negatives: these tests are too specific. In principle, this is the basis of diagnostics. Everybody wants a test that is 100% accurate, but there is no such test available for humans. Any test is limited by costs, time, technology, the involvement of human beings interpreting data, and many other factors. Moreover, the degree of sensitivity of a test can only be measured once there is a more sensitive test available for comparison. The same applies to specificity. At any point in time, the most advanced test is the benchmark, doomed to be replaced by a more sensitive or more specific test in the future.

Apart from sensitivity and specificity, all tests need another feature to justify their application: a test must be reproducible, that is to say that when ten radiologists interpret the same image, all ten should come exactly to the same diagnosis. This is unlikely to happen. There are two equally good outcomes: either all ten say the patient has a positive diagnosis, or all ten say the patient has a negative diagnosis. A poor outcome would be if five radiologists say the patient has a positive result, and five give a negative result. Fortunately, this is rare in radiology. In other diagnostic approaches like palpation, however, this 50/50 split is a common outcome. Flipping a coin would have the same value, but looks less professional. The term for this reproducibility is "**inter-rater reliability**."

Inter-rater reliability is easy to measure with a sample group of testers with standardized training, using the same technology or method and asked the same question. Some strategies have almost 99% inter-rater reliability; some others, far less. There are statistical methods to measure inter-rater reliability: the unit of measurement is $\varkappa$ (kappa, the Greek letter k). In general, a diagnostic approach with a high $\varkappa$-value is preferred. Many clinicians still use palpation for other reasons, even though there is strong evidence that the $\varkappa$-value is very poor.

Inter-rater reliability is an independent feature, not related to sensitivity, specificity, or relevance. Pigeons, for example, have (after two weeks of training) the same results in the detection of early breast cancer in mammography as radiologists (Levenson, 2015).

Another challenge is selecting the most appropriate diagnostic tool. In other words, what should we ignore (relevance)? A diagnostic method like ECG, even though showing high sensitivity, specificity, and inter-rater reliability for cardiac arrhythmias, is a poor choice to determine whether a patient has onychomycosis. In the majority of cases, relevance or its absence seems obvious. However, in some cases, it is not only not obvious; it is quite the opposite. Relevance is hard to measure, requiring comparison of large clinical cohorts. In order to determine the relevance of a diagnostic procedure, different and measurable treatment approaches are required, chosen according to the diagnostic algorithm. When a diagnostic algorithm enables us to differentiate fifteen different types of conjunctivitis, yet treatment for all fifteen is silver-nitrate eye drops (as was the case in the 1940s), the relevance of a differential diagnosis is hard to measure. In the presence of more specific treatments available 50 years later, the same diagnostic algorithm becomes more meaningful.

In many cases, relevance is determined by trends and the teacher's opinion, rather than on scientific evidence. For example, there is strong evidence that imaging strategies have no relevance in lower back pain, but nevertheless, imaging strategies are still the number one diagnostic tool in lower back pain in many countries (Maher, Underwood, and Buchbinder, 2017, Chou et al., 2009, Jensen et al., 1994). The number and depth of forehead skin wrinkles is a very strong indicator for the risk of early death from a cardiovascular incident and the significance of the wrinkles seems to be far higher than that of cholesterol level, ECG, and blood pressure, as demonstrated by Esquirol, et al. (2018), but despite this data, physicians adhere to their old predictors, even though they might be less reliable.

The considerations outlined above are no more important to the FDM than to any other medical approach, but the limitations of FDM diagnostics, like other diagnostic models, should be kept in mind. In the following chapters, common contemporary approaches for diagnosing fascial distortions will be discussed. If another diagnostic approach looks more promising than current methods, one should be able to determine the benefit of the new approach. Is its benefit sensitivity, specificity, inter-rater reliability, relevance, cost, or something else? The benefit to patient care should be specified before the current algorithms are questioned. Fashion or the teacher's opinion are weak arguments for changing the plan.

The fascial system is arguably the largest sensory organ of the body. (Some say the skin is larger, but it is hard to prove). Most proprioceptors and nociceptors are located in the fascia and the majority of the nervous system is dedicated to this inner sense. When we look at a cross-section of the spinal cord, half of the fibers are afferent. All these axons conduct information about pain, tension, position, and other internal qualities. It is the first sense that develops *in utero*. The embryo knows little about the exterior world but is already gathering information about its own limbs. Inability to receive information about position, strength, and tension is perhaps the worst disability, similar to tetraplegia, and removing the individual's ability to do anything purposefully. The case of the British butcher, Ian Waterman, who lost almost his entire proprioception within a few days is well described in *Living without Touch and Proprioception,* by Cole and Oppenheimer (2005, pp. 85–97).

Despite its importance, proprioception was not recognized for over two thousand years. Aristotle (384–322 BC) defined the five senses as sight, hearing, taste, smell, and touch and strictly excluded the future discovery of other senses. Though pain and perception of our own body were not included in these senses, Aristotle's theory was passed on for over two thousand years virtually unquestioned. In his 1833 publication, *The Hand*, Charles Bell (1774–1842), a Scottish physician known for first describing Bell's palsy, was the first to suggest a sixth sense, an inner sense for position and tension. Bell was the first in the long history of science to discover this scientific gap. It took another seventy-three years until Charles Scott Sherrington (1857–1952), the British physician and founder of neurophysiology, defined the terms "proprioception" and "nociception" in his book *The Integrative Action of the Nervous System* and introduced this "new" sensory organ to the scientific world in 1906.

The sensors of this inner sense of proprioception and nociception, all located in fascia, gather supreme information about the condition of fascia. This vast sensory organ is the basis for diagnostics in the FDM. The skin is, according to many authors, envisioned as an organ of its own and is equipped with a high density of nociceptors.

All concepts of subdivision of the body, especially traditional anatomy, take some issue with fascia. The concepts of organs, such as kidney, brain, or liver, originated in the early 19th century. Carl Rokitansky (1804–1878) was the leading pioneer in this field of "organ pathology." Before that, organs were not seen as entities of importance, but in the age of the industrial revolution, "parts" were a common analogy. The hype about organs in medicine was short-lived: by the second half of the 19th century, cellular pathology had replaced organ pathology. Later in the 20th and 21st centuries, genetic, epigenetic, and molecular pathology reduced the need for subdivisions of the human body. Even though organ pathology played only a brief role in medical history, the idea is still dominant because medical specialties are identified with it, i.e. there are heart doctors, lung doctors, and skin doctors, which suggests the existence of heart, lungs, and skin. On the level of fascia, there are no organs, only fiber arrangements, and embedded liquid and minerals, so from a fascial perspective, the dermis is a special arrangement of superficial fascia. Even in the skin, nociceptors are embedded in fascial fibers and proprioceptors, like the Ruffini corpuscles, are exclusively embedded in fascia. Since all proprioceptors, and the majority of nociceptors, are mechanoreceptors, they measure the mechanics of fascia. The three-dimensional sense of position and tension is based on the measurement of the movement of fascial fibers. Once the deformation has exceeded a certain threshold, nociceptors detect this deformation, and we feel pain.

The basis of FDM diagnostics is the hypothesis that nociception and proprioception are the supreme sources of information concerning the shape of fascia. Since each of the six distortions is an entirely different type of fascial deformation, proprioceptive and nociceptive information will be different, and each of the six fascial distortions feels different.

There is one person in the world who knows already which of the six distortions are present, due to exclusive information via a supreme sensory network – the patient. The challenge for the practitioner is to gain access to this exclusive information by communication and observation.

The main components of an FDM diagnosis

Non-verbal description of the complaints

Observation and classification of specific pain gestures. Patients all over the world, regardless of their age, education, or ethnic origin, display the same reproducible gestures, unconsciously displayed, when communicating their complaints.

Verbal description of the complaints

Listening, detection of keywords, classification of reproducible verbal description of the complaints.

Objective findings

Clinical examination, mobility tests, palpation.

Mechanism of injury

If available, the mechanism of injury is helpful information to determine the type of distortion.

Other diagnostic tools have yet to be implemented. As stated above, the implementation of other methods requires additional effort in terms of time and financial resources and must be justified, by either better sensitivity, specificity, inter-rater reliability, relevance, or other measurable benefits.

The Fascial Matrix 5

The fascial matrix is a three-dimensional biotensegrity framework of connective tissue. Adstrum, et al. (2017) define the fascial system as follows:

> The fascial system consists of the three-dimensional continuum of soft, collagen-containing, loose and dense fibrous connective tissues that permeate the body. It incorporates elements such as adipose tissue, adventitiae and neurovascular sheaths, aponeuroses, deep and superficial fasciae, epineurium, joint capsules, ligaments, membranes, meninges, myofascial expansions, periostea, retinacula, septa, tendons, visceral fasciae, and all the intramuscular and intermuscular connective tissues including endo-/peri-/epimysium. The fascial system interpenetrates and surrounds all organs, muscles, bones and nerve fibers, endowing the body with a functional structure, and providing an environment that enables all body systems to operate in an integrated manner.

The fascial matrix is ubiquitous and continuous throughout the body and can act not unlike a non-Newtonian fluid, shifting in response to applied forces.

Triggerbands

A triggerband is a distorted or twisted band within the fascial matrix. It is thought that triggerbands occur in banded fascia which are strong in the longitudinal direction, but weak when a perpendicular force is applied. When a perpendicular force is applied to a fascial band, the fibrils of the matrix separate, then the exposed ends of the fibrils quickly reattach to the nearest fibril, often resulting in a wrinkle or twist within the matrix (Figs. 5.1, 5.2 and 5.3).

A patient with a triggerband often experiences pain in a well-demarcated line that is described as a

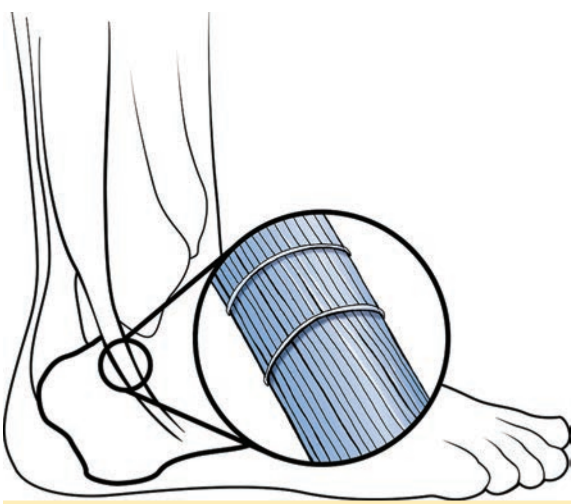

FIGURE 5.1
Banded fascia
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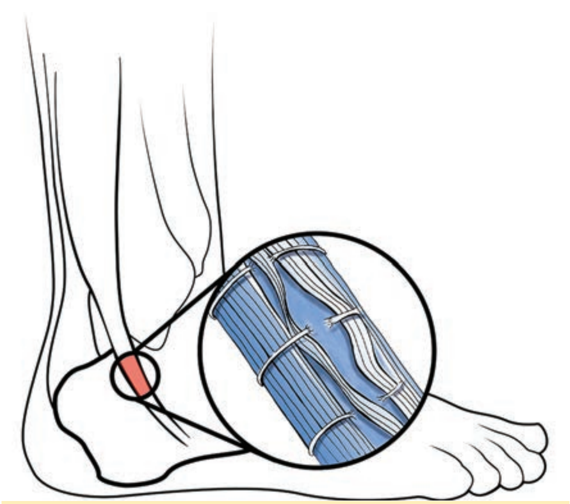

FIGURE 5.2
Triggerband
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FIGURE 5.3
Triggerband found in the superficial fascia of a goat

burning, pulling, or tightness. The gesture used by the patient to describe a triggerband is a sweeping motion with the tip of one or more fingers. The fingertips will trace the exact course of the triggerband (Figs. 5.4 and 5.5).

Patients experiencing triggerbands often have reduced range of motion (ROM) in one or more planes. They may experience weakness of a limb in certain positions, while the limb remains strong in other positions. An objective loss of balance and proprioception is another common symptom.

Any place on the body where pain is demonstrated in a linear pattern with a finite start and

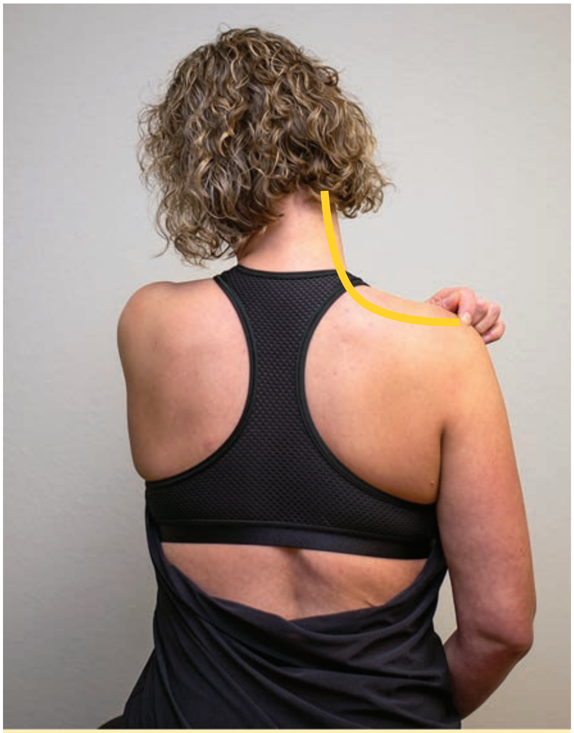

FIGURE 5.4
Shoulder–mastoid triggerband: patient gesture 1

FIGURE 5.5
Shoulder–mastoid triggerband: patient gesture 2

endpoint represents a triggerband. The start and endpoints are a consistent feature, even when the patient describes them as passing through the body. Patient gestures may be limited to a short portion of the overall triggerband, either due to limitations in the patient's ROM, or because the portion indicated by the gesture is the only painful portion.

A triggerband can be palpated by the practitioner. These are frequently described as indurated and range in width from a fine line to a wide ribbon. The practitioner may elicit pain on palpation along the entire course of the triggerband, beyond the short area first identified by the patient.

Dr Typaldos described various subtypes of triggerbands. These descriptions were provided to explain the different palpatory sensations that can be felt when treating them:

Twist – the sensation appreciated when the triggerband twists during treatment (Fig. 5.6).

Wave – the sensation of the fascial tissue of the triggerband bunching up in front of the practitioner's thumb (Fig. 5.7).

Crumple – the sensation of a wave that changes depth in the fascial matrix (Fig. 5.8).

Knot – considered to be a loop in the triggerband. This knot moves along the triggerband as it is treated. Knots come in various sizes (Fig. 5.9).

Triggerband technique

Triggerband technique is a manual technique in which the practitioner uses the edge of their thumb

FIGURE 5.6
Twist

FIGURE 5.7
Wave

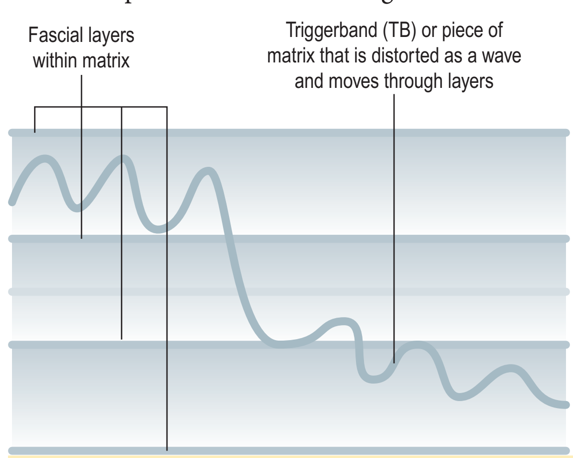

FIGURE 5.8
Crumple

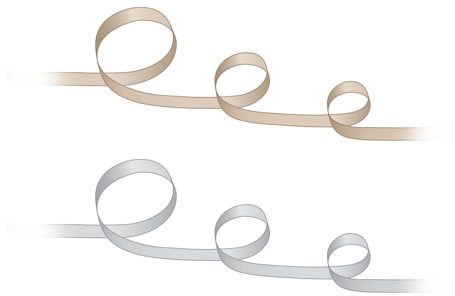

FIGURE 5.9
Knot

to apply force along the entire length of the triggerband, untwisting the twisted fascial fibers. The force being applied to a triggerband must be directly on the skin: it should not be treated through clothes. The friction of the thumb on the skin is what allows the fibers of the fascial matrix to be separated, therefore use of lubrication between the practitioner's thumb and the patient's skin is very rarely required. The force applied by the thumb separates the twisted fascial fibers within the fascial matrix, and allows the fibrils to reattach in a more neutral or normal position.

When treating a triggerband, the practitioner should seek feedback from the patient. The patient

FIGURE 5.10
Hand X-ray, showing thumb

FIGURE 5.11
Thumb X-ray

will describe the treatment as a cutting or burning sensation as the practitioner moves their thumb along the triggerband. If the patient feels relief, the practitioner has “fallen off” the triggerband, or the triggerband has ended. It is important to start before the origin of the triggerband and to continue the treatment all the way to the terminus. If only a portion of the triggerband is treated, the fascial matrix may remain weak, and the triggerband may easily reform.

Triggerbands are said to be acute if no fascial adhesions have formed. If adhesions have formed and are stabilizing the triggerband, it is said to be chronic. The formation of a triggerband in the fascial matrix tends to cause and recruit secondary triggerbands. The goal of every treatment is to untwist the twisted fascial fibers, reattach separated fascial fibers, and break adhesions when they are present.

When performing triggerband technique, proper thumb position is essential. The edge of the thumb is placed directly on the triggerband, positioned so that the bone located in the tip of the thumb (Figs. 5.10 and 5.11) is acting like a knife blade, cutting through the triggerband (Fig. 5.12). The practitioner pushes away from their own body and the fingers of the treating hand can be used to pull the thumb along during the treatment. The non-treating hand can adjust the tension on the skin, preventing the tissue from bunching up in front of the treating thumb. Practitioners must maintain short thumbnails to be able to treat triggerbands without leaving nail marks on the patient.

Depth and speed are vital aspects of triggerband technique. If the practitioner thinks of their thumb as a farmer’s plow (Fig. 5.13), they can adjust the angle and depth to obtain the proper depth of treatment (Fig. 5.14). Using the proper depth improves the effectiveness of the treatment, minimizes the force required, and often can make the treatment much more tolerable for the patient. A triggerband can easily be treated too fast: the practitioner’s thumb then slides across the skin, and there is not adequate friction to separate the underlying fascial fibers. If treatment is unsuccessful, slow the treatment down, press deeper into the tissue, and consider changing the direction of treatment. The correct speed of triggerband treatment is the speed at which the tissue can be felt changing under the treating thumb.

With practice and constant feedback from patients, practitioners gain ever-improving palpatory

FIGURE 5.12
Triggerband technique thumb placement

FIGURE 5.13
An antique two-furrow plow

FIGURE 5.14
Angling the thumb like a plow blade

skills and learn to feel the location and depth of the triggerbands as they treat them. When learning how to treat a triggerband, the practitioner must trust that the exact location provided by the patient is where it is located. The location is confirmed by patient feedback regarding the pain that is experienced. If the pain of the treatment disappears, the triggerband is either finished or has been lost along the course of the treatment.

The direction of triggerband treatment can also make a difference in the outcome of triggerband technique. Often, treatment is in the direction that the patient first demonstrates the triggerband, but if the initial pass is not successful, reversing the direction of treatment may be helpful. The practitioner can start and stop during treatment, to work around clothing or to switch thumbs, as long as they note the triggerband pathway, make necessary adjustments, and take a step back along the triggerband course before resuming treatment.

Triggerbands can have a variety of clinical progressions. They can heal slowly; they may remain acute regardless of duration if adhesions do not form; or they may form adhesions and become chronic in a relatively short time. Alternatively, they can be repaired immediately with triggerband technique.

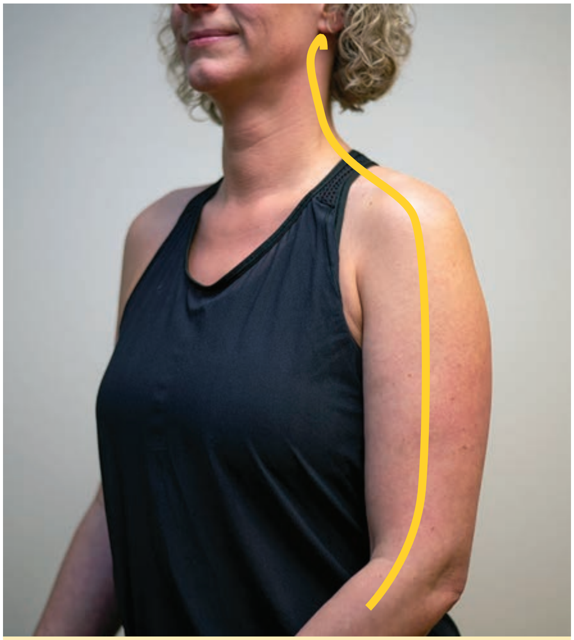

FIGURE 5.15
Anterior shoulder triggerband

FIGURE 5.16
Posterior shoulder triggerband

Every FDM practitioner should be aware of common triggerband pathways and their general location. The patient is always the expert, and they will guide the practitioner to the location of their specific triggerband either with their body language or by the reaction to triggerband treatment. Common pathways are the anterior shoulder triggerband (Fig. 5.15), posterior shoulder triggerband (Fig. 5.16), shoulder–mastoid triggerband (Fig. 5.17), lumbar triggerband (Fig. 5.18), posterior thigh triggerband (Fig. 5.19), lateral thigh triggerband (Fig. 5.20) and lateral ankle triggerband (Fig. 5.21).