

Autonomic Nervous System

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Traditionally, the autonomic nervous system (A.N.S.) is viewed as a system composed of two antagonists: the sympathetic nervous system (S.N.S.), and the parasympathetic nervous system (P.N.S.). The SNS is the part that elicits fight-or-flight responses. However, the current paradigm about these two parts of the autonomic nervous system is that they are not antagonistic systems, but rather that the SNS is primarily a mediator between the neuromuscular system and the visceral system (Korr 1979). All of your soft tissue has sympathetic innervations. There is little parasympathetic innervation of your soft tissue. All of your cardiovascular system, every blood capillary in your body, has a sympathetic nerve attached to it. Therefore the sympathetic nervous system regulates your vasomotor system. The rate and flow of your blood through the body is controlled by the sympathetic nervous system. The vagus nerve, which represents 75% of your parasympathetic system, has some control over your heart and visceral system. Everything else is sympathetic, throughout your whole body. The contraction/dilation of your blood vessels (vasomotor) is accomplished via the sympathetic nervous system.

The parasympathetic part helps regulate the visceral system (which is all of your organs—the digestive apparatus) and forms a link to your enteric nervous system for cross-talk to the central nervous system (Camilleri 1993). The main part of the parasympathetic system is the vagus nerve, and in the pelvis it is the sacrococcygeal plexus. The parasympathetic system is called the cranial-sacral system and the sympathetic system is called the thoraco-lumbar system. This represents where the nerve roots originate respectively.

We have a tuning process between the S.N.S. (neuromuscular system and cardiovascular systems) and the visceral system (P.N.S.). The neuromuscular system is the largest consumer of energy in the body. It uses more oxygen and produces more heat and waste products more rapidly than any other part of the body. This requires the sympathetic nervous system to modulate and tune visceral functioning to respond to the needs of the neuromuscular system (Gellhorn 1960). Thus, it is considered to be a primary system. The neuromuscular system in this paradigm is considered to be primary, because it is the biggest consumer of energy in the whole system. The viscera contain their own inertia and have a smaller influence on the spinal cord and brain (Foreman 1989). The viscera and enteric system, which are the neurons in the alimentary canal, keep digesting food and producing amino acids and fatty acids and fuel for metabolism. When we exercise improperly or live with a lot of stress and anxiety, it tightens the soft tissue. Then the visceral system will begin to decrease activity because of the energy shift into the soft tissue. Over time, this imbalance becomes the general adaptive response (Selye 1984). Soft tissue dysfunction and visceral problems (ulcers, constipation, irritable bowel syndrome, diarrhea, etc.) become prominent. Continued habituation becomes adaptive and compromises the immune system, heart and brain (Arnason 1993). Habituation is the first stage of stress responses in the body until the nervous system charges and

adapts to elevated levels of charge and stimulation known as stress.

The central nervous system provides the basic wiring for muscular activity. Research has shown that the sympathetic innervation in the soft tissue augments muscle energy (Korr 1979). We receive a 20% boost in muscle energy activity by stimulating the sympathetic fibers in the soft tissue. This is in addition to the capacity of the central nervous system afferents. Muscle tissue contains both types of nervous innervation, sympathetic and somatic. This gives the soft tissue system of the body tremendous adaptive potential when under threat, performing, etc. Under emotional stress, we also increase the energy in our sympathetic system. We have all heard of those stories about people who lift cars up off kids who have been hit and other dramatic feats of strength. It is also referred to as second wind in sports. That is really important information for myofascial release. I go around preaching the gospel of the autonomic nervous system in terms of this type of fascial release. I want to tell you that any time you lay your hands on somebody, you can begin affecting sympathetic tone. We live in a culture that breeds very high sympathetic tone. That goes hand-in-hand with having to run five yellow lights (and maybe a couple of red ones) on the way to work every morning, while consuming three cups of coffee and having an argument with your wife on the car phone and facing an angry boss. The same response that primitive people had to a saber-tooth tiger attack is the same response as when we almost get hit by a car. Our nervous system initiates the same response as primitive men. However, we crank up our nervous system far more often than primitive man did, and then keep it up with poor diet, lifestyle, etc. It gets stuck on this high. It was not designed for this (Levine 1986). We do not complete the natural response. This is extremely relevant in the myofascial release concept, since this incomplete response is found in the connective tissue.

It is not unusual at all during myofascial release to begin seeing a tone shift within five, ten, fifteen minutes. What we are normally looking for is lower tone. Those clients who feel dizzy, start to sweat (sudomotor response), or his/her whole body flushes and shakes from myofascial release, are demonstrating a rapid tone shift in the entire sympathetic nervous system. Accumulated stress, anxiety and neurological reflex activity have a direct relationship to the physical trauma with which we are working. We collect not only on the trauma that has occurred, but also on the general adaptive response (Willard and Patterson 1992). If we just broaden our perspectives a little bit, we can begin to see tone shifts and we look for them in the skin color, sweating, emotional responses, shaking, etc. When we start doing fascial manipulation, we must keep our eyes open and scan the body. With any kind of bodywork, we can begin to observe sympathetic tone shift or discharge phenomena. It makes our work a whole lot easier.

I have mentioned some of the preverbal signals that the body gives off. The terms I use are sympathetic tone shift or discharge phenomena. What these terms mean is that high sympathetic tone will begin to shift the moment you begin applying manual therapy. I am going to make a bold statement—all manual therapy causes the autonomic nervous system to shift. This autonomic expression happens in a wide variety of ways. For example, fasciculation activity: a client's leg begins trembling or his/her arm or shoulder starts to shake. It is not unusual at all. Clients need permission for these responses to occur. I know we have seen this in our practices—clients start shaking almost uncontrollably or trembling. Trembling, shaking, jerking, skin color changes,

sweating, clamminess, laughing, crying; these are autonomic discharge patterns (Levine 1992). Have you ever noticed how sometimes in the middle of a treatment somebody will begin talking a lot? That is another sign of sympathetic discharge. The verbal system becomes activated. This also applies to crying. How many people have had a client or a patient cry with them? This is sympathetic discharge. The hypothalamus co-regulates the autonomic nervous system. It is the end structure in the limbic system or mid-brain. The emotions interface with the body via the limbic system (LeDoux 1993). Emotions form an interface with your hypothalamus (reaction), hippocampus (memory) and especially the amygdala (emotion)—all limbic structures. These three structures are right next to each other (Morgane 1992). Recent research (Pert 1995) indicates that neurotransmitters regulate mood and emotions. The majority of receptor sites for these transmitters are in the amygdala hippocampus and hypothalamus.

What are emotions? What is anger? In the spectrum of anger, we have rage and hatred. What is a lesser variation of anger? Disgust is one. Others are aggression and irritation. It is called gauze-like irritation—the web of irritation you feel every now and then. This irritation is actually quite healthy and relates to mindfulness and awareness of the environment. Very often our environment is giving us reminders by way of an irritating quality to pay attention and become more aware of what's going on within us and outside of us. Our bodies shape around our emotions (Reich 1972). When we hold onto our emotions for awhile, our hypothalamus begins to regulate the neuromuscular desire to swing at your boss, or shake your fist at the driver that almost hit you. We hold onto what happens to us in the soft tissue and fascia. Most cervical whiplash injuries are accompanied by fear, anxiety and high sympathetic tone. One of my teachers said that whiplash patients were usually on their way from or to an emotionally charged situation. It is important to ask your client where they were coming from or going to. Then there are those with multiple motor vehicle accidents (MVA's). I always ask the client what they have learned from all the accidents. What is the message? Have they gotten the message? There is an important psychological interface with stress, illness and soft tissue problems that we cannot ignore (Sgoutas-Emch, Glaser and Kiecold-Glasser 1992, Booth and Ashbridge 1993, Toss 1994 and Cunningham 1995).

I want to differentiate between a release and a discharge. The autonomic system discharges, the soft tissue system releases: it is a continuum or cycle. When the energy of a soft tissue release shunts into the autonomic nervous system, and it will do that because this is all predicated on the bio-electrical activity and bio-energetic level within the tissue, we trigger a discharge. I am defining a discharge as a much broader-based, whole-system event. A release is a more regional situation in the soft tissue. Discharge is systemic. It is a larger whole-system or multi-system event. We have the fascial system releasing down in a leg. We have the respiratory system beginning to constrict and hold or hyperventilate, which is parasympathetic. We have tears beginning to form in the eyes. Sympathetic tone is shifting. This is a multi-systems event. The CNS and the ANS may desynchronize for several minutes. This can be crying or having a catharsis, genuine unwinding, or even dissociation. This is discharge. We are facilitating this response and helping to guide it to resolution. The skill of the therapist is important. The discharge needs to be acknowledged and supported. We may suspend our treatment plan and shift gears into tracking the autonomic nervous system.

I should also mention another category of release called unwinding. This is a natural but widely abused phenomenon. It is implied by some teachers that if the client does not cry during the unwinding, they are not doing it right. Impact trauma is received by the body in a spiraling pattern of absorption by the fascia. The fascia will release or unwind in this spiraling pattern. We receive many impacts and insults to our body of both slow and fast velocity. Most have no significance in terms of our health and well-being; however these events can still contain fear or even trauma. In this case, the fear and trauma have already been integrated or released. The trauma that is locked into the tissue and has become chronic is especially challenging. What is not being taught about unwinding is how to differentiate between genuine and non-genuine unwinding and to track discharge. Viola Frymann, a brilliant osteopath, originally developed unwinding. It was never intended nor used by her to provoke emotional release. Many psychiatrists, psychologists and psychotherapists agree that provoking emotional release is a narcissistic trap that the therapist has not grown out of (Herman 1992, Grossinger 1995).

The key is going slowly, backing off and watching people breathe, to allowing an integration to occur in the nervous system. Integration refers to the adaptability of the brain/body to a higher level of functioning. It implies the nervous system seeking wholeness and healing from its fragmentation. Integration implies that the discharge process is enhancing organismic functioning. Integration is a function of time. The nervous system takes more time to integrate than soft tissue does to release. This integration may not complete itself for hours or days after it is initiated by our work. Integration does not complete itself while your client is in your office. We allow the leg, hip or spine that has become orthopedically involved to release, and then allow the client to move through discharge and then integrate through the whole nervous system and body. It is a permission that you are giving your client. It requires patience, vision and a soft touch on your part.

With any particular trauma in a person's life, there are always some related events occurring psychologically and physically. Wholistic, humanistic models postulate that mind and body are inseparable (Cassidy 1994, Johnson 1992, Johnson 1994). But we are not attempting to be psychotherapists at all. If we can just open our eyes and observe tone shifts happening as releases and then discharges; give people verbal permission and keep them breathing into the pain (because that is what we are really concerned about here—how to bring order and utilize and integrate discharge phenomena), we will do our patients and clients a great service. What we often miss in terms of observation skills is scanning the whole body when the client walks in for his/her appointment and all the non-structural cues I just mentioned. We have all gotten good at symmetrical/structural observation in standing. Now I suggest that you can begin to observe the ANS, which is not symmetrical. The brain and spinal cord map out reflex activity for pain (nociception), emotion, sensation, feeling, thoughts, etc., to the body (Willard and Patterson 1992). It is unique to the individual, observable and very workable. The face, jaw, eyes, neck, trunk, breathing, extremities and pelvis are the areas where the major autonomic plexi are located. Autonomic activation and discharge are highly observable in these areas.

As S.N.S. tone drops, parasympathetic tone rises or rebounds (Gellhorn 1957). There are specific areas of the body, particularly the lumbar fasciae and the cervical fasciae, that when manipulated, will raise vagal tone (Cottingham, Porges and Lyon 1988, Cottingham, Porges and Richmond 1988).

Cranial-sacral work also raises vagal tone. As I mentioned earlier, these areas of the body contain the integrative fascias—all the para-spinal fascias. I call these fascias integrative because I work on them at the end of every session. It puts the whole session together by organizing the paraspinal fascias towards the midline. Sometimes this vagal parasympathetic shift feels like nausea or a slight headache or the spine will arch into extension. These are transient sensations. Sometimes the sensations associated with these autonomic shifts are pleasurable, and clients could be reminded of this and asked to smile. The face is a parasympathetic organ and smiling activates the parasympathetic system (Ruskin 1979).

The breath has such a big impact because systemically, by working with the breath along with sympathetic discharge, there is a re-education and reintegration that occurs very deep inside a person. Most people do not know how to breathe into pain. Our culture is oriented around breath-holding—a fixation on either exhalation or inhalation. The startle-reflex mechanism in the respiratory diaphragm becomes fixated. It is as though we are holding our breath waiting for all these feelings to go away and to leave us alone. There is a blockage, or a lack of synchronization between sympathetic discharge, emotional arousal and the way that we experience emotions in the body. Think about your experience. Philosophers and scientists have been arguing for a long time about the actual experience of emotion (Solomon 1993). But we can be quite pragmatic and recognize that when we feel excitement, anger, passion, sadness, guilt, etc., we do feel it in our bodies. You might remember having the experience of being angry and having sensations rushing through your arms and legs and chest, or noting that sadness has a definite location in the upper thoracic area, maybe the chest. By working with the client's breath, we actually can reconnect or synchronize the body and mind during myofascial release, or any bodywork for that matter. It does not have to be cathartic or something wild.

The clinical applications are quite amazing. Think if you could affect the whole body without using hot packs or cold packs or ultrasound. Think if you had a way of supporting vasodilation systemically, if you had a way of supporting metabolic waste removal systemically, wouldn't you want to do that? If we move slowly into the tissue, if we are not looking at it as simply a mechanical procedure, we then have the opportunity to reduce sympathetic dominance. Systemic vasodilation is important and systemic waste removal is also important, because where you have increased blood flow, you are going to decrease nerve irritation. Also, with the decrease in sympathetic tone, you have more blood shunting into the viscera. We have such a large problem with ulcers and a host of related digestive disorders. It is a sign of high sympathetic dominance and the general adaptive response. An increase in systemic waste removal, vasodilation, relaxation in the soft tissue are going to help your work, because what we are intending is to facilitate a healing response in the body and let the body take over its own healing. The breath influences so much physiology systemically. The body wants to balance itself. Part of the physiology of stress is that the higher the percentage of carbon dioxide in the blood, the more acidic the blood becomes and therefore the greater the tendency on an intercellular level for hypoxia. This strangles the body's healing response. As we encourage slow, full, purposeful breathing, we are flooding the body with oxygen. The experience of tetany that some of you might see in doing this work is simply the body's transition state out of one homeostatic level to another. When a client goes into tetany, I encourage relaxation with the breath and I massage the client's arms and face to relieve the cramping. Tetany

occurs because hyperventilation causes the calcium ion pump to shunt calcium out of the muscle. This causes cramping in the arms and face in particular, along with a numbing sensation in the lips. The client will also begin to curl up into fetal position and hyperflex his/her wrists, elbows and arms.

My first treatment goal is always to promote flexibility in the A.N.S. by reducing sympathetic adaptation and inputting to the parasympathetic areas of the body. Can you be flexible enough to shift your goals in the middle of a treatment? When you see discharge beginning, you might say, "Oh, this is obviously a sympathetic tone drop, crying, shaking, whatever," and shift your approach away from the tissue and your goals for the session at that point. The strategy in a discharge is to organize the bio-energy and movement of the discharge up and down the axial midline of the body. Or if the middle is bound up, then move the discharge out to the extremities. Then integrate that discharge into their central nervous system and throughout their body? Change your goals and intervention strategies to accommodate any state change in your client. Follow their process as they switch body systems. If they are sympathetically dominant at the beginning of the treatment and then become parasympathetic dominant, you cannot continue the same level of touch. Your touch must change. Sometimes that means gently holding the client's diaphragm or massage or movement work or nothing at all. Let go of always doing something to the client. Develop or cultivate a simple presence, keep your eyes open and be available to support the client.

Coupled with our capability to have a flexible approach in our treatment is our ability to move from an area of specificity to a more global view. We can step back and look at the whole person. We can encourage emotional integration through hands-on contact. Our caring can be expressed through our hands and we can encourage integration by reminding or educating our patients to relax through their breath. It is very simple. We can encourage our clients to give us feedback about the pressure we use. It does not involve any analysis, and we begin to respect the person's ability to integrate on their own. We can be there as facilitators and educators, not just technicians. That is a very powerful clue for our patients, just to encourage breathing and verbal feedback. What I am addressing here is trust that develops through intimacy. Breathing is very intimate. In our society, intimacy is immediately paired with sexuality, and that is a big mistake because it denies a majority of intimate contact that we have and do not notice. There is the intimacy of our own gentleness. That is really the focus in the work—our own gentleness. I am not interested in just teaching slick techniques.

There are intelligent ways to interface with autonomic arousal. If I see someone's leg begin to shake, I may ask, "Can you let the shaking into your pelvis?" Whenever there is a body part shaking, in terms of facilitating whole body integration, I just see where the shaking is not happening, and I ask if a person could go inside and allow that shaking to happen at the next segment higher or lower. I move segment by segment. This might feel risky if you have not worked with these responses before. But you will be able to help that person more deeply. You are helping reconnect their whole body. The central nervous system loves that. It loves feeling the whole body rather than the fragmentation resulting from trauma. Many people experience themselves as fragmented without a sense of a whole. As touch therapists we can facilitate psychological integration. We are entering into a person's physical reality with empathy and an innate desire to help a person feel whole. That is big magic in indigenous cultures, and in ours.

When you see discharge happening, breathing in the trunk and abdomen tends to become restricted. You can encourage relaxation in the abdomen and diaphragm verbally or just by placing your hand there. The thoracic outlet and the neck begin to tighten and flex during discharge. I am sure some of you have seen that. You can encourage easing the neck by placing your hand under the neck or spine and gently lifting the spine into extension until you feel relaxation. This encourages the P.N.S. to open. This supports the charge to go through the body. An increase in parasympathetic tone is occurring when the body begins to go through a whip-like motion up and down the spine. Every now and then clients will get a sudden jerk in the body and arch the spine. This is the parasympathetic tone, the vagal tone is pushing right through because it has an opportunity to do so. This is to be supported because that tone shift will even out after a couple of minutes, perhaps as much as fifteen or twenty minutes. A.N.S. discharge patterns move back and forth from sympathetic to parasympathetic.

Our task is to coach the breathing and to facilitate relaxation in the tight parts. You will see people trying to hold and constrict. Encourage them to let go of the holding in that area. If a client cannot let go, I encourage getting in touch with the tight parts, getting to know them, as they have served a useful purpose. I do not want to ask a client to give up the fight without his/her permission. I know some of you only have twenty minutes behind your curtains with people, and if this starts in the fifteenth minute, you have got five minutes. I know you have to shut it down, and I know you have work to do, but you also have a window of opportunity in future treatments to work with these responses. Any loss of short term progress will be balanced by a greater gain in long term effect coupled with improved client responsibility. This is quite simple and quite straightforward, although some of it looks a little strange from time to time.

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