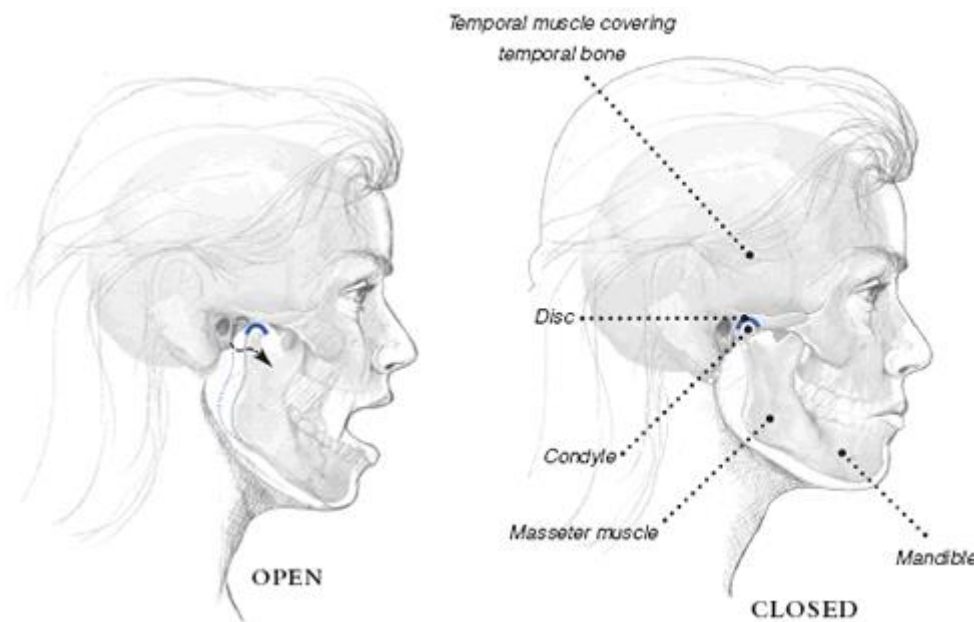


TMJ/TMD Disorders & Laser Therapy

Temporomandibular joint and muscle disorders, commonly called "TMJ," are a group of conditions that cause pain and dysfunction in the jaw joint and the muscles that control jaw movement. We don't know for certain how many people have TMJ disorders, but some estimates suggest that over 10 million Americans are affected. The condition appears to be more common in women than men. For most people, pain in the area of the jaw joint or muscles does not signal a serious problem. Generally, discomfort from these conditions is occasional and temporary, often occurring in cycles. The pain eventually goes away with little or no treatment. Some people, however, develop significant, long-term symptoms.

The temporomandibular joint connects the lower jaw, called the mandible, to the bone at the side of the head—the temporal bone. If you place your fingers just in front of your ears and open your mouth, you can feel the joints. Because these joints are flexible, the jaw can move smoothly up and down and side to side, enabling us to talk, chew and yawn. Muscles attached to and surrounding the jaw joint control its position and movement.



When we open our mouths, the rounded ends of the lower jaw, called condyles, glide along the joint socket of the temporal bone. The condyles slide back to their original position when we close our mouths. To keep this motion smooth, a soft disc lies between the condyle and the temporal bone.

The temporomandibular joint is different from the body's other joints. The combination of hinge and sliding motions makes this joint among the most complicated in the body. Also, the tissues that make up the temporomandibular joint differ from other load-bearing joints, like the knee or hip. Because of its complex movement and unique makeup, the jaw joint and its controlling muscles can pose a tremendous challenge to both patients and health care providers when problems arise.

A variety of symptoms may be linked to TMJ disorders. Pain, particularly in the chewing muscles and/or jaw joint, is the most common symptom. Other likely symptoms include:

- radiating pain in the face, jaw, or neck
- jaw muscle stiffness
- limited movement or locking of the jaw
- painful clicking, popping or grating in the jaw joint when opening or closing the mouth
- a change in the way the upper and lower teeth fit together

There is no widely accepted, standard test available to correctly diagnose TMJ disorders. Because the exact causes and symptoms are not clear, identifying these disorders can be difficult and confusing. Currently, health care providers note the patient's description of symptoms, take a detailed medical and dental history, and examine problem areas, including the head, neck, face, and jaw. Imaging studies may also be recommended.

Facial pain can be a symptom of many conditions, such as sinus or ear infections, various types of headaches, and facial neuralgias (nerve-related facial pain). Ruling out these problems first helps in identifying TMJ disorders.

Conservative Treatments

Because the most common jaw joint and muscle problems are temporary and do not get worse, simple treatment may be all that is necessary to relieve discomfort.

Self-Care Practices

There are steps you can take that may be helpful in easing symptoms, such as:

- eating soft foods
- applying ice packs
- avoiding extreme jaw movements (such as wide yawning, loud singing, and gum chewing)
- learning techniques for relaxing and reducing stress

Practicing gentle jaw stretching and relaxing exercises that may help increase jaw movement. Your health care provider or a physical therapist can recommend exercises if appropriate for your particular condition.

Medical Treatments

Pain Medications

For many people with TMJ disorders, short-term use of over-the-counter pain medicines or nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, may provide temporary relief from jaw discomfort. When necessary, your dentist or physician can prescribe stronger pain or anti-inflammatory medications, muscle relaxants, or anti-depressants to help ease symptoms.

Stabilization Splints

Your physician or dentist may recommend an oral appliance, also called a stabilization splint or bite guard, which is a plastic guard that fits over the upper or lower teeth. Stabilization splints are the most widely used treatments for TMJ disorders. Studies of their effectiveness in providing pain relief, however, have been inconclusive. If a stabilization splint is recommended, it should be used only for a short time and should not cause permanent changes in the bite. If a splint causes or increases pain, or affects your bite, stop using it and see your health care provider.

The conservative, reversible treatments described are useful for temporary relief of pain – they are not cures for TMJ disorders. If symptoms continue over time, come back often, or worsen, tell your doctor.

Botox

Botox® (botulinum toxin type A) is a drug made from the same bacterium that causes food poisoning. Used in small doses, Botox injections can actually help alleviate some health problems and have been approved by the Food and Drug Administration (FDA) for certain disorders. However, Botox is currently not approved by the FDA for use in TMJ disorders.

Results from recent clinical studies are inconclusive regarding the effectiveness of Botox for treatment of chronic TMJ disorders. Additional research is under way to learn how Botox specifically affects jaw muscles and their nerves. The findings will help determine if this drug may be useful in treating TMJ disorders.

Irreversible Treatments

Irreversible treatments that have not been proven to be effective – and may make the problem worse – include orthodontics to change the bite; crown and bridge work to balance the bite; grinding down teeth to bring the bite into balance, called “occlusal adjustment”; and repositioning splints, also called orthotics, which permanently alter the bite.

Surgery

Other types of treatments, such as surgical procedures, invade the tissues. Surgical treatments are controversial, often irreversible, and should be avoided where possible. There have been no long-term clinical trials to study the safety and effectiveness of surgical treatments for TMJ disorders. Nor are there standards to identify people who would most likely benefit from surgery. Failure to respond to conservative treatments, for example, does not automatically mean that surgery is necessary. If surgery is recommended, be sure to have the doctor explain to you, in words you can understand, the reason for the treatment, the risks involved, and other types of treatment that may be available.

Implants

Surgical replacement of jaw joints with artificial implants may cause severe pain and permanent jaw damage. Some of these devices may fail to function properly or may break apart in the jaw over time. If you have already had temporomandibular joint surgery, be very cautious about considering additional operations. Persons undergoing multiple surgeries on the jaw joint generally have a poor outlook for normal, pain-free joint function. Before undergoing any surgery on the jaw joint, it is extremely important to get other independent opinions and to fully understand the risks.

Laser Treatment for TMJ

It is estimated that TMJ disorders affect over 10 million Americans, mostly women between 20 and 40 years of age. TMJ pain can result from trauma to the joint but for many, the cause of their pain is difficult to diagnose and therefore difficult to treat. When simple therapies such as anti-inflammatory medication and jaw rest do not produce results, laser treatment may be the key to recovering your quality of life.

Laser Therapy for TMJ

Laser treatment uses light energy (photonic energy) to penetrate deeply into the tissues surrounding the temporomandibular joint as well as the joint itself. Laser energy decreases inflammation deep in the tissues that produces almost immediate relief. It also stimulates healing.

What is Therapeutic Laser Energy?

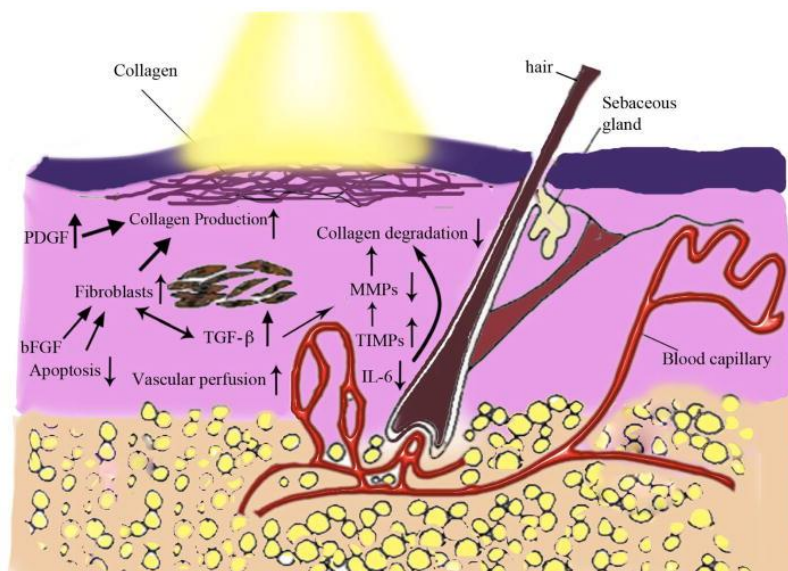
Therapeutic Laser Energy (Photonic Energy) is part of the electromagnetic spectrum, which ranges from radio waves to gamma rays. Electromagnetic radiation waves, as their names suggest, are fluctuations of electric and magnetic fields, which can transport energy from one medium to another across a barrier. Visible light is not inherently different from the other parts of the electromagnetic spectrum with the exception that the human eye can detect visible waves. Electromagnetic radiation can also be described in terms of a stream of photons which are massless particles each travelling with wavelike properties at the speed of light. A photon is the smallest quantity (quantum) of energy which can be transported, and it was the realization that light travelled in discrete quanta that was the origin of Quantum Theory.

Mechanism of Action

The mechanism associated with the cellular photobiostimulation (laser therapy) occurs at the molecular, cellular, and tissue levels. The basic biological mechanism behind the effects of laser therapy is absorption of NIR light by mitochondrial chromophores (chromophores are substances present in living tissues that absorb wave energy in therapeutic wavelengths (808-980nm); examples of endogenous (existing inside the body) chromophores are melanin, hemoglobin, (oxyhemoglobin, de-oxyhemoglobin and methemoglobin), water, protein, peptide bonds, aromatic amino acids, nucleic acid, urocanic acid and bilirubin - exogenous (existing outside the body) compounds, like different colors of tattoo ink, also act as chromophores) including Cytochrome C Oxidase (CCO), which is contained in the respiratory chain located within the mitochondria, and also by photo-acceptors in the plasma membrane of cells and within DNA.

With laser therapy a cascade of biochemical interactions occur in targeted tissues, leading to stimulation and enhancement of various biochemical processes.

Laser therapy alters the cellular redox state which induces the activation of several intracellular signaling pathways, altering the affinity of transcription factors concerned with cell proliferation, survival, tissue repair and regeneration. Additionally, absorption of light energy causes photo-disassociation of inhibitory nitric oxide from CCO, leading to enhancement of enzyme activity, electron transport, mitochondrial respiration and adenosine triphosphate (ATP) production. (see figure below).



For additional information, please past this link in your browser:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4126803/>

NOTE: Cold laser devices (Class 3a and 3b lasers) output less than 1/2Watt of energy and are too weak to effectively stimulate pain relief and healing in affected tissues. Laser devices producing over .5 watts of energy are all designated Class 4 lasers. The low energy output of class 3 therapy lasers do not heal the tissues and are often ineffective in providing pain relief. Class 4 therapy lasers produce energy in sufficient quantity to effectively resolve the conditions that cause TMJ.

Energy absorption coefficients are decided by the following energy/tissue interaction factors:

- Age
- Relative Health
- Weight (BMI, Or Body Mass Index)
- Skin Type/Color (Used To Determine Melanin Content)
- Tissue Hydration Level
- Tissue Location
- Sensitivity To Light & Heat
- Other Patient Factors
- Other Environmental Factors

Complete recovery time may be longer for people with more severe cases. In rare cases, symptoms may continue to return or may be permanent; however, effective laser therapy treatments will significantly reduce the intensity, frequency, and duration of the condition, and will completely resolve the pain and dysfunction of TMJ/TMD, as long as underlying causes are also addressed.

NOTE: To achieve maximum results, see suggested treatment protocols below:

Option #1

Wavelength: 980nm and/or 810nm
Power: 12Watts
Mode: Pulse (Frequency: 44-45Hz, T-on 20ms, T-off 2ms)
Duration: 10 minutes (600 seconds)
Area: 100cm²
Dosage: 63J/CM² Total Joule count 6300J
Schedule: Day 1-3: 1-2X daily if possible, otherwise at least 1 treatment every other day; day 4-7 once daily or at least 1 treatment every other day; day 8-14 every other day, day 14-21 every third day

Option #2

Wavelength: 980nm and/or 810nm
Power: 10Watts
Mode: Continuous Wave
Duration: 10 minutes (600 seconds)
Area: 100cm²
Dosage: 60J/CM² Total Joule count 6000J

Schedule: Day 1-3: 1-2X daily if possible, otherwise at least 1 treatment every other day; day 4-7 once daily or at least 1 treatment every other day; day 8-14 every other day, day 14-21 every third day

Option #3

Wavelength: 980nm and/or 810nm

Power: 12Watts

Mode: Continuous Wave

Duration: 10 minutes (600 seconds)

Area: 100cm²

Dosage: 72J/CM² Total Joule count 7200J

Schedule: Day 1-3: 1-2X daily if possible, otherwise at least 1 treatment every other day; day 4-7 once daily or at least 1 treatment every other day; day 8-14 every other day, day 14-21 every third day

The treatment should be applied by lightly resting the handpiece lens over the affected area, and gliding the handpiece slowly back and forth on the skin – the patient should feel a soothing warmth beginning after about 30 seconds, and slowly increasing over the course of the application.

It may be necessary to adjust treatment dosage based on *Patient Factors*; please follow the instructions below to adjust dosage:

TO INCREASE DOSAGE, DO ONE OR MORE OF THE FOLLOWING:

- Increase power (Watts)
- Increase T-ON, decrease T-OFF
- Increase duration of treatment

To INCREASE dosage, it is only necessary to adjust ONE of these settings; however you MAY adjust all settings

TO DECREASE DOSAGE, DO ONE OR MORE OF THE FOLLOWING:

- Reduce power (Watts)
- Increase T-OFF, decrease T-ON
- Reduce duration of treatment

To DECREASE dosage, it is only necessary to adjust ONE of these settings; however, you MAY adjust all settings

The patient should show marked improvement within the first three treatments, with complete recovery by the end of the treatment protocol.

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