CHAPTER 4
TMJ—THE GREAT IMPOSTER

Over ten million people in the United States suffer from TM joint problems.
—The National Institutes of Health

Although Rick was a forty-year-old medical professional who oversaw sports performance, player development, and overall wellness for athletes at a multimillion-dollar operation, he struggled to figure out why he had poor sleep quality and quantity. At night, he had trouble falling asleep, and he would often spend the night tossing and turning. After such a restless night, he rarely woke feeling refreshed. Worse, he often woke with neck pain and had headaches that sometimes lasted for days. He also had ringing in his ears and a chronic

sore throat accompanied by the constant feeling that he had a foreign object in his throat.

His medical history indicated that he had atrial fibrillation (AFib), an irregular and often rapid heartbeat that can increase the risk of stroke, heart failure, and other heart-related complications. AFib is when the upper two chambers of the heart beat out of sync, resulting in heart palpitations, shortness of breath, and weakness. Obstructive sleep apnea (OSA) is known to be associated with AFib, something we keep in mind as we evaluate patients with symptoms like Rick's. His AFib stemmed from a diagnosis of supraventricular tachycardia (SVT), an abnormally fast heart rhythm for which he was taking the medication Flecainide. Rick also suffered from chronic allergies for which he took allergy medications and used two different nasal sprays.

Rick's health problems had begun to disrupt his daily routine for himself and his family. His victory was to improve his sleep quality and quantity to get back some sense of normalcy in his life.

VICTORY

Rick's victory was to improve his sleep quality and quantity to get back some sense of normalcy in his life.

In examining Rick, I felt right away that even though he was reporting sleep to be his problem, many of his symptoms were related to a disorder of the TM joints. Chronic, recurrent headaches and facial pain are quite common and affect up to 20 percent of the popu-

lation, according to the National Institutes of Health.[8] But people with TMD also commonly report ear symptoms such as pain, ringing, or buzzing along with clicking and popping of the TM joints. Historically, these symptoms appear to be unrelated, which is why they are often treated by multiple doctors, all of whom fail to address the origin of the problem. Symptoms like Rick was experiencing are commonly misdiagnosed as migraine or tension-type headaches, stress, or inflammation or pain associated with nerves (neuritis or neuralgia). Unfortunately, when treatment for these various conditions fails, patients are often labeled as hypochondriacs and told "It's all in your head." Even worse, these patients aren't taken seriously or are just abandoned.

TMD—A COMPLEX DIAGNOSIS

TM joint symptoms can be vast and complex. In fact, they are so challenging to understand that patients commonly go from doctor to doctor, only to end up frustrated because they haven't received any real help. If they do receive some relief, their symptoms usually return because the underlying cause is not treated.

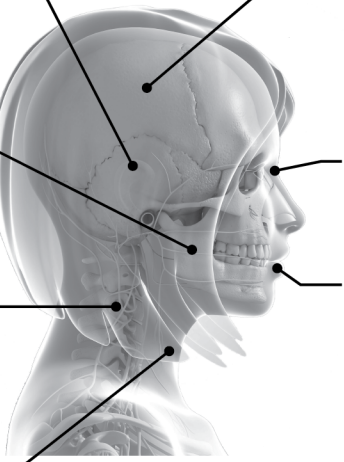
When a patient presents with common signs and symptoms of TMD, we start looking at whether they are

8 "Prevalence of TMJD and its Signs and Symptoms," Research, National Institute of Dental and Craniofacial Research, last modified February 2018, https://www.nidcr.nih.gov/research/data-statistics/facial-pain/prevalence

independent symptoms from various, unrelated disorders or a compilation of symptoms from one disorder.

Let me take a moment to clarify some misconceptions about craniofacial pain, TMJ, and TMD. Craniofacial pain is exceptional, debilitating pain and discomfort in the head and face that can significantly affect a person's quality of life. This kind of pain is more than the occasional headache requiring Advil or Tylenol to provide relief.

DO YOU SUFFER FROM ANY OF THE FOLLOWING?



EARS
1. Hissing, buzzing or ringing
2. Decreased hearing
3. Ear pain, ear ache, no infection
4. Clogged, "itchey" ears
5. Vertigo, dizziness

JAW
1. Clicking, popping jaw joints
2. Grating sounds
3. Pain in cheek muscles
4. Uncontrollable jaw and/or tongue movements

NECK
1. Lack of mobility, stiffness
2. Neck pain
3. Tired, sore muscles
4. Shoulder aches and backaches
5. Arm and finger numbness and pain

THROAT
1. Difficulty swallowing
2. Laryngitis
3. Sore throat with no infection
4. Voice irregularities or changes
5. Frequent coughing or constant clearing of throat
6. Feeling of foreign object in throat constantly

HEAD PAIN, HEADACHE
1. Forehead
2. Temples
3. "Migraine" type
4. Sinus type
5. Shooting pain up back of head
6. Hair and/or scalp painful to touch

EYES
1. Pain behind eyes
2. Bloodshot eyes
3. May bulge out
4. Sensitive to sunlight

MOUTH AND TEETH
1. Discomfort
2. Limited opening of mouth
3. Inability to open smoothly
4. Jaw deviates to one side when opening
5. Locks shut or open
6. Can't find bite
7. Clenching, grinding teeth at night
8. Looseness and soreness of back teeth

As I mentioned at the beginning of the book, the TMJ refers to the temporomandibular joints, which are located on

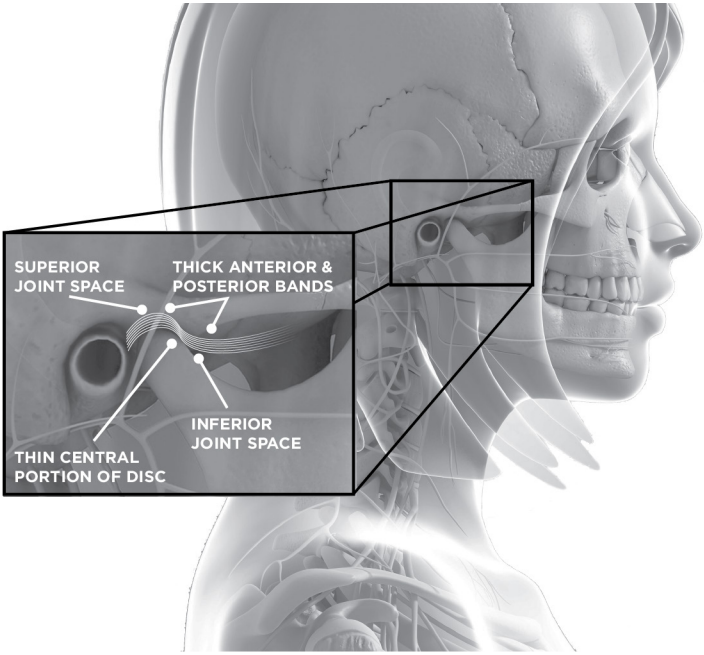
each side of the face. Everyone has TMJ—in fact, we all have two TMJs, a left one and a right one. When patients say, "I have TMJ," what they truly mean is that they have a *disorder* or *dysfunction* of the TMJ. To avoid confusion, I often use the term "TM joint" when I'm talking about the anatomical structure of the temporomandibular joint versus TMD, the disorder that affects the joint.

The TM joint is a truly unique joint in that it is actually two joint spaces encompassing one bone. The two joint spaces are on each side of the face, and the bone connecting the two is the mandible. The joint spaces consist of the condyle of the mandible, which sits within the glenoid fossa of the temporal bone, creating what is known as the TM joint complex.

In regard to the TM joints, one joint cannot move without influencing the other. The joint is intended to move within and out of the glenoid fossa to allow the person to speak and eat. The glenoid fossa is the space in the temporal bone of the skull where the mandible rests. The top portion of the mandible is called the condyle. The joint should allow the mouth to open vertically forty-two to fifty-two millimeters, and the mandible should be able to move laterally, side to side, about twelve to fourteen millimeters. The mandible should also be able to move forward about eight millimeters.

Although the two TM joints move as one, they can differ in shape, size, and function. Furthermore, since they're connected, there can be a problem on one side that may not have the same symptoms in the other side. In fact, pain can start on one side of the head and migrate to the other side.

Lastly, inside the TM joint is a cartilaginous structure called the articular disc, located between the condyle and the glenoid fossa. The articular disc is attached to muscle at the front end, which allows it to move forward with the condyle as it moves within and out of the glenoid fossa. On the back end, it is attached by connective tissue that helps keep the articular disc stabilized and secure.



The articular disc is a shock absorber between the two bones. Since the ligaments that hold it in place are elastic, they can be stretched, causing the articular disc to be mal-positioned or moved out of place, causing many problems. Improper positioning of the articular disc can result in pain, limited opening and movement, clicking, popping, and

crepitus, which is a gravel-type sound indicating bone-on-bone contact during function.

Remember: The TM joint is not like any other. It is not a ball-and socket joint like other joints in the body, which move in a hinge-like fashion, many with a ball pivoting inside a socket. The jaw joint is multidimensional. The condyle moves in and out of the glenoid fossa (the socket of the temporal bone, or skull). This is why the TM joint is referred to as a bilateral diarthroidal joint. It is meant to move in and out of the socket and laterally while being connected to another joint space—two joints, one common bone.

TMD is a group of maladies that affect the TM joints, the muscles of the jaw, neck, and face, and associated neurologic and vascular structures. Commonly these disorders are caused by injuries resulting from macro or micro trauma or inherited genetic factors. Macro trauma would be an accident with a considerable force, such as a blow to the face, a car accident, whiplash, or a fall. Micro trauma includes repetitive and recurrent exacerbation of muscle spasms resulting in increased forces on the TM joints and the associated structures. Micro traumas comprise the majority of what we see and treat in clinical practice.

Problems within and around the joint complex produce an array of symptoms that on the surface appear to be unrelated to the TM joints. These symptoms often include:

- ☐ Headache pain
- ☐ Ear pain
- ☐ Jaw pain
- ☐ Chewing pain
- ☐ Face pain
- ☐ Eye pain
- ☐ Throat pain
- ☐ Neck pain
- ☐ Shoulder pain
- ☐ Back pain
- ☐ Limited ability to open mouth
- ☐ Difficulty closing mouth
- ☐ Jaw joint locking
- ☐ Jaw joint noises
- ☐ Stuffiness
- ☐ Sinus congestion
- ☐ Dizziness
- ☐ Ringing in the ears
- ☐ Muscle spasms
- ☐ Vision problems
- ☐ Numbness

Patients do not always present with all the symptoms of TMD, but oftentimes more symptoms exist than the patient is even aware of, since the brain prioritizes pain in the order it is affecting survival. I'm often impressed with the tolerance to pain and discomfort many of my patients are experiencing.

METHODS FOR DIAGNOSING TMD

As stated earlier, 95 percent of effective treatment is accurate diagnosis, and accurate diagnosis only comes from a proper review of medical history and review of bodily systems followed by a comprehensive evaluation. Dr. Olmos devised an amazing system for evaluating the TM joints and associated structures. In my opinion, his system is second to none; it is the most thorough examination process available for evaluating these structures.

Our examination process is our way of looking for real proof that we can help. Before starting treatment, we want proof that we aren't just taking a shot in the dark, but that we have evidence that the presenting symptoms are related to the conditions that we, in fact, can treat and alleviate. I take my job very seriously, and when I tell a patient I can help them, I want to be certain that I can help them. Too many patients with chronic pain have been told by too many providers that they can be helped—and yet they arrive at our office with pain.

The best part about Dr. Olmos's system is that it is ever evolving and updated as we progress as a profession. I have the honor of collaborating with him on research projects and continuing educations for other medical providers. In addi-

tional to lecturing, part of the reason I travel so much now is to attend courses on the updates in the medical environment.

Since the TMJ, a.k.a. the "great imposter," is so complex and can lead to mysterious symptoms, it can be a tricky structure to evaluate and treat. Many of the symptoms that patients are suffering from can actually be problems of the TM joint in disguise. It is best to start from a position of higher prognosis certainty so that we don't rush the evaluation and examination process and make assumptions.

The brain devotes a great deal of neurologic support to the mouth, nose, throat, and jaw structures, because these are all needed for survival—breathing, drinking, and eating. The amount of brain devoted to certain body parts for survival can be seen in our friend here, the "cortical homunculus," which illustrates graphically the amount of brain devoted to specific body parts. It is not surprising that those involved with breathing, eating, and drinking are the largest, since they are what allow us to continue to exist. If something is off in those areas, a lot of alarms can signal there's a problem.

An evaluation of the TM joint complex looks first at orthopedic ranges of motion of the jaw and neck to ensure that function is within normal limits. It's similar to seeing an orthopedic surgeon about a knee or shoulder problem—the first thing they're going to evaluate is range of motion to ensure that the joints can move as intended. Joints remain healthy by adequate range of the motion, which allows fluid to constantly move throughout the joint space cavity, nourishing it.

Next, we evaluate and document all anatomic structures, noting any variations from the norm. A physical exam includes the jaws, teeth, tongue, muscles surrounding the structures, and the nasal and sinus passages. After all, the bottom half or floor of the nose is the top half of the maxilla. We also evaluate the ears, since the ear canal rests right up against the TM joint complex.

Since nine of the twelve cranial nerves pass through the TM joint and control over 125 different muscles, it is also important to evaluate these nerves. A discrepancy of one of these nerves could be a sign of problems inside the head or of a tumor compressing these nerves as they exit the cranium. Unfortunately, we have found that to be the case in rare circumstances, so intracranial pathology must be ruled out.

We then evaluate any friction within the TM joints with what is known as joint vibration analysis (JVA). JVA is an invaluable tool for evaluating TM joint function and for diagnosing pathology of the TM joints. Traditionally, a stethoscope or Doppler was used to hear joint sounds, but those rely on the hearing ability of the examiner, which can result in shortcom-

ings. JVA passively listens to and records the vibrations of the TM joints while in motion. We want smooth gliding surfaces within the joint space, and the JVA allows us to document the friction upon movement. Those objective recordings are then used to help evaluate dysfunction of the TM joints.

Clinical studies have found that the JVA is superior to the stethoscope or Doppler for evaluation of joint noises. Furthermore, all TM joint noises (popping/clicking/crepitus) are pathologic, indicating disease or dysfunction, but even joints that are quiet are not necessarily normal and healthy. Thus, JVA is merely a piece of the comprehensive clinical exam that leads to the most accurate diagnosis and effective treatment.

Evaluation of posture and the condition of the teeth are also extremely important for effective diagnosis. Oftentimes, patient posture is affected by longstanding injuries or difficulty with proper breathing. Over time, these can lead to the postural decompensation I defined earlier. The first rule of CPR (cardiopulmonary resuscitation) is to tilt the head and lift the chin (head tilt chin lift)—this elongates the neck to improve the airway. When the posture of the head is forward, it can produce problems all the way down the spine into the lower back. The old song about the head bone being connected to the tail bone is accurate—a change in the upper portion of the spine inevitably causes changes at the base of it. By comparing before-and-after photographs, we can see just how much improvement a patient is making as they progress through treatment.

After all the aforementioned information is gathered, if clinically indicated, we image the TM joints and associated structures using CBCT, a vital tool for evaluating the hard tissue structures and airway. In the past, plain film or two-dimensional radiography was the best tool available, but it had numerous shortcomings because it could not image the structures in 3-D. These images are referred to as Panoramic X-rays, PANO's, or Panorex. The CBCT's 3-D images allow us to see variations in the anatomy and provide way more information needed for a proper diagnosis and treatment plan.

Low-dose imaging using CBCT has been a real game changer in the TMD and sleep profession. The "dose" in CBCT refers to the radiological units that are absorbed by the body during the imaging process. These dose units are known as microsieverts (μSv). It is common practice to minimize exposure to radiation. That means only taking images that are absolutely necessary in formulating a diagnosis and ensuring that the exposure is not going to cause harm. CT (computerized tomography) images at the hospital emit up to 10,000 microsieverts (μSv) of radiological dose. But our CBCT only emits around 11 to 70 μSv of radiation, making it extremely low dose and extremely safe for patients. It is about equal to the daily exposure to radiation here on Earth. The International Commission on Radiological Protection (ICRP) recommends we keep non-occupation exposure levels less than 100,000 μSv per year.[9] We would have to take thousands of

9 ICRP, 2007. 2007 Recommendations of the International Commission on Radiological Protection (Users Edition), ICRP Publication 103 (Users Edition). Annual ICRP 37 (2-4).

images per year on a patient to have any discernible effects of exposure. Thus, it is safe to say that this technology is extremely beneficial with minimal risk.

PUTTING DOSE IN CONTEXT

Imaging Modality	Effective Dose µSv	Extra Days on Earth of Radiation Exposure
Routine X-rays at Dentist	171	21
Panoramic X-rays	19-24	2.5
CBCT at Dr. Klauer's	9-155	9

2,920 µSv Normal yearly radiation from living on Earth (8 µSv/day)

77 µSv i-CAT scan is a common scan we utilize and we routinely dose it less when indicated

CBCT also heightens the ability to identify osteoarthritis at early stages and accurately follow the condition during treatment. Osteoarthritis in the TM joint typically occurs because the patient has chronic inflammation that does not produce enough pain to warrant treatment or to justify going to see a provider, so the problem progresses. In the case of knees and hips, that explains how patients end up with artificial joints, but the TM joint is too complex to replace as readily as knees and hips, and there is a low success rate associated with TM joint surgery for treatment of TMD. We do

have some very talented colleagues who perform TM joint replacements, but they agree that they are best utilized as a last resort or for developmental issues with the TM joints. So, the earlier we can diagnose and treat TMD, the better for the patient.

Once all the data from the tests is collected and reviewed, the exam concludes with a physical evaluation of the autonomic nervous system—those nerves that automatically control internal organs such as the heart, lungs, and stomach—using autonomic motor nerve reflex testing (AMNRT). As I mentioned before, these reflex tests developed and used by orthopedic surgeons allow me to identify the primary structural instability that is producing postural changes and posture avoidance in patients as it relates to their presenting symptoms. As Dr. John Beck states, in chronic pain situations, the location of pain is rarely the site of origin of the pain, thus making it prudent for us to find the origin of the patient's problem.

In his book *Finding the Source: Maximizing Your Results—With and Without Orthopaedic Surgery*, Dr. Victor Romano explains in detail how essential the autonomic motor nerve reflex testing is within his orthopedic practice. The true value of the reflex testing is that it shows us neurologically what the patient's primary pain problem is currently. Many of our patients have multiple layers of problems, and just because their chief complaint is facial pain doesn't mean the problem resides solely in or around the face. In his book, Dr. Romano goes on:

One study found that the more comorbidities, the more pain the patient may have—in other words, pain in one area may make them more susceptible to pain in another area.[10] *For instance, the size of a rotator cuff tear may not correlate with the amount of pain a person is experiencing. They may also have pain coming from somewhere else in their body, and it's my job to find those comorbidities. If I can find and treat them, then the area where a patient is experiencing pain may improve without the need for surgery.*[11]

RICK'S VICTORY

Rick's clinical examination revealed that he had capsulitis (inflammation) of the jaw joint and that his articular disc was dislocated. The TM joint condyle was flattened on top, indicating long-term forces in the joint complex. That was the source of his tension-type headaches, pain, and discomfort. The temples on either side of the head just behind the eyes and above the ears are the region of the temporalis muscles

10 Davis, Jessica, et. al, "Incidence and impact of pain conditions and comorbid illnesses," *Journal of Pain Research* 4 (2011): 331–345, accessed August 18, 2017 on U.S. Library of Medicine National Institutes of Health, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3215513/ quoted in Romano, Victor, *Finding the Source: Maximizing Your Results—With and Without Orthopaedic Surgery* (Charleston, S.C.: Advantage/Forbes Books, 2018).

11 Romano, Victor, *Finding the Source: Maximizing Your Results—With and Without Orthopaedic Surgery*, (Charleston, S.C.: Advantage/Forbes Books, 2018).

that helps to close the jaw. In Rick's case, the excessive firing of these muscles from his nighttime bruxism is what was contributing to his tension type headache. His motor nerve reflex testing illustrated that the orthopedic instability of his TM joint was his primary problem.

Since the nasal complex is in between the TM joints, we are able to capture the anatomical structures of the nose during examinations, placing us in a position of responsibility for making referrals for treatment when needed. Imaging of Rick's TM joint revealed a profound nasal obstruction that was preventing him from breathing properly through his nose. We noted a deviated septum and maxillary sinusitis (inflammation), which was consistent with his chronic symptoms of sinusitis, mouth breathing, and allergies. That led us to refer him to an ENT physician.

Given Rick's cardiac history of AFib and poor sleep, we also recommended a diagnostic sleep study to confirm or rule out OSA. Rick was non-obese, not even overweight, and had a low probability of OSA, but although we recommended an in-lab sleep test, his insurance dictated that he take a home sleep test.

Although he came in for evaluation of his sleep, we found that Rick's longstanding TM joint pain and difficulty breathing through his nose were likely culprits producing all his significant sleep symptoms. He agreed immediately, as the data collected was detailed, clear, and fit his clinical situation.

After all the testing, we determined that the best treatment for Rick was decompression orthotics to be worn

day and night for twelve weeks. His diagnostic home sleep test came back within normal limits, and the sleep physician only recommended an in-lab sleep study if his symptoms did not improve during treatment, since home sleep tests can have false negative results. He wore the daytime orthotic on his mandible for twelve weeks, and the nighttime orthotic on his maxilla while he was sleeping. Together, the orthotics placed his jaw in a neutral position to allow for the TM joint complexes to heal. The orthotics were supplemented with home exercises and in-office physical therapy using photobiomodulation therapy (PBMT), also known as laser therapy, low-level laser therapy, and cold laser therapy. I will explain this in depth in Chapter 8.

We also felt that his cardiac condition could certainly improve, since the therapies helped to reestablish normal, functional nasal breathing and regulate his respiratory rhythm.

Just two weeks into treatment, Rick was already beginning to achieve his victory. He reported having fewer headaches, and the pain of those headaches had dropped from eight to two on a pain scale of zero to ten. He said he also fell asleep easier, slept better, and felt more rested in the morning—all of these improved by 50 to 70 percent or better within the first two weeks of treatment.

He still had some morning neck pain, so we administered trigger point injections into his trapezius (shoulder) muscles to help reduce some of his neck pain and spasms. Trigger point therapy is a great adjunct treatment we provide for

many patients, giving immediate relief for specific situations. I will explain this treatment modality further in Chapter 8.

Rick was also happy to report that his heart palpitations ceased. In the past, a single glass of wine or a beer would cause his heart to flutter almost immediately. But after starting treatment, that didn't happen when he was at a summer cookout and indulged in a single beer. "For scientific purposes," he told me, he decided to try a second beer to test whether the improvement was real or just a fluke—happily, his heart didn't flutter even after beer number two.

Concurrently, his treatment also included chiropractic care from his existing doctor and correction of his deviated septum by an ENT physician.

After four weeks, Rick's symptoms were completely gone, and he had stopped taking his heart medications (under the direction of his cardiologist). At twelve weeks, we did a final evaluation on Rick to document all his improvements and to begin weaning him off his daytime orthotic. In medicine, we call this maximum medical improvement (MMI)—the point at which treatment reaches its peak improvement. Similar to treating a stress fracture, the twelve-week orthotic is designed to be worn while the jaw joint "heals," then it is removed rather than worn long term. Historically, patients with TMD were in orthotics for much longer periods (a year or more) and this was referred to as "Phase 1" treatment. After such a long period of use the teeth would shift so permanent changes to the dentition would need to be made. Patients would be transitioned into "Phase 2" treatment requiring new crowns

or restorations throughout the mouth. It is a rare occasion that Phase 2 treatment occurs in our office, because we are comprehensively addressing the source of the problem and getting to the root cause. Phase 2 is an additional long-term treatment to the dentition needed to maintain a reduction of symptoms. Thankfully, we rarely need this in our office. Rick's before-and-after photos showed that his head was uprighted profoundly, his shoulders were situated back instead of forward, and his feet were no longer divergent. A cone beam computerized tomography (CBCT) scan taken at that point showed that his jaw joints were within normal limits, his nasal passages were far more open, and his sinus disease was completely resolved.

Rick's case illustrates how the TM joint can produce symptoms that appear to be unrelated. For Rick, what appeared to be a problem of sleep and headaches was actually a problem stemming from the jaw and the inability to breathe properly through his nose. That's why it's important to take a comprehensive approach to evaluating patients so that a proper diagnosis and effective treatment plan can be made. For Rick, treatment "changed everything," he said. "I sleep great now. I don't have pain. I feel so much better about not only my jaw and how my body feels, but I have so much more energy and I'm much, much happier."

Rick's situation explains how we must ensure a sound night's sleep void of any stimulation from pain and fragmentation from disordered breathing. His case also displays the body's habit to compensate for a problem by exhibit-

ing symptoms that seem unrelated. In Rick's case, these symptoms would be his sleep problems and his headaches—things not caused by just surface-level factors, but by the issues embedded in his TM joints. Treatment proved that his cardiac issues (AFib) were caused by his chronic breathing issues and craniofacial pain. Once the body wasn't under distress, his cardiac issues self-resolved. It never ceases to amaze me that if we put the body the right environment, it will heal. The most gratifying part of what I do is reading testimonials from my patients, and I'm happy to say here that his victory was achieved!

> "After not sleeping well for an extended period of time, I longed to have a good night's sleep. Desperate for a solution, I sought care for my insomnia from Dr. Klauer, and informed him I had TMD. Uncertain of how they connected, but determined to sleep again, I followed all the treatment Dr. Klauer provided. In a short time, I was sleeping better, had fewer headaches, and even had decreased neck and back pain. At the completion of the treatment, I no longer had heart palpitations or arrhythmias I had been diagnosed with fifteen years earlier. Today, I have better posture, no jaw pain, and great sleep. The treatment and care has changed my life!" —Rick

In the next chapter, I will dive into the importance of sleep and how that is essential for patients to heal, recover, and go on living a great life.