

Headache Report

According to the National Institute for Neurological Disorders and Stroke, there are 45 million headache sufferers in the USA. Migraine sufferers amount to 28 million strong, with nearly everyone (90%) experiencing a general headache each year. Due to the biomechanical, neuromuscular and musculoskeletal inter-relatedness of the back, neck and head, headaches are very often correlated with neck, back and shoulder pain.



Whether the headache is daily or more infrequent, pain in and around the head, face, jaws, neck and ears, can be anything from a major annoyance and inconvenience, to downright painful, to disabling. Headaches are usually classified as either: Sinus, Tension, or Vascular (including migraines). While there are other types and variants, these major classifications represent the most common types.

Sinus Headaches

The sinuses are air-filled spaces which are located in your forehead, cheekbones, and between the eyes behind the bridge of your nose. Inflammation or problems with the lining of the sinuses can prevent the normal outflow of sinus secretions (mucus). This can build up pressure within the sinus cavities and produce pain similar to that of a headache.

Due to their location, sinus headaches are associated with a deep and constant pain in the cheekbones, forehead or bridge of the nose. The pain usually intensifies with head movement, straining, or any activity that increases pressure in the sinuses (rising in elevation while flying in an airplane, blowing the nose, etc). Other symptoms are often present such as a "runny nose", ear congestion, facial swelling or fullness, and fever.

These types of headaches are best diagnosed and treated by a physician or ENT specialist. Common therapies would begin with medications that thin out sinus and nasal secretions, decrease inflammation in sinus tissue linings, deal with infections and inflammation, or include surgery to clean out problem sinuses and improve drainage from sinuses.

Migraine Headaches

Migraines are a particularly vexing type of headache primarily because of the severity of the symptoms and how disabling the symptoms and pain can be. These headaches are characterized by head pain that is usually one-sided (unilateral). The pain is often described as an intensely strong pulsating or throbbing pain and is often accompanied by eye pain, light/photo sensitivity, or sound sensitivity, to name a few. It is often preceded by an "aura" which alerts the individual that a migraine is imminent. Migraines are somewhat gender selective in that they are three times more common in women.

It is generally understood that migraines are the result of a vascular phenomenon of vasodilation, where small blood vessels in the lining of the brain dilate and produce immense throbbing pain by pressing on nearby nerves. However, it has never been certain whether the dilation was a primary or secondary event. Various triggers such as chemicals, hormones, stress, and other agents have been shown to initiate or induce a migraine headache, and migraine sufferers generally learn to avoid those trigger agents or activities. To date most medical therapies (mostly pharmacologic) have been aimed at controlling and preventing this dilation response to proven triggers.

However, new information about blood flow in the brain and about the nerve endings embedded in the lining of the brain (dura mater) has revealed that the order of events in a migraine may not be as straightforward as we once thought. It appears that the nerve endings in the brain act first, releasing proteins that cause the blood vessels to be more permeable and which “primes” the nerves to be in a ready state of alert, or to be “sensitized.”

During the course of a migraine, researchers have found that the upstream (afferent) nerve fibers of the Trigeminal nerve (carrying nerves from the face, jaws, mouth, and forehead) were very busy with sensory nerve traffic. This is to say that during a headache the Trigeminal nerve floods the brain’s cortex with a barrage of sensory (pain & proprioception) signals.

Because the Trigeminal nerve is a dual component nerve with nerve traffic going both directions (motor and sensory), this research now suggests that there is a neuromuscular component to migraines. This begins to explain how migraines get started as well as how to prevent or reduce their onset and severity. Many now believe that the elevation in upstream (afferent) sensory nerve traffic traveling to the brain is responsible for creating a sensitized central nervous system (the “ready state of alert” mentioned previously), and that this storm of nervous system activity can precede and actually set the stage for the actual migraine activity itself. With this stage set the reflexive dilation in the blood vessels of the brain’s lining occurs and triggers the vascular headache pain or migraine.

Because of this Trigeminal nerve involvement migraine headaches are now being referred to as “trigeminovascular events”. The Trigeminal nerve is the cranial nerve responsible for a major portion of the head, face, and jaws. This upstream nervous system traffic is the sensory and proprioceptive (body position) nerve signals traveling up to the brain for processing and interpretation. When this upstream sensory traffic is elevated due to chronic muscle tension, muscle spasm, and pain, it burdens the brain and its abilities, depletes neurotransmitters, and sensitizes the CNS. Then when certain aforementioned triggers come along and provoke it sufficiently, dilation results in precipitating a migraine headache episode – or trigeminovascular event.

The good news from this information is that the neuromuscular component can be better balanced and controlled thus reducing the storm of upstream sensory traffic on the Trigeminal nerve. This is like taking more cars off the freeway during rush hour. When motor and sensory activity is calmed down on these nerves, with muscles and pain pathways relaxed from tension and fatigue, onset and frequency of headaches can be reduced.

While this science doesn't yet explain away every migraine it does explain why we very often obtain profound results in migraine reduction when we work to balance the head, neck and dental bite, and reduce the neuromuscular tension in these areas.

Tension Headaches

Tension headaches are the most common type of headaches among adults, and are sometimes referred to as "stress" headaches. This is because they are the result of overworked or stressed muscles in the forehead, jaws and neck.



An episodic tension headache may be described as a mild to moderate constant tight band-like pain, tightness or pressure around the forehead or back of the head and neck. These headaches may last from 30 minutes to several days. Episodic tension headaches usually begin gradually, and often occur in the middle of the day. The severity of a tension headache increases significantly with its frequency. Chronic tension headaches can come and go over a prolonged periods of time. The pain is usually throbbing and affects the front, top or sides of the head and is often described as though there were a tight band or vice putting pressure around the head. Usually, there is an associated amount of discomfort and tension also present in other areas such as the neck, shoulders, back, and jaws. Although the pain may vary in intensity throughout the day, the pain is almost always present. Chronic tension headaches do not directly affect vision, hearing, or balance, each of which is more indicative of a vascular type of headache.

Causes of Tension Headaches:

Much has been written about the causes of tension headaches, which in and of itself reveals there is still some debate on the topic. Traditionally the medical model that many physicians have used to explain the varied causes of tension headaches have included:

- Unknown cause
- No single cause
- Inherited trait that runs in families
- Not caused by tightened muscles
- Tightened muscles in neck and scalp
- Inadequate rest
- Poor posture
- Emotional or mental stress
- Depression or Anxiety
- Hunger (hypoglycemia)
- Overexertion

- Environmental stress
- Internal stress (family, friends, work, school)

This confusing array of explanations is made worse when the medical model for treatment has traditionally been limited to over-the-counter and prescription pain relievers, muscle relaxants, antidepressants, and stress management counseling, biofeedback, etc.

As is evidenced by the very name of this headache, muscle tension is the hallmark characteristic or common denominator of this headache. Ironically, few have been able to understand or explain it, as is evidenced by their using signs and symptoms as etiologic or causative factors. Even fewer seem to know how to go “upstream” with a line of questioning that asks the basic question “Why are the muscles tense in the first place?”

It is therefore helpful to ask “What is a tense muscle?” and “What causes a muscle to be tense?” Understanding the answers to these questions will help better understand where pain comes from and what can be done about it other than resorting to a temporary drug-induced relief.

First – to better understand muscle tension and muscle health let’s discuss muscle physiology (how muscles work). Muscles are made up microscopically of small muscle fibers. When a nerve signal arrives at a muscle, muscle fibers are stimulated to contract which brings the ends of the muscles and the bones they are attached to, closer together. This works because these small muscle fibers are composed of small protein muscle filaments called Actin and Myosin (see Figure 1). These filaments can slide tight past each other much like interweaving your fingers and pushing your hands/fingers together. When triggered with a nerve signal and supplied with molecular energy (ATP), these filaments ratchet or slide together, and in turn contract the muscle tighter. The molecular energy for doing this muscle work comes from an energy molecule called ATP (adenosine triphosphate) which is created from the glucose sugar molecule in what biochemists call ‘Krebs Cycle’. (It is at this simple molecular level that all energy in the body and our muscles comes from.) But, in order to generate ATP molecules from glucose for use as energy to power a muscle, a ready and steady supply of oxygen is needed, which in turn is delivered by red blood cells.

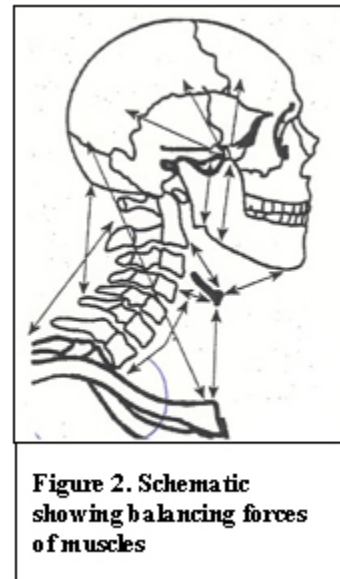
Question: What happens when the supply of oxygen is reduced? What happens if blood flow, and hence oxygen delivery, is compromised? What happens when chronically tense hyperactive muscles in spasm cause a reduction in blood flow to the muscles, thus depriving it of its needed oxygen? Furthermore, what happens when the available oxygen supply is exhausted or used up due to excessive demand from hyperactive muscles?

Answer: The muscle converts from an efficient aerobic (oxygen) state, to an inefficient anaerobic state (without oxygen), with its concomitant build up of harmful muscle metabolites like lactic acid.

With elevated muscle tension devouring up the available oxygen and reducing the blood flow due to tight compressed muscles, there is a metabolic shift from aerobic to anaerobic metabolism within the muscle itself. This shift to an anaerobic condition results in the build up of metabolic waste products such as lactic acid. The result is pain!

In fact, in the vast majority of cases, pain comes from muscles which have lactic acid in them! Most people have experienced this in their muscles when they over-worked them in the garden or in the gym or on a bike ride. It takes a day or two before lymphatic drainage and normal blood flow in the muscles washes out the painful toxic metabolites and restores the muscles physiology and comfort to normal.

With this basic understanding of muscles, you can now understand why healthy muscles are such an important part of dealing with headaches. The biomechanical and neuromuscular models of posture, muscle balance, and healthy muscle physiology are represented in many common everyday experiences which touch your life. Workplace ergonomics and repetitive motion injuries are common and costly problems we must deal with. Using muscles to support poor body posture, forward head posture, and to generally support your body above a flat floor in a world of gravity, requires considerable muscle activity and coordination and balance (see Figure 2). When improperly overworked, especially over prolonged periods, the muscles exhaust themselves, find themselves fatigued, and can begin to cause pain and suffering in the offending muscles and body parts thus affected.



So how does all of this apply directly to headaches? Consider this:

The way the mandible (lower jaw) is postured or positioned against the base of your skull can be the reason for tense muscles. If these postural muscles can't relax or refresh themselves (get rid of lactic acid build up), if they are unbalanced and overworked because of a bad bite or chronic poor posture, muscle metabolites will build up producing pain which can refer and generate the headache we call a "muscle tension headache."

This is to say that these muscles that control the posture and movement of the jaw and neck can become very uncomfortable if the dental bite is not balanced or if the jaw joint is strained or injured. Often clenching and teeth grinding results, causing damage to the jaw joint and to the teeth themselves.

The jaw-to-skull relationship is determined by the teeth or dental bite. How the lower jaw fits against the base of the skull is determined by the tooth-to-tooth relationship of the upper and lower jaws. Muscles tendons and ligaments that connect the two jaws together must "go along for the ride", as it were. They are subservient to the dental bite or occlusion. When the muscles get tired of holding a certain mandated posture, they can fatigue to one degree or another, resulting in problems. Depending on individual adaptive or compensatory capacity, the muscles can exert themselves to grind the "pegs" (teeth) together in an attempt to create more harmony

between the jaws. Obviously, the muscles and teeth don't do anything in and of themselves, but what the nervous system is involved. Muscles can't fire or work without a nerve impulse. This is why the Trigeminal nerve is so intimately involved in both muscle tension headaches as well as the aforementioned migraine headache scenarios.

To extend this conversation further, other postural aspects must be considered when dealing with headaches. Ascending (bottom to top) posture affects how the "top block" is held or balanced on the top of the "stick" (spine), and muscles must work all the way up the physical frame in a bracing fashion to keep the skeleton body upright and opposed to the effects of gravity so as to insure effective function. The nervous system is integral to this process as nerve signals are constantly whizzing up and down the neural network at lightning speed telling the brain where the body is in relation to the world around it, and sending back instructions on which muscles must be contracted, and how much, in order to assure a smooth ride without injury or noxious insult (a process called proprioception).

These ascending and descending postural influences, driven by the central and peripheral nervous system, keep us functioning and help us to avoid trouble. However as far as the jaw position against the skull is concerned, if the muscles don't like the jaw position that the teeth put the jaw into, then these muscles will be stressed, tense, strained, and overworked. This can result in abusive muscle forces which can damage the jaw joint, grind down or damage the teeth themselves, and create the pain and discomfort that leads to or creates headaches.



Example of excessive tooth wear from hyper-active muscles

Because of how the muscles work together on the skeletal frame to allow function and movement, muscles rarely if ever work in isolation. This explains why the neck, shoulders and jaw muscles work together as a unit, and why they so often wind up tight and sore. Neck and jaw muscles brace each other and work together to support head posture.

This is why the muscles of the head, scalp, neck, and jaws can become so tender and sore, and such a strong generator of headache pain. Again, jaw problems, unbalanced muscles, stress on the jaw joint (TMJ), or a bad bite (misalignment or malocclusion) all can play a significant role in headaches. They can also create facial pain, ear problems, and pain that extend to the neck, back and shoulder.

Due to the effects of this muscle tension and the referred pain patterns it creates, other symptoms can be created. A partial list of other symptoms include: ear pain and congestion,

dizziness, ringing in the ears, facial pain and pain behind the eyes, neck and back pain, teeth sensitivity, nighttime teeth grinding, broken teeth or fillings, loose or missing teeth, malocclusions like overbite or deep bite, depression, anxiety and insomnia, and so forth. Any or all of these signs and symptoms can be an indication that there is instability in the jaw joint, and that muscles are in spasm due to an unbalanced bite or neck posture.

It should be apparent why depending on or using medications can't solve this problem alone. Medicines that obtund the pain, or relax the muscles, or calm the nerves, or induce sleep, can't resolve problems that are fundamentally neuromuscular, bio-mechanical, and muscle-skeletal, and which require treatment to get at the "roots" rather than the "branches and leaves" of the problem.

For best effect, proper dental care often requires the use of other "physical modalities". Because posture is an up-and-down affair, limiting treatment to spinal adjustments, foot orthotics, or dental bite corrections alone, will often leave the problem short-changed. Chiropractic adjustments and physical therapy will never "take" or "hold" as muscles fight them due to a faulty dental bite. The opposite is often true as TMJ and dental bite therapies will often fail if the contributing or concomitant postural problems in the ascending spine are not addressed.

TMD Signs and Symptoms
Ear pain
Ear Congestion
Dizziness
Ringing in ears
Facial pain
Pain behind eyes
Neck tension & pain
Teeth pain
Teeth grinding
Broken fillings
Fractured teeth
Missing teeth
Overbite
Crooked teeth
Depression
Insomnia
Tension headaches
Migraine headaches

The bottom line is that muscles which are chronically under stress and in tension can cause muscle tension headaches and other disorders. This will not stop until something is done to lower the muscle tension and restore balance to the postural equation.

This is why consulting with a properly trained dentist is so necessary! No other health professional has the training to reposition the mandible so that the muscles of the head, neck and jaws can remain in a physiologically rested, aerobically healthy, metabolically stable state.

Regardless of the source or reasons for headaches it is important to determine whether there are dental factors that contribute to headaches. What we know for sure is that if muscles are sore or are tense, that means they have lactic acid in them which results from anaerobic muscle tension. Very often this degree of muscle tension is created secondary to postural imbalances in the dental bite and the jaw muscles that brace with the neck to support head and neck posture. This is a never ending viscous cycle that must be stopped in order to gain relief from pain and to provide protection to the teeth, jaw joint, neck vertebrae, and all the associated soft tissues.

Those ready to find relief are encouraged to consult with a dentist trained in dental occlusion, neuromuscular dentistry and TMJ treatments. Remember that not all headaches are caused by unbalanced muscles. Sometimes systemic factors such as hormones, environmental chemicals, diseases, and tumors can be the cause. This is why a comprehensive evaluation is

so important. The facts are that the vast majority of headache sufferers have a neuro-muscular component which can only be treated in a multi-disciplinary approach that stabilizes and balances muscles of the head, neck and jaws. Our consultation time together will begin to determine the best route for you to go based upon your situation and your medical history.

If you find that you are tired of living in pain and are ready to begin on the road to healing, you are invited to speak directly to a neuromuscular dentist trained in the complexities of treating these problems. Remember, that by putting the jaw joint and mandible back into alignment and stabilizing the muscles you can alleviate most headache problems related to TMJ, muscle tension, nerve and jaw joint disorders.