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2019

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HEALTH



**ORTHOPEDICS • SPORTS PERFORMANCE
BALANCE & FALL PREVENTION
DIZZINESS & VERTIGO • CONCUSSIONS**



PATIENT EDUCATION

Dr. Kim Fox, PT, DPT, Advanced Vestibular Provider



Dr. Fox began her career in the United States Air Force in 1991, having served with both active duty and reservists from 1991 to 1997. She completed her Masters of Physical Therapy Degree in 1996 at the University of Maryland at Baltimore with special recognitions for neurology and research. In 2011 she received her Doctorate in Physical Therapy from the University of Montana. Dr. Fox is a Certified Vestibular Provider and holds several Advanced Vestibular Certificates.

Dr. Fox specializes in the testing and treatment of balance and vestibular disorders. She owns AVORA Health Center for Balance & Dizziness, specializing in the assessment and treatment of disorders which cause balance and dizziness problems. The center is home to some of the most advanced technology in the world. She additionally owns AVORA Physical Therapy, which has two locations (Asheville and Black Mountain), providing outpatient rehabilitation for a variety of orthopedic injuries as well as sports performance.

Dr. Fox has provided educational in-services for a variety of physician groups, fellowship programs, hospitals and community organizations. She regularly teaches around the country, educating other providers about balance and vestibular disorders. Dr. Fox serves on the editorial review board for VEDA (the Vestibular Disorder Association). She also runs a vestibular support group which meets regularly to help patients navigate the many challenges associated with vestibular disorders.

**To Schedule a Provider Presentation
Call (828) 505-2664**

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Choosing a Good Physical Therapist

Not all therapists are created equal. So, we have put together our recommendation of what to look for in a good provider and clinic. It is perfectly OK to call and ask a practice questions before your visit. If you ask a healthcare provider about his or her credentials and the provider is offended, that's probably a red flag that you may want to find a different provider.

1. Formal Education

How much medical education does your provider have? PT is a standard nomenclature for Physical Therapist. Generally, a therapist's name followed by PT means the provider is a Physical Therapist who, at a minimum, graduated from college with a Bachelor's (4-year). Degree. When you see MPT that means the Physical Therapist has a Master's (6-year) Degree. When you see DPT, that means the PT graduated with a Doctorate (8-year) Degree in Physical Therapy. Hence, not all "PT's" are created equal!

2. PT vs PTA vs PT Aide or Technician

Ask if you will be seeing a PT or a PTA for your treatments (PT aides, also called technicians, are not legally permitted to render treatment). A PT is a Physical Therapist (4-8 year degree as listed above) while a PTA is a Physical Therapy Assistant (2-year degree). To practice physical therapy in the state of North Carolina, PT's and PTA's are required to hold a license from the North Carolina Board of Physical Therapy Examiners. To verify the license of a PT or PTA, you can go to <http://www.ncptboard.org> and click on the link for "Services" then "Verify a NC PT or PTA". AVORA only hires therapists that have a clean history and hold a current license. PTA's are not trained to perform evaluations or re-evaluations, and must treat patients under the guidance of a licensed PT. Hospitals and facility owned clinics favor PTA's because they are paid less than PT's and are a means of creating higher revenues, since insurance companies reimburse the same regardless of who renders treatment. PT Aides or techs have no license, no required medical education, and are not authorized to perform physical therapy. Their primary job is to prepare tables, ready equipment, and provide general set up support for PT's and PTA's. AVORA currently has 10 providers – 100% are Physical Therapists (PT) with 90% holding a Doctorate Degree (DPT).

3. One-On-One Care

Ask if you will be seeing the same therapist throughout your care. Some practices toggle your treatment between the PT who evaluated you, a different PT and a PTA (a PT aide/technician should never render care). Nothing beats staying with the same PT that evaluated you. AVORA provides one-on-one care, working directly with the same PT who evaluated you throughout your plan of care.

4. Wait Time

Ask how long you will typically need to wait for your scheduled appointments. Be warned that a vague response like "not too long" or "pretty quickly" is a sign that you may be waiting longer than expected. There is nothing worse than being on time for an appointment and having to wait 30-45 minutes or even an hour to be seen. AVORA values your time and is committed to seeing you on time, every time!

5. Office Appearance

When you walk into a business that looks, smells, and feels like a quality establishment, it probably is. A quality physical therapy clinic should be equipped with modern equipment, clean, comfortable, and above all, have a friendly and helpful staff. Remember, the physical appearance reflects the people who work there. Take your time and shop around. You deserve it!

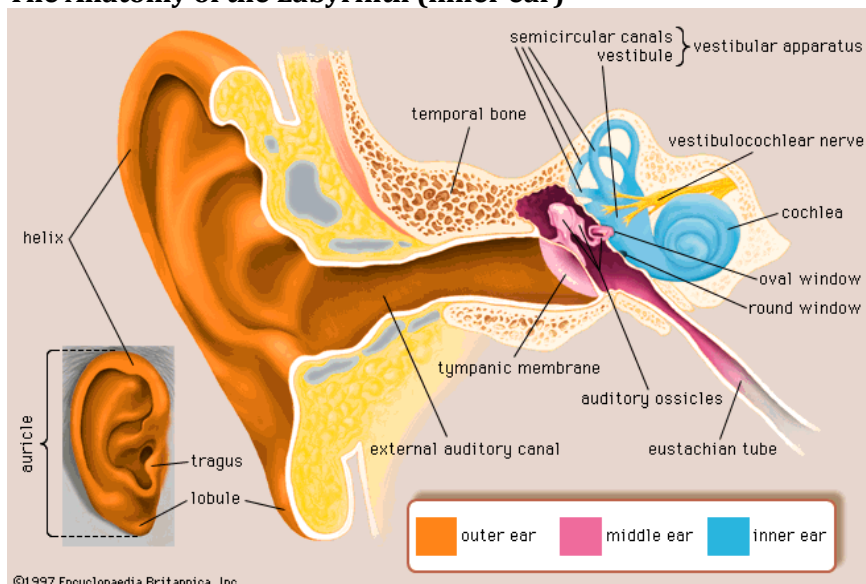


Mark & Kim Fox
AVORA Health
You Deserve Great Care

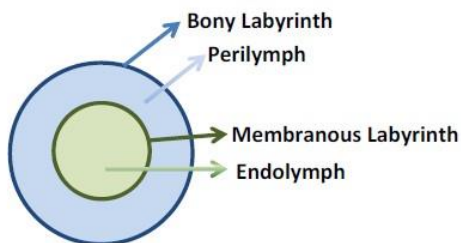
The Peripheral Vestibular System

The vestibular system can be divided into two main systems; the central system (the brain and brainstem) and the peripheral system (the inner ear and the pathways to the brainstem). The inner ear, known as the labyrinth, contains 2 primary structures: the cochlea, responsible for hearing and the vestibular apparatus, responsible for maintaining balance, stability and spatial orientation.

The Anatomy of the Labyrinth (inner ear)



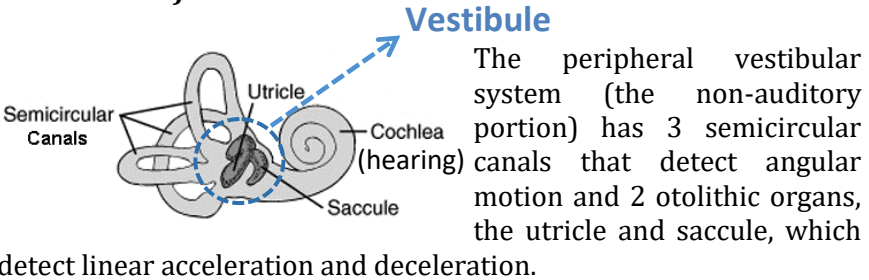
The labyrinth (inner ear marked as blue in the picture above) is encased in bone, called the bony labyrinth. Suspended by fluid (perilymph) within the bony labyrinth is another chamber called the membranous labyrinth, which contains its own fluid, called endolymph.



Think of this as a hose within a hose, both filled with fluid. The fluid within the bony and membranous labyrinth both contain sodium and potassium, however, in different ratios. Conditions that affect the stability of these ratios, such as Meniere's disease, can cause vertigo

(the perception of movement, usually spinning), dizziness, nausea, vomiting, ear fullness and tinnitus.

The Anatomy of the Vestibular Apparatus (balance portion of the inner ear)



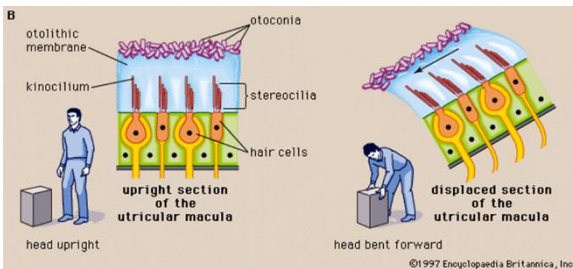
The peripheral vestibular system (the non-auditory portion) has 3 semicircular canals that detect angular motion and 2 otolithic organs, the utricle and saccule, which

detect linear acceleration and deceleration.

The Otolithic Organs – the Utricle & the Sacculle

Collectively, the utricle and saccule make up the vestibule (see picture above). The utricle detects linear motion primarily in the horizontal plane (like a car moving forwards or backwards) while the saccule detects motion primarily in the vertical plane (like an elevator moving up or down). Each otolithic organ has hair cells

embedded in a gelatinous material (like jelly or scoop of ice cream) with calcium carbonate crystals, called otoconia, attached to the surface (see

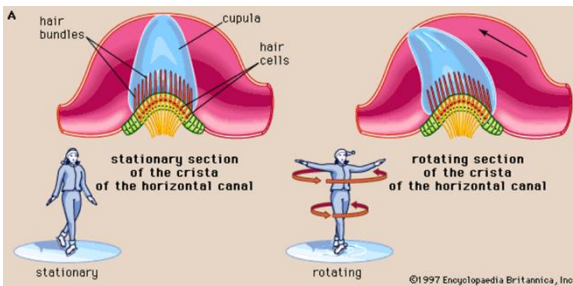


picture to the left). Imagine sprinkles on top of ice cream, with the sprinkles representing the otoconia. Many refer to otoconia as “ear rocks” and is the substance responsible for a very common condition known as benign paroxysmal positional vertigo (BPPV) in which “ear rocks” fall off the “jelly” (sprinkles fall off the ice cream) and into one of the semicircular canals, causing vertigo, nausea and sometimes vomiting with changes in head position. The otoconia (ear rocks) serve a valuable purpose when they are in the correct places within the utricle and saccule. They enable the otolithic organs to be sensitive to gravity (see picture above). For example, when you are in an elevator going up, *you* do not see the elevator moving and, although you are standing still, you know that you are going up! The otoconia allow you to sense that movement as long as there is a

change in linear motion. When you take off, land, or hit turbulence in an airplane, you detect this motion because the otoconia are sensing linear acceleration and deceleration. Once you are at cruising altitude while flying, you do not realize that you are traveling 500 miles per hour since there is no acceleration or deceleration.

The Semicircular Canals

Unlike the otolithic organs, the semicircular canals are not sensitive to gravity since there are no otoconia normally in the canals. The 3 canals in each inner ear are oriented roughly 90 degrees to each other (like the corner of a room between 2 adjoining walls and the floor). Each semicircular canal has one bulbous shaped end called an ampulla. In the ampulla is a structure that is situated like a divider called the cupula (see picture below). In the cupula, there are multiple hair cells with bundles of hair that project up into the cupula. Within the hair bundles, there is one long hair called the kinocilium and multiple short hairs call the stereocilia. The cupula gets pushed or pulled during angular movement from the flow of endolymph causing the cupula to bend.



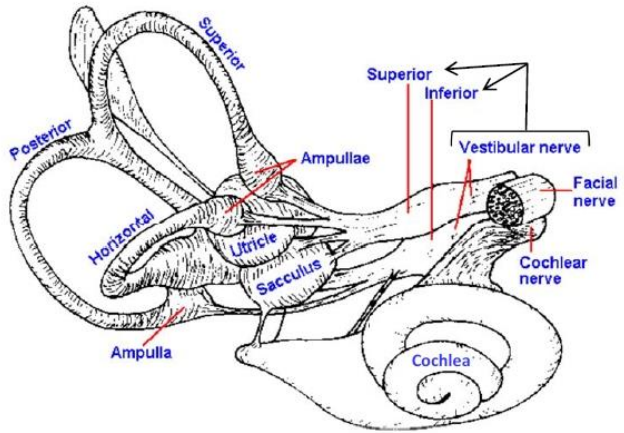
In response to the direction the cupula moves, the smaller hair cells (stereocilia) either move towards the large hair cell or away from the large hair cell. This information is

converted into an electrical signal which ultimately produces corresponding eye movements.

The Vestibular Nerve

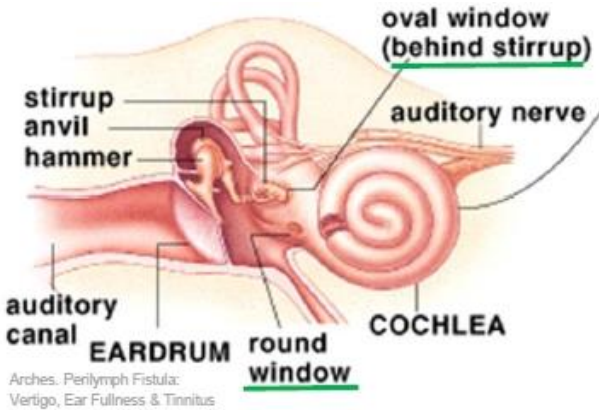
The inner ear has its own blood and nerve supply. The vestibulocochlear nerve (cranial nerve VIII) travels from the inner ear to the brainstem and is still considered part of the peripheral system until it enters the brainstem. The vestibular nerve has 2 portions; the superior vestibular nerve and the inferior vestibular nerve (see image next page).

Each portion attaches to specific structures in the inner ear. Vestibular disorders that damage one portion of the vestibular nerve most commonly affect the superior portion as it



The Nervous System in Action, Michael D. Mann, Ph.D.

must travel through a narrower canal as compared to the inferior portion of the nerve. When the superior vestibular nerve is affected, it results in damage to the utricle, part of the saccule and the anterior (also called superior) and horizontal (also called lateral) canals. The posterior canal remains perfectly intact. In this scenario, it is then possible that when the utricle is damaged, otoconia (ear rocks within the utricle) fall off and drop into the posterior canal, resulting in BPPV in the posterior canal. This can be referred to as “the perfect storm” (a damaged area (the utricle) affecting an intact area (the posterior canal) causing it to also become dysfunctional). Some conditions will affect both portions of the vestibular nerve while still other conditions may affect both the vestibular and cochlear nerves, causing both hearing and balance problems simultaneously. You have 2 vestibular nerves, one from each ear, which must work together when sending signals to the brain. When one nerve’s signals are disrupted, this will immediately cause vertigo, dizziness, imbalance and often nausea and vomiting, which can last for several hours to several days until the brain learns how to reinterpret the signals. When the system does not “reset” on its own, vestibular rehabilitation helps to teach the system how to readapt and function. The blood supply follows a similar path as the nerve supply and, when compromised, will result in similar symptoms.



The final peripheral structures to briefly mention here are the oval window and round window, two openings from the middle ear to the inner ear, closed off by membranes

(picture on left, underlined in green). They help to transmit sound. If these structures are compromised, allowing fluid to enter into the middle ear (known as a perilymphatic fistula) they may produce unwanted symptoms such as vertigo, imbalance, ear fullness, hearing loss, poor tolerance of loud sound, nausea and vomiting. A third location where a fistula can occur is above the superior semicircular canal, in which the bone between the canal and the brain opens, known as Superior Canal Dehiscence.

Psychological Connections

The pathways of the vestibular system overlap with pathways that are involved with anxiety, depression, migraines and pain (Balaban, 2013). Psychological conditions, when present prior to a vestibular disorder, may increase vestibular symptoms. Likewise, the onset of a vestibular disorder may cause psychological symptoms that were originally not present. Common complaints with many vestibular disorders are difficulty concentrating, difficulty paying attention and poor memory, increased dizziness with sound, light and busy environments, headaches and poor balance, along with increased or new anxiety or depression.

The Function of the Peripheral Vestibular System

As previously mentioned, the vestibular system is responsible for maintaining balance, stability and spatial orientation. There are several reflexes responsible for these responses. Similar to tapping your knee with a reflex hammer and your leg extending out, there

are responses that occur with movement to keep your vision and body stable.

Vestibular Ocular Reflex (VOR): is a reflex that coordinates eye and head movement in order to keep an object in focus. The VOR is one of the fastest reflexes in the human body. Head movement must be compensated for almost immediately by the eyes in order to have clear vision. This means when your head moves one direction, your eyes must move in an equal and opposite direction at virtually the same speed to keep a target in focus. For example, when you are walking, your head is not staying perfectly still, moving side to side and up and down as you walk, yet objects don't sway or jump up and down (if the VOR is working properly). The VOR is triggering your eyes to move in the opposite direction of your head to keep objects in focus. If the VOR is deficient, you may experience oscillopsia (objects appear to blur or jump) when you are in motion. Your VOR works best at frequencies greater than 1 Hz, which is equivalent to turning your head to the right and then the left in one second. If your head is moving slower than 1 Hz, your visual system will take over the responsibilities. Routine daily activities generally range between less than 1 Hz to about 4 Hz, while walking averages between 2 to 4 Hz. Running may challenge the system up towards 10 Hz or greater depending on speed and terrain. Testing the VOR involves fast head movement while looking at a fixed target, known as a Head Thrust Test or Head Impulse Test. When done manually by a provider, the provider is looking for a delayed response in the eyes. A more sophisticated way of testing the VOR is called video head impulse testing or vHIT for short. It uses special infrared goggles and a computer to analyze results more precisely and to pick up deficiencies that are not visible to the human eye. It tests all 6 canals, the first test of its kind. The equipment is only recently available and still quite expensive, so it is only found in limited locations. AVORA is one of only a few clinics in North Carolina to utilize vHIMP technology.

Vestibular Collic Reflex (VCR): A reflex that, in response to information from the otolithic organs and semicircular canals, activates neck musculature to stabilize the head. We do not currently have a controlled way to test this reflex as the pathway is not fully understood.

Vestibular Spinal Reflex (VSR): is a reflex that maintains your posture and stabilizes your body to maintain an upright position. It refers to reactions that happen below the neck, such as staying on a bucking bull. Through a series of events, an impulse is sent to your spinal cord to activate muscles to keep you upright.

For example, if you are falling forward, the muscles on the back side



of your body contract (pull) while the muscles on the front side of your body elongate (push) in an attempt to bring you back to center. If someone bumps into you on the right and you start falling to the left, you need

muscles on both sides of your body to activate (a push from one side and a pull from the other) so that you don't fall.

Recall that the 3 semicircular canals sense angular motion and the 2 otolithic organs sense linear motion relative to gravity. In part, these structures can be tested without sophisticated equipment if you have a knowledgeable provider who understands what they are looking for. However, the system is tested in more detail and specificity when sophisticated equipment is available. Infrared Video Goggles allow for observing the eyes in the dark (without the patient focusing on a target), enlarge the eyes on a screen for easier viewing and records the eye movements for repeated playback. VNG (video nystagmography) software converts the eye movement into a computer-generated signal, also increasing the likelihood of an accurate diagnosis. As with most vestibular equipment, this equipment is expensive and found in limited locations, usually clinics which specialize in vestibular testing and treatment. Other computerized testing exists, such as caloric testing (which tests the horizontal canals at a very slow frequency), VEMP (vestibular evoked myogenic potential) testing and rotary chair testing (hallmark for confirming deficits in both vestibular systems) to test other portions of the vestibular system or to confirm a suspected diagnosis.

Summary

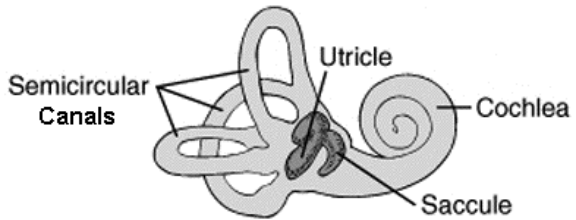
Since there are direct connections from the inner ears to the eyes and brain, injuries or deficiencies in any number of these structures can produce dysfunction in balance, hearing and abnormal eye movements. Testing exists to evaluate the response of the eyes in to determine if there is dysfunction in the peripheral, central or both vestibular systems.

The AVORA Health Center for Balance & Dizziness has specialized equipment to aid in a proper evaluation and specially trained vestibular providers to properly manage vestibular rehabilitation.

Benign Paroxysmal Positional Vertigo (BPPV)

Have you ever felt like you were spinning? Located in the inner ear are calcium carbonate crystals called otoconia, commonly referred to as “ear rocks.” When otoconia are displaced, patients may complain of dizziness and a spinning sensation (called vertigo) typically associated with lying down, rolling over in bed, getting out of bed, tilting the head back or bending forward with the head down. Other symptoms may include imbalance, nausea, fogginess and a general sense of not feeling well.

It is helpful to understand a little about the anatomy of the inner ear. There are 3 semi-circular canals. Each canal starts and ends at the utricle. The utricle and saccule both contain otoconia (ear rocks).



Sometimes otoconia fall out of the utricle and into a canal. When this happens, it is known as Benign Paroxysmal Positional Vertigo (BPPV). Misplaced otoconia can be due to illness, age related changes, ear infection, trauma, prolonged bed rest, and sometimes for no known reason. Research also makes a strong correlation between BPPV and osteoporosis as well as diabetes.

It is important to report specific symptoms to a medical professional experienced in treating vestibular disorders to rule out any other possible and more serious causes of your symptoms. One of the diagnostic tools used to confirm BPPV is called the Dix-Hallpike test,

a positioning test designed to elicit rapid eye movement (nystagmus) and/or vertigo. **The specific direction and duration of the nystagmus is the key to confirming if you have BPPV, which of 2 forms of BPPV you may have (canalithiasis vs cupulolithiasis) and identifying which of the 6 canals (3 on each side) is/are the offending canal(s).**

Infrared Video Goggles are extremely beneficial to aide in a correct diagnosis, necessary to rule out other causes and is very helpful to educate the patient about their specific condition. **Some vestibular tests cannot be performed without goggles.** Once the offending canal is properly diagnosed, the patient may be taken through various movements to maneuver the “ear rocks” back where they belong. There are multiple maneuvers depending on the type of BPPV, the involved canal(s) and the skill and knowledge of the professional. When the correct maneuver is performed accurately, treatment is extremely successful, often resolving symptoms in 1-3 sessions.



Effective treatment starts with proper testing



Patients and providers work together as a team

Anti-Dizziness Medication

The inner ear provides valuable information about balance, movement and spatial orientation. Having two inner ears (a left and a right) is a blessing and, at times, a curse. Two inner ears allow us to detect a wide range of movement, however, an imbalance creating dizziness and sometimes nausea occurs when one inner ear is damaged from conditions such as viral infections, fluid disorders, head trauma, tumors or age-related changes, to name a few. Frequently, antihistamines such as Meclizine (Antivert, Bonine), a first-generation antihistamine, or less often Benzodiazepines such as Valium, are prescribed to manage symptoms of motion sickness and vertigo. As is true with most medications, this is attempting to treat the symptoms, not the source. Quite often medications to treat dizziness and vertigo are over-prescribed and can have unfavorable consequences.

The vestibular system is made up of the inner ears and their pathways communicating with the eyes, body and brain. The inner ears each send information about balance, movement and spatial orientation. This information varies according to the position, direction and speed of head movement. The right and left inner ears must work together, in a “push-pull” relationship for the brain to interpret signals correctly. As one side “pushes” the other side “pulls”, translating into one side sending an increased signal to the brain while the other side sends a decreased signal. This is how the brain identifies movement and spatial orientation, assisting in balance and stability.

Immediately following inner ear damage to one side, the signals are no longer balanced in the necessary “push-pull” relationship. Initially the brain is unable to interpret this information correctly and will perceive constant motion despite the absence of movement. As a result, a person may feel violently ill for hours up to a few days with a constant feeling of dizziness, vertigo, unsteadiness, light-headedness and often sweating, nausea and vomiting. The use of anti-dizziness medication can be appropriate during this early stage and may help to prevent dangerous, secondary issues such as dehydration and falling. Once this acute phase has passed, continued use of these types of medications can inhibit recovery by

suppressing the vestibular system, masking symptoms instead of correcting the problem. Additionally, these medications all list dizziness as a possible side effect, the same symptom you are trying to resolve! Vestibular therapy, when done correctly, and after a proper examination pinpointing the source and extent of the problem, can be very beneficial and can begin early in the course of an injury or illness. Unlike medication that suppresses the vestibular system, vestibular rehabilitation works to normalize signals and teach the brain how to correctly interpret information through small, controlled and repeated movements. Vestibular rehabilitation may provoke dizziness and unsteadiness but should never stimulate nausea or vomiting. Anti-dizziness medication interferes with this learning process. For a moment, think of the use of anti-dizziness medication for vertigo or dizziness the same as wearing a sling for a new shoulder injury. For a few days, a sling can be appropriate to allow the acute injury to settle, much like anti-dizziness medication during the acute phase of an injury. Imagine going to therapy several weeks later and asking your therapist to rehabilitate your shoulder without removing your arm from the sling. Even worse, imagine what your shoulder, and even your entire arm, would feel like if you left your arm in a sling for months or even years! You cannot rehabilitate the shoulder if you never remove the sling and, even worse, the entire arm will continue to weaken from lack of use, creating more problems than you originally started with. Medications that suppresses the vestibular system will inhibit the recovery process and potentially lead to further decline in balance and stability from lack of use. Additionally, in March of 2015, Dr. Shelly Gray, et al. published research in the Journal of American Medical Association (JAMA) Internal Medicine titled, Cumulative Use of Strong Anticholinergic Medications and Incident of Dementia, linking long term use of first generation antihistamine medications, such as Meclizine, with an increased risk for dementia.

In a prevalent condition which causes vertigo, known as Benign Paroxysmal Positional Vertigo (BPPV), calcium carbonate crystals become dislodged and travel into the semi-circular canals. While there are many different conditions that cause vertigo, BPPV is prevalent and worth mentioning here as anti-dizziness medications provide little to no benefit and will not fix the problem. The American Academy of Otolaryngology, and endorsed by the American Academy of Family Physicians, states that vestibular

suppressant medication is not recommended as a source of treatment for BPPV. Likewise, the American Academy of Neurology also does not list medication as recommended treatment for BPPV.

Matching each person's condition, after proper assessment, with the correct treatment is the key to effective and efficient treatment. It is important to talk to a medical provider familiar with vestibular disorders as to the appropriate use of anti-dizziness medications which can be beneficial in the first 1-2 days following certain types of injuries or illnesses causing dizziness or vertigo but are limited in their long-term benefits, can cause undesirable side effects, and can be counter-productive to recovery.

Ménière's Disease

Ménière's disease is a chronic "plumbing problem" of the inner ear (labyrinth). This syndrome produces a recurring set of symptoms because of fluid (endolymph) in one of the inner ear chambers (the membranous labyrinth) collecting in abnormally large amounts causing swelling. In another chamber of the inner ear (the bony labyrinth) is a different fluid called perilymph. Both endolymph and perilymph contain sodium and potassium but in different ratios. Under normal conditions, the endolymph and perilymph do not mix. Symptoms of a Ménière's episode are triggered when the normal ratio of sodium and potassium becomes out of balance as a result of the inner ear swelling and the mixing of these two fluids. The exact cause of Ménière's disease is unknown, however it does appear to run in families, suggesting a genetic component. Other proposed causes include an autoimmune response, migraines, or circulatory problems. Meniere's episodes may be triggered by stress, fatigue, pressure changes, certain foods containing excess sodium, a drop in potassium, dehydration, caffeine or alcohol. Some people may be sensitive to even subtle changes in sodium and potassium. Ménière's Disease affects 2 out of every 1000 people, and can begin at any age, although it is most common for the first episode to occur between age 40 and 60. The disease appears to "run its course" and resolve with age... something that actually improves with age! In the late stages of the disease, some may be afflicted with drop attacks, known as Tumarkin's Otolithic Crisis. There is no loss of consciousness, purely a loss of vertical orientation lasting seconds.

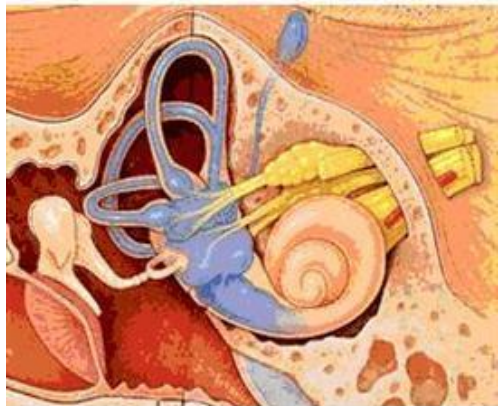
While these attacks are unpredictable, they are said to occur only in the late stage of the disease, signifying a means to an end. Classic Meniere's disease affects the entire inner ear, including the cochlea (hearing) and vestibule (balance). Less common, Ménière's may affect only the balance portion (Vestibular Ménière's) and even less common, Ménière's may affect only the hearing portion (Cochlear Ménière's).

An episode of Ménière's may last 20 minutes to 24 hours. The frequency of episodes varies widely. A typical episode may be preceded by a sensation of fullness in the diseased ear(s). A person may also notice changes in hearing or ringing in the ear(s) prior to an episode. During an episode, a person may experience severe vertigo (feeling of movement of self or environment without the presence of actual movement), imbalance, nausea and/or vomiting, aural fullness and changes in hearing. Oftentimes individuals feel very tired after an episode. In the beginning stages, most people will return to normal between episodes. Following a severe episode or repeated episodes, a person may have residual dizziness and instability and / or hearing impairment. In classic Meniere's disease, a low tone hearing loss is diagnosed. With repeated attacks, hearing loss can progress to all frequencies.

Although there is no known cure for Ménière's Disease, there are treatments that can help decrease the frequency and duration of episodes. Frequently, a low sodium diet is prescribed



Normal membranous labyrinth



Dilated membranous labyrinth in Meniere's disease

by a medical professional to control the initial fluid build-up within the ear. A registered dietitian can help make lifestyle changes to manage sodium intake. Testing and treatment may be performed by a provider that specializes in vestibular assessments and rehabilitation to assist in ruling out other conditions, to educate patients about the disease and ways to minimize the effects of an episode and/or to reduce occurrences, to instruct in relaxation techniques and to decrease dizziness or balance impairments which may occur between episodes. Balance and vestibular exercises are not indicated when a person is symptom free between episodes. Non-pharmacological intervention may include psychology, tai chi, yoga, meditation or acupuncture to improve stress management. A medical doctor may prescribe medications to use during an attack to decrease symptoms of vertigo, nausea and vomiting. If dietary changes are not enough to effectively manage symptoms, a medical doctor may prescribe a potassium sparing diuretic to help deplete your sodium while conserving your potassium. Conservative management is effective 60-80% of time. For those who do not respond to conservative treatment, a medical doctor (usually an Otolaryngologist, better known as ENT) may perform middle ear injections with a steroid as a first tier, gentamicin injections as a second tier and surgical intervention as a last resort.

Persistent Postural-Perceptual Dizziness

Persistent Postural-Perceptual Dizziness (PPPD, or 3PD) was formerly called Chronic Subjective Dizziness and even earlier known as Phobic Postural Vertigo. While the word dizziness is in the name of the condition, some people may not experience “dizziness” as a symptom. Symptom classification includes persistent sensations of rocking or swaying unsteadiness and/or dizziness without vertigo lasting greater than 3 months; symptoms present at least 15 out of every 30 days, but can often occur daily; and symptoms noted to be worse with upright postures, such as when walking, standing, or sitting, head or body motion and exposure to complex or motion-rich environments. 3PD typically starts shortly after an event that causes acute vertigo, unsteadiness, dizziness or instability.

3PD can develop spontaneously in people that may have a history of motion sensitivity, anxiety or depression, however, more commonly

there is a triggering event that initially caused disequilibrium, vertigo, or dizziness. For example, following the resolution of Benign Paroxysmal Positional Vertigo (BPPV), which is the most common reason for peripheral vertigo, 3PD may result as a sequela.

Common for many vestibular disorders, there may be an underlying or associated anxiety disorder concomitant to 3PD. 3PD is not a psychiatric disorder, however, patients may begin to avoid socialization, become reclusive or go to extreme measures to avoid exacerbating symptoms, resulting in abnormal psychological behaviors. The pathways from the inner ear to the brain have been shown to overlap with those that deal with anxiety, depression and migraine. Because of this overlap, one system can “drive” the other. For example, if a person feels unsteady, they may become easily anxious which subsequently makes the unsteadiness worse and results in a perpetual cycle of escalating symptoms. It can be very common to have overlapping conditions and symptoms.

Those with 3PD may become hypersensitivity to excessive visual feedback, visual motion or a visual mismatch such as what might occur in busy environments, or looking at complex patterns. Symptoms may be referred to as ‘space and motion discomfort’ and relate to an uneasiness or dizziness associated with heights, large rooms, small room, being in motion (whether body movements, head movements or both), viewing motion, viewing repeating patterns or fluorescent lights, watching television, reading, going to the movies or grocery store or eating out in a restaurant, to name a few. The grocery store is such a prevalent problem, it has been dubbed ‘Supermarket Syndrome’ or ‘Grocery Store Syndrome’, depending on what part of the country you call home.

Computerized testing and scans are often normal, unless an underlying or concomitant condition is discovered. The diagnosis is made based on presentation and ruling out other possible causes. When present, anxiety needs to be addressed, whether through counseling, relaxation exercises, meditation, yoga, acupuncture or, when necessary, medication. Patients with 3PD can be desensitized to the hypersensitivity of visual and body motion through vestibular rehabilitation. Recovery times vary but can be prolonged 3-12 months, especially when multiple conditions are present, however, a consistent and gradually progressive program can result in a full

recovery. Selective Serotonin Reuptake Inhibitors (SSRI) and Serotonin Norepinephrine Reuptake Inhibitors (SNRI) have been trialed with moderate success when medication is tolerated. Vestibular suppressants, such as Benzodiazepines, have not shown to be an effective primary treatment for 3PD. 3PD, often resulting from a prior vertiginous event or disturbance in balance, can be successfully treated with vestibular rehabilitation when done properly. To optimize successful outcomes, when anxiety, migraine or depression coexists, all sources of symptoms must be addressed.

Concussions 101

Concussions occur in both the young and old due to sports related injuries and falls, respectively. Between 1997 and 2007, ER visits for 14 to 19 year olds relating to concussion TRIPLED (Bakhos et al., 2010). This is in part due to better detection with the implementation of mandatory concussion guidelines that now exist for high school sports. Falls in the elderly is a well-recognized problem but often without good follow up concussion management or treatment.



There are several types of concussions. One in which the brain moves forwards and then backwards in the skull in a linear motion at a rapid rate of speed as occurs during a tackle or a fall. The front of the brain strikes the front of the skull and then rebounds, forcing the back of the brain to hit the back of the skull. The head does not have to contact the ground for a concussion to occur. In addition to the contusions created at the front and back of the brain, stretching and tearing of neurons in the brain and brain stem may occur. A second type of concussion is due to a rotational injury, for example, in a boxing injury. In this case, the brain rotates causing stretching and tearing of brain stem and brain structures in addition to the brain hitting the inside of the skull.

No two concussions are alike which makes it more important to recognize any potential symptoms. Grading scales, which are based on whether there was a loss of consciousness (LOC), are no longer used as LOC occurs in less than 10% of concussions and is not a

reliable predictor of severity or recovery. (Guskiewicz et al, 2003). Headache is the most common symptom, occurring in approximately 75% of concussions (Kontos et al., 2013). Problems with memory loss and cognitive function are a means to predicting severity of the concussion (Collins et al, 2003). Those with vestibular symptoms, dizziness in particular, are 6 times more likely to require a longer recovery time (Kontos et al, AJSM, 2011).

Initial symptoms of concussion, within the first week, commonly include impaired cognitive function (difficulty concentrating and remembering, fatigue, drowsiness), migraine related symptoms (headache, sensitivity to light and noise, nausea) and vestibular issues (dizziness, foggy feeling). Symptoms change over time. Patients may notice being more emotional, increased irritability or nervousness, changes in cognitive function, sleep disturbances and ongoing migraines (Kontos et al; AJSM, 2012).

For athletes, it is imperative to recognize even subtle changes in physical and cognitive performance as many athletes, in their desire to return to play, will often indicate that they feel fine. Schools have implemented pre-season physical and cognitive testing to use as baseline measurements in the event of a suspected concussion. Trainers, coaches and medical personnel have greatly improved on-field assessments. Athletes must also match their post-concussion testing scores and should be symptom free both at rest and with exertion before returning to play. Within the last 5 years, vestibular and ocular screening has gained attention to further help in determining whether an athlete is fit for play. These screenings include identifying dizziness, balance and ocular-motor (movement of the eyes) deficits.

Adults that experience concussion following a fall do not have the advantage of comparing pre and post testing. Assessing all clinical signs and comparing them to age related norms, (when available) is beneficial. A thorough screening should include vestibular, ocular, cognitive, balance, migraine, anxiety/mood, exertion and cervical assessments.

High school age athletes take on average 1 to 3 weeks longer to recover than an older athlete; therefore, conservative management of the younger athlete is imperative. Additionally, the brain remains

vulnerable until the athlete can achieve baseline measurements. **In both young and old, a second concussion can sharply increase symptoms and significantly extend recovery time.** Not all concussions result in vestibular symptoms, but when they do, the role of a certified and experienced vestibular therapist is essential to managing and improving recovery in both the athlete and older adult, whether from a sports related injury or a fall.

Cervical Headaches

Headaches are a relatively common complaint. It has been estimated that approximately 1 in 6 Americans experience frequent headaches. The most common type of headache treated by Physical Therapists are cervicogenic headaches. Cervicogenic (meaning “coming from the neck”) headaches affect people in different ways. Patients who experience these will often complain of pain starting at the back of the neck and/or head that begins moving towards the forehead or around the eyes. Pain may set in over a few minutes or may take as long as a few hours to fully develop. Dizziness can also occur as a result and is referred to as cervicogenic dizziness.

To effectively treat cervicogenic headaches, it is important to first identify the cause of the symptoms. Poor posture, muscle imbalances, decreased cervical spine joint mobility, and excessive muscle tension can all play a role in the development of headaches. A Physical Therapist’s job is to determine the root cause of complaints and develop an appropriate treatment plan. Manual therapies such as joint mobilization or soft tissue relaxation techniques are used to restore ROM. Strengthening and stretching exercises are prescribed to correct any muscle imbalances and postural deficits. Techniques to improve awareness of joint position may also be implemented.

Neck Pain

The most common sources of neck pain are increased muscle tightness, decreased mobility of the cervical vertebral joints, and nerve root impingement. Neck pain can result from a traumatic injury, a motor vehicle accident, surgery, poor posture, or gradual onset without a specific event such as from osteoarthritis or stenosis. Neurological symptoms such as numbness or tingling of the shoulder

and/or arm and fingers sometimes accompany neck pain if a nerve root is being compromised.



In the case of a traumatic injury or motor vehicle accident, the muscles and joints of the neck usually experience a quick forceful stretch. This overstretch of the muscles can lead to soreness and muscle spasms. Along with muscle pain, the vertebral joints and

surrounding structures of the cervical spine can produce pain by becoming restricted or tight and thus limit motion and functional mobility.

Neck pain due to poor posture is usually due to a forward head position; this position applies increased force and pressure along the paraspinal cervical muscles causing increased muscle tightness, decreased joint mobility, and sometimes neurological symptoms. Postural education and specific exercises to improve posture can help to prevent pain and decrease muscle tension.

Effective physical therapy treatment for neck pain begins with a thorough look at a person's posture, range of motion, strength of the neck, shoulders, shoulder blades, arms and hands, joint and soft tissue mobility, reflexes, and sensation. Once the impairments and deficits are identified, treating them as part of a comprehensive program with patient's individual needs and goals in mind is the next step.

Low Back Pain and Physical Therapy

Low back pain is one of the most common musculoskeletal complaints that Americans have. Despite being a familiar complaint to so many people, the cause of pain is often misunderstood. This is because there are many factors that contribute to symptoms.

Pain may be located centrally in the low back, it may be one sided, or may radiate out towards the hip and buttock area. The sacroiliac joints (SIJ) can play a role in the development of symptoms. Trauma

or a causative event (lifting, twisting, car accident, etc.) can lead to pain or symptoms may develop slowly over time.



While pain is usually what brings people into Physical Therapy, the cause of pain is what is treated and corrected. Postural deficits, soft tissue tightness, decreased or excessive lumbar joint mobility, gait abnormalities, and

muscular weakness may all be contributing factors. It is a Physical Therapist's job to determine the reason pain is present and work to correct the impairments to get patients back to their normal routines.

A Physical Therapy evaluation will consist of a thorough examination of posture, joint and soft tissue movement, strength analysis, assessment of gait, and other appropriate testing depending on each individual's complaints. A treatment plan will be established based on each patient's needs and deficits.

Piriformis syndrome and sciatica

Many people can experience painful symptoms that goes from their hip down their leg, sometimes all the way down to their foot. For some people, the pain comes on gradually and others relatively suddenly. Some sensations are described as burning, pins and needles or numbness in the leg or foot. These types of symptoms usually point to some type of nerve compression or entrapment condition. However, where the nerve is being affected can affect how the condition is treated. When the sciatic nerve is involved, it is important to figure out if the condition is being caused close to the nerve root near the spine where the discs are or further "downstream" through the tunnels which the nerve travels. Proper treatment will depend on determining the actual source of the problem.

A physical therapist can perform specialized testing to determine the origin of the nerve issue, whether it is near the spine or further down the leg. When the sciatic nerve is being compressed or impinged near or at the spine, it is usually called sciatica. However, the sciatic nerve can be compressed or irritated anywhere along the nerve path, for example, by a tight hip muscle, which can mimic the symptoms of sciatica. When the nerve is compressed by the piriformis muscle it is called piriformis syndrome and the treatment for this condition will vary from that of sciatica. Proper treatment comes from proper diagnosis.

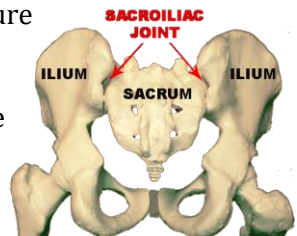
Sacroiliac Joint Dysfunction

Sacroiliac joint (SIJ) dysfunction is a problem arising from the imbalance of muscle activation in the pelvic region. SIJ dysfunction can be a source of severe back pain that affects about one in five Americans.

The Sacroiliac joint is comprised of two bones; the sacrum and the ilium and about 35 muscles. The pelvic bones are connected in the middle by cartilage, allowing each side to move independently of the other. A dysfunction occurs when one or more of these muscles on one side is either tight/over-active or loose. Usually, if a muscle is tight on one side of the pelvis, the muscles on the opposite side are loose and not providing stability. This imbalance can cause the pelvis to tilt or rotate abnormally, occurring on one side or both.

Two types of common dysfunctions are excessive force closure and reduced force closure. Excessive force closure is a result of increased muscle activity and loading of the pelvic region usually caused by overuse of bracing/stabilizing muscles. Reduced force closure originates from insufficient muscle forces which cause excessive strain to the involved joints and result in motor control deficits. Reduced force closure is usually more common, but can occur in conjunction with excessive force closure resulting in a pelvis that is tilted and rotated.

Since SIJ dysfunction is a prominent source and contributor to low back pain, a thorough evaluation by a physical therapist



is important to either rule in or rule out SIJ dysfunction as a source of pain.

Physical therapy treatment for SIJ dysfunction includes the use of core stabilization exercises, stretching, manual therapy, and modalities. Manual therapy will usually involve the application of muscle energy techniques to promote appropriate contractions of certain muscles that help to balance the pelvis. As SIJ dysfunction also includes muscles that have been over-worked, stretching and soft tissue manipulation are important to restore balance.

Nerve Entrapments

Many people have heard of carpal tunnel syndrome. This is just one condition that affects peripheral nerves. Sometimes, peripheral nerves can become impinged or rubbed in a way that aggravates the nerve. When this happens, the nerve can send signals to the brain that have some common symptoms: pins & needles, burning, electric shock-like sensations or numbness. There are many relatively common places where nerves can become impinged such as the wrist (as in carpal tunnel), the ankle, posterior hip at the piriformis muscle, and the elbow. There are many reasons for these conditions, but they often result in decreased blood flow in and out of the nerve itself.

A physical therapist can often perform special testing maneuvers to determine where the problem is originating from and rule out some conditions that may present with similar symptoms such as lumbar or cervical conditions. It is important to treat these conditions with specialized treatments designed specifically for nerves. Nerves are unlike muscles in that stretching is not usually advised and they are not able to be strengthened like muscles. Our providers will provide therapeutic maneuvers that will improve the health of the nerve to reduce pain and other sensations.

Rotator Cuff & Other Non-Surgical Shoulder Injuries

Common non-surgical rotator cuff & shoulder issues include Tendinopathy, Adhesive Capsulitis (Frozen Shoulder), Impingement, Rotator Cuff Strain, & Bursitis. Often shoulder pain & irritation are initially brought on through repetitive motions or activities.

Examples include such activities as throwing, painting overhead, or work-related tasks. Poor posture, poor body mechanics, overuse, & abnormal shoulder mechanics are frequently contributors to these shoulder issues.

The bones involved with the shoulder complex included the Scapula (shoulder blade), the Clavicle (collar bone), & the Humerus. There are also numerous muscles, tendons, & ligaments that make up the shoulder complex. For proper shoulder mechanics to occur, all of these soft tissues & bones must work properly & in unison. An analogy could be made comparing the structures involved with the shoulder to the footings of a bridge. If one of the footings is crumbling than the bridge is at risk for falling down.



To effectively treat these common shoulder issues the abnormal component in the shoulder must be determined. A physical therapist will be able to assess these mechanical & structural issues. Based on the results of the assessment a plan will be developed to normalize the mechanics, improving a person's functional use of their arm, & improve their pain. Physical therapy for non-surgical shoulder injuries typically include exercises for strengthening the rotator cuff muscles, stretching exercises, & manual therapy for improving soft tissue mobility. Educating on proper body mechanics, improving work station ergonomics, & developing a home exercise program are also frequently involved.

Postoperative PT following Rotator Cuff Repair

Shoulder pain due to a tear of the rotator cuff is not uncommon. If more conservative treatments do not fully restore function, the decision is often made to undergo surgery to repair the tear.

The rotator cuff is made of 4 muscles:

1. Supraspinatus
2. Infraspinatus
3. Teres Minor
4. Subscapularis

These muscles have to work in concert with each other and the scapula muscles, known as the scapulohumeral rhythm. The rotator cuff is very important for shoulder movement, particularly overhead movement. If damage is present, then pain and/or limited movement will likely be present.

Following surgery, patients will likely be in a sling for a few weeks and will begin PT soon following surgery. The beginning stages of PT are primarily focused on improving ROM and protecting the surgical site. Pain and soreness may be associated with PT so modalities for pain control can be used. As healing progresses, appropriate exercises will be prescribed for strengthening and improving the functional use of the shoulder.

It is important for those that undergo surgery to be patient and allow the healing process to occur. By lifting or using the shoulder when not cleared to do so, patients run the risk of compromising the surgery. Having a clear understanding of postoperative precautions is necessary for a favorable outcome.

Our Physical Therapists work closely with your surgeon progressing you safely and effectively through your rehabilitation program. The ultimate goal of Physical Therapy following rotator cuff surgery is returning the shoulder to as high functioning as possible.

Bursitis

Bursitis is a condition that can affect most of the joints in the body. Most commonly, it is seen within the shoulder, elbow, hip, and knee. A bursa is a fluid filled sac and is a naturally occurring structure within each joint. Their function is to cushion and decrease friction between all structures that make up the joint such as muscles, tendons, bones, and ligaments as our bodies move.

Bursitis usually occurs due to repetitive stressful activities that cause inflammation within the bursa. These activities could include

repetitive overhead lifting or kneeling on your knee or elbow for an extended period of time. This condition can also be caused by direct trauma to the joint. Another cause for developing bursitis is strength and flexibility imbalances within the body. Take for instance your hip joint. If muscles are tight within the hip and restricting motion, this will lead to faulty joint mechanics and posture. When moving with these restrictions, tight muscles will try to move as they normally do however can create more friction over the bursa than is supposed to occur. Bursitis can be a very painful condition. Pain usually occurs with movement of the joint, with direct pressure to the joint/bursa, and can be accompanied by swelling.

A physical therapist can perform tests and measurements to determine if pain is originating from a bursa or other structure within the joint. An evaluation will also consist of testing strength, range of motion, flexibility, and gait. They will determine what muscles need to be stretched and what muscles need to be strengthened in order to address the root of the problem and prevent a recurrence of pain in the future. A physical therapist can also assist you with activity modification guidance while going through the rehabilitation process in order to decrease the stress placed on the bursa. Modalities such as cold packs, ultrasound, and/or electrical stimulation are typically used in the treatment of bursitis in order to decrease pain and inflammation.

Muscle Strains

A strain, or partial tearing of a muscle, occurs when a muscle is overstretched in a contracted state. Muscle is connected to the bone by a tendon. Most muscle strains occur at the junction where the muscle turns into a tendon. There are four types of muscle strains. Grade I to III ranges from a small tearing of the muscle without change in length or function of the muscle to a strain which involves a complete tear of the muscle where the function of the muscle is compromised. The fourth type of muscle strain is delayed onset muscle soreness and it is not graded. This occurs from microscopic tears in the muscle after performing a new or higher intensity activity. The pain and soreness are felt the day after the activity.

Muscle strains occur from a sudden change in activity causing an overload to the muscles. Typical causes of strains include (1) starting

resistance training workouts and performing new exercises, (2) performing tasks like raking leaves, spreading mulch, or shoveling snow, and (3) performing any activity where there is a sudden increase in intensity or resistance. Muscle strains happen when someone performs an activity that they are not used to doing, which involves muscular effort. Common symptoms of muscle strains are pain, tenderness to touch, swelling and bruising of the muscle tissue. There will be an alteration in normal motion of the joint affected. Muscles that cover two joints are more susceptible to tearing and these include the hamstring, quadricep, and calf muscles.

Depending on the extent of the muscle strain, full recovery usually takes between 2 – 8 weeks. Through physical therapy, the recovery time can be reduced. With a thorough examination of muscle strength, flexibility, joint range of motion, biomechanics (joint movement patterns) and pain levels, the physical therapist will devise a specific plan of exercises, stretches, and modalities to reduce pain and swelling. With the guidance of a skilled therapist to direct the care after a muscle strain, the risk of a re-tear or permanent weakness in the muscle is reduced. Appropriately addressing a muscle strain the first time can decrease the chance of a reoccurrence.

Carpal Tunnel Syndrome

Carpal tunnel syndrome is a common ailment of the nerves and tendons that become compromised as they pass through the wrist resulting in pain, tingling, and sometimes numbness of the thumb, index finger, and/or middle finger. The symptoms are usually contained to the wrist and hand and progressively worsen over a period of time.



Carpal tunnel syndrome is usually caused by increased inflammation of the tendons and compression of the median nerve. Common causes include overuse,

repetitive motions including twisting or bending of the wrist, poor wrist posturing during typing, use of a laptop, and previous wrist injuries. Certain jobs also can put a person at higher risk for developing carpal tunnel syndrome such as painter, gardener, office worker, assembly line worker, and many others that involve continuous or repetitive use of the wrist.

During an evaluation, a physical therapist will assess the wrist, fingers, elbow, shoulder and neck to accurately determine the source of the pain and develop a plan to treat it.

The treatment of carpal tunnel syndrome includes decreasing pain and inflammation while improving wrist posture which aids to improve recovery time. Wrist braces are used to allow the wrist to relax and rest while exercises are progressively implemented to strengthen surrounding muscles without causing further damage to the involved tendons and median nerve.

Osteoporosis

Osteoporosis is a disease where decreased bone strength and mass significantly increases the risk of fractures. It is commonly called the “Silent Disease” because a diagnosis of osteoporosis is frequently unknown until someone falls and breaks a bone. Bones are living structures that continue to form new bone cells as old bone cells die off. As we age, the old bone cells are continuously removed, and the rate of new bone growth slows down. This difference in bone cell production and cell removal causes the bone mass density (BMD) to decrease which increases the risk breaking a bone. Osteoporosis can affect both men and women of all ages. One out of two women over the age of 50 and one out of four men over the age of 50, will break a bone due to osteoporosis.

Vitamin D is required for calcium absorption and bone density. Sources of Vitamin D come from dietary intake, sunlight (which becomes less efficient with age) and supplements. According to the American Geriatrics Society (AGS) workgroup on Vitamin D (Judge 2014), adequate amounts of Vitamin D have been shown to significantly reduce falls and fracture rates in older adults, but it may not be for the reason that you think. The workgroup found that there was minimal impact on bone density in older adults but was rather

linked to improved muscle strength. The workgroup recommended Vitamin D serum levels of 30 ng/mL for older adults to protect against falls and fall-related injuries which equates to 4000 IU total average daily intake of Vitamin D from all sources (diet, sunlight, supplements) combined. The recommendation ensures 90% of the population will achieve adequate serum levels of 30 ng/mL according to Dr. Judge, a member of the AGS Clinical Practice Committee.

There are medication options for osteoporosis to slow down or prevent the loss of bone density. These medicines are called bisphosphonates. Some common examples are Fosomax, Actonel, Boniva, Atelvia, and Zometa. According to the Journal Osteoporosis International, the standard first line of treatment of osteoporosis is bisphosphonates. However, drug treatment only generates a modest bone mass density (BMD) increment and has limited effects on the risk factors for fracture, such as weak muscle strength, reduced joint flexibility and agility, and poor dynamic movement and balance (Zhao et al, 2015).

Six months of regular weight training exercises will not only improve muscle strength, but studies show as much as a 3%-4% increase in bone density. A supervised and guided high intensity resistance training program along with high impact body weight exercises have shown increases in bone density in the femoral neck (hip) and lumbar spine (low back). Through improving muscle strength, joint flexibility and agility, the risk of falling is reduced. Resistance training can help in preventing falls and increase BMD.

During an in-depth physical therapy assessment, our therapists will test muscle strength, joint range of motion and flexibility, balance reactions and abilities, functional movement patterns, and general cardiovascular conditioning status. With a detailed and supervised strength training program, physical therapy will help to improve muscle strength, joint flexibility, agility, and balance.

Hit osteoporosis with a 1, 2 punch! Increasing bone density and improving muscle strength gives the greatest protection when battling osteoporosis. Reduce the risk of falling by improving overall balance and fitness. Knowing safe and appropriate exercises that

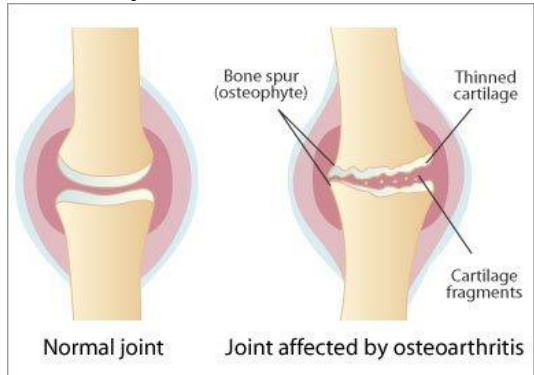
can be performed helps people with osteoporosis achieve success and reduce their risk of bone fractures and falling.

Osteoarthritis and Physical Therapy

Osteoarthritis (OA) is a degenerative disease that affects joints within the body. OA is most commonly described as:

- Stiffness
- Soreness
- Swelling
- Grinding of specific joints in the body

These symptoms are due to inflammation within and around the joint and deterioration of the cartilage present within the joint. This degeneration makes the cartilage lose its elasticity and can even result in complete breakdown of it.



The most common joints affected include the knees, hips, shoulders, fingers/hands, neck, and low back. OA usually presents unilaterally (one side) and can occur in more than one joint. Weight-bearing joints, such as the knees, are usually more affected by OA than non-weight bearing joints. Sometimes supportive knee braces or taping can be useful to help a person remain active while decreasing pain due to OA.

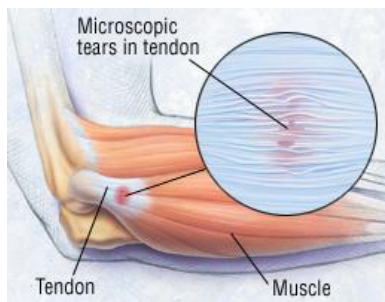
Although the effects of OA cannot be reversed, physical therapy can be utilized to treat the impairments that arise as a result of OA. Loss of motion can be regained by manual (hands-on) therapy, designed to increase joint mobility, and by performing certain exercises designed to regain motion. Strengthening of surrounding muscles is also important in order to maintain good posture and/or alignment to prevent further damage to the affected joint. Modalities such as ultrasound or electrical stimulation can be helpful to decrease pain and improve functional mobility. A thorough Physical Therapy assessment and treatment plan can minimize the effects of OA while maintaining a healthy and active lifestyle.

Overuse Injuries/Tendinopathy

Most people are familiar with the terms tendonitis or muscle strain. These injuries are some of the most common in active populations. Despite being so common, most people do not do what is necessary to properly treat or prevent these conditions.

Tendinopathy is a type of overuse injury that occurs when the physical demand of an activity exceeds the strength of the muscles required to perform the activity. Keeping muscles strong with good endurance is an effective way of working to prevent an overuse injury. Knowing one's limits and not going past the point of being overworked is another good way of preventing tendonitis.

Muscles are most fit when they are strong and flexible. By engaging in a stretching program, a person may notice an improvement in flexibility in a few weeks. A 30 second hold on each stretch is most effective. Areas to stretch include the hamstrings, calves, hips, neck and low back muscles, taking caution to avoid over-stretching muscles, particularly the low back.



If a tendinopathy develops, then proper care must be taken to avoid further damage. Icing and rest are appropriate at the beginning stages to allow healing to occur. Once the tissues calm down a bit, then it's time to work on gradually getting stronger and more flexible.

A Physical Therapist is trained in the evaluation and treatment of overuse injuries and can help guide people towards a full return to function. An evaluation of posture, strength, flexibility, and joint movement is the first step in identifying the cause of an injury. Once a patient has been evaluated, an appropriate strengthening and stretching program is developed. Physical Therapists work with patients to not only treat the symptoms that are present but give patients the tools they need to prevent a tendinopathy from coming back.

Tennis Elbow

Tennis elbow, also called lateral epicondylalgia (still widely known as lateral epicondylitis), is a type of chronic overuse syndrome that comes on, sometimes from sports, but often from performing certain types of repetitive motion, like those that occur in many work conditions. Pain is usually felt at the outside part of the elbow and is made worse by gripping, twisting, and lifting type activities. Sometimes the pain can be so bad it may impair one's ability to perform their job duties or chores around the house.

In treating this condition, it is important to perform specific exercises in certain ways that will treat the underlying cause of the problem and not make the pain worse. Sometimes, manual therapy techniques will be employed that can reduce the pain experienced at the elbow. Researchers have been able to show that treating the neck can reduce the pain in the elbow because of the nerves that travel from the neck to the elbow. Depending on the aggravating factors, a special strap may be recommended to offset the tension that is put through the elbow which can also help with the pain. At AVORA Physical Therapy, we are able to offer customized treatments to meet the needs of each patient.

Chondromalacia Patella

Anterior knee pain can be a debilitating impairment resulting in decreased participation in functional and daily activities resulting in a decreased quality of life. One type of anterior knee pain is known as chondromalacia patella.

Chondromalacia patella is diagnosed by a skilled medical professional through a thorough history, description of current symptoms, specialized hands-on testing, typically performed by a Physical Therapist or Orthopedic Physician, and may involve having an x-ray or an MRI of the knee joint. Chondromalacia patella is classified by deterioration of the cartilage on the posterior (the back side) aspect of the knee cap. This cartilage serves as a natural shock absorber. Due to the degeneration of the cartilage, scar tissue can then develop around the knee joint limiting mobility and increasing pain. This condition can result from overuse, injury or poor strength and flexibility of the muscles around your knee and hip.

Physical therapy can assist with the treatment of symptoms that arise from having chondromalacia.

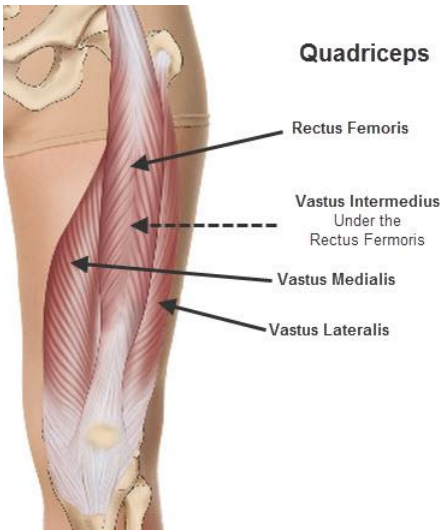


These symptoms can include, but are not limited to, generalized pain behind the knee cap, difficulty navigating stairs, and pain with squatting or prolonged sitting with the knee bent.

During an evaluation the physical therapist will perform a comprehensive examination to determine all current impairments that need to be addressed, such as decreased range of motion, decreased strength, poor flexibility and poor biomechanics (i.e. how your knee is moving). The biomechanics (movement patterns) of the legs, hips and pelvis play a large role in knee positioning during functional activities. Poor positioning of the knee can place excessive strain and pressure on the knee cap which can contribute to the degeneration of cartilage and build-up of scar tissue. Knee positioning is controlled by the muscles and anatomy of the hip joint and the ankle joint. Another primary reason for knee problems is a poorly tracking knee cap which commonly occurs due to weakness of the vastus medialis (the innermost quadriceps muscle) in combination with excessive tightness in the Iliotibial band on the outside of the thigh. A physical therapist will determine which muscles need to be strengthened and which muscles need to be stretched in order to improve posturing and biomechanics to reduce pain and improve functional mobility.

Postoperative PT After Total Knee Replacement

Patients with irreparable knee damage and complaints of knee pain may choose to undergo a total knee replacement or a unicompartmental/partial knee replacement. But what should be expected after surgery?



Patients will likely stay in the hospital for a few days following surgery then receive Home Health Physical Therapy or go to a rehab facility for another few days. Once patients are more mobile, outpatient Physical Therapy is initiated.

Outpatient Physical Therapy will begin with an examination of gait, ROM, strength, balance, and take into consideration each patient's individual needs and

an appropriate plan will be established. PT usually lasts a few weeks and the focus of treatment is improving ROM, strength, balance, and gait quality. Main goal of PT is to help you recover quickly and safely in order to return to an active lifestyle without knee pain.

Modalities may also be used to help control pain and soreness that develop as a result of stretching and increasing activity levels. There is some pain to be expected getting the knee bending after surgery. Avoiding bending the knee can cause scar tissue to form and may make it necessary to undergo another surgical procedure to break the scar tissue, known as manipulation under anesthesia. Every person who undergoes a knee replacement is different. Therefore, lengths of recovery, impairments, and individual needs will vary from person to person. It is important to be patient and be consistent with the home exercises and stretches that are prescribed by your Physical Therapist.



Therefore, lengths of recovery, impairments, and individual needs will vary from person to person. It is important to be patient and be consistent with the home exercises and stretches that are prescribed by your Physical Therapist.

Postoperative PT After Total Hip Replacement Surgery

Total hip replacement surgery is one of the most common surgical procedures being performed today. Those who elect to have this type of surgery usually suffer from chronic arthritic changes of the joint surfaces of the hip, leading to increased pain during daily activity. Hip replacement surgery is often used as a treatment for hip fractures as well. After hip replacement surgery, a patient will work with skilled physical therapists in the hospital following the procedure. Once discharged from the hospital, you will have home care physical therapy for several weeks or will go to a skilled nursing facility to participate in further rehabilitation until well enough to return home. Outpatient physical therapy will then be initiated.

During the first few weeks following the surgery, rehabilitation will consist of basic strengthening and range of motion exercises, gait training, transfer training, and learning how to perform necessary activities while maintaining movement precautions that are set by your surgeon. Some total hip procedures do not require movement precautions and others do. For example, common movement restrictions following a posterior surgical approach to the hip will be to avoid hip flexion past 90 degrees, no hip adduction (crossing leg past midline), and no internal rotation of your hip past neutral (no twisting of the leg as if pivoting over the surgical leg to turn while walking). You will be informed by your surgeon the type of procedure that will be done and whether or not you will have movement restrictions prior to surgery. Most of the time hip precautions are discontinued after approximately 8 weeks however this varies depending on your surgeon. They will inform you of how long to adhere to these precautions.

Once arriving to outpatient physical therapy, your therapist will perform a full evaluation of your strength, range of motion, flexibility, gait, balance, and any specific soft tissue or muscle tightness that might be causing pain. Each person is different, leading different lifestyles. A physical therapist will take into consideration each individual's goals and develop a treatment plan to get you back to the level of activity that you wish to achieve. A physical therapist can perform hands on techniques to improve joint and muscle function along with using modalities such as electrical stimulation, ice, or heat for pain management. You will continue to

work on strength and flexibility throughout your rehabilitation and your therapist will determine the right time to progress your exercises. Addressing balance is another key component of rehabilitation, especially if you had to have this procedure because of a fracture of one of the hip bones due to a fall.

Understanding Balance at Any Age

Our bodies take in information, process it in the brain and respond accordingly. Poor balance can occur at any age. The systems involved in maintaining balance do change as we get older; however, age alone is not an indication of declining balance nor is it a limiting factor to improving balance. Balance can be improved at any age. Information is picked up by 3 different sensors: Vision, Proprioception (the awareness of body movement and joint position, enabling you to sense where your body is in space, perceived by your muscles and joints), & Vestibular (the inner ears). See the schematic on the next page. As we age, we need 2 of the 3 systems working properly to have good balance. Many people, especially older adults, tend to rely on vision to keep balanced. When this occurs, balance is lost very easily when there is little or no lighting, the ground is uneven, objects in your line of sight are moving, or even when you turn your head to look at something other than where you are going. Once the brain picks up and sorts through the information provided by the 3 sensors, your body will respond to keep you balanced. The responses come from 4 main areas: ankles, hips, stepping response, and lowering center of gravity. If there is no response or an inadequate response, then a fall may occur. The good news is, when done properly, exercise and training will improve all components of balance regardless of age or ability. A good program identifies your specific deficits. For example, if you have an undiagnosed vestibular disorder and you begin strength and balance training without addressing the vestibular deficit, then you may have limited or no improvements in balance. One piece of equipment to isolate balance impairments is a Computerized Dynamic Posturography (CDP). In addition to assessing how well your 3 systems are utilizing and processing balance information, it will also assess reactions to instability, further identifying your fall risk. The CDP results are also matched to gender and age-based normative data so you know exactly where you stand (no pun intended) relative to your peers. A good program also transitions your training to work quick and

BALANCE

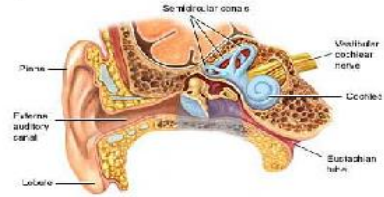
By Dr. Kim Fox, DPT



1. Vision

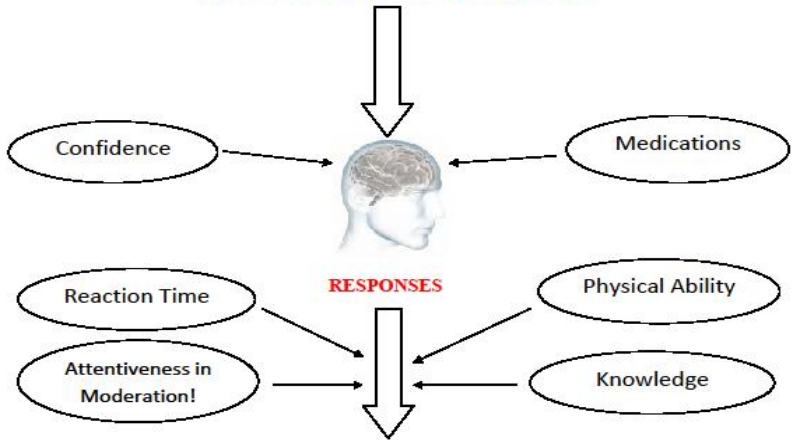


2. Proprioception



3. Vestibular

INFORMATION SENT TO THE BRAIN



1. Ankles

2. Hips

3. Stepping

4. Lowering
Center of Gravity

(This entire process needs to run in the background, automatically!)

automatic responses. “Over thinking it” will make your balance worse! Reflex training is imperative for better balance and to decrease the risk of falling. Additionally, confidence must be addressed as it plays a major role in your ability to sense and respond to instability. Our Doctors of Physical Therapy (DPT) are highly qualified therapists with additional advanced vestibular training that specialize in the assessment and treatment of balance and vestibular disorders.

Walking Speed Correlates to Longevity of Life

There are many factors that play a role in having a long, happy life. As the years go on, we become much more aware of the things that

help improve our physical and mental well-being. Much attention has been devoted to eating right, getting adequate rest and exercising regularly. We measure our success by yearly blood work, assessing body mass index and routinely checking 4 of the 6 vital signs: temperature, blood pressure, pulse and respirations. The 5th vital sign is pain which gives us a general snapshot of our current health. So, what is the 6th vital sign? It may vary among disciplines, however, many professionals agree that the 6th vital sign is walking (gait) speed. How fast you walk is a reflection of your strength, balance, endurance and flexibility. While many of us admittedly slow down as we get older, which is normal, there are age and gender related walking speed norms that have been identified as a measure of good health.

A study published in 2011 in the Journal of the American Medical Association (JAMA) by Dr. Studenski *et al* analyzed over 34,000 community-dwelling adults aged 65 years or older and followed them for 6 to 21 years. The average age of participants was 73.5 years old, roughly 60% women and 40% men. They looked at survival rates and life expectancy and analyzed whether the speed at which one walks was a reliable way to measure longevity. They found that gait speed was associated with survival in older adults. In a nutshell, those that walked faster lived longer. The breakdown was as follows:

Percentage of **Men**, 75 years old, that lived another 10 years:

SLOW WALKERS	FAST WALKERS
19%	87%

(19% of slow walkers lived another 10 years while 87% of fast walkers lived another 10 years)

Percentage of **Women**, 75 years old, that lived another 10 years:

SLOW WALKERS	FAST WALKERS
35%	91%

(35% of slow walkers lived another 10 years while 91% of fast walkers lived another 10 years)

They found that the usual or preferred walking speed of people 65 years and older varied, but in general those that only traveled 1.3 feet per second while walking at their preferred pace had the highest

death risk while those that walked 4.6 feet per second or greater had the lowest death risk.



Does this mean you should start speed walking everywhere you go? Not exactly! Trying to walk faster when you are not physically capable is a very bad idea. There are a variety of reasons why walking speed slows that can be determined with a thorough physical

therapy assessment. Successful treatment is then customized for each person. One program does NOT fit all! To improve walking speed, it is important to have adequate strength, flexibility and endurance which are commonly addressed items. Items often overlooked but crucial for improving walking speed are confidence, reaction time and vestibular (inner ear) function. Better balance and learning how to fall without sustaining an injury improves confidence and reduces the fear of falling. To safely improve walking speed, all of these areas need to be assessed and included as part of a thorough physical therapy program.

We have listed age related norms for walking speed in older adults on our website. Don't have internet access? No problem. Simply stop by the clinic and we will be more than happy to give you a written copy.

Chronic and Acute Ankle Sprain

Ankle sprains are a common injury in both athletes and non-athletes. They can be relatively minor and an isolated incident or can be a chronic occurrence and lead to continued problems.

Ankle sprains are injuries to the ligaments of your ankle that stabilize the joint. A sprain takes place when these ligaments are stretched beyond their normal range of motion, resulting in anything

from a mild stretch to a complete tear of the ligament. Ankle sprains typically happen by excessive inversion, meaning the foot turns inward too much as shown in the image below. The anterior talofibular ligament (ATFL) is the most common tissue damaged during an ankle sprain. The ATFL is on the outer portion of the ankle and vulnerable to being over-stretched if ankle sprains are frequent.

Many times following an ankle sprain pain will resolve in a few days. But what if pain and swelling continues? What if ankle sprains start to become more frequent or balance and walking become problematic? There is no such thing as “just an ankle sprain.”

Physical Therapy can be beneficial in treating acute ankle sprains to expedite healing and to prevent future injuries. Therapy will improve balance and stability, reduce and ultimately resolve pain and reduce swelling. Treatment for chronic ankle sprains focuses on strengthening, normalizing motion and flexibility, resolving pain and normalizing biomechanics and joint mobility. A Physical Therapist will perform a thorough evaluation of foot and ankle structures, joint



mobility, strength, gait, and identify any other impairments contributing to an individual patient’s complaints. Working to normalize joint mechanics and improve strength of the ankle muscles is helpful in improving the stability of not only the ankle, but improving balance to prevent falls.

Physical Therapy intervention helps to prevent the first-time ankle sprain becoming a chronic condition. If an acute ankle sprain is keeping you from what you want to be doing or if chronic ankle sprains are affecting your daily routine, Physical Therapy is very beneficial to expedite and maximize healing.

Achilles Tendinopathy/Tendon Rupture

The Achilles tendon attaches the calf muscle to the heel at the back of the ankle. Its function is to point the foot towards the ground when standing on toes and to push off the ground during walking, running, and jumping. Different types of injuries can occur at the Achilles Tendon, otherwise known as the heel cord. The tendon can be strained, overstretched or ruptured depending on the intensity of the injury. Common causes include (1) a sudden increase in activity intensity, (2) a direct blow to the back of the heel or calf, and (3) a quick, sudden increase in demand to the calf muscle like sprinting, jumping, or cutting.

Common symptoms of an Achilles tendon strain or overstretch is pain along the heel cord at the back of the heel. Swelling may or may not be present along the tendon. The tissue may be warm and tender to the touch. There can also be pain in the back of the ankle when standing on the balls of the feet or pressing the foot downward.

A severe strain, grade III, is a rupture of the Achilles Tendon. Symptoms of a rupture can include a sudden feeling of “someone hitting the calf with a rock” or a popping sensation at the time of injury. There will be tenderness and warmth along the tendon. Swelling and bruising may also occur. There will be pain when attempting to stand on balls of the feet or pressing the foot downward.



After a thorough assessment of ankle range of motion, leg strength, balance, pain levels, and functional mobility, a physical therapist can assist the patient in full recovery from an Achilles Tendon injury. The physical therapist will provide specific instructions and education to the patient on appropriate stretches and strengthening exercises to be performed as well as what exercises to avoid, to

ensure proper healing of the tissue. The education and intervention from the physical therapist is designed to promote proper healing while reducing the risk of reinjury to the tendon.

There are preventive measures that can also be done to help prevent injury to the Achilles Tendon. With a systematic assessment of the patient's current activity level, strength and flexibility of each lower leg, muscle endurance and cardiovascular fitness, physical therapy can provide the patient with an exercise program to minimize the risk of an Achilles Tendon injury.

Plantar Fasciitis

Many people have heel pain that is often attributed to plantar fasciitis. The plantar fascia is a very thick, dense band of connective tissue that attaches to the calcaneus (heel) and the metatarsal heads (the "balls of the feet"). The primary purpose of the plantar fascia is supporting the arch of the foot. Abnormal length of the plantar fascia and poor foot and ankle mechanics are likely contributors.

Excessive stretching of the plantar fascia is a cause of irritation. This is common in people with flat feet. Though overstretching the tissue is a more common cause of pain, someone with a very high arch may experience pain due to the increased fascia tightening over time. Discomfort with weight bearing, especially the first few steps in the morning, is very common. People at a higher risk to develop this

condition are those that stand for most of the day, runners, or those who are mostly sedentary. Symptoms generally come on gradually without any specific injury.



Plantar fasciitis can be prevented by making sure there is adequate arch support in the shoes being worn.

Wearing excessively high heeled shoes or flip-flops should be avoided if possible. Making sure the calf muscles do not become tight is another good preventative measure.

The first step to Physical Therapy treatment of plantar fasciitis is a thorough evaluation of gait, foot and ankle mechanics, strength, and tissue length. Once this is done, a Physical Therapist will incorporate appropriate exercises, stretches, and modalities to assist with decreasing pain and improving functional mobility.

PT to Prevent or Treat Common Running Injuries

Jogging is enjoyed by millions of people in the United States alone. Most joggers will have to be sidelined at some point because of a running related injury. Many of these injuries can be avoided if certain training principles are followed & biomechanical issues are addressed. Some common running injuries include hamstring muscle strains, achilles tendonitis, lower back pain, plantar fasciitis, patellar tendonitis, ilio-tibial band syndrome, and patello-femoral pain syndrome.

Running greatly increases impact forces and stresses different areas of your body compared to walking. If you are new to jogging or just getting back into it, your joints, muscles & tendons need to adapt to the extra stress which running places on them. This often means you need to slowly increase your weekly jogging mileage, usually no more than 5-10% per week.

Proper running shoes can play a vital role in preventing injuries. Think of how important a good set of tires are for determining your car's performance. The same can be said for a good pair of running shoes. A physical therapist can determine which type of running shoe will best address your individual needs and style of running. Going to a specialty running shoe store with well trained staff is another great place to get educated on which type of running shoes may be best for you.

If you have a history of running related injury or want to be proactive about injury prevention, an evaluation, especially one that includes an analysis of your running technique, by a physical therapist may be very beneficial. They will be able to assess your individual running mechanics & possible strength and/or flexibility imbalances. The physical therapist will also be able to determine the best exercises for addressing your specific biomechanical, strength, & flexibility issues.



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