you're going to fall, so your vision starts to take over and helps with your balance."

Buy a hat. "When you have brain surgery and they shave part of your head, they replace part of your skull with a metal plate. So on a cold, windy day, you get instant brain freeze. So, I tell them, 'Go hat shopping!'"

Don't get frustrated. "A lot of times, I lose my words because I've had a couple surgeries right on

the word-retrieval section of my brain. I always feel like the word is on the tip of my tongue, but it takes longer to remember what it is. So, I try to calm down and just give it an extra second."

Her advice isn't just for her patients, though. Aimee's positive attitude is thanks, in part, to a simple habit that she encourages anyone to add to their daily routine. "I tell a lot of people to just find the funny in every day," she says. "I always follow it up with: 'Yes, there are days when you're going to want to sit in a corner and throw forks at everybody, and you're allowed to have those days, but you can't turn it into a daily thing.' Find the funny, or it's going to consume you – the bad vibes or the bad moods."

"Yes, there are days when you're going to want to sit in a corner and throw forks at everybody, and you're allowed to have those days, but you can't turn it into a daily thing. Find the funny, or it's going to consume you."

That is expert insight from someone whose diagnosis came at a most inopportune time and used what it taught her about her own strength to propel her through nursing school. "Just because you get bad news, that doesn't mean it's the end of it," Aimee says. "You can keep going and work through it. Because if not, I wouldn't have continued with nursing school."

"Healthcare workers who understand both worlds – the demands of medicine and what it's like to be a patient facing a diagnosis with very unknown consequences – are the angels that walk among us," says Carrie Collins-Fadell, MPA, Executive Director of the Brain Injury Alliance of Arizona, and Aimee's high school classmate. "As Aimee has experienced both sides of the patient/healthcare-provider dynamic, what we all can learn from her is a gift. Aimee is a true warrior."

Part of what keeps Aimee in fighting shape is her own recovery regimen. She says recoveries from her type of brain surgery usually last four to six months. "But I can do it in four to six weeks," she says. "My longest was eight weeks. I usually try to push myself to get back into doing stuff. I like to keep busy." Her recipe for success starts with a week of "vegging" – just relaxing, not pushing herself, and taking it slow. "Then I add in a walk, and picking stuff up around the house, then folding clothes, and add to it every day. I like to keep pushing myself. Even my doctors say they can't believe I do so much in such a short amount of time." And that includes her time in the hospital. "When I go to surgery, I am there one night, and I go home the next morning. I'll know the signs and symptoms if I get sick, or if something is wrong, so I go home the next day."

Aimee comes by her independence, drive, and determination honestly. Her grandmother will turn 100 in June, and, until a few months ago, she lived by herself in the same house she lived in since 1954. Aimee says she and her family had to convince her grandmother to move into a retirement community. "She couldn't go up and down the stairs anymore," Aimee says. "She fought it, too. And it's not assisted living, it's a retirement community, so she has her own apartment. She does everything herself."

Proving that the apple doesn't fall far from the tree, Aimee has her own reasons to continue the family legacy of being a strong role model. "I push through it. I have young kids. I just can't sit in a corner," she says. "There are days that I want to sit in a corner and scream and throw forks at people, but I can't do it every day. I can't let this disease take me. I am too young to give up. I've still got things I want to do. I have things I have to do. I've got obligations. I owe it to my kids to be here for them."

"Healthcare workers who understand both worlds – the demands of medicine and what it's like to be a patient facing a diagnosis with very unknown consequences – are the angels that walk among us."

In her role as a healthcare professional, Aimee has additional reasons for persevering. "I like to get the word out about brain issues because a lot of people don't like to talk about it. But a lot of research needs to be done, especially with NF, because there is no cure. My family knows that when my time comes, I'm donating my brain to research because this disease is terrible and some people have it worse than I do. We don't need to research just the big-name diseases, there are a lot of other things that are out there, too, these oddball diseases."

Thinking of others, even future generations, is a consistent theme in Aimee's family life and her professional world. Taking time for herself and being realistic about her needs are essential tools in helping her give back most effectively, which is a life lesson anyone can relate to.

"My grandfather always used to say, 'Play the hand you were dealt.' What was given to you, the situation you are in, that's what you've got to deal with, and you've got to find your way through it," she says. "If you were dealt lemons for the day, you've got to deal with the lemons. So do something with them."

In playing the hand she was dealt, Aimee Osgood is winning the round by staying active, finding the funny, and encouraging others through her wise insight. Her patients and her family get to see what happens when you truly make the best of each day.

"I'm still here. I can walk," she says, cheerfully. "And I can roller skate."

Ellen Fortini *is a globe-trotting writer and editor who currently lives in fabulous Las Vegas, Nevada.*

YOUR GUT *and* TBI

BY KELLY HARRIGAN

TBI, concussions, and whiplash all affect the normal functioning of the vagus nerve, significantly impacting our digestive motility, resulting in some uncomfortable and gut-wrenching side effects.

The vagus nerve is the key protagonist of our parasympathetic nervous system, which pops us into "rest and digest" mode. This is in direct opposition to the "fight or flight" mantra of the sympathetic nervous system. With TBI, many people find themselves in a predominantly "'fight or flight" state, which doesn't allow the body to rest, digest, and repair itself, thus altering the vagus nerve's work, slowing digestion and impacting gut motility.

In the field of neurogastroenterology, the body's enteric nervous system (aka your gut's brain) is responsible for controlling digestion from swallowing, to the release of enzymes for food breakdown, to blood flow control for nutrient absorption and elimination. The ENS plays a central role in the body's nervous and immune systems, thus impacting not only digestive disorders, but also with metabolic conditions and mental health because of the two-way communication between the ENS and brain via the body's vagus nerve.

When your body's gut motility is slowed or altered, food isn't processed in a normal manner. This permits bad bacteria to remain in the small intestine too long, running roughshod over good bacteria, effectively creating an overgrowth known as SIBO (small intestinal bacterial overgrowth). Chronic health conditions, age, stress, infections, surgery, prescription medications (including antibiotics, proton pump inhibitors, and narcotics), scar tissue, GI tract blockages, and intestinal injuries can all put you at risk of SIBO and poor gut motility.

SIBO and poor gut motility symptoms include fatigue, weakness, loss of appetite, inflammation, dehydration, stomach pain, constipation, bloating, cramps, weight loss, and heartburn or acid reflux. Both SIBO and gut motility directly contribute to brain fog, such as impaired judgment, short term memory issues, concentration difficulties, word finding, and even slurred speech and gait disturbance. Since more than ninety percent of serotonin, the hormone that makes you feel happy, is found in the gut, there's no doubt that gut imbalances have a neurological effect.

Go with your gut instinct.

Discuss your symptoms with a trusted medical professional. Gut motility symptoms can be vague and overlap with other medical conditions, so it's important you find an expert in neurogastroenterology or an experienced professional who specializes in digestive disorders. Consulting with an integrative health doctor and a functional nutritionist may be of significant benefit for you. Tracking your symptoms and causal triggers, as well as keeping a food journal and making a list of supplements and vitamins, are helpful to share with your doctor.

Exercise and a healthy diet lay the foundation for good gut health, which in turn supports optimal brain function. Eliminate processed sugar and other trigger foods, alcohol, sodas, and caffeine. Yes, bid adieu to even the gluten-free, dairy-free, vegan cupcakes and soy chai latte (for now).

Breath tests measuring methane and hydrogen, Bravo pH tests, CT and MRI, upper GI series, endoscopy, colonoscopy, and blood work may be requested to determine the root cause of your digestive problems. Treatments and supportive therapies vary based on your specific diagnosis.

Left untreated, poor gut motility and SIBO have been linked to weak bones (osteoporosis), malnutrition, weight loss, anemia, kidney stones, and electrolyte imbalances. The National Institutes of Health stated that digestive disease affects 60 to 70 million Americans, from gallstones to irritable bowel syndrome to Crohn's disease.

The Ancient Greek physician Hippocrates said that "all disease begins in the gut" nearly 2,500 years ago. Fast forward to modern day and we can see the impact that good gut health has on our brain.

Kelly Harrigan *is a single mum, veteran, TBI survivor with a girl child and a Frenchie, oolong tea in hand and humor on hand, who lives in Annapolis, Maryland.*

How *Light* Returns *Clarity & Hope* to a **FOGGY BRAIN**

BY DEBORAH ZELINSKY, O.D.
EXECUTIVE RESEARCH DIRECTOR, THE MIND-EYE INSTITUTE

Healthy brains are able to interpret and respond to the environment at many different levels almost instantaneously. So, it is not surprising that patients who have sustained a traumatic head injury or concussion, which oftentimes damages or scrambles brain circuitry, may exhibit information-processing (neurocognitive) deficits affecting their ability to interact in appropriate ways with people, activities, and events in the world around them.

> **Experts call the problem "brain fog:" an obscuring or shrouding of one's thoughts; lack of clear thinking, focus, and concentration; confusion; memory issues; decreased reaction time; and difficulties comprehending – or remembering – what has just been learned, read, or been heard during social conversation.**

The Mind-Eye Institute sees patients who often complain of brain fog. One patient recently described her brain fog in this way: "I was unable to do simple, everyday activities. I could no longer cook because my brain was unable to signal my hand to turn off the stove when my sense of smell indicated that food was burning. In the supermarket, I was overwhelmed with sounds, lights, smells, and the need to make decisions. I could no longer do calculations or keep track of time or use the computer. I had problems spelling words, writing words in cursive, and reading. I would read a paragraph from a book and forget what I just read."

Another patient explained her brain fog as "Nothing making sense to me any longer. I would think, 'Oh, I should do the laundry,' but that is as far as I would take it. I never thought to gather up the clothes and get them cleaned. I would walk into a room and go completely blank: 'Who am I; where am I?' Then I would look at my feet and jog my memory, 'Oh, yes, I am me, and I am standing in the bathroom.'"

Simply put, a brain injury interferes with visual processing, namely the simultaneous ability of the brain to take in external sensory signals (from eyesight, hearing, smell, taste, and touch) at all levels – unconscious, subconscious, conscious, meld them with one's internal sensory signals, and then process the information. When retinal processing is dysfunctional and foggy, so is one's understanding of the surrounding

Continued ...

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environment. Correct understanding is what is necessary for organizing, planning, and making decisions.

In a recent blog on my website, I related how a near accident involving a ridesharing van serves as a perfect example of levels of brain function. I was with a party of four about to embark on a relatively short ride in a ridesharing vehicle. Two of our group were already seated, one was waiting behind me, and I was literally stepping into the van when the driver started to pull away. My immediate action was to let out a primal scream and grab the door tighter – simply hold on as best I could. It was an unconscious, instantaneous, reflexive response for survival. Sensory processing then kicked in at a subconscious level as I became more aware of my environment of seeing and feeling the van moving. Finally, when my perception – and understanding – of the incident rose to consciousness, I was able to start yelling to the driver, "Stop," which he did.

"A brain injury interferes with visual processing, namely the simultaneous ability of the brain to take in external sensory signals (from eyesight, hearing, smell, taste, and touch) at all levels."

Because my visual processing and senses are intact, all these levels of perception – from reflex to awareness of the environment to consciousness – occurred nearly instantaneously, allowing me to react and appropriately respond to what was happening in my world. As the renowned cognitive neuroscientist A.R. Luria pointed out in his many publications, the healthy brain functions using multiple signaling circuits at various speeds. Of course, the differences in speed can be calculated in milliseconds or even nanoseconds.

Research has demonstrated the retina is a piece of brain tissue which is part of our body's central nervous system. It not only sends the brain environmental signals through eyesight at a conscious level, but also from luminance (external light) that disperses across the retina at an unconscious level. Concurrently, the retina receives feedback signals from the body through informational pathways in the brain. This continuing process of feeding forward signals to the brain from the environment and receiving feedback signals from various brain structures makes the retina a two-way portal for influencing and monitoring thought processes and body functions, including posture, movement, and, of course, motor reflexes, such as my tightly gripping the door of the moving vehicle and screaming.

Each of our eyes contains approximately 126 million light-sensitive receptors. Input from the receptors moves through a sophisticated filtering system, which compresses the information into about 1.2 million signals that exit each eyeball. These signals travel across and radiate from the optic nerve through the many pathways inside the brain. In fact, the retina connects with many systems other than eyesight, including structures in the brain's cortex, cerebellum, and limbic system, as well as midbrain and brainstem. All these structures affect the body's reactions and responses, including activity in such systems as endocrine, respiratory, circulatory, circadian, digestive, and musculoskeletal.

With the retina having such an important impact on so many systems at different levels, any disruption in the retinal processing cycle due to head injury can cause a cascade of debilitating symptoms, including brain fog. Retinal processing is one portion of visual processing. Patients with retinal-processing deficits usually lack some degree of synchronization between their perception and target location. They often have difficulty visualizing auditory space, having difficulty determining where and from which dirction sound emanates.

The Mind-Eye Institute applies new science discoveries to test patients' retinal processing capabilities on many levels. Careful analysis results in a prescription of individualized activities and, most notably, "brain" glasses or Brainwear™, designed for comfort. With highly customized "brain" glasses, we are able to vary the amount, intensity, and angle of light passing through the retina and, in so doing, resynchronize a patient's senses, particularly eyesight and hearing, as well as help the brain build new informational pathways.

Peripheral visual skills, which are required in today's modern society with its mobile phone screens, movie and video-game special effects, highly-trafficked streets, and constant scanning of rolling information on computer displays and GPS systems, are becoming more important to assess. Properly functioning peripheral eyesight is necessary for normal visual processing to occur. Mind-Eye testing emphasizes peripheral visual skills, internal visualization, and linkage between auditory space perception and visual space perception. Glasses prescribed for these purposes tend to be comfortable, and patients have fewer symptoms while on the long road to recuperation.

Speaking of roads, just as the sun eventually burns away the early morning fog enshrouding a highway, so light passing through specially prescribed lenses can burn away the fog of an injured brain. Thanks to advanced scientific practices, the Mind-Eye Institute is striving to return quality life to many patients with traumatic brain injuries.

Let there be light!

Deborah Zelinsky, O.D., *is a Chicago optometrist who founded the Mind-Eye Connection, now known as the Mind-Eye Institute. She is a clinician and brain researcher with a mission of building better brains by changing the concept of eye examinations into brain evaluations. For the past three decades, her research has been dedicated to interactions between the eyes and ears, bringing 21st-century research into optometry, thus bridging the gap between neuroscience and eye care.*
www.mindeye.com/tbiquiz

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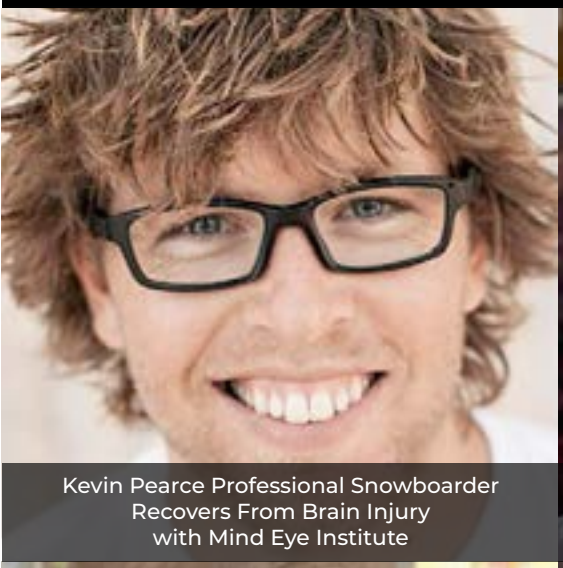

Kevin Pearce Professional Snowboarder Recovers From Brain Injury with Mind Eye Institute

"Ghost In My Brain" Author Clark Elliott Recovers Thanks To "Brain Glasses"

BrainWear Glasses Play Critical Role in TBI Recovery

Brain' Glasses Help Shooting Victim Read, Write Again

Mind-Eye Helps Head-Injured Marine 'Return to Person I Was'

Utah Patient 'Blown Away' by What Eyeglasses Do for His Injured Brain

If you or someone you love has experienced a brain injury or feel like "something is different," please take our free online "Brain Quiz" or speak with one of our New Patient Advocates and come in for a Mind-Eye exam today by contacting our office at 847-750-4616 or visiting us at https://mindeye.com/tbiquiz

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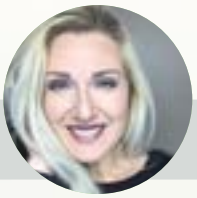
Turning *Brain Fog* into BOOSTED BRAIN FUNCTION



BY DR. TATIANA HABANOVA, DC, DACNB

For many, especially those with a brain injury, brain fog is like that uninvited guest who makes themself way too comfortable at the dinner table. And once settled in, getting rid of them can be very difficult. Brain fog begins to take over the way you feel, how you think, and slowly separates you from the very fabric you called your life. By altering your cognitive functions, like focus, attention, concentration, information processing speed, and initiation, you are eventually at the mercy of its subtle, but consistent influence. You begin unconsciously adjusting your life to accommodate this unwanted guest, all the while not realizing your very essence is slowly slipping away.

Brain fog shows up differently in everyone. Just like snowflakes, no two are alike. For some, brain fog is transitory and mild. It comes and goes. For example, if one had one too many drinks the night before and woke up "hungover," that's the effect of brain fog. With adequate rest, hydration and time, the feeling of a fuzzy brain goes away. The same holds true for gluten, dairy, and other potential food items one has become "sensitive" to. Once the system is exposed to a trigger (i.e.: toxin or food item), a metabolic cascade occurs, leaving one feeling as if their head is in the clouds.

For others, brain fog is more a constant experience of haze ranging from mild to severe. It just always seems to be there. In addition to the cognitive symptoms, one can also have memory issues, light and sound sensitivity, blurry vision and eye strain, and vestibular symptoms, just to name a few. Essentially, this type of brain fog is due to the neurons (brain cells) being less stable/fit to function at the capacity they are being asked to do. For example, if one is reading, the brain must control both eyes to move in exactly the same speed, the same distance along the page, and in a coordinated fashion so accurate eye movements occur and one does not experience blurry vision. If the nerves that control the eye muscles are unable to perform at peak state, then errors with smooth coordinated eye movements cause one to become tired (brain-based fatigue), as well as experience difficulty with reading, short term memory, and spatial awareness.

Now, let's get to the root cause of neurologically-based brain fog.

In order for neurons to work efficiently, they need three essential nutrients. Often, this is referred to as …

The Three Neuro Necessities:

- **First, each neuron requires a constant supply of oxygen:** *The brain utilizes up to 20% of the oxygen carried in the blood and 50% when thinking hard, being creative, or under stress. Shallow breathing with minimal rib cage expansion is an indicator the quality of breath is less than ideal. To demonstrate the power of breath, take a few deep, slow, prolonged breaths in and out, and then notice if you suddenly become more alert and aware.*
- **Second, a constant source of fuel, preferably in the form of fats and carbohydrates, is required as the brain never stops working (even when you are sleeping):** *Many people, unknowingly, create the effects of brain fog by not eating a balanced healthy diet, skipping meals, or ignoring underlying sugar handling issues (i.e.: insulin resistance, metabolic syndrome, etc.), which hinders the availability of glucose to brain cells.*
- **Last, each neuron requires appropriate stimulation (not too much and not too little — I call this the "Golidlocks Rule"):** *This is essential for neurological pathways to be maintained and kept viable, just like a well-walked path doesn't allow the weeds to grow on it. When the demand placed on the neuron is greater than it can cope with, the neuron begins to undergo a slow neurodegenerative process, which leads to a slow spiraling decline in cognitive functions.*

An important note:

Multiple brain fog-producing mechanisms can be occurring simultaneously to create a chronic state that waxes and wanes. For example, someone can have a food intolerance (i.e.: gluten, dairy, soy) which produces an inflammatory event, which affects brain cell function, plus they may not have enough or too much neurological stimulation to a pathway causing it to undergo transneuronal degeneration (TND).

By understanding the various mechanisms that produce brain fog, assembling a plan of action to turn brain fog into boosted brain function is easier. Focusing on the three Neuro Necessities is the foundational step for this process. Working with a trained professional who can properly assess brain function, and then create a care plan that can be properly executed is extremely valuable in overcoming brain fog.

Dr. Habanova *is the host of Brain Health Savvy, a weekly podcast that inspires listeners through real conversations on all things pertaining to women's brain health. She transforms women in simple, yet real ways, encouraging them to seek their true potential, to be fierce and unapologetic while leading from authenticity, and to embrace change as they buck societal norms in favor of better brain health.* ***www.drhabanova.com***

Brain Fog & TBI

BY JAMES HEUER, PA

In the age of COVID-19, a symptom that comes along with having contracted the virus is brain fog. This symptom of COVID-19 is comparable to the cognitive issues that traumatic brain survivors experience after their initial concussion. Brain fog, which is not a medical term but a description, can have a dramatic effect on brain injury survivors, no matter how sharp or quick-witted the person was prior.

Symptoms of brain fog occur within the first seven to ten days and will usually dissipate within three months. Sometimes brain fog can persist for a year or more. To achieve a quicker recovery from brain fog, doctors recommend immediate treatment after your concussion in order to manage it. Like TBI survivors, people recovering from COVID-19 struggle with brain fog on a daily basis with symptoms lasting weeks, or even years.

Brain fog is one of the most common symptoms examined in TBI patients. Signs to look for include slowness in thinking, trouble concentrating, or even difficulty remembering and learning new information. Short term memory loss and inability to concentrate, multi-task, organize and plan, coincide with brain fog.

Patients with a TBI typically experience brain fog either immediately post-concussion or possibly days, weeks, or months later. The common triggers for brain fog can vary from using a computer, reading a book, or seeing bright lights. Patients have described brain fog as "I feel like I'm seeing the world through a haze," "I feel like I'm running in sand," "I just can't keep up," or "I can't process everything."

The brain fog stems from the impact that causes the brain to smash into the skull which leads to inflammation and disruption of communication within the brain. Two main sources of brain fog are hypoactivation (inefficiency in the brain) and hyperactivation (overload). Oxygen and other resources are needed for the brain to complete a task. When inflammation or axonal shearing (tearing of the brain's connecting nerve fibers) after a concussion occurs. regions of the brain may be blocked from getting their needed resources. This is the hypoactivation happening. Hyperactivation is what's considered an overload, when an area of the brain is on too much or working too hard. In short, if there are areas of your brain working inefficiently or overworking, a lot of energy is being used, causing the brain to simply give up – resulting in what is called brain fog.

Healing and eliminating brain fog to live a normal day-to-day life is possible. One recommendation is to give your digestive system a rest. Intermittent fasting can stimulate brain regeneration. Exercise is good for sharper mental acuity as it promotes the release of helpful chemical messengers, as well as releasing endorphins to rejuvenate the brain. Also, sleep is important to heal. Sleep is essential to recovering from brain fog, especially with the persistent fatigue and exhaustion. Overall, TBI survivors need to have patience with themselves to lower their stress. Eventually, brain fog will subside.

James A. Heuer, PA, *is a personal injury attorney helping individuals with TBI after suffering one himself. He is located in Minneapolis, Minnesota.*

Are you living with a TBI caused by someone else's mistake?

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Brain Fog Amongst the Family

BY IAN HEBEISEN

My mom never considered herself a morning person. I inherited her night-owl nature, and often the two of us will stay awake after everybody else in the house is asleep. She'll work on a puzzle; I'll work on a project of my own. My evenings serve as a time to myself to continue my progress on whatever it is I'm doing, while my mom's time is necessary for her to clear away the day's brain fog.

My mom has been living with a TBI for roughly seven years, and battles brain fog pretty much every day. Mornings tend to be the trickiest part of the day. Early morning brain fog takes time to clear, and if she doesn't have a cup of coffee brewing, it can take upwards of two hours for her to really get going. Often, it takes that long even with the coffee.

Brain fog can recur throughout the day, usually after being overstimulated or finishing a long work day. My mom recalls one day at work when she was trying to learn a new software system. After a while, she struggled to speak, type words, and write notes, all due to heavy brain fog. "I needed to go home early that day," she said. "I wasn't improving or getting things done; being there was counterproductive."

To my mom, brain fog feels as if her head is full of concrete. She feels fuzzy and numb, and her normal thought processes aren't there. She can be sitting in a familiar room, but everything will seem out of focus.

Over time, she's found a couple ways to manage her brain fog to the best of her abilities. Sitting down and resting help a great deal, and doing her puzzles soothes her mind. She'll often play a familiar audio book or song she recognizes. Her brain fog is like a frosted windshield: she can chisel away at it to clear her mind, but it takes patience.

I asked her what my brothers and I can do to help ease her brain fog, and after some reflection, she replied, "The family has gotten so good at adapting; I no longer know what you do to adapt." We discussed the situation further, and came to the conclusion she struggles most with tasks that require moving parts and decision making.

For example, she can load the dishwasher just fine, but emptying it overloads her head, and she gets that fuzzy feeling. Emptying the machine has too many moving parts — each dish goes into a different location, and the whole process ends up fairly sprawled across the kitchen. Loading, on the other hand, features moving parts all going into one centralized location. It's a slight difference, but it makes a world of difference.

Another task that proves overwhelming is driving. If my mom needs to run errands, she'll often ask for a ride. Driving requires a lot of decision making and vigilance. Paying attention to merging cars and switching lanes can easily knock my mom out of commission, making a task like grocery shopping even harder. But if she's in the passenger seat, she doesn't have to worry about the other cars and can save her energy for the store.

It comes down to knowing limits and attending to needs. Learn about the little things that can make a survivor's life easier; that simple action will go a long way. One positive action such as prepping their breakfast could mean all the difference later in the day for them, and give them the break they need to recharge.

Overall, be patient. Brain fog is a challenging symptom, fluctuating in severity from day to day, and recovering takes time. Listen to what your TBI survivor needs, and do your best to provide it. Your compassion and empathy will go a long way, and give them the support they need as they travel the road to recovery.

Ian Hebeisen *graduated from Saint Mary's University in May 2020, earning a degree in Literature with a Writing Emphasis. Now living in the Twin Cities, Ian writes comics, graphic novels, and poetry. In his spare time, he enjoys playing board games with his family.*

YOGA
Seated Twist

BY AMY ZELLMER,
EDITOR-IN-CHIEF

Yoga is a powerful tool for recovery after brain injury. Contrary to some beliefs, everyone can do yoga — you don't need to be super flexible, have great balance, or even be able to stand up. The beauty of yoga is that every pose can be modified to accommodate anyone.

An important aspect of yoga is your breath. Connecting your breath to your body and flow, and getting oxygen flowing to your brain, is what makes yoga so powerful for recovery. Yoga is also a time to quiet the mind and let anxiety and distracting thoughts drift away.

> "Connecting your breath to your body and flow, and getting oxygen flowing to your brain, is what makes yoga so powerful for recovery."

Seated Spinal Twist is a restorative yoga pose that helps promote good digestion and spinal mobility. Seated twists are usually done at the beginning or end of a practice and can be both energizing and relaxing simultaneously.

Some of this yoga pose's many physical benefits include toning the belly, massaging internal organs, and relieving lower back pain.

Instructions:

1. *Sit on the floor with your legs crossed, or in a chair with your feet on the floor.*
2. *Inhale as you place your left hand on your right knee and sit up tall through the spine.*
3. *As you exhale, twist to the right, keeping your back long and your shoulder blades back and down.*
4. *You can either keep your head neutral or turn to the right or left if that is comfortable.*
5. *Stay for 30 seconds, lifting a little more through the spine with each inhalation.*
6. *Release back to center on an exhale.*
7. *Repeat on the other side.*

Adjustments and modifications: If you have trouble sitting cross legged on the floor, you may sit in a chair with your feet firmly on the floor.

Join me for monthly yoga classes via zoom for only $10 a month: ***www.patreon.com/amyzellmer***

Three Brain-Boosting Powers of HEMATITE

BY KRISTEN BROWN

HEALTHY LIVING

When you feel foggy, unfocused, or distracted, it's time to get grounded. Hematite is a perfect stone to bust your brain fog because its energy is both calming and activating. Plus, the silvery black color provides a visual message to your brain to get back to the present moment, while the stone's cool temperature and heavy weight are a tactile reminder to be grounded in the moment.

Here are three ways Hematite can boost your brain power:

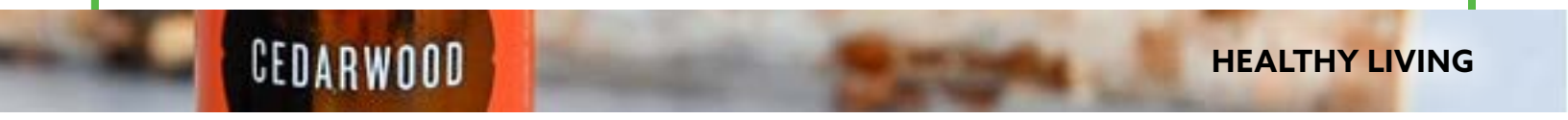
Clarity – This power stone is great for tuning into your intuition and getting clear on how to move forward. When you want to trust your gut and have a strong connection to your next steps, use Hematite.

Grounding – When you are scattered or unable to get your thoughts or emotions under control, Hematite can help ground them. This stone is an iron oxide compound that brings your energy back down to earth.

Focus – Hematite can be a powerful activator of your energy when you need to stay on track with a project or plan. The stone brings a gentle flow to your overall energetic pathways, so you're not so all-over-the-place.

Hematite is one of my favorite power stones for brain fog, clarity, focus, and staying grounded. Use it at work by placing it near your computer or on your desk. Use it at home in spaces where you want to be productive and spend a lot of time. I also love to keep a piece in my purse and in the car for quick reminders of my forward momentum.

Kristen Brown *is a bestselling author, keynote speaker, and energy medicine practitioner who charges up her clients by syncing up their body/mind/spirit for work and life growth. Want more info on crystals and energy healing? Connect with Kristen at* ***KristenBrownPresents.com***



HEALTHY LIVING

BY AMY ZELLMER, EDITOR-IN-CHIEF

Essential Oils: CEDARWOOD

Essential oils are a complementary tool that can help you achieve a healthy lifestyle. They are easy to use, smell great, and are versatile.

All oils are not created equal. Young Living is the only brand I personally trust because I know they have complete control over their product from seed to seal. Oils sold at health food stores can be misleading. They are not regulated by the FDA, so you must look closely at the labels. The labels may say they are 100% therapeutic-grade oils when they are not. If the ingredients list anything other

than the plant stated, or if the label has statements like “For external use only,” “For aromatic use only,” and/or “Dilute properly,” the oil inside that bottle may have been cut with other oils, synthetics, or chemicals.

Cedarwood

The biblical Cedars of Lebanon are the Cedrus libani, which are very closely related to the cedars in contemporary cedarwood oil. Historically, ancient Egyptians used cedarwood oil in ceremonial rites.

Cedarwood essential oil has a calming and soothing aroma. The oil promotes the appearance of healthy skin, hair, and scalp when applied topically. Cedarwood is also a natural deodorizer.

Cedarwood includes naturally-occurring constituents high in sesquiterpenes, which help deliver oxygen to the cells.

Use cedarwood essential oil in a diffuser to set yourself up for a restful evening enjoying a soothing, honey-like scent.

For more information on how to use essential oils, please visit: ***www.facesoftbi.com/eo***

HIGH PROTEIN BLUEBERRY PANCAKES

HEALTHY LIVING

BY AMY ZELLMER, EDITOR-IN-CHIEF

What you need:

- *¼ cup liquid egg whites (around 4 eggs)*
- *1 scoop (25g) of vanilla whey powder*
- *½ banana, mashed*
- *almond milk, if needed*
- *¼ cup (25g) fresh or frozen blueberries*
- *½ tsp. coconut oil*

1. *Whisk together the egg whites and protein powder.*
2. *Stir in the mashed banana and add the blueberries. If the pancake mixture seems too thick, add a splash of almond milk to thin it.*
3. *Heat the coconut oil in a pan to low-medium. Pour in the pancake mixture and cook until little bubbles form (about 5 minutes).*
4. *Make sure the pancake has set enough before you try flipping it, then flip over. Cook the pancake for another 2-3 minutes.*
5. *You can also make 3 small pancakes instead of 1 large.*
6. *Serve with your favourite toppings.*

Serves: 1
Prep: 5 mins
Cook: 10 mins

Nutrition per serving:
257 kcal
5g Fats
18g Carbs
36g Protein

Using Our **SENSES** to *Eliminate Brain Fog*

BY AANIKA PARIKH

For those of us who were fortunate enough to remain medically unaffected by the COVID-19 pandemic, the vaccines brought an end to the stagnancy of what had been our three-hundred-something dreary nights spent staring at our living room walls. For many, the term "brain fog" became an everyday phenomenon that had been inching namelessly into their lives for so long. For students like me, this meant unmuting myself during online classes and immediately feeling my train of thought charge in the opposite direction. It meant spending sleepless nights fighting the bouts of unused energy that preoccupied my thoughts for hours.

It is difficult to imagine those who suffered traumatic brain injuries sometimes deal with this unbearable brain fog for the rest of their lives. Fortunately, doctors have found simple lifestyle changes that can help our brains function better, so we can successfully prevent our brains from turning into gelatin at the most inconvenient of times. And what better place to start than our senses? After all, our brains are home to billions of neurons and our senses have direct access to these essential cells.

Taste

"We are what we eat." When it comes to brain fog, this phrase cannot be taken more literally. Dietitian Fatema Valikarimwala discloses in a Vogue wellness article that docosahexaenoic acid (DHA) is a long-chain omega-3 fatty acid essential to regular brain functions and can directly prevent brain fog. Foods such as walnuts contain high levels of DHA and have also been proven to reduce brain inflammation, improve memory, and aid with learning. Fatty fish are also rich in omega-3 fatty acids that advance the functioning of our nervous system.

Do your research and keep your eyes on nutrition labels. If you are unable to incorporate such foods into your diet, you may simply visit your local pharmacy and purchase omega-3 supplement tablets. According to Healthline, medical professionals recommend an intake of 250-500mg of omega-3 acids (DHA and EPA combined) daily.

Touch

Hyperactivity, which occurs when our body's mechanisms struggle to fight restlessness, is a common symptom of both brain fog and ADHD. Fidgeting has become a popular therapy for those who struggle with ADHD for good reason. Fidgeting, whether it be tapping our fingers on the dining room table or playing with a Rubik's Cube, is a proven method to channel our unnecessary energy and can help redirect brains that are losing focus.

Flushing Hospital Medical Center found fidgeting requires utilization of both the right and left side of the brain (aka brain lateralization). An article from The Dana Foundation explains that this brain lateralization is essential to increased brain capacity. Fidgeting toys come in many forms, such as fidget spinners and anti-stress putties, and have proven benefits.

Sound

Scientists have long proven music can help with improving concentration and memory. But what actually happens in the brain when you listen to music? According to a Harvard University study titled "Music and the Brain," sound waves cause vibrations that turn into electrical signals upon entering the brain. After reaching the brain stem, these signals are relayed throughout different parts of the brain, stimulating them, and activating the entire body.

By testing which type of music works for you, you can take advantage of the incredible power of sensory nerves to stimulate our brains whenever we feel them turning rapidly into unfathomable mush. Specifically, the amygdala and hippocampus must become activated in order for us to listen to music. As a byproduct, we are stimulating the parts of our brain that deal with emotions and memories. Not only will listening to music help us get a stronger grasp on our emotional tendencies, but will improve our ability to concentrate and retain information.

Smell

Essential oils can be potentially life-changing when trying to prevent brain fog from hindering your daily activities. Let's follow the impact lavender leaves upon our brains just moments after inhalation. According to the Sonoma Lavender Company, the aromatic scent of lavender enters our brain's limbic system, which is directly related to our ability to focus. This is an excellent solution since forgetfulness is one of the main characteristics brain fog experiencers claim to suffer.

When experiencing brain fog, we often enter into a flight-or-fight state of mind as our abilities to concentrate and communicate diminish, and we seek relief from the fruitless situation. According to the Mind Body Green Health blog, lavender oil can ease our nervous systems into a "parasympathetic rest-and-digest state." In other words, we would be able to comprehend the information we receive and communicate our responses with less trouble. To reap the benefits of these helpful oils, which include many others such as peppermint and frankincense, you can participate in essential oil massage, use essential oil body washes or oils, or invest in essential oil scent diffusers.

Sight

For many of us, sight is the most unforgettable of our five senses. Fortunately, simple lifestyle changes to release pressure on our eyes can help reduce the impact of brain fog on our bodies. According to a Harvard Medical School study presented in the renowned Wellness Workdays blog, those who participated in electronic reading at night experienced reduced sleepiness, melatonin levels, and morning alertness, all factors that characterize brain fog. Scientists conclude that blue light exposure before bed contributes directly to foggy and tired behavior the following day. Therefore, those who suffer from brain fog would largely benefit from either limiting their nightly screen time or investing in blue light blocking glasses.

Furthermore, practicing the 20-20-20 rule can help reduce eyestrain, lack of focus, and mental obscurity. According to the Wellness Workdays blog, the rule consists of taking "a break from your screen every 20 minutes or so to stare at an object 20 feet away for 20 seconds." This will naturally reduce your blue light exposure and limit eyestrain. After all, protecting our vision promotes neuroplasticity, which is "the brain's ability to form new neural connections through growth and reorganization," according to the wellness blog.

Brain fog, although it is not an official neurological condition, is an obstructive symptom of many conditions, including ADHD, concussion, and traumatic brain injury (TBI). Our senses have direct access to our brain's behavior through the process of neuroplasticity. With a few meaningful lifestyle changes, we are able to regain control of our concentration, mental clarity, and communicative functions.

Aanika Parikh *is a high school junior who is very passionate about health care and the medical sciences. She is also interested in combating public health inequities and plans to pursue a career as a medical doctor in the future. As an avid writer, Aanika uses her skills to advocate for health-related improvements.*

DOCTOR DOLPHIN

PODCAST HIGHLIGHT

Will See You Now

BY IAN HEBEISEN

Animals have aided mental health and physical therapies for decades. While dogs traditionally serve as the most common assistance animal, the roster continues expanding. Now, the list of therapy animals includes dolphins.

Dr. Michael Bagnell is one such doctor working with dolphins to conduct therapy. Practicing for over 31 years, Bagnell first became fascinated by the nervous system while attending chiropractic school. He began a postgraduate neurology program, eventually leading him to functional neurology.

The idea to work with dolphins came to Bagnell from a client. "I have a client… she and her husband are co-owners of dolphin habitats around the world. And a couple years ago, she asked 'Have you ever thought about doing anything with dolphins?'" said Bagnell. Certain programs in the Caribbean have used dolphins in occupational and physical therapies, but Bagnell wanted to focus on ways the dolphins could help with traumatic brain injuries.

Intrigued by the possibilities, Bagnell began conducting research on the dolphins and the facility. "I spent countless hours going down to the habitat where the dolphins are, working with the specialists and getting in the water," recounts Bagnell. Over time, he developed a neuroscience camp utilizing the dolphins for a patient's brain health and recovery.

The entire camp lasts for a week, featuring exercises on land and in the water. Rests are built into the programming to avoid exhaustion for the clients, and meals are provided. "Whether it's vegan or gluten free, we go all out on the eating and fueling." Baseline tests are conducted on the first day, with brain training catered to the client based on the test results. Dolphin training alternates every other day with land-based exercises.

The water exercises target the vestibular system as well as specific parts of the brain, like the amygdala. "We've seen that the amygdala, which is related to our response to threats, can be overactive in people with PTSD or a brain injury," said Bagnell. "Many things can bother you, like sound or movement. The amygdala seems to reduce its hypervigilance when you start working with animals like this."

One exercise features the patient floating on their back in the water while the dolphin circles them. As the dolphin swims, it echolocates, firing natural electromagnetic pulses at the patient. At times, the dolphins seem to know exactly what the patient needs. Bagnell recalls one particular session with a client suffering from a seizure disorder. "As a trainer was trying to move the dolphin to a different area, the dolphin kept coming back near her head and seemed to want to just stay right there." This indicates the dolphins might be in tune with the patients in ways people don't fully understand.

Another therapy consists of the patient wearing a snorkel floating face down in the water. With the patient's limbs outstretched like a starfish, the dolphin pushes the patient in a circle. This pinwheel motion replicates a gyroscope, targeting the vestibular system. "When you're in the water, your vestibular system is very active," said Bagnell. "Your brain is having to get information about where you are in the water and your body position. So, we're using the vestibular system in the water to do particular exercises with the dolphins."

This program has been running for a few years now, and Bagnell hopes to expand their research and resources. "We have brought in other doctors and we hope to train others, but to have other functional neurologists there serving at the camp is one of my heart's desires."

Bagnell encourages people to seek functional neurology and other treatments. Reaching out to people in your area for consultation can lead to solutions you had not previously considered. "It's a difficult road. Hang in there, seek out some help spiritually, physically," Bagnell suggests.

To learn more about Bagnell and the dolphin exercises, visit www.bagnellbraincenter.com. To listen to the whole conversation, look for the Faces of TBI Podcast on Apple Podcasts or wherever you get your podcasts.

Ian Hebeisen *graduated from Saint Mary's University in May 2020, earning a degree in Literature with a Writing Emphasis. Now living in the Twin Cities, Ian writes comics, graphic novels, and poetry. In his spare time, he enjoys playing board games with his family.*

AMY ZELLMER, EDITOR-IN-CHIEF

Connection

Feeling connected, whether through personal contact or virtual, is so important to our mental health and overall wellbeing. The pandemic made connection a bit of a challenge, but most of us learned how to navigate new technologies and made an effort to connect with others.

Now that we have started to emerge from the pandemic isolation, we can actually feel a bit weird reacclimating to in-person connection. Some people are feeling anxious about venturing out in public, while others aren't quite ready to make the leap just yet.

No matter where you are on this spectrum — it's OK! You have to go at your own pace, just like with any other sort of recovery (emerging from the pandemic is likened to a form of recovery). You have to be willing to set boundaries for yourself, and communicate them with those you love to let them understand what you want from them, or how you want to interact with them.

Many survivors struggle with asking for help or expressing what they need. But it is critical if you wish to move forward. Whether verbal, written, or even drawn in pictures, the objective is to help others help you feel comfortable.

Moral of the story: It's important to feel connected with others, but it is equally as important to communicate clear instructions for how you wish to connect. Nobody can read your mind … and it's absolutely OK to ask for assistance.

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