THE PHYSIOLOGY OF MUSCLE TESTING - HOW MUSCLE MONITORING WORKS, AND WHAT IT CAN TELL US ABOUT HOMEOSTASIS OR PHYSIOLOGICAL BALANCE IN THE BODY.

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Introduction:

What is muscle testing? Sounds a simple enough question that I'm sure most of you have heard before. You may have found, however, that the answer was not so easy to come up with! You may answer that a positive muscle test is one in which the muscle being tested is "strong" and a negative muscle test is one in which the muscle being tested is "weak". But what does a muscle being strong or weak mean?

Below is an explanation of muscle testing and how much information just testing a single muscle can give. Muscle testing as employed in Touch for Health (TFH) and other types of Kinesiology originated with Kendall and Kendall, two academic kinesiologists in the late 1940s (1). They developed test positions for a number of muscles of the limbs and trunk that isolated, as much as possible, the action of one muscle in contraction as "**prime mover**" - the muscle with the optimal mechanical advantage in that position. By applying manual pressure to the limb or other body part in that test position, the integrity of response of that "prime mover" could be evaluated. If the muscle could not resist the pressure, indicating loss of full neurological integrity, they developed a relative scale from 0, or no resistance (flaccid paralysis) to 5+, or full lock.

Dr George Goodheart, a Chiropractor from Michigan, USA, developed manual muscle testing further in the 1960s by elucidating the relationship between specific muscles and organs, glands and meridians. The system of diagnosis and correction he developed based on muscle testing he called Applied Kinesiology (A.K.). Indeed, it was from A.K. that all other types of Kinesiology developed. Since John Thie developed Touch for Health in the early 1970s (2), the art of muscle testing has been taught to thousands of lay people. Several of these people then went on to develop various other forms of Kinesiology (One Brain Kinesiology, Educational Kinesiology, Biokinesiology and Applied Physiology to name but a few) (3).

The basis of all these kinesiologies, except One Brain and Applied Physiology, remained the single position muscle testing developed by Kendall and Kendall as modified by Dr. Goodheart (4). In single position muscle testing, the "prime mover" is placed in the fully contracted position and a consistent pressure is steadily applied in the direction of extension. If it held against the pressure demonstrating full neurological integrity, it was said to be "strong". If, on the other hand, the muscle could not develop full neurological integrity of response and gave way in the direction the pressure was applied, it was said to be "weak". While a strong muscle is easy to "feel", it is difficult to describe in quantitative

terms. A weak muscle may even be difficult to "feel" until you have practiced enough to get a "feel" for the range of responses produced by the loss of full neurological integrity. This is why you often hear people describe it as the "Art of Muscle Testing". Nevertheless, once you have developed the "feel" of a weak muscle, anyone can accurately test for the integrity of muscle response using manual Muscle Testing.

While some kinesiology systems continue to call the feedback from the muscle, Muscle Testing, in Applied Physiology, and increasingly in other types of kinesiology, this biofeedback aspect of the muscle response is being called Muscle Monitoring. In this paper the term Muscle Monitoring (MM), rather than muscle testing will be used when referring to the various stress responses of a muscle in kinesiology.

Muscle Strength: strong and weak:

A few comments on the neurology underlying Muscle Monitoring to dispel a few commonly held myths about what it is and what it is not. **The first thing a MM is not an evaluation of muscle strength. When a muscle holds during MM, it is not strong. Likewise when a muscle gives during MM it is not weak**. Even though AK continues to use the terms "weak" and "strong" to describe muscle response during their muscle testing (5), neurologically this is simply not an accurate description of what is happening during MM in current kinesiological practice. When a muscle holds during MM, the muscle has "locked" because the level of neurological information flow between the muscle and the central nervous system (CNS) is sufficient to maintain muscle contraction in opposition to the pressure applied. If the muscle gives during MM, the muscle "unlocks" or just can not maintain the "locked" state because of insufficient neurological flow between the muscle and the CNS.

Muscle strength, on the other hand, is based on the number and size of muscle fibers in a muscle. This is usually measured in the weight that can be lifted by that muscle or force that can be exerted by the muscle (e.g. as measured on a dynometer). A "strong" muscle is one that when "locked" can hold against a large weight, while a "weaker" muscle is "over powered" by the same weight even when all muscle fibers are "locked". Thus, the "weaker" muscle can still "lock", that is, maintain sufficient neurological flow to hold against all pressures below that which over powers it. An "unlocked" muscle, however, can not maintain sufficient neurological flow to hold its position even at pressures far below that which are needed to over power it. Therefore, the use of terms "strong" and "weak" with respect to muscle testing are totally misleading conceptually and incorrect neurophysiologically.

Reciprocal Facilitation/Inhibition: Locking and Unlocking.

Before further discussion of the nature of muscle testing, it is important to briefly discuss muscle function in general and the neurology of muscle "locking" and "unlocking" in greater detail. The fact that muscles turn on or "lock" and turn off or "unlock" is the basis of all movement, and happens millions of times a day as you move about. All muscles in the body with only a few exceptions (the diaphragm being one) are arranged in **antagonistic pairs** of muscles that oppose each other's action. This arrangement of muscles is called **reciprocal facilitation/inhibition** because whenever one of the pair is facilitated or turned on, its antagonist (or antagonists as there may be several) is automatically

inhibited or turned off (6,7). Hence, the turning on or "locking" and turning off or "unlocking" are both normal states of muscle function that happen all the time.

But, what happens when a muscle "locks" during muscle testing? Neurologically, signals are sent to the "**prime mover" (PM)** to hold the position the body part was placed in by facilitating (turning on) the PM. Then as the pressure on the body part (e.g. arm held horizontal) is increased during MM the muscle sensors (spindle cells) in the PM respond by a spinal reflex arc called the "load reflex" to increase the degree of PM contraction, while at same time inhibiting their antagonists and facilitating synergists (7). Synergists are muscles that help the PM in holding the arm up, but are not in their position of optimal mechanical advantage, so they contribute much less than the PM to establishing and maintaining this position. A muscle circuit then, is the PM and all other muscles, both synergist and antagonists, to which it is "wired" both at the level of the brain and spinal reflex arcs. The concept of muscle circuits is discussed more fully below.

Information on this response is also sent to subconscious parts of the brain (e.g. the cerebellum, thalamus and Basal Ganglia where comparisons of intended response and actual response are made (7). If the intended action was to keep the arm horizontal, but it is now actually moving downward due to the increasing pressure of the test, these brain centers will order additional contraction of the PM to offset movement and the arm will remain horizontal. As long as this flow of information from muscle sensors to and from the brain and CNS remains "clear" with no interruptions, the muscle will "lock" and maintain its "lock" under continued loading till it reaches its full power of contraction. If loading continues above this point the arm will move down as the PM is "over powered" by the downward pressure.

Recruitment:

It should be noted that until nearly full contraction of the PM, it is the only muscle "facilitated" (turned on) to any degree. As the load on the PM approaches its limit of contraction, its synergists are then increasingly facilitated, a process call "**recruitment**". However, in properly conducted MM, the load on the PM should never exceed about one third of the power of the muscle, and thus recruitment of synergists is minimal. This also explains why it is easier to "recruit" muscles in addition to the PM when MM is done too vigorously. If you observe someone you are muscle monitoring "recruiting", lighten up the pressure, as the lighter the pressure, the more difficult it will be for them to recruit muscles in addition to the PM. Since the PM has the optimal mechanical advantage in the correct monitoring position (a reason for paying attention to where you place a limb during MM) and you are applying far less force than needed to over power the PM, a muscle with full neurological integrity will "lock" during MM. That is, unless something interferes with the neurological flow of information between the muscle and the CNS, the muscle will be "facilitated" sufficiently to maintain its physical position even under increasing load during MM. This "locking" indicates a muscle in "balance" with its neurological circuitry.

Under-Facilitated, NOT Weak:

However, should any factor disrupt or interfere with this free flow of information between the muscle and the CNS, the muscle will not be able to co-ordinate and match its degree of facilitation to the increasing loading taking place during MM. The arm will then move downward appearing to give under the monitoring pressure, resulting in an "unlocked" muscle. Thus, a muscle that is monitored and found to "unlock" is "under facilitated" relative to the pressure being applied. Note that, whilst the muscle may appear "weak" (e.g. giving under the monitoring pressure), it is not "weak" but just not being "facilitated" sufficiently to resist the test pressure.

"Weak" as it refers to muscle strength has nothing whatsoever to do with an unlocking muscle as found in muscle monitoring, but rather only with the amount of force required to "over power" the fully facilitated muscle as discussed above. Since properly conducted MM never fully facilitates the muscle (and certainly should never, never overpower the muscle), **an "unlocking" muscle is NOT WEAK! It is just "UNDER FACILITATED".** That is why you will many times find little difference between a "locked" or "unlocked" muscle in the force required to "overpower" it. Particularly if the force is applied rapidly such as lifting a heavy weight, or by forceful MM.

Proper Muscle Monitoring Technique:

In properly conducted MM, therefore, the degree of facilitation (turning on of contraction) of the muscle is matched by the CNS against increasing load not exceeding about one third of the muscle power. If the muscle is able to maintain sufficient coherent facilitation to hold the arm in the desired position under pressure that is increasing evenly, the muscle has **"locked"**. On the other hand, should the information flow between the muscle and the CNS not be able to maintain facilitation equal to the rate of increase in pressure applied during the test, the muscle will move in the direction of pressure or be **"unlocked"**.

Muscle Circuits:

When monitoring a muscle in a single position, usually the optimally contracted position, MM can only tell you two things: that the muscle was facilitated/locked or under facilitated/unlocked. As useful as this information may be it is only a part of the story the muscle has to tell. The rest of the story is only told when the rest of the muscle circuit has been investigated (8).

Each muscle in the body has antagonists (usually more than one) that oppose its action. The agonist or PM and its antagonist/s are neurologically wired together via the spindle cells in the belly of these muscles such that when a PM is facilitate (turned on) it sends signals to automatically inhibit (turn off) its antagonist/s to the same degree it has been facilitated, and at the same time facilitates its synergists. In this way, the limb moves in the direction of contraction, unopposed by its antagonist/s, permitting smooth and rapid movement of the limb. Likewise, facilitation of an antagonist will inhibit the PM, as the spindle cells of the antagonist/s need to inhibit the PM in order to move the limb in the opposite direction from the action of the PM. Therefore, a complete muscle circuit includes the Prime Mover, its synergists, and its antagonists on both sides of the body

Why on both sides of the body? Because the muscles of the arms and legs are reciprocally linked by the Gait mechanism. That is, when a PM on one side of the body is being facilitated, its mate on the opposite is being inhibited. Just think of walking! If the right anterior deltoid is facilitated moving the right arm forward, the left anterior deltoid is inhibited so the left arm may be pulled backward by its antagonist/s.

Contraction and Extension Monitoring:

To learn more of the story that muscle has to tell us, the PM should be monitored not only in contraction (as in a typical TFH muscle test), but also in extension. That is, the muscle should be monitored first in its position of optimal contraction (pressure from contraction toward extension) and then again from its most extended position toward its contracted position (pressure from extension toward contraction)(8).

Contraction monitoring evaluates the balance of the neurological flow to and from the sensors in the PM, while the extension monitoring evaluates the balance of neurological flow to the antagonist/s as controlled by the sensors in the PM. Since both flows, to and from the PM itself and to its antagonist/s, are both part of the same muscle circuit, the state of "balance" within the PM and the PM's relationship to its antagonists needs to be evaluated to know if the complete muscle circuit is in "balance".

In extension monitoring, the antagonist/s may either "lock" or "unlock". However, an "unlock" here does not mean that the antagonist/s are "under facilitated", but rather, that the PM is "over inhibiting" its antagonist/s. When the PM is actively contracting, it should strongly inhibit its antagonist/ s as discussed above. However, even when the PM is in its fully extended position, the PM maintains a slight level of contraction to maintain its "tone". This tonal contraction of the PM in extension creates a small level of inhibitory output to its antagonist/s, but it should not be sufficient to prevent the antagonist/s from becoming fully facilitated, and thus "locking" when the muscle is monitored in extension. Even though you are not monitoring the antagonist/s in their optimal position/s of contraction, but rather, relative to the extended position of the PM, the antagonist/s should be able to develop a full "lock" as long as the inhibitory output of the PM is within "normal" levels. **Should the level of contraction in the PM in its extended position exceed normal homeostatic levels, however, then the PM will begin to "over- inhibit" its antagonist/s. The antagonist/s will then "unlock" when monitored with the PM in extension**. While the PM may monitor in balance in contraction, it may nevertheless be over-inhibiting its antagonist/s, creating a significant imbalance in the muscle circuit as a whole. **Extension Monitoring, therefore, is really a read-out of stressors "hidden" in a part of the PM's circuitry that is NOT Monitored by contraction monitoring alone!** Nevertheless, these hidden stressors can affect the function of the PM, and more importantly, reflect underlying imbalances in the Organ/Gland-Meridian complex associated with that muscle.

Muscle-Organ/Gland-Meridian Relationships:

At this point two additional factors need to be considered. The first is the muscleorgan/gland-meridian relationship and the second is the type of "read-out" the MM is intended to provide. AK developed the

relationship between certain muscles in the body and corresponding organs and/or glands and the meridian energies affecting and affected by these organ/glands. The Chinese labeled the meridians by organ names (e.g. Heart meridian) or gland (e.g. Triple Heater referring to thyroid and adrenal glands) because they recognized that the meridian energies represented "qualities" that supported the function of the related physical structures in the body. **The "quality" of the "organ" in the Chinese view encompasses far more than the Western concept of organ as a physical, physiological structure**. Besides the physical/ mechanical organ of the West**, in the Chinese concept each "organ" also includes a related tissue group, a related sense organ, a related emotion, and a network of channels for directing energy flow (the associated meridian)** (9). You may consult your TFH Law of 5 Elements chart for these associations (the concentric circles in the lower middle). Thus, **Chinese organs for which the meridians are named are NOT organs per se, they are complex networks of relationships and function**.

Goodheart added specific muscles to this relationship, such that the state of "balance" in this network of relationships and functions (including the function of Western organs) was reflected by the state of "balance" in specific muscle circuits. Thus, the balance in the Stomach meridian not only affects and reflects the balance of energy flows, but also the physiological functions of the stomach organ and the balance of several muscles in the body (e.g. the pectoralis major, clavicular division, biceps, neck flexors and extensors etc.). Goodheart noted these relationships early on in AK. For instance, when the PMC monitored “unlocked” or "under facilitated", he found there was often stomach dysfunction (e.g. an ulcer), and when the Tensor Fascia Lata monitored "under facilitated", there was often large intestine (colon) dysfunction etc. Therefore, a muscle circuit evaluated by MM may give us a "read-out" of "stressors" affecting the associated organ/gland/meridian as well as imbalances within the muscle circuit itself.

Stressors and Muscle Monitoring:

A muscle may "unlock" whenever a "stressor" is present in this interrelated system. Importantly, the muscle response is a general one not dependent upon the nature of the "stressor". Any "stressor" of sufficient magnitude in any of the related systems, organ, gland, meridian or muscle, will interrupt the neurological flow between the muscle and the CNS resulting in an "unlocked" muscle. For example, the stress of a kidney stone may disrupt the coherent information flow to the psoas or related Kidney meridian muscles causing them to test "under facilitated". Or, the emotion of fear may disrupt the same information flow resulting in the same "under facilitated" response of the psoas upon muscle monitoring. Likewise, an "under energy" condition of the kidney meridian will also result in an "under facilitated" psoas muscle. *Indeed, one of the things that makes Muscle Monitoring so useful is that its response to a stressor is not specific, but rather general, allowing the muscle to “indicate” a wide range of stresses*.

Muscle Balancing:

When doing a 14, 14+ or 42 muscle balance, it is precisely these organ (in the Chinese sense) responses that are being evaluated. The different correction techniques (e.g. Spindle, NL, NV, ESR) restore balance to the system or function affected by stress in the muscleorgan/gland-meridian complex. The

"unlocking" muscle signals "stress" in some component of this complex. Challenging each part of the complex by circuit-locating the NL, NV, ESR points, meridian end points etc. defines the nature of the imbalance and the type of correction to be employed. In TFH muscle balancing you are using the response of the muscle monitored as "read-out" of the state of stress only in the muscle-organ/gland-meridian complex directly associated with this muscle function.

Indicator Muscle: a "Clear" Circuit Required.

However, MM is often used in more advanced TFH classes and techniques and in other types of Kinesiology in quite another way, as an "indicator" of stress in general. In this case, the muscle is not just being used for its specific organ/gland/meridian association, but rather as an "indicator muscle" to evaluate stressors at any site or in any system in the body. This often involves circuit-localization (CL) i.e. touching a specific point on the body, or other techniques that tie the "indicator muscle" to the function/ site being evaluated. When using a muscle as an "indicator", it is important, if not essential, to be sure that the whole muscle circuit is "clear" with no hidden stressors. Hence, the muscle must be monitored for all states of potential stress or imbalance by MM both in contraction and extension.

The stressors "hidden" in the extension part of the circuit do not matter as much in Muscle Balancing as they do when the muscle is being used as a generalized "indicator". Although there may be an imbalance in one part of a muscle circuit that went undetected with standard TFH monitoring procedures (contraction monitoring only), during Muscle Balancing, corrections down the line may well rectify these "hidden" imbalances. When using the muscle as an "indicator" on the other hand these "hidden" imbalances in the muscle circuit may often compromise the "accuracy" of the response as they may be interactive with the stressors being evaluated. Therefore, to use an "indicator muscle" as a reliable "read-out" of stress in any system other than the specific one to which it is directly connected by the underlying muscle-organ/gland- meridian relationships, it is essential that the complete "muscle circuit' be cleared of stressors that may affect the coherent function of any part of that circuit. **If the full muscle circuit of an "indicator muscle" is NOT cleared of all "active stressors" the accuracy of the information obtained from it is always in doubt.**

Seven States of Muscle Response: The First Three States - Homeostasis, Under-Facilitated, and Over-Inhibited:

The concept of a muscle circuit that included monitoring in both contraction and extension was first developed by Richard Utt, the founder of Applied Physiology. Richard recognized that there are really 7 states of muscle response that can be evaluated by muscle monitoring not just "locked and unlocked". The first is the **"balanced or "homeostatic (H)" state** of muscle function in which the muscle has "clear" neurological flow with the CNS and can "lock" when monitored in all positions. The second type of muscle response is the **"underfacilitated (UF)" state** in which a "stressor" has interrupted the neurological flow between the PM and the CNS. These first two muscle states are the **only** muscle responses assessed by single position muscle monitoring. The third type of muscle response is the **"overinhibited (OI)" state** in which a "stressor" has caused an excess of inhibitory flow from the PM to its antagonist/, as discussed above.

Two States of Flaccid Paralysis:

Two other types of muscle response result from actual damage to the nervous system causing the state of flaccid paralysis in the PM or its antagonist/s. In this case, either the PM or its antagonist/s can not be facilitated to even move the limb or other body part into the monitoring position. Indeed, these two states of flaccid paralysis in contraction or extension are evaluated by the inability to establish the monitoring position.

Over-Facilitated and Over-Inhibited States:

The remaining two types of muscle response, the **"over-facilitated (OF)"** and **"underinhibited (UI)"** states of muscle balance are the most subtle and difficult to evaluate. *Both of these muscle states "appear" to be in balance as indicated by a "locked" muscle when monitored in contraction or extension. However, both represent highly compensated states of response usually resulting from chronic imbalances*. In the "over-facilitated" state, spindle cell or Golgi tendon sedation of the PM **do not** cause the PM to "unlock" as they would in a "balanced" muscle. In the "under-inhibited" state, spindle cell or Golgi tendon tonification of the PM **do not** inhibit the antagonist/s of the PM, and the muscle remains “locked” in extension.

While only Applied Physiology and One Brain Kinesiology initially recognized the OF and UI states of muscle imbalance, the importance of these two states of muscle imbalance are being more widely recognized in many types of kinesiology today. When recognized, a wide variety of terminology has been applied, such as frozen muscles, blocked muscles, jammed muscles, etc. Physiologically, however, they are “over facilitated” and represent a compensated “under facilitated” condition. If a muscle is demonstrating an “unlock” due to a physiological stress in a component of the Muscle-Organ/Gland-Meridian Complex, and this stress persists over time, the body will compensate for this stress to try to re- establish the best balance it can. Energetically, this unlocking muscle represents an “under energy” condition which is compensated for by the meridian system under stress “borrowing” energy from one or more of the other meridians to “make up the difference” so to speak. This compensating “borrowed energy” will relock the muscle by putting it into an “over energy” state resulting in an “over facilitated” muscle response. The end result is a state of compensation in which the muscle is now in a “Balanced/ Imbalanced” state that is more functional than the overtly “Imbalanced” state of under facilitation.

In both the OF and UI states of muscle imbalance, the PM or antagonist/s monitor as if the muscle is balanced, e.g. the locking homeostatic state. However, unless the PM can also be under facilitated by sedation, a muscle that "locks" when monitored in contraction may mean two quite different things. It may mean that the muscle being monitored is indeed in a balanced homeostatic state. On the other hand, the muscle being monitored may be compensating for chronic imbalance in the muscle-organ/gland- meridian system associated with that muscle by going into the state of over facilitation. The same is true if tonification of the PM does not cause an inhibited response in the PM's antagonist/s upon extension monitoring. Again, this may indicate either a balanced or chronically compensated imbalanced state.

Homeostasis and Stress: The Balanced State.

To understand the meaning and significance of the OF or UI states of muscle imbalance a brief discussion is necessary of homeostasis and the nature of compensations the body makes to maintain homeostasis in the face of chronic stress. Homeostasis is an integrated response of the body to maintain all bodily functions within narrow limits around the "optimum levels of function" (6). When a "stressor" drives a response towards these limits (either + or -), the body responds by changing some physiological function to bring the response back towards the "optimum" level. Because all systems in the body are in a state of "dynamic equilibrium", the actual level of each physiological response in the body varies about this "optimum" level over time. As long as the level of response remains within these narrow limits the system is said to be in a true state of homeostatic balance and the body functions normally. Occasionally a strong "stressor" will push the level of response outside homeostatic limits, creating a state of "distress" in that system. Immediately the body responds by altering physiological function/s to bring that response back into normal homeostatic limits. If it is successful, the "distress" is relieved and the body re- establishes normal function and homeostasis.

For instance, normally the secretion of acid in the stomach is kept within narrow limits such that there is sufficient acid for digestion, but not enough to harm the mucosa lining the stomach. However, on occasion, many people may experience the "distress" of an acid stomach in which case the level of acid secretion has exceeded normal homeostatic limits. The "stressor/s" causing this over secretion of acid (the distress) may have been a bout of worry and anxiety over a financial or relationship problem (emotionally based), or perhaps due to the choice of inappropriate levels and/or kinds of food and drink. If the "stressor/ s" creating the "distress" are resolved (e.g. you won the Lottery or found your true love, divorced, etc.), normal acid secretion will be re-established and the pain of the excess stomach acid will be just a memory. If someone was repeatedly monitoring your PMC, the muscle related to stomach function/ energy, they would probably have found it to test in balance when your acid levels were within homeostatic limits. As soon as the stressor/s had created a state of "distress", the PMC would most probably monitor "unlocked" or UF. The PMC would continue to test this way until the stressor/s had been resolved, at which time the PMC would again "lock" as levels of acid secretion were once more within homeostatic limits.

If the "distress" is too far outside the homeostatic limits, or if it continues for too long at high levels, the body can not successfully compensate, and a conscious high level of "distress" called Sickness or Disease results. Sickness usually results from "distress" that rapidly exceeds the Homeostatic Limits to too high a level. Disease, on the other hand, usually denotes a "breaking down" of compensations from prolonged levels of "distress". Therefore, a raging viral or bacterial infection makes us "Sick", while we may take years to develop "Heart Disease".

Resetting Homeostatic Limits: The State of "Balanced/Imbalance".

However, if you were **not** successful at resolving the "stressor/s" in the short term, the body often compensates for long term stress by "resetting" the homeostatic limits upward toward the level of "distress", while at the same time reducing the level of distress. Hence, what was an acute "distress" in the short term has now been compensated for by altering the homeostatic limits to "less optimum levels", but with lower levels of distress in the long term. The net result of the compensation of

resetting homeostatic limits to less optimum levels is less efficient physiological function and more stress on related systems that are supplying the energy to compensate in the stressed system.

To continue the example of over secretion of acid in the stomach, as long as the levels of acid secretion remain outside "normal" homeostatic limits, related systems in the stomach would also have to be altered to reduce the damage of this too acid state. For instance, more stomach mucosal cells (the cells lining the stomach) may need to be produced and the levels of protective mucus they produce would have to be significantly increased. This is not to mention the additional work of constantly producing more stomach acid than needed for digestion. This increased workload to compensate for the over secretion of acid would, therefore, require additional energy output from a number of related systems throughout the body.

Basically the body has created a state of "balanced/imbalance" as a compensation for long term unresolved stress. If the homeostatic limits were not "reset" too far from the optimum level, this state of "balanced/imbalance" may persist for years. The person still functions well enough that all symptoms remain sub-clinical (e.g. you may be aware of them, but not enough to make you "sick"). Once the body had established a state of "balanced/imbalance" with respect to acid secretion levels, the PMC may once again test "locked". This "lock" would not be reflecting true homeostatic balance, but rather the compensated state of "balanced/imbalance". You would also find that it is not a true "lock" but an "overfacilitation". That is, if the PMC was sedated, it would continue to "lock". You may also find that while the PMC would “lock” in extension, tonification of the PMC would not “unlock” its antagonist/s. Thus, OF and UI states represent the body's way of notifying the monitor that it is doing its best to compensate for a long term imbalance created by, as yet, unresolved "stressor/s".

When you investigate the complete PMC muscle circuit on someone with a peptic ulcer, you will quite often find that the PMC "locks" in contraction, but monitors "over-facilitated". The antagonist/s may also monitor "under-inhibited" or "over-inhibited" by the PMC as well, suggesting that these long term chronic stresses in the stomach have created additional compensations in other related systems. Since only single position contraction monitoring is used in AK, Walther (5, p. 14) states that "the muscle/organ/gland association should not be considered absolute. An individual may have a gastric ulcer confirmed by radiology but the PMC may not test weak". However, because the person’s PMC was not monitored for “over facilitation”, the strong muscle test may not be indicating balance, but rather, compensated imbalance. I personally have never found a person with a confirmed peptic ulcer whose PMC did not show at least one and usually several of the following imbalances: under-facilitation, over-facilitation, under-inhibition or over-inhibition. Most often it will monitor OF or UI and, not uncommonly, both, while it will very often not test UF or OI. Why? Because peptic ulcers are chronic long term problems for which the body has ample time to compensate!

Return to Homeostatic Balance: The Resolution of Stress.

Without monitoring the whole PMC circuit, valuable information on the state of balance of the stomach muscle-organ/gland-meridian system will be missed. **More importantly, you can only correct "imbalances" that you have found!** Once you have located and corrected all imbalances within the PMC muscle circuit e.g. rebalancing all UF, OF, OI and UI states of imbalance, you will often observe a

concomitant improvement in stomach ulcers. As "balanced/imbalanced" states of function are eliminated from the body , the body appears to respond by "resetting" the homeostatic limits back to "optimum levels of function'. This is perfectly reasonable if you realize that it was only unresolved stress that pushed the homeostatic limits away from optimal levels in the first place, and prevented them from returning to these optimal levels long ago!

Significance of the State of Balanced/Imbalance indicated by OF and UI States of the Muscle.

Hans Selye won the Nobel Prize for his discovery of the Generalized Adaptation Syndrome (GAS). Selye found that the body responds to a wide variety of stressors (temperature, acid, mental stress, infection, etc.) with a generalized response not dependent upon the nature of the specific stressor. He observed that the time course of the GAS had three distinct stages: **Stage 1- Alarm Reaction, Stage 2- Stage of Resistance, and Stage 3- Stage of Exhaustion** (11). In the Alarm Reaction, the body is in "distress" as various parameters are driven outside normal homeostatic limits. If the "distress" persists over time, the body undergoes adaptations to develop resistance to the stressor, but at the expense of energy expenditure and efficiency. However, the body can not maintain this extra energy expenditure indefinitely, and eventually will enter the Stage of Exhaustion as the compensations offering the resistance begin to breakdown. The end of the Stage of Exhaustion is Death! These Stages of Stress can be represented graphically.

These Stages of Stress are indicated by specific types of muscle imbalances. **Stage 1 Stress of the Alarm Reaction is registered by UF and OI states of muscle imbalance**. Even though the Stage of Resistance represents a successful adaptation to the on-going presence of the stressor, indicated by the balanced/imbalance state of the indicator muscle, it must be recognized that this is a compensated state, not a state of true balance. **Stage 2 Stress of Resistance is a compensated state indicated by the OF and UI "balanced/imbalance" states of the muscle**. All compensations take energy to sustain and are less efficient physiologically than normal homeostatic balance. It is like borrowing from Peter to pay Paul, because at some point Peter has to be paid back, and if the borrowing has gone on for too long or at too high a level, you may be bankrupted trying to pay Peter back. Likewise in the body, if Stage 2 Stress goes on for too long, the systems supporting the compensations needed for resistance begin to break down leading to the Stage of Exhaustion. Likewise, **Stage 3 Stress of Exhaustion is also uncompensated and registered by UF and OI states of muscle imbalance**. Therefore, by being able to directly monitor for Stage of Resistance Stress by identifying the OF and UI states of muscle imbalance, we are able to balance for these compensated states within the body. This allows us to move the body back within normal homeostatic limits, and hopefully further from the Stage of Exhaustion. **This clearly has tremendous significance in helping people to return to more optimal levels of health!**

The Significance of Clear Circuit Muscle Testing:

A "clear" balanced muscle circuit, therefore, is one in which a "lock" is observed in both contraction and extension monitoring and one in which the "locked" muscle can be under facilitated by sedation of the PM in contraction monitoring and the "locked" antagonists can be unlocked by tonification of the PM in extension monitoring. *A muscle demonstrating any imbalanced state, (e.g. UF, OF, UI or OI) can*

not reliably be used as a generalized "indicator" muscle. Perhaps more importantly, the muscle will NOT be able to "indicate" many imbalances "hidden" in these OF, UI, or OI states of muscle response.

Therefore, if only single position contraction MM is utilized, the presence of any or all of these states of imbalance may well obscure significant information. Remember that the body is in a state of "Dynamic Balance" that constantly creates fluctuating states of imbalance. For instance, your PMC "indicator" may be in a balanced state in the "clear" when not thinking of anything in particular. But the minute you are asked to think of your Mother, it may very well (and often does) go into an "over-facilitated", rather than the more obvious "under-facilitated" state. Using only single position contraction monitoring, this important response to this question would be missed, and the monitor would incorrectly assume that thinking of your Mother was not stressful for you because the muscle stayed "strong"! Since the purpose of muscle monitoring is to evaluate and correct "stressors" in the muscle-organ/gland-meridian system, much of the total story MM can tell us may be lost unless an indicator muscle is "cleared" of all UF, OF, UI, and OI imbalances in all four monitoring positions - contraction and extension on both sides of the body.

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- One Brain Kinesiology - part of a program encompassing a number of workshops involving dyslexia correction and emotional stress defusion skills.

- Educational Kinesiology (Edu-kinesthetics in the US) - a program developed by Dr. Paul Dennison and Gail Hargraves for the detection and correction of learning problems.

- Biokinesiology - a program developed by Dr. John Barton and further developed by Dr Wayne Topping for the detection and correction of stress related physiological disorders.

- Applied Physiology - an integrated program and a number of advanced Workshops for the detection and correction of stress induced physiological disorders.

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