

Consumer Guide for Recovery from Car Accidents

**Learn how your body and brain
may be affected**

Know what care you need

Become a partner in healing

Save time and frustration

Rachel S. Katz, P.T.

2006

**This report may not be reprinted without the written consent of Rachel S. Katz, P.T.
Rachel S. Katz, P.T. 303-875-7878 rachelsranch@yahoo.com**

Introduction

You have recently been in a car accident, and you are concerned that you are receiving the best care for your short and long-term health. This booklet reviews both the large and obvious possible injuries that may occur, and secondarily a range of other definite problems that you may face. The second category of problems relates to conditions that are complex, and variable in how they show up. These other problems are at times considered debatable, unthought-of, unappreciated, and unfortunately may go untreated. A reason why this guide was produced was to shed light, hope, and validation on the issues of Head Injury, Post Traumatic Stress Disorder, and Protective-Involuntary Muscle Spasm Influence. You can benefit in terms of progress, more rapid recovery, more complete recovery, decreased frustration, and better communication with your providers when you understand more about your needs.

Major injuries usually are associated with hospitals and that is the right place for care when there are fractures, internal damage, head injuries, or cuts. Whatever medical intervention you need is provided and your medical condition is stabilized. Sometimes you will have to stay in the hospital for your injuries to be taken care of. You may be referred to a range of therapists who are clearly needed to address your obvious injuries both in the hospital and later upon discharge. Typically in this case, you will continue with therapy at the facility where you began your care. There is often a feeling that these dedicated therapists and doctors know you. They have been with you along your road to recovery and there is a team feeling that they will get you the rest of the way there.

Sometimes you are only seen in the Emergency Room. Imaging by x-rays or other more complex testing may be done and if no damage is discovered, you will be sent home.

You may find yourself in the situation of resting, icing, taking pain medications and waiting for pain to abate. You may have multiple or limited sites that hurt. You may have pain in your neck or back, arms or legs. You may have dizziness or nausea or ringing in your ears. You may have difficulty returning to a sense of calm. You may notice an increased sense of alarm being in cars. You may have trouble finding a position that relieves pain and enables you to rest. You may have sensations that you can't explain and that alarm you partly because you don't know what they are from. You may need to continue to work or be quite challenged to be able to go to work.

Each person has their own sense of how long they should wait for matters to go away or for a choice to be made to seek assistance. You may have a relationship with a care provider, personal doctor, or therapist who you can turn to for direction.

You may find yourself in a maze searching for a route to comfort. What kind of care should you seek? Who should you go to? What should you expect in your treatment? How do you decide if it's the right care? Is there anything else that's been missed? Why isn't the pain going away if nothing is showing up in tests? Who is supposed to be in charge of getting the answers? You will want your diagnosis and follow-up care to address all the relevant aspects of your situation.

Next let's take a look with more detail at the types of problems you may encounter. I will divide these into major and widely recognized injuries, aspects of damage and aspects of recovery and treatment. The next grouping of problems may not be in the general awareness of the public or many medical providers. It involves greater complexity of how symptoms may show up, complexity to when symptoms show up, complexity regarding evaluation, treatment and recovery timelines. Familiarity on the part of the person seeking care and familiarity on the part of the care providers is crucial for directing treatment.

Injuries That May Occur In Car Accidents:

A. Major Categories: These are the main governing theories in car accidents and they impact evaluation, treatment direction, and projected healing times.

I. Bone/Joint injuries

Fractures

Cartilage

II. Soft Tissue Injuries

Sprain/Strain of Ligament, Tendon, Muscles, Joint Capsule

Spinal Discs

Nerves

Muscle Injuries

Weakness

Loss of Muscle length

Scarring/Adhesions

Spasm

III. Some Brain Injuries

IV. Pre-existing Conditions

B. Brain/Body Conditions with Complex and Variable Presentations:

I. Mild Traumatic Brain Injury

- Mechanisms of injury
- Symptoms
- II. Post Traumatic Stress Disorder
 - Altered brain processing as cause
 - Symptoms
 - Fight, Flight, Freeze discussion
 - Movement reaction plans
 - Mind/Body aspects
 - Communication with the deep brain
- III. Protective-Involuntary Muscle Spasm Influence
 - Deep brain altered regulation
 - Symptoms
 - Evaluation
 - Talk Discovery
 - Motion Discovery
 - Skin Sensation, Vision, Balance, Sound Localization

Having a theory to guide care is a big plus. It enables a practitioner to have a rationale and course of action for a treatment program. Measurable changes can be observed and progress can be made.

A. Major Categories

I. Bone/Joint Injuries:

For example, **fractures** have a fairly predictable time frame for knitting. If they need a surgical repair, these often have expected time frames for how long they need to be immobilized and when motion and work loads can begin. X-rays and other imaging can be used to assess healing and guide the return to using the injured area.

The joint surfaces are covered in **cartilage**. Cartilage can be damaged in impacts due to excessive force crossing the joint surface. No symptoms may show in the short term of a few years but over time there can be degenerative changes. A joint that sustains an internal tear in an accident can usually be picked up by special tests and/or imaging, the presence of swelling or other markers. The set up for a slow decline typically isn't identifiable if nothing is out right torn at the time of the accident.

As a person ages, the cells that make cartilage diminish and the material cannot regenerate well. You may not have had the most perfect cartilage in the first place due to prior illness, use, injuries, bone alignment, disease or commonplace degenerative changes. A person may be absolutely unaware that they have lost a high percentage of a joint surface's cartilage because it doesn't cause pain until it's worn through. Also, having a problematic joint somewhere doesn't mean that all your cartilage elsewhere is wearing out.

II. Soft Tissue Injuries:

Sprains and strains usually refer to over stretch and some degree of breach in ligament, tendons, muscles and joints. Ligament is a type of strong connecting tissue that helps hold two joints together. Tendon attaches muscle to bone. Joint capsules hold two bones together and enclose the joint fluids. Sprains and strains have generally accepted healing time frames. When **ligament** is torn but not completely off its attachments, it will have an ability to heal by laying down more of the collagen fibers that comprise it. It becomes strong again. The more it's torn the less this is true. Tears that have significantly reduced possibilities to regain adequate strength may have a surgical solution, but some do not. This depends on location, a person's physical needs for work or recreation and age. Another possibility for some kinds of torn ligament is a particular type of injection into the ligament that causes scar to form. This is called a sclerosing injection.

Fractures and sprains/strains usually need strengthening of the related muscles. This helps make up for any rest period. Muscle damage may also occur at the same time that bones or ligaments give way to forces beyond their capacities.

Spinal discs are another tricky area. Discs have a low blood supply and hence a low recovery capacity. They have 2 major parts to them. There is a central mushy part and outer layers that are like the wraps of a radial tire. They undergo normal changes as a part of aging.

Depending upon your age when a disc injury occurs, different kinds of possible outcomes may result. In your 30's and below, the central material may bulge or completely come through the outer wrappings. This is evaluated by special imaging, not just x-rays. A bulge or full herniation can leave material in new places that don't have room for it. Nerves and/or sensitive ligaments may be pinched with characteristic pain qualities of a stabbing, shooting or burning nature. Sciatica is a name for this kind of nerve pain that travels along the back of your leg along the sciatic nerve's route, even though the source of the pinch is in the low back.

With aging, in the 30's, the central material dries up enough that it tends not to herniate through the outer rings. The radial wraps of the outer disc can crack or tear and be a source of pain and problem.

Changes in the spine and discs that show up in imaging studies can be a challenge to sort out because people with no pain can have a host of changes present but be completely comfortable.

Treatment for disc injuries involves joint protection principals, attention to posture, correction of movement patterns that contribute to wear and tear, and

strengthening of the torso. Attention is paid to avoiding positions that increase the pressure in the discs so that inflammation can quiet down. There is some individuality to this. Some people can't sit for a long time and for others it's okay. Healing time with disc injuries is less predictable although many people can regain high measures of comfort with time and treatment.

Nerves can be injured by stretch, physical disruption, pressure from new or prior disc protrusions, bone spurs or via compression from muscle spasm, or swelling. Nerve pain may be particularly noxious. It can be one of the most difficult types of pain to tolerate. It may be searing, stabbing, electric-like or tingling. It is sometimes brought on by specific positions of the neck or spine or a limb. If the nerve pain is accompanied by weakness in the muscles it supplies, there may be an urgent need for surgery to relieve this situation. Not all nerve pain means a surgical solution will be advised. Some nerve pain comes from nerve tissue close to the spine and discs, other nerve pain may come from compromise farther along in what is called peripheral nerves. Treatment is directed at relieving pressure, decreasing swelling, avoiding postures or positions that bring an increase in pain, tingling or numbness. Sometimes injections of pain or sensation blocking medicines are used to provide relief or to diagnose the specific location that symptoms are coming from. Nerves can refer pain into distant locations. A compromise in the neck region may cause the hand to feel numb or tingling. Sometimes it's a blood vessel that is constricted that causes similar sensations.

Types of **muscle injuries** include tearing, healing with scarring or adhesions (think glue that goes where not needed), getting tight, being weak, and being in spasm.

In a typical and predictable healing course for muscle, new tissue is laid down by your muscle fixing cells, you feel less pain, and you begin to gingerly use your healing muscles. Gradually more and more effort can be used with the healing muscles. As strength returns, more effort can be used until you are able to do your typical activities and the muscles feel responsive and normal to you. Fortunately, tissues modify because of the activity and you go back to essentially the same state you were in before injury. Muscles have an excellent blood supply and typically repair nicely when properly treated.

At some point in the healing cycle your therapist will give you instructions on how to **stretch** your muscles. This helps the muscles to lengthen. Muscles have two major divisions; the part that contracts so that motion can occur, and the coverings and soft framework that the contractile parts arise from and blend into. The second part, which is the "frame work " responds well to stretching. It needs the stretching to physically change the shape of its new molecules back to their prior length.

Under normal conditions the contractile part of the muscle will also stretch. This is what we expect when young gymnasts or ballet dancers work to gain muscle length. Yoga and various exercise programs also address length by putting the body in positions that ask the muscles to get longer.

There are a range of theories about how to get the most out of the stretch. These can relate to the time that a stretch is held (typically 2-3 minutes for a long stretch), combining breathing, adding small motions in the final range of the stretch, and use of resistance.

The basis for some of these instructions is that the muscles have feedback systems into the brain and spinal cord. The various receptors pick up information about the proper length a muscle, whether it is changing length or holding steady, whether it has a safe amount of tension or it is in too much tension. The information interplay between the receptors and higher control centers in the nervous system help produce a change in the muscle length in the moment, and to help carry the effect beyond the immediate session.

Typically we expect the stretch to maintain for a relatively brief duration. Think of a runner who stretches prior to a race. It would seem odd to stretch for a run hours or a day earlier. Stretching programs are usually daily for this reason. There is a benefit in the frequency of stretching.

Muscle injuries are often treated with **massage, and other hands on methods that may be called soft tissue mobilization or neuromuscular re-education.** The term neuromuscular re-education refers to the therapy's interaction with nervous system/body communication. There may be pressure applied in varying depths to some areas of the muscle. This is called trigger point work. The idea is to physically help **scarred or adhered parts** of the muscles stretch back out. Think about rolling out pie dough. You can't just pull on it or work just one part. You work all the different parts to accomplish success with the whole. While the muscles are physically being stretched and worked, the receptor systems are also participating. This kind of therapy needs to be modulated to suit your sensitivity. You don't want to have to brace against invasion or pain that is "too much" or find yourself "mentally checking out." Hands on methods can be very helpful without painful force. If treatment involves pain, clarity and good communication is especially important.

Sometimes the healing process has created a scarred area within the muscle that doesn't respond to hands on work. In these cases, the "trigger point" sets up repetitive signaling to the nervous system to keep the muscles around it tight in order to limit pulling on its scarred fibers. A doctor can inject the area directly, providing a useful and often quick resolution to the pain. Some acupuncturists can address trigger points. This can physically open up a scarred place in one or a few sessions. You know it's the right answer if it leads to better muscle length and pain relief in a few days.

Muscle spasms often occur soon after the injury. Muscle spasm also shows up following planned knee surgeries and is a normal response of the body to keep an injured area quiet. Sprains/strains often have spasm in the area for 4-6 weeks following an injury. As healing progresses, the expectation is that spasm will self limit and diminish.

If a joint is out of **alignment**, spasm may result to keep things from getting more out of alignment. **Spinal adjustments** can help physically reposition segments and often the local spasm goes away.

III. Some Brain Injuries:

Major brain injury like coma is identified right away, it's hard to miss. Concussions are frequently picked up too even if there was no loss of consciousness or direct blow to the head. They can have a range of severity. Lasting effects of traumatic brain injury may or may not occur and depend on many factors. Time and treatment with brain specialists is important to improve outcome. Avoidance of sports or activities that could re-injure the brain is prudent. Symptoms of concussion or brain injury can include headache, difficulty thinking, remembering, organizing, sequencing thoughts, word finding, emotional fluctuations and mood swings, easily fatigued, sensitivity to noise that beforehand would have easily been filtered out, feeling overwhelmed, difficulty with focusing the eyes, and other symptoms.

If there is central nerve damage in the brain there can be neurological impacts on how the muscle system works. There can be movement that becomes stroke-like. When central brain control is altered, muscles may not act independently but in patterns that involve the whole limb. Treatment by a Physical or Occupational Therapist who does neurological rehabilitation is advised.

Intensity, severity and permanence of brain injury symptoms are dependent on many factors. In its milder expressions it can very much mirror some of the aspects of Post Traumatic Stress Disorder. This will be discussed in the section on complex conditions.

IV. Pre-existing conditions:

These can be made worse by car accidents. Prior infrequent back pain may become more frequent and/or intense. Places that rarely caused you trouble can be flared up. Arthritic joints can worsen. It's important to get a clear idea of what has changed in your ability to get through the day. As more time goes by it becomes difficult to remember precisely what ground has been lost. You need to have a baseline idea of where you were at beforehand. A skilled therapist or doctor can take the time to sort through the details and develop a clear picture of your capacity before the car accident. You may be able to get back to this

capacity. Having a pre-existing condition should not prevent you from accessing treatment and results.

B. Brain/Body Conditions with Complex and Variable Presentations

Now we come to **applicable new and noteworthy theories** that may further enable you to find your way through the maze. Theories are very helpful in explaining and guiding observation, and in helping you and your practitioners to identify the way in which symptoms relate to other aspects of the whole puzzle. The conditions of Mild Traumatic Brain Injury, Post Traumatic Stress Disorder, and Protective-Involuntary Muscle Spasm are not easily recognized if someone is not familiar with them. A fracture is generally clear-cut, but this terrain is less obvious.

You may have to work a bit harder to find evaluation, validation, and a practitioner who can help with Mild Traumatic Brain Injury, Post Traumatic Stress Disorder, and Protective-Involuntary Muscle Spasm Influence. Unlike the fairly straightforward healing of bone, these areas depend on the interactions of many variables. Some people are more resilient than others in the face of injury and combined stress challenges. Others have a harder time. What types of family support you have along with your friends and extended community matter. Your emotional strengths and the negative effects of the accident on your psyche can have an effect. The human brain is said to be the most complex system on the planet. It is this complexity that makes for unpredictability in healing. Sometimes extended time frames for healing are appropriate.

I. Concussions and Mild Traumatic Brain Injury (MTBI)

Especially if no medical attention was provided at the time of the accident, these types of injury can be missed. Amazingly, the military medical complex doesn't routinely provide brain scans of injured soldiers even if they were injured by explosives. This is discussed in the December 2006 [National Geographic Magazine](#) article on Military Medicine. Exposure to forces involving impacts and/or acceleration/deceleration can shear and damage brain tissue. These injuries may not be diagnosed. Therefore, you may need to pursue evaluation for these types of injuries more vigorously. Imaging studies alone may not provide enough information so cognitive testing may also be needed. Cognitive testing is a series of standardized tests that take a look at brain thinking abilities. Not only thinking functions can be affected, emotions may be hard to manage and relationships can be strained.

People can have a **huge and varied range of problems** including sleep disturbance, memory issues, sequencing steps of familiar tasks, word recall, anxiety, depression, headaches, difficulty reading, difficulty understanding what is being read, sensitivity to noises, difficulty filtering out conversation from other

background sounds, withdrawal from intimacy, feeling like a stranger to oneself, and difficulty on the job or at home to mention a few. Simple tasks like cooking dinner or grocery shopping can become overwhelming.

Without the understanding that something may really be wrong, even greater strain on a person's sense of reality and self may occur. There is no easy answer for outcomes and timeline for healing. Generally cutting back on stress and brain demands is helpful. Brain injury specialists are important resources for evaluation and treatment.

II. Post Traumatic Stress Disorder (PTSD).

Post Traumatic Stress Disorder can in some ways be seen as an operating glitch. It is different from the situation of physical shearing and disturbance of the brain cells like a sprain/strain inside the head that is part of Traumatic Brain Injury. There may not be physical alterations from force of impact, but processing functions of the brain have changed. Its basis lies in the ancient hardwiring circuits that switch us from a "safe" mode to full "red alert mode." Your brain should switch back once the coast is clear but for a host of reasons you may have become stuck in this other way of existing.

In Post Traumatic Stress Disorder, brain blood flow is decreased to the higher centers in the brain. You don't need to be able to write a great novel while you're in a fundamental survival mode. The basis for the shift in brain function lies in our evolutionary heritage of the fight, flight, and less known and understood freeze response. Interestingly enough, some of the same problems that Traumatic Brain Injury causes also occur with this condition. There can be problems with thinking, sleeping, emotions, muscle tension, pain, filtering sound, reading, focusing the eyes, becoming easily over stimulated or becoming detached and numb.

Let's look a little bit at why these changes occur. A sense of safety in our immediate place in the world provides our bodies with a relatively calm baseline level of muscle tension. We are relatively relaxed. We can listen to the sounds around us and filter out a lot of inconsequential background noise. Our eyes can easily move up down or right and left which enables us to read because we can focus our gaze on a page and then move our eyes across the lines. Our brains are receiving a good blood supply to the thinking centers.

Our ability to be in positions that are sustained by posture muscles is working. When some of the back muscles tire, others within the same groups take a turn at holding us up. We are unaware of the changes in our background muscle activity because small movements provide rest for some of the muscles while fresh fibers take up the task of providing postural support. We have a quality of fluid motion because all motion directions are possible, evenly available, and the amount of effort it takes to begin to move is so small it's unnoticeable.

If the brain is stuck in a fight or flight mode it's easy to understand that the "juice" in the whole system is high, muscle tension is up enormously, attention is distracted seeking an outlet for release. Thinking and calm, patient interpersonal relationships are going to suffer. Huge amounts of energy are harnessed for a response that is supposed to be a short lived and hopefully successful event. This is what provides the strength to pick a car up off someone or to power the legs for a high speed run. If this brain program stays, it interferes with sleep because of the high sympathetic nervous system activity. Muscle pain can increase as well from the over-activity of the whole muscle system.

Car accidents may first bring up a fight or flight response which the brain will begin to orchestrate via the fastest shortest circuits it has in the deep brain centers. There are instinctive reactions that begin that are quicker than conscious choice. There may be a move to turn the car, or to move away from danger that is seen or heard or felt. The eyes may shift into wide gaze as part of a scan the horizon mode of operations. This wide gaze is not a mode a person can bring up at will in calm situations. Another possible visual change can be tunnel vision as the gaze narrows onto some aspect of what is going on.

Uncontrolled, unplanned, unexpected, loud, motion and or trajectory altering circumstances will send the brain into "red alert". Part of what makes a roller coaster ride fun is the safe exposure to exciting moves. Car accidents that cause PTSD have taken the person's experience into extremely unsafe feeling territory. Part of the short fast nerve circuitry signals go to the eye, head and neck muscles. Several different classes of action plans may occur. There can be an action to orient or discern where the trouble is coming from. There may be an action to dodge or twist. There may be a plan to look towards a child or other passenger. There may be a plan to look for an escape route. There may be an order delivered to look and/or move a precise way. Where ever hands or feet are in contact with a support there can be signals to brace into a steady position.

Speed is often a part of car accidents and part of the sense that there was hardly any or zero time to react. When fight and flight stop being an option, the next thing that the instinctive brain sends through the shortest fastest circuits it has, is the directive to go into freeze. What is freeze? It is the last choice the brain picks to try to survive in the face of threat. Think of opossum and coyote or a mouse playing dead with a cat. It's a form of shut down. There may be an extreme sense of detachment. There may still be high muscle action or at times the opposite and a person may collapse. The action plans that initially went into effect now may be present under an overlay of global muscle tension. Sometimes the freeze response affects the whole person and sometimes it is a part of the person.

In a freeze response a person may feel entirely or partially unable to move. If the voluntary part of the brain tells the body to move it may feel like it takes

considerable effort to get going. Thinking can feel very scrambled, and there may be disorientation. A “shocky” feeling may be present. The blessing of freeze is a numbing of pain. It is not at all uncommon that major injuries can be present and the injured person can't tell that they should be going to the hospital.

Many people rapidly shift out of freeze once the coast is clear again. They may have felt less of a sense of deep threat in the accident, be more able to shrug off what happened, have less of a sense of lost control than others. They may have experiences that enable them to take it in stride that they've been in an accident, and readily return to their baseline state of calm. The passage from freeze to normal may involve subtle calming shifts in the body, heart rate, breath rate, muscle actions fading off the directive paths of the short fast brain circuits, and the proverbial sigh of relief is experienced. Some of the shifts out of freeze involve more dramatic or noticeable shaking or trembling in the large muscles, emotions, tears, very shaky breathing and a progression to normal.

Some people do not readily regain a sense of safety, feel that the accident is passed, or find the return of their former relatively calm state. They may remain with the deep short brain circuitry continuing to send messages that sustain a state of alert plus freeze leaving them coping but clearly altered by the experience which they found quite overloading.

The diagnostic description of PTSD once included changes in function in the body. The research field never really has caught up to this, never has elucidated how to spot the physical aspects of the disorder, nor has it identified symptoms of altered muscle activity. In fact, the latest DSM IV psychiatric diagnostic manual of 2000 has deleted musculoskeletal tension from its descriptive markers of PTSD. Therefore, the physical changes in function are typically absent from most literature and treatment approaches related to PTSD. Some important exceptions are the works of Peter Levine, PhD., Robert Scaer, M.D., Diane Poole Heller, PhD. and Babette Rothschild. Most of the literature and trauma research is in the sphere of psychotherapy and has not filtered into the body focused therapy fields of Physical Therapy, Occupational Therapy, Chiropractic, Medical Doctor (M.D.) or Doctor of Osteopathy (D.O.), Massage Therapy, Cranial-Sacral Therapy or the body and mind exercisers like Yoga, Pilates, Personal Trainers, and Exercise Physiologists.

The hidden piece for many car accident related injuries is that the mind and the body both contribute to keeping up the state of “red alert”. The mind and body are stuck in a complex reaction. There can be steady signals from injured areas that keep up the message that spasm is needed. The brain can be fixed on a scanning mode, or some version of hunker down. The body's message from posture regulating muscle receptors sent back upstairs to the brain can be that bracing reactions are still needed.

Despite these background brain and body confusions, you are trying to get back to normal. You can tell yourself its okay and to just relax and move on. You can do affirmations and a whole host of higher mind directives to your body. The trouble is that **the part of the brain that talks and thinks can't get through** to the brain/body systems.

The Far Side Cartoonist Gary Larson illustrates this in his cartoon of a man telling his dog Ginger to stay out of the garbage. The upper half of the frame titled "What we say to dogs" shows the man looking at Ginger and saying "Okay, Ginger! I've had it! You stay out of the garbage! Understand, Ginger? Stay out of the garbage, or else!" The lower half is titled "What they hear." The man and dog are looking at each other same as above. Ginger hears "blah blah Ginger blah blah blah blah blah blah Ginger blah blah blah blah...."

The language that is spoken by the older regulatory brain systems in the face of severe threat is the **language of sensations including visual images and sounds**. It is the language of interface between motions and purposes, emotions, behaviors, movement sense, movement memory, sense organ use, balance, and fine tuned muscle tension awareness. Telling oneself to relax is a bit like blah blah Ginger. **The key for recovery from PTSD is to work with body sensation, the involuntary action plans imprinted in the event, their receptor signals and the meaning and emotion of the event.** This enables the Protective-Involuntary patterns to be returned to normal brain body communication patterns.

There are experts in these fields that debate if patients have TBI or PTSD when low forces are involved. The overlap of behaviors and problems is so similar. On a positive note, with the right treatment, you can recover from PTSD and give your brain its best shot at returning to normal.

There is a growing field of therapists in the realms of both the psychology/mental and bodywork fields who approach PTSD in a variety of ways. It's important to put together a team who will treat the whole person and not just the pieces. Unfortunately our dominant medical models separate the brain and mind from the body. When a brain/body condition is present, a therapist may only be addressing their side of the equation. **It's important for team members to communicate and work compatibly.** This is no small feat to accomplish with competing theories, approaches, and egos. The way the situation is explained differently by different practitioners can sound conflicting, even when it's not.

There has been a huge increase in interest in the field of trauma. Sources of trauma that were excluded from consideration of causing PTSD are becoming recognized as valid. It used to be that only battlefields were linked to the disorder. There are those that believe you cannot get this problem if the circumstances were not clearly a real threat to you or someone close to you. Some authorities claim that low impact car accidents cannot produce PTSD. This

idea is under challenge in new trauma literature. Extreme fear may occur for yourself or another who is in danger. **It's your perception of great threat or harm**, not any outside independent view of your situation.

There is a classic old **Tom and Jerry cartoon movie** that comes to mind. It perfectly illustrates the concept of perceived threat. The situation begins with the cat, Tom, being threatened by the bird Jerry. Jerry is holding a pistol aimed rather wobbly at Tom. Tom backs up into the corner of the mantle by the fireplace. The second bird there quickly drops a light bulb. The sound convinces Tom that he's been shot. He falls to the ground in a deathlike swoon, sees a vision of his tombstone and becomes rigid like a board. As his feet come down to the floor they creak. This cartoon captures within its imagery the idea of reacting to threat with rigidity and/or collapse when one is overcome by a situation. There is a term in the literature for this. It's labeled tonic immobility or the freeze response. Another way to describe it is the **deer in the headlights**. This reaction has many aspects in heart rate and chemical release parts of body function. It also has an enormous influence on how the muscle systems may subsequently operate.

III. Protective-Involuntary Muscle Action

We will focus next on the muscle systems. When the major freeze connected to the accident goes away but its influence is still present, I call it Protective-Involuntary Muscle Action. The influence can be present in the body in varying degrees. It can be in one region and not others; flare up in certain situations; change over time to more entrenched or widespread reactivity; and can converge with other stored memory for a more complex or potent expression. It is regulated through involuntary and often unconscious parts of spinal cord, brainstem (lowest part of the brain in the head), cerebellum (the cauliflower part on the back lower part of the brain) and deep brain nuclei (deep central locations in the brain). These interlaced nerve pools govern the nervous system in concert with the muscle system.

The result includes a range of possible sensations. It can feel like it takes way too much effort to move. Becoming overly nervous can prevent settling into a calmer state. A person may feel clumsy or bang and bump into things. You may feel stiffness, pain, spasm, muscles that won't stretch out, a sense of the body being in a new posture or position, nerves that feel pinched, global whole body tensing, or an inability to find a comfortable position to rest. The neck or spine may feel compressed or crunched. Balance may be mildly off or you may feel dizzy. Any emotional distress ramps up muscle tension more noticeably than before.

How to determine if this is going on relative to the car accident and if it is Protective-Involuntary Muscle Action Influence.

There is no known high tech instrument that will pull the picture together. It's important that the physical evaluation look at the function of the background involuntary aspects of motion control. It is within the posture system and its links to the senses that the distortions of function primarily reside. Most people can unquestionably move their bodies through the resistance present in their spine and limbs. Therefore, **actual range isn't important, but the quality of ease, is.**

Areas of evaluation:

The doctor or therapist needs to use their skills, know what to look for, and have an open mind to interpretation. This is especially so in the presence of overlay from any other injuries present. The 3 areas to evaluate are generally classified as talk discovery during history taking, moving the muscles, and special tests of how sensory information is processed.

First and foremost in testing is respect for how you are doing in the process. It is possible to trigger a large stress reaction in some people because of the degree to which they are overwhelmed by their accident. Please keep in mind that it is counter-productive to press forward with any part, talking or otherwise, if the result is an overload of increasing distress. Assessment can take place in parts, in no particular order, and everything need not be addressed.

The next sections will discuss how a doctor or therapist can evaluate for the presence of Protective-Involuntary Muscle Action Influence. It is directed at your provider and you. You may find this section helpful because it gives more detail about sensations and awareness of your muscles. This may help you to see more of the whole picture that may be going on. Your therapist may find this section helpful in taking a new perspective on how your body is functioning. These concepts are often not in the theoretical framework of many body focused professionals such as Physical Therapists, Massage Therapists, Chiropractors, and Exercise specialists. I have provided extensive detail so that you and your provider can explore these areas together. It takes curiosity, skill in palpation, and an ability to interpret the findings.

Talk Discovery

The evaluator will discuss the accident and test for the appearance of related muscle actions. Be aware of changes in heart rate, breathing, and body position. If it is minimally distressing it's ok to explore in detail. Be careful that discussing accident details doesn't cause overload. Overload can show up in clear ways like fast heart rate, sweating, fear, and distress, or it can show up as mentally checking out, getting numb, hard to think, and silent suffering. Keep checking in on how your body is coping. It is perfectly **ok to limit discussion** and to avoid difficult parts of the experience if the body reaction is too much distress.

While you are talking with someone about the accident, you may demonstrate a move, a position, or a part of what you did during the accident. A foot and leg may extend as you describe braking. You may have a clear sense of twisting a certain way. You may remember focusing your eyes either wide or very narrow on a certain distance or direction. You may have a memory of striking a part of yourself and feeling the blow. It may be pushing hard on the steering wheel with an arm or hand.

Motion Discovery:

Passive Range of Motion Test for the presence of movement barriers. When you are in a comfortable resting position, your therapist can gently support and move an arm or leg or your neck and feel how easily the motion occurs. Often the therapist will feel resistance which you may not because you are accustomed to judging tension at much higher levels. While you are resting on your back, a limb can be gently rocked to see how much therapist effort it takes to cause a small displacement of position. One limb may move differently than another or there can be a feel of stiffness all over.

Testing is done for the available flexibility, and for the first instant that extra resistance to movement is felt. By passively moving the body, the earliest barriers to free movement can be assessed. Sometimes movement is freely accomplished on one or two passes through the available range, but changes to resisted motion can occur within a few cycles. This type of muscle activity can be called spasm, tone, or movement barriers. This testing gives clues about Protective-Involuntary Muscle Action. Normal muscle regulation allows for free movement through the available range. If movement begins to cause increasing resistance to movement, muscle spasm is present.

Active Range of Motion Test for the development of movement resistance/freeze influence. You may be asked to slowly move an arm, leg, neck or your torso back and forth through a part of your available range on your own or with the guidance of your therapist's hands. You're looking for a change in the ease of movement and fine tuning of whether or not you come to rest in a certain place. Sometimes by feeling for where a limb would most readily position itself, a quality of becoming stuck in place can show up. You may use information from the accident discussion to guide the motion testing. Active movement should also be tested with attention to how the end range feels to overpressure. Normally at the limit of movement there is an elastic quality relevant to the joints and their muscles. A hard stop can be indicative of spasm.

Observation and details of Body Posture. Sitting is often a challenge because posture muscles are being used. These muscles may already be on too much tension and unable to make small shifts in body position. What happens then is you have to fidget. You may find that you have to relieve tension by periodically stretching, twisting, or shifting from one side to the other. You may have to stay

leaned against a chair back because you get too tight if you sit upright. You may need to frequently “crack your back” to decrease pain or tension. The act of making big motions to keep interrupting muscle tension is worth noting. You may find you are sitting with more hunch than usual, you may have increased tension around your shoulders or the base of your head.

Assessment of postural support hyper-reactivity: The posture system has a lot of parts, one of which is the feet and their pressure and muscle stretch receptors. Active and passive motion testing of the feet in sitting and how the legs respond can show bracing patterns that would not show up when testing is done while you’re lying down or have your feet dangling. It’s often the case that passive testing shows that the feet can’t easily come to a flat or neutral position in relationship to the long bones of the lower leg. In standing the tension is jacked up further as the muscles are forced to bear the load of the body in a lengthened position. Some people can feel the effects of over-reactivity from the feet into their hips and spine when this is assessed.

Palpation of muscle is often done with moderate to deep probing and notation of the degree of muscle pain and sensitivity. The quality of how pliable the muscles are, how yielding they are to incoming stretch, and how much they let go with massage and other muscle handling methods is noted.

Palpation of fine muscle adaptive qualities can also be assessed. This is done with light touch and attention to the resulting matching quality. Normally muscle is able to do a beautiful job of matching motion or pressure with smooth and tiny shifts of position. If you placed your palm on someone else’s, you’d be able to move along with them like a dance. It’s the quality in a happy cat that enables him to flow into your palm as you pet his back. It’s the quality that lets you lean against a backrest or a counter. It’s the muscle function that gives slight shifts in posture to keep you comfortable in sustained positions. It can be palpated for. Normal feels like the person is matching the contact. With Protective-Involuntary Muscle Action influence it feels more like the body area is a board that doesn’t react. It’s like touching an unhappy cat, no flow.

SPECIAL SENSES AND MUSCLE INTERPLAY

Loss of sensation is typically a marker of a pinched or damaged nerve. There are well known skin maps that show the whole body and which nerve supply and spinal cord level is the dominant source for each place. **Dissociative numbing** is a different kind of altered sensation to light touch. The skin may become numb or deadened to light touch on the surface above areas of muscle spasm. **This kind of sensation change doesn’t match a nerve root distribution area.** It can be in what is called stocking/glove or all around distribution. For example a whole leg may have it. It may be absence of light touch or a muffling of sensation. There may also be a decrease in your ability to tell where the touch actually is. It’s not uncommon to find that an area on either side of the spine has

lost light touch or had a decrease in light touch sensitivity. It may extend 4 inches to each side of the backbone and then normal sensation resumes.

Testing a spot here or there doesn't pick this up. The **testing should be done with a single finger moving slowly across the region in horizontal sweeps.** Pressure is about one ounce. The pace is about 10 inches of distance in 15 seconds time. The loss of sensation is usually paired with Protective-Involuntary Muscle Action underneath.

Sound can be a trigger for increasing muscle tension especially in the muscles that move you into a Protective Posture. Let's say you were rear-ended. There would have been a big sound coming at your body from the zone behind you either directly or to the side a bit. Now you may be fine with noise coming your way from the front, but react with tension gain when you hear any or certain qualities of sound coming from behind you. This can be tested if you sit and have someone slowly circle you making clanks. Attend to whether or not you can tell where the sound is coming from very specifically and if it causes any change in your "baseline" muscle activity. If you are sensitized to sound this will need to be de-programmed. **You want your sound processing system to help you find sounds, their direction, and to discern what is worth filtering and what is worth reacting to.**

The vestibular or balance system is completely intertwined with posture and muscle, vision, and receptor communication throughout the whole body. The receptors include those in the skin that register pressure contact, pain, in muscle that register changes in length and rate of stretch, joint receptors that assess ligament and joint position, and the reflexes in the brain that keep track of all this plus the pull of gravity and whether there is acceleration/deceleration going on.

One of the **powerful reflexes of the eyes is called optic righting** that keeps us looking at the world with eyes level to the horizon. The tricky part is that when a freeze reaction is triggered, optic righting may become a secondary influence. Think about an opossum. It's one of nature's clearest ambassadors of the freeze response. We even say when someone is playing dead that they're playing possum. Imagine a coyote comes along and finds an opossum. Opossum goes down in a freeze. The idea is to look dead so coyote will lose interest and leave it alone. It wouldn't work very well if optic righting did its job and the possum's eyes and head kept looking around because coyote would stick around to eat what's looking like a live dinner.

If you get a lingering dose of Protective-Involuntary Muscle Action from a car accident, there may be competition between how your eyes, head, and neck muscles co-ordinate. You may become clumsy, walk through doors part way and bang yourself. You may feel a generalized unsteadiness as if you

couldn't react right if you had to. You may have an overall increased sense of vulnerability.

No one just lets themselves be knocked off balance whether sitting on a therapy ball or doing a standing test. There will be a lot of voluntary muscle action elicited that covers up what may be going on with the involuntary system. To get around this, **balance needs to be tested with the person relaxed and not needing to do any voluntary action to protect or maintain their position.** This way, the reactions that do show up are the background involuntary protective patterns you're looking to identify and then treat.

Testing can be done by tipping the table that a person is lying down on.

First you will take a reading of what your body feels like at rest and notice the position sense of being flat. You are asked if you want to see how your body responds to a slight change in position by a small tip. This question alone can actually produce an involuntary bracing response. If so, note what happens and time how long it takes for the sense of being fully back to flat to return. Another starting question is "which way would your body find it easiest to go toward, right or left?" When a person is ready, a slight tip in that direction can be made by lifting the opposite side of the table.

The therapist will hold the tip for 10-15 seconds. **While tipped, explore what that feels like and what if any reaction the body makes.** Is there a sense of flattening and a feel like double edge tape is holding you on? Do the eyes change position from looking straight up to somewhere else? Is there a feeling of going over like a sack of potatoes? Do you feel any shift in weight distribution? Are the legs the same or different? The therapist looks for the response of the eyes, head, neck, and body.

The table comes back to flat and again how long it takes for you to feel all the way back to flat is timed. Normally this is a fairly instant readjustment. With Protective-Involuntary Muscle Action influence this can take as long as 20 minutes. Sometimes part of the body gets back to feeling flat before other parts catch up. Usually the head and neck take the longest. A normal response to a tip brings in normal equilibrium reactions. An abnormal reaction is characterized by stiffening, sometimes dizziness, and a slow return to pre-tip muscle tension sense.

Protective-Involuntary Muscle Action influence needs to be treated. Its resolution leads to considerably increased comfort in the body and can contribute to reduction of overall anxiety and mood regulation issues. Return of the muscle system to normal qualities is important for the longevity and health of the joints the muscles cross. Abnormal and imbalanced muscle tension accelerates degenerative and arthritic changes in the joints. Unless the team of therapists deals with the involuntary regulation it will persist. It is a complex enough problem that multiple team players may all be needed.

SUMMARY

We have looked at a lot of problems that can be caused by car accidents. Both obvious and less obvious changes may continue to cause pain and limitations if they aren't addressed. Having greater knowledge about how to understand what you are experiencing will enable you to seek out the kinds of care you need. There are many approaches to help people recover. It is your right to ask questions and to participate in finding solutions. Many experts are open to new ideas and fresh ways of looking at symptoms if they have a means to measure what is before them.