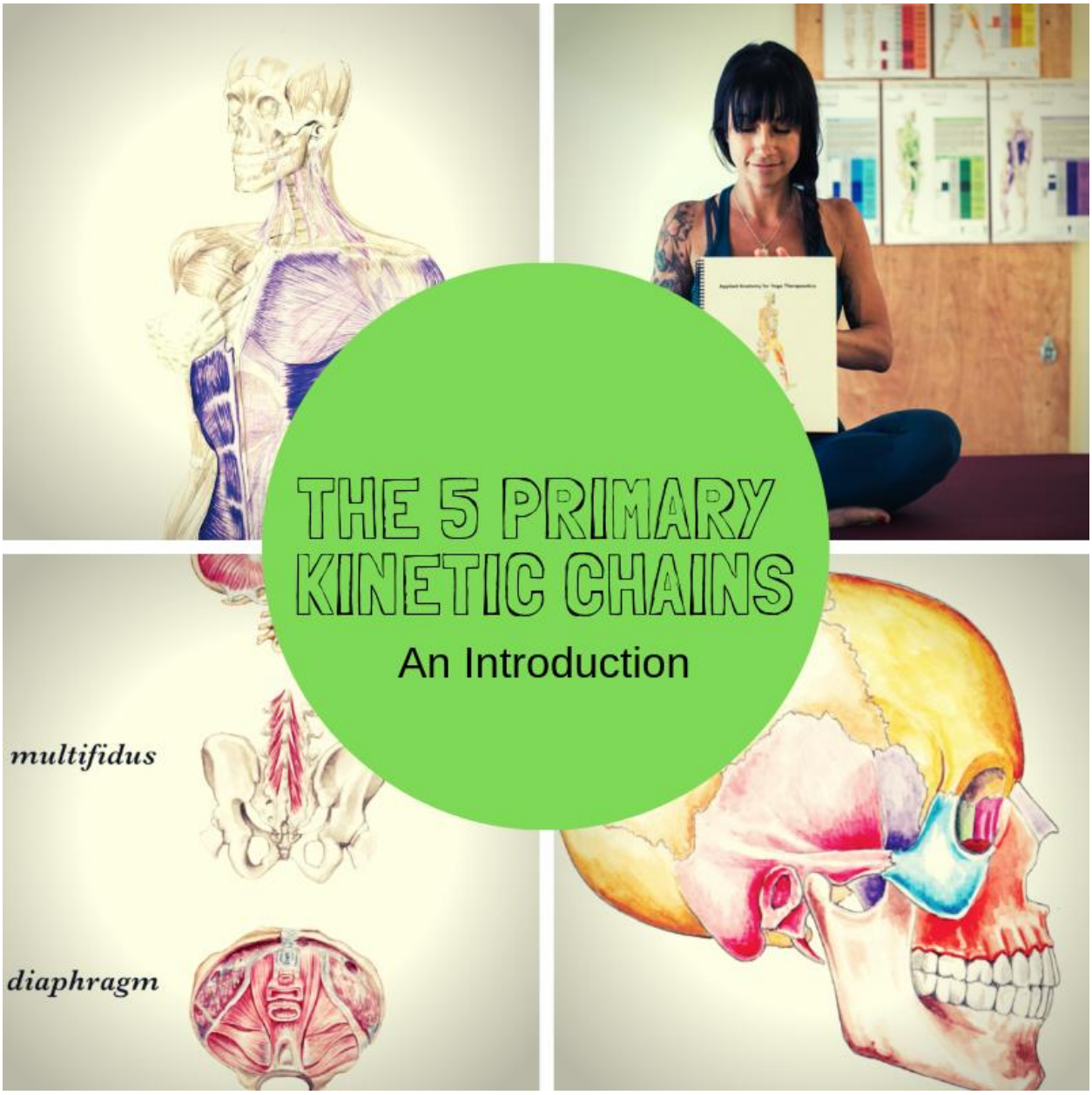


THE 5 PRIMARY KINETIC CHAINS

An Introduction

The 5 Primary Kinetic Chains (5PKC) – developed by Joseph Schwartz – are based on the theorem behind *Andry Vleeming's Core Subsystems* and how those subsystems connect the entire fascial fabric through the kinetic chains. Each chart outlines a primary physiological principle in movement: bones, joints, ligaments, tendons, muscles and fascia do not work in isolation. They work synergistically to create movement. When movement is balanced and efficient, all the players are all cooperating as a team.

The 5 Primary Kinetic Chains are the master template for not only the walking gait as demonstrated in The 5PKC Desktop Edition and 5PC Poster Set, but for all locomotion and movement. Different movements have different relationships to gravity and the environment, and they use different muscular activations. (These activations are referred as kinetic chains, force transmission systems, and sling systems.)

For example, swimming doesn't have ground engagement like the strike phase of the gait. Instead, the spear phase (reaching through the water) is analogous to the deep longitudinal system. The kinetic sequence runs from the hand and through the anterior body to the opposite leg. The arm lines are doing the work in swimming that the leg lines are doing in walking.

Intro

1) Intrinsic ~ Breath

The intrinsic system is the nervous system's relationship to breathing. Our breathing apparatus, the mechanism of pressurization systems, has a direct effect on the autonomic nervous system. "You can't own your movement until you own your breath." This is about our breath mastery in relationship to our movement.

2) Deep Longitudinal ~ Shock Absorption

The deep longitudinal system is about shock absorption. Shock absorption is the ability for kinetic energy to wave through the body joint by joint. If the wave is unable to move freely through the fascial system, that energy has to be absorbed in some way (such as a compensation). Imagine ocean waves breaking on the beach. The forces flow rhythmically absorbed by the sand. Now put a rocky buttress in front of the same wave and there is a tumultuous energy exchange of the crashing into the buttress.

3) Lateral ~ Stability

The lateral system is the midline stability of the structure. The axis of the spine (axial skeleton) needs dynamic stability so that the appendicular skeleton has a platform by which to generate energy. Without the stability of the axis, the arms and legs will be impaired to generate power or work production.

4) Posterior Spiral ~ Stored Elastic Energy

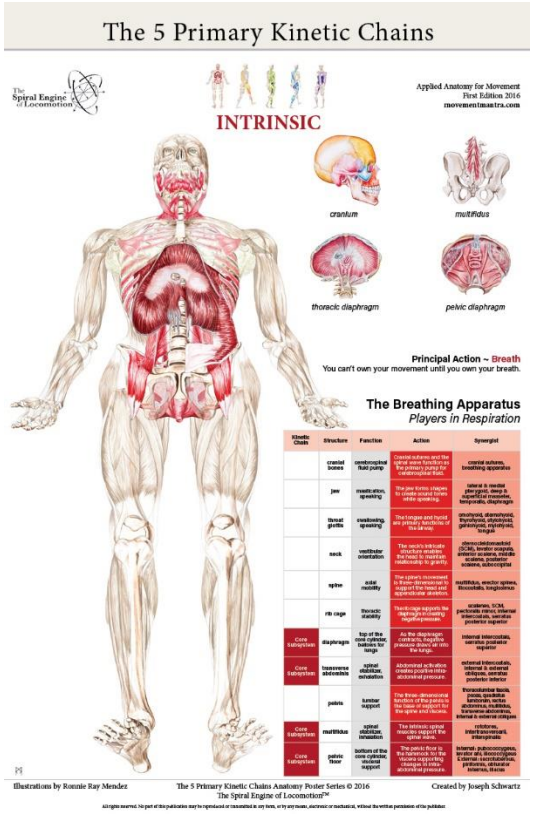
The posterior spiral is the generation of stored elastic energy. The fascial matrix is a potential energy system. Efficient movement uses muscular activation to act on the fascial system. The fascial system spreads the load over as much area as possible which increases efficiency. As the energy winds up in the tissues, the potential release of that energy assists work production in the complementary movement.

5) Anterior Spiral ~ Translation of Elastic Energy

The anterior spiral is the release of elastic energy into the complementary movement. Elastic energy can be released in different ways across the structure. When you are watching graceful athletes moving in profound ways, you are seeing elastic energy being stored and released in an efficient way. The energy is spread across the entire fascial fabric and the result is seemingly effortless movement.

Breath, shock absorption, axial stability, stored elastic energy, and translation of elastic energy are always present in integrated movement.

Intrinsic Kinetic Chain



The Intrinsic Kinetic Chain is the first of Five Primary Kinetic Chains and is the one ring that binds them all. Breath is essential for survival. It is the barometer for vitality and it is intrinsically connected to the central nervous system.

The thoracic diaphragm is a striated muscle that is directly connected to the autonomic nervous system. As such, we are incapable of holding our breath to the point of oxygen deprivation. Survival reflexes will override, and the body will issue instructions to contract the thoracic diaphragm.

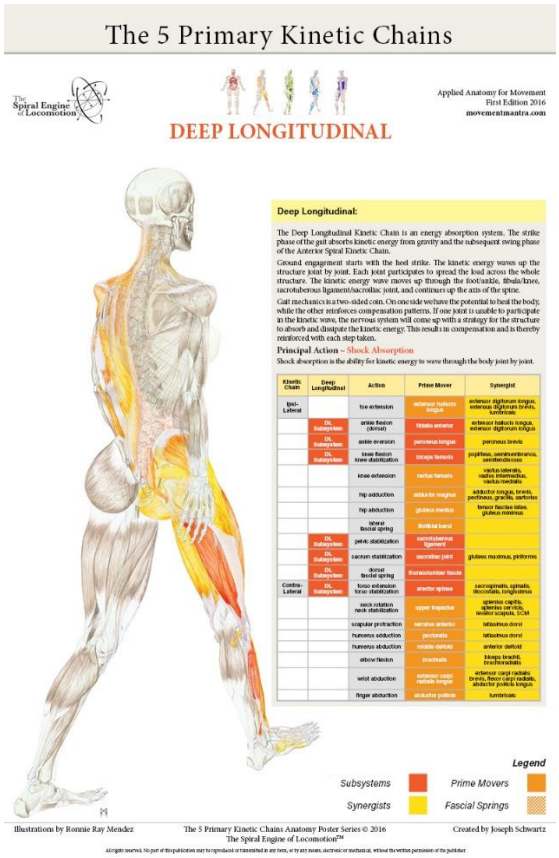
The thoracic diaphragm acts like a bellows for the lungs. The rib cage provides the support structure so that when the thoracic diaphragm contracts, intra-abdominal and intra thoracic pressure changes. Intra-abdominal and intra-thoracic pressure are interdependent. Intra-abdominal pressure act on the visceral contents and supports the pelvis and lumbar spine. Intra-thoracic pressure acts directly on the lungs. The lungs are essentially a sponge, it is the change in intra-thoracic pressure that breathes the body. When intra-abdominal pressure increases, intra-thoracic pressure decreases. This pressure drop creates a void. That void is then filled with positive atmospheric pressure, filling our lungs with precious life-giving oxygen.

The thoracic diaphragm works in partnership with the pelvic diaphragm. The thoracic diaphragm is a dome that faces upward. Contraction pulls the dome downward. The opposite is true for the pelvic diaphragm. The pelvic floor is a dome facing downward. Contraction pulls the dome upward.

When we breathe, the domes of the thoracic & pelvic diaphragms move in sync. They move in the same direction, though one is in concentric action while the other is in eccentric. During the inhalation phase, the thoracic diaphragm is in concentric activation while the pelvic diaphragm is in eccentric. Both domes are moving downward. While the thoracic diaphragm is pushing the visceral contents of the abdomen downward, the pelvic floor provides the hammock that supports the viscera.

Restoring the proper sequence in breathing is often the foundation of the therapeutic process. As the mechanics of the breathing apparatus are restored, balance can return to the structural, physiological, and emotional components.

Deep Longitudinal Kinetic Chain



The second primary action of The 5 Primary Kinetic Chains is shock absorption. Shock absorption is the kinetic energy as it waves through the body. This concept has several contextual layers, let's further explore shock absorption.

Kinetic energy refers to mass in motion. The earth we live on is a spinning ecosystem that comprises of many elements – including gravity.

When we walk, run, or jump, our musculoskeletal system puts into motion the mass or weight of our structure. The product of the interaction between musculoskeletal activation, gravity, and ground engagement produces a wave of energy, a kinetic wave. Energy is a wave form, as it has a measurable amplitude and modulation. The amplitude is the height of the wave, or intensity, and modulation is the length of the wave, or duration.

When we are standing still, gravity is pressing our structure into the earth. In order to counter gravity, or to balance the force of gravity, we push into the earth creating a rebound. As the popular yoga saying explains, one must "root to rise, or stand tall like a mountain." Without this action to counter gravity, we would collapse under its compressive force.

When we add momentum, our kinetic energy increases, and more energy is required to counter-act the compressive forces. Let's explore this experientially. Take a few normal steps and notice how the impact

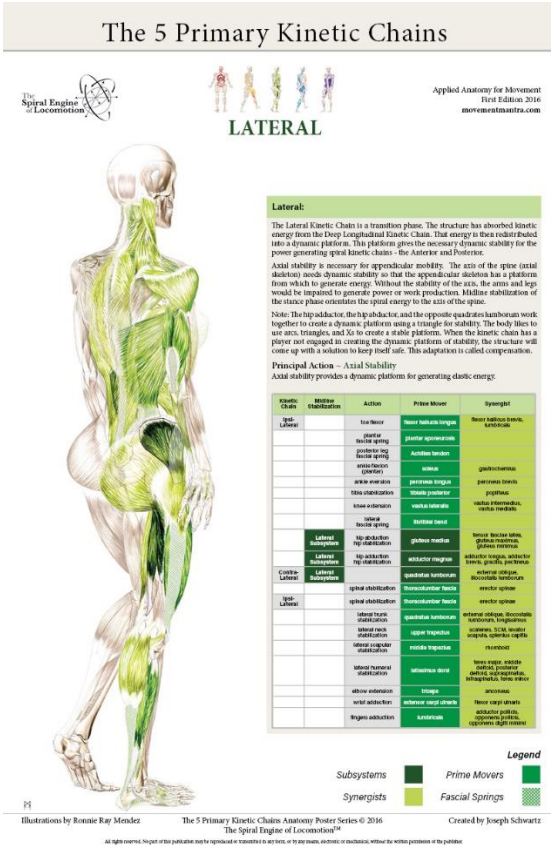
of the strike phase of the gait is reverberating up your structure. Now increase the kinetic energy and transition from a walk to a trot. Notice how your body requires more of your structure to dissipate the energy.

Let's increase the energy wave another notch. Try jumping up with both legs. See how much vertical height you can clear. Feel the leg drive from pushing into the earth and the absorption of kinetic energy as you reengage with the ground as you land. Now do the same thing, but drive and land with one leg only. Notice that that single leg absorption is asymmetrical. Take inventory of how this energy moves up the body, joint by joint. This is ground force reaction and is a key principal action in movement.

What happens when a joint or multiple joints are unable to participate in the distribution of kinetic energy throughout the body during the shock absorption phase of a movement? The structure must come up with a solution to dissipate the kinetic energy, this is called a compensation pattern. This is a maladaptive learned behavior that then is reinforced with each cycle of shock absorption.

Shock absorption is an essential element in structural assessment for integrated movement. The kinetic chain chart in the Deep Longitudinal anatomy poster gives great insight into how the energy of shock absorption waves through the body.

Lateral Kinetic Chain



The stability or mobility question has been brought to the table many times. Which is more important ~ to be stable or to have mobility?

There are different perspectives to the answer depending on one's field of study, the application, and the lens that you look through.

However, when we look at the walking gait, stability and mobility are in an interdependent relationship. One can't effectively happen without the other. Stability and mobility rely on each other to keep the structure safe. Stability is to software as mobility is to hardware. Stability requires motor control, the ability of the nervous system to respond appropriately as movement occurs. Mobility is the hardware, the organization of bones, joints, ligaments, tendons, muscles and fascial structures. The structure is responding to movement, messages of how movement is occurring, and how this information is being relayed up to the motor control center. A strategy is then derived as a response to the changing environment. The quality of movement being expressed is a product of integration of both stability and mobility.

Dynamic stability is perhaps a better term to describe the product of stability and mobility. The question then shifts from "stability or mobility" to whether the body can appropriately respond to movement over a complete range of motion and a changing environment. For example, if you are hiking a steep

loose trail, and the earth shifts under your feet, is the responsive mobility available for you to keep from losing footing and possibly spraining an ankle?

Dynamic stability keeps the structure safe. The result of stability + mobility is neuromuscular integration that is available to respond appropriately to a complete range of motion. When life happens, and the environment shifts in an unforeseeable way, dynamic stability ensures an appropriate response is available.

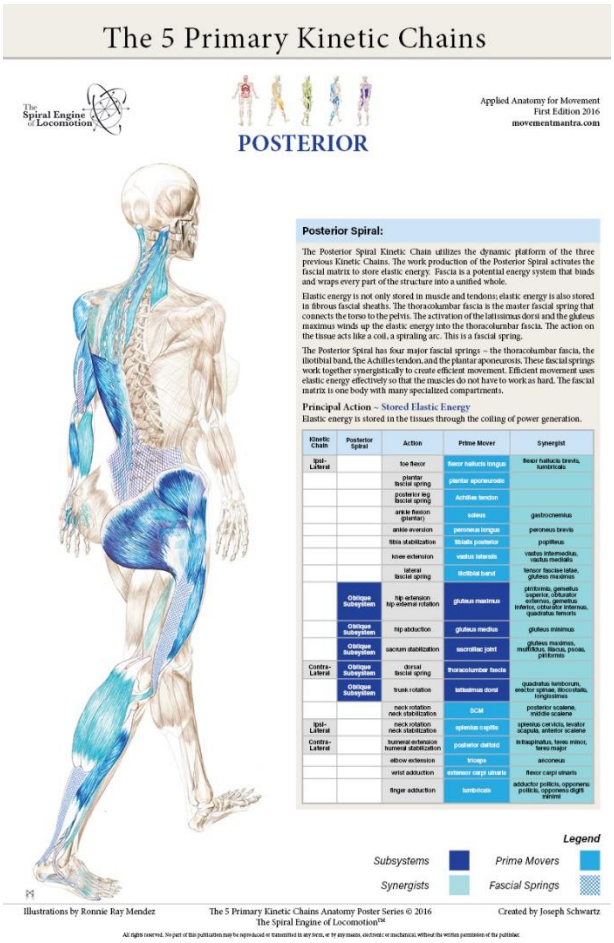
In the movement known as the walking gait, the Lateral Kinetic Chain completes this dynamic platform. The body has just absorbed the kinetic energy through the deep longitudinal kinetic chain, the strike phase of the gait. That energy now needs to be grounded into a stable yet dynamic platform, the lateral kinetic chain, that will allow the body to generate the next movement, the power generation of the posterior spiral kinetic chain. The axis of the spine is integrating all three planes of motion while centralizing the energy from the previous shock absorption phase. As a result of dynamic stability, the body is prepared to generate propulsion, the forward motion of the walking gait.

The midline action of maintaining balance is another important action of the lateral kinetic chain. Complementary neuromuscular activations are working in cooperation to balance the relationship of movement, kinetic energy, gravity, and ground force reaction. These complementary actions provide the dynamic base so that the appendicular skeleton can generate energy.

Movement is a balancing act between environmental factors and the structure's ability to respond appropriately. For example, when we look at the sculpture of rock stacking, we see the dance between the unique attributes of each rock. The size, shape, and center of gravity of each influences the balance point. Each rock complements the previous. The balance points create an axis, an axis of stability. Without this axis, the stack of stones would fall.

When a dynamic base is in place, the appendicular skeleton can express its potential of generating stored elastic energy in movement.

Posterior Spiral Kinetic Chain



Encoded in our bodies is the master blueprint, the DNA Helix. The structure of the DNA Helix represents energy efficiency and it looks like a coil or a spring.

Springs are efficient ways to transfer energy. That could look like the coil springs on your automobile absorbing the bumps in the road. These are called compression springs. They absorb energy and compress. The energy is then released and the spring returns to its “normal” length. Tension springs work from the opposite perspective. Your garage door has huge closed coil springs. When you open the door, the spring goes from its resting length to its expanded length. The energy to “stretch” the spring is released to assist in closing the garage door.

There are many kinds of springs. We use springs in all the machines that we encounter in our lives. Fascia is the spring in our bodies.

Fascia has several roles in our bodies. It is also called connective tissue which is the primary component of our structure. Fascia wraps and binds every part of our body creating a unified whole. Fascia is also a communication avenue for the nervous system. Messages about our environment and movement are relayed through fascia. Fascia plays a crucial role in responding to our movement.

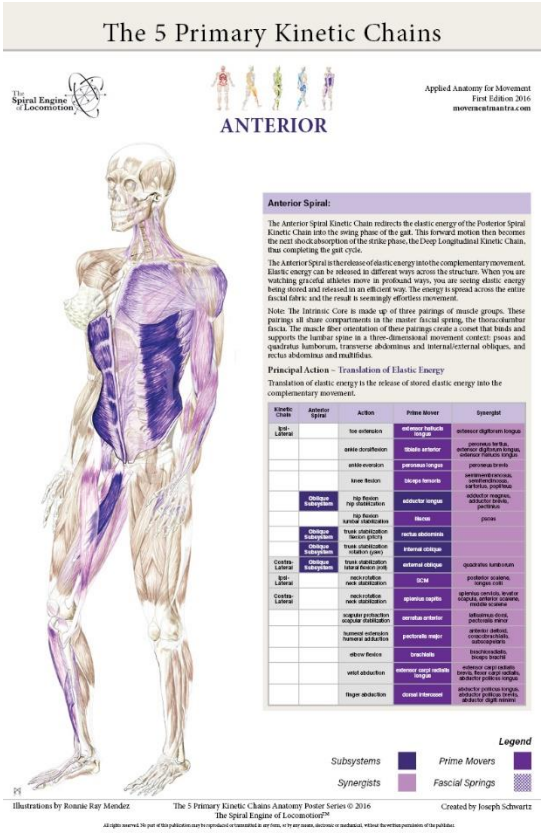
At a muscular level, fascia binds all the different layers into a unified muscle belly. Muscles act on the fascia, the fascia translates that energy into movement. The energy potential of fascia is relative to the ability of the tissues to move between the resting length and its coiled activated length. The coiling action is storing elastic energy and likewise, the uncoiling is the translation of elastic energy. The ability of tissues to store elastic energy is directly proportionate to the work capacity of those tissues.

The iconic model airplane with a rubber band that drives the propeller is a great example of stored elastic energy. We wind up the propeller by hand. That energy is then stored into the rubber band. When we release the propeller, the stored elastic energy is then translated into the propeller. The propeller spins the opposite direction giving the craft movement, flight.

Our bodies are not so different than the model airplane example. The fascial sheath of the thoracolumbar fascia is the primary fascial spring for locomotion. When we walk, the torso is twisting on the axis of the pelvis. This rotary action of the posterior spiral is winding up elastic energy into the thoracolumbar fascia. The stored elastic energy is then released into the complementary movement resulting in forward motion.

This is a simplified example, as the thoracolumbar fascia has the potential to store and release elastic energy in all three planes of movement. When you add two or more planes of movement together, the result is a spiral. During the gait cycle, all 5 Primary Kinetic Chains are working together synergistically, and the body's movement can be described as complementary, contralateral spirals.

Anterior Spiral Kinetic Chain



The Five Primary Kinetic Chains demonstrate how efficient movement requires the integration of a stable yet dynamic foundation so that the body can generate the power needed for locomotion.

The Anterior Spiral is a culmination of everything that we've discussed previously. As such, let's review how the previous four kinetic chains have worked together to get us to this final kinetic chain.

The Intrinsic system is related to the nervous system and breath. The breath is a barometer for our movement. How our breath is integrated with our movement determines how our nervous system responds. If we move in a manner by which the movement breathes the body, the sympathetic nervous system can remain down-regulated, thus giving us access to refined motor control. If instead our breath reaches the threshold of cardiovascular distress, or we are holding our breath out of bracing or fear, our sympathetic nervous system becomes up-regulated and arms the body with a flood of chemistry.

One of the markers for stress tolerance is the capacity to return from an aroused sympathetic nervous system back to a calm parasympathetic down-regulated state of being. A large percentage of our population is stuck in an up-regulated sympathetic nervous system. This is a stress reaction that results in inflammation in the body contributing to decreased healing and regenerative ability. As a result, it is becoming popular to "train" the vagus nerve — the tenth cranial nerve — to experience arming and disarming the nervous system.

There are some very good modalities to specifically address an up-regulated sympathetic nervous system. Our personal practice is one way we can take responsibility for our stress levels. Tai Chi, Qi Gong, Shamatha Meditation, and Yoga are but a few examples. For people that are attracted to manual therapy, Cranial Sacral Therapy is a wonderful way to engage the nervous system and the breathing apparatus. Nervous system health very well may start with the subtle aspects of how the cranial sutures are integrating with breath and movement.

The Deep Longitudinal Kinetic Chain is about how we interact with gravity and shock absorption. Our bodies are under a constant compressive force. The energy of the compressive force changes as movement and locomotion further generates kinetic energy. The energy of our bodies in motion must be absorbed and translated. The energy is distributed across the fascial fabric of our bodies.

This energy becomes a dynamic platform, the Lateral Kinetic Chain. The Lateral Kinetic Chain provides dynamic stability so that the appendicular skeleton has a foundation from which to work off. Without this foundation, the body would be at a disadvantage in generating stored elastic energy.

In developmental movement, the reflexive motor learning that is hard wired into our nervous system, we see that the movements are all about creating dynamic stability with the intention of getting us upright and using a bi-ped strategy of locomotion, the walking gait.

With an established dynamic platform, we have the capacity to store and release elastic energy. Elastic energy is stored in the tissues in two modes: lengthening or stretching and coiling or compressing. When tissues lengthen or stretch, the fascia's elasticity stores energy. This would be like stretching a rubber band across your finger and releasing it; the rubber bands soars across the room. Likewise, winding up the rubber band on a model airplane illustrates the second mechanism of storing and releasing elastic energy. As the rubber band coils tightly, energy is stored; more coiling equates to more compression that stores energy to release.

The Posterior Spiral Kinetic Chain is the avenue the body uses to coil elastic energy into the fascial springs that perpetuate the energy of the walking gait. The body is utilizing both modalities (lengthening and coiling) for activating the fascial fabric to generate stored elastic energy. As the Posterior Spiral Kinetic Chain is coiled to release that energy, the ipsilateral anterior spiral is lengthening. It is a coiling of one side of the body and a lengthening on the opposite. The body is utilizing both pathways simultaneously, to generate stored elastic energy.

The Anterior Spiral completes the gait cycle. Elastic energy up to this point has been stored into the tissues, and now the body is poised to do something with that energy. The body will now translate the stored elastic energy into the complementary movement. The forward motion generated by the push of the posterior spiral is realized through the leg swing of the anterior spiral.

The ability to effectively store and release elastic energy is paramount to athletic performance.

Conclusion

The 5 Primary Kinetic Chains working together create an integrated whole. If one or more of the components are unable to engage, then we need to isolate the issue and through motor learning, reengage and integrate back into the whole. The kinetic chain charts are meant to be a map for inquiry, as we explore who is playing and who is not, the charts can help us to discern what disengaged players need to get back in the game.

Learn more about The 5 Primary Kinetic Chains and the therapeutic application of the kinetic chains, Dynamic Neuromuscular Assessment™ here: https://movementmantra.com/the-5-primary-kinetic-chains/