

The Neurology Of Muscle Spindle Cells

The Underlying Science & Art Of Energy Kinesiology

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Abstract

In this paper and accompanying presentation, the author will provide a review of the neurology and physiology of the spindle cell mechanism. The intent of this is to shed light on the spindle's role in defining proper application of performing a "muscle test" based on the underlying neurological/physiological principles involved. In doing so, I hope to answer one of the age-old questions that people first learning kinesiology inevitably ask – "How much pressure do I use?" – and explain why this is actually the wrong question.

For the purposes of this presentation, I will refer to "muscle testing" as "muscle response feedback" (MRF)

Introduction

I've been teaching Kinesiology/Muscle Response Feedback workshops around the world for about 30 years. Most of the students I've taught in that time had already taken one or more workshops prior to mine, and therefore had learned how to "muscle test" from someone else. What I've observed is an immense disparity in how people actually perform muscle response feedback/muscle testing.

This disparity creates massive confusion. Its a two-fold problem: in the classroom, students "critique" each other, (usually by complaining about the amount of pressure they're experiencing, either too light or too hard); and in public, as people that experience MRF from different practitioners don't understand why one person does MRF one way and another practitioner does it so much differently.

When someone is first learning, one of the obvious first challenges is understanding how much pressure to apply. As they're learning something so new – and often without the understanding of how things work in the body – they struggle to be able to feel a muscle change, usually resulting in using more pressure to make sure of what they're experiencing...which is exactly the wrong the thing to do!

As an instructor, this provides a lot of challenges to overcome in the classroom. To attempt to help a person change their existing (bad) habits while learning the new techniques they've come to the workshop for is a lot to ask. And usually, they simply fall back into their previous habits as soon as I walk away – a result of how the brain works once it has established a way of doing things. For a person to change how they perform MRF requires conscious effort and (usually) a minimum of several days or more to create a new program.

When they do make the change, based on the concepts I'm presenting here, it results in more confidence in the results they get – which is one of the most frequent troubles a new kinesiologist is presented with when learning MRF. Along with that confidence comes more consistent results.

When instructors begin to teach how to do MRF more consistently, then the whole field of

Energy/Specialized Kinesiology will benefit as people who are receiving it will have a more consistent experience.

So the question is...what is the key to a more consistent approach to teaching and practicing MRF?

One of the first techniques learned in any course of Applied or Energy Kinesiology is the Spindle Cell Technique. The reason usually given for this is to be able to determine if a muscle is functioning properly so that we may trust the outcome of whatever it is we're using that muscle for – monitoring it as it relates to an organ or gland, or other communication with the body such as the effect of a food or nutritional supplement.

For the “lay” (non-professional) students of Energy Kinesiology, not much more information about the spindle cells and their inherent importance is given. And in the author's experience, even the more highly educated professionals don't appear to embrace the relevance of the spindle cell mechanism as it relates to the underlying art of kinesiology itself – the application of pressure that is the basis of everything we do: the so-called “muscle test” as used for its feedback response and the information gleaned from that.

My intent in offering this perspective is for a variety of reasons:

1. To offer a means for a more consistent approach to teaching “how to” apply muscle response feedback (MRF).
2. To provide new students a means of developing confidence in their MRF skill.
3. To provide long-time users and practitioners a means of better understanding the mechanism of what they're doing, and a means of refining their MRF skill. MRF is, after all, an art form as well as a science. The best artists are always refining their art!

If the reader embraces the underlying science and premise of this paper, it may take some effort to change their MRF habits. It is my opinion that doing so will improve results, increase confidence, and begin the process of creating a more consistent experience for the receivers of kinesiology – which will work to enhance its reputation and remove some of the doubts, questions, and skepticism that arises from people experiencing very different applications of the base tool of Applied & Energy Kinesiology – muscle response feedback.

The Models Of Muscle Response Feedback

Before we begin our discussion of the spindle cell mechanism, I offer a brief historical look at the models of Applied/Energy Kinesiology for context that will come into play later.

There are 2 basic models we find in the plethora of Energy Kinesiology modalities:

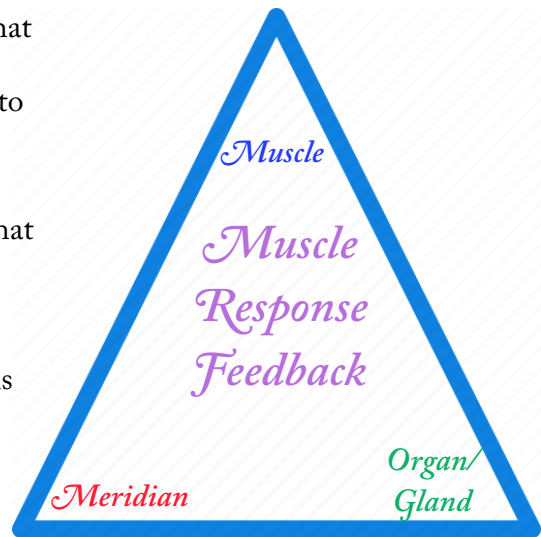
1. The Energy Readout Model
2. The General Communication Model (Indicator Muscle)

The Energy Readout model is where it all began. George Goodheart's initial finding that led to the founding of Applied Kinesiology was that every muscle in the body relates to an organ or gland. John Thie carried this over in his application and development of Touch for Health, which

was, essentially, Applied Kinesiology for the lay person. Little did he know that this would spawn a revolution that would lead to an entirely new lay profession – Energy Kinesiology (or Specialized Kinesiology as it is referred to in some parts of the world).

As each organ/gland is also associated with a meridian, that initial trinity was created. And the premise was/is that by “testing” the muscle, the muscle response (feedback) provides an “**energy readout**” of that relationship – muscle/organ-gland/meridian. In the energy readout model, the information from the muscle is limited to this specific relationship.

In the General Communication Model, we learned that any muscle in the body can act as an *indicator muscle*. This indicator muscle provides a means of communication more generally, accessing information in a neurological/electromagnetic manner, and has the ability to explore information outside of the muscle’s specific organ-gland/meridian correlation. This more generalized approach offers a flexible, and even improvisational, method of communication with the person being monitored.



Each model has its advantages and disadvantages. However, as is often the case, when integrated, the result is greater than the sum of the parts.

As the world of Energy Kinesiology developed, the use of the Indicator Muscle model became much more prevalent. The ability to “ask questions” of the body and get a response by using a single muscle seemed much easier than going through many muscles to assess energy flow.

However, the importance of the Energy Readout model is not to be overlooked. When you consider the premise that each meridian, and therefore its related organ or gland is directly represented by a particular muscle(s), then you can say that the muscle is a **direct neurological representation of the energy flow in that meridian**. So when a meridian is out of balance, that imbalance may show through its related muscle, as originally researched and developed by George Goodheart, D.C.

Unfortunately, many kinesiology modalities developed utilizing only the indicator muscle, and ignored the benefits of energy readout model.

Consider the role of an indicator muscle with one of its first uses – checking the alarm points of Chinese acupressure. By going through these points and using a single indicator muscle, the body has a way of indicating what meridian(s) one might find stress in without monitoring a lot of different muscles. This is a great “shortcut” to finding where stress exists, but consider that it is just that – a shortcut that acts as an alarm.

To use an analogy...when a fire begins in a house, what happens? An alarm goes off in the fire station. And then what happens? Do the firemen simply get the hoses out and begin spraying water around? Of course not! They have to go to the house where the fire is.

By neglecting the addition of monitoring the specific muscle related to the meridian identified through the alarm point, you get the information about the alarm, and then simply start to

balance, ignoring the “house” – in other words, the muscle that is the direct neurological representation of the energy flow of the meridian and its associated organ/gland – where the fire is.

Because the muscle related to the meridian/organ is the neurological representation of the imbalance found via the alarm point, then activating that muscle alerts the body as to where to more specifically direct the healing modality applied when the balancing is done.

This prevalence of the Indicator Muscle Model has led to a deterioration of the use of the Energy Readout Model. In fact, the use of *precision* MRF as the tool of the Energy Readout Model is often neglected or considered a burden, despite it being the foundation of what Energy



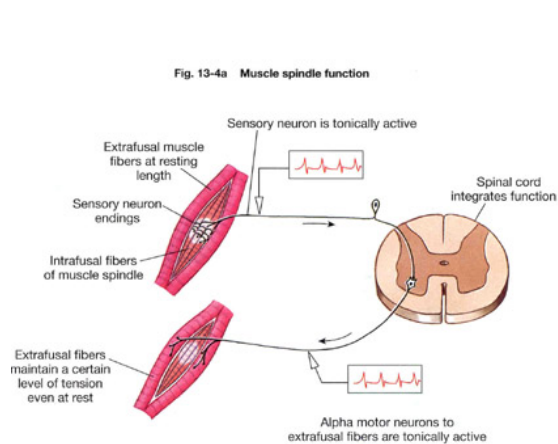
Kinesiology is about.

The famous French researcher and “father” of western auricular acupuncture, Dr. Paul Nogier, found that when he activated the neurology and physiology of his patients’ issues before treating, his results increased significantly – from roughly 50% to 95%. In this respect, monitoring the muscle directly related the meridian identified through an alarm point via an indicator muscle offers (and adding it to the circuit if you work in that way) is similarly stimulating neurology directly related to the imbalance you’re working with.

The invitation here is, if you don’t already do so, to begin to use the Energy Readout related muscles whenever you have the opportunity to do so when working with someone.

The Art Of M R F

While there are several factors that go into precision MRF – such as position, direction of monitoring, etc. – the focus of this paper is to look at the *quality* of the application of MRF as defined by the function of the spindle cells, and why it’s so important from a number of perspectives. Still, there are aspects of these other factors that are important to touch upon.



Muscle monitoring originally developed as a means of assessing neurological function to determine where injury occurred. Knowing that the spinal segments each provide neurological enervation pathways to the muscles in a certain area of the body, then determining which muscles in that area are able to “hold” or not against pressure has the ability to identify at what spinal segment an injury occurred. In order to precisely determine this, it is important to isolate, as much as possible, a particular muscle’s action and range of motion. We use the muscle’s anatomy to help figure this out.

Unfortunately, it can get a little more complicated. Some muscles have more than one attachment at each or both end, giving those muscles the ability to have more than one, or a more complex, action. As well, some synergists (muscles that assist in a particular action) kick in close to the

edges of another muscles prime movement and take over as the prime mover, potentially confusing where the range of motion begins and/or ends.

So the trick of monitoring a muscle precisely is knowing how to position it such that its action is as isolated as possible from its synergists, and how to monitor it in such a way (direction) that the specific action of the muscle is challenged while remaining as isolated as possible in this action.

And why is this important? The premise that kinesiology goes by is that each muscle is related to a specific meridian, and we're monitoring that muscle in order to get the energy readout of its related meridian. Therefore, it's important to monitor that muscle in such a way as to negate the synergists as much as possible. This is because we don't want information bleeding in from the synergist(s), whose related meridian(s) is likely different than the one we're trying to get information about!

With this in mind, the initial position of the muscle and the direction of the pressure that challenges the muscle's ability to stay contracted (or extended in some cases) are critical elements in applying MRF.

This is also why the *quality* of the muscle monitoring itself is also so important. If the pressure used is either abrupt or strong enough, it causes recruitment from the synergists, and the premise of the Energy Readout Model is defeated. When done properly, only the agonist muscle

responds, and we get the information we're looking for accurately.

The combination of isolating a muscle and properly monitoring it within its range of motion is the *art* of Energy Kinesiology.

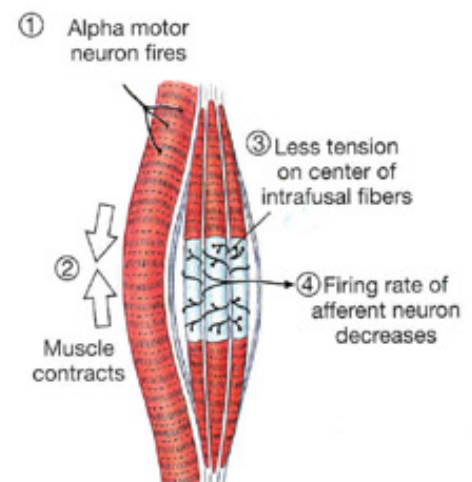
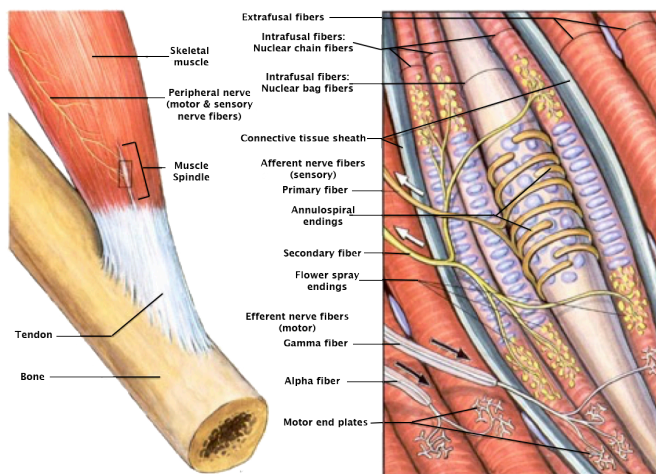
Muscle Proprioception – The Spindle Cells

Muscle spindle cells are specialized units of intrafusal (inner) fibers wrapped in a fibrous capsule deep in the belly of every muscle with their own neurological communication system connected to those fibers.

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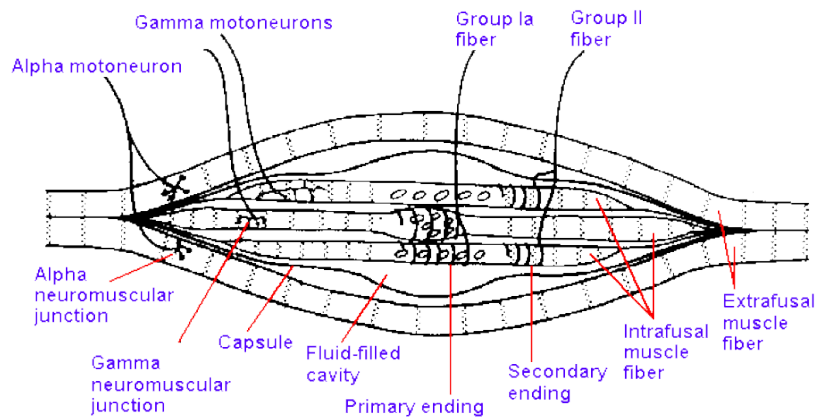
proprioceptors, their function is to detect the state of the muscle – how contracted or extended they are – as well as to the speed that those outer fibers are changing. The spindles then relay this ongoing information to the brain (cerebellum and other areas) through reflexive relay stations at the vertebral level.

In this way, the spindle cell mechanism provides information important for maintaining posture and other activity, as well as important protective information. For example, if a muscle is extending too quickly such that the fibers might tear or the joint becoming hyperextended, the message gets quickly



relayed neurologically and the fibers are told to contract again to stop the hyperextension. As well, the information of how contracted or extended the muscle is, even when not moving, is used to determine how much opposition is necessary from the antagonists (opposing muscles) to maintain a static position (important for posture). In other words, there is an enormous amount of information being relayed from the spindle cells that is critical to posture and movement on an on-going basis – millions of neurological messages every second.

Muscles have several groups of fibers that combine to create movement and resistance. The outer fibers, known as *extrafusal* fibers, are the main workers – they are stimulated by alpha motor neurons, whose messages originate in the motor cortex and are further processed in the spinal cord before exiting to the muscle itself. These fibers are bundled into groups of various sizes (depending on the size of the muscle) – anywhere from 3 to several hundred, referred to as *motor units*. In this way, they are able to receive messages for a variety of levels of contraction and therefore, controlled and refined movement. If only a small amount of movement is needed, a small bundle of only 6



fibers might be stimulated. If more than that is necessary, maybe that bundle of 6 is supplemented with another bundle of 14. If a big movement is necessary, maybe a bundle of 20 is stimulated. And if the whole muscle must contract, then they all get stimulated. With larger muscles, these numbers would, of course, be greater.

Anatomy Of A Spindle

Within the outer layer of *extrafusal* fibers that are getting the alpha messages are other bundles of fibers, the *intrafusal* fibers, that have nerve fibers connected and/or wrapped around them. The ends of these intrafusal fibers attach to the extrafusal fibers. In this way, as the extrafusal fibers extend or contract, they stretch or squeeze the outer portions of the intrafusal fibers.

Intrafusal bundles are smaller than extrafusal bundles, containing anywhere from 3 to 12 fibers per bundle, and are scattered throughout the belly of the muscle. These intrafusal fibers are different from extrafusal fibers in that they have contractile regions at the ends and a non-contractile center receptor area (exactly the opposite of an extrafusal fiber, which contracts in the middle, but not at the ends where they eventually attach to bones as tendons). So when the extrafusal fibers extend or contract, the effect is felt more immediately by the stretching or compression of the ends of the intrafusal fibers.

With enough stimulation (contraction or extension), the central sensory region may get stimulated to send its message through the spindle cell neurology as well.

There are 2 types of intrafusal fibers – nuclear bag and nuclear chain. The nuclear bag fibers are both longer, and wider in diameter in the central sensory portion due to a larger amount of cell nuclei gathered there. There are anywhere from 1 to 3 nuclear bags in each spindle.

Nuclear chain fibers are half the length of a bag, and have nuclei lined up in a row (like a chain). There may be anywhere from 3 to 9 of these in each spindle – roughly 3 times more than bags.

The Neurology Of A Spindle

The neurons that are connected to the spindle cells are not alpha motor neurons, but rather gamma motor neurons.

Additionally, there are 2 types of sensory neurons – Ia and II. This is our main point of focus for this discussion.

Type Ia nerve fibers, also known as the primary ending or *annulospiral* ending, wrap a single sensory fiber around the central (less contractile) portion of the spindle. These endings transmit messages as fast as any sensory nerve in the body, giving a hint at the importance of the messages they send.

Type II nerve fibers are also known as secondary endings or *flower spray* endings because of how they “spray” out many connections to the fiber at their junction. One or 2 of them are found to either side of the type Ia fiber, and connecting to the more contractile ends of the intrafusal fibers.

The primary endings (Type Ia) connect to both types of intrafusal fibers (bags and chains), but the secondary endings (Type II) only attach to the nuclear chain fibers. This offers some clues about their respective functions.

endings connected closer to the extrafusal fiber are thought to be the most involved with the static response. It takes a more significant amount of static (not movement related) contraction or extension to reach and stimulate the center of both types of intrafusal fiber where the primary Type Ia fibers are attached.

(b) Alpha-gamma coactivation with gamma motor neuron activity

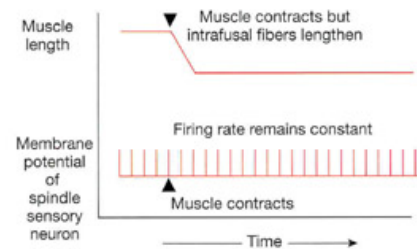
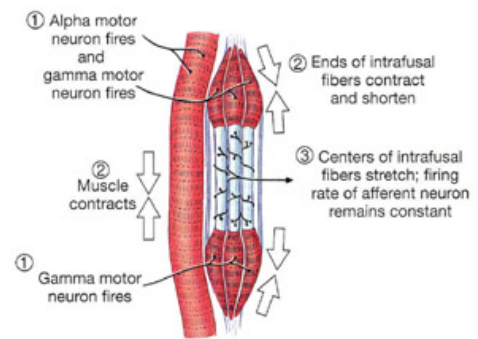
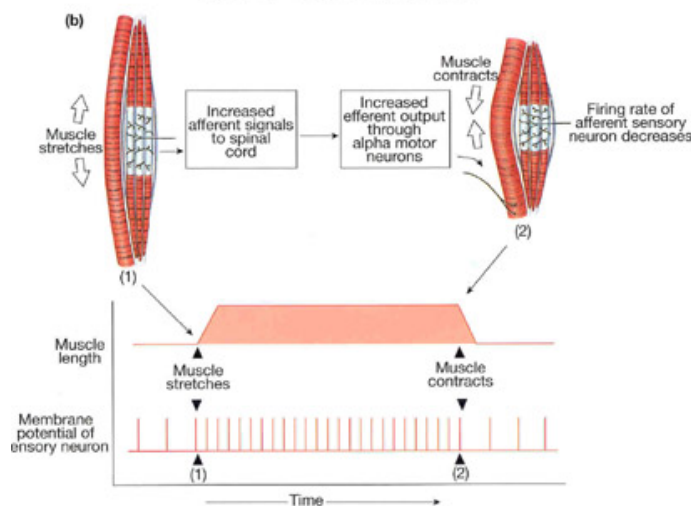


Fig. 13-4b Muscle spindle function



One of the functions of the Type II sensory neurons is the static response. These don't respond to the speed of contraction or extension signals. Instead, it relays messages that have to do only with the **overall length** (or *state*) of the muscle. These messages are sent continuously so the body knows how contracted a muscle is at any time the spindle is stretched. While these signals are sent by both primary and secondary endings, the nuclear chain fibers with their secondary

The dynamic response does both speed and state (length) messages. However, it is only the primary endings that send these messages. Therefore, it is thought that the nuclear bag fibers are most involved in this dynamic response mechanism.

When the length of the spindle changes suddenly, the effect is transmitted through the spindle right to the less contractile center portion. The primary ending is then powerfully stimulated (remember that these are also some of the fastest messages in the body's sensory system). It doesn't matter how big the change is – it might be minuscule – but if it is fast enough, then the nuclear bag fibers will stimulate a message through the primary ending. This message is only sent as long as the stimulation is occurring, contrary to the ongoing message of the static response. There is a brief lag time as the central receptor area adjusts to its new length and the static response receptors reflect that change.

These two different responses (static and dynamic) play a significant role in the feedback we receive – and how accurate it is – when we perform MRF.

The Physiology Of Spindle Responses

If we put the above discussion into practice, we find 2 key functional effects: the static reflex and the dynamic reflex.

In each of these, the messages sent by the 2 responses go to the spinal cord, where interneurons send the messages to the brain (specifically the cerebellum, basal ganglia and cerebral cortex), and also respond to the messages themselves for quicker response. In each case, the response from the interneurons is to do the opposite action of the originating message.

In other words, if the dynamic response is stimulated by fast muscle *extension* (spreading), then the interneuron's response is to powerfully oppose that response by quickly contracting the fibers. This is what is happening when we apply the "spindle cell technique." We translate this as "turning on" a muscle.

Conversely, if a long term stretch is gradually applied such when the static response is invoked, then a slower contraction message is returned from the interneurons. This is what happens when applying pressure to an arm or a leg to challenge a muscle's ability to "hold."

In either of these examples, if the originating message was one of too much *contraction* (pinching the spindles or monitoring a muscle in extension), then a "negative" response of inhibition (relaxing of the fibers) is returned from the interneurons.

Much is still not known about how this mechanism fully works, and all the functions it may be involved with. However, it can be postulated that this complex feedback system is involved in posture (including antigravity responses that allow us to maintain standing positions through ongoing muscle contraction), the constant balance that must be maintained between agonists, antagonists, and synergists for any given movement, and the ability to make refined and smooth movements by all these mechanisms working together properly.

Putting It To Work

Given what you now know, it becomes easier to surmise exactly what you're doing when you use MRF.

When you apply pressure to a muscle to gauge its response and get feedback regarding the muscle/organ/meridian relationship, you do so to see how the muscle responds – it either "holds"

or doesn't. This invokes the *static stretch response* (secondary Type II receptors) – applying pressure that causes a sloooooow isometric contraction (further contracting the muscle with no movement resulting from asking the person to “hold” the position). By applying our monitoring strength *gradually* within a specific muscle's range of motion, we are isolating that muscle's action and making sure the static reflex/response mechanism is functioning properly. It has nothing to do with the strength of the muscle, which is based on the extrafusal fibers' abilities.

In order to further ensure that the response you are getting is accurate and complete, you then challenge the dynamic response by pinching and spreading the spindle cells *quickly* to see if the muscle responds or not. In essence, you are intentionally “tricking” the spindle to think that a fast – and therefore potentially “dangerous” – amount of contraction (pinching) or extension (spreading) is happening to trigger the spinal reflex's opposite response...unlocking the muscle in response to pinching, locking the muscle in response to spreading. (Note: this process and response is reversed when doing MRF on a muscle to gauge its function in extension.)

If a muscle is not functioning properly due to its inability to hold against gradual pressure (static response) and/or determining that the dynamic spindle mechanism is malfunctioning via the pinching/spreading of the muscle, then you've learned something that is dependent on what model of Kinesiology we're working with:

In the energy readout model, you know there is stress in the muscle, and therefore, the flow of energy in its related meridian is perhaps out of balance and/or there may be an issue with the associated organ/gland.

In the indicator muscle model, you are unable to rely on the indicator muscle to tell you what you want to know until you do something to bring it back into balance.

This is an important concept that is often overlooked in kinesiology modalities that use pause lock (circuit retaining mode) to hold stress in the neurology. If the stress being held in pause lock caused the indicator muscle to go out of balance, **then you must do something to return it to being in balance before you look for the next piece of information.** After all, if making sure that your indicator muscle is in balance before you start is critical to know (as it is), then why would that need be any different at any other point of the balancing process?

The Meaning Of It All

For the purpose of this discussion, what this all boils down to is the *quality* of MRF that you're using on your family, friends and clients.

When you were first learning MRF, it's likely that a lot of emphasis was placed on the amount of pressure to use. It is also what most early students of MRF are challenged by. As an instructor for over 3 decades and teaching around the world, I have observed thousands of people in classroom situations, and the most common issues when students are practicing is that one person is “pushing too hard,” or the practitioner person not feeling confident that they're getting correct information because they're not feeling if the muscle is locked or not. This leads to a lot of discussion around the amount of pressure relative to both the comfort of the person on the table, and the confidence of the practitioner performing the MRF.

Related to the confidence is the practitioner's ability to feel a change in the state of the muscle – typically from a lock to an unlock. When this gets questioned, the usual response is to push harder. This is exactly the thing not to do.

The real question is not about the amount of pressure, it's about how that pressure is applied. While the nervous system is very fast in its ability to respond, it still needs that fraction of a second to do so. So the key word in how to apply MRF properly is...

GRADUUUUUAAAAAAAAALLLLLLLYYYYYYYY (Gradually)!

When applied *gradually*, the amount of pressure becomes almost moot. In a properly functioning muscle, the spindles are able to adapt, and the muscle is able to absorb more pressure! This is the static response in action. Yes, the muscle will eventually get tired from continued use of more pressure, but in short amounts – long enough to get a response – it's more about how gradually that pressure is applied.

In then refining your technique, the goal is to feel that a muscle is holding without necessarily applying a lot of pressure – which will become easier to trust and feel as you get comfortable with this approach. This will build your confidence and keep your partners' arms and legs from becoming tired. And as odd it may sound, as you get used to applying gradual pressure, you'll find you can do so more quickly.

As well, when unsure of whether a muscle is locked or not, go *more gradually* as opposed to using more pressure. If a muscle is truly unable to hold a position, the non-activation of the dynamic response – with its often very subtle recruitment abilities (remembering that this is some of the fastest neurology in the body) – will expose the muscle's inability to hold if there's a problem, and the muscle will fail...even on strong, body-built athletes. Another important part of this is proper beginning positioning to make sure the muscle is as isolated as possible to avoid instant recruitment of synergistic muscles.

If applied gradually enough, **a muscle that is able to maintain a "lock" should not move...at all!** If even a slight amount of movement is happening when you perform MRF, and you still are assessing a muscle as being locked, then you are applying your pressure too quickly. This is causing the dynamic Type Ia receptors to send a message that is causing the muscle to briefly unlock. There are two possible outcomes to this...

Because the receiver has been instructed to hold, part of the dynamic response is to recruit other muscles very quickly as the alpha fibers of the muscle being assessed catch up to assist in maintaining the initial position, and the static type II receptors can return to providing feedback about the static state of the muscle. **At this point, you are no longer getting accurate feedback regarding that muscle as it relates to the energy readout model and its relationship to its organ/gland/meridian**, because the surrounding synergistic muscles may very well not be related to same organ/gland/meridian. And if you're assessing physical injury in an area, then you may be missing an important part, thinking it's OK when it's not, regardless of the organ/gland/meridian relationship.

The other possibility is that it's simply taking a moment for the spindle's to adapt, and the muscle locks when they've caught up a split second later. This may be the result explained in the previous paragraph, and there is potentially another issue as well. By moving to where it has before locking, the muscle is now in another part of its range of motion. As discovered by Richard Utt, L.Ac., founder of Applied Physiology, when a muscle provides a different response elsewhere in its range of motion, it is related to a different relationship of that muscle's meridian to other other meridians. Therefore, it is no longer providing the information associated only to the muscle's own organ-gland/meridian triad as determined by Goodheart. **At this point, you are no**

longer getting accurate feedback regarding that muscle as it relates to the energy readout model and its relationship to its organ/gland/meridian.

As you can see, neither of these is ideal, and you no longer can be sure of exactly what you're working with. When you monitor a muscle artfully, with gradual pressure such that a locking muscle has no movement whatsoever and responds properly to spindle cell manipulation, then you can be confident that you are working with the muscle in the way it is intended – as an accurate energy readout or a properly functioning indicator muscle.

Conclusion

As a result of the above discussions, you see that the neurology of a muscle provides you with a lot of information that affects how you, as an Energy Kinesiologist, do what you do. The position you place a muscle in, and the *quality* of the pressure you use (gradual), are critical to the accuracy of the information you obtain through the use of MRF. When you move outside of the boundaries of the actual neurology of the body, you no longer can be sure of what information you're getting.

If Energy Kinesiology is to become well regarded in the mainstream of the healing arts, then awareness and consistent application of these principles is important. This means consistent instruction of these principles as well.

You have now seen how muscle spindle cells actually work, an important part of muscle neurology that you use on a regular basis. Now that you know how they function, it becomes important again to use them properly, in a neurological manner. If the spindle cells are not pinched or spread in the direction of the fibers, or if enough pressure to actually push into the belly of the muscle and activate the spindles is not used, then the message is not being sent. If these guidelines are not being followed, but muscle changes are being observed, then it is not the neurology that is causing that. Neither is it intent, as many often offer as a reason. Rather, it is the expectation of the practitioner, instead of the actual neurology of the client, that is influencing the outcome, and thereby doing the client a dis-service.

If Energy Kinesiology is to become well respected, then the tools we profess to use must be used properly so that the results can be explained. Otherwise, one must wonder why we even use these mechanisms if we use them improperly while claiming they are the basis of what we do.

Energy Kinesiology is the use of MRF as the voice of the body/mind – and beyond that, the *living matrix*. As such, it provides you with an incredibly useful tool to assist others in their healing process by identifying blockages to healing and letting the body indicate what will work best for unblocking those blockages.

By learning how this tool works and honoring the principles of the underlying neurology as a means of getting accurate information, your understanding of what that information means and your confidence in the responses you are getting through MRF will increase dramatically.

If you take the time to adopt this approach – and it does take time and conscious effort – you will benefit, your clients will benefit, your students will benefit, and the profession will benefit. It's a win across the board!

Adam Lehman, En.K., has been in love with Energy Kinesiology and related healing arts for more than 3 decades. He is Director of the Institute of BioEnergetic Arts & Sciences in Fort Collins, Colorado. Adam travels around the U.S. and internationally, giving talks and teaching workshops in the art and science of MRF and its application through integration of related healing arts modalities. He is the developer of the Holographic Explorer series based on MRF (including Holographic Touch for Health), and creator of the online Integrative Wellness Facilitator Program (IWFT). Adam is also a HeartMath® Trainer and Practitioner.

Bibliography

Guyton, Arthur C. Textbook of Medical Physiology, 8th ed. 1991

Utt, Richard Stress: The Nature of the Beast, 1984

Lehman, Adam Notes from various Anatomy/Physiology classes and workshops

Internet through Google