In this issue

Scoliosis
How Rolfing® SI can help those living with scoliosis.

Fascia Insights

Perspectives
How trauma is held in ‘gesture’. How tensegrity relates to perception.
**Metamorfosis Cervical**

Healing Through Art

Front Cover by Rocío Villalobos

**Artist statement:** “I was born in El Salvador, at age of 8 in a robbery attempt I was gun shot and left paraplegic. Through the years, I developed a Scoliosis, Kyphosis and Lordosis. When I was 18 I had a spinal fusion surgery. My spine was fuse from Thoracic 3 to S1. I spent 3 months in the hospital. When I was there they had an art program. I started to paint and art was my form of rehabilitation. I did this butterfly titled Metamorfosis Cervical inspired on the curvature of my spine, the wings symbolize the healing process. The wings remind me that my dreams and my intent are bulletproof. I can feel the constellation of scars in my back, but I also feel a light on the inside that won’t let me settle for less than wonderful life.”

Instagram @rockolvlobos

**Strong as a Sunflower**

Accepting the Scoliosis Journey

Back Cover by Ambrose Leiske

**Artist statement:** “I am 16 years old and live in the USA and I was first diagnosed with scoliosis as a child but never really did anything about it until it was noticeable. In the 8th grade my curve was at 35° so I was fitted for a Boston back brace and wore it for 2 and a half years, 18 hours a day. During this time, I developed depression and social anxiety. I was very insecure and I was scared to make friends. By the time I was able to stop wearing the brace, my curve had advanced to about 40°, but still I was so much more confident because I was no longer wearing my brace. I made several amazing friends and I have gotten to the point where I can share my story on my Instagram. Eventually after a year of not wearing my brace, because of my curve type, my curve increased to 51°. Now I need spinal fusion, which I will be having in summer 2019. I am happy I will have spinal fusion, so now I can say I’ve gone through the whole scoliosis experience and will have a scar to prove it! In my scoliosis painting, titled Strong as a Sunflower, I painted my x-ray of 51°, and decorated it with sunflowers, whose thick stems make them strong and whose height makes them stand above all else.”

Instagram @ambrose_.artist
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From the Editor

Anne Hoff

With this issue, we relaunch our Journal with a new name – *Structure, Function, Integration: Journal of the Dr. Ida Rolf Institute™* – and an enhanced mission.
Our primary theme for this issue is scoliosis. Looked at one way, scoliosis is one of the greatest challenges and frustrations to Rolfers™ if we work too narrowly from a rigid goal of aligning the body.

The origins of this journal are in the Bulletin of Structural Integration, an in-house publication of the Rolf Institute® (now the Dr. Ida Rolf Institute®) in the 1970s. In the 1980s, the name was changed to Rolf Lines®, with an upgraded look, yet publication was sometimes sporadic and content inconsistent. In the early 2000s, then Editor-in-Chief Stephen Paré spearheaded a new iteration, named Structural Integration: The Journal of the Rolf Institute®, that introduced regular themes for each issue and upgraded the quality and quantity of articles. Since then, we’ve kept the same name and endeavored to keep upping our game, while also deciding to make the journal widely available through the CreateSpace and Amazon platforms. This way it can be found and read not just by the Rolfing® Structural Integration (SI) community, but also by any interested parties – whether practitioners from other SI schools or of other modalities, or interested laypeople. As we work to upgrade our Journal yet again, you will find both a new name and new look. We will continue to feature one to two themes each issue, and are inaugurating enhanced regular content in the form of news on specific fascia research and resources on Rolfing® SI in relation to sports. In addition we will feature unique and powerful cover art, when possible, to more deeply connect us to each issue’s theme and people touched by the topics in focus. In this edition we are extremely honored to share the work and stories of two outstanding artists whose lives have been deeply affected by scoliosis. You can read more about Salvadoran artist Rocío Villalobos and American artist Ambrose Leiske before the Table of Contents.

Our primary theme for this issue is scoliosis. Looked at one way, scoliosis is one of the greatest challenges and frustrations to Rolfers if we work too narrowly from a rigid goal of aligning the body. Idiopathic scoliosis – the most common form, scoliosis of an unknown etiology – is generally resistant to dramatic change if our sole goal is to make the body ‘straight’. Yet if we widen our objectives, our work can be of great assistance to the client in terms of mobility, coordination, body perception, and body image, among others. Besides the contributions to the “Ask the Faculty” column, our authors on this theme went all out with deep and exhaustive articles and interviews. Whether the nuanced mix of diagnostic and clinical information with case study provided by Rebecca Carli-Mills, the insightful interviews with Peter Schwind and Til Luchau, the comprehensive and far-ranging article by Jeffrey Burch, the lived experience and therapeutic guidance of Bibiana Badenes and Bethany Ward, or the wide-open perspective of Pierpaola Volpones, there is much to learn and guide our work.

We follow with a second theme, Fascia Insights, where Karin Wagner takes us on a romp of an interview with Bruce Schonfeld about his upcoming film The Secret Life of Fascia and with Gil Hedley about his multimedia presentation on fascia What’s the Fuzz?! Next, on a more sober note, we hear Jason DeFilippis interview his mentor Tom Findley in a discussion marking the publication of Findley’s biography; they discuss character, life influences, cancer, retirement, fascia research, and, of course, Rolfing SI. Next, our Research/Science Editor Szaja Gottlieb introduces our reprint of “Fascial Tissue Research in Sports Medicine: From Molecules to Tissue Adaptation, Injury and Diagnostics: Consensus Statement,” a significant paper where key members of the fascia research community come to a consensus on fascia that is, according to Gottlieb, “a declaration not only of the theoretical results from laboratory research but also its practical application as applied to sports medicine.”

Our Perspectives section offers Kristen Kuester’s elegant discussion of how ‘gesture’ is held in the body through traumatic events and Mary Bond’s interesting twist on biotensegrity as it relates particularly to perception. We close the issue with Jason DeFilippis’s review of Fascia Pioneer, the biography of Tom Findley, medical doctor, Roler, and fascia researcher.
What I understood is that a scoliosis isn’t just a shape in the spine; it’s a movement, a dynamic action that travels throughout the body.

Pierpaola Volpones, Rolfing® and Rolf Movement® Instructor
ABSTRACT In our regular “Ask the Faculty” column, worldwide Rolfing® Structural Integration faculty answer a question related to the theme of the journal. In this issue, Basic and Advanced Rolfing Instructors and Rolf Movement® Instructors discuss working with scoliosis from angles related to etiology, treatment, expectations, psychobiology, and adjunct modalities that they are experienced in.

Q: As practitioners of Rolfing Structural Integration (SI), we all at some point work with clients who have scoliosis. What can you share from your experience about any aspect of that work?

Russell Stolzoff
Basic & Advanced Rolfing Instructor

SI practitioners have an important role to play in the treatment of whole-body patterns associated with scoliosis. Not only can our manipulation and movement education skills offer clients relief and improvement, but our unique perspective of the whole-body pattern gives us the ability to associate patterns in the spine and ribs, which ordinarily define scoliosis, with effects that reach up into the cranium, out into the extremities, and deep into the viscera. This expanded view of the effects of scoliosis can then lead to approaching clients’ patterns from a broad perspective that I find to be more effective than merely zeroing in on the spine and ribs.

It is important to recognize that most bodies exhibit a mild version of spinal and whole-body patterns that become labeled as ‘scoliosis’ when the degree of the curvature is greater. In other words, most people have a spinal pattern that includes some degree of lateral curvature and vertebral rotation in each of the spinal regions. Furthermore, it is common for the orientation of the lateral curves in each of the regions of the spine (lumbar, thoracic, and cervical) to exist in an alternating arrangement. For example, a right sidebend in the lumbar region is usually accompanied by a left sidebend in the thoracic spine, and another right sidebend in the cervical spine. Naturally, the opposite pattern is also a possibility. I also find that the sacrum, L4, and L5 are a smaller lower curve that forms a base that will be either congruent or incongruent with the more superior lumbar.

Regardless of the particular pattern or the degree of curvature in the spine and ribs, there is always a corresponding myofascial twisting or spiraling in the full thickness of the tissues that surround the skeleton, from the deep ligamentous structures that are part and parcel of the way the joint surfaces meet, all the way out to the interface between the skin and the superficial fascial layers. Naturally, this nonlinear arrangement involves nerves, blood vessels, and the suspension and spacing of organs. From this perspective, because of the continuity of fascial tissues, it is easy to understand that lateral deviations of the spine, combined with rotation, exert rotational forces on the tissues of the extremities.

Conversely, tensions in the softer tissues exert vectors of force on the skeletal structure. These effects can be observed visually in static standing and in motion, felt through palpation, and worked with using SI techniques. In my experience, with most people, regardless of whether or not their curvature warrants being called scoliosis, the greatest integrative effects come from interventions that work back and forth between the spinal complex and the related patterns of the legs, arms, viscera, and cranium.

When the degree of lateral curvature is greater than 10°, with vertebral rotation, it meets the criteria to be diagnosed as scoliosis (see https://www.aafp.org/afp/2014/0201/p193.html). As with all circumstances that involve the tissues and joint surfaces, SI is most beneficial if our client is younger and all body tissues are more adaptable, and there is less spinal and whole-body adaptation to the asymmetrical forces placed on the joint surfaces and supporting ligamentous tissues. This is when we have the greatest chance of significantly improving the curvature.

When the degree of curvature has progressed and the client is older, we must temper our expectations of ‘correction’ according to the age and adaptability of the client’s tissues. In the most progressed cases, the vertebrae, facet joints, ribs, and bones of the pelvis have changed shape as have the thoracic, abdominal, and pelvic cavities. Not only does the pattern spiral, but it compresses due to the loss of columnar support and the shortening effect of twisting. It follows that organs have to conform to the twisted, diminished space, and breathing can become difficult.

When working with scoliotic patterns I find it most useful to focus on the regions in the spine where the curve changes direction. This usually happens at the sacroiliac joints, at L3 (since S1-L4 often function...
as a single segment), at the thoracolumbar transition around L2-T10, and at the cervicothoracic transition around T2-C6. Secondly, I find working on the convex side of the apex of the laterally flexed curves in the lumbar and thoracic region to be helpful. In the thoracic region the ribs also have a significant effect, both close to the spine and at the sternum where, due to the cartilaginous connections, adaptations to the spinal pattern occur.

Since the cervicals have more freedom, it is less predictable what will occur there in response to the patterns. The cranium, due to the fact that all facial layers anchor somewhere on it, will reflect and play a role in maintaining the whole-body pattern associated with scoliosis. It is essential to remember that the pattern spirals, and to search circumferentially for aspects of it. One cautionary note: in older clients it is safe to assume that bone density is diminished, so a thorough history and sensitive use of force is warranted.

Apropos of the principle of support, it follows that when the spinal pattern has lateral flexion and rotation, then the connection/integration between pelvis and legs will be affected. I usually find asymmetrical concentrations of adapted tissue density around both hip joints (ilioptosas, adductors, adductors, hamstrings), across the knee joints (hamstrings, quadiceps, posterior knee compartment), and at the ankles and feet where all of the imbalances from above funnel down to dense adaptations. The importance of addressing the scoliotic pattern from the feet and legs cannot be overestimated. In my opinion, this essential feature, namely working with the whole-body pattern through the legs and feet to provide support for structures and segments that lie above, gives Rolfing SI an advantage over methods that focus more narrowly.

As for the shoulders and arms, the spinal pattern will reflect there too. The simple fact of twisted vertebrae in the thoracic spine, and the concomitant reflection into the rib cage, creates a ripple effect through the myofascial web of tissues that connect the scapula, humerus, radius, ulna, wrist, and hands. The pattern in the arms also directly involves the lower portion of the cervical plexus and relates to the transitional area associated with the thoracic and cervical regions. Since the arms are not weight-bearing, they have the freedom to adapt in space and reflect in the whole-body pattern in their own ways. For these reasons, and to get the best possible results, it is important to also include the arms in the whole-body treatment of scoliosis.

Larry Koliha
Rolfing Instructor

I have worked with numerous scoliosis clients over the years. Each client has his or her own set of conditions and opportunities. I’ll share a few thoughts that I’ve found helpful with most clients.

1. Goals: Clarify your clients’ goals and expectations in the intake. Find out all you can. Do they hurt? What can they do? What can’t they do? How does scoliosis impact their lives? Are they looking for a straight spine or quality of life? Be honest with the client regarding what you can do. Are the client’s goals realistic and within your skill range?

2. Body Patterns: Scoliosis is a whole-body pattern not just a condition of the spine. The Ten Series is a great tool to use with scoliosis. The Ten Series addresses arm and leg rotations, pelvis asymmetries, shoulder girdle, rib patterns, head, and neck. Opening these areas creates space for spinal changes later. If you think of a Raggedy Ann doll with its arms and legs twisted in knots, you can imagine how hard it would be to straighten out the spine with the knots in place. The arms and legs need to be untied for the spine to move differently.

3. Your Work: Follow the Ten Series to open the body from appendicular to axial and from superficial to deep. The series addresses and readaddresses each part of the body in a logical fashion that makes sense for unwinding the complexities of scoliosis. Include breath work in each session. If there is holding on the inside, the body will not respond correctly on the outside. You need to practice sensing the inside of the person’s body moving while your hands are working on the outside of the body. The breath must flow and function through the different diaphragms, from feet to cranium. Holding anywhere creates patterns of tension everywhere.

Think titration – work slowly and do not release more than the client can integrate. With scoliosis, it’s particularly important not to free patterns too quickly. Remember that this person has found support and adaptability with the scoliosis. Disturbing compensatory patterns too quickly can throw the client into a painful tailspin that can last a long time. Titration helps the client with integration and prepares the body for the deeper work. By the end of the session, check to see that you have freed both ends of the spine (C1 and sacrum), as well as openings into the appendicular. This reduces the chances of aches and pains after the session.

Scoliosis holds at the deepest muscular skeletal levels of the body. Once you get into deeper spinal work it will take a while for the client’s body to understand what it needs to untwist. If you work too quickly, removing contact after a minute or so, the communication may never be received in the body. At times it is necessary to maintain contact for several minutes to allow the ripples of your work to progress into the holding patterns.

4. Anatomy: Knowing your anatomy helps. Learning spinal mechanics will change your work. Knowing what is under your touch helps you see what is possible. The biggest trick is to get what’s not moving, moving – this is where the functional work comes in.

5. Movement: Be sure to include the client’s awareness in the changes. Have the client participate with slight movements at first, progressing to global movements as the sessions continue. Functional movement work is important and tricky. Stretching into the arms and legs with movements into the neck and head helps open the spine. Initially, when asking a client to move, he or she will use familiar patterns. Have the client explore new body movements into different areas to enhance the work. If the client is more at ease turning right, have him/her move to the left. Move anything to help break up the pattern, increase proprioception, and help the client explore functional boundaries. Be sure to use gravity as a tool with movement. Have the client move parts of his/her body off of the table to help open areas. Let the client stay there and allow gravity to help you with the work. Use bolsters, blocks, and balls to position a client and keep the area you are working with open and in a state of awareness of how it might change.

6. Collaboration: Some of the best results I have had with scoliosis resulted from work between modalities. I have worked with chiropractors, osteopaths, and others. Some clients have benefited from a form of physical therapy called Postural Restoration, which teaches a series of interventions and movements that help the client understand the side-to-side variations and work with balancing them out. These exercises are something clients can do daily to help enhance the work in our sessions.
I have tried to simplify a subject usually explored in entirety. My list gives very simple guidelines to a complex situation. Scoliosis is a lifetime condition for most people and the goal is to help clients improve their quality of life. Scheduled exercise combined with post-ten Rolfing sessions usually helps the situation. You may not give clients a ‘textbook’-looking spine, but improved movement and quality of life are well within our scope of work.

Peter Schwind
Basic & Advanced Rolfing Instructor
Whenever SOSORT, an international society for the conservative management of scoliosis, plans its annual conference, I receive an invitation to contribute by giving a lecture or teaching a seminar. So far, I have never had the courage to accept the invitation, because there are so many different ways to look at scoliosis, and there is the danger that we will limit the perspective to our own somewhat limited view. However, to find productive clear results that we can discuss and that are felt and lived in a positive way by our clients, we have to see scoliosis from several different perspectives.

Traditional orthopedic medicine tried to keep it simple and just documented the development of scoliosis by taking X-rays of the vertebral spine. All therapeutic issues were related to the angle of deviation of the spine from the central midline of the trunk. To limit your view to the bony part of the back helps to keep things clear and easy. However, this limited view only allows simplistic approaches that follow clear guidelines, and unfortunately produces very limited results.

Currently, a new generation in orthopedics is ready to see scoliosis as more than merely an arrangement of unusual curvatures of the spine. There are new concepts being developed even in the field of non-conservative methods like surgery. For example, some surgeons are paying more attention to the role that the dura mater may play in scoliotic development. As manual practitioners we have the chance to start a dialogue with these new orthopedic doctors and surgeons, and also with researchers who have found new insights into the various manifestations of scoliosis. For example, we may benefit from the recent discovery of a certain chromosome that seems to play a dominant role in certain phases of scoliotic development.

In my own practice I had the chance to treat three generations of a family: the grandmother, the mother, and the daughter. The three showed the same scoliotic pattern, a very unusual three-dimensional spatial arrangement of all the different parts of their organisms. In the center of these arrangements they show what I call a ‘stomach scoliosis’ – where the stomach is strongly connected with the liver and does not extend into the left side of the body. For these individuals, the stomach is, probably since the third month of embryonic life, fixed to the center of the body. (When I started Rolfing practice forty years ago, I thought that people with this particular pattern did not have a well-developed quadratus lumborum muscle on their left side. I was not aware then of the role that the stomach played deep in front of this muscle.) Those of us who have made similar observations and see a strong visceral impact on spinal structure will find support looking into the conclusions that scientists have recently made about the relationship. A study group at the University of Utrecht (Schlösser et al. 2017) has published relevant findings about visceral anatomy and scoliosis.

But including the viscera in our view is certainly not enough. Scoliosis is everywhere inside the organism, even beyond anatomical units. It is also present in orientation and perception. For that reason, it makes sense that Hubert Godard works with the visual perception of scoliotic people. When he suggests unilateral ‘blindfolding’ [Editor’s note: through placing a sticker or patch on eyeglasses, to block central vision with that eye], he may successfully bridge between the person’s inner world and his/her visual orientation.

There are many – quite different – modalities for working with scoliosis. We may benefit from elements of all these modalities. So far we are at the beginning of potentially new treatment strategies. And it is a very interesting and challenging beginning, indeed.

Recommended Research:


Neal Anderson
Rolfing Instructor
I’ll share my experience with one client who started out as a classroom client for one of my students (now Certified Rolfer™ Melissa Dailey), and then became a client of mine after the class ended. “Kathy,” an active woman in her sixties, had her first exposure to Rolfing SI in a Phase III student clinic in the fall of 2017. Prior to the class, she had been addressing her scoliosis by working with Schroth Method practitioners. You can read one study about the effectiveness of this method here: https://www.ncbi.nlm.nih.gov/pubmed/28976171.

Kathy found the experience of the Ten Series quite helpful. Among the preconceived impressions she came in with was that “they” (meaning the Schroth practitioners) told her to “never” engage in activities that required spinal movements in multiple planes. This eliminated activities she enjoyed, like yoga. “They” also said to keep her torso very still as much as possible. Without denigrating the Schroth Method, we gently chipped away at this mandate’s hold by explaining that even walking was an activity that required spinal movements in multiple planes. We also introduced Kathy to the phrase “motion is lotion,” which helped her to be less afraid to move.

Kathy expressed a Ten-Series goal of wanting to walk with a sway like the film star Mae West. For Kathy, West was the epitome of feminine grace, power, and ease. Using this as a psychobiological handhold, Melissa did the standard Ten Series with a focus on increasing contralateral movement in Kathy’s walk. They were successful. Kathy exhibited much more ease and movement in her walk. There was also a slight decrease in the severity of the scoliosis. One key piece was Melissa’s suggestion to “walk with your inner Mae West.” This idea delighted Kathy and gave her a touchstone to remind her to engage in and be okay with contralateral movement when walking. While Melissa...
was disappointed to not eliminate the scoliosis (structural outcome), I was able to shift her focus to what success was for Kathy. Simply increasing the motion, and therefore the ease in her structure, was a hugely successful result (functional outcome).

I have seen Kathy as a post-Ten client several times. She is still engaged with the Schroth Method practitioners while continuing to see me for Rolfing SI. She credits the former with increased core strength and the latter with increased range and ease of motion. We work mainly to ease compensatory patterns in Kathy’s shoulder girdle resulting from the primary scoliotic spinal and rib pattern. I blend non-formulistic structural work with movement repatterning at about a 60:40 ratio.

Kathy accepts that she has scoliosis and through Rolfing SI has come to appreciate the functional success over a structural fix. From an expectation-management perspective, this significantly helps me as a practitioner. She knows and accepts the structural pattern without letting it preclude activities she once thought of as “dangerous.” This, to me, is an ideal outcome.

**Rita Geirola**  
**Rolfing Instructor**  
**Rolf Movement® Instructor**

The first issue I had to deal with when I started my career as a bodyworker was in fact related to scoliosis. It was 1980, and I had the privilege and the honor to learn from, and then work with, for seven years, Anita Gandini, the person who brought the Mézières Method to Italy. Françoise Mézières, a French physiotherapist, developed the methodology, which works on the muscle chains. She noticed that in the continuity of the spinal curvatures, the back muscles are tense and retracted and work as a single, continuous unit. In order to regain elasticity and better organization in the system, it is crucial to take away all compensations and stretch the entire chain in the same moment. Mézières practitioners position the client’s body, mainly supine on the floor, as symmetrically as possible and elongated. Keeping that posture, they then ask for deep breathing.

This postural approach is very effective in addressing scoliotic patterns (see Figures 1 and 2). Mézières was concerned with biomechanics and stretching, but based on this knowledge and my experience of thirty-one years in Rolfing practice, I think that much of the excellent results from the Mézières approach is related to the great amount of work on the diaphragms and in the reorganization of the head position in relation to the rest of the body. Neck, hands, forearms, lower legs, and feet are precisely addressed in every session. Mézières was also aware of a compensatory pattern that she called “antalgic reflex a posteriori” that developed due to trauma or disease, and the importance of addressing it as soon as possible (see Figure 1). I still use some of the competence I acquired during that time, and include elements of the work in my Rolfing sessions.

Focusing solely on muscles and bones, however, is not the best way to address a complex issue like scoliosis. This condition is strongly related to all levels of the person’s experience: body image, felt sense, orientation and the ‘right’ to occupy space, maturity, perception, coordination, as well as the neurological and visceral components.

Scoliosis manifests in the body’s adaptation to gravity, but can also happen in space. Our kinesphere is full of ‘ghosts’ such as desire, attraction, or avoiding that act as a magnet, drawing us or repelling us. A key question concerns the client’s clarity and definition of up/down, side/side, back/front, in/out. The body system needs to acquire meaningful information to reorient in gravity and address tonic function. All parts of the body that have been neglected need to be experienced and owned again. In the scoliotic pattern, I find there is a lack of up orientation, and front-back definition is poor.

The back and the spine, the source of pain and a sense of inadequacy, the ‘enemy’ to be controlled and corrected, cannot be the resource for change. What I try to do is to empower my clients with a sense of inner space, and the line of gravity that is behind the sternum within that space. I also want them to develop a different, more refined way to use their senses and eyes to perceive and build the space they move in. Discovering that s/he can rely on this inner and outer space, and using the pressure of the visceral area as gentle three-dimensional support, is extremely beneficial in creating a different level of organization where muscle control is less in the foreground and tonic function can be addressed.

Most often adolescents are brought to my office by worried parents, and it’s quite common that the boys/girls are disoriented and detached. They have a sense of being ‘wrong’ or unhealthy. Also, with adults who have been ‘cured’ in their youth according to medical protocol, there is often a sense of denial of that part of their body, or the feeling of being inadequate and fragile. The use of a brace bars feeling and becoming competent in the adaptive

From Souchard (1982)  
*Ginnastica Posturale E Tecnica Mézières*  
(Fig. 98, pg. 126), used with permission.

Figure 1: The result of work on a girl who developed a sudden scoliotic pattern after a fall (antalgic reflex a posteriori pattern). Treatment started in 1974, and the second X-ray was done after six days of treatment.
use of the spine, so the girdles then need to take over.

Of the people I have met in my years of practice, very few had a real, pathological condition. In the majority of the cases, there was no real health problem, only a fear for the future of their 'poor' back. So my first goal with scoliotic clients is to reassure them that having a scoliosis is quite normal. It is a special, subjective way our bodies adapt to gravity and context, and for some people the rotational pattern and the compression are more evident than for others. Of primary importance for a healthy body is flexibility and adaptability — not a straight shape to the spine, and symmetry even less so. There is nothing wrong with being asymmetrical; we all are; it is normal and physiological. And it's what makes us interesting. Beauty is based upon imperfection sometimes.

I integrate the hands-on work with contralateral activation, both during the manipulation and/or as exercises. I want the client experiencing connections through the inner space of the body, from up to down and vice versa. It is so important that the client become familiar with the part of the body that has been labeled as imperfect (and that often creates the pain and maladaptation). Through active movement and awareness of what is doing what, and how the elements of our system can be associated, a new and more complete map of the territory can be designed. From there, a new journey can begin.

Resources on the Mézières Method:

Pedro Prado
Basic & Advanced Rolfing Instructor
Rolf Movement Instructor
I have been using Structural Stretches combined with manipulation and functional and psychobiological approaches to our work to help clients with scoliosis. I developed Structural Stretches some years ago, and as I note in my manual (Prado 2000), “when these stretches are performed with awareness, they will access and activate our somas’ inherent orthotropic nature, that is, the innate tendency of our bodies to correct themselves and seek uprightness. As a result, the integration we all desire is not imposed on us from the outside, but discovered within.”

The strategy is to design a posture (different for each individual, according to his/her scoliotic pattern) in which we align the biomechanical segments of the body in gravity (standing, sitting, or lying down, depending on the case and existing support) in a way that respects the available congruence of segments (shoulder girdle, pelvic girdle, axial, core, sleeve) in relationship with the 'Line'. The basic process is as follows. I have the client stretch from core to extremities, finding the first resistance point. Helping him to keep this position, I encourage micromovements through the body, coordinated with breathing, and orient the client's perception towards either space or ground, depending on the nature of the holding he presents. As he stretches, I wait for myofascial mobilization (release) and shifts in autonomic tone (sympathetic/parasympathetic resilience). With the corresponding discharge, there is a change in nervous-system holding patterns. I monitor the client's experience during the discharge, the shift in myofascial tonus, and as the structure organizes in gravity through shifts in position that I guide, laying to sitting to standing. Finally, I assist the client in orienting, moving, and relating.

Psychobiological experiences may come into play, and as physical and emotional patterns are triggered and addressed, new meanings to these perceptions may also emerge. As the client 'hosts' them, I support the change in the physical body in gravity. I find that the shifts are sustainable as they address many layers of being simultaneously.

This work has been a twenty-five-year-long experiment that keeps unfolding.

Rolfing® SI and Sports

Structural Integration 10-Series Effects on Balance and Postural Alignment in Soccer Players

By Lorrie Brilla, Sarah Viera, Russell Stolzoff, David Suprak, Maximillian Antush, and Jun San Juan

This research abstract is a reformatting of a poster presentation by researchers at Western Washington University, including Certified Advanced Rolfers™ Russell Stolzoff and Brad Jones. The poster was presented at the November 2018 Fascia Research Congress in Berlin, Germany. The study was conducted in 2014.
ABSTRACT

BACKGROUND Structural integration is a manual therapy that focuses on whole body functionality. The mechanisms and effectiveness of the treatment, however, are still not well known. Fascia, which is affected largely by tension and has proprioceptive capabilities based on the function of mechanoreceptors, may underlie the effects. The purpose of this study was to determine if structural integration could affect balance and structural alignment in recreational soccer players.

METHODS Twenty subjects (age: 29.0±4.8 yr; height: 1.72±0.1 m; weight: 72.0±11.3 kg) with no ankle injuries in the past 6 months were randomly assigned to two groups; the treatment group underwent structural integration for 10 weeks and the control group with no treatment. Pre- and post-measures included balance assessment, with the 10 treatment subjects having pre- and post-photos in frontal and sagittal views. Balance was evaluated with center of pressure (COP) excursion, in the mediolateral (COPx) and anteroposterior (COPy) directions, measured on a force platform during four conditions of a balance test. Photo images were digitized as JPG files using MaxTRAQ. Statistical analysis was done using a 2-way mixed ANOVA for COP and dependent t-tests for postural alignment variables. Effect sizes were calculated.

RESULTS For balance, there was not a significant three way interaction between time, group, and condition for both COPx (p = 0.285; partial η2 = 0.067) and COPy (p = 0.212; partial η2 = 0.085) excursion but there was a significant time and condition interaction for both COPx (p = 0.001; partial η2 = 0.350) and COPy (p = 0.030; partial η2 = 0.211). For postural alignment, there was no statistical difference in AC tilt (p = 0.187; d=0.168) but significant improvements in both lateral tilt (p = 0.022; d=0.439) and anteroposterior spine angle (p = 0.024; d=0.298).

CONCLUSIONS COP excursion reduced over time across all conditions, hence better balance, but this may be a learning effect as both groups improved. Postural alignment improved by the intervention. Structural integration is a viable intervention for postural alignment in young, physically active subjects.

INTRODUCTION

Structural integration (SI), also known as Rolfing, is a form of treatment that has grown in popularity but mechanisms and effectiveness are not well known. The few studies completed on SI found improved joint range of motion, pain, and symptoms associated with muscular dystonia of the eye. Possibly underlying the effects of SI is fascia, which is affected largely by tension and has proprioceptive capabilities based on the function of mechanoreceptors. The mechanoreceptors facilitate the sense of joint position and proprioceptive sensations involving muscle length. Mechanoreceptors are found in connective tissue, such as fascia, surrounding muscles, groups of muscles, blood vessels, and nerves. With the stimulation of mechanoreceptors, such as prolonged pressure during SI, changes in local fluid dynamics and tissue metabolism as well as global muscle relaxation can occur. Changes in the fascia may affect functionality, demonstrated through balance and postural alignment. Balance has only been assessed in one study.

The effects of other myofascial manipulation methods, such as self-myofascial release and massage, have been examined more thoroughly than SI. In a recent review, myofascial release techniques were an effective way to restore or enhance range of motion in various joints without a reduction in muscle activity or performance. Research is needed on the effect of SI on balance and postural alignment. If SI can affect one or both of these parameters, future preventative care or rehabilitation could improve functionality. Therefore, the purpose of this study was to determine if SI significantly affected balance or postural alignment in healthy, recreational soccer players.

MATERIALS & METHODS

Design of the Study: This study was a pretest-posttest experimental design. The treatment group underwent SI each week for a total of 10-weeks. Pre- and post-intervention measurements included balance and postural assessment. This study was approved by the university Human Subjects Review Committee.

Subjects: Twenty subjects (10 female, 10 male), aged 22-40 (29.4±8.8 years old, volunteered to participate in this study. All were currently participating in a recreational soccer league at least once a week and were free from injury for the past 6 months.

Instrumentation: The treatment group (n=10) underwent 10 total SI sessions, consisting of one per week, lasting 10 weeks. Measurements were made at baseline and then within 24-72 hours of the end of the 10-week interval. Balance was evaluated with center of pressure (COP) excursion, in the anteroposterior and mediolateral directions, as measured by a force platform during four conditions of a single-leg balance test. Photo images were digitized as JPG files using MaxTRAQ.

Procedures:

• Subjects performed a warm-up consisting of five minutes on a cycle ergometer at self-selected pace followed by dynamic stretches.
• The balance assessment was carried out on an AMTI (Advanced Mechanical Technology, Inc., Watertown, Massachusetts, USA) OR6-6 force platform collecting at 1200 Hz. Both dominant and non-dominant feet were used in both eyes open (EO) and eyes closed (EC) conditions.
• The subject performed each condition 3 times for 10 seconds in a randomized order. Stopping codes were used for consistency (Springer, Marin, Cyhan, Roberts, & Gill, 2007) and 5 seconds of balancing was required per condition.
• After collection, BioAnalysis with NetForce by AMTI was used to export and analyze the data. The standard deviation of the COP, in the anteroposterior and mediolateral directions, was analyzed to represent COP excursion over the 10-s testing period for each subject.
• Frontal and sagittal plane photos were taken pre- and post-intervention in a marked area with a tripod camera. Subjects were instructed to stand in a relaxed manner.
RESULTS

- The results did not support the experimental hypothesis for balance; treatment had a non-significant effect on mediolateral (p=0.677) and anteroposterior (p=0.363) COP excursion (Tables 1 and 2 on page 13).

- For postural alignment, there was a reduction in all spine angles from pre- to post- treatment. There was no statistical difference in AC tilt (p = 0.187; d = 0.166), but significant improvements in both lateral tilt (p = 0.022; d = 0.439) and anteroposterior spine angle (p = 0.024; d = 0.298).

SUMMARY & CONCLUSIONS

The results showed both groups significantly decreased their COP excursion in the mediolateral and anteroposterior directions across all single-leg balance conditions over time. This finding may suggest that the improvements were the result of a learning effect. Improvement in COP excursion, however, may have affected the soccer player’s ability to perform during gameplay. It was hypothesized by Barone et al.1 that proprioceptive training of both legs resulting in improved one-leg standing balance could maximize kicking performance due to the amount of time spent on one leg when striking, passing, or trapping the ball. Additionally, the participants had large standard deviations; this may have affected the interaction significance for balance. Overall, the balance changes appear to be a learning effect in both groups; both improved significantly. It is possible that ten weeks of SI fascial manipulation is not enough time for significant changes between groups.

For postural alignment, the SI treated subjects significantly improved lateral and anteroposterior tilt. The small effect sizes with a significant outcome (p<0.05) may be due to: the small sample size with subjects who were young, physically active, and healthy with inclusion of both sexes. The strong impact may be related to the SI treatment being administered by one certified practitioner. Further research on postural alignment with SI intervention is warranted. The effect may be more substantial in subjects with maligned postural alignment.

REFERENCES


### Table 1. COPx excursion mean ± standard error of the mean for each group across the four balance conditions.

<table>
<thead>
<tr>
<th>Time</th>
<th>Eyes closed left</th>
<th>Eyes closed right</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tx</td>
<td>No Tx</td>
</tr>
<tr>
<td>Pre</td>
<td>0.055±0.009</td>
<td>0.068±0.010</td>
</tr>
<tr>
<td>Mild</td>
<td>0.011±0.004</td>
<td>0.006±0.001</td>
</tr>
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</table>

### Table 2. COPy excursion mean ± standard error of the mean for each group across the four balance conditions.

<table>
<thead>
<tr>
<th>Time</th>
<th>Eyes closed left</th>
<th>Eyes closed right</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tx</td>
<td>No Tx</td>
</tr>
<tr>
<td>Pre</td>
<td>0.025±0.004</td>
<td>0.027±0.001</td>
</tr>
<tr>
<td>Mid</td>
<td>0.005±0.002</td>
<td>0.003±0.000</td>
</tr>
</tbody>
</table>

### Table 3. Summary of average changes in spine angle as defined by acromion tilt, lateral tilt, and anteroposterior tilt before and after SI treatment followed by p value and effect size calculated.

<table>
<thead>
<tr>
<th>Mean before SI Treatment</th>
<th>Acromion Tilt</th>
<th>Lateral Tilt</th>
<th>Anteroposterior Tilt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.00026763°</td>
<td>177.3067076°</td>
<td>191.9237992°</td>
</tr>
<tr>
<td>Mean after SI Treatment</td>
<td>-0.15236997°</td>
<td>176.6731552°</td>
<td>189.5524369°</td>
</tr>
<tr>
<td>p value</td>
<td>0.187</td>
<td>0.022</td>
<td>0.024</td>
</tr>
<tr>
<td>Effect Size (Cohen's D)</td>
<td>0.166</td>
<td>0.439</td>
<td>0.298</td>
</tr>
</tbody>
</table>
Embody, Disembody, Re-embody, Body

Working with Scoliosis and Embodiment

By Rebecca Carli-Mills, Rolf Movement® Instructor, Certified Advanced Rolfer™

ABSTRACT  The scoliotic client is met with a world that idealizes the spine being ‘straight’ and faced with diagnoses and treatment that often focus exclusively on angles, scales, and measures of the spine and rib cage. But what is the experience of the person living within the spine and rib cage? The author broadly reviews the domain of scoliosis, from etymology to diagnosis to psychobiological issues and conventional corrective measures. She explores the effect of a scoliosis diagnosis on embodiment and considers what it means to embody ‘curved’ and ‘rotated’ in a world that idealizes ‘straight’, taking us through elements of her work with a client diagnosed with scoliosis as a teenager some forty years ago.

When I reflect on years in private practice and clients coming for help with scoliosis, I recognize that the majority came because they thought I could help them “be straighter.” Many had pursued their ‘straighter’ ideal with braces, surgeries, and a variety of exercise methods ever since their scoliosis was first diagnosed. All too often, ‘straight’ was something someone told them they were not, others were, and they desperately wanted to be. Not being ‘straight’ had shaped their self-concept and defined their capacity for expression.

As I imagine is true for many of my colleagues, my practice includes scoliotic clients of different ages with varying types and degrees of curvature. Some of these clients have received or participated in an assortment of treatment approaches, including anterior dual rods, spinal fusions, Cheneau braces, and stretching techniques, such as the Schroth Method. Many perceive their previous treatments to have been effective at varying degrees, others not so. Some have complications and compensations from treatments resulting in pain and movement restrictions.

Many were diagnosed during routine screenings as a child or adolescent. Others never knew that they had scoliosis until, as an adult, they visited an orthopedist, chiropractor, or physical therapist who, based on films, told them their pain was linked to a scoliotic spinal curvature. Many have continued to pursue various forms of treatment – the reason for their arrival in my office.

As Rolfing® Structural Integration (SI) and Rolf Movement® Integration practitioners, we are fortunate because, as we continue to grow and refine our education in myofascial, visceral, cranial, and movement concepts and techniques, we have many opportunities for meaningful interventions in scoliotic patterns. However, the focus of this article is not about specific theories and interventions, but on exploring scoliosis related to embodiment. Scoliosis diagnoses often focus exclusively on angles, scales, and measures of the spine and rib cage, but what about the person living with the spine and rib cage? What does it mean to embody ‘curved’ and ‘rotated’ in a world that idealizes ‘straight’?
PART I: BACKGROUND TO DISEMBODIMENT AND EMBODIMENT

The word ‘embodiment’ means different things to different people. Its definition seems to be in constant motion as diverse disciplines embrace embodiment as essential in understanding our personal, social, and cultural experience on Earth. Physiological, phenomenological, developmental, and behavioral aspects of embodiment are considered and weighed differently depending on the viewer’s vantage point. As Rolf Movement and SI practitioners, we often speak of embodiment as a valued therapeutic process for our clients and ourselves. We believe our embodied presence is integral to our work. When our clients embody one of our principles or goals we are pleased. When they return and the evidence is still present and alive, we are thrilled. We may meet a new client and think, “Hmm, he lives in his head, disconnected from his body.”

Guiding someone to reconnect with his/her body, to embody, involves coaching awareness of the steady stream of sensations arising from processes of interoception, proprioception, and exteroception. We help our clients learn to allow and recognize the flow of these sensory experiences as rich information to support their actions, their movement in the world; and in turn their movement creates sensations rich for their awareness. Additionally, we pay attention to language as a way to encourage embodying supportive patterns of coordination and perception instead of reinforcing unsupportive ones. Kevin Frank’s (2012) article, “Differentiating Categories of Embodiment: An Educational Rationale for Rolf Movement Integration within Rolffing SI”, describes seven categories of embodiment relevant to our work: orientation, interoceptive, proprioceptive, exteroceptive, agency body/coordination, levels of abstraction, and autonomic. As SI and Rolf Movement practitioners, we are trained to value, monitor, and coach a holistic process of embodiment and recognize that the long-term nature of our work depends on it.

The Invisible Brace

Coaching embodiment for scoliotic clients – or any client – is not coaching them into ‘straightness’, which is something they may already try to do themselves. When Colette first started sessions with me, she would begin by enthusiastically demonstrating her latest evolution toward “standing straighter” by shifting sections of her rib cage and pelvis in various lateral directions, along with a variety of sagittal rotations. These adjustments seemed to come from her interpretation of suggestions made by a collection of past and present therapists, medical practitioners, and fitness instructors. Once she had all these in place, she would ask, “Okay, am I straighter?” Often, she would interrupt my response with, “Wait, let me try that again . . . no, wait, I need to start over . . . there . . . how about now – am I straighter?” It was as if she systematically put on an invisible brace and then tightened it in various directions before locking it in place. We will return to Colette as we journey through this article.

Diagnostic Criteria for Scoliosis

Before going further with the discussion of embodiment and our work with clients, let’s look at how scoliosis is conceptualized, traditionally and with recent advances.

2D Versus 3D Conceptualization

SI and Rolf Movement practitioners generally accept that scoliosis is a whole-body phenomenon, not exclusively limited to the shape of the spine. We see manifestations of scoliosis from the arches all the way through to eye focus and cranium shape. However, from a more traditional viewpoint, scoliosis involves a three-dimensional torsional deviation in the shape and position of the spine involving the coronal, sagittal, and horizontal planes, and often includes the thorax, trunk, and pelvis. The Cobb angle, named after orthopedist John Robert Cobb, is the most widely used basic measurement to quantify the magnitude of spinal curvature and track progression. By anterior-posterior radiographs in an upright position, lines are drawn from the endplates of the most angulated superior and inferior vertebral of the curve. Two more lines are drawn at an angle of 90º to these lines. Finally, the resulting angle is measured and expressed in degrees (O’Brien et al. 2008, 49-53). The Scoliosis Research Society (SRS) suggests a diagnosis of scoliosis when the Cobb angle is 10º or higher and axial rotation is recognized. Cobb angles between 10º-24º are considered mild scoliosis; 25º-39º, moderate; and 40º-70º, severe (Baaj 2018).

Since the Cobb angle measurement was invented in 1948, several curvature classification systems have been developed, mainly for refinement of surgical decisions. The Lenke system, created by orthopedist Lawrence Lenke in 2001, is still predominately in use. It measures lumbar and thoracic curves in the coronal plane with sagittal-plane modifiers, thus attempting to represent a more global overview of the spine. He first attempted to factor all three planes into his system, but the horizontal plane was excluded due to “inconsistent reliability of measurement assessment” (Lenke 2018).

The issue with Cobb angle measurement and the Lenke classification system is that they consider a three-dimensional phenomenon from a two-dimensional image. In his keynote presentation at the 2017 conference of The International Scientific Society on Scoliosis Orthopaedic & Rehabilitative Treatment (SOSORT), orthopedist, J.F. Dubousset proposed axial vertebra rotation (AVR) to be key in determining the progression and appropriate treatment of scoliosis, more so than the Cobb angle (Karavidas 2017). During the 1980s, Dubousset worked with Dr. Yves Cortel to develop the Cortel-Dubousset Implant System for surgical correction of scoliosis – the first method to consider the three-dimensional nature of scoliosis (Drummond 2009). Dubousset pointed out the significance of the shape and degree of ‘rib hump’, or ‘piling up of vertebrae’, as an indicator that scoliosis is an “evidence symptom from trouble occurring on the horizontal plane” (Dubousset 2017). A 2015 article published in the Journal of NeuroEngineering and Rehabilitation suggests that current computer modeling technologies can more accurately represent the complex three-dimensional nature of scoliosis and that the time has come for clinical application (Donzelli 2015).

It’s interesting to note that the latest technology provides a model that validates what SI and Rolf Movement practitioners perceive through our eyes and hands. During his keynote, Dr. Dubousset spoke in favor of computerized modeling, but also recommended experiencing the nature of scoliosis by direct feel of its shapes: bulging, hollowing, missing, protruding, or penetrating. Similar to Gracovetsky, he stressed the importance of torsional movement in the horizontal
Scoliosis

Scoliosis results from known and unknown causes in patients of all ages. Exact figures for worldwide occurrence of scoliosis are unavailable. However current research suggests that 2%-3% of the world’s population is affected, with 80% labeled idiopathic (unknown cause) in origin. The majority of idiopathic scoliosis (IS) is diagnosed in adolescence, between the ages of eleven and eighteen, and is therefore named adolescent idiopathic scoliosis (AIS). It is more likely to show up at the onset of puberty when there is a major growth spurt. Females are eight times more likely than males to have AIS and are at increased risk for progression. The main risk factors at diagnosis for progression are: female gender, large curve magnitude, skeletal immaturity measured by the Tanner scale, and sexual immaturity measured by the Risser scale. Of adolescents diagnosed with scoliosis, only 10% have curves that progress and require medical intervention (Negri et al. 2018, 3-5).

Other forms of IS are infantile, juvenile, and adult. Infantile scoliosis is diagnosed before three years of age, occurs equally in males and females, and accounts for 1% of IS. While the etiology is unknown, there are two theories. The intrauterine molding theory suggests that the spine is curved at birth and progresses with growth. The post-delivery theory suggests that placing infants on their backs will lead to flattening of their skulls and scoliosis. Juvenile scoliosis occurs between the ages of three and ten years. In the lower age range, it is found more often in males and the curve is left-sided. In the upper age range, it mirrors AIS with more females and right-sided curvatures. When the juvenile curve is greater than 20°, there is a high incidence of Arnold-Chiari malformation and syringomyelia, a cyst on the spinal cord. Adult idiopathic scoliosis is typically continuation of a curvature that began in adolescence and continues or progresses into adulthood (Nelson and Sanders 2018).

Scoliosis cases with known causes are categorized as: congenital, neuromuscular, degenerative, functional, or syndromic. These account for the remaining 20% of diagnoses. Congenital scoliosis starts before birth and results from incomplete formation or separation of one or more vertebrae (Kawakami 2018). Neuromuscular scoliosis results from a medical condition affecting nerves and muscles, such as cerebral palsy (Newton 2018). Degenerative, or de novo, scoliosis is diagnosed in adulthood and results from degenerated discs and arthritic facets, often accompanied by a flattening of the lumbar lordosis (Crawford and Glassman 2018). Functional scoliosis is secondary to a primary cause, such as a leg-length difference (Baaj 2018). Syndromic scoliosis is attributable to any of a number of syndromic diseases, such as Marfans, Ehlers-Danlos, and osteochondrodystrophy (dwarfism) (Herzop et al., 2018).

Naming and Early Treatment

The word scoliosis is derived from the Greek skoliosis, meaning crookedness or bent. Recorded observance dates to the fifth century BC when Hippocrates described spinal deviations as spina luxate. He developed the Hippocratic Ladder to facilitate traction with the subject hanging head upwards alternating with head downwards. In the second century AD, the Greek physician Galen of Pergamum defined scoliosis as an abnormal lateral spinal curvature and added manual pressure, braces, distraction, and breathing techniques (including singing) to the work of Hippocrates (Kanter et al. 2009, 631). Leonardo da Vinci scrupulously illustrated the spine, indicating the significance of curvatures and articulations. The first supportive braces were developed by a sixteenth-century French army surgeon, Ambrose Paré, who described a method of using directed pressure and extension to reduce the deviated curvature (Serhan and Kuhn 2016, 1072). The treatment principles of Hippocrates, Galen, and Paré form the basis of traditional scoliosis treatment today: use of stretches, pressure, devices, rods, cages, or pins to directly move the laterally deviated spine, with ‘straightness’ being the goal.

Language and Imagination

Scoliosis is often described in literature as a ‘spinal and trunk deformity’. Deformity is defined as being ‘misshapen’. Relevant to a discussion about abstract language and embodiment is that scoliosis is named with a visual description and references an ideal aesthetic about how a posterior view of our upright spine and torso should look. At a deep level, there is primal symbolism in the language and concept of an upright spine that can trigger strong emotions. An upright spine is associated with our capacity for survival without dependence on others for our basic needs. On a social level, phrases such as ‘an upright citizen,’ ‘having a backbone,’ ‘being spineless’, or ‘crooked to the core’ symbolically describe conditions of morality, ethics, strength, and desirable behavior.

Somatic pioneers alluded to the condition of the spine as being symbolic of character. Peggy Hackney (1998, 85), student of Irmgard Bartenieff, wrote: “A spine which supports and easily achieves verticality while also having the potential for fluid grace with flexibility seems to convey an important message: ‘This person is proud to be the human being s/he is and is comfortable attending to the world.’” She suggests that our culture places value on the individual and asserts that a sense of ‘individual’ resides at the spinal level of development. According to Hackney, “The culture is quite deprecating of a person who has not achieved a sense of self, whose internal support does not allow them to reside easily in a fluid upright relation to gravity.” Ida Rolf (1977, 182) wrote, “...The individual's attitude toward his environment does mirror the sturdiness and adequacy of his spinal structure.” Historically, authors have employed spinal deformity to symbolize undesirable behavioral characteristics or situations. In his novel The Quaker City; or, The Monks of Monk Hall (1845), George Lippard's most villainous characters share an overtly visible distortion of their spines (Hall, 2010). In John Steinbeck's novel Of Mice and Men, Crooks, a lonely disempowered character, is named for his crooked spine. Victor Hugo titled The Hunchback of Notre Dame to describe the main character, Quasimodo, who is socially ostracized because of his physical characteristics. Even though society has advanced toward acceptance of physical differences and public figures
are more open to sharing their stories as encouragement to others, it’s not difficult to image the fear created by a radiographic image of a meandering spine if it is yours, and especially if you are an adolescent girl.

Back to Colette: her scoliosis was diagnosed when she was fourteen, with a Cobb angle of 25°. She has never forgotten staring at the x-ray in disbelief as her doctor traced vectors to arrive at his diagnosis; Colette’s conclusion for herself was “crooked spine.” She was placed on a four-year, every six-month observation schedule. Her doctor suggested she might have to wear a full-torso brace for twenty hours per day or else he would need to surgically insert a rod to straighten her spine. He advised her to attend ballet classes and work on her posture. Colette was terrified, but determined. She said that she excelled in all the stretching aspects of ballet, and was able to perform splits in every direction, but she was terrible at petite allegro (quick footwork) and adagio (slow balance).

Thirty-five years later, she came to my office with multiple shoulder dislocations, collapsed arches, and chronic sacroiliac instability. Every few months, Colette incurred an injury, in spite of her years of physical therapy and therapeutic-exercise programs. She stood with hyperextended knees, tailbone tucked, weight on heels. Colette was terrified to move, so no wonder she organized, re-organized, and held herself together with the image of a straight spine. She relied on others to tell her where she was in space and how she should use her body. For Colette, “Am I straighter?” also meant, “Am I secure?”

**Stability – Mobility**

Orthopedic doctors Julius and Robert Hass casually linked joint laxity with scoliosis in 1958. In 1967, British physician J. A. Kirk coined the name joint hypermobility syndrome (JHS) to describe “generalized joint laxity occurring as an isolated finding in otherwise normal subjects” (Kirk et al. 1967). Forty-four years later, physiotherapists and researchers from Poland published a comprehensive award-winning study on JHS in adolescents in the journal Scoliosis, finding that adolescents diagnosed with scoliosis are 30% more likely to have coexisting JHS (Czaprowski, et al. 2011). Additional research conducted by Czaprowski (2014) found that JHS was more prevalent in girls with AIS, but there was no relationship between curve pattern, size, or number of vertebrae involved in the curvature. So JHS is more likely to coexist regardless of whether the curve is mild or severe. Czaprowski (2011) warned that the treatments often prescribed for IS patients involving flexibility training, passive stretches, and balance-dependent exercises may cause injury or deterioration if refinements are not made to take coexisting JHS into account.

In 2017, an international consortium of experts in treating the condition changed the name of JHS to hypermobility spectrum disorder (HSD) and expanded the criteria beyond hypermobile joints to include both musculoskeletal and systemic manifestations. One of these manifestations is “disturbed proprioception,” defined as “not understanding where our joints are and how much muscle strength it takes to use them” (Castori et al. 2017). In clients with HSD, I have often noticed hyperextension of the joints as a means to enhance postural stability; or perhaps due to disturbed proprioception, the joint overshoots home. In those with coexisting scoliosis, the natural braking knee is often the one that enhances their scoliotic curve. Each person and each curve is unique with stories, experiences, and emotions behind them. However, a worrisome commonality I have often found is that scoliotic clients diagnosed as adolescents attach their success on being ‘straighter’, regardless of improved capacity for breath, greater ease of movement, or even freedom from pain. Even more troublesome, this ideal body image often seems to define them and may impede a more differentiated body awareness – a fluid sense of embodiment based on the body as a sensory organism, not an objectified ideal. This may lead to less coordinative adaptability and stability in response to internal and external stimuli.

Colette was once sitting on a wide flat seat, chatting with a fellow passenger, on a slow-moving shuttle bus. Suddenly, the driver swerved to avoid an oncoming car. Colette slid across the entire width of the shuttle bus, unable to catch or right herself before crashing her head, shoulder, and hip into the opposite side. She sustained a concussion and several painful soft-tissue injuries.

**Body Schema, Peripersonal Space**

Embodiment doesn’t end with our skin. We navigate movement through space by continually monitoring our position and motion in relation to gravity, body parts, and nearby objects, including other people. The effectiveness of this piloting to avoid, connect, or manipulate objects in pursuit of our behavioral goals requires an integrated neural representation of our body (body schema) with the space around us (peripersonal space). Researcher Lorimer Moseley, author of the Explain Pain books, proposes the name, ‘body matrix’ for this dynamic interrelated system: “This body matrix is a network of multisensory and homeostatic brain areas. That is, it is a dynamic neural representation that not only extends beyond the body surface to integrate both somatotopic and peripersonal sensory data, but also integrates body-centered spatial sensory data and then integrates the whole lot with homeostatic and motor functions” (Moseley 2011). In this way, we organize our movement based on our perceived potential for action in the world – our agency (Holmes and Spence 2004). Perception is shaped by multiple experiences, including emotions, beliefs, memory, and culture. If our perception is that we are deficient because our spine is not ideally shaped, and therefore we must hold ourselves as close to that ideal as possible, then our movement capacity corresponds to that belief. We lose adaptability and connectedness related to movement, task, and environment.

Often, Colette was injured by seemingly random pedestrian actions. She took a cast-iron pot off the stove and strained her elbow; sprained her ankle stepping off a curb; and pulled back muscles while organizing a closet. The frequency of these occurrences created exasperation about the lack of an explanation and a sense of distrust in her body. They also increased her resolve that “straighter” would provide the remedy.

Considerable research – and money – has been devoted to identifying the etiology of AIS. By identifying the origin, researchers hope predictions regarding progression and appropriate treatment will improve. To date, the two leading professional scoliosis research societies, SOSORT and SRS, agree that the etiology of scoliosis is multifactorial, and because it tends to run in families, there
is a genetic basis, yet the full etiological mystery remains unsolved. A 2011 review of the literature reports previous and ongoing etiological hypotheses related to abnormalities of genetics, spinal growth, postural control, intervertebral discs, connective tissues, hormones, melatonin, in utero visceral rotation, the autonomic nervous system, muscle tonus, minerals, and neuraxis growth (Séze and Cugy 2011). Various disciplines conduct research and investigate hypotheses; however, until recently many studies have suffered from small sample populations, inconsistent reporting, discipline bias, and lack of established guidelines. SOSORT and SRS are working together to improve these practices. Even with these research difficulties, many topics have implications for Roelfers in working with clients, scoliotic or not.

Proprioception, Postural Control, Postural Sway

Since the late 1970s, there have been studies investigating the role that certain aspects of body schema, especially faulty proprioceptive postural control, may play in AIS. In 1984, Herman et al (1983) published an article in the journal of the SRS, Spine, that postulated a relationship between IS and a proprioceptive recalibration of the internal representation of the body in space, so that a “non-erect vertebral alignment may be erroneously perceived as straight.” Robert Schleip (2000) describes a study in his article “Scoliosis and Proprioception,” that links proprioceptive dysfunction in the upper extremities to the presence of scoliosis (Keessen 1992). The researchers found no correlation between the degree of curvature and the degree of inaccuracy; so, the presence of proprioceptive dysfunction was suggested as a causal factor in scoliosis.

Since these earlier studies there have been many others investigating faulty proprioceptive postural control and the development, progression, and treatment of scoliosis. ‘Postural control’ is a term used by researchers to describe the role of proprioception for the dual purposes of stability and orientation. Postural control – or as we might say, ‘orientation embodiment’ – allows us to balance, calibrating our center of mass over our base of support, and orient appropriately within our environment. Hubert Godard offers a more comprehensive and dynamic vision of this phenomenon in his theory of tonic function. [If you are unfamiliar with Godard’s tonic function theory, see Newton (1995) and Frank (1995).] Postural sway describes the small oscillating movements that humans make while standing, in response to breathing and orienting with a relatively high center of mass.

Recently, Swedish researchers (Dufvenberg et al. 2018) published findings from a review of eight case-controlled studies (of 917 filtered for inclusion and exclusion criteria) linking proprioceptive postural instability with the occurrence of AIS. Nine of these studies qualified for meta-analysis. The research team explained the background reason for this review as: “postural stability deficits have been proposed to influence the onset and progression of AIS.” The chosen studies, conducted from 1978 through 2013, utilized a force plate to measure ground reaction forces that represent the sum of pressure distribution under the foot in quiet standing balance. The studies included adolescents aged ten to eighteen years with IS without surgical or brace interventions. The review found increases in range of oscillation and amplitude of sway in AIS patients compared to the control group. According to Dufvenberg et al., these increases correlated with a center-of-pressure positional shift posteriorly in the sagittal plane in persons with AIS.

This may be significant for the progression of AIS because biomechanical studies suggest that the human spine becomes more rotationally unstable with increased dorsal shear loads on the thoracolumbar spine. The review also cited a sensory-integration hypothesis that indicates a presence of impaired dynamic regulation of sensorimotor signals due to inaccurate weighting of sensory inputs in AIS. Our body schema relies on ‘weighting’ or filtering sensory inputs to activate the most efficient and effective postural motor adjustments. Impairment in proprioceptive signaling may create uneven tension in muscular and ligamentous structures, which may also exacerbate curvatures (Dufvenberg et al. 2018, 15-16).

Gerda Alexander, the creator of Eutony, named her work based on healthy tonus, describing it as “harmonious, well-balanced tension” (Alexander 1985) and discusses tonus regulation underlying adaptability in postural reflexes and equilibrium (Bersin 1983). Alexander describes tonus as the system by which humans feel and react; it provides the capacity to adapt to the reality of the moment, interfacing our inner state with the movement dynamics required by a given situation. In scoliotic clients, we may see uneven tonus regulation, not exclusively in the muscles along the spine, but also throughout the body, including diaphragms, tendons, ligaments, and membranes, resulting from the scoliosis or from compensatory strategies.

As far as compensatory strategies, such as those I observed with Colette, Dufvenberg et al. (2018, 15-16) recognized that “what clinicians see in their evaluation of postural control is the net result of the disease process and the person’s compensatory strategies in terms of behavioral components and adaptive plasticity in the nervous system.” They pointed out the need to identify the compensatory strategies because they may not be optimal or effective. The findings of this review support investigating postural stability and sensory integration in early stage AIS with the prospect of identifying cause and effect of the curvature, as well as the effectiveness of postural control in scoliosis progression.

PART II: CLINICAL CONSIDERATIONS

Research and Inspiration for Our Work

The art of our work lies in the inspiration we gain from scientific research studies in application to our clients. My inspiration from the Dufvenberg et al. study is the importance of engaging scoliotic clients in active sensorimotor activities as a way to rehabilitate proprioceptive signaling. I am reminded of the tuning boards created by Darrel Sanchez, the cranial beanbags of Esther Gokale, the Franklin Textured Ball™ of Eric Franklin, and the use of tools – sticks, balls, and bands. In order to be effective, these activities must be coached for their rich sensorimotor content, as opposed to a performance-oriented approach. For example, clients being guided toward experiencing the weight of the beanbag, and away from the challenge of balancing it; trying this, the beanbag may drop, and in the dropping there is valuable sensate information. Similarly, the tuning board is about experiencing shifts in weight and feeling how the whole body responds, rather
than the task of maintaining balance. I described a sensation-based Franklin Textured Ball exercise in an earlier article (Carlis Mills 2018). The Dufvenberg et al. study also illustrates the need to cultivate structural and coordinative ease both within the thorax and in relation to pelvis and shoulder girdle. No matter the degree of thoracic scoliosis or hardware installed, it’s possible to work with interventions that create fluidity in these relationships such as multidirectional micromovements, bidirectional senses, and spatial perception to foster ease in breathing and adaptability in postural strategies. I am further reminded of the importance of the segmental congruence of the vertebrae that transition between lumbar lordosis, thoracic kyphosis, and cervical lordosis. Godard (2009) emphasizes the function of the transitional vertebrae as key to full movement capacity. In scoliosis, there may be multiple variations of transitional vertebrae following the rotational torsion patterns. It’s important to consider the spine as a three-dimensional congruent whole in order to develop the capacity for movement initiated in one direction to cascade responsively through the entire spine. If necessary, the movement can be small or even coached energetically. It is critical that the apices of the curvatures do not become the default habitual hinges for initiation of lateral and anterior-posterior spinal movement.

Lastly, I am reminded of the image that humans live on a sensation-rich continuum between earth and sky; this embodiment is a key resource for our movement potential.

Ideal and Imperfection

Another piece of work that is necessary with scoliosis is a process of re-embodifying, or reclaiming the body from the pathologizing scoliosis diagnosis and the disembodied template of ‘straightness’ it often imposes on posture and movement. Often IS begins to show up at the beginning of puberty, a powerful developmental time bringing uneven growth spurts and shifting hormones that produce dramatic physical and emotional changes. At the same time, social pressures are most intense. Being accepted and included within one’s peer group is perceived to be of primary importance. Often we go to a different school, involving a sorting of new social structures along with intense pressure to conform. Our world and our body are dramatically changing. Streams of new sensations, thoughts, and feelings merge with changing demands and expectations from our family, friends, and environment. In case you have forgotten, Bo Burnham’s movie, Eighth Grade will take you right back there.

In many communities, there are still routine school screenings for scoliosis, a practice that brings the topic into social conversation, with potential for speculation, comparison, anxiety, and humiliation if one receives a flag for possible scoliosis. Adolescents are at a critical stage regarding the development of self-concept, and those with scoliosis have a constant reminder that their own may not be as ‘perfect’ as those of their friends. One young blogger said that she felt like a “monster,” with her “rib hump.” An older blogger said she had never danced nor worn a bathing suit in public.

Colette was initially flagged in 1975 by a school screening exam using the Adams Forward Bend Test. This test involves a health professional observing the patient bending forward at the waist 90° with arms stretched towards the floor and knees straight. The practitioner observes for signs of asymmetry such as: one shoulder, scapula, hip, or side of the rib cage appearing higher than the other – or an uneven waist or body tilting (D’Alessandro 2017). This was at the height of two alarmist poster screening campaigns in the U.S.: “The Dangerous Curve” and “Straight as an Arrow?” (Linker 2012). U.S. school posture and scoliosis screenings began as an early twentieth century practice to identify skeletal deformity linked to poliomyelitis and tuberculosis. Once these diseases were eradicated, the practice of school screening continued to be promoted, even though the exact nature of the health risk was unclear. These campaigns often relied on alarmist messaging linking scoliosis with bad appearance and ill health.

Orthopedic surgeon John H. Moe, an early adopter of the Harrington rod, founded the SRS in 1966. According to medical historian Beth Linker (2012), Moe and colleagues “simply adopted disease-related treatments and applied them to a non-disease related spinal deformity, with few questions asked about the medical and scientific validity of such a transference.” Moe advocated a “do not delay” campaign for universal screening, promoting the belief that undiagnosed and untreated curves, no matter the degree, could lead to children having to endure radical surgery. According to Linker (2012), “Instead of emphasizing the limits of surgical intervention (or even the necessity of it) for AIS, Moe and his colleagues shifted the blame to recalcitrant parents, uneducated physicians, and obstinate adolescents, making anyone but themselves responsible for bad outcomes.”

During this era of medically imposed fear and guilt, along with confusion about the difference between transient or mild spinal curvatures and those that progress to morbidity and disfigurement, Colette was diagnosed with scoliosis. Colette’s radiology report likely read something like this: Standing AP and lateral views of the entire spine demonstrate an arcuate thoracolumbar scoliosis with a leftward convexity. No associated vertebral abnormalities are noted. Using the Cobb technique, and measuring from the top of the T9 and the bottom of the L3 vertebral bodies, this angle measures 24°. The apex of the curve is at the T12 vertebral body and demonstrates grade 2 out of 4 right rotation. The iliac apophyses are complete along the iliac crests, but have not yet fused with the ilium, indicating that the patient has not yet reached skeletal maturity (Richardson 2018). Colette told me that her mother interpreted her scoliosis to mean that she was “imperfect.” When I met her, Colette had been “fighting her curvature” for forty-five years; she said it was exhausting, but she would continue to fight. The symbolic power of fighting for a ‘perfectly straight’ spine as counter to a deadly and disfiguring disease makes Colette’s collection of postural corrections and desire for validation of their effectiveness understandable.

As we know, the influence of our history, culture, and beliefs is experienced and seen in our postural and movement patterns. When a fixed aesthetic ideal governs one’s process of embodiment, especially when it involves posture, there is disharmony between the postural ideal, ease in movement, and responsive tonic function. When we are in harmony with gravity, and responsive to the immediate context, we may say that our movement is in a dynamic state of ‘flow’. We coordinate muscular activation appropriate to successfully meet the demands of the context without excessive effort. Our body is secure in its sense of shifting weight and spatial location because we are actively engaged with the environment. However,
when an overlay of an ideal image (flat stomach, military posture, tucked chin, wrapped ribs, straight spine) is valued and reinforced enough to become habitual and patterned, our dynamic state of flow will be inhibited. We may disrupt our sensorimotor response to orientation by imposing one based on an ideal, a thought. Godard (1993) describes controlling the masses or blocks of the body as “the beginning of the end of movement.” We could also describe it as a movement from embodiment to disembodiment.

**Body Image and Body Schema**

The work of re-embodiment – reclaiming the actual body from these attempts to impose an ideal – involves work with body image, body schema, and peripersonal space. Within the fields of neuroscience and psychology, the terms ‘body schema’ and ‘body image’ have often been used interchangeably, while at other times they have been meticulously differentiated. The term ‘body image’ was coined in 1935 by Paul Schilder MD, and the first line of his definition is often quoted by psychologists: “The image of the human body means the picture of our own body which we form in our mind, that is to say, the way it appears to ourselves” (Schilder 1950, 11). However, his definition went on to include aspects that are commonly attributed to body schema: “There are sensations which are given to us. We see part of the body-surface. We have tactile, thermal, pain impressions. There are sensations which come from the muscles and their sheaths – sensations coming from the innervation of the muscles – and sensations from the viscera . . ." (Schilder 1950, 11) Shaun Gallagher and Jonathon Cole (1995) made a conceptual distinction between body image and body schema in describing the rehabilitation of a deafferented patient, who, in short, lost properties of her body schema, yet her body image was able to compensate. They said, “Body schema involves a system of motor capacities, abilities, and habits that enable movement and the maintenance of posture,” and concluded that this takes place largely in the unconscious. In contrast, they defined body image as "a complex set of intentional states – perceptions, mental representations, beliefs and attitudes – in which the intentional object of such states is one's own body. Thus the body image involves a reflective intentionality.” French neuroscientist Jacques Paillard (2005) supported a cooperative relationship between body schema and image; he suggested that body image derives knowledge from the appropriate action of the body schema “interfacing the cognitive brain with its external world.” He proposes a mental self, grounded with motivations and emotions, aware of his presence as a “self-owner” of his body space, and “accountable of his own purposeful action in the world.”

Body image is a prevalent topic in scoliosis research and treatment. The medical usage of the term ‘body image’ has a slightly different connotation than the neurophysiology body image/schema discussion; it implies valance – a positive or negative attitude to how we perceive our bodies. In this context, the term, ‘self-image’ is frequently substituted for body image. This usage of body image is shared by other psychologically oriented fields such as the study of eating disorders and gender studies.

Adolescents often place great emphasis on how they believe others see them, and shape their body image in response. While mirror image is classically developed as a toddler, the typical adolescent seems to cycle through a more intense version of this phase, especially because the social stakes are higher. Philippe Rochet and Dan Zahavi (2011) describe the mirror phase as “the realization that I am exposed and visible to others . . . I am seeing myself as others see me. I am confronted with the appearance I present to others.” At this time of life, as their world expands, adolescents are prone to influence by the cultural body image, with ideals cultivated by various social and aesthetic standards, often driven by mass marketing and social media. Body image incorporates experiences, memories, assumptions, beliefs, comparisons, and attitudes about one’s appearance. Most relevant research studies have documented a higher proportion of self-criticism, negative body image, low self-esteem, anxiety, depression, and personality disorders among those diagnosed with scoliosis.

I am struck by the similarity of Dubousset’s naming of scoliosis shapes (bulging, hollowing, protruding, missing, penetrating) to those described by psychiatrist and Laban Movement Analyst Judith Kestenberg to depict body-contour changes (bulging, hollowing, narrowing, widening, shortening, lengthening) expressing affective relations of self with others and environment. Rudolf von Laban described breathing in terms of bodily shape flow alternations between growing and shrinking (Bartenieff 1980). Kestenberg went further to develop a system of movement analysis, the Kestenberg Movement Profile (KMP), linking observable movement patterns with psychological needs, affect, temperament, learning styles, defense mechanisms, and relationship dynamics. Her observations included primordial needs, feelings of comfort/discomfort, and attraction/withdrawal to correlate meaning with movement (Kestenberg 1967, 356-357). The KMP describes tension flow rhythms as alterations between free and bound flow that are also expressive of needs. Bound flow is a restraining movement pattern that occurs when agonist and antagonist muscles contract simultaneously. Free flow is a releasing or joining movement whereby there is no counteraction of the antagonist while the agonist is contracting. Tension flow is linked to self-regulation with bound and free flow associated with feelings of caution/danger/displeasure and trust/safety/pleasure respectively (Koch 2014).

Godard describes controlling the masses or blocks of the body as “the beginning of the end of movement.” We could also describe it as a movement from embodiment to disembodiment.
Adolescence is characteristically a dramatic time of trial and error with uneven hormonal surges coupled with social tensions and new situations. Often there is inner confusion, distress, and recalibration. Kestenberg describes adolescence as a prolonged period of development – a stage of reorganization of the past and preparation for the future, when earlier developmental phases are revived, but with a more complex ego, advanced intellect, and a less restricted social situation (1967, 426). One might have an inner drive to bulge, widen, and move forward to join, but retreat, narrow, and hollow if met by rejection. Or one might feel conflicted by competing inner drives and external demands, resulting in conflicting shape and tension flow changes. Dubousset describes structure – human architecture that he feels with his hands. Kestenberg describes function – the dynamics of human movement. In the context of Rolfing SI, we often cite the time-space relationship between form and function. It is understandable that as a human is in a process of growing upwards, while navigating unfamiliar sensations and circumstances, the symbolic home of the Self – the spine – might take a few twists and turns along the way. For most, this is a minor or temporary detour, but for a few, it becomes a long-term condition that shapes the relationship they have with their body.

Paris Opera Ballet prima ballerina Marie-Agnès Gillot was diagnosed with double scoliosis at age twelve and retired from professional performance at age forty-two. Throughout her acclaimed career, she danced with broken bones, battled double scoliosis, and continued to rehearse en pointe while seven months pregnant. Gillot is quoted as saying, “Discipline is the cornerstone of freedom” (Wilkens 2009). College student Rebecca Dann chronicled her severe scoliosis and surgery with a series of stunning photographs titled *I'm Fine* to “explore beauty and the media and dating with a disability” (Dann 2016). She received a photography award presented by Stephen Hawking. A web search including scoliosis+tattoos reveals realistic and abstract artistic tattoos to highlight or cover scoliosis curves and scars, some transformed into butterflies, elephants, or flowering vines, many with the expression bent, but not broken.

### The Impact of Questionnaires on Treatment

There has been increasing use of patient-reported questionnaires designed to measure subjective body perceptions, emotions, and health-related quality of life in AIS patients. Recent trends indicate their application for surgeons in recommending treatment and determining the success of their outcomes. Conservative scoliosis practitioners use them to recommend the type of brace and implications of bracing, especially compliance (Carrasco and Ruiz 2014). Examples of body-perception questions are: Do you feel attractive with your current back condition? Do you feel self-conscious about your body? How do you look in clothes? Do you wish to change certain aspects of your body? Most questions are multiple-choice and ask patients the one best answer from a bipolar range. Several questionnaires ask patients and their parents to choose from a range of drawings of the trunk, spine, or rib hump appearance that corresponds with their experience. Several studies on these questionnaires indicate that AIS patients perceive the magnitude of their deformity, especially rib hump, to be worse than measurements. Notably, Goldberg et al. (2001) stated, “It is the rib hump that the patient is unhappy with, not the value of the Cobb angle.”

One study designed and implemented by Rebecca Jacobson, a high-school student enrolled in an AP Capstone Research Program, caught my interest. It was published in the *Journal of Spine & Neurosurgery* in 2018. She used the causal-comparative method with a sample size of thirty-four high-school girls, twelve with AIS. She found that most girls, with or without AIS, had a negative view of their bodies. If given the choice, they wanted to change something. Most hid their torso with clothes. Interestingly, most – scoliotic or not – were more concerned about the appearance of their stomach, rather than their torso (Jacobson 2018).

The SRS-30 Questionnaire is most widely used to compare body perception postoperatively. A review of the AIS research literature from 2007-2013 showed that appearance is the domain most improved following surgery, and this strongly correlates with rib-hump correction. Researchers Carrasco and Ruiz (2014) stated, “Surgeons regard aesthetic appearance as grounds for surgical intervention and rib resection is increasingly being used for this purpose.”

The authors noted that the surgeon’s assessment of the cosmetic outcome often does not coincide with that of the patient and stressed the need to inform patients and relatives of objectives and expectations and that these must coincide with the patient’s needs. A recent study published in the *European Spine Journal* cited a rapid increase in the incidence of scoliosis surgery, especially in AIS cases, during the past fourteen years (Heideken et al. 2017). This correlates with the increased role of patient questionnaires in treatment decision-making. Because adolescents go through rapid changes in their physicality, and are also going through a pivotal, and sometimes turbulent, time in the development of their self-image, this life stage may not be the best time for long-term decisions. For example, one scoliosis blogger wrote that wearing a back brace was tantamount to a death sentence. Daily exercises can be a burdensome time commitment, and surgery in contrast may seem to offer the option of a quick improvement in appearance. Comprehensive long-term studies have not been completed, but the few that are available show a correlation between self-perception and spinal fusion surgery to be higher in the appearance domain and lower in the domains of activity and self-esteem. This seems to correlate self-esteem and our ability to move freely through our world. And no surprise to SI and Rolf Movement practitioners, studies show evidence of disc degeneration in the unfused areas.

### Braces and Exercises

The research society SOSORT is dedicated to conservative management of scoliosis, including braces and physiotherapeutic scoliosis-specific exercises (PSSE). A 2013 clinical trial, *Bracing in Adolescent Idiopathic Scoliosis Trial (BrAIST)*, demonstrated strong evidence that bracing significantly reduced the progression of high-risk curves with increased duration of wear (Weinstein et al. 2013). Shortly thereafter, SRS, which had previously leaned toward surgical options, updated their position on conservative management to include a stronger advocacy for bracing, PSSE, and other non-fusion techniques for mild to moderate scoliosis.

It’s no surprise that braces and rehabilitation exercises are rarely considered sexy or glamorous, especially by young people, so some may have difficulty complying. (The
standard prescription is to wear a brace twenty hours per day.) Helping brace-wearing adolescents feel more personal agency can make a difference in their compliance. Some may engage with the engineering and technological aspects, others may respond by creating brace art, or participating in web groups such as: Curvy Girls (www.curveygirlsscoliosis.com) or Scoliosis Stories (www.scoliosisstories.webs.com). The website Embrace Your Brace offers clothing advice (www.embraceyourbrace.com).

In sessions with brace-wearing adolescents, I find it useful to spend some time working with the brace on. Sitting work is a good time to encourage a sense of whole-body connectivity: as they connect with the ground, bench, and space around them, what happens if they sense themselves touching the brace, instead of only the brace defining them? What movement is available within their torso with the brace? Where does the movement of breath travel? How is breathing when they are connected to the ground through their feet? We may have conversations about what the brace is telling them and what they are telling their brace – some name it or develop images. If the brace is accepted and integrated into their body schema, compliance is less difficult. I have seen the brace become a reassuring friend, instead of a dreadful obligation.

In 2016, the journal Scoliosis and Spine published a comprehensive review of seven major methods for scoliosis-specific exercises: the Lyon approach from France, the Katharina Schroth Asklepios Center approach from Germany, the Scientific Exercise Approach to Scoliosis (SEAS) from Italy, the Barcelona Scoliosis Physical Therapy School approach (BSPTS) from Spain, the Dobomed approach from Poland, the Side Shift approach from the United Kingdom, and the Functional Individual Therapy of Scoliosis approach (FITS) from Poland (Berdishovsky et al. 2016). The shared characteristics of these methods are:

- They teach three-dimensional self-correction exercises.
- They include training for active daily activities.
- They show evidence of stabilizing the corrected posture.

The methods are a combination of exercises, breathing techniques, manual therapy, and bracing practices. (I have only witnessed training in the Schroth method and have read about some of the others.) Even though they are challenging and time consuming, they offer patients a proactive option to address their spinal curvature. Often, doing something feels better than passive watchful waiting. Whenever exercises are performed for any reason, especially with the specificity, repetition, and duration of these, it is essential to engage in sensory awareness and foster haptic connections with the environment in order to stay alive in the movement. Coaching an enlivened connection to ground and space in anticipatory postural activity (APA), also known as pre-movement, is key, along with generating renewed curiosity about sensation throughout the action.

Back to Colette and ‘Straighter’

So was Colette ‘straighter’ through the adjustments she demonstrated for me? Sure, her spine appeared to be straighter, as long as she was standing still, but this visual ideal was very expensive to her capacity for ease and efficiency in standing. There was evidence of holding in her feet as they worked to manage the shifts in weight distribution from above. She took small nips of air in and out, as if anything more natural would disturb her posture. There was tension in her neck and face reflective of the effort below. Difficult to describe, yet profound to see, were the effects of her lack of authentic connection to the ground and space around her. It felt as if Colette’s presence began and ended within the confines of her embodied image. I felt stilted in my ability to relate to Colette, as if her image formed a barrier that communicated, “Either tell me that my spine is straighter or say nothing at all.”

Of course, the effort and awkwardness intensified when she walked. With fixed focus, she seemed to wear blenders. Instead of relating to the ground, she pulled the ground. Her arm swing was a separate action unrelated to the rest of her, and her lumbar and cervical lordoses were more fixed than mobile. When asked about what she was sensing as she moved through space, she seemed to lack tolerance of the question and wanted to engage in, “Am I straighter now?” At this point, her image was in charge, limiting the primacy of the sensory information necessary for building proprioception.

Each of us might handle this situation differently with a client in our practice. For me, it was a matter of unlocking the hold this ‘straight’ image had on Colette without negating her experience and years of investment in trying to find solutions for her musculoskeletal issues.

Compare and Contrast

Reflecting back, I explained the primacy of movement over position, balance over symmetry, and dimensionality as a way to find ease in verticality. We worked with experiences of each of these concepts for comparison with her old patterns and to help her build different experiences of embodiment. I guided Colette toward awareness of her internal sensations with and without her ‘invisible brace’. We worked with movement to facilitate new coordinative pathways that didn’t evolve from the ‘straighter’ position, but rather from a sensory relationship with the ground and space. My hope was that as Colette expanded her movement vocabulary to find resources in experiences other than being ‘straighter’, she would also describe herself in terms other than being scoliotic or straight.

Sensation as Support

A breakthrough happened after I returned from studies with Hubert Godard and was inspired by the work he did with me and with a colleague. (Note: I am not attempting to describe his work, nor indicate a specific technique or protocol, nor suggest that my work as discussed here is representative of his work.) The process with Colette, described below, lasted over the course of several months; a given step may have taken several sessions. During some sessions, we would stay with the process more, others less, and then go to table work.

I began by asking Colette to allow herself to “have her scoliosis” – to allow her body to go where it wanted to go without interference – a kind of meeting. Instead of fighting or fixing, I asked her to allow herself to be with her scoliosis through direct experiencing or matching – being inside the shapes, twists, bends – allowing them. Of course, at first she looked puzzled, was resistant, and told me reasons why she should not. However, slowly and steadily, with reassurance that she would not be left there forever, she reluctantly agreed to try. We began in supported sitting, and with hands and
words, I asked her to gently release the holding in her rhomboids that was pulling her tightly upright. I asked her to allow herself to follow that release . . . and waited. Then I told her it was okay to let go of the area around her solar plexus. Understandably, her first attempts were fairly superficial and she would pop right out again, asking me what we should do next. The going was quite difficult, so I suggested small rocking types of micromovements to explore releasing into gravity, first her rhomboids, then her solar plexus. We continued, and after some time her neck released slightly and her head eased forward. As we explored this gently, she began to soften and release gradually into her scoliotic shape – superficially, at first, then gradually more deeply . . . sensing her weight, her breath, and her presence; what was moving. Each time, we focused on building the sensation of her feet listening and opening to the ground and the shifting weight of her pelvis on the chair as the basis for her return to uprightness. We built the ground as the sensate basis for her support instead of the learned holdings in her middle.

Some days we moved more quickly to table work than others, but gradually Colette was able to stay with the process longer. Each session we began by returning, deepening the experience, slowing it down, and describing sensation. As Colette was more able to sense her relationship to the ground as a resource for security, we also worked with her awareness of the space and objects around her as she moved toward uprightness.

This process was the beginning of Colette experiencing herself moving, liberated from an ideal image. But first, she needed to experience the sensation of her shape, as lived through her body, instead of fixing or fighting it – parts against other parts. How can you release a whole pattern when you don’t recognize the wholeness in the first place? Often our work is so powerful in its ability to create change that we can easily forget an important first step: allow the client to recognize where s/he is. We all have versions of Colette’s ‘straighter’ body image that drive our standing and movement; holdings or inhibitions that interrupt our ability for harmonious tonus. Bringing awareness to the sensations involved in our body just being, without all the extra effort, may provide a pathway for finding responsive connection with self, other, and environment. In this way our body schema may provide the therapy our body image needs.

None of this was quick or easy. It was a process based on trust, not a technique or protocol. It provided a collaborative frame for our work together, allowing me to fine tune fascial, visceral, or osseous manual techniques performed on the table relevant to Colette’s ongoing process of remapping her orientation embodiment. On a good day, Colette described feeling free and connected. Often her image would catch her midassage and so we would back up or start again. Gradually she began building strength, resilience, and continuity in connection. She could sustain a little uncertainty without locking her ‘brace’. After having a minimum of one injury every several months, she hasn’t had one in six. Colette enjoys traveling and recently danced at a wedding. She is committed to a daily practice that reminds her to connect with the sensation of her self – now – embodied.

Thank goodness this story doesn’t have a ‘perfect ending’. I’m sure you have guessed: following a session, Colette will occasionally turn to show me her back and say, “Come on Rebecca, just tell me, am I straighter?”

Writing this article has been exciting and a little humbling. It was compelling to explore different perspectives on scoliosis, from spinal surgery, to public health, to support blogs. My goal was to enter domains with an open mind, and I found each to be uniquely compelling. Also, it was eye-opening to recognize that the central tenet of our work – how human beings embody our relationship with gravity – is often marginalized or missing from mainstream scoliosis theories and treatments. However, this also reveals the potential of our work – provided we communicate our message appropriately and make meaningful alliances with other professions. The 14th International SOSORT meeting is April 25-27, 2019 in San Francisco (https://bit.ly/2yXhqFI). I encourage those of us with interest or expertise to attend.

Rebecca Carli-Mills became interested in somatic movement studies while pursuing BA and MFA degrees in dance. She earned certification in Rolff Movement Integration in 1987. In 1989, she became a Certified Rolfer and in 1992 a Certified Advanced Rolfer. In 1994, Rebecca graduated from the Pennsylvania Gestalt Center for Psychotherapy and Training and joined the Rolf Movement faculty of the Dr Ida Rolf Institute™. Rebecca’s understanding of gravity and human movement potential has been enriched by her long time studies with French movement expert Hubert Godard, PhD. Additionally, she draws from her training in craniosacral, energetic osteopathy, dance kinesiology, and a wide variety of somatic movement modalities. Rebecca teaches courses through the Dr Ida Rolf Institute and has a full time Rolfling and Rolf Movement practice in Chevy Chase, Maryland.

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Containers and Contents – In General and in Relation to Scoliosis

An Interview with Peter Schwind

By Anne Hoff, Certified Advanced Rolfer™ and Peter Schwind, Basic and Advanced Rolfing® Instructor

ABSTRACT In this interview, conducted in September 2018 when he was in the U.S. to present at the Rolf Institute® Membership Conference, Peter Schwind discusses his ongoing work with harmonizing the cavities of the body and their contents. Specific attention is given to a discussion of this in relation to scoliosis.

Anne Hoff:
Thank you for what you wrote for the “Ask the Faculty” column about scoliosis (see page 7), and I’m glad we have a chance to speak in more detail. It sounds like many factors can be involved when a client comes in and asks for help with scoliosis.

Peter Schwind:
It’s helpful at the beginning to know something, what we know nowadays, about how scoliosis develops and how it manifests. As a beginning Rolfer almost forty years ago, I thought that the rotations and the irregular curvatures of the spine were very important, and that the different development of muscular and fascial layers manifest in the back were very important, and that they are the scoliosis. But I was a little bit disappointed with my results when I did practical application of the ten-session Rolfing Structural Integration (SI) series. Then when I got in contact the first time with craniosacral therapy, and then also with authentic cranial osteopathy, I thought that’s the key to scoliosis, because like everybody I found very typical motion restrictions inside the cranial system and also spatial irregularities. But after a while [of working with that], I was disappointed again.

Then I slowly realized that there are different kinds of scoliosis, and the key in the development of those different types of scoliosis, the key for treatment, is how the scoliosis manifests as a very specific three-dimensional arrangement of inner spaces inside the cavities of the body. It’s not just about treating visceral motion restrictions. I think in many, many of the scoliotic manifestations, there’s a spatial dialogue between unilateral motion restriction of organs and the structures inside the craniosacral system, but this develops – the first steps of it – very early in embryological life.

I published my first treatment (technical) book, about fascial membrane techniques, in 2001; that’s seventeen years ago. In the chapter that discusses scoliosis, I described how I speculate that in up to 60% of scoliotic people the stomach has never found its place under the left side of the diaphragm, that it’s still in the middle and totally fixed together with the liver, with the main
space of the liver on the right side of the body. This kind of reality originates very early, in the third month of embryological development, when the embryo is only maybe 6 - 6.5 centimeters tall. At that moment, the esophagus and the stomach and the duodenum are like a straight little pipe in the middle of the body, and the stomach is a thickening in the middle of that pipe. Then during the latter days of the third month, the backside of that little thickening, the stomach, has to rotate anteriorly and move to the left side of the body and grow into the peritoneum. In those people who develop what I call ‘stomach scoliosis’, this movement of the stomach has not happened. The stomach remains in the middle of the trunk. There is a similar type of scoliosis where the liver is a little bit too much on the left side of the trunk. The ones with the stomach we can treat much more successfully than those with the liver; the liver is much more rigidly fixated by many ligaments, while the stomach is somewhat more mobile.

I had confirmation of my hypothesis about ‘organ scoliosis’ when I was able to observe the scoliosis of a grandmother, mother, and young daughter who all had the same scoliosis. The mother had to have an abdominal surgery, and the surgeon reported that when he opened the abdomen, the stomach was totally fixed to the midline towards the right side of the body, and to the liver. He cut the lesser omentum and a few other parts of the intraperitoneal structures and the stomach moved to the other side. I checked the client three months later, and the curvatures of the vertebral spine had lessened almost 50% because of this surgical intervention.

However, we have to be careful. It is not just the topography of the intrabdominal organs that comes into play (Figure 1). There is an interaction with certain spatial torques inside the cranium also. The big challenge is not to straighten the trunk too much. The least important is the back and the vertebral spine. That’s the area where the scoliosis shows on the outside of the container, at the level of the musculoskeletal system. I am convinced that the deepest manifestation of scoliosis is inside the inner spaces, the inner cavities. It may be inside the thorax, we could call that a ‘high scoliosis’. And, of course, a scoliosis has an effect on the whole tensional situation of the dura. Good old John Upledger said – and it’s still valid nowadays – you have to open the upper end and the inferior end. You have to open the transition between the sacrum and the coccyx, and you have to open the transition between the axis, atlas, occiput. The curvatures happen in between. You have to open above and below at the beginning and the end of the treatment. I think that’s still very, very good advice.

I was very disappointed by my early belief systems when I thought that [scoliosis related to] one certain dimension of the body, and that the spine and the back, or just the craniosacral system, or just the visceral system, was the most important. Nowadays, after almost forty years of practice, and observation of some of my clients over that period, I have realized that we have to be quite modest, we have to be aware that scoliosis manifests all over the human organism, and it’s a deep inscription in how the person orients in space in a tactile way and a visual way. That’s why I think Hubert Godard can successfully do his work on the level where he, for example, blindfolds one eye and has the person move. I think it’s extremely interesting to look into scoliosis from the perspectives that Hubert has opened for our profession.

AH: It sounds like a practitioner has to understand Rolfing SI, and visceral, and cranial work, but then that s/he also has to relate to all of those in a very different way, relating to the spaces.

PS: Exactly. I think that’s most important, and also we have to be aware that scoliosis is inscribed in the whole system very early, before you see it from the outside. I always thought that it’s a genetic disposition, and actually this has found some confirmation in the latest research. It was – if I remember right - in 2016 that some research groups found a specific chromosome that is very active in certain phases of growth and is responsible for the scoliotic development. There are genetic orders for growth and some important ones manifest on the level of the endocrine system. Scientists have documented how the injection of certain hormones into the body of fish will make them develop a scoliotic pattern.

But there is a much more global reality to be looked at: even considering just the outside of the body, the shape of the ‘sleeves’, we find spinal curvatures from the sagittal perspective, that are different in African cultures or Brazilian cultures compared to Asian cultures like Chinese or Japanese where you have less pronounced curvatures. That’s a simple example. Also there has been some new research about the role of the organ anatomy, that the genetic orders that happen during growth for the organs to find their right position, that plays a very, very, very dominant role. In 2016, besides the genetic research, there were some interesting publications from a group in Utrecht in the Netherlands about the role of the development of the anatomy, motion restrictions, the position of the organs inside the body, and how those relate to scoliosis.

AH: Even if it’s genetically driven, affecting embryological development, can you later in life get a change in the pattern, get the anatomy towards more optimal positioning?

PS: Yes and no. You have to really evaluate all the inner spaces, all the horizontal subdivisions from the thoracic inlet down to the diaphragm and the pelvic floor. You have to really be aware that even the vertical and diagonal ‘pipes’, the arteries, the veins, all those things, they are in a very specific condition in a scoliotic person. I learned from some sad experiences that an overcorrection of scoliosis – trying to make a scoliotic person too ‘straight’ – is not beneficial. We have to aim for quite modest goals. However, if we start very early, with a newborn infant, and if we do minimal corrections, maybe three times a year only, ten- to seventeen-minute sessions, then longer sessions after puberty, then we have a chance that the scoliosis will not fully develop and may even disappear almost 90%.

AH: You described a family where you worked with three generations.

PS: Yes. I treated the grandmother, then I treated the mother, and then her baby. When the baby arrived, an orthopedic doctor did an x-ray and said there is no scoliosis, the spine is totally straight. A pediatrician who is also a Rolfer – my colleague Anne Koller – and I found that’s not true. One of us would hold the pelvis and the other would hold the cranium of the few-weeks-old baby, and as we relaxed the baby there would be the whole shape of the scoliosis in the whole organism. I have observed this particular case of the girl for more than twenty years. We had to walk through dramatic challenges around her third year of life. There were times when we almost lost the courage to continue with our work. However, I just recently talked to her
mother again, who also has scoliosis, and she says that nowadays you see nothing in the daughter, even from the back. We checked, and tried to be as modest as we could in looking at the result. Even on x-ray, all you see is a little bit of soft side curvature. However, this can only happen if you start treatment very early with the baby, and apply only a small dose of treatment once in a while. If we correct too much towards the so-called ‘normal’, it will be risky. What was tragic, but taught us something good for our insight, is that her brother, who also has a scoliosis, was never treated young. I didn’t get to work with him until he was seventeen. Comparing him and his sister it’s really amazing. If the scoliosis manifests more clearly after puberty, it will change the shape of bones, especially in the rib cage. Once there’s this unique individual manifestation in the bones, we have to be very very modest in our work and our goals and it will take a long time to see a really positive shift of the whole spatial arrangement and the curvatures.

**AH:** It would seem like change has to be very gradual because the entire body has to adapt if it’s grown that way from embryology.

**PS:** I agree.

**AH:** You don’t want to change something and then have other parts of the body not able to catch up.

**PS:** What you say is really essential. I remember . . . once, during a workshop in the United States – way back – I did a demonstration session. I really tried to show a very drastic structural shift on all levels of the body during only one treatment. I wanted to show what is possible. I used techniques that some of us – including myself – might call ‘Stone Age Rolfing’ work . . . I made the person too straight, and while I was able to impress my colleagues, the person I treated was in misery for a very, very long time. Sometimes we learn more from our mistakes than from our successes . . . Unfortunately, there are also problems – once in a while – with the outcome of brilliant surgery. In the old days, they would take part of the tibia and put it alongside the spine, or they put in a rod. Nowadays surgeons intervene – and sometimes there is no other choice, they have to do that – in a much more smart way; they put titanium elements on two vertebrae, two vertebrae, all the way on both sides from the first thoracic vertebra down to the fifth
I think it’s very, very interesting to look at scoliosis, to think about scoliosis, and evaluate in the most critical way possible what we are able to accomplish and what we are not able to accomplish. I think that we really have to look at what researchers say, we have to look at surgeons’ experience, we have to look at what different bodyworkers do.

AH: It would be great if you could get your hands on the cranium of someone where they’ve done that and see if you find the shift that you don’t find with the surgical titanium.

PS: That would be interesting. I will try and get in contact with the surgeon who does this kind of work. There is also one researcher who claims that scoliotic people have unilateral attachments, extra attachments, of the dura inside the spinal channel. I do not know whether that’s true or not, but it may be true because I’m absolutely sure that some of the very, very dramatic forces that act in the scoliotic organism manifest inside the spinal channel. I’m quite sure about that.

AH: You felt that with your hands on the clients?

PS: Yes. I feel that with my hands. I think it’s very, very interesting to look at scoliosis, to think about scoliosis, and evaluate in the most critical way possible what we are able to accomplish and what we are not able to accomplish. I think that we really have to look at what researchers say, we have to look at surgeons’ experience, we have to look at what different bodyworkers do. We have a good chance, I would say, within the next three to five years to make some very relevant conclusions that will make our efforts as Rolfers and as instructors of our method much more beneficial for everybody.

AH: Can you say a bit to help readers in thinking about how to at least palpate some of these patterns you’re talking about? What are some ways people might relate more to cavities than structures?

PS: For traditional Rolfing work, it is helpful to use our traditional visual analysis, but forget about the outside contours of the body and think about the inner spaces – like the intraperitoneal space, the retroperitoneal space (which contains mainly the psoas, the kidneys, and the supporting fat of the kidneys), and the subperitoneal space. These three spaces in the center of the trunk, in everyday activity like breathing, should function like the inner space of a vertically oriented accordion. The inner space on both sides should be in balance when people move around, when they breathe. It doesn’t matter on which layer we work, so long as we support better expansion of the spaces that are compressed. We should respect some of the motion restrictions on the level of the vertebral spine. In a more regular physical structure we may eliminate motion restrictions, especially those that manifest bilaterally, they are unnecessary. But in the case of a scoliosis, some motion restrictions are necessary for stability so we have to be very careful in adjusting vertebrae in
relationship to each other. We have to sort out how much irregularity in joint mobility and restriction is helpful for the person, and how much of it is actually reducing a person's vitality.

AH: It seems like the inner cavities have to change first, then that need for stability might be less. Eliminating the joint restrictions without the inner cavities changing, you'd be messing with how that person knows how to hold himself together and function.

PS: Exactly. Looking at the 'column of organs' – as I call it, and as Jean-Pierre Barral calls it – if the column of organs supports the lumbar spine quite well, we can remove strain on an articular level of the vertebral spine – but only as far as this is supported from the front in the three-dimensional space. If you remove the restrictions between vertebral bodies, or between ribs and vertebral bodies, without having better support from the front, it won't help the person that much. When we work on one level of the organism from an anatomical point of view, you have to watch whether the other anatomical – 'spatial' – units say yes to that or say no to that. I think that's probably the best strategy. People say that Ida Rolf once stated, "Man is something build around a line!" – But what is the something around the line? The something is cavities relating to each other in the field of gravity. In my opinion, man is certainly not made by lines around a line. Well, we may speculate that cavities and pipes do relate to each other in curved planes. I do not say that we have no linear force transmission inside our organism. But the nonlinear force transmission inside the fascial spaces should never be neglected. When Jan Sultan introduced the notion of lines of transmission in the old days, this made sense, because he was smart enough to give his internal-external model a spatial dimension.

AH: Now you spoke about the percent of scoliotic cases that you think relate to this embryological pattern affecting the cavities.

PS: Of the stomach, 60%. Then there may be 12%-20% related to the liver's development. Then there are others which are more related to especially the heart inside the thorax, and others – not so many as I originally thought – to a sort of a torque inside the spaces of the cranium. While thirty-six years ago I would have thought there were problems on the sutural or membranous level of the cranium, now I would say it's on the level of spaces, because the scoliosis is manifesting even within the different units of the brain itself. If we correct only the container of the brain and we do not have elegant direct access to the brain and its nerves and arteries, we have a certain effect on the 'contents' – the brain – via the container but it's not profound enough. That leads to my favorite inspiration from the work of Jean-Pierre Barral about direct manual treatment of the brain and its nerves and arteries and all this kind of thing, which is different from the traditional cranial osteopathic approach. I'm not saying that's bad; cranial osteopathy, what Sutherland developed, is a very big step forward, but it's probably not the most important part of the game. Treating the container, the cranium and the subdivisions with membranes, in an intelligent way, as Sutherland did, you automatically do something good to the blood supply of the brain and also to the nerve connections, but – sometimes – it's not enough.

For me, it was always interesting to speculate that there is permanent interaction between the cavities of the body. So the craniosacral system and the inside of the cranium are not separate from the inside of the thorax and the abdomen. What most of us do not know is that when Sutherland, the founder of cranial osteopathy, taught his first course, many years before Jean-Pierre Barral, he taught visceral manipulation as part of the cranial work. There are photographs of that, of deep liberation inside the spinal channel. I'm not sure if Ida Rolf was aware of that because she talked so much about mobilizing L5 and S1 and many other aspects of the pelvic lift. But when Lloyd worked on me more than forty-five years ago with the basic Rolfing series, when he performed ten times a pelvic lift, six times I was deeply moved and four times I felt this incredible positive impact on the autonomic nervous system and I had the feeling that something inside my whole organism, very deep inside, went in flexion and extension. I didn’t have the anatomical and physiological knowledge in those days. – some forty-five years ago, I had no idea what was happening. Nevertheless I was quite desperate for a long time in the years after, because I couldn’t find anybody who could do this kind of pelvic lift for me. In my personal experience, most of us were only able to release compression between the lower part of the lumbar spine and the sacrum but were not able to affect the dura and the spinal cord. For that reason, prevertebral and postvertebral balance was accomplished quite rarely.

AH: Again you’re talking about the importance of multiple layers being affected.

PS: Multiple layers and cavities. Putting the inside of the cranium aside for a moment, the most interesting cavity is this very long cavity, the channel inside the spine, the spinal canal. Not only the dura but also the spinal cord live inside that space. We may call the contents of the two spaces, the contents of the cranium and the contents of the spinal channel, the most important core structures. Compared with these core elements, the psoas is a quite superficial muscular structure. This muscle is so important to move the leg, but it has almost no power to move our back. The anatomist Frank Willard had something quite relevant to say about this when he discussed the

The containers and the contents are in a permanent dialogue, a spatial dialogue, a tensional dialogue.
outcomes of his inspiring anatomical research at the Osteopathie Kongress Berlin 2018 in November.

**AH:** So it’s the containers, their shapes, their qualities, and also their relationships to each other and their contents?

**PS:** That’s what I want to say. The containers and the contents are in a permanent dialogue, a spatial dialogue, a tensional dialogue. On the container level, we have flexion and extension of the muscular units. But part of it is transmitted in a nonlinear way inside the fascia, as Huijing has demonstrated so clearly with his research. On the level of the contents inside, we find an exchange of differences of hydrostatic pressures between the different cavities – and you can speculate that that is true all the way down to the cells. You may look at the joints inside the capsules and realize that most joint problems are not only too much tension or a lack of tension in the layers that cross the joint; it is also the hydrostatic pressure inside the joint capsule which is the problem. One of the really important goals in treating joints is to reduce the pressure inside the joint capsule. If the pressure is natural and not too high, through movement of the sliding surfaces (which are covered by cartilage) we have better flow of the synovial fluid inside the joint, and that’s the nutrition for the cartilage which has no arterial blood supply. It can only stay alive by the support of the synovial fluid. Also, when we have problems in the vertebral spine, we have to become aware that it’s not a problem that the disk is too thin or too small or that it bulges out. The problem is that the pressure inside the disk is too high, and we have to treat the structures related to that to diminish that pressure.

**AH:** It seems like a lot of this, to generalize, is talking about tensegrity.

**PS:** Yes and no, because the tensegrity model that originally came from architecture is a model that is only useful to a certain degree. We have to be aware that if we have the traditional tensegrity model with struts and cables, it is a very dry model. In the human organism, the bones and the teeth are the most solid parts; they are the ‘struts’; however, they are floating, their ends sit in liquids inside joint capsules. In the traditional tensegrity architectural model, you don’t have that; it’s very dry; it’s much more simplistic. We have to be aware that, actually, we have to understand it better. If we want to go on to use a tensegrity model to explain what we are aiming for, we have to expand this model respecting the realities of fluids and cavities and we have to forget struts and cables. We have to add to the model the hydrostatic component at the endpoints of the struts. We also have to be aware that we will not find ‘struts’ inside our bodies. There are no straight struts in the body, no straight lines. There are curvatures in the body that change also in relationship to the longitudinal and diagonal ‘pipes’, like arteries, veins, lymphatic vessels, and so on.

Nowadays people forget that we Rolfers were the first ones – aside from some creative architects – to talk about tensegrity; it was in the ’70s that Frei Otto...
published an article in the old journal, the Bulletin of Structural Integration. Nowadays, everybody talks about tensegrity, sometimes only from the perspective of marketing – which is not a bad thing. We all may benefit, those who are mainly interested in marketing and those who are interested in new insight, we all may benefit if we try to expand the models we use in a more intelligent way.

AH: Right. I wasn’t thinking so much of a simple idea of the struts; I was thinking that really even a joint capsule or a joint itself is like a tensegrity structure; and that these tensegrity structures exist within larger tensegrity structures like the cavities. It seems like there would be an optimal shape and elasticity for the cavities, an appropriate arrangement of their environment.

PS: That may be true. And please let us not forget about gravity. Gravity is not only interesting from a perspective of alignment of that what we see on the surface of the body, like on the back curvature or front curvature. Gravity is very important to see in relationship to how the different cavities can slide on each other while gravity acts.

To give an example, let’s look at the peritoneum as a whole; I don’t think so much about individual organs and their movement only. The peritoneum as a whole should be able to slide not only downward with its posterior wall in relationship to the psoas fascia and the renal fascia, which in turn would all also slide upward; it should also have the capacity as a large unit in space to rotate and sidebend, up to a certain degree, to the left and right – just like, for example, the sacrum on the level of bony segments.

Similar to the micro-adaptability we see in the different segments of the sacrum. Osteopaths know that the individual segments of the sacrum should have the capacity to micro-rotate on each other and even micro-sidebend on each other. It’s equally true for a bone and for large units like the cavities of the body. They should show the same behavior if they are free in space. The simple vertebral movements that avert pressures in relationship to other vertebrae inferior or superior, movements of rotation and sidebending for example, should show also as movement potential in larger units of a whole cavity.

The large intraperitoneal space supports the lumbar spine from the front. If there’s a collapse inside the peritoneum, a spatial collapse, it means that one side of the vertebral spine is not supported in an efficient way from the front. You can treat the fascia of the back as much as you want; it won’t work. Of course, it may be helpful to train the transversus abdominis muscle.

AH: This goes back to the accordion that you described.

PS: Exactly.

AH: The accordion can’t expand and contract within certain spaces.

PS: Yeah. Think of the torso of the human body as being like several small accordions stacked on each other. While breathing, a certain accordion may expand well on both sides, and the next small accordion under it may only move on one side while on the other side it’s stuck. I don’t know if you know the bandoneon, the instrument of the unforgettable artist Piazzolla. The bandoneon is much smaller than the accordion. It’s almost like a cube, and it explains this in a much, much better way. If you imagine a bandoneon in a vertical position, that’s the best image of what happens inside a person’s whole trunk when a person breathes and moves around.

AH: This seems like it would very much relate with the whole idea of lift.

PS: Yes. There should be enough lift, but there should also, in a similar way, be a certain capacity to collapse in space, to fall into space, to bring the space under compression deep inside and let it expand by self-regulating pressure. Hans Flury has described that for normal function – if I remember right – as sinking into the fascial net.

AH: What do you think about the different things that people wear for scoliosis, braces and corsets?

PS: I don’t want to struggle too much with the orthopedic profession. Some leading orthopedic doctors around Germany send their own family members to a Rolfer rather than using these kinds of devices. I have many times had discussions with them. I know that actually there is a very problematic side to teenagers wearing those corsets, because there are underlying emotional patterns related to individual organs. If you squeeze the organs in a particular direction where they cannot comfortably stay, you run the risk of developing tremendous psychoemotional problems. As a result, many times besides the corsets, they have to prescribe heavy psychopharmaceuticals. That’s something I see from a critical perspective: if you compress an organ, you cannot exclude psychological reactions. The corset squeezes the container more towards an ideal average position, but the contents can only follow up to a certain degree, so you create a struggle between a more ideal container and the contents. Sometimes in these cases, the contents don’t fit the forced container shape.

AH: There needs to be a harmonization between the contents and the container.

PS: Exactly.

AH: There’s also the psychological impact of being the only kid in school wearing a brace, especially at the vulnerable time of puberty and teenage years. I think it can create a self-image of, “There’s something wrong with me.”

PS: You are right. If we push the container too much towards an ideal shape and the contents cannot really follow, there is a big conflict not only in the anatomy of the
If you know what to look for, you will see something. If you don’t know what to look for, we will see just our fantasies – which sometimes touch into reality, but unfortunately, only sometimes.
Working with Scoliosis – In Our Clients and Ourselves

By Bibiana Badenes, Certified Advanced Rolfer™, Rolf Movement® Practitioner, and Bethany Ward, Rolfing® and Rolf Movement Instructor

ABSTRACT  The authors dialogue about scoliosis, the personal impact of having scoliosis, and how they have used their own bodies through self-experimentation to develop Rolfing Structural Integration and Rolf Movement techniques to bring clients into greater body awareness, ease, and efficiency in movement. With two perspectives – Ward works mainly with adults, and Badenes with teenagers individually and in groups – they offer insights that support experimentation and improvement in how we work with clients with scoliosis.

How has scoliosis affected your life?

Bibiana Badenes:
I really think my scoliosis has shaped who I am and influenced my personal development. During my childhood, I had a lot of back and neck pain and movement limitations in specific areas.

Bethany Ward:
I agree. While I doubt I would have chosen a scoliotic spine, it continues to be an amazing teacher. You can’t get away from deep myofascial and proprioceptive imbalances. There’s nowhere to go! The more you try to abandon, ignore, or cajole an achy back the worse it gets, because you keep moving and behaving in the same ways. Eventually you have to sit with it and feel it. Self-judgment can give way to curiosity about what you’re sensing and how your body works. In a society forever looking outside the self, befriending scoliosis demands feeling what’s happening inside. I used to do sitting meditation, but in recent years a somatic practice has taken its place. It’s great self-care for my spine, but I also find it very mentally and emotionally integrating.

When did you discover that you had scoliosis?

BW: I was particularly susceptible to neck pain and headaches throughout college but didn’t know why. It wasn’t until my Rolfing Structural Integration (SI) training that anyone mentioned my spine. I clearly remember a fellow student asking, “So how long have you had your scoliosis?” I was taken aback but laughed and responded, “I don’t have scoliosis; I just have a left sidebend and a long right rotation.” But to myself I thought, “Duh, that explains so much.” Growing up, my mom always had a “bad back.” She “slipped” a disc getting a jar of mayonnaise out of the refrigerator when I was nine and stayed on that couch for two months. Years later, she had back surgery, which was “successful” until she tripped over a vacuum cord and the pain returned. After I became a Rolfing practitioner, I worked with my mom; we have similar spinal patterns.
BB: My parents took me to the doctor when I was eleven because I was complaining of neck and back pain. I remember having difficulty sleeping on the floor at summer camp. I was tall and felt embarrassed because my posture wasn’t very good. That doctor told me to swim. I guess swimming helped because the curvatures didn’t get worse, but I always felt limited. My father also had spine surgery but never complained of back pain; he was very athletic. The doctor gave me a set of daily exercises, which I never did. I appreciate where young people are coming from. So instead of using a lot of words to describe scoliosis, I try to help them feel – sensing how body tension affects patterns and how releasing this tension creates opportunities for change.

Thoughts about your scoliosis?

BW: The apex of my curve is in the thoracolumbar region but the sidebend starts in the lowest lumbars as you can see from the x-ray in Figure 1, image A. My pelvis compensates by sidebending right, in the opposite direction of the left sidebend in my thoracolumbar spine. This results in a fairly vertical looking carriage overall. People notice my uneven stride but rarely detect axial rotations unless they look closely. Yoga instructors and trainers miss it until I forward fold. BB: I have a double-curvature. The right convex thoracic curve is about 28˚ and the left convex lumbar curve is about 22˚ (Figure 1, image B). Due to the torsion in my pelvis, my right leg has always felt longer. I have always had problems with my left sacroiliac joint, but my right hip can also be an issue. I always felt my main limitation started in my neck. Once, a memory surfaced: I clearly saw myself as a child being hit by a soccer ball and getting thrown into the air. I asked my mother; at first she thought it happened to my sister, but then she remembered it happened to me. It takes years to appreciate how our bodies compensate after some traumas.

BW: Also, I don’t think most people appreciate how much these non-conscious compensations tax our resources. Structures that align major centers of gravity (head, torso, abdomen, knees, and feet) are better positioned for efficient body use, which can translate to subjective feelings of internal strength, connection, and emotional ease. Postures like ours that stray from segmental alignment expend extra energy just to remain upright. Unless they learn to use perception to experience internal balance, clients with significant scolioses are likely to feel tired and may beat themselves up for being ‘lazy’. They rarely appreciate that their bodies are working overtime. It can be very healing to acknowledge the fatigue and explain why. These clients have often learned to ignore their bodies and soldier through, so teaching self-care is essential.

BB: I never felt symmetrical. Learning how to find support in standing was an important discovery in my Rolfing series. It was a revelation to sense inner expansion with a place to rest. Connecting with your inner strength feels powerful and affects the way you work with others and yourself. Rolfing sessions gave me the opportunity to work with my resources and not against them. It takes years. Nothing seems to be happening and then all of a sudden there’s this aha.
moment when your body intelligence clearly makes a connection.

I’ve avoided writing about my scoliosis because when I tried, it came from an intellectual point of view. While I can talk about neuromyofascial manual techniques, coordination, balance, de-rotation exercises, and using the Ten Series for scoliosis, what it comes down to is that I am talking about myself. (Maybe I wasn’t ready to show my vulnerability.) But the most important point I want to make is that as I started to sense and find these internal relationships, an internal peace appeared. What I’d considered limitations became potential. Even today there are moments of hesitation; but my own journey in my body has been and continues to be a treasured learning experience.

I feel lucky that I did not have to wear a Milwaukee Corset, because as a teenager I was already struggling with body image. I felt like the Hunchback of Notre Dame. I wanted to hide my body, which limited any natural sense of spontaneity or grace. Underneath it all, my intuition was still there, and I think I followed it to the best of my ability. I never even considered receiving or learning aggressive treatments; I somehow knew that wasn’t the way. This is a very emotional point for me. We should never force scoliotic structures into preconceived alignments. The pattern will only go deeper into the body. Unless we teach clients to find internal support and expansion and listen to what the system is telling us, our work can do more harm than good. Our touch speaks volumes. Firm, steady touch builds unspoken trust.

**Do you see a common physical pattern in teenagers with scoliosis?**

**BW:** Research finds that most idiopathic scoliosis shows up in adolescence, affecting both boys and girls but at a much higher rate among females. Some estimate the ratio of girls to boys as eleven to one. What I see in my office is consistent with these statistics. It shows up in young people but is more common and often a more serious problem for girls than boys. Boys seem more likely to ‘grow out of it’ than girls. The most common pattern I see involves a left thoracic sidebend and right rotation, or what Bibiana referred to as a “right convex thoracic curve.” This is easiest to see from behind when the client forward bends and the right ribs rotate posteriorly. The cervical and lumbar tend to sidebend in the opposite direction, creating the common ‘three-curve’ scoliosis pattern (Lehnert-Schroth 2007).

**BB:** I also see more girls with scoliosis, but I see more boys with kyphosis.

**BW:** I see that too!

**BB:** Another common pattern I observe is limited range of motion in the neck and left-side vertebral fixations. I suspect that pediatricians could assess these neck restrictions and use them as early indicators of scoliosis before the spinal curves become established. Many children have episodes of being hit in the head and afterward seem okay. No major medical problems arise, but the body compensates with spinal anomalies.

Functionally, I also see a lack of hand-eye coordination. Working with coordination and spatial orientation is key to making progress with scoliosis. These clients tend to relate to the space on their left and right sides very differently. This uneven kinesphere affects how we move and can increase the scoliosis. Coordination exercises can be used to predict future muscle-tone discrepancies. I’ve also noticed that a high percentage of people with scoliosis wear glasses, orthodontics, and/or shoe orthotics.

Most clients with scoliosis are constantly fighting against gravity. Sometimes this seems to show up in their personalities. These clients are often quite hard on themselves.

Scoliosis is complex. Rolfing bodywork is particularly useful because it takes a holistic approach to the human being. Most modalities don’t work with the whole person. It’s why working with touch and movement is so powerful.

**We know our embodiment affects our clients’ experience. What have you learned from this?**

**BW:** How we think about embodiment depends on the context. According to Rolf Movement Instructor Kevin Frank (2012, 5), embodiment is “what we know in our own bodies.” Rolf Movement Instructor Lael Keen (2009, 25) emphasizes that embodiment “has to do with presence, and presence has to do with being at home in the body.” When we work with embodiment, we are helping clients reconnect with what their soma knows and helping them more fully inhabit their bodies. This is particularly relevant for clients with scoliosis. What I consistently find is that clients struggle with balance and tend to have strong preferences for the ways they orient in the world. Clients often have a strong hand or eye dominance, or spatial awareness preferences (see Figure 2). Working with embodiment helps them find more functional balance, which supports structural shifts.

**BB:** Embodiment is also essential to teaching self-care. When clients are better in touch with what their bodies know, they make better choices about their activities. Practitioner embodiment is also very important; clients sense and learn from our presence. If clients feel safe, they can trust in their body’s own ability to heal, change, and regulate. If practitioners are tense, we transmit our stress to clients and undermine their budding confidence. This is probably one of the things that make our work appealing to clients – they can trust the Rolfing approach because they can see and sense our own embodiment. From my own perspective, the more embodied I become, the better my results and the more I enjoy the work. Lastly, embodiment is particularly important for clients with scoliosis because these clients tend to be...
obsessed with form. This is emphasized when medical doctors use labels and focus on curve angles. It's refreshing to work with a Rolfing practitioner who teaches integration and functional economy – especially if s/he has also faced similar challenges, as we have, with scoliosis.

**How do you work with clients with scoliosis? Do you follow the Ten Series? How often do you see these clients?**

**BW:** Although I usually follow the Ten Series with new clients, I might spend an initial session addressing 'low-hanging fruit'. By this I mean that if someone comes in with acute pain and I see obvious structural limitations that seem related, I might do one session to see if we can bring the whole system to a higher level of order (and comfort) by addressing glaring issues. I tell clients my thought process. Often, we can get them some relief, which may or may not hold, but may make our future sessions more effective. I believe the Ten-Series approach works really well as a way to start addressing scoliosis.

If I don’t start with a breath session, it will be my second session. Working with breath is extremely important for these clients because one side of the rib cage is usually bigger (the side of the rotation) and another area needs depth. Working with breath, we can help clients develop awareness and expansion of these contracted areas. This helps release intercostal muscles so important to functional respiration and excursion of the rib cage. I pay a lot of attention to the wrapping of the superficial fascial layers, which gets really disorganized in scoliotic spirals. Unlike the traditional Rolfing Ten Series, I also incorporate compression techniques coordinated with the client’s breathing to begin freeing up rib and vertebral relationships.

Session one begins an embodiment inquiry that we will build upon in all future sessions. As we teach our clients how to receive the work, one of the primary interoceptive skills is the ability to sense weight and volume. Both of these are critical for working with scoliosis clients. We started to speak to volume in our discussion of the rib cage. Volume is usually limited in certain areas in these clients – especially front/back depth around T5 and commonly one side of the rib cage. I also start working with clients’ perception of weight. Scoliosis introduces functional leg-length differences and pelvic torsions, which make it impossible for clients to weight evenly through their legs. The inability to find easy support from the ground often influences clients to engage functional patterns that overemphasize the upper gravity center (G’), shoulder girdle, and neck in an attempt to ‘hold themselves up’. Introducing a sense of weight and ‘letting down’ is often a profound experience and is fundamental for helping these clients access ease in their bodies.

And that’s just session one! Here are a few thoughts for the following sessions:

- **Session two:** Clients with scoliosis often have one femur (often the right one) that acts like an ‘internal’ body type, and one femur (guess which?) that acts like an ‘external’ body type. As such, each foot needs a different approach. Foot work and dynamic sitting education (put your hand on the client’s back and teach him/her to ‘meet’ your contact by extending his/her feet into the earth) is essential.

- **Session three:** This session is ideal for working with scoliosis because it provides a chance to address left/right differences from the side and work with convex and concave curvatures more specifically. More details are in the box “Working with Scoliosis in Sidelying” on page 37.

- **Session four:** When working with a pelvic torsion, the inner line of the leg is critical. This gives you an opportunity to address the asymmetries in femoral rotation. Save time for pelvic-floor education; many things that may seem obvious to you (like where your ischial tuberosities are) may require additional sensorimotor mapping for a client with scoliosis.

- **Session five:** If there are spinal rotations, the abdominal muscles are involved. The psoas on the side opposite the rotation is often tighter.

- **Session six:** This session allows you to do the work needed in the deep, small spinal muscles and ligaments. Don’t just focus on the side of the rotation but make sure to spend time on the side with the sidebend, which tends to be less spacious. Request the client to breath into areas as you introduce fuller dimension. Consider putting the client in supported seated positions that allow you to better access the spine.

- **Session seven:** The head and neck are often compromised because of impaired support from below. Decouple head and eye movement. Also, in clients who have had extensive orthodontic work, cranial movement may have been impeded, which affects the ability of the spine to integrate and respond to challenges. Make sure the upper cervical spine is responsive enough to adapt to unwinding of the entire spine. Address head balance in standing.

- **Sessions eight, nine, ten:** There will be lots of cleanup and revisiting of previous themes needed for scoliosis clients, so the last three sessions are extremely valuable. Rethink what areas made the most difference. Did your client really benefit from work in the legs and feet? – this is common. What about the deep spinal patterns? You may want to emphasize prone spinal work. Or, challenges in the cranium and shoulder girdle may be important factors. As you complete session seven, you should know enough to strategize your final three integrative sessions. As we get to this part in the Ten Series, I talk with clients about how they may or may not want to use Rolfing SI in the future.

When I work with adolescent clients, we may see a shift in the progression of the scoliosis. That said, most of the scoliosis clients who come to see me are females between the age of thirty and fifty. Most of these clients use Rolfing sessions to help them manage their conditions and come in for sessions approximately every four to twelve weeks.

**BB:** I agree with your Ten Series approach. My practice is different since most of my clients who have scoliosis are teenagers. In addition to the Ten Series, I put them in groups where I teach ‘Body Intelligence’ as soon as possible. These group sessions really improve their results.
Working with Scoliosis in Sidelying

By Bethany Ward

Each client is unique, but a lot of scoliosis patterns are a version of the 'three-curve' scoliosis pattern described by Christa Lehnert-Schroth. In her seminal book on scoliosis treatment, Lehnert-Schroth describes how torsion relationships create overly strong muscles on the convex side of the curve and short tight muscles on the concave side. Discussing her model she explains that “left lumbar spinal erectors muscles are overly strong, thus the right thoracic group becomes stronger as well, and finally the left cervical group, resulting in a typical three-curve scoliosis posture” (Lehnert-Schroth 2007, 50).

This model informs my seeing and interventions. I find that discomfort often shows up in the overly strong convex regions (i.e., painful left trapezius and left low-back/sacroiliac regions). When working in these areas, my intention is predominantly to differentiate and ease hypertonic tissue. I find I get better results when I devote more of my efforts to freeing and ‘waking up’ the shorter, weaker, less embodied areas around concave spinal curves. For clients with scoliosis, this often means focusing structural and functional interventions around the right lumbar, left thoracic, and right cervical spine. Of course, this is a generalized observation and interventions need to be customized to the individual.

To address concave curves, I often work with the client sidelying, bolstering at different locations on each side (see images below). By placing a bolster at the left waist, I can more effectively free the right iliac crest and lift the lower ribs. This is also a good time to address shortness in the right anterior neck and shoulder. When the client turns to the opposite side, I bolster under the convex left thoracic curve to facilitate right rib expansion. Bolstering each side differently facilitates creating space, increasing breath, and refining perception on the concave curves of the spine.

Clients with scoliosis tend to be tighter, weaker, and less embodied on the concave side of the spinal curve – often sections of the right lumbar, left thoracic, and right cervical spine. Bolstering the convex side facilitates interventions that increase span, breath, and perception in concave areas. With common scoliotic patterns, bolstering under the left waist assists freeing the right iliac crest (A) and lengthening the waist and lifting the lower ribs (B). When the client switches sides, a more superior placement of the bolster (under the rib cage just inferior to the armpit) assists compressive rib release (C) and educates the client to breathe into the left posterior thoracic cavity.
Do you teach movement to these clients?

**BW:** Totally! Although I believe all clients benefit from Rolf Movement Integration, it's essential for working with scoliosis. We're working with a functional spiral as much as a structural one. While movement work can create appreciable shifts in curvature patterns in young people whose spinal curves are still developing, I think working with perception and coordination is just as critical for those of us whose spines have already adapted at a boney level. We can still find fluidity, support, and balance through significant curvatures. This is where embodiment through somatic awareness and imagination come in.

**BB:** Absolutely. Over the years, my functional and structural sessions have merged until now I cannot separate the two. Working this way has had a personal benefit as well. Since I do the experiential exercises when I teach them, I continue to enhance my own embodiment. I continue to work full time because the work contributes to my own self-care.

I do not teach anything that could be interpreted as 'how the body should be'. Instead, I try to help my clients learn to feel and sense without judgment. Developing acceptance is very important. I teach a sequence to people with scoliosis that works on the following concepts:

- Trust/support (on the floor and in standing)
- Relationship/expression
- Pushing/pulling
- Inner expansion vs. contraction
- Relaxation vs. collapse
- Direction and forces
- Breathing/whole-body breathing
- Balance vs. imbalance
- Walking
- Exercise vs. rest
- Strength vs. compression
- Self-care exercises for the neck, hands, feet, spine mobilization, sitting, and girdles.

*Could you speculate about where or how you think idiopathic (not neuralgic or from a degenerative disease) scoliosis starts?*

**BW:** I suspect it's a combination of nature and nurture. Research suggests that most adolescent scoliosis has an inherited, or at least genetic, component. Rolfer Larry Koliha and I were teaching a class on working with scoliosis to bodywork practitioners in Iceland several years ago. When we asked participants about their experience working with scoliosis, we were stunned to learn that only one person had worked with a client with scoliosis, and none of the participants had the condition themselves. Such lack of exposure is never the case in U.S. classes. Larry hypothesized it was because everyone in Iceland learns to swim, and because this was a common exercise in the culture, young people grew up using their bodies bilaterally. My theories tended more toward the 'nature' side of the equation. Until the 1940s Iceland was pretty isolated with a highly homogenous gene pool. I hypothesized that there was less of a genetic predisposition in the population. I suspect both points are valid: genetics creates the opportunity, but how we live in our bodies has a lot to do with whether a predisposition is realized.

**BB:** I always wonder why scoliosis is so much more prevalent in girls than boys.
Some of the things I’ve read suggest cultural differences. Perhaps boys are more likely to be involved in spatial activities such as ball games (baseball, soccer, etc.), which allow them to remap and release neural patterns before long-term compensations set in. But we just don’t know. Scoliosis is a symptom of the whole neuro-myofascial-skeletal system – not just the spine. So we have to teach clients to rebuild this system via their sensing and not focus on form.

**What about homework? Do you want parents to be more or less involved?**

**BW:** You can’t cram functional learning – it takes time. Homework is useful only if it gets done, so I like to give clients things they can do when they’re waiting in a line (play with perception in standing), or sitting at a stoplight (notice ‘backspace’), or talking on the phone (keep a ball nearby for foot mapping). I also encourage clients to do somatic exercises on the floor before retiring for the night; it makes a nice transition to sleep. Adults and adolescents alike are more likely to do homework if they understand how it might benefit them. So the most important thing is to get to know your clients and what motivates them. This is especially important for kids who may not have asked to get bodywork therapy. I once had a client bring in his son to address a spinal curve and an extremely tight chest. Initially the boy had no interest in our sessions. So we just talked. As he began to open up, I learned he was an avid swimmer. When I mentioned that Rolfing work might facilitate fuller breathing, he wanted to try it. Clients need to be invested for the work to be effective.

Parents can help or hinder. I worked with one mother/daughter pair who each had scoliosis. It was wonderful to see them support each other in practicing homework and moving more. But I have also seen parents who are overly involved or critical. On several occasions, I have made time to talk with parents separately about their use of language. Descriptions such as ‘bad posture’, ‘crooked’, and ‘lazy’ have no place in our sessions, but often creep into the vocabulary of well-meaning parents. I acknowledge that they probably don’t even realize that they’re using these words, but owe it to them to highlight how these terms shape their child’s body image. Parents are usually receptive.

Whenever possible, I prefer to interact directly with adolescents and create the expectation that they are responsible for doing their homework and giving me feedback. It’s about creating self-sufficiency and ‘internal support’ – a metaphor that goes a long way when working with scoliosis.

**BB:** I also educate parents about how to better support their child. I often see a pattern of young girls with scoliosis whose mothers place very high expectations on them. I can’t help but wonder if these girls respond to this pressure by compressing physically. It’s just an observation.

Some parents think that scoliosis is only an aesthetic condition. Unless their child is in pain, they don’t think it’s something they need to address. But I find that working with these patterns not only results in straighter spines but also improves attention and academic performance, develops greater self-confidence, and increases social interaction. I tell them, “Hands on the body are hands on the nervous system.” I think somatic coaching plays a big role. It’s important to motivate clients and make them part of the equation.

One more thing – some parents think that we can complete this work in a matter of weeks. This is a learning process. As a result, I only take children whose parents commit to a longer period of time, and I tend to space my individual and group sessions so they don’t feel burdensome.

**What about non-idiopathic scoliosis? Have you had any success with that?**

**BW:** In cases of scoliosis that result from things like a disease, a neuromuscular disorder, a tumor, or spinal malformation, our work is less effective in terms of changing spinal curvature or lessening pain. That said, one of the most startling changes I ever observed occurred with a client in her early sixties who presented with a dramatic scoliotic pattern. She was a nurse who told me that she hadn’t had the scoliosis until a couple years prior. At that time, she’d been in a significant car accident and she attributed her alignment to the event. Although I tend to rely on client input, when she told me she’d never had scoliosis as a young person, I was skeptical. Perhaps, like myself, she’d had the condition but never realized it. The pattern was similar to the idiopathic adolescent scoliosis I commonly see, which often becomes more pronounced with age. I couldn’t help but think the accident had simply hurried the process. I’m glad I kept silent. We did a pretty traditional Ten Series with only a moderate amount of functional work. When she showed up after her seventh session, her spine was straight. It was as if something sprung loose and the spine unwound. She was thrilled and I was speechless. I am humbled by what the body can accomplish when we take obstacles out of its path.

**BB:** In my opinion, we always can help people with scoliosis (through movement, awareness, and manual therapy) to avoid future compensations. If it is related to pathology, especially neurological, we have to be aware that we are part of a multidisciplinary team and that we need to work together. I love this work! It’s amazing what can happen when we help people find simultaneous stability and mobility.

**BW:** It can change everything.

Bibiana Badenes is a physiotherapist, Certified Advanced Rolfer, and Rolf Movement Practitioner in Spain. She organizes the BodyWisdom Spain Congress, teaches internationally, and serves on the board of ISMETA.

Bethany Ward, MBA, is a member of both the Rolfing and Rolf Movement Integration faculties at the Dr. Ida Rolf Institute™. She is a member of ISMETA's Leadership Council and past president of the Ida P. Rolf Research Foundation.

Bibiana and Bethany became friends in 2016 teaching a gait workshop while walking the Camino de Santiago in Spain, which Bibiana organized with colleague Til Luchau and Advanced-Trainings.com. At a second workshop last year, each shared how living with scoliosis had brought cherished insights as well as challenges.

**BIBLIOGRAPHY**


The Mystery of Scoliosis: Working from Inside Out

An Interview with Til Luchau

By Anne Hoff, Certified Advanced Rolfer™ and Til Luchau, Certified Advanced Rolfer, Rolf Movement® Practitioner

ABSTRACT Til Luchau, long-time Rolfer and director of Advanced-Trainings.com, discusses scoliosis in a wide-ranging interview that covers his influences, orientation toward working with scoliotic clients, working with teenagers, expectations, conventional treatments, and changing understanding of scoliosis towards a three-dimensional model.

Anne Hoff:
Thank you Til. I think most people in the Rolfing® Structural Integration (SI) world know who you are, through the Rolf Institute® (now the Dr. Ida Rolf Institute™) and your classes and books, but please say a little bit about your current activities.

Til Luchau:
I spend a lot of my time these days writing – a regular column for Massage & Bodywork magazine, my own blogging, other publications here and there – and I teach one or two shorter workshops a month mostly in this country, sometimes in Europe or Australia. And I have a small private practice here in Boulder.

AH: Okay, great. Our topic today is scoliosis and how to work with scoliosis. You teach classes on this, correct?

TL: I do. Scoliosis is one of the classes in our series, and seems to be of particular interest to Rolfers; we also sell a lot of class notebooks online to them. Scoliosis is just one of the topics we teach about, as we work our way through the whole body.

AH: There’s little in-depth discussion of scoliosis in Basic Trainings, and later in Advanced Training Rolfers learn more about spinal mechanics but not necessarily in relation to working with scoliosis. Yet nearly every Rolfer in private practice has people walk in the door and say, “I have scoliosis.” Some, it’s very mild, others it’s severe. I’m curious, did you study about scoliosis first and then
apply it in your work and teaching, or did clients drive you towards the study and the development of what you now teach? Or a bit of both?

**TL:** It was probably both. I, like you, got maybe six facts out of my basic Rolfing training that related directly to scoliosis. I listened hard because I was interested in it. I think, as Rolfer, it interests us because, on the surface, is an alignment issue. It looks like something gone wrong with whatever the different forces are that keep us aligned. Because we have this legacy of being able to help people embody dimension, otherwise known as alignment in gravity and space, we get interested in scoliosis.

My first serious scoliosis client was in a wheelchair hitchhiking around the country. She showed up at a retreat I was teaching in New Mexico, just to visit the place, and was in a lot of pain. I had been out of the Rolf Institute two years at that point. It was a puzzle. I took some of the things that I remembered and learned in my Basic Training and started working on her. At some point she just gave a big smile and relaxed and felt a lot better. We got to work together often there that summer. Later, people with scoliosis began appearing more in my practice. The biggest influence within the Rolf Institute was probably Robert Schleip, a mentor of mine, who particularly around the scoliosis puzzle has a passion of his own. His ideas had a lot of influence on the way I was thinking about scoliosis, and still do, as did Jan Sultan's, though I'm doing it all differently than I learned it from both of them.

The other big Rolfing influence that comes to mind was Emmett Hutchins. He said, "When I'm working with scoliosis, I'm helping them move around a line, not necessarily stand around a line," which I found interesting. It was one of those koans he would toss out, that we would have to ponder and wonder. But “moving versus standing around a line” was a real clue that started my inquiry and probably still informs the way that we're working with scoliosis to this day.

**AH:** That points to something important: we're not going to make somebody straight. If you’re lucky, there may be some change in those curvatures, but we’re not trying to get a platonic ideal of the spine.

**TL:** We’re trying to make the person happier, like that woman in the wheelchair. I think we’re all driven to help people. That’s why we’re in this profession, and there’s where human compassion arises. Here are people who may or may not have pain, may or may not have restrictions in their movement; if we can support them as Emmett was indicating, in helping them in living with more ease and moving in a way that works better, they’re going to be happier and feel better.

**AH:** How do you go about that?

**TL:** One thing is, when people walk in and say, “I’ve been told I’m crooked. I want to be straight,” that asks for a reality-check conversation. There are miracle cases. There’s plenty of pictures around of people who were dramatically, visibly different after getting hands-on work. But I think most people would agree, those are the exceptions more than the rule. Most people aren’t walking out of their Rolfing session perfectly straight after coming in with scoliosis. And attempts to try to make people straight often make them less comfortable. Often people hurt more after we just try to lengthen their shorter erectors, or whatever we think will help them be straighter. Being straightened isn’t always more comfortable. Then, it’s teasing apart the context of why someone is coming to us. If it’s just to look different, there may be some reframing or alternatives to explore.

Pain is interesting, because we often assume that if someone has a funny shape, they must feel funny too. That doesn’t seem to be the case with scoliosis. People with scoliosis don’t actually have any higher incidence of back pain than the general population. That's important: just because someone has a different shape, doesn’t mean they hurt, or will hurt. There is some evidence that says when people with scoliosis do have back pain, it tends to be worse, or more intense. But they don’t have it more often. It's not like a crooked spine equals back pain. A crooked spine, in and of itself, is not a problem to fix from a pain perspective.

**What Causes Scoliosis?**

**AH:** So the woman in the wheelchair, was she in the chair because of mobility issues or pain or any sort of degradation of her condition that was causing pain?

**TL:** Which came first? I don’t know. There is a point at which spinal curves are a serious biological issue, often a compromise to organ function. Then, at some point, having a sideways spine starts to affect the nerve roots and things like that where you have pretty clear mechanical effects. The standard medical cutoff point – the point at which medical issues are more likely to happen – is somewhere around 40º, that's where they need to take some aggressive measures to stop the progression. In most cases, 40º is an obvious and strong scoliosis. Most of our clients don’t have that much curve and are a different category of intervention, where it’s about mobility, comfort, staying proprioceptively refined, less about intervention on their shape.

**AH:** Let’s go bigger picture for a moment. What do you understand about potential causes of scoliosis?

**TL:** It’s a puzzle really. Rather than try to answer the puzzle, what I do is ask how I can help people. ‘Idiopathic’ scoliosis, which is the most common form of scoliosis, means unknown cause or without apparent cause. Honestly, anybody who says they know why it’s being caused is going in the face of the consensus view. There’s lots of pieces. There is some thought about cerebrospinal fluid flow having turbulence, that being associated with fetal development. There are bizarre little facts like there’s almost no adolescent idiopathic scoliosis in people that are deaf. Animals, quadrupeds, don’t get adolescent idiopathic scoliosis. There are some interesting puzzles there that point to bipedalism, that point to perceptual issues, that point to developmental things. Some say it’s visceral; other say it’s a top-down phenomenon that relates to the way you’re perceiving; or, a bottom-up phenomenon, related to the way you’re supporting yourself. Those are just a few pointers toward possible causation; but causation is complex, and what really counts in the practice room is strategy. All those are probably strategic narratives that get the practitioner thinking about how to go about working with it, more than they actually explain how it got there.

Adult-onset scoliosis is a lot more common than adolescent scoliosis. By the time we’re seventy years old, about 70% of us have an observable scoliosis. It appears progressively through our lives, and it's mostly asymptomatic, not correlated with back pain or other symptoms (although, sometimes it can result from osteoporosis or facet issues, things like that). So lot of elderly people have scoliosis, and it’s not necessarily a problem. Strategically, if there’s back pain, or if there’s a movement restriction,
we work with those like we do any back pain or movement restriction. That's a little different maybe than a strict structural integration perspective. The perspective we take in my trainings is to ask, "Are there options for movement needed?" – and those include the option of stillness and support. And, "Is there a way we can help refine proprioception, so the person can feel body sensations more accurately and in a more nuanced way?" In other words, can they have greater body awareness?" 

**AH:** Has the way you work with scoliosis changed over time? You've been a Rolfer a long time.

**TL:** Yeah, thirty-three years. Has it changed over time? Absolutely. It began probably with that story I told you and with Emmett's teaching, and my time assisting Robert Schleip and mentoring under him, teaching with him. His perspective is interesting and his stories were influential. For example, he realized at some point that he was doing the biomechanics exactly opposite of Fryette's laws; but going back to those clients and working with the 'correct' coupling of sidebending and rotation didn't really get much different results, maybe 10% better. So when he got the laws 'right', there weren't necessarily dramatic improvements.

**AH:** Interesting. Perhaps even when he didn't have Fryette's law right in his mind, he was still working the soft tissue correctly, if not the joints.

**TL:** I wonder. I bet he would argue, and I would too, that 'correctly,' at least in terms of external measures like left/right etc., becomes less relevant. It is the act of getting worked, and the act of moving, and the act of finding movement into new places. Whether you did it as an open fixed or closed fixed direction, in either case, you can make a huge difference. From the perspective of psychobiological influences, most of the effect we have as practitioners comes from the client receiving work, as opposed to the actual strategy being employed. Increasing body awareness, increasing mobility, providing a powerful intervention in the context of movement, therapeutic ritual, all those things are valuable.

So that's probably been the biggest change. I'm not thinking any more about things like which direction is right, or how do I want the body to be 'corrected'. I'm thinking more about how to increase options for mobility so that the body can do what it needs to; and I'm thinking about refining proprioception, in a way that's not noxious, because pain is unrefined, overwhelming proprioception.

**Importance of Therapeutic Alliance in Scoliosis**

**AH:** Please talk a bit about the therapeutic context. I'm sure much of what you do with scoliosis is going to be the same as with any client: building a safe container, dialogue, clear communication. What extra pieces might come in with scoliosis?

**TL:** You're right, it is the same, though of course someone with a scoliotic pattern is going to move and perceive differently than someone with a different pattern. But the therapeutic alliance is especially important in that context, so that I understand why they want to work with me. What's their motivator? What are their desires? What are they hoping for from our time together? For that reality check I mentioned, and also so that I can bridge what I'm seeing and doing to what's important to them. That's important to all of our clients, but especially with someone with scoliosis, because in the classic scenario, it's a teenage girl sent by her parents, or doctor, to 'fix' her scoliosis. She may not have any direct inside-out experience of any scoliosis, she just knows what people told her, outside-in. To her, scoliosis is a long word that sounds vaguely pathological. A lot of setting ourselves up for success would be finding a way that she can have an experience of what people are talking about from the outside. It's finding the inside-out pathway.

**AH:** Right. There's the element of she's just going about her life feeling completely normal, and suddenly people are saying there's something wrong with her, taking her around to all sorts of different practitioners who are supposed to try to fix what's wrong with her. That's quite a change of worldview for a girl or young woman.

**TL:** Yeah. Her body and body image are still forming, and the social interactions are so important.

**AH:** So if it's the mother or the father that brings in their teenager, who may or may not really know why they're there, and who may or may not be comfortable with all these people they're being shuttled around to, how do you build the relationship with the teenager herself?

**TL:** Well, first I want to find out how they think about it and feel about it. Sometimes, there is physical discomfort, or some awareness that movements are different in one direction compared to the other. Sometimes there's no internal experience at all. If there's no internal experience, then there is still probably is a role I can play in maintaining mobility, and meanwhile helping increase and educate their body sense. For some people, it's via movement. If they touch their left toe and then their right toe, they might notice a difference. One girl, it was sit-ups. She was really into having a strong belly, so I had her do some sit-ups and I could show her that actually one side of her belly was higher than the other. That's when she got interested in the work, and she could get inside of it though seeing it, and later, feel it and work with it.

**AH:** Yeah, it's engaging her interest. I find that teenagers are not necessarily interested in the work, whether it's for scoliosis or anything else. With that age group, it's particularly important to find what's going to hook them, to get them interested in being there.

**TL:** I worked both as a high-school teacher and an Outward Bound leader for teenage boys for a few years, and there were a lot of kids that didn't want to be there. There are ways to get them interested. I would never underestimate the power of an interested adult. Just being interested in them is radical. Also, understand that, at that age, the only defense a lot of kids have is apathy.

**AH:** That's huge. I never thought about it that way.

**TL:** Yeah. It's a defense, really. It cracks open quickly when there's an interested adult, who is interested in just listening, and is curious. That, for most kids, is a rare experience.

**Goals**

**AH:** Okay. Somebody comes in with scoliosis, what are your own goals and aims, and how do you work with whatever the client's expectations are? Do people come in with realistic expectations, or do you have to downgrade their expectations?

**TL:** I'm always assuming that the reason that they're coming in has an element of false promise to it. I probably don't think about it as downgrading, but more reframing. Often, it's an upgrade of what they imagine could be possible; often, it's a
I want to find the essence of what interests them. That’s at least one layer deeper than the presenting problem. There is something they want, identifying that and staying connected to that is my therapeutic goal.

she wanted to see her belly differently, so that’s where we went, that’s the thread we followed, and then she was interested.

**AH:** Is your goal first to find what interests them?

**TL:** Yeah. I think I want to find the essence of what interests them. That’s at least one layer deeper than the presenting problem. There is something they want, identifying that and staying connected to that is my therapeutic goal. That’s a moment-by-moment thing, where you look to see what’s interesting to someone, where their energy goes up or goes down, how does that breath get more expansive, how can they move awareness into a part of their body that they haven’t before. Those are all types of positive feedback.

**AH:** Right. Our June issue was about consciousness. I’m seeing threads that relate to that, that our work is so much about consciousness, that the potential for change is so much based in an engagement of consciousness: the practitioner’s consciousness, the client’s consciousness, the therapeutic container, and how that relationship is happening. If that substrate is not there, then doing this on the physical level loses a certain essence.

**TL:** I am with you. Or maybe, this thing we call ‘consciousness’ is just another aspect of the same thing we call ‘body’, or what we call ‘pain’, or what we call ‘trauma’, or ‘experience’, what we call any of these things. Any of these lenses we use are just aspects of a whole that’s greater than any one of those. They all include consciousness and yet are more.

**AH:** When we explicitly invite or engage a certain question below the question, that next level down, it evokes something that takes us out of the model of the client being just a passive body on the table. These days, that’s how many people are oriented. I go to get a massage; I lie on the table and he does something that makes me relax. I go to the chiropractor; she adjusts my neck. The client orients as an object that the practitioner is doing something to. Once you use the type of question you describe to drop down a level, then it’s no longer a subject and object. It’s the meeting of two subjectivities in a container of ‘let’s see what happens here’. I think that opens up potential for something real and truly beneficial to happen.

**TL:** That’s right. We do have an advantage over massage, where many people expect a passive experience. Not all massage therapists work that way, but people expect to ‘receive’ a massage. But in a Rolfing context, we have lots of ways that we’re engaging people more actively. It’s also not just the opposite of being passive; the opposite of the client lying on the table is the client telling you everything they want you to do. Instead it is that intersubjectivity, that interaction that includes what’s important for the client, but also includes me finding a way to invite the client into a deeper or more expansive set of possibilities. That includes what I’m interested in as well.

**AH:** There’s a whole interesting tangent we could go on here, that we each get the clients who resonate with who we are and where we’re coming from. I think we get the clients who fit us.

**TL:** Or the ways they don’t fit are the ways that we grow and get more fit-able. More adaptable.
I’m not thinking any more about things like which direction is right, or how do I want the body to be ‘corrected’. I’m thinking more about how to increase options for mobility so that the body can do what it needs to; and I’m thinking about refining proprioception...

Structural vs Functional Scoliosis

AH: Say something about structural and functional scoliosis and different approaches based on that.

TL: Classically, structural scoliosis would be thought to be related to the bone shape, like one due to an osteoporosis that’s causing vertebrae to go wedge-shaped; something like that could sidebend the spine and cause it to rotate. Some definitions include the ligaments; they say ligamentous relationships, or articular relationships in the spine are a part of the structural components that make a spine passively stiff. The definition is if it’s passively stiff in one direction, it’s a structural issue. If the client can actively move it, then it’s functional. It’s an interesting distinction. It’s probably a false dichotomy. Ida Rolf’s big revolutionary statement is that all that is plastic. Way before neuroplasticity, she was saying there’s fascial plasticity. Giving people a sense of possibility about what could change right down to the level of what we’re made of. There’s something useful in that point of view. Even if collagen molecules turn out not to literally stretch, there’s something useful in the sense that my body is changeable.

I don’t limit myself to working just functionally or just structurally. We do tests in our treatment protocols that help me feel: does this resist me passively? – in which case, it probably fits into the structure category. Or can it respond? – then it’s probably more functional. We end up working with those similarly or at least we have similar goals. We want more options for movement. We want it to move in ways it doesn’t now. We want someone to be able to feel it in a less noxious or more refined way. Feel it in context to the whole body.

Homework

AH: How important is it, with working with scoliosis clients, that they are doing something on their own, either some form of movement practice or some exercises that will support the manual therapy.

TL: It would depend on their identified goals. But let’s say there’s somebody who’s getting close to that 40˚ curve and trying to avoid surgery. They want to do whatever they can. Then, yeah, a multidisciplinary approach is super important. It isn’t just a fascia thing. It isn’t just a visceral thing. It isn’t just a strength and conditioning thing. All those are factors. When people do strength and conditioning, they have fewer problems with their scoliosis. Scoliosis can measurably change. There are some good studies of people doing just myofascial work on scoliosis and showing a change in curves. All of these are pieces. For some people, there’s balance differences, there’s more postural sway. Especially for adult onset cases, being active physically seems to help.

AH: Do you refer people in any particular directions or it all depends on that client and what their interests are?

TL: I encourage people to be physically active in a way that they’re likely to do. Just being physically active. There’s a window of opportunity too, with kids right around puberty. There’s some pretty specific ways that physical therapists or orthopedists can tell if a kid is within that window using x-rays to stage their growth plates. For our purposes, within a couple of years of puberty, that’s a key time when there does seem to be an argument for aggressive and preventative work, even if there are no presenting problems with pain. That includes bracing or surgery, if the threat was severe enough. And in kids approaching that degree of severity, I would encourage everything I could. Some physical activities, some balance sports or balance activities, hands-on work, refined proprioception body awareness. Whatever that means for the kid.

Working Symmetrically, or Not

AH: Here’s a question about working symmetrically and asymetrically. In Rolfing sessions, we work differently on the two sides of the body according to what we find. My experience is that many trainers and yoga teachers want people to work very symmetrically. If you do this exercise or stretch, do it equally on both sides. My sense has always been that if someone has scoliosis, or any identifiable asymmetrical pattern, and they can sense that from the inside or understand it from the inside, it’s intelligent to take an asymmetrical
approach into conditioning or yoga or stretching. I’m curious for your thoughts.

TL: Massage therapists are the other one. In entry-level massage they’re taught to do the same thing left and right. The intention behind that is probably good: it’s to try to keep things balanced, so to speak. You don’t want to induce some sort of difference. Again, it’s a simplistic way to stay safe and it gets translated into dogma. Probably the least dogmatic person that I can think of in that point of view was Moshe Feldenkrais, who was famous for working just one side of the body and leaving his clients asking for the other side. His answer was well, just, “No. You remember what I did right? Just think it through on the other side.” In his model it was all neurological, it was all about learning. Once you learned it, you got it. It wasn’t thinking of the stuff we’re made of, the hardware, as much as the operating system.

TL: In our trainings we’re teaching people how to work asymmetrically. But that’s not the point. The point is to leave people feeling like they have balanced options for movement. If someone comes in with an asymmetrical pattern, that means working asymmetrically. Then again, it’s not to try to make them symmetrical, but to help them do something, like Emmett was referring to, which is to be able to move in a way that feels supported, balanced.

AH: If they’re going to go out and do yoga as part of their program of being active, would you encourage them to explore being more asymmetrical in how they do it?

TL: I want to be careful about my prescriptions to them. It’s not like, “you should now do asymmetrical yoga, in order to ‘correct’ your imbalance.” My only prescription is, “What would it be like if you explored movement in both directions? Can you have as rich a sense of flexible body in this direction as in that direction? Can you expand in each direction?”

Clients with Rods and Fusions

AH: That’s a nice way to frame it. Let’s talk about scoliosis and surgery. Are Harrington rods still current?

TL: Harrington rods are still used. They are one of about five different rods that are being used now, commonly. There’s lots of exceptions. Lots of people trying experimental things too. Harrington rods were the main choice for a long time. A lot of people will come with Harrington Rods that they got years ago. Honestly, the principles are still the same: I’m still helping them find options for movement and refined proprioception. Now, I’m not trying to bend the rod, obviously. You can get a sense of movement and limited proprioception in the zone of a spine that’s been fused, either through bone infusion or a rod infusion.

The newer rods have lots of variation, and many of them flex. Many of them attach to the ribs instead of the spine and are adjustable, so they grow with the kid as she ages. Most of them now are three dimensional. Harrington rods were straight; that came from a two-dimensional view that scoliosis was an S, not a three-dimensional spiral, which probably is attributable to the fact that x-rays were the main way that they were studied – that we just perceived scoliosis as a flat situation because we were looking at flat pictures (even though some of the early people were working with scoliosis with stereoscopic x-rays – in the early twentieth century, they would take two x-rays and wear stereoscopic glasses to try to see the three dimensional curves in scoliosis). The classical view of scoliosis, the Cobb angle, is measured in two dimensions. The rod became a straight rod to try and straighten it out. They’re getting more sophisticated, the rods are now three dimensional, flexible, and adjustable. People can move even with a rod. That’s a major insider discovery for people that have a rigid rod. Even the mental concept of having a rod stiffens people up. Finding that they can actually feel breath, even bending and twisting and moving in the zones where they have a rod, can be a healing insight.

AH: It makes me think of a client in her twenties who had the Harrington rod surgery as a teenager. She was fine, completely adapted to it. She could play soccer, pretty much do whatever she wanted to do, no issues. Then she was in a car accident and that homeostasis of comfort from having adapted to and been supported by this surgery was disrupted and she was suddenly getting all sorts of radiating pain. She perhaps had less adaptability and that made it a little harder to go back to the old homeostasis or to find a new one.

TL: That sounds feasible. People with rods do have a higher statistical incidence of arthritis at the ends of the rods. In general, people with scoliosis don’t have more back pain than people without scoliosis, but people with rods have more facet joint issues at the end of the rods over time –decades later usually. That’s information we need to be careful with because it could definitely be a self-fulfilling prophecy or something that would upset someone to think about. Most of them have heard it anyways. They’re worried about it already. We can get good results by getting movement in the other facet joints, the ones that aren’t in the section where there are limits or where there’s a rod. The results come from relieving the extra movement that’s being asked at the ends of the rods that seem to be contributing to that joint problems.

AH: You teach in Europe also. Is there any different viewpoint or treatment, anything that’s useful that we might not know about in the U.S.?

TL: There’s a tremendous amount being done in Europe, especially movement in physical therapy. I think there’s seven major schools of scoliosis rehabilitation in Europe. They involve different sorts of movement and strength and conditioning physical therapy, and in some cases, manipulation. There’s a lot of really creative work being done. Schroth is one of the granddaddies – or grandmothers, in her case – schools that have given rise to different offshoots. They have different degrees of client/patient involvement too, the different schools. Some base it a lot on what the patient feels. That’s interesting to me as opposed to a prescribed set of movements.

AH: I have a client whose been doing the Schroth work as an adult and seeing a dramatic change in her curvatures.

Parts and the Whole

AH: Talk a bit about the content of your courses. How long they are and what kind of material you cover, the scoliosis courses in particular.

TL: Well, we have a series of modular seminars and online courses. The in-person versions are typically three-day workshops. I am about to release a new DVD all about scoliosis per se. And we have a specialized workshop specifically about scoliosis, but it’s really the culmination of our five principle courses, which cover the whole body. That’s because scoliosis is a whole-body phenomenon. Even though we have two days that we dedicate to it, in practice it means pulling in perspectives and ideas for working the entire body.

AH: You’re working from the holistic perspective, obviously.
Scoliosis is a whole-body phenomenon.

TL: Trying to all the time. We try to play that balance between really tangible, sometimes joint-specific, tests and techniques, while staying connected to the whole-body, whole-person picture.

AH: Which is something we didn’t talk much about, but obviously when we’re working with clients who have scoliosis, we’re not just looking at their thorax, their spine, we’re looking at the whole body too, and how the pattern plays out through the limbs, through the head, through the cranial system.

TL: Absolutely. The muscles of the spine aren’t strong enough to curve the spine in the way that we see in scoliosis — there are some really bizarre machines they use to test spines’ and stiffness. The idea that scoliosis is due to spinal muscular contraction doesn’t hold up, and as Schleip’s later research showed us, any force provided by fascial contractibility is very weak and slow. But conventionally, a practitioner with a tissue-based view would look at someone with a sidebend and think, “Oh, those erectors are tight on that concave side.” You’d think of the bowstring model, that you’ve got to go loosen the tight tissue and straighten it out. Well, refining awareness and getting more movement possibility in the concave side can be really useful, but it turns out that those things also help on the convex side. And there won’t usually be dramatic muscle tonus or fascial texture differences between the concave and convex sides. It’s probably not the case that the erectors or thoracolumbar fascia are ‘pulling’ the spine into a bend, and so that’s why ‘lengthening’ the erectors doesn’t usually straighten it out.

The girdles, however, are a somewhat different matter. That’s because myofascial structures crossing the girdles and going out into the limbs are bigger, stronger, and have different line of pull, so they can exert more force on the spine than the spinal muscles themselves. So just in terms of biomechanics, there are better arguments for working with the girdles and limbs than with the spine per se.

AH: What about the psoas?

TL: For a long time, the psoas was considered a key muscle in scoliosis. If you look at a lumbar scoliosis or even a lower thoracic scoliosis, it looks like the concave side has got to be short — one psoas could look like it was pulling the spine into that pattern. That led to a common surgical release where an orthopedic surgeon would actually sever the psoas tendon on the ‘short’ side, to try and correct the scoliosis and prevent it worsening. This was done up until the 1950s when a large study was done that showed that people that had psoas release surgery were no better off than the people that didn’t have the surgery.

AH: They were minus the psoas.

TL: Yeah, they were minus one of their psoas. It called into question the role – the causative role, you could say – of the psoas too. People’s scoliosis wasn’t getting better with one psoas cut. But the movement possibilities and preceptive function that myofascial structures provide seem to be important. The bowstring model probably doesn’t have a lot of basis in actual physics, and even less so in what seems to actually help; the tissue-tightness model is more conceptual than empirical.

AH: The three-dimensionality really implies that the whole biomechanical structure is going to be involved; trying to figure out one or two places to work is not going to be a model that is that helpful, ultimately.

TL: That’s right. In our trainings, we start our scoliosis protocol with the arms, legs, shoulder girdle, and pelvic girdle. We also have a lot of tools for direct work with the spine, thorax, abdomen, sacrum, and the neck. But then we finish with the limbs and girdles, back to where we started.

AH: If somebody wants to learn from you, they should move through the sequencing of your classes to get the whole worldview?

TL: Yeah. It’s a whole-body phenomenon. But people can jump into our series of short workshops at any point, and move through them in whatever order.

AH: Anything else you’d like to share?

TL: One thing – the deep pathologizing of scoliosis. People will come in having been told that they have scoliosis, and that they should do something about it. If they’re in that adolescent window, like I said, there’re good arguments for doing ambitious preventative work. But so many people have spinal curves that are asymptomatic. When we see mild curves, especially in an otherwise healthy person, it’s more helpful to reassure them and ease their concerns about having a disease that they’re afraid is going to cause them to degenerate or degrade or twist up in a funny way.

AH: That’s a good point. I can think of so many clients who’ve come in and announced that their chiropractor or another practitioner has said they have scoliosis. I look at them and feel, “You’ve been scared for no reason.”

TL: It gets complex when they’ve been scared by another practitioner. That gets into the ethical quandaries around interprofessional relationships. Often clients are relieved by an approach that’s more like, “I’m going to help you move comfortably in every direction. And I’m going to help you refine your body awareness, in every direction.” That seems to help everyone.

AH: Thank you very much, Til!

Til Luchau is a Certified Advanced Rolfer and former Coordinator of the Foundations of Rolfing Structural Integration program at the Rolf Institute, where in the early 1990s he originated Skillful Touch Bodywork. The author of the Advanced Myofascial Techniques textbook series, his regular column has been featured in Massage & Bodywork magazine since 2009, and his articles have been published in magazines and peer-reviewed technical journals in Australia, Canada, Japan, Korea, Poland, the U.K., and the U.S. Formerly a resident practitioner at the Esalen Institute, Chair of the Rolf Institute’s Teacher Training Committee, and Adjunct Faculty in Naropa University’s Somatic Psychology Department, he now directs Advanced-Trainings.com.

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Resources
Til Luchau’s free online courses, as well as his books, DVDs, and course schedule are at http://Advanced-Trainings.com. Or via social media: @tililuchau on Facebook, Twitter, and Instagram.
Scoliosis: A Way of Growing

By Pierpaola Volpones, Rolfing® Instructor, Rolf Movement® Instructor

ABSTRACT Scoliosis isn’t just a shape in the spine; it’s a dynamic action throughout the body. It’s not a disease but a way of growing, a strategy the body has adopted. In light of this, when working with scoliosis, practitioners want to be cognizant of not just the body but also the client’s perception, coordination, and meaning, including body image and body schema.

During my years of practice as a Rolf®️, I have come to think of scoliosis as a way of growing. There are trees that grow straight toward the sky and others that twist and torque: bamboo and olive trees. Both are beautiful (see Figures 1 and 2).

People with scoliosis remind me of olive trees. With this in mind, my interventions when I work with somebody with scoliosis are intended to remind the body that there are several ways to grow up: that there are different options to grow that are less twisted, with more length. I stand at the client’s side imagining myself as a gardening tutor, planting a small tree.

What Is Scoliosis?

Searching ‘scoliosis’ on Google, this is the first definition I encounter:

“Scoliosis is a sideways curvature of the spine that occurs most often during the growth spurt just before puberty. While scoliosis can be caused by conditions such as cerebral palsy and muscular dystrophy, the cause of most scoliosis is unknown . . .

Signs and symptoms of scoliosis may include:

• Uneven shoulders
• One shoulder blade that appears more prominent than the other
• Uneven waist
• One hip higher than the other

If a scoliosis curve gets worse, the spine will also rotate or twist, in addition to curving side to side. This causes the ribs on one side of the body to stick out farther than on the other side” (Mayo Clinic).
If I didn’t know what scoliosis is, what I would take from such a definition is that it consists of a lateral deviation of the spine due to unknown causes. But this is an overly simplified description. We will see that scoliosis is not limited to the shape of the spine.

What is interesting to me is that, in the definition above, under ‘signs and symptoms’ we find only ‘signs’: in itself, scoliosis does not create any pain. ‘Symptoms’ are generally manifestations of pain due to a disease or illness. With scoliosis, adolescents find themselves having to go see a doctor, even if they don’t feel pain, and they receive a diagnosis of something that they don’t recognize as an illness.

This discrepancy sometimes creates frictions, an obstacle in the relationship with the therapist or the Rolfer: clients are told that something is wrong, but they can’t perceive what it is. When they stand in front of a mirror, they can see that one shoulder or one hip is higher than the other, but if they close their eyes, they don’t feel any asymmetry. They feel perfectly fine, straight. Accordingly, this is an area where I place quite a bit of attention: to finding congruence between what the clients perceive from the inside and what they see from the outside.

How Do People Perceive Their Scoliosis?

In working with adults who wore a corset for scoliosis when they were young, I’ve been struck by a couple of things: first, that their torso is ‘frozen’, rigid, immobile, as if the person were still wearing the corset; second, that the corset has left signs – callouses where it pushed the client’s spine into a straighter position. Where the corset pushed on a hip or the ribs, the person often resisted the push because his/her body schema did not recognize that something was crooked in the first place. The corset pushed on something perceived as straight; the body resisted the push. When I have asked clients if the corset was helpful, the reply almost always comes back, “The doctor said that it was helpful to stop the situation getting any worse.”

Swimming is often recommended in cases of scoliosis, and the logic behind this is very simple: with the water’s buoyancy, there is less effect on the body from gravity. But while the symmetrical activity of the limbs in swimming can balance the asymmetry, more recent research suggests that swimming helps but does not really correct scoliosis. Kinesia therapy is also recommended: it aims at lengthening the muscles on the side where they are too short, and toning the muscles on the side where they are too weak. Again, this seems logical, but it does not really work as it seems to further strengthen the side that is already too strong.

Scoliosis Has a Dynamic

A woman in her fifties came to see me because of back pain. She told me a story that touched me, and taught me a lot about scoliosis. She had a severe scoliosis, and when she was twenty years old decided to have surgery to straighten the spine. The surgeon inserted a rod that was locked with screws. A few months later, the rod broke: the thrust of her spine was stronger than the rod. She had to undergo another surgery to take the rod away.

What I understood is that a scoliosis isn’t just a shape in the spine; it’s a movement, a dynamic action that travels throughout the body. As a consequence, there needs to be an agreement with the client – spoken or unspoken – to reverse or modify the vector of growth that that person has embedded in her/his structure. Knowing that, as Dr. Rolf said, “I think there’s more than the body, but the body is all you can get your hands on,” my work as a Rolfer is not only to touch the physical structure but also to address and have in mind other structures: the structures of perception, coordination and meaning, which also includes body image and body schema.

Ways of Working

Talking with clients, it is clear that they don’t perceive their spines as twisted – in the client’s brain, his/her spine is straight. So our work needs to affect the cortical maps where the spine is located. How do we do this? What I have tried is to bring awareness to the inner motion of the breath and to the volume occupied by the breath in the thoracic cavity, and the response of the pelvis and the back to the movement of breathing into the pelvis and pelvic floor. I use my hands as a reference that clients can reach with the breath, particularly where the ribs are closer and narrow.

Having the client visualize and move the vertebrae with micromovement is also interesting. I have the client sit on the bench facing the massage table, with hands resting on the table. I touch each spinous process and ask the client to move that vertebra toward my fingers. It is often at the place where the spine changes direction that the client is confused. Asking the client to push more with one foot or/and one hand helps him/her to find that vertebra, or group of vertebrae, and at the same time to de-rotate it/them. Finally, using a mirror helps to reset the cortical map. In addition to seeing himself or herself looking straighter, the client is able to add the inner sensation of more equal volume in the thorax and can begin to integrate this new information.

Hubert Godard has stated that for people with scoliosis, the space outside the body – the kinesphere – is no longer round; it seems to have ‘holes’, as if at the side of the spinal concavity the space outside the body does not exist or is not available. Somatic Experiencing® affirms something similar: in particular circumstances, the space outside the body is perceived as if it is no longer available and not safe and the body shrinks in response. The body may lose its ability to orient, or the capacity to scan the horizon fully and freely, and this may translate, to give one example, into a sidebend of the head. Therefore, our work with people with scoliosis also involves giving back to our clients the possibility of inhabiting space inside and outside the body.

All these observations brought me to think that scoliosis is not a disease but a way of growing: it is a strategy that, for whatever reason, the biology or physiology of that particular person has adopted.

Examining Scoliosis: Assessment and Positioning for Work

Scoliosis is a movement that happens in all three planes and travels throughout the body. We often hear that one hip being higher than the other is due to a ‘shorter’ opposite leg, and it is conventionally treated with a lift of that leg. If we look more closely, we might see that this so-called ‘shorter leg’ may have a pronated foot, a valgus knee, a rotation at the femoral head (take a look at the orientation of the lesser trochanter of the ‘shorter’ leg). A precise body reading and intervention is key to normalizing the two legs and balancing the pelvis.

The sidebend and rotation of the thoracic
particularly of the liver or stomach. There is no question that disordered structure at the level of the costovertebral and costochondral joints and ligaments is directly in dialogue with the parietal pleura attaching on the sternum and the vertebrae and creates a consequent disorder of the membranous system of the thoracic organs, and the organs themselves.

Just below the diaphragm, the liver and its ligaments, and the stomach with its sphincters and ligaments, are in close contact with each other and with the

vertebrae obviously affects the ribs. At the concave side, the ribs will be closer to each other, rotated anteriorly, and flatter. The opposite will be true at the other side. A strategy for the thorax is 1) to work the convex side, put the client in the SIMS position (Figure 3) resting on the concave side, and work the ribs of the convex side anteriorly; 2) to work the concave side, put the client in a regular sidelying position lying on the convex side, allowing you to mobilize and encourage more space between the ribs on the concave side.

Sometimes the sidebend and rotation appear in the shoulders and arms. In Figure 4 we see a schematic with contours drawn from a photo of a young person with scoliosis. We see a right rotation of the ribs on the right side; an anterior right shoulder and posterior left one; internal rotation of the right humerus, and external rotation of the left humerus; and the left forearm seeming to compensate with pronation.

The Visceral System

Another aspect of structural organization that appears to have a strong impact on scoliosis is the visceral contents of the thorax and abdomen. I have not yet explored in detail how to address the visceral content of the head (the tongue, eyes, and brain), but I have observed and worked with sidebends and torsions of the skull and jaw. We have more work to do to understand the visceral content of the head.

Recently I did an experiment. I have been working with a twelve-year-old girl who has a scoliosis where the right humeral head is both forward and internally rotated. Looking at the movement of her eyes, I noticed that, when I asked her to look to her left, her right eye would converge more than her left one. It seemed that the right eye was more caught, medially, by the ocular muscles. Very gently I touched her closed eyeball, with the intent to release the medial pull, and this helped the shoulder to open!

Peter Schwind has suggested that some cases of scoliosis originate in a torsional movement of the organs, particularly of the liver or stomach. There is no question that disordered structure at the level of the costovertebral and costochondral joints and ligaments is directly in dialogue with the parietal pleura attaching on the sternum and the vertebrae and creates a consequent disorder of the membranous system of the thoracic organs, and the organs themselves.

Just below the diaphragm, the liver and its ligaments, and the stomach with its sphincters and ligaments, are in close contact with each other and with the

shoulder forward

Figure 3: Working the convex side of the scoliosis with the client in the SIMS position.

Figure 4: Schematic of a young person with scoliosis.
diaphragm. Work around the diaphragm is more effective when it also includes work on these membranous structures. If we think about the space in front of the spine, the psoas muscles are often asymmetrical, and the kidneys share that space. Indirectly mobilizing the kidneys by addressing the psoas can also be very effective.

The iliacus and its fascia, reaching in front of the sacroiliac joint, encases the inner surface of the pelvis. Likewise the subperitoneal organs with their lamina and ligaments spread between the pubis and the sacrum and coccyx. Thus, the pelvic floor and the overall balance of the pelvis are interrelated with the action and position of the subperitoneal organs.

**Additional Considerations for Work**

Working with people with scoliosis requires asymmetrical work: every session has to be tailored to that person and that moment. No two scolioses are exactly the same. Some clients have a lateral shift of the thorax, others of the pelvis; often the dorsal kyphosis is lost. Some have two, three, or more curves of the spine. Sometimes scoliosis emerges after adjustments of the teeth.

I often work the suboccipital and lumbosacral areas to free the spine. Then the table work continues, moving between the sleeve and the core, and back again: the myofascial layers, the ligamentous bed, and the visceral-membranous system. That day's body reading provides a suggestion of where to work in each session. Often I close the session with bench work, inviting the client to negotiate how s/he deals with gravity, to recognize old and new patterns, and to find new options while I work the back, the girdles, and the spine. The use of a mirror helps to reset the client's system, including the way that the brain has unconsciously mapped his/her physical reality.

I invite my client to do a number of things: sense position and weight on the sit bones; feel the connection of the feet to the spine; perceive the length of the spine; sense the space in front of the spine; use breath to relate the shoulder to the thorax and neck . . . All of this is the normal bench work that I use with clients in general, but when there's a scoliosis I pay more attention to de-rotating and untwisting the spine. To achieve this, I might ask the client to use one foot more than the other, to rotate to one side and open to the space on that side, to breathe into a specific area, to shift one of his/her sit bones, and so on.

**Working with a Corset**

Sometimes clients have to wear a corset for the scoliosis during the day, and they don’t like it! After a few sessions in which I aim to build rapport, confidence, and trust between us (and enhance adaptability in their structures), I ask the client to bring the corset. During bench work, I work first of all with the client in front of the mirror to untwist the spine and the torso until the client feels and sees that there is more length and less twisting. I shape the client's shape with my hands so that the person perceives the difference between what is familiar and what is possible and is finally able to accept this change in his/her shape. I then ask the client to put on the corset, feeling the places where it holds rigidly against the ribs or pushes against the pelvis or lumbar spine. I invite the client to allow the corset's push, to stop resisting, recalling the same sensation that s/he felt from my hands and the memory of the moment where s/he accepted a new reality, a changed shape.

**Bibliography**


Pierpaola Volpones discovered Rolfing Structural Integration through bodywork and her research into well-being and somatic expression. She studied in Munich with Stacey Mills and Michael Salveson for her Basic Rolfing Training and with Michael Salveson and Jeffrey Maitland for her Advanced Rolfing Training. Her Rolf Movement Training took place in Italy with Janie French and Annie Duggan. She began Rolfing and Rolf Movement teacher training almost twenty years ago and has been teaching since 2006. She maintains a practice in Rimini, Italy and teaches for the European Rolfing® Association. Her website is www.volpones.it.
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Pierpaola Volpones
Scoliosis: Assessment and Treatment

By Jeffrey Burch, Certified Advanced Rolfer™

ABSTRACT This comprehensive article begins by describing scoliosis from several perspectives, and then addresses how we as structural integration practitioners can work with scoliosis, both in our own practices and through teamwork with other practitioners.

PART I: ABOUT SCOLIOSIS

All scolioses share certain characteristics, and each scoliosis has a unique combination of other features. All snowflakes are recognizable as snowflakes and no two have ever been found to be identical. So it is with scoliosis.

Commonalities in Scoliosis

First, the common ground.

All scolioses are sidebending (frontal plane) curves of the spine that can neither actively nor passively be brought to a straight vertical axis. All of our spines should be able to bend to either side. Any fixation in sidebending is called scoliosis. To begin to quantify this, at least four adjacent segments must be sidebent the same direction for the spine to be described as having a scoliosis.

Sidebending and rotation are always coupled. In the mechanics of our spine, neither sidebending in a frontal plane nor rotation around a vertical axis can occur alone. In other words when one is present, the other will also always be present. In the thorax, the rotation moves the spinous processes to the concave side of the sidebending curve, unless there is a large degree of flexion or extension also present. One effect of this is that, for a mild scoliosis, the line of the tips of spinous processes may appear straight when the person is standing, even though the bodies of the vertebrae are arranged in a curve.

Theme and Variations in Scoliosis

That's it for the common characteristics. Now for the snowflake patterns. We can describe features of each scoliosis from several perspectives, akin to describing color in terms of hue, value, and chroma, or plant identification by size, form, leaf shape, flower color, and odor.

Scoliotic characterizations require that we investigate:

- etiology (if known) of the scoliosis; ‘idiopathic’ if unknown
- age at first diagnosis
- number of curves
- direction of each curve
- depth of each curve
- correlation with genetic syndromes

Each of these features is looked at separately, and then the information brought together to form a fuller picture of that person’s scoliosis.

Etiology

An important point to remember is the likelihood of multicausality. There is a classic thinking error in which something related to a problem is found, leading the investigator to believe the whole story has been told, thus ending the investigation. The fact first recognized is seldom the entire explanation, and may not even be one of the more important pieces of the puzzle. However much we learn about a problem, we must always keep looking.
Unilateral compression fracture: The body of a vertebra may be shattered in an injury. If the full width of the body of the vertebra shatters, that vertebral body will lose height resulting in an angulated kyphosis at that level. If only one half of the vertebra – left or right – is shattered, the spine above that level will tilt to that side, producing an angulated scoliosis similar to a hemivertebra, with similar compensatory patterns (see Figure 1). Such fractures are usually produced by a near axial load such as a fall landing on either the ischial tuberosities or the feet. This often shatters a single level in the spine, but may shatter two or more vertebrae.

Congenital hemiblock vertebrae: A block vertebra is a congenital fusion of two or more adjacent segments in the spine. Usually hemivertebrae are fused full-width. However, it is possible for the fusion to be only one side – left or right. When only one side is fused, during childhood growth the fused side is not able to grow vertically as much as the unfused side, and a scoliosis will progressively develop.

Degenerative scoliosis: Any combination of unilateral disc degeneration, asymmetric facet-joint degeneration, asymmetric osteoarthritis, or osteoporosis can result in marked loss of height on one side, left or right, of a portion of the spine. This is a condition most common in people over age forty. Sedentary lifestyle plays a major role. Occupations that make markedly asymmetric use of the body can contribute. Poor diet and genetics also make contributions.

Neurologic: Scoliosis can be caused by neurologic deficits, which create an asymmetric ability to recruit muscles, and/or long-term asymmetrical muscle spasms. Sources of this include:

- stroke
- brain tumor affecting motor control
- brain surgery affecting motor control
- asymmetric peripheral nerve damage
- cerebral palsy
- Duchenne muscular dystrophy
- ALS

Infectious disease: Some infectious diseases directly affect bones. These include osteomyelitis and tuberculosis of the spine. Osteomyelitis is an infection of the bone, a descriptor that is non-specific as to infectious agent. However, the infectious agents are usually bacterial. Bone infection anywhere in the body is life-threatening and requires prompt robust antibiotic treatment. The infection weakens bone and when present in the spine can result in scoliosis. Tuberculosis of the spine is a particular infection in vertebrae by Mycobacterium tuberculosis.

Tuberculosis is usually thought of as a lung infection, but the bacteria can infect any body tissue. Bone tuberculosis is fairly common. It is worth noting that pulmonary tuberculosis, as well as other severe pulmonary infections, are known to contribute to scoliosis by creating asymmetric pleural adhesions that bend the spine. More on this below.

Anatomic leg-length difference: This is objectively measurable length differences between the left and right long bones of the legs. It is best measured as a standing x-ray as supine measurements are less accurate. (This must not be confused with functional leg-length difference, which is determined by comparing the way medial malleoli meet in a supine position. Functional leg length differences are entirely soft-tissue problems and do not affect the relative height of the greater trochanters when standing.) If one leg is anatomically substantially longer than the other, the pelvis – including the sacral base – will be tilted toward the short-leg side. The fifth lumbar vertebra, articulating with the sacrum, will be tilted to the same side as the anatomically short leg. Vertebrae superior to that will incrementally correct toward level. For moderate anatomic leg-length differences, the lateral curve may be entirely in the lumbar spine. For greater leg-length differences, there may be a compensatory curve or curves in the thorax, or rarely a single curve through the whole spine. See Figure 2. Some persons are born with anatomic leg-length
differences; others spontaneously develop during growth; and some are created by fracture management or surgery.

**Idiopathic**

The above seven categories distinguish scolioses by known origin. Collectively, these seven categories describe a minority of cases of scoliosis. The etiology of the majority of scolioses remains unknown. These scolioses of unknown origin are called ‘idiopathic’, a medical term that means “We don’t know where it came from.”

With idiopathic scoliosis, the sidebending of the spine is initially a soft-tissue problem – tight tissues pulling bones out of line. Over time, the unbalanced forces on the bones induce the bones to change their contour. For a typical idiopathic scoliosis diagnosed between ages nine and fourteen, there is initially no bony deformity. By that person’s late twenties, there will be body deformity as the bones adapt to their positions. This speaks to the value of our early intervention.

I have a speculation related to some idiopathic scolioses. Identical twins are formed when one embryo divides very early in development into two genetically identical babies. Fraternal twin formation occurs when two ova are released, both are fertilized, and both survive until birth. Fraternal twins are as like and unlike each other as any other two siblings. There is another less-known phenomenon in which two fraternal twin embryos merge into a single baby. This is called chimera, or mosaic. In a mosaic, the components of the two embryos may be well-mixed or not. With less well-mixed chimeras, a person may have checkerboard skin color, eyes of two colors, marked facial asymmetry, or other obvious dissimilarities. Other times, the mix is more homogenous so there is nothing to see on the surface.

While chimerism or mosaicism has been recognized for a long time, incidence of it has not been measured. Clinicians and researchers suspect that there are many more human chimeras than we have been aware of. The incidence of human chimerism has been challenging to quantify: the two cell types may have any distribution and proportion in the body, so identifying a mosaic would require sampling many tissues in the person, some of them quite deep. One opportunity to measure comes in studying people with Down’s syndrome, as these patients are often screened by examining their blood cells to see what proportion of the cells have trisomy 21. The etiology of Down’s syndrome is the presence of a complete or partial third chromosome number 21. While about half of Down’s syndrome patients show mosaicism, the proportion of the two cell types is highly variable, reflecting non-equal mosaicism. This, however, looks only at mosaic distribution in marrow, the tissue that creates blood cells. Mosaicism could be expressed entirely in other tissues. Recently, researchers used embryos from in vitro fertilization to investigate this further. For in vitro fertilization, several embryos are fertilized; typically two are implanted and the rest discarded. In the study, the extra embryos were analyzed cell-by-cell for mosaicism. This is practical since each early embryo has only a small number of cells. The results showed that 50% of these embryos were mosaics. It appears half of us have two distinct genotypes. My guess is that idiopathic scoliosis is more common in those who are mosaics. Another hypothesis is that autoimmune disorders are more common among mosaics.

**Categorization Based on Age of Onset**

**Birth:** Some scolioses are present at birth. Etiology may be hemivertebra, unilateral block vertebra, or – most commonly – idiopathic. The idiopathic ones sometimes resolve during childhood growth, sometimes not.

**Early childhood:** Some scolioses first appear at a young age. These can involve injury, neurologic insult including cerebral palsy, other brain injury, or peripheral nerve injury. The majority are idiopathic. The idiopathic ones sometimes resolve during childhood growth, sometimes not.

**Later childhood and adolescence:** Of idiopathic scolioses, 80% are in girls, and most commonly appear during the growth spurt associated with puberty. While scoliosis in boys is less common, it tends to occur at a somewhat earlier age, around nine to ten. Scoliosis of other etiologies can occur in this same age range, including bony injury to the spine or legs, neurologic insult, or vertebral infections.

**Young adulthood:** The onset of idiopathic scoliosis is over by physical maturity, which may be between ages seventeen and twenty-two. Injury and infection are the opportunities in young adulthood, and this is the least common era for the onset of scoliosis.

**Midlife:** Past age forty, the likelihood of degenerative scoliosis gradually increases. Injury and infection-induced scolioses continue to take small tolls.

**Old age:** The trends of midlife continue to accumulate into senescence.

**Number of Curves**

**One curve:** It is possible for a scoliosis to have only one curve with no compensatory curves (Figure 2, #1 and #2). There are two versions of this. With a mild-to-moderate anatomic leg-length difference, there can be a lumbar scoliosis with no thoracic compensation. More rarely there is a single curve to the same side through all areas of the spine from skull to sacrum.

**Two curves:** Most commonly there will be a curve to one side and a compensatory curve to the opposite side (Figure 2, #3 and #4).

**Three curves:** Slightly less commonly, there will be a series of three curves (Figure 2, #5), one to one side, another above that to the other side, and a third, more superior, back to the side of the most inferior curve.

**Four curves:** Uncommonly, the pattern described for three curves will be extended to four curves (Figure 2, #6); for example, from inferior to superior, left-right-left-right, or right-left-right-left.

**Direction of Curves and Primacy Among Curves**

Scoliosis curve directions are named for their convex sides. In the normal mechanics of the lumbar and thoracic spine, the spinous processes rotate to the hollow side of the curve, which means the bodies of the vertebrae rotate to the convex or bulging side of the curve. If the bulging side of the curve is on the right, the bodies of the vertebrae rotate to the right and this is called a dextrorotary curve. (‘Dextra’ refers to right and ‘levo’ to left.) If there is a single curve it is named for its convex side. If there are two curves in opposite directions, each curve is named for its convex side, however one curve is considered to be the ‘primary’ curve and the scoliosis as a whole is named for this ‘primary’ curve. When two or more curves are present, the criteria for deciding which of them is primary are ill-defined. There is an assumption that the
primary curve occurred first, although it is rarely possible to know this historical sequence as fact. The primary curve is usually the longest curve, which means it is almost always the curve in the thorax. About eighty percent of scolioses have a thoracic (primary) dextrorotary curve, i.e., convex on the right.

**Depth or Radius of Curve**

The depth of the curve can be measured. This is usually done by drawing a series of straight lines on an x-ray by a method known as the Cobb angle method (see Figure 3). The top and bottom laterally-tilted vertebrae in each curve are chosen, and a line is drawn extending the superior or inferior surface of each of those vertebrae. Where those lines intersect is called the Cobb angle. Measurement of the Cobb angle quantifies the curve and 10° is the minimum standard to define a scoliosis. Thoracic curves greater than 60° have been shown to result in severe cardiac and pulmonary compromise. Cardiac compromise tends to be greater with thoracic curves convex on the right.

**Correlation with Genetic Syndromes**

Some genetically-based syndromes have elevated incidence of scoliosis: Marfan syndrome, Ehlers-Danlos syndrome, Trisomy 21/Prader-Willi syndrome; Beals syndrome, and spina bifida. Spina bifida may have a purely nutritional component if there is severe vitamin B12 deprivation during pregnancy. Often spina bifida is largely an expression of Methylenetetrahydrofolate reductase (MTHFR) gene mutation; the MTHFR enzyme converts folic acid to methyl folate, the active form in our physiology.

**Multicausal**

As mentioned above, a scoliosis may have more than one contributing factor. For example, a client may have a mild anatomic leg length difference, a highly asymmetric occupational or recreational activity (such as a baseball pitcher), and an injury (such as a unilateral compression fracture). Or, another example, the person may have Ehlers-Danlos syndrome, spina bifida occulta, a sedentary occupation (such as seated work requiring frequent rotation to one side only), and a small stroke that affects muscle control.

**PART II: TREATMENT OF SCOLIOSIS**

Below I will discuss how to approach scoliosis with Roling® Structural Integration (SI), as well as the importance of teamwork with practitioners of other modalities.

**Know Your Client’s Scoliosis**

A client telling you s/he has scoliosis is a useful start, but insufficient. Collect more information.

**History:** First, take a history. Here are useful questions:

- When was it first observed?
- Who found it, and how?
- Have any x-rays or MRIs been taken? When? What did they show? Are these films and radiology reports available?
- How have other healthcare providers described this scoliosis?
- What treatment has been tried in the past? With what results?
- What other treatment is ongoing now?
- Has any anatomic leg-length difference been verified by standing x-ray??
- Was there any precipitating event: injury, Illness, period of unusual activity.
- Do any first-degree relatives (parents, siblings, children) have scoliosis?
- What other syndromes are present?
- What are and have been the person’s occupational and recreational activities?

**Request x-rays and medical reports:** Ask the above questions and remember that most people are weak medical historians. Request records. Request the x-rays, associated radiology reports, and related medical reports. If the last x-ray was more than five years ago, suggest the client discuss with his/her doctor the potential value of getting a current x-ray. A lot can change in five years.

**Quick test:** A quick and informative test for scoliosis uses the fact that the coupling between rotation and sidebending in the spine also interacts with flexion. Sidebending and rotation cannot occur separately, but if the spine is also flexed, more of this coupled motion is put into rotation, and the bodies of the vertebrae may rotate in the opposite direction. Have the client comfortably seated with his/her feet on the ground a little in front of the knees, arms hanging loosely at his/her sides. Ask the client to roll down – similar to a roll down for SI back work. As the person rolls down, notice, in passing, areas of reduced mobility. The real test for scoliosis is when the client is fully forward bent. Because the flexion of the spine shifts the rotation/sidebending coupling to more rotation, the scoliosis will be much more visible in this flexed position. The ribs on the convex side will be much more prominent toward the ceiling. The degree of this prominence gives you a rough estimate of the degree of scoliosis.

**Ask about other treatment:** Ask the client what other treatment s/he is currently receiving related to the scoliosis. Ask the client what treatment s/he has had in the past, including – but not limited to – surgery and physical therapy.

**Consult:** Talk to the client’s physical therapist, occupational therapist, Pilates teacher, Schroth Method teacher (more on that below), etc., to coordinate care.

**Some Specific Situations**

**Hemivertebrae:** This is a difficult structural situation. The medical solution is to remove the hemivertebra and fuse the adjacent segments, which provides straightness and stability. It is a sensible
solution to an otherwise unmanageable situation. The surgery must be done by adolescence, though earlier is generally better. After recovery from surgery, SI can offer a great deal to help the client adapt to his/her modified body.

**Compression fracture:** The surgical solution to a compression fracture is a balloon kyphoplasty. A balloon is inserted into the crushed bone and carefully inflated to restore the height of the vertebral body. The balloon is then withdrawn and the space created is filled with cement. This restores the height and shape of the vertebra. Once the bone is well healed, SI can help the client adapt. If the vertebral body was allowed to heal without this balloon intervention, it will have healed in an angulated, sidebent position that is very difficult to manage. Some compensations may be addressed and mobility may be improved, but it will not be possible to straighten this spinal segment.

**Significant anatomic leg-length difference:** How much leg-length difference a person can tolerate and adapt to varies with several factors including, prominently, disk health and occupational and recreational stressors. Often people adapt to a half-inch of anatomical leg-length difference without symptoms. For larger or otherwise symptomatic differences, shoe lifts are in order. Heel lifts have been used, but these have the disadvantage of pitching weight forward onto the ball of the foot; a one-inch heel height doubles the load at the metatarsal heads. That is why it is often better to lift the foot as a whole. There are additional considerations with this. The added sole height makes the sole of the modified shoe both heavier and stiffer. This stiffness is an unfortunate side effect. Choice of sole material can partially mitigate this. Some prosthetists add weight to the non-lifted shoe to equalize the inertial mass. Both shoes are now heavy, which changes gait, but this may be a lesser evil than a large difference in shoe weight between the two feet.

**Neurologic problems:** If the scoliosis is of neurologic origin or has a substantial neurologic pathology contribution, it is important for the client to work with a physical therapist well-versed in this kind of situation. Therapy must be focused on evoking as much potential from the person’s nervous system and musculature as possible. Sometimes much can be done; other times very little. Anne Shumway-Cook and Marjorie H. Woolacott (2017) have written an excellent book – *Motor Control: Translating Research into Clinical Practice,* a comprehensive presentation of research in the field geared to clinical intervention – and also offer workshops in their methods.

**SI for Scoliosis**

**The Place of the Ten Series**

In my Advanced Training in 1990, Jan Sultan told us that while he regularly uses the Ten Series, he will often do several sessions of non-formulaic work before beginning the series. He likened this to wanting to cook a nice meal, but the kitchen is a mess, so it is necessary to clean the kitchen first. This way of thinking is strongly applicable to scoliosis. With scoliosis, the kitchen is always very messy. It’s important to attend to disorganization as you discover it. For this reason, the process will involve considerably more than ten sessions. Begin by cleaning the kitchen as well as possible. Work with what you find. Think structurally. Apply the principles of Rolfing SI in a broad context. The work will be more like sessions eight and nine. Do not chase pain. During the Ten Series, you may open a cabinet or drawer in the kitchen and find another mess. Pause the ‘Recipe’ to deep-clean that mess.

There are innumerable possible ways a ‘kitchen’ can be dirty. Often, a client will show more than one. For example, shoulder girdles and upper limbs often compensate for scoliosis. The central goal of improving breath in a First Hour may not be directly approachable. It might be necessary to increase the organization of the client’s hands before any improvement can be made in breath. The series dictates that we work first on superficial layers before proceeding deeper, like peeling an onion. However, if the surface of the body appears lax and deep tissues are stiff and condensed, then working on deeper layers first to expand them will take up slack in surface layers so the tonal differences between portions of the ‘sleeve’ become visible. ‘Cleaning the kitchen’ is a big job in itself. When you do use the Ten Series with scoliosis clients, stay with a goals-oriented version of the Recipe rather than an anatom-territory version. On several occasions, when Dr. Rolf was demonstrating a First Hour on a new model, she used that opportunity to work on the feet and lower legs. She was not skipping ahead to the Second Hour. A central goal of the First Hour is to do what is immediately available to improve the person’s breathing. In those First Hours she could see the clients’ contact with the ground was so poor they could not relax into their base of support, which limited their breath. The best thing she could do for their breath at that moment was to give them a better base of support. Similarly, a central goal of a Second Hour is to get the feet more fully and flexibly on the ground. Accomplishing this may or may not include touching the feet. The problem may come primarily from higher up.

**Application of Rolfing SI Principles of Intervention**

A further consideration is the application of the Principles of Intervention that underlie Rolfing SI. Get support under the spine by first organizing feet, legs, and pelvis. Organize the ends of spine, neck, and head. Follow Rolf’s classic Recipe, which has as one of the goals of every session to horizontalize and mobilize the pelvis. Keep at all of this. Sorting out the ends of the spine and improving the client’s base of support will make it easier to change the spine. Every time you change the spine you will put more demand on the ends of the system and you will have to help them adapt more. Every hour is an integration hour. Only following the Recipe won’t work well. You need to work in a more circular way, like scoliosis itself, revisiting the same areas multiple times in order to achieve better organization.

**Order of Intervention**

In my Basic Training we were repeatedly told that the perpetual question in our minds must be “Where can I work on this person at this moment that will make the greatest change for the whole person?” It was a great idea, but we were not given many tools to figure out where that sweet spot was. Decades later, in my first Barral Institute class, I was told exactly the same thing, and given a group of assessment methods to find the place on the body that would make the most change for the whole person. The instructor also offered language for this ‘best’ spot, calling it the ‘primary restriction’. Primary in this context meant it was what should be worked on first, and had nothing to do with either the order in which restrictions were created or the severity of the restriction.
A central assessment method to find the primary restriction, popularized by Barral and his associates, is called by the non-descriptive term ‘general listening’. (Instructions for general listening are in Appendix 1.) One effect of working on the primary restriction is to ‘shuffle the deck’. Once the primary restriction is worked on, it is necessary to have the client stand and ‘general listen’ again to learn what has become the next primary restriction.

**Myofascial Factors**

Myofascial factors contributing to scoliosis include:

- ligamentous laxity
- ligament fibrosis
- muscle weakness
- muscle fibrosis
- muscle spasticity
- fibrosis in other tissues

Ligamentous laxity (or weakness) allows bones to fall out of line. Fibrosities both pull and hold bones out of line. While both can be found in scoliosis, the fibrotic problems are by far the more common. These fibroses can be viewed as restricting factors preventing the spine from moving from sidebent to straight. The fibroses may be local, close to the curve, or at any distance in the connective-tissue matrix of the body. The situation is never simple. There are always multiple fibrosed areas – some local, some at a distance – holding the spine out of line.

There is a straightforward process to finding a succession of fibrosities maintaining the curve, a process I developed called Ultra-Slow Mobility Testing (USMT). The general form of this method is included as Appendix 2, which I recommend reading now, in service of understanding the principles of treatment, before proceeding with this article.

To apply USMT to a scoliosis, choose the particular curve you want to treat at the moment, then follow these steps.

1. Position the person’s body deeper into the curve, as deep into the curve as can be achieved without undue effort and while maintaining comfort for the client.
2. Pause for a moment.
3. Instruct the client not to help.
4. With your hands, begin to straighten the curve with almost imperceptible slowness. As you use your hands to straighten the curve, also keep your hands actively sensing. At the first hint of increased resistance, feel for the ‘catch’ or ‘bind’ that resists your movement. This may be close to the curve you are testing, or far away in the body. Allow yourself to be surprised.
5. Work the area that ‘catches’ or ‘binds’ with the goal of increasing tissue span, using any of the soft-tissue methods we have to increase the length and elasticity of tissue.
6. Once that area is worked, return to Step 1. Repeat this cycle several times, maintaining an approach of curiosity and willingness to be surprised.

In this process, myofascia may be worth working on – and myofascia is commonly the least useful tissue. Many tissues can be fibrosed. In Rolfing Basic Training, there is focus on connective tissue associated with muscles, yet this is the connective tissue in the body least likely to be ‘primary’ among restrictions to work with. Skin, organ support membranes, vasculature, nerves, meninges, and bone are more likely to be primary. When the primary restrictions are found and released, the compensatory holdings in muscle and myofascia will fade away, as they are now no longer useful. Consider instead working with:

- organ support membranes and organ glide planes (dura, pleura, peritoneum)
- nerves
- vasculature
- strain in bone

USMT may be applied to any shortened area. Lengthening is the objective. For scoliosis, an obvious application of USMT is to find a series of shortened tissues maintaining an alignment distortion and/or mobility limitation. Also consider the rotary component of scoliosis. A way to do this is to have the client seated. Ask the client to allow you to move his/her body slowly, with the client neither helping nor resisting. With your hands, contact the upper thorax (not shoulder girdle); rotate the client to the left to an end of range of motion. Allow the client to return to neutral by slowly reducing the load applied to rotate the body. I allow it to spring back toward neutral. Then pause briefly. Rotate the client to the right, again to ‘end-feel’. Notice which side is more mobile.

After returning to neutral and pushing again, rotate the client to the more mobile side. Next, very slowly (like grass growing!) reduce the force you are using to hold the client in rotation. Watch for the first hint of a catch, which will occur well before neutral. Note the location of the catch. Allow the client to return fully to neutral. When the client rotates to one side, this loads tissues in the body, like springs. By gradually reducing the rotary force, the body will slowly spring back toward neutral. This may be done in a seated, standing, or lying-down position. (Use any method we have for lengthening and increasing the elasticity of soft tissue.)

After the first catch is treated, return the client to seated position and repeat the rotation test on both sides to see what, if any, improvement has been made. If rotation to the two sides is not equal (which, after one intervention, it usually will not be), repeat the test sequence to find and treat the next catch. Repeat this sequence until rotation to the two sides is substantially closer to equal and full.

**A Trick of the Trade**

We SI practitioners give considerable emphasis to the iliopsoas muscles. Rightly so, as the psoas major is a crucial determinant of the depth of lumbar curve and degree of lumbar rotation. The iliacus is similarly a major player in anterior or posterior tilt of the ilia. There are many things that can happen to these muscles. In my experience, the single most common issue is reduced glide of the iliopsoas over the front of the pelvis and the femoral neck. I have never seen a new client who had this glide working well on both sides; often it is not working well on either side.

This issue is widely recognized in osteopathy. I was taught the following protocol by three different osteopaths all of different lineages. The iliopsoas is accompanied by the femoral artery, femoral vein, and femoral nerve. Collectively, these four structures are known as the **inguinal bundle**. Any or all elements of this bundle can and frequently do have reduced glide under the inguinal ligament.

To assess this glide, have the client lie supine. Locate the inguinal ligament and...
make a dynamic stabilization of it with one hand. With the other hand locate the inguinal bundle just inferior to the inguinal ligament. With a respectful gentle load, try to glide the bundle inferiorly under the ligament. Note the excursion of the bundle under the ligament. Rearrange your hands to again make a dynamic stabilization of the ligament and to contact the inguinal bundle just superior to the ligament. Now gently attempt to glide the bundle superiorly under the ligament. If the inguinal bundle is found not to glide well, work gently to restore this glide; you are working with major blood vessels and a major nerve so always be gentle. A way to restore glide is to turn the test procedure into a treatment. Try to glide the inguinal bundle superiorly; as you approach a soft barrier to this glide, pause and maintain the traction. This puts a gentle shearing force through adhesions in this area. After a few moments, reverse your hands and apply the same sort of traction inferiorly. Continue to work in an alternating superior-and-inferior manner, traction load-shearing, until the glide improves.

**Assembling Your Team**

Treatment for scoliosis is usually a team effort. Depending on the characteristics of the particular scoliosis, SI practitioners can contribute significantly to treatment. However, in the best interests of our clients, our work can seldom stand alone. The more severe the scoliosis – and the more complex the etiology – the more true this is. A client’s history and the characteristics of the scoliosis give direction to the selection of team players. Some varieties of scoliosis are more amenable to our work than others. Since a wide range of tissue types may be involved, specialized training in visceral, cranial, neural, and vascular methods is often quite useful.

The client may already be working with other practitioners. Consult with them. If there’s not a team in place, based on your initial understanding of the situation, recruit a team to assist this client. Over time, as you work, more information will emerge that will lead to adding other team members and/or pausing the work of some of them. The additional information may come from insights that you or any team member have based on assessment procedures and / or treatment results. Further, the client will usually volunteer additional information along the way.

**Team members to consider:**

**The Schroth Method physical therapy:** Physical therapist Christa Lehnert-Schroth developed a detailed method of analyzing scolioses to apply individualized, corrective muscle-strengthening and stretching treatment plans. This intensive program is often highly effective. The Schroth Method (http://www.schrothmethod.com) will be beneficial for nearly all types of scolioses. I advise structural integrators to develop cross-referral relationships with Schroth Method Therapists as our work is synergistic with theirs.

**Neurologically oriented physical therapy:** Some physical therapists are well trained in working with neurologic deficits. Some clients with cerebral palsy, strokes, or other known neurologic deficits are prime candidates for this type of work. All scoliosis clients should be evaluated for this possibility and, if neurologic deficits are found, continue to work with a specializing physical therapist. Shumway-Cook and Woollacott, mentioned earlier, have made lifetime studies of motor control and co-written an excellent and regularly-updated textbook (2017) on the subject. They also offer trainings in their approach.

**Occupational therapy:** Occupational therapists work with clients for whom tasks of daily living present challenges. They are very good at ergonomic problem solving and can assist people with scoliosis to find less stressful ways to use their bodies, which, in turn, fosters comfort and healing.

**Cranial manipulation:** Distortion in the cranium is a frequent component of scoliosis. I have seen a cadaver skull whose distortion was an obvious continuity of the scoliotic curve. Developmentally, the bodies of the occiput and sphenoid are vertebral bodies, essentially cervical 0 and -1. (We number cervical vertebrae as C1-7 from the top down. Embryologically, there were two more vertebral bodies superior to C1 that become the basilar portions of the occiput and sphenoid bones.) Not attending to this part of the scoliotic curve will limit effectiveness in all parts of the spine. I recommend structurally-oriented cranial work such as discussed by Alain Géhin (1985). In my experience, the more “energetic” forms of craniosacral therapy are less effective for this situation.

**Chiropractic:** Chiropractors move bones in the spine toward normal location. Often this requires repeated ‘adjustment’ because there are soft-tissue tensions holding the bones out of line. From long experience, I believe Rolfing SI and chiropractic can work very well together. The work we Rolfers do makes it easier for chiropractors to move bones, and the bones are more likely to stay put. In turn, chiropractors’ work often facilitates our work. This applies to scoliosis as well as to other conditions, and is often particularly useful with scoliosis. Over the decades, chiropractic has diversified to a very large extent. While some practitioners in any chiropractic specialization are more skillful than others, my impression is that the following chiropractic specialties may be particularly useful for scoliosis: 1) upper cervical specialists such as Nucca (http://www.nucca.org/what-is-nucca/) – while all vertebrae are important, the upper vertebrae are of particular importance since they house the brain stem; 2) sacro-occipital technique (SOT; https://soto-usa.com/what-is-sot/), a system that works particularly with the two ends of the spine and the relationships between those ends – think of it as another take on the Sixth- and Seventh-Hour relationships in Rolfing SI; 3) Gonstead (https://bit.ly/2UdvTtvH), a system, quite compatible with SI, that makes careful structural measurements based on x-rays of all parts of the spine and then, based on this structural assessment, systematically prioritizes returning spinal segments to good alignment. Besides these, other varieties of chiropractic may be quite useful, depending again on the skill and insight of the individual chiropractor. Get to know the chiropractors in your area.

**Prolotherapy (proliferation therapy) and platelet-rich plasma (PRP):** Prolotherapy and PRP use the body’s own healing capacities to heal injury by stimulating collagen fiber growth. Both involve specifically-targeted injections into injured areas. Prolotherapy uses a benign dextrose solution; PRP uses the client’s own whole blood ‘spun’ or centrifuged to remove the red blood cells, thus producing a highly concentrated, platelet-rich plasma that also contains stem cells and growth factors. Both approaches can be highly effective for healing injuries that do not yet require surgery, such as tendinous tearing and ligamentous and capsular laxity. They are performed by medical doctors and naturopaths.

**Nutritionist:** As for any client, nutritional status is important. Over the decades
we have learned more about what works nutritionally for humans. While general statements are made and are useful, physiology differs widely from person to person. Working with a savvy nutritionist to help figure out what works can give clients the tissue health to support the changes we introduce with Rolfing SI. Nutrition can be an important issue for any client; with scoliosis we need every extra point.

**Sleep specialist:** Many people have sleep that is either insufficient in quantity, quality, or both; those with chronic pain are especially prone to insufficient sleep. [There are many factors to good sleep. I recommend screening all clients for sleep hygiene. There are several perspectives on sleep hygiene with somewhat differing lists; one from Harvard Medical School (2007) is listed in the bibliography]. People with scoliosis, many of whom suffer from chronic pain, have a particularly difficult time finding a comfortable sleeping position. They are also significantly more likely than the general population to experience sleep apnea or, to use the more general term, ‘sleep disordered breathing syndrome’ (SDBS). There are three varieties of SDBS: obstructive apnea, central apnea, and upper airway resistance syndrome. Obstructive sleep apnea is where the airway in the throat closes during sleep, stopping breath for tens of seconds to minutes, possibly many times per hour. The result is dangerously low blood oxygen levels and interrupted sleep. Central apnea is where the brain stem fails to heed instructions for the body to breath. This can be the result of stroke, traumatic brain injury, or heart failure. Upper airway resistance syndrome resembles obstructive sleep apnea, but the airway does not completely close; rather, it is 80% or more occluded. This may not make blood oxygen levels as low as would obstructive sleep apnea, but it creates more persistently low oxygen levels. Untreated SDBS impedes healing and sabotages our work as SI practitioners. When a client backslides or is not improving during the SI work, consider SDBS as a possible factor. Unfortunately, SDBS is rarely helped by Rolfing SI or any other form of bodywork. The Sacred Heart Medical Center’s Sleep Disorders Center makes a screening questionnaire for SDBS with scoring instructions available online (see bibliography).

**Case Study**

A fourteen-year-old girl was brought to me with a rapidly advancing scoliosis. At age eleven, a well-child exam had found no evidence of scoliosis. At age twelve, a mild scoliosis was noted. By age thirteen, her scoliosis had increased dramatically, she had constant neck, shoulder, and upper back pain, and she was referred to a regional children’s hospital where she was fitted with a brace and told that if her curve did not improve promptly, surgery would be required. During the next six months, despite wearing the brace, her scoliosis had continued to increase. She came to me at that point. In the first session I found dorsal-tube adhesions on twelve of her vertebrae, some each lumbar, thoracic, and cervical, all on the concave side of her primary thoracic curve. While common, the number of adhesions was remarkable, and, unusually, the arrangement was all on the left side of her neural canal. It looked suspiciously like the effect from an acceleration injury or whiplash-type event, with her head going to the right, thus injuring the left side of her dural tube. I asked her about this and she described an accident at age eleven, where she fell over a table, striking the table with her right side. This created a sidebending injury, over-lengthening along the left side of her body. It appeared that as the dural tube had healed, it had formed adhesions to the periosteum in the neural canal of half of her vertebrae, resulting in a shortening of the left side of her spine. As I released these dorsal-tube adhesions it became more possible to straighten her spine.

In her second session I noted extensive adhesions of her left lung; the entire lung was stuck to all its adjacent structures – parietal pleura of the chest wall, respiratory diaphragm, the wall of the mediastinum, as well as to the pleural fissure – upon which it should normally glide. Lung adhesions are common, but this sort of thorough adhesion along all surfaces is a less common pattern. It is consistent with having had pneumonia in one lung. When asked about this, the girl’s parents revealed that, indeed, about a month after the sidebending injury, she had severe pneumonia in her left lung only. As I released these pleural adhesions it became yet easier to straighten her spine. At her next monthly check at the regional children’s hospital, her spinal scoliosis was found to be five degrees less than at the previous exam, reversing the trend of her rapidly increasing scoliosis.

What appeared to have happened was that at age eleven she had a quick succession of two events, an injury and an infection, both affecting her left side. This was soon followed by the growth spurt associated with puberty. The fibrosed left lung and left-sided dural tube adhesions were not able to lengthen symmetrically with her right side during this growth spurt. The result was scoliosis. During the first two sessions mentioned here, many other tissues were also treated. Several more sessions followed. Full correction of the scoliosis was not achieved, but surgery was avoided and her pain was gone.

Jeffrey Burch was born in Eugene, Oregon in 1949 and grew up there except for part of his teen years in Munich, Germany. He was educated at the University of Oregon, Portland State University, and the University of Pavia, Italy, earning bachelor’s degrees in biology and psychology and a master’s degree in counseling. Jeffrey received his Rolfing certification in 1977 and his advanced Rolfing certification in 1990. He trained extensively in cranial manipulation with French etiopath Alain Gehin, and in craniosacral therapy with the Upledger Institute. Jeffrey trained to the instructor level in visceral manipulation under Jean-Pierre Barral and his associates. He has made substantial innovations in visceral manipulation, particularly for the thorax. Jeffrey has also developed groundbreaking new joint-mobilization techniques. He practices in Eugene, Oregon and offers continuing education classes in Eugene and other locations. For more details see www.jeffreyburch.com/biography.

**BIBLIOGRAPHY**


APPENDIX 1: GENERAL LISTENING

Each of our bodies has several ‘lesions’, several areas of localized tissue dysfunction. These several lesions are all linked by multiple pathways: connective-tissue fibers, nervous system, vascular, lymphatic, emotional, and hormonal. We won’t always know all the pathways by which lesions are linked, but we can discover the body’s priority for which one we should work on first to have the strongest therapeutic effect on the whole person. One of the most important keys to successful treatment is addressing ‘lesions’ in the right order. As practitioners, we have the constant question of what to do first, and what to do next. Fortunately, if we know how to listen, the body will tell us what structure to work on next, at every step of treatment. This kind of listening is the heart of success in manual therapy.

The body is constantly revising its system of compensations. New events happen to the body, the body ages, and the body constantly tries to find the best compromise that will leave it the most compromise that will leave it the most

is about to change anyway. If we treat this area of imminent destabilization, it will be relatively easy to do and the therapeutic effect will strongly ripple out to the rest of the body. We call this focus of strains that is about to change the ‘primary restriction’. It is primary only in the sense that it is the one we should work on first. It did not necessarily occur first historically, and it is often not the strongest restriction in the body. ‘Primary’ only means that it is the one we should work on first.

We find the primary restriction using three related methods: 1) general listening, 2) local listening, and 3) inhibition. This appendix will introduce general listening.

To general listen, I stand behind my client and place my dominant hand gently but firmly on the top of the person’s head, contacting the sagittal suture. Within three to five seconds, his/her body will lean in some direction, pointing me toward the primary restriction. We have an expression – ‘the body hugs a lesion’. There is more to listening than this, but one metaphor is to consider the body as a structural column. When we put the weight of our hand on the client’s head, the column will begin to collapse around (hug) a weak spot. This ‘hug’ is the primary restriction. As the client’s body bends, watch what direction it goes – left, right, forward, backward? In addition to direction, see how far down the body the bend is. Is the bend at the neck? – at the diagram? – near the top of the pelvis? These two factors, direction and distance, point us to the zone of the primary restriction.

The next step is a method to check if we have the right zone. To check your dominant hand on the top of the head, with your nondominant hand gently touch the area you suspect of being the primary restriction. As you touch, have an intention to temporarily remove the effects of this lesion from the body’s system of compensations. As you make this inhibitory touch one of two things will happen. One possibility is the body will right itself, moving out of the lean that the general listening showed you. This confirms your assessment. The other possibility is nothing will happen, the body will stay bent in the same direction. This tells you that you did not find the primary restriction. This is one use of inhibition.

There are eight more points I want to share about general-listening:

1. The weight and/or energetic effects of glasses, watches, jewelry, pagers, cell phones, etc. may skew the results of listening. Have these removed before listening.

2. From the client’s perspective, it may feel odd to have you step behind him/her. One way to handle this is to say you are going to check some postural things. Step behind the client, check the heights of the iliac crests with your hands, then check shoulder levels with your hands. Finally, ask the client to close his/her eyes for a moment and put your hand on the top of his/her head.

3. It is important to be centered behind the person as you are listening, otherwise you may unintentionally pull the person in a particular direction. If you are short relative to the client, get on a chair so you don’t have tension in your arm, which could also skew the pattern of movement.

4. If the client’s eyes are open, s/he may use visual reference to stay level, and you will not feel in the listening. Have the client shut his/her eyes.

5. Listening happens within the first three to five seconds of contact. It may happen immediately when you contact. If you are there longer than five seconds, you may feel the body do many interesting things, but none of those things point you to what you should work on first.

6. The very first direction of lean is the important one. After the first one, the body may go a second, third, or fourth direction, but the information after the first direction is not useful. The first motion may be quite small and later motions much larger. Do not be distracted by these larger movements, but find the first one.

7. There is a variation of general listening you will need in a certain situation. If the person seems to bend near the hips, or if it is difficult to decide if the bend is in the legs or in the trunk, then have the person sit down, and listen again. If the seated listening is the same as standing, then the lesion is above the sit bones. If the seated listening is different than
the standing, then the primary lesion is below the sit-bones.

8. The quality of touch for listening is different than palpating deeper structures. In assessing motility you sink down to the level of the organ. In listening, you completely let the information come to you. Do not enter the body. If you sink into the body for listening the results will be inaccurate.

APPENDIX 2: ULTRA-SLOW MOBILITY TESTING

Concept

For any limitation in joint movement there are usually several limiting factors. Some of these limiting factors will be tissues that are shorter than others. Finding and releasing these in order from the shortest element to the least limiting one often works well. If the therapist moves the joint very slowly, the shortest limiting tissue will be encountered first. The protocol here is for joints. The same procedure is adaptable for a wide range of tissues.

Method

1. With the hands as relaxed as is practical, contact the tissue on both sides of the joint, close to the joint line. Feel into the joint and maintain awareness in the joint throughout the rest of the procedure, at the same time let your awareness be broad in surrounding tissues.

2. Mobility test the joint to end range. Note the results, both the excursion and the effort required to move through the range. Excursion will be greater in some directions than in others. Some directions may have less-than-normal range of motion, suggesting fibrosity. Other directions may have greater than normal mobility suggesting laxity. Note all these differences of normal range, subnormal range, and abnormally large range, as well as the effort required to move through the range.

3. Let the joint settle back to a neutral position.

4. Select a direction of reduced range in which you wish to increase the range of motion. (Do not choose a direction of laxity.) Displace the joint to end range in the direction opposite the direction you wish to increase, however if this is a direction of laxity exercise caution and restraint, displacing the joint to less than full range in the lax direction. Extremely slowly start to move the joint back toward the direction whose range you wish to increase. Initially a certain amount of effort will be required to move the joint, but after a short distance a greater amount of effort will be required to further move the joint. Precisely as this increase in effort is noted, feel the direction and location of the short element that is now resisting movement.

5. With palpation and knowledge of anatomy discern what this limiting factor is.

6. Return the joint to neutral.

7. Treat to reduce the fibrosity in the limiting area.

8. Retest the overall range of motion. Is it the same as before treatment or has it changed?

9. Again extremely slowly test the joint mobility as in step 4. Is the first limitation in the same area or in a different area?

a) If the limitation is in the same area as before treatment, treat it more.

b) If the limitation is in a new area, return to step 7 for this new area.

10. Cycle steps 1-9, releasing progressively less short elements.

11. Mobility test to end range. Note how this is different from the original end-range mobility tests.

Important Elements

- Avoid pain, which is indicative of tissue damage. Ask the client to tell you if there is pain. Some clients will try to be stoic, but this is counterproductive. If the client experiences pain, stop. Try less force or a different technique. If a way is not found to work on an area comfortably, stop. Shift to working on another area.

- An analogy to this process is a weight suspended from the ceiling by not one but by several cords. The cords are not all of equal length so the weight is initially suspended by the shortest one or two. The shortest ones can be seen because of the gravitational load on them. When the shortest cord is lengthened we then see the next shortest one. One at a time the cords can be lengthened until the weight is distributed on them all. In this process any particular cord may be returned to more than once.

- The shortest limiting factor may not be the toughest. How short a tissue is does not correlate with how easy or challenging it is to change. Let yourself be surprised.
A Fresh Look at the Role of Fascia

A Conversation with Bruce Schonfeld and Gil Hedley

By Karin Wagner, Certified Advanced Rolfer™

ABSTRACT We start with a phone interview Karin Wagner conducted with Bruce Schonfeld about his upcoming film, The Secret Life of Fascia. Surprise guest Gil Hedley joins the call later, and Karin and Bruce then interview Gil together about his recent project, a forty-six-city tour of his multimedia presentation called What’s the Fuzz?!

Karin Wagner:
Hi Bruce. Thanks for taking the time to do this interview. Let’s start with why you decided to make this film, The Secret Life of Fascia.

Bruce Schonfeld:
I went to film school and I’d been angling to make a film for a long time, but I wanted to make the right film. I wanted to present the science of fascia in all of its glory and ambiguity versus making some sort of fitness video. Robert Schleip is a great storyteller with a great story.

KW: What does this film teach us about fascia?

BS: Fascia, historically: why it’s been marginalized in medical and anatomical texts, and what’s changed in the field to make it so it can actually be measured. It’s relevant, particularly in the field of sports, and the film comprehensively goes through a lot of rich, dense, science-informed material about how the body works through the lens of fascia, and then the journey ends up looking at how to train fascia.

KW: So the film is interesting enough for the general public, but detailed enough for professionals to learn from?

BS: It’s a rich body of information, so you can learn a lot from it academically. It’s something to muse on, perhaps, to see it presented in a visual way that you can relate to. That’s fertile ground for self-reflection and just being like, “Hey, I don’t agree with that” or “Hey, I agree with that. I do that in my practice every day.”

KW: Tell us a bit about what to expect. What’s the format?

BS: Well, it’s a movie. You’re going to watch a movie. Act One is “What is fascia?” Act Two is sports medicine and underlying mechanisms – how the body works through the lens of fascia. Act Three is training fascia; it’s based on a presentation by Robert Schleip. Each act is broken down further into a bunch of different chapters. Many of those chapters have citations to document what research is being cited, and then there will be a bibliography in the credit roll.

KW: I’d like to hear more about the scientific research that the film refers to. You’ve peppered it with citations that are visible on screen and will also be available on the website, right?
The key is to follow the science, and also try to follow what you know as a practitioner at the same time. Science can explain how some of the change may be occurring in your office, or [suggest] incorporating some different techniques based on the science.

BS: The truth is the citations are their own entity. They drive me crazy and they have to be perfect. It’s a thesis paper in film, and, like you say, it’s loaded with research. The research and citations are pretty much rooted in two books, Fascia: The Tensional Network of the Human Body and Fascia: In Sport and Movement. Robert [Schleip] interprets the science in a global sense, and I’m trying to interpret Robert, and it’s obviously not just about Robert. We’ve got Don Inger, Helene Langevin, Carla Stecco, Antonio Stecco, and Jean-Claude Guimberteau. And I’m shooting some new video of Robert at the dissection for the Plastination Project with Body Worlds in Germany.

KW: Tell us about that research. What might be surprising to our audience – anything that’s really changed in our understanding of fascia?

BS: The Franklyn-Miller research deconstructs the central premise of how force transfers from point A to point B in the classic kinesiological model, where the hamstring transmits force from attachment to attachment with the straight leg raise test. That research shows that it actually doesn’t work like that. There’s a lateral transfer of force to the IT band. The true nature of motion transfer is a more global event. Helene Langevin and Robert Schleip talk about it in the movie.

KW: With all of this new information about fascia from the research and especially with what your film is conveying, how can structural integration (SI) practitioners make their work more effective?

BS: I think it’s helpful in terms of clinical reasoning skills, and trying to square off with the research may be relevant to practitioners. The key is to follow the science, and also try to follow what you know as a practitioner at the same time. Science can explain how some of the change may be occurring in your office, or [suggest] incorporating some different techniques based on the science.

KW: That makes sense. You’ve added oscillation to affect those specific mechanoreceptors, as example of a way that you have changed your bodywork approach based on the fascia research. Has it impacted your exercise approach?

BS: I’ve always been a three-dimensional mover. I have a background in Continuum Movement® (a movement practice) and contact improv dance and playing baseball in a very dynamic way. But that plyometrics piece was something I didn’t really do. So I have incorporated more plyometric movement.

KW: That’s a fancy word for jumping?

BS: Yeah. Thank you. That’s a fancy word for jumping, and I’m the jerk that uses big words [laughs]. To make it relevant for middle America, the idea is to move more three-dimensionally and to do more jumping. Really, the movie has a position of moderation because it’s not telling you to jump like a crazy person, too much too fast. If anything, it’s weaving a cautionary tale: saying you have to work your way into the exercise gradually, incrementally, to be sustainable and less risky versus just overdoing it.

BS: I took from the film that you should be thoroughly warmed up to avoid injury, and then it doesn’t take a huge amount of jumping to start to trigger the connective tissue remodeling. After warming up, we increase the intensity to perform maybe a dozen jumps at 60% of our total capacity and repeat that perhaps once a week in order to see long-term improvements in the connective tissue.

BS: Correct. One of the chapters is called “Finding the Right Challenging Zone” – it’s exactly what you are talking about.

KW: I’ve been working with clients on how to go from not being a runner to starting to run, especially doing barefoot running or minimalist-shoe running. You can’t just tell people to warm up, you have to tell them what to do. You have to teach people.

BS: That sounds awesome. Do you have a short list of warm-ups?

KW: I’ve been telling clients to warm up with ankle circles. Twenty ankle circles in each direction is enough to thoroughly warm up the Achilles, plantar fascia, ankle, and calf. Then ‘heel raises’ off the back of a step, lifting and lowering the heel. Then bouncing, just light hopping, and then hopping on one leg. Then they can move into a few bigger jumps.

BS: If you were actually inspired by the movie to create this list, that’s fantastic, and it dovetails in a really lovely way.

KW: The information from the film helps inspire clients to take action. I tell them that if they’re only doing yoga and bicycling, or other low-impact sports, the connective tissue in the Achilles and their plantar fascia can easily become de-conditioned. The film makes it clear that dynamic plyometric strain helps to ready the Achilles for stepping off a curb suddenly or other unpredictable incidental motions. Maybe plantar fascia problems stem from this same weakness.
**BS:** Yeah, that makes sense. Also, they seem to be particularly vulnerable first thing in the morning. Our bodies can be so robust in movement, but we have to start gently, and then make sure to move outside the box.

**KW:** Say more about moving outside of the box.

**BS:** Are we the most domesticated species on the planet? The answer is no, but we’re in probably the top ten. Dogs, and then maybe horses, but we’re definitely on the list. When we behave in a domesticated manner, we move our bodies primarily in really predictable, limited ranges. The movie is making the case that this could be the root of many of our problems.

**KW:** From the title, *The Secret Life of Fascia*, it’s clear that fascia is the star of the show. Is there a surprising costar?

**BS:** The trailer poster says starring Robert Schleip. It’s Schleip and fascia, it’s fascia and Schleip.

**KW:** I would have said that movement is the surprising costar.

**BS:** One of my co-producers quipped, “Essentially, your protagonist is a small sheet of white tissue, and your audience is not going to emotionally bond or feel engaged with that.”

**KW:** But this movie is nonfiction. It’s a documentary, so the audience isn’t comparing it to fictional movies. In my experience, the public is very motivated toward health lately. They’re interested in preventing health problems instead of waiting for those problems to sneak up on them.

**BS:** Yeah, people are interested in health and sports training and fitness and anything that helps them feel better and perform better.

**KW:** Speaking of surprising co-stars, Gil Hedley’s joining us now! Hey Gil, nice to have you on the call.

**Gil Hedley:**

Hi, nice to talk with you both.

**KW:** Gil, I’m going to ask you the same question that I asked Bruce. From the title of your multimedia presentation, *What’s the Fuzz?*, it’s clear that fascia is the star of the show. Is there a surprising costar?

**BS:** Good luck with that, Gil.

**GH:** I’m already stumped. I’m never stumped.

**KW:** I already told Bruce, for his film I thought the surprising costar was movement. For Gil’s presentation, I think that the surprising costar is adipose tissue.

**GH:** Well, adipose is fascia.

**KW:** And that’s a surprise for many people. We don’t think that much about adipose tissue, and yet you explain and demonstrate how very important it is.

**BS:** I like your idea about movement being the costar in my movie. That’s lovely. I would have never thought of that.

**GH:** I would say that movement also is the main star in my presentation: the whole idea is to show how the different types of fascia contribute differently to movement as a whole.

**BS:** That’s what Gil talks about in my movie, and he’s brilliant.

**KW:** A lot of new information is coming out of research into the role of the nervous system – regarding pain and injury, and also in explaining how structural integration works. As our field adapts to the current science, do you think fascia is becoming less important?

**GH:** Since you will not find a nerve apart from fascia, nor fascia apart from a nerve, I don’t believe the importance of fascia should or will recede anytime soon. Neither should nerve or fascia deserve to ascend higher alone. The eye cannot say to the foot, “I don’t need you!” The body in its awesome unity does not support any attempt to prioritize the importance of a particular tissue. The actual continuity of our body pays no respect to the ‘word-knives’ that would cut it into separate parts that literally exist in the mind alone. The notion that one could be ‘working on’ fascia, or ‘working on’ a nerve, overlooks the fact that you can only touch the whole person, the whole body. Let the parts become less important, and let the whole have its day!

**KW:** Gil, is there some surprising factoid about fascia that our readers might not know?

**GH:** Well, which fascia do you mean? That would be a surprising factoid, that fascia is a category and a taxonomy that might include more than is generally discussed. If we were to expand the elements within the taxonomy of fascia, we might find ourselves arguing less, because we’d say, “Which fascia are you talking about?”, rather than “fascia this,” or “fascia that.” Hot-headed arguments go on between people who are insisting this and that, and whether we’re all talking about the same tissue or not is important. Right? So, I find that we can’t just speak generically about fascia and be sure that we are having the same conversation. We need to be more specific about exactly which tissues we’re talking about because they have different properties.

**KW:** For instance, whether fascia can stretch?

**GH:** That’s a good one. Some folks will say, “Fascia can’t stretch.” And other people say, “Well, yes it can.” Well, which fascia are you talking about? If we’re talking about superficial fascia – which I also realize there’s controversy about, what is superficial fascia? – but if you grab yourself by the skin and lift it up and let go, chances are it’s going to snap back down. And that’s because it’s a stretchable elastic tissue, not just the skin, but superficial fascia underneath it. The dermal connections to all those tissues are extremely stretchy. But when it comes to deep fascia, that’s not a great stretcher, and we can be grateful for that because it’s holding us together. It does, however, distort, it does have elastic properties, it does have contractual properties, but in different timeframes than muscle tissue or superficial fascia.

And we have what I call the filmy fascia, the perifascial membranes, formerly known as ‘the fuzz,’ that also is distortable, distensible, and quickly responsive fabric, which I believe, for most structural integrators, is the main subject of their attention, by accident. The deep fascia, dig into it as you may, does not respond in the same way that these other tissues readily do.

**BS:** Where does the interstitium fit in? Is that the perifascial membranes?

**GH:** Yes, as best as I can grasp from my exposure to the recent research, they are talking pretty much exactly about the same tissue I’ve been talking about my whole career, but without the benefit of a scanning electron microscope, or whatever they used. Wherever you find differential movement in the musculoskeletal system, there you will find perifascia, or perifascial membranes, or filmy fascia, all the same, fuzz. Fuzz is simply the desiccated, embalmed version of filmy fascia, aka perifascial membranes, which I will call a fascia because it meets the terms perfectly: I can cut it into a fascia, and therefore it is a fascia.
Perifascial membranes are a super-hydrated, fibrous, and mucoidal layer. And I dare call it a layer, again, because I can cut it into one, not because the body is made out of layers, but because I can cut it into layers, and that's what anatomists do. So, the filmy fascia or perifascial membranes that I'm talking about hold the same place in my mind as this interstitium. And the fact is that, although I can't cut the layers from around individual motor units because my tools are insufficient to do so, the structures are repeating in multiple fractal ingresses of cylindric envelopment, which can be demonstrated in cross section. And wherever we find differential movement in the body, we're going to find this, call it interstitium, call it fuzz, call it filmy fascia, call it perifascial membranes, call it perifascia, whatever word you want to lay on it – and I'm sure other people have made up lots more words.

**BS:** That's a lot of words, baby. A lot of words.

**GH:** We play with the words, and that's okay, because, depending on who you are, you'll choose the word that suits your purposes. I find that in our community ‘perifascia’ is an extremely suitable way of distinguishing one tissue texture from another and one set of functions from another. So, they have different textures, they have different functions, and once you know the textures and the functions, you can relate to them, treat them, find them, touch them, and be consistent in your understanding of their response to different types of touch because they don't respond to the same kind of touch.

**KW:** What different types of touch can be useful for affecting different types of fascia?

**GH:** Well, superficial fascia doesn't really love being mauled. It tends to get bruised. Filmy fascia will respond to very, very gentle touch. The perifascial membranes, being very wet on a good day, and slippery, can be contacted lightly, and the touch will easily conduct through the whole. If it's gotten gummy, dehydrated, agglomerated, or inflamed, you may need to get more creative in how you approach it and reincorporate it into the greater flow. The deep fascia, for all the pouting folks see fit to deliver to it in the short run, is really slower to respond, reforming over months, not minutes, to the transformation of movements in the other tissues. Facilitate everything else, and the deep fascia will come on board. This is just a story. There are other good stories to be told as well!

**KW:** So, when I'm thinking about cutaneous nerves and using very gentle touch to affect those, I'm trying to affect the nerves within the fascia, but are you saying that even the fascia itself would respond well to that touch?

**GH:** In my mind, I'm flashing on multiple levels of tissue, even in an instance of a nerve. So, every single nerve has a perifascial membrane, as well as a more fibrous wrapping, which gives a guitar-string feel when you're touching it. At least, when you put it on tension. And so its capacity to move differentially to the tissue in which it's living is important. Say a nerve going to muscle tissue is passing along the way and it doesn't move exactly the way the muscle does; it has its own movement and that's important, whether it's hooked up in the tissues. But the thing is, there are multiple types of fascia right there: in other words, there's the membranous fascia and there's the fibrous fascia and they're both responsive, maybe, but differently, and I feel you can absolutely speak to a nerve. We're not even talking about the neuron here, that's another tissue altogether. Right? You can't treat just a nerve. There's no such thing as a nerve in the body. There's only the body, which is wrapped in layers of connective tissue.

**BS:** Exactly. That's why you want to think along parallel lines. You don't have to think just in one way. You can hold the balance of analyzing how to work with the client, both regionally around their knee problem, and then I'm also mapping it out through a fresh slate in terms of their whole body, whether you end up working with the whole body, or locally, but you can think it out on both levels at the same time.

**KW:** Yes, spot work or fix-it work can still have a holistic intent, when it's contextualized in the big picture.

**BS:** And there you go: Gil is not a practitioner. Gil is a man in the fascia. Gil, let's talk a little bit about the fascial specifics of visceral fascia. Give it to us, set it up real nice. Tell it to Karin and me like we're just happy, joyous little seven-year-olds at science summer camp.

**GH:** Well, bags, and bags, and bags. Here's the thing, in the visceral world, in those beautiful body realms, our textures change significantly. What we might consider to be, say, a fibrous fascia may be differently fibrous than it would be represented in the musculoskeletal system. So, something like transversalis fascia: picture a guitar fret board where you have six strings widely spaced, forming a layer. In the posterior rectus sheath, the transversalis fascia is extremely thin. It is a layer, but it's kind of a mix.

**BS:** It's the visceral interconnector. It's the continuity between the thorax and the pelvis.

**GH:** By all means, it's in there, but it's not the tensor band, it's texturally different. It's very thin and it is a real layer, but I sometimes find that if people take their mental images of fascia from the musculoskeletal system into the viscera and then work on it that way, they're not working on what's there. Because what's there is operating at a totally different speed, and the textures are fitting to the environment and deserve to be also listened to and worked with in a way that's appropriate to that texture and environment.

**KW:** So, that is to say?

**BS:** Don't put your elbow on somebody's liver like it's an IT band. And by the way, stop doing that to the IT band.

**BS:** Well, there's what you do, and there's how you do it. Do you administer the force slowly and broadly, or do you do it rapidly and with a sharp angle?

**KW:** Back to Gil's presentation, I thought one of the big messages was a resonant call-to-action around body acceptance, both self-acceptance and cultural acceptance, appreciating the beauty of the wave-like motion of adipose tissue and the way that it protects us, its roundness and softness.

**GH:** The sensuality and the connection that it provides. All of that is good. I have taken up the banner of the goodness and the gift of the body. I like to wave that flag high in the face of the cultural problematization of the body and the attempt to commercialize and commodify solutions to false problems that boil down to making a problem out of who and what we are, and telling you it's wrong, and then selling you solutions that you don't really need. I'm just saying, don't buy it!

**KW:** Yes. I think one of the important take-home messages for practitioners from your presentation is that we have an incredible opportunity to help our clients cultivate greater self-acceptance. But it has to begin with ourselves.

**GH:** Yes, that's right. For the practitioner, there has to be leadership and then modeling for the client, the participant in the session; that they be led by the practitioner out of that forest of problems.
We should be looking for balance, not symmetry, in a body, and that’s a completely different phenomenon.

into an appreciation of health and beauty in the many forms that it takes, and the incredible advantages that each of us is enjoying from life in a body despite the various problems that arise. If there’s one thing going wrong, there are probably a trillion things going right in the course of a minute in your body. Incalculable goodness is happening there in order to let you whine and complain about whatever it is that ails you. There has to be a whole lot going right for you to be able to show up at a session and complain about [pause]

KW: To be able to complain about the fact that my big toe is a little stiff?

GH: Yeah, or that someone’s left boob is a little differently shaped than their right boob. We’re not symmetrical creatures. We’re not meant to be, and it’s only in the imitation of art that we live as a disappointment to ourselves.

BS: We’re worshiping false altars and prophets, one of them being perfect symmetry.

GH: We should be looking for balance, not symmetry, in a body, and that’s a completely different phenomenon.

BS: It’s about quality of life and function. It’s not about aesthetics. That’s the way our tribe has primarily evolved.

KW: Gil, I was really surprised at where you took your message over the trajectory of your presentation. You delved really deeply into a lot of science, but it blew my mind that you ended with a big-picture call to the public. Gil, you aren’t a practitioner yourself, but you teach anatomy to many. Do you have any advice for the practitioners out there?

BS: It’s coming out in 2019. For updates, please follow The Secret Life of Fascia on Facebook. The website is www.secretlifeoffascia.com.

KW: Great. I highly recommend both of these. Thanks to both of you for everything you contribute, both to the field of structural integration and to the public.

Bruce Schonfeld was certified in Rolfing® SI in 1994. Bruce has extensive training in visceral osteopathy including 300+ hours directly with Jean-Pierre Barral and 600 combined hours of dissection and anatomy in clay. Bruce and Jan Sultan have been collaborating and bridging the gap between SI and the visceral system. Find him online at www.advancedrolfing.com.

Gil Hedley, Ph.D., has been teaching ‘integral anatomy’ in the human dissection laboratory for twenty-five years. He is the producer of The Integral Anatomy Series and the author of a gaggle of books. He is currently writing his magnum opus, The Atlas of Integral Anatomy, when not leading groups in the lab. His educational courses and resources are available at www.gilhedley.com.

Karin Wagner is a Certified Advanced Rolfer practicing in Portland, Oregon for fifteen years. She has a black belt in Ki Aikido and BA in Women’s Health. She enjoys teaching classes for the public on topics related to posture, movement, and the nervous system. Her website www.portlandrolfer.com is packed with resources for clients.
What Shapes a Life?

An Interview with Fascia Pioneer
Thomas Findley

By Jason DeFilippis, Certified Advanced Rolfer™

**ABSTRACT**
Tom Findley – medical doctor, research scientist, and Rolfer – is interviewed by Jason DeFilippis about his biography and his work with structural integration (SI) and fascia research.

[Editor’s Note: A prior interview with Findley covered his history as a Rolfer, his work with the Veterans’ Administration, his fascia research, and his founding of the Fascia Research Congress. See “Fascia Pioneer: An Interview with Thomas Findley” in the December 2016 issue of Structural Integration: The Journal of the Rolf Institute®.]

Character and Lineage

**Jason DeFilippis:**
Reading your biography, *Fascia Pioneer: Dr. Thomas W. Findley Jr.*, I learned that your family lineage is overwhelmingly full of people who, in the face of poverty and hardship, were high achieving, resourced, and ethical. There is clearly a family pattern that has expressed itself in you also. In this book, you say that you are led by something. What are you led by?

**Tom Findley:**
I'm led by what we Quakers call 'God in every person', so there's an internal spirit, be it God, Buddha, Jehovah, whatever, that guides me. I come from a lineage of Presbyterian ministers, and if you go back to the 1700s, William Findley's portrait hangs in Independence Hall, and beneath it is a brief characterization, “upright, unbending, and contentious.” He was a simple tailor who came here from Ireland, and wound up by serving in the House of Representatives for more than thirty years. He also negotiated an end to the Whiskey Rebellion, so he definitely added to human progress.

**JDF:** So, in a sense, you seem to know that everything will work out?
**TF:** Well, when I was a child, I was small. I wound up skipping a grade, so I was even smaller than most, and I would not tolerate being bullied, or seeing anybody else being bullied. I stood up to people much bigger than me, and stood them down, because that was just the right thing to do. So I learned early on how to do that – not that I had a conceptual scheme in my mind, I just knew it was the right thing to do, and I would just do it. Part of it was that I was surprised that people really didn't expect that from me, and part of it was just that, I don't know, I have a way of reading people, and an intuitive reaction to them. I don't know where this came from, because I can't say that either of my parents do that. But there is, I know, from my mother's side an intuitive sense of the future, being able to predict the future, and so that may be part of what I inherited from her side.

**JDF:** You have achieved a lot in your life, all the while having many adventures and a few near-death experiences. You have had a fierce loyalty and belief in doing what was needed to alleviate the suffering of others. This quality is clearly potenitated by having the cultivation, intelligence, fearlessness, and novelty to get things done. Can you speak to that?
how, but I’d usually pull it off anyway. So I have some sort of intuitive skill. I wasn’t taught the basic stuff, so people would assume that if I didn’t do something basic, I was dissing them, because I obviously had the inherent skill. So they would assume that if I missed a basic cue, I did it deliberately, but I had no clue what they were talking about.

**JDF:** Would you say that an interest in novelty has been very prominent in your approach to life?

**TF:** Not just an interest, an insistence on it. I never liked to do the same thing twice. I remember teaching myself to sew. I made one moccasin, I made a right moccasin. I never got around to making the left, because I knew I could do it, so I just made one, and then I went on to making other things.

**JDF:** Not a lot of time or patience for unhealthy repetitions?

**TF:** Well, my mind is like a computer. I put a question in, and I wait for an answer. I can be doing something else while I’m getting the answer, and I don’t know how I get the answer, but I do know that it’s useful just to wait. For instance, when I do math problems, I just look at them and get the answer. My son has the same ability. I had to teach him that “You have to actually list the steps, or the teacher will think you cheated.” So, my brain puts together things from very different sources, and comes up with very unique ideas, as my son’s does. I’ve always done that. That’s just the way it works, and I’ve learned to trust both when it comes up with something and that when it’s humming away, it’s not time to answer yet.

**JDF:** There has been a lot of pain in your ancestry. Your father is fairly distant. In your own life there was sexual abuse of your sister, and of you. There was also abandonment, just to name two areas of trauma. Yet despite this upbringing, you are interested in emotional process, and in the body as a way into an exploration of the human being. How has this inquiry contextualized your achievements?

**TF:** Well, I determined not to pass these on to my children, so when my daughter was about eleven and my son was eight, I realized that there was work to be done. I offered my son weekly lessons on dealing with people. What would take me weeks to realize would take him hours. I offered my daughter the same thing, and she refused. So instead I offered her cooking lessons, and in the guise of these lessons, I rolled in all the lessons about dealing with people. What do we cook? When do we serve? What kind of meal do we have? Who gets to go first? All of those things got rolled into cooking lessons. Later she was just aghast when I told her that, but she learned it.

I guess this came from when some of my childhood memories, which were blocked for forty years, started coming out. Dealing with them, [it] worked best [to go for] a Rolfing® [SI] session, and then the next day go for a Core Energetics session; which is psychotherapy with movement, and that’s how a lot of these things came out. So of course the body and the mind are very much related.

**Cancer Journey**

**JDF:** You were diagnosed with prostate cancer in 2008. The cancer was caught late, and there were metastases. It’s been a very challenging time for you. You seem to have remained curious, mindful, and vulnerable. Since you retired from your practically full-time jobs (researcher, Rolfer, and clinician), you seem to have turned your attention inward, to the present moment, in some novel, nonclinical ways. Can you talk about that?

**TF:** Yes, it’s probably most evident in Robert Browning’s poem “Grow Old With Me.” I won’t quote it here, but basically “grow old with me, the best is yet to be.” He says it’s a journey, and towards the end of the journey, we turn inward to the spirit, and look forward to the next step. I don’t want to take the next step now –
There are clearly deep changes that can come from contacting the skin surface in various ways. We just don’t know how to measure those yet.

I’m a scientist, I’m sort of curious, but one only gets to study that once. Turning inward to the spirit is something that I’m leaning more towards as I get more time on my hands. Well, I can’t say I have any more time than I used to; I don’t know how I ever managed to carve eight hours out of my day to go to work. I’m busy, but I’m able to use some of those things for more internal endeavors; for reading poetry, and exploring in that sense.

JDF: Who are you reading other than Browning?

TF: Anna Silver, a poet who had a Guggenheim Fellowship last year. She dealt with breast cancer for fourteen years, and her poetry is good. [Some of her poetry] incorporates her perspective on the process of being sick. There’s a lot of people who’ve written books about the process of dying, and a bunch of it is crap. Her stuff is real.

JDF: What makes the other stuff not useful?

TF: Well, it’s the classic stuff, you know; clean up your room, be a good boy, and life will go well.

JDF: Yes. If there are two things you would share with someone going through a life-threatening illness, what would they be?

TF: The mantra that I said to myself in medical school is, ‘the best approximation of the person you will be in the future, is the person you are today’. When I start straying, I get back to that, what do I want to be like tomorrow? It’s hard sometimes to force myself to do one day at a time, because my mind moves forward in drastic jumps. I have to kind of put a brake on it, to say; sometimes you just need to stay here, in the present. I’m sure a new grandchild will do that – my daughter is delivering in January – because that’s the way kids are; they’re in the present.

Our Work in SI

JDF: What are we doing as structural integrators?

TF: The short version is we are helping our clients become more integrated in the field of gravity, to paraphrase Ida Rolf. Even though we work on them lying on the table, we are aiming for a change when they are standing up.

JDF: What’s the mechanism of change?

TF: That’s a good question. Next question?

JDF: I’ve heard you answer this question before.

TF: The mechanism? There are numerous things that we certainly have glimpses about, but to actually be able to test it is still coming. [There was a study on massage with muscle soreness, where the subjects exercised two legs until they were sore [and then received massage on one leg]. The study actually showed changes at the cellular level and gene transcription on the massaged leg; that happens right away. Two hours later, the anti-inflammatory stuff is moving around much more in the massaged leg. So there are clearly deep changes that can come from contacting the skin surface in various ways. We just don’t know how to measure those yet.

JDF: Do you think that the capacity for the body to self-organize is one of the primary things that’s happening in a structural integration session?

TF: Oh yeah. In my Advanced Training, the patient came in, we all did our analysis of what was wrong with the structure, and she laid down. Then the instructor, Bill Smythe, put his hands on her head, and forty-five minutes later he took his hands off her head, she stood up, and she was different. Then we said, “Well, that’s why he’s the instructor, and we’re the students.”

Nuances in the Body

JDF: Is there anything else that you want to talk about?

TF: Well, it’s difficult, embarrassing to kind of put myself out there. A lawyer friend of mine, Brian Held, said “You have a life that people want to know about” – and he actually hired a biographer, Suzanne Becker, to sit with me. In the process I’ve learned more about my heritage. If we were to do it again, there would be many more chapters, as my sisters and I are digging up more and more of our heritage. Right now my sister is looking to see how those things in our heritage get carried down through emotion and habit patterns, which I think is very interesting, and to some extent that’s what we do with structural integration. I guess the best example is that for years I had sort of a knot in the middle of my chest, and no structural integrator could ever get to it. Then my mother came as a model for my Rolfing training, and when she was getting work on her chest, I got the release, and it went away. It wasn’t my stuff. I’m sure those patterns [exist]; sometimes the patterns are obvious, and sometimes they’re not. When you achieve a sudden change in somebody, it may be because it wasn’t their stuff. So I would say, pay attention to that, pay attention to the lineage.

I was once talking with someone, and their cat came in. I said, “Somebody hit that cat right here,” and when I moved my hand, the cat just flew out. How did I know that? Well, you look at somebody, you look at the way they move, and you just have a sense that something physical has happened in the past. You don’t have
to describe it, you don’t have to work on it specifically, you just have to know in a
global sense how it is incorporated. I use
my body as a sensor. When I look at my
client, when they walk in the room, where
do I hurt? It’s not my hurt, its their hurt.
That’s how I know that their left lower
back hurts, because mine is hurting just
there. Trust your body as a sensor, just
as when somebody walks in the room, if
they’re depressed, or they’re happy, you
know where they are within seconds.
Well, it’s the same kind of knowledge
working with structure. We all have our
own particular talents for working with
people, and they’re different, and I’ve
been blessed with talents.

Fascia Research Congress
JDF: You drew on a lot of your talents
over the years in shepherding the Fascia
Research Conference.

TF: At this stage in my life, I’m really
delighted to be handing off the torch for
the Fascia Research Congress, which is
going gangbusters for the next conference
in Berlin. It’s been over ten years [that
we’ve had the conferences], and it’s great
to watch the younger generation coming
through, taking charge, and moving it
forward. This time it’s not my show, but
I get to advise.

Ongoing Webinar Series
JDF: I’ve always known you as a
humble person, and you’re also a very
good teacher, so thank you for letting
the biography be written, and for doing
this interview. You’ve done so much
for structural integration – in terms of
the Fascia Research Congress, your
research papers, and your work with the
Veteran’s Administration bringing structural
integration into the hospital.

TF: A skill I have is taking complicated
things and explaining them simply. So
what I’m starting to do now is three or
four times a year give a webinar on how
clinicians can find articles on topics they
are curious about. I’ll help you jump into
the literature, and find something that
will help explain that topic. I’ve probably
done 15,000 literature searches in my
career. It’s just a skill I have, but then I can
take that information and make it simple
for the clinician to understand. And so I
welcome you to watch those. And they
are recorded and archived through the
Fascia Research Society, so you can go
back and watch the others. I’ll be doing
this in November 2019 at the Fascia
Research Congress in Berlin, and I’ll keep
doing this as a way of helping clinicians
who want to explore some of the
principles behind what they’re observing.
The theme for one of the fascia
conferences is, what do we notice, and
what do we know? It’s really always an
interplay between clinicians who notice
something and scientists who try to figure
out what we know about that. So, those
are the two themes in my life that I like to
pass on to others.

Reason and Intuition
JDF: This kind of bringing together of
opposing forces has always been important
throughout history; faith and reason, heaven
and earth, thinking and being.

TF: That’s right. It takes both. People
sometimes make a distinction between
intuitive and rational, they think of
scientists as rational and others as
religious, as intuitive. Now, scientists have
to be intuitive. There are too many things
to explore, and too many variations; they
have to make intuitive choices. Some
scientists know they do, and some don’t,
but they all do. So it’s a combination in
both categories.

JDF: You’ve really cultivated your
intuition. Is this part of what has made
you so successful, and efficient?

TF: Yeah, and I’ve been blessed with a lot
of horsepower.

JDF: Thank you for the interview.

Tom Findley is Professor of Physical
Medicine and Rehabilitation at Rutgers
University, New Jersey Medical School.
He received his MD from Georgetown
University, and completed his residency
training in Physical Medicine and
Rehabilitation at the University of
Minnesota under the guidance of F.J.
Kottke, a pioneer in the field. He went
on to earn a PhD at Minnesota in
physical medicine, and received state-
of-the-art training in physical therapy,
exercise physiology, psychology, and
anthropology. He has extensive training
in complementary medicine and until his
retirement in 2016 was an active clinician
(Certified Advanced Rolfer) as well as a
researcher at the VA Medical Center East
Orange New Jersey, which is a member
of the Planetree Network of hospitals
incorporating integrative medicine. In his
retirement he no longer sees patients, but
continues to do research on exercise and
cancer with a team at Rutgers.

He is the founder of the Fascia Research
Congress, and served as CEO and
executive director from its inception
in 2007 through 2013. As a physiatrist
he treated many disorders of the
musculoskeletal system. As a scientist he
strove to understand their pathophysiology
in order to develop focused treatments
and prophylactic regimens. Fascia, part of
the connective tissues that permeate the
human body, may be the unifying structure
and concept that is essential to elucidate
the mechanisms of these dysfunctions.
The links between fascia and cancer
were proposed more than 100 years ago
by A.T. Still, the founder of osteopathic
medicine. Dr. Findley is the recipient of the
prestigious 2009 Northup Award from the
American Osteopathic Association for his
paper “Three-Dimensional Mathematical
Model for Deformation of Human Fascia
in Manual Therapy.”

Jason DeFilippis began his Rolfing SI
practice in 2004. Since then, he has been
a curious student of the healing arts,
studying in the realms of manual-therapy,
perceptual/emotional, and spiritual
paradigms. His approach to work is to focus
on health as the primary mover of the client,
often using SourcePoint® to contextualize
his manual work. Jason’s sessions are an
elegant blend of subtle bodywork practices
with very direct manual intervention. He
lives and practices in New York City. His
website is www.cityrolfing.com.
Trust your body as a sensor, just as when somebody walks in the room, if they’re depressed, or they’re unhappy, you know where they are within seconds. Well, it’s the same kind of knowledge working with structure.

Tom Findley
A Significant but Unnoticed Stepping Stone in Fascia Research

Commentary on the “Consensus Statement”

By Szaja Gottlieb, Certified Advanced Rolfer™, Research/Science Editor

ABSTRACT This serves as an introduction to and commentary on the significance of the next article, “Fascial Tissue Research in Sports Medicine: From Molecules to Tissue Adaptation, Injury and Diagnostics: Consensus Statement.”

Sometimes abrupt and other times imperceptible, science moves along an undetermined path towards clarity and perhaps a notion of truth. In March 2017, practically unnoticed even in the larger somatic community, some of the world’s foremost experts in the science of fascia attending the International CONNECT Conference in Ulm, Germany released a consensus statement articulating the current fascia research in respect to sports medicine. Titled “Fascial Tissue Research in Sports Medicine: From Molecules to Tissue Adaptation, Injury and Diagnostics: Consensus Statement,” it was published in the British Journal of Sports Medicine in July 2018. Significantly, their statement is, as the title implies, a declaration not only of the theoretical results from laboratory research but also its practical application as applied to sports medicine – developments of obvious interest to our community. I should note that there are thirteen authors to the statement, including well-known scientists Andy Vleeming and Jan Wilke, presenters at past meetings of the international Fascia Research Congress (FRC), and two signees will be quickly recognized as our own, Rolfing® Structural Integration (SI) instructor Robert Schleip and Certified Advanced Rolfer Thomas Findley.

Although the article is open access and available at https://bjsm.bmj.com/content/52/23/1497, its significance to our profession merits reprinting in our Journal and some commentary to guide the reader.

First, take heed of two words in the title: Consensus Statement. In previous FRCs, there had been an unremitting tension between those scientists that presented fascia as tissue and others that presented fascia as system. For a discussion of this tension, please read my report “An Overview of the Fourth International Fascia Research Congress,” which was published in the November 2015 issue of Structural Integration: The Journal of the Rolf Institute® (pages 46-49). That tension was seemingly bridged in the aftermath of this conference with the issuance of this consensus statement.

While definitions may seem irrelevant to the SI practitioner, in the scientific world of information, exacting definition, often arrived at through discussion and polemic, is a critical aspect of communication between researchers in the same field. Thus, the definition as presented is of supreme importance for the continuity of work in the field of fascia research. A definition of fascia is thus presented in the abstract of the Consensus Statement as the first item of information: “The fascial system builds a three-dimensional continuum of soft, collagen-containing, loose and dense fibrous connective tissue that permeates the body and enables all body systems to operate in an integrated manner.” Simply put, this statement, and further elucidation in the paper, validates the consideration of fascia as a body-wide system enabling the efficiency of all other systems in the body.

This enlarged understanding paves the way for consideration of fascia as critical for overall health and also as significant in the body’s breakdowns, particularly musculoskeletal. While this size of this paper is relatively small, it is full of noteworthy pronouncements and declarations concerning the role of fascia in health, as highlighted in the following examples:

1. The concept of myofascial force transmission, a favorite conceptual model within the SI community, particularly the Tom Myer’s Anatomy Trains branch, is in dispute, or at least unproven at the moment.

2. Loading of fascial tissues is important for tissue repair but can also lead to compromised function of healthy tissue. At issue is the inflammation response. Short lived, it can benefit; Prolonged, it can create fibrotic changes in tissue. The researchers note inflammation as being a central problem in health and disease.

3. Some of the present medical treatments in relation to fascia are questionable; certainly surgeries, but also certain drugs such as NSAIDS, corticosteroids, and estrogen, which may impair regeneration and tissue adaptation.

4. Foam rolling is deemed beneficial, but with admitted uncertainty as to the scientific underpinning for its therapeutic results.

5. The researchers’ pronouncements on the relationship between aging and fascia – i.e., densification and stiffness of fascia tissue – are particularly interesting. Generally, the problem is how to train to build strength without increasing inflammation.

6. There is also a discussion of imaging techniques for fascia, including MRIs, and a renewed interest in other techniques, particularly ultrasound.

All in all, this paper marks another important step from theory to practical considerations, an unquenchable craving within our community.
Fascial Tissue Research in Sports Medicine: From Molecules to Tissue Adaptation, Injury and Diagnostics: Consensus Statement

Consensus Statement by Martina Zügel,1 Constantinos N. Maganaris,2 Jan Wilke,3 Karin Jurkat-Rott,4 Werner Klingler,5 Scott C. Wearing,6 Thomas Findley,7 Mary F. Barbe,8 Jürgen Michael Steinacker,9 Andry Vleeming,9 Wilhelm Bloch,10 Robert Schleip,11 Paul William Hodges12

[Editor's note: This article is a reprint of an open-access article from the British Journal of Sports Medicine 2018;52:1497. Re-use permitted under CC BY-NC. Original article available at https://bjsm.bmj.com/content/52/23/1497]

ABSTRACT The fascial system builds a three-dimensional continuum of soft, collagen-containing, loose and dense fibrous connective tissue that permeates the body and enables all body systems to operate in an integrated manner. Injuries to the fascial system cause a significant loss of performance in recreational exercise as well as high-performance sports, and could have a potential role in the development and perpetuation of musculoskeletal disorders, including lower back pain. Fascial tissues deserve more detailed attention in the field of sports medicine. A better understanding of their adaptation dynamics to mechanical loading as well as to biochemical conditions promises valuable improvements in terms of injury prevention, athletic performance and sports-related rehabilitation. This consensus statement reflects the state of knowledge regarding the role of fascial tissues in the discipline of sports medicine. It aims to (1) provide an overview of the contemporary state of knowledge regarding the fascial system from the microlevel (molecular and cellular responses) to the macrolevel (mechanical properties), (2) summarise the responses of the fascial system to altered loading (physical exercise), to injury and other physiological challenges including ageing, (3) outline the methods available to study the fascial system, and (4) highlight the contemporary view of interventions that target fascial tissue in sport and exercise medicine. Advancing this field will require a coordinated effort of researchers and clinicians combining mechanobiology, exercise physiology and improved assessment technologies.

Terminology and Definitions

The term fascia was originally used to describe a sheet or band of soft connective tissue that attaches, surrounds and separates internal organs and skeletal muscles. Advancing research on the physiological and pathophysiological behaviours of a range of connective tissues has revealed that this definition is too restrictive. Understanding of mechanical aspects of connective tissue function depends on consideration of a host of interconnected and interwoven connective tissues beyond these sheets or bands, and there is enormous potential gain from understanding the convergence of biology underpinning adaptation, function and pathology.

With its diverse components, the fascial system builds a three-dimensional continuum of soft, collagen-containing, loose and dense fibrous connective tissue that permeates the body and enables all body systems to operate in an integrated manner (figure 1).1 In contrast, the morphological/histological definition describes fascia as ‘a sheet, or any other dissectible aggregations of connective tissue that forms beneath the skin to attach, enclose, and separate muscles and other internal organs’. The proposed terminology distinguishing the terms ‘fascia’ and ‘fascial system’ allows for the precise identification of individual structures as well as grouping them for functional purposes.

Consensus Meeting

The Second International CONNECT Conference was held at the University of Ulm, Germany, on 16–19 March 2017, as part of a conference series aimed at fostering scientific progress towards a better understanding and treatment of fascial tissues in sports medicine. After the conference, a meeting was held with conference speakers and other field-related experts to discuss and find consensus regarding the role of fascial tissue in the field of sports medicine. Injuries to a variety of fascial tissues cause a significant loss of performance in sports2 and have a potential role in the development and perpetuation of musculoskeletal disorders, including lower back pain.3 A major goal of clinicians is to return athletes and patients to activity, training and competition after injury.

This consensus statement reflects the current state of knowledge regarding the role of fascial tissues in the discipline of sports medicine and will be updated as part of a consensus meeting during the CONNECT conference. This paper aims...
to summarise the contemporary state of knowledge regarding the fascial system from the microlevel (molecular and cellular responses) to the macrolevel (mechanical properties), and the responses of the fascial system to altered loading (physical exercise), to injury and other physiological challenges including ageing, methods available to study the fascial system, and the contemporary view of interventions that target fascial tissue in sports medicine. This document was developed for scientists and clinicians to highlight common traps and truths of fascial tissue screening and imaging techniques and intervention methods, and to present a multidisciplinary perspective of future research in the field.

**Molecular Adaptation of Fascial Tissues: Effects of Physical Exercise, Ageing, Sex Hormones and Inflammation**

Molecular crosstalk between extracellular matrix (ECM) molecules and cellular components is an important determinant of fascial tissue physiology and pathophysiology. A molecular chain, characterised by high functional and structural plasticity and bidirectional molecular interactions, connects the cellular cytoskeleton to the ECM (figure 2). Small functional and structural alterations in the ECM result in complex cellular adaptation processes and, vice versa, changes in cell function and structure leading to ECM adaptation. Therefore, fascial tissue homeostasis is the result of a complex interplay and dynamic crosstalk between cellular components and the ECM. Especially under dynamic conditions such as growth and regeneration, strong alterations of the local ECM microenvironments are necessary to allow cellular adaptation and rebuilding of fascial tissues. All factors influencing cell or ECM behaviour can result in changes in the structure and homeostasis of tissues and organs.

The ECM also works as a molecular store, catching and releasing biologically active molecules to regulate tissue and organ function, growth and regeneration. Molecules stored in the ECM network can be cleaved to release biologically active cleavage products. Mechanical stress can induce the release and activation of ECM-stored molecules, inducing the cleavage products of collagen XVIII and other basement membrane components. It has been shown that endostatin (the 20 kDa C-terminal fragment of collagen XVIII) can modulate vascular growth and function. In addition, changes in the ECM by ageing or physical exercise may be involved in triggering systemic effects via excreted circulatory molecules, such as the exercise-responsive myokine irisin, which has been proposed to increase energy expenditure in mice and humans.
In fascial tissues such as tendons, acute and chronic loading stimulates collagen remodelling. As the exercise-induced increase in collagen synthesis is lower in women than in men, and as injury frequency and the expression of oestrogen receptors in human fascial tissue are sex-dependent, oestrogens may play an important regulatory role in ECM remodelling. The effects of oestrogens on collagen synthesis appear to differ between rest and response to exercise. While oestrogen replacement in elderly, postmenopausal women impairs collagen synthesis in response to exercise, oestrogen has a stimulating effect on collagen synthesis at rest. Oral contraceptives, on the other hand, have an overall depressing effect on collagen synthesis.

Physiological ageing is a highly individual process characterised by a progressive degeneration of tissues and organ systems. Age-related alterations in fascial tissues include densification (alterations of loose connective tissue) and fibrosis (alterations of collagen fibrous bundles). Functionally, these pathological changes can modify the mechanical properties of fascial tissues and skeletal muscle, thereby contributing to pain-related and age-related reductions in muscle force or range of motion, which cannot be solely explained by the loss of muscle mass. ECM structural, biochemical, cellular and functional changes occur during ageing. Interestingly, ageing is characterised by chronic, low-grade inflammation—the so-called inflammaging. As the ECM is the main site of inflammatory responses taking place in tissues, it is not surprising that the ECM can interact with immune cells to change their function, which is important for growth and regeneration of tissues. Leucocyte extravasation depends on cleavage of the basal membrane by locally released proteases. Tenasin and osteopontin are examples of ECM molecules important for the regulation of the local immune response. In addition, ECM plays an important role as a barrier to transmigration of immune cells in and out of the tissue. Although early inflammation after tissue damage due to physical exercise or injury is crucial for tissue remodelling and adaptation, stem cell activity and collagen synthesis may be inhibited by the chronic intake of non-steroidal anti-inflammatory drugs prior to exercise. However, limiting the magnitude of inflammation might be beneficial for tissue regeneration and gains in muscle mass and strength, depending on the nature of the injury, and in elderly people.

Myofascial Force Transmission

Conventionally, skeletal muscles have been considered as primarily transmitting force to their osseous insertions through the myotendinous junction. However, in situ experiments in animals and imaging studies in humans have shown that intermuscular and extramuscular fascial tissues also provide a pathway for force transmission. Although the magnitude of non-myotendinous force transmission under in vivo conditions is disputed, the contribution of these pathways is thought to be dependent, in part, on the mechanical properties of myofascial tissue linkages. Myofascial tissue that is stiffer or more compliant than normal has been shown to influence the magnitude of intermuscular force transmission and, arguably, may have a significant effect on muscle mechanics. The mechanical
properties of fascial tissues can be modified by several factors, which, inter alia, include a change in fluid content, crosslinks and molecular organisation and content of specific ECM molecules, and the contractile activity of myofibroblast cells. Changes can also be a consequence of muscle injury, disease, surgical treatment or ageing (figure 3). As fascial tissues connect skeletal muscles, creating a multidirectional network of myofascial continuity, altered local forces (eg, by muscular contraction) might also affect the mechanics of adjacent tissues. In fact, a plethora of cadaveric and animal studies have demonstrated substantial mutual interactions between neighbouring muscles arranged serially in slings (eg, latissimus muscle and gluteus maximus muscles) and parallel to each other (eg, lower limb synergists). For example, when seen from a fascial perspective, the knee-joint capsule is influenced by directly inserting tendons and by more distant structures such as the gluteus maximus or the tensor fasciae latae and their connecting fasciae. However, it remains to be further elucidated how such findings translate into human in vivo conditions. Although scarce, initial in vivo evidence points towards a significant role of myofascial force transmission for the locomotor system. Available data point towards the existence of (1) remote exercise effects and (2) non-local symptom manifestations in musculoskeletal disorders, both of which might be of relevance in athletic and therapeutic settings. Furthermore, despite convincing in vitro evidence for the existence of myofascial force transmission, its relative contribution to the occurrence of remote exercise effects under in vivo conditions has to be further elucidated. Besides mechanical interactions between adjacent tissues, non-local changes of stiffness or flexibility may also (at least partly) stem from neural adaptations, for example, a systemic reduction of stretch tolerance.

**Injury of Fascial Tissues: Cellular and Mechanical Responses To Damage**

Excessive or prolonged loading or direct trauma to fascial tissues initiates micro and macro changes necessary for tissue repair. These effects may also contribute to pathological changes that modify tissue function and mechanics, leading to compromised function of the healthy tissue. Effects may become systemic, and thus not limited to the injured/loaded tissues.

Following an acute injury from overload or anoxia in fascial tissues, the immune response aims to phagocytose injured cells. An acute inflammatory response is typically short-lived and reversible and involves the release of a range of molecules, including proinflammatory cytokines from injured cells and macrophages, along with other substances (eg, bradykinin, substance P and proteases) that sensitize nociceptive afferents and promote immune cell infiltration. If loading is prolonged or repetitive, persistent inflammation may develop, leading to the prolonged presence of macrophages and cytotoxic levels of cytokines in and around tissues, ultimately resulting in ongoing tissue damage. Some tissue cytokines (eg, interleukin-1β, tumour necrosis factor (TNF) and transforming growth factor beta (TGFβ-1)) are fibrogenic cytokines that can promote fibrosis via excessive fibroblast proliferation and collagen matrix deposition.

Outlook and perspectives for future research: Although the basic mechanisms of myofascial force transmission have been studied, there is a need to discern the influence of variables, such as age, sex, temperature and level of physical activity, within healthy physiological and pathological settings. Furthermore, despite the occurrence of remote exercise effects under in vivo conditions, its relative contribution to the occurrence of remote exercise effects under in vivo conditions has to be further elucidated. Besides mechanical interactions between adjacent tissues, non-local changes of stiffness or flexibility may also (at least partly) stem from neural adaptations, for example, a systemic reduction of stretch tolerance.

Overproduction of cytokines also maintains sensitisation of nociceptive afferents—a change that would increase production and release of substance P (a known nociceptor neuropeptide). Recent studies show that substance P can stimulate TGFβ-1 production by tendon fibroblasts, and that both substance P and TGFβ-1 can induce fibrogenic processes independently of each other.

Taken together, these findings suggest that both neurogenic processes (nerves are the primary source of substance P) and loading/repair processes (TGFβ-1 is produced by fibroblasts in response to mechanical loading and during repair) can contribute to increased collagen in fascial tissues. Fibrosis (eg, collagen deposition) around the tendon, nerve and myofascial tissues influences dynamic biomechanical properties secondary to tissue adherence and can tether structures to each other or induce chronic compression.

Increased collagenous tissues surrounding the nerves can tether the nerves and also enhance pain behaviours. Furthermore, inflammatory cytokines can ‘spill over’ into the bloodstream, leading to widespread secondary tissue damage and central nociceptor windup. Circulating TNF is elevated in chronic lower back pain, and recent data highlight a relationship between elevated TNF and greater risk for progression to chronic pain in some individuals and in animal models of overuse.

Muscles also undergo changes in muscle fibre composition, adiposity and fibrosis in response to injury to related structures (eg, injury to an intervertebral disc) even in the absence of muscle trauma (figure 4). These changes closely resemble those identified for direct muscle trauma, such as supraspinatus tendon lesion, although with some differences (eg, differences in the distribution of infiltrating fat). After an injury to an intervertebral disc, deep back muscles undergo rapid atrophy, most likely mediated by neural changes such as reflex inhibition. This is followed by changes in muscle fibre composition (slow-to-fast muscle fibre transition), fibrosis and fatty infiltration associated with increased production of proinflammatory cytokines (eg, TNF). Increased cytokine expression was first identified from an mRNA analysis of the muscle, but with an unclear origin. Recent work suggests this is mediated by an increased proportion of proinflammatory macrophages, hypothesised to result from altered metabolic profiles of the...
muscle as a consequence of transition to more fast (fatigable) muscle fibres. Adipose tissue is a potential source of proinflammatory cytokines and has been implicated in a range of musculoskeletal conditions, including osteoarthritis. Regardless of the underlying mechanism, fibrotic changes in the muscle have a substantial potential impact on tissue dynamics and force generation capacity. Exercise, physical modalities and pharmacological interventions have all been shown to reduce the inflammatory processes associated with fascial tissue injury and fibrosis. For example, early treatment with anti-inflammatory drugs can prevent/reverse pain behaviours induced by TNF signalling and reduce downstream collagen production in animal models. Stretching of fascial tissues can promote resolution of inflammation both in vivo and in vitro, and manual therapy can prevent overuse-induce fibrosis in several fascial tissues. In terms of muscle changes, resistance exercise is necessary to reverse fatty changes (and perhaps fibrosis) in chronic conditions, whereas gentle muscle activation is sufficient to reverse early muscle atrophy, and whole body exercise can prevent inflammatory changes in back muscles that follow intervertebral disc injuries.

Outlook and perspectives for future research: Future research is needed to gain a deeper understanding of the mechanisms underlying the impact of treatments on fibrosis and fatty changes in fascial tissues. Although there is evidence that exercise, physical therapies or pharmacological approaches can impact inflammatory processes, and reduce consequences, further work is required to understand how best to tailor interventions based on the time-course of pathology and type of exercise, or whether there is additional benefit from combined treatments.

Imaging and Non-imaging Tools For Diagnosis and Assessment

Pathological changes in the mechanical properties of fascial tissues have been hypothesised to play an essential role in musculoskeletal disorders such as chronic pain conditions and overuse injuries. As a result, considerable demand for diagnostic methods examining fascial tissue function has arisen. In basic research, an oft-used approach is to study molecular and mechanical changes in myofibroblasts and other biomarkers via needle biopsy and subsequent immunohistochemistry. To evaluate the effects of treatment and exercise in clinical settings, a series of methods are available (table 1). Changes in water content can be analysed via bioimpedance assessment, but there are no data on reliability and validity of measurements in smaller body regions. Manual palpation represents a cost-neutral
and widely used screening method aimed at assessing viscoelastic properties (eg, stiffness); however, similarly, its reliability is limited.48 79 80 81 However, the approach is based on a number of assumptions, and available devices often lack a thorough proof of validity.77 82 Moreover, no tissue-specific conclusions can be drawn due to the black-box character of the measurements.83 Imaging methods such as ultrasound or elastography, in contrast, are promising tools for explicitly quantifying the mechanical properties of fascial tissues under in vivo conditions.84 Producing a distortion of the measured tissue (eg, through compression or shear waves), elastography provides ultrasound images reflecting the relative hardness of the targeted area. Recently, the technique has been increasingly applied in musculoskeletal research. However, the existence of several different methods, lack of standardisation and frequent appearance of artefacts during measurements threaten the validity of achieved results.85 Without the use of elastography, the conventional

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Table 1: Currently used diagnostic methods to examine fascial tissue structure and function.
Ultrasound image can be reliably used to display and measure the morphology of fascial tissues, such as myofascial tissues, ligaments and tendons. Some initial studies have, moreover, attempted to quantify relative movement (e.g., sliding of fascial layers and shear strain) using cross-correlation calculations. Despite some initial applications to myofascial tissues, most data on ultrasound imaging are available for tendon measurements (figure 5). In the late 1990s, advancements made in the application of B-mode ultrasonography allowed quantification of the tensile deformation of human tendons, in vivo, based on tracking of anatomical features in the tendon when pulled on by the force exerted in the in-series muscle during static contraction. Unfortunately, the in vivo stiffness and Young’s modulus results often disagree with findings from in vitro material tests, when forces and elongations are precisely controlled and measured. Errors are likely being caused by in vivo measurement simplifications in the quantification of both tendon deformation and the loading applied during the static muscle contraction. The former includes simplifications regarding the tendon’s resting length, line of pull and uniformity in material properties. The latter includes simplifications regarding the effect of loading on tendon moment arm length, the effect of antagonist muscle coactivation and the uniformity in tendon cross-sectional area. Most of these simplifications can be avoided by appropriate measurements to quantify the neglected effects. In addition, recent developments in ultrasound shear-wave propagation and speckle tracking have the potential to substantially improve experimental accuracy and physiological relevance of in vivo findings.

In contrast to static muscle contraction tests aimed at assessing human tendon stiffness and Young’s modulus, scanning during dynamic activities has typically been applied to document tendon deformations directly, through morphometric analysis on scans, or indirectly, through ultrasound propagation speed analysis, to investigate the interaction between tendon and muscle in the studied task. These experimental approaches are relatively immune to problems caused by erroneous quantification of tendon forces; however, appropriate measurements need to be taken to validate the assumption that the usual practice of tracking a single tendon anatomical point, or a tendon region limited by the size of the scanning probe, can give a representative picture for the entire tendon.

Outlook and perspectives for future research: In view of the current diagnostic methods’ limitations, further research investigating the measurement properties (e.g., validity) is warranted to provide evidence-based recommendations. Hence, within the clinical assessment of mechanical soft-tissue properties, collected data should be interpreted with caution, and, as long as no clear gold standards exist, a combination of methods seems advisable instead of focusing exclusively on one technique. Ultrasound-based assessments of tendon deformability on loading have grown in popularity but can provide erroneous conclusions due to several invalid assumptions and approximations typically made to simplify the experimental protocol. Most of these errors can be eliminated by appropriate measurements.
Mechanobiology of Fascial Tissues: Effects of Exercise and Disuse

The main principles of the above ultrasound-based methodology have been implemented in numerous studies over the last 20 years to study the adaptability of human tendons to exercise and disuse.\textsuperscript{94, 95} The findings convincingly show that human tendons respond to the application of chronic overloading by increasing their stiffness and to chronic unloading by decreasing their stiffness. The mechanisms underpinning these adaptations include changes in tendon size and changes in Young’s modulus. One common finding among studies is that tendon adaptations occur quickly, within weeks of mechanical loading/unloading application.\textsuperscript{96, 97} Importantly, however, some studies report adaptations in tendon size but not tendon material,\textsuperscript{98} and others in tendon material but not size,\textsuperscript{99} while some report adaptations in both tendon size and material.\textsuperscript{99}

To study human tendon mechanobiology and explore the basis of the above distinct adaptability features, both cross-sectional and longitudinal experimental designs have often been adopted. Cross-sectional designs have been used for the following purposes: (1) to compare tendons subjected to different habitual loads due to their specific anatomical location,\textsuperscript{100} (2) to compare tendons between limbs with muscle strength asymmetry,\textsuperscript{89} (3) to compare tendons in humans with different body mass but similar habitual activities\textsuperscript{85} and (4) to compare tendons in athletes with those in sedentary individuals.\textsuperscript{89} Study designs (1), (2) and (3) support the notion that adjustments in tendon stiffness to accomodate changes in physiological loading are accomplished by adding or removing tendon material rather than altering Young’s modulus of the tendon. Importantly, the addition or removal of tendon material does not seem to always occur uniformly along the tendon, but in some regions only, which can go undetected unless the whole tendon is examined.\textsuperscript{101} In contrast to study designs (1), (2) and (3), findings from study design (4) show that improvements in Young’s modulus of the tendon may occur and account fully for, or contribute to, the increased tendon stiffness in response to loading. Interestingly, exercise-training intervention studies also report improvements in Young’s modulus of the tendon.\textsuperscript{94–96} In combination, these findings indicate that stiffening of the tendon through alteration of its material requires ‘supra-physiological’ loading features (eg, in terms of loading magnitude, frequency and/or duration). Once this rapid adaptation occurs and the exercise becomes a habitual daily activity, alterations in tendon size might mediate any further changes in tendon stiffness.

Outlook and perspectives for future research: Combining ultrasonography with dynamometry methods has now made it possible to assess in vivo human tendon plasticity under conditions of altered mechanical loading. Two important questions warrant further research. (1) What is the mechanism underpinning regional differences in tendon adaptability in terms of tendon size? Possibilities worth investigating include differences in local stress, local Young’s modulus, local blood flow and mechanotransduction sensitivity. Finite element modelling of the tendon may be an appropriate avenue to examine the first two possibilities. (2) What is the limiting factor in tendon plasticity to exercise? An intuitive answer is that the magnitude and time-course of tendon plasticity are merely determined by how much and how fast the in-series muscle force increases as the muscle adapts to the chronically increased load, but confirming this requires systematic research.

Interventions For Fascial Tissue Pathologies In Sports Medicine

Fascial tissue dysfunction in the field of sports medicine is rarely treated surgically. Anti-inflammatory drugs are used for sports-related overuse pathologies; however, they may impair regeneration and diminish tissue adaptation.\textsuperscript{24, 25} Gyrase-inhibiting antibiotics often contribute to an increased likelihood of tendon injuries in sports.\textsuperscript{102} In addition, injections of platelet-rich plasma seem to be successful in some cases of tendinopathy, although efficacy remains inconclusive.\textsuperscript{87} Moderate evidence exists on the value of shockwave therapy and eccentric loading in tendon healing.\textsuperscript{104, 105} Similarly, foam rolling (tool-assisted massage of myofascial tissues) seems to improve short-term flexibility and recovery from muscle soreness\textsuperscript{75} and decrease latent trigger point sensitivity.\textsuperscript{103} Nevertheless, the physiological mechanisms of these reported effects remain unclear, although initial evidence suggests increases in arterial perfusion, enhanced fascial layer sliding and modified corticospinal excitability following treatment.\textsuperscript{108} 109 (F Krause et al, submitted, 2018). Finally, manual therapies, such as massage, osteopathy or Rolfing (a massage technique based on achieving symmetrical alignment of the body), are frequently used to improve fascial tissue regeneration or athletic performance, although their efficacy still remains to be validated.\textsuperscript{110, 111}

Outlook and perspectives for future research: Hopefully, current and future improvements in assessment methodologies will generate more conclusive research regarding which treatment modalities are most promising for specific conditions. While commercial and other interests often favour the promotion of premature positive conclusions about specific fascia-related treatments, strict application of scientific rigour is essential for the development of this promising field.

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ABSTRACT  Developed from thirty years of clinical observation, this work incorporates organizational principles from classic Rolfer® Structural Integration, Somatic Experiencing®, movement re-education, and craniosacral modalities. The ‘gesture’ is defined as the stored history of movement in response to life. The techniques presented identify tissue and movement patterns associated with both what is stuck and what is supporting homeostasis in the client’s body. The intention of the work is to re-establish, through touch and verbal cueing, natural resiliency in the autonomic nervous system and to quietly unravel gestures, associated structural patterns, and traumatic responses.

The Web and Crossing Patterns
As Rolfer we are trained to see the continuous web of myofascia like a knit garment that when pulled at the hem moves at the neck. About thirty years ago I remember a client whose shoe got caught in machinery which tugged at his leg until it pulled off his overalls. His arms, braced against handrails, countered the downward force. Hearing this I remember registering in my own body the drawn-and-quartered conflict: the powerful resource of his arms and shoulder girdle in contrast to the helplessness of his foot and leg at the mercy of the vortex below. This is a dramatic physical example of the pulls on the myofascia in traumatic events.

More subtle, but not dissimilar, are the car-accident stories. The client reports: “In the first one I was a passenger in the front seat and I watched the car come toward me as it hit the front right wheel housing. In the second one I was driving, but I didn’t see it coming. I was looking to turn left and I was rear-ended.”

In this case, we have two patterns crossing one another. The first with fixated eyes turning the upper spine to the right and the force of impact coming at a diagonal from the right, with probable bracing in the limbs, and upper right to lower left seatbelt restraint on the torso. The second one with softer eyes turning the head to the left and a surprise back to front impact, and specific bracing through the limbs (arms on the steering wheel, right foot on the brake) and upper left to lower right seatbelt restraint.

These are classic examples of events that create disruption through our physical structures. I’ve found it useful in my practice over the years to gather detailed information and note specific bodily position and movement in the moment of a challenging incident. Envisioning (and experiencing in our own felt sense) what was happening for the client in a moment of perceived life-threat gives us clues as to what remains present in the myofascial net and how multiple patterns might intersect. We can listen for how and where patterns cross.

If you imagine two grids, screens or sheer fabric, laid over one another, a third pattern emerges: a moire pattern, an undulating wave that moves across the plane of the surface. Now extend this picture into three dimensions. Fill in the specifics of bodily positions and movement during each incident, as described above, overlay the two, and wow, that’s a lot of mind-boggling spatial/somatic information!

If we can wrap our minds around that, the next question is, what might cause one pattern to predominate over another? Perhaps immediate positive human contact, self-care or professional care soon after an event might soften the effect on the body. Perhaps time factors:
one was many years ago but big; one was recent, smaller, but re-triggering the past. Or the two events were in very close proximity to each other, so there was no recovery time. Other factors that may magnify a pattern may be the social/emotional field at the time of the event, i.e., in the middle of a divorce or a funeral.

The Social/Emotional Field
Considering these psycho-emotional/physiological components in a client’s experience may lead us to think, “Is this going into material that lies outside my scope of practice?” I had a client with whom I had worked for a number of sessions to resolve a chronically challenged shoulder. I worked every bit of joint magic I knew, gave it my all, and it wasn’t resolving, so as I worked I began to chat with him about how long it had been an issue and what was happening around that time. The story emerged of his child – a child he had lost custody of in a divorce. His whole being changed as he shared poetically about the loving relationship he had with this little one. He mentioned how he never wanted to leave him in the stroller looking out, but he didn’t want to hold them either. He could look into each other’s faces and could look out into the environment together as they walked. He raised his arm, the one we were working on, to gesture how he held his child. I registered, “Whoa, there it is!”

The grief of the missing child in his flexed shoulder and arm held a gesture almost imperceivable in the scope of traditional structural bodywork! The story being heard in the context of ‘fixing’ the physicality of the problem revealed it. I said nothing. He called me a few days later and said his shoulder was miraculously just fine. I never saw him again. Is that Rolfing Structural Integration (SI)? Is that within the scope of practice of bodywork? I say, “Yes.”

As traditional Rolfers we are looking for aberrations in alignment through body segments and joints, stacking on the vertical upright line – the goal being to recreate order so that the mass of the body can function fluidly within the gravitational field. However, we are not just sculpting inert material. We are working with life body/beings whose forms cannot be separated from their function or their emotional or spiritual reality, and who live in a fluctuating environment, in time. The accidents, injuries and stress factors that shape our experience often involve some measure of trauma. Whether a brief startle/surprise or full-blown flashback-level hyper-arousal, the autonomic nervous system is engaged. Which means that in order to serve our clients well, on top of visualizing the crossover of three-dimensional patterns moving through tissue, we need to “keep one ear up” for dislocation in the nervous system and develop a chest of tools to assist with these issues.

Autonomic Disregulation and Simple Questions
Obvious ‘stuck on ON’ or ‘stuck on OFF’ symptoms of undischarged hyper-arousal might present themselves in the client intake interview. Speediness, restlessness, defensiveness, high startle response, sensory hyper-vigilance, stories of nightmares or thrill-seeking activities paint a picture. Similarly, a somber, spacey quality, a sense of disinterest in life, neediness, resignation, or stories of boundary issues paint another picture.

Inability to make eye contact, tendencies to mumble or whisper, nervous laughing, or stories of irritable bowel syndrome paint yet another. All of these qualities can be present in the same client and can give us information before we watch the client walk or before we go to the table to touch in. At the table we can then manually read the tightly held tissue that feels ready for action or the unresponsive tissue that has collapsed. We use our intuitive sensibilities to take in vast amounts of information and to decide what is important to act upon in helping the client achieve his/her chosen goals.

In addition to skilled noticing, we can also ask simple questions: “What are you experiencing?” We can use invitational language to cue response: “As you sense that the tightness is still in your neck, what happens when you spread your attention to sense your whole body? Take a moment without my hands and let me know what shows up.” This gives the client a break from receiving, and the client’s conscious check-in communication can reveal mysterious new areas in the body that are calling for attention. Sometimes these are areas that would have gone unnoticed by you – or the client. Asking simple questions can be a tool to uncover points where patterns cross.

Simple questions can also reveal a client’s inability to easily track sensation. Once I asked a client, “How does this feel?” and he opened his eyes and took his hand to the area in order to answer my question. There was clearly no internal proprioceptive experience. Feeling was something he did with his hands. And then sometimes it will seem as if the only way the person has to connect with his/her body is through pain. The body screams to keep the person embodied. If his/her body doesn’t hurt s/he can’t know where s/he is. Pain serves the purpose of orientation. Making gentle contact with areas of the body that don’t hurt during the course of a session is an avenue that allows the person to recognize his or her body through the sensation of your touch. As the practitioner, you become a bridge to the client’s resource. Your neutrality in touch presents a new way for the client to find contact with him/herself and can both rectify the painful areas and educate toward a fuller experience of being present.

As we go about the tasks of our SI work we can listen for responses that shed light on how the individual’s autonomic nervous system is wired. The automatic, instinctual, fight, flight, or freeze responses show up in primal flexion/extension reflexes, physical tension stillness, muscular tonic (or lack thereof), hyper-mobility, or rigidity in joints. The shape of a beautifully aligned body that traditional Rolfing SI attempts to achieve is honed by identifying movement.

The Gesture
A primary gesture emerges that is the history of a person’s movement in response to life. The structural twists, the body/mind memories of external impacts, the relational issues of trust and boundary, the flat, or anxious, or spacey affect – are all a part of the composite. The primary gesture is not a static shape, but a history and a potential. It is an individual’s unique quality of being that registers kinetically what has happened or what wants to happen: a cringe, a wince, a collapse, an implosion, a thwarted explosion, a retreat, a brace, a dramatic defense, a leap, a bold thrust, a hunkering down, a shutdown, or an opening.

It takes a peripheral vision of sorts to take in the entirety of the quality the client presents. Whether in anatomical layers or in the field, one can attempt to envision the whole gesture in three-dimensional space, in present time.

I once saw Dr. Peter Levine sit down at the head of a client who was lying in
supine position to begin a demonstration. There was no prior information exchange about the nature or content of the demonstration. He placed his hands gently on the client’s shoulders (“holding the envelope,” as we Rolfers would say). Within a minute the client said, “I feel as if I am falling backward, as if my feet are going skyward.” Peter replied, “Has there ever been a time when you have fallen backwards?” The client said, “When I was about ten years old I was pushed off a dock and my feet went over my head as I fell to the water far below . . .” The session continued from there. I thought, “Okay. What was that?” It seemed that Peter could expand his peripheral awareness and hold the space for whatever wanted to emerge from the stored history of this client’s movement. This stored history of movement in response to life is what I’m calling the gesture.

As we notice the gesture and notice what is stuck, what also emerges is what isn’t working. What flows, what resolves, what appropriate boundaries are operative, what keeps on going, surviving, thriving against all odds, what expresses freely. This is the resource.

It is so important to remember that we, as humans, are designed to be self-regulating, and that as practitioners it is our job to notice the client’s resources, to notice what’s working and to support that. ‘Homeostasis,’ a word derived from the Greek (homeo: similar/unchanging + stasis: stable/standing) means keeping things constant. It is characteristic of a system that regulates its internal environment and tends to maintain a relatively constant condition of properties. If we can actively listen for homeostasis, the body/being in our care can remember how to self-regulate and how to return to the stillness of home.

Homeostasis and Resource

Knowing these resources in ourselves is crucial. As an exercise, let’s look at two somatic ideas that are considered resources – centering and grounding. What is the difference between centering and grounding? Take a moment, close your eyes to disengage from the external environment. Think centering. What does that word suggest to your body/being? Take your time. Then, open your eyes; close them again. Think grounding. What shows up in your sensory awareness?

Almost everyone associates grounding with gravitational pull, a downward dropping toward the feet when standing or a weighted settling toward the floor/ bed plane when lying. Centering, to most people, feels more concentric from surface to core. It may have social-nervous-system connotations like coming back to yourself, or pulling inward away from others, coming home from being overextended, or some physical surface to core somatic experience that brings us to a deeper spatial awareness, like our spinal canal or our guts.

Recognizing resources within the context of bodywork/trauma work can direct us to focus differently within a session. I worked with a client, a bicyclist, whose left elbow had been clipped by a truck’s side mirror, which threw him over the handlebars. Thankfully, he knew enough to rest on the side of the road, get his bearings, and allow his body to shake after the impact, which sped the recovery. Over a number of sessions, I worked with the dynamics of the two blows, one from the truck, the other from the ground, with good resolve.

A month later he called so upset that now his right arm was aggravated – as painful as was the left one originally. He was lamenting the thought of having to now spend another wad of cash to rectify the next issue. I immediately recognized what was happening, calmed him, and set an appointment for him.

Think about it. Riding along with your hands on the handlebars of the bicycle prepared to brake, the assault of the truck’s side mirror creates a breach-of-boundary at your left elbow taking your left hand out of commission. Your right arm automatically becomes the resource that heroically brakes to slow the bike and, simultaneously, stabilizes your catapult to the ground as you fly over the handlebars.

Like a gymnast throwing his whole body over a gymnastic horse balanced on one arm, the power of the right arm, in this scenario, saved the day. It was the pivot point in the moment that prevented the accident from being much worse. It is not uncommon to see a delay in symptoms when the hero, in this case the right arm, can finally let down after the catastrophe has settled. One session integrating the musculature and movement of the right arm and consciously acknowledging the good job done was enough to complete the work. The right arm could now join the rest of the body/being and regain the quietness of feeling weighted, falling into gravity.

Directional Forces and Resource

Here’s another example of the importance of noting the directional forces and resources at play within an accident scenario. This client came to me for help with a traumatic brain injury incurred in a car accident. After a few sessions of subtle stabilizing work with the spine, neck, head – and the feet – we started to explore what actually happened. She was driving. The other car drove into her passenger’s side. I situated myself at her left shoulder to place myself in line with the resource of the driver’s-side door that prevented her from being thrown to the pavement by the force encroaching from her right. Yet, as we carefully gathered her somatic experiences, everything changed. In the time-stands-still moment-of-impact drama, she experienced that the driver’s-side door was the enemy force biting into her. And there I was, sitting not in what I assumed to be the supportive, safe resource position, but conjoined with her perceived danger.

I registered, “Who’d have guessed? Practitioner error. Think fast!” She was lying on her back. My right hand was under the edge of her scapula, my left palm capped her humeral head. I instinctively said, “I’m going to bring my (left) hand in the air above your chest. I want you to meet my hand with your right palm.” She opened her eyes briefly to orient her hand to mine. (This was an unintended benefit which served to slow her internal process and to bring her out of the accident story for a moment into present time.) I asked her to press into my palm. As she used her muscular intention to press she was pushing against the remembered attack of the door into her body, keeping herself from feeling crushed. Even though I was still in the position of the perceived force of evil, I supplied the counter-pressure that allowed her to create her own resource against that force. I regained my role as the bridge to resource. Her brain fog lifted substantially after that session.

Homeostasis and Midline

I’ve always thought that craniosacral work at its best, when it’s really spot on, has the practitioner asking him/herself, “Am I making this up?” “Is this really turning in my hands and pulsing?” This is the quality of inquiry necessary to find the underlying patterns and gestures – current, historical, or hereditary. A tool I use consistently is
As we explore the gesture as the history of a person’s movement in response to life, and the resource available within that gesture, we can perceive the awareness of gravitational pull as a resource.

an awareness of the cranial midline. The cranial midline is the beginning of bodily life. Embryologically, it is the first line laid down after the fertilized cells divide and multiply. It becomes the spine. It holds the endocrine centers. It is the line out of which the organ cavity and heart/ lung cavity enfolds. Even if knowledge of precise osteopathic cranial manipulation is lacking, or not of real interest, learning to listen for what’s happening in the deep core midline is valuable. This is not elbow-to-the-gristle kind of work. It involves intelligent imagination and use of our own body while working to provide orientation and grounding for the client’s process.

Homeostasis connotes a return to blueprint specifications, a return to what is normal for the individual – a return to optimal physiological function. Sensing our own midline within the three-dimensional space of the room where we work, and focusing on the client’s midline, invites a natural, un-efforted return to homeostasis. It is out of this neutrality that the body can re-regulate. And neutral listening to the client’s nervous system helps us re-regulate our own.

An exercise: Lie across a string hammock with the poles of the hammock to your right and left; placing yourself precisely perpendicular to the stretch of the hammock, the pendulating swing of the hammock moves your spine head to tail. In this position you can feel the importance of the cranial midline. This suspension in gravity is not dissimilar to buoyancy in utero, before we are born, and before we learn how to find upright balance in the gravitational field. From this position in the hammock, if you twist you can feel how the web underneath your entire body responds to the core line, and you can grasp how that line is the center from which your body enfolds.

I once rescued a five-week-old puppy found alone at the side of the road. He required surgery to repair a puncture wound. He wasn’t responding to sound or tracking his eyes to follow an object. He was in a state of infant-failure-to-thrive. I got into the hammock as described above, placed him on my stomach with his spine aligned with mine. As we settled into the gentle swing of the hammock and I let go of what might be, I felt his little three-pound body reignite. It was as if a sequential, ascending musical scale moved through him and he fully awakened – to live a long and healthy life.

Gravity as Resource

One of the core principles of Rolfing SI is the idea that we can architecturally stack the segments of our bodies in space to optimize movement through gravity. Newton’s Third Law of Motion states that for every action there is an equal and opposite reaction. The force of our foot strike on the ground is met with an equal and opposite force. The ground pushes back.

As we explore the gesture as the history of a person’s movement in response to life, and the resource available within that gesture, we can perceive the awareness of gravitational pull as a resource. Dr. Rolf said, “We want to get a man out of the place where gravity is his enemy. We want to get him into the place where gravity reinforces him and is a friend, a nourishing force” (Rolf 1978).

As Rolfers it is our job to ensure that the line of gravitational force through body segments is available as a resource to the client. We can also sense the field of gravity as a space we occupy with the client as we work. As we lift limbs or place our hands under the mass of our client’s body, we can assist him/her in experiencing a falling to Earth, being held, resting in safety. We can simultaneously feel the underside of our arms weighted as we lift. Animals and bodies learn best through the example provided by another animal/body. We can reinforce the body learning with our words and ask the simple question: “Can you let the weight of your body fall into my hands?”

Even if you don’t wish to focus on trauma work in your practice, you can excel at providing support in gravity, and thus create a bridge to a challenged social/ emotional or autonomic nervous system. This focus suggests to your clients that there is something, or someone, trustworthy who will catch them when they fall. This important message, through your presence, touch, and words, transforms the gesture of traumatic response. It opens the possibility for homeostasis and ignites the resource within the gesture, the freely expressing, thriving, self-regulating part of each of us that remembers how to return to the stillness of home.

Author’s note: Client stories have been modified to ethically protect privacy.

Kristen Kuester completed her certification as a Roffer in São Paulo, Brazil in 1987. She completed Somatic Experiencing certification in 2002. Craniosacral studies have been incorporated since 1992. She has practiced yoga, t’ai chi, and various contemporary body-mind repatterning techniques since 1975, including two years of classes with Bonnie Bainbridge Cohen.

She holds a master’s degree in sculpture/ performance from the School of the Art Institute in Chicago. Her intuitive aesthetic sensibility, envisioning, and following the unique form each individual may take, influence her work and her teaching.

She taught extensively in the arts prior to teaching movement and trauma work for application in massage/bodywork practices. She currently is teaching workshops in The Gesture of Traumatic Response for Rolfers. You can get more information on the Dr. Ida Rolf Institute™ website rolf.org or on her website, kristenkuester.com.

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Perceptual Tensegrity

From Microfibrils to Your Stance in the World

By Mary Bond, Certified Advanced Rolfer™, Rolf Movement® Instructor Emeritus

ABSTRACT Tensegrity has been used as a concept in structural integration (SI) going back to Ida Rolf, and elaborated further as we have benefitted from the paradigm shift from tensegrity to biotensegrity for living organisms. Bond discusses tensegrity and biotensegrity, then introduces the idea of ‘perceptual tensegrity’ as being present in our orientation to ground and space. She discusses how to bring this into our work with clients to enhance the embodiment possible through SI and Rolf Movement sessions.

Tensegrity Buzz

In tandem with the fascia research that has galvanized the structural integration (SI) and fitness communities (including Pilates and yoga) and the ‘body world’ in general, there has been a smaller but equally dynamic buzz about tensegrity. Like many SI practitioners, I have a Skwish™ toy in my office and show it to clients to make the point about interconnectivity. I got it about struts and tensioned cables, bones and soft tissue, diffusion of compression through the continuous-tension network, and returning to equilibrium after removal of constraint. It seemed a cool mental exercise. But geometry wasn’t really my thing. Little did I know that it’s the tensegrity principle operating in our bodies that makes movement possible. Tensegrity ensures that the interior spaces, large and microscopic, that deform when we move can always return to spacious equilibrium when we stop. That gets my attention.

Tensegrity came to life for me when I saw Dr. Jean-Claude Guimberteau’s endoscopic video images of living fascia (see Figure 1). The tensional integrity of those tissues as they changed shape was beyond doubt. Until then, tensegrity had been of historical interest because Ida Rolf had talked about it, and about Buckminster Fuller, when I studied with her. But it never seemed central to SI for me. Dr. Rolf and most of my other teachers were mainly looking at human structures through the lens of classical Newtonian mechanics, basically a top-down system where gravity holds the body together like hinged and levered stacks of blocks. I had lived with the Little Boy Logo for a long time.

The Biotensegrity Nerds

While the fascia aficionados have been making strides in their research, there have been tensegrity enthusiasts waiting in the wings. The common themes of ubiquity, continuity, spaciousness, and equilibrium have motivated communication between these two cohorts, making the past several decades a fertile time for reconceiving how our bodies function.

It started, of course, with Buckminster Fuller, architect and systems theorist, who sought a structural design that would be...
light, strong, and energy-efficient. Although famous for inventing the geodesic dome in the 1940s, he was actually reinventing (and claimed the patent for) a structure made decades earlier by a German engineer. Nonetheless, it was Fuller who popularized the continuous tension / discontinuous compression design. Inspired by the ‘floating compression’ sculptures of his artist student Kenneth Snelson, Fuller coined the term tensegrity. He also introduced the concept of synergetics (Wikipedia) – the behavior of a system that is not predicted by the sum of its individual parts but rather by their interactions – and coined that term long before the word ‘synergy’ became widespread.

In the 1970s, orthopedic surgeon Stephen Levin, troubled by the Newtonian thinking of classical biomechanics, had an epiphany after viewing Kenneth Snelson’s Needle Tower on the National Mall (see Figure 2). He was then inspired to apply the principles of tensegrity to living matter. Levin subsequently coined the term biotensegrity and introduced the concept of equilibrium between structures, a major advance in the understanding of the organization of anatomical structures, “from viruses to vertebrates” (Guimberteau 2015, 139).

Cell biologist and bioengineer Donald Ingber has applied the tensegrity principle to the nanosphere. His work on tensegrity led him to investigate mechanotransduction, the molecular process by which cells convert mechanical signals into changes in intracellular biochemistry. He has shown that the effects of mechanotransduction can occur at a distance from local stimuli.

Artist and inventor (of the Skwish toy) Tom Flemons, already fascinated by geometry, was inspired to pursue tensegrity designs by attending a Buckminster Fuller lecture in the 1970s. In 1985, Flemons noticed a similarity between tensegrity masts and vertebrae. His eloquent work with dowels and cords demonstrates how the tensegral architecture of the bones eliminates the need for levers or fulcrums in our conceptualization of biomechanics. Flemons later met Stephen Levin and the two have collaborated since the 1990s.

As mentioned, micro-surgeon Jean-Claude Guimberteau has demonstrated the biotensegrity of the fascia through his endoscopic images. He demonstrates how the dynamic properties of the microfibrils within fascia act together to maintain internal spaces (the microvacuoles) during movement.

According to these tensegrity researchers, the complexity of the balance of tensions and compressions within the body is the best explanation for the maintenance of the body’s volume. It is the only biomechanical hypothesis that adequately explains our capacity to resist the force of gravity in a way that lets us change shape as we move about. The interactions of these tensegrity researchers with one another and with the fascia research community seem to demonstrate the synergy or synergetics that Fuller talked about.

Ida Rolf

When I studied with her in the late 1960s, Dr. Rolf was already familiar with Fuller’s work. Tensegrity was a fertile metaphor for Rolf because it allowed the body to be conceived as spacious rather than solid. The concept of tensegrity may also have helped her articulate the continuity she felt under her hands.

Tensegrity was pertinent to Rolf’s theory because it understood fascia as a changeable and responsive element in structural organization. But the tensile characteristic of fascia wasn’t consistent with the compressive model of structure portrayed in the Little Boy Logo (Figure 3). It may have been that she was loath to let go of the illustrative power of the logo to market the concept of “gravity is the therapist.” In the block model of the body, fascia was regarded as a glue that hardened when the blocks were out of alignment. For the most part, SI training had to do with getting the glue unstuck.

Developing her work in the period prior to significant fascia research, Rolf had it both ways: the body was a stack of blocks and a tensegrity structure. Thanks to her genius as a manual therapist, she was able to communicate her vision despite its theoretical inconsistencies and to inspire several generations of practitioners.
The SI community understands that tensegrity (or biotensegrity) makes it possible for living beings to navigate the gravitational field without solidifying or collapsing. But we have not clearly articulated how a human body achieves optimal tensegral expansion other than receiving a Ten Series. Our clients’ bodies become observably more spacious, but perhaps we can do more to help them sustain it.

For clients who truly embrace the emancipation of their inner space – those who feel it – the tensegrity principle can begin to function to their benefit right away. But if we are honest, we know that not all clients have the same interoceptive capacity or refinement of body awareness, or the same degree of interest in helping themselves. It’s our job to educate them about the necessity of beneficial self-use. But what are our tools for doing that? Well, Rolf Movement work.

What features of our movement education support tensegral expansion? Certainly three-dimensional breathing helps – re-training those aspects of breathing biomechanics that are not functioning efficiently. What else? Unless we are teaching stand-alone movement sessions we don’t have very much time. We teach balanced sitting, sit to stand, folding and unfolding the spine, walking, and with certain populations – dancers, musicians, yoga practitioners, and athletes – we may have input into performance. We coach our clients so that their movement makes use of expanded internal space. But although we strive to focus on the sensation of movement rather than the form of the movement, most clients, when they get home, translate sensation into form. Form is easier to relate to. For example, most people more easily manage the intimate sensation of spaciousness between sit bones and coccyx as a prescribed position of the pelvis. But whereas freedom in the posterior triangle of the pelvic floor can emancipate contralateral motion of the spine, positioning of the pelvis does little for the play of the spine when the person walks.

Perceptual Tensegrity: Experiencing the Support of Spatial Orientation

Ever since I first met Hubert Godard in 1994, I’ve been an enthusiast of his tonic function theory of body organization, and the idea that to help someone find a new way to move, it’s essential to help him/her find new body perceptions. For over twenty-five years I’ve been trying to embody this way of being in my own life. I keep writing books about it. This fall I publish my third attempt, Your Body Mandala. In the middle of writing, it occurred to me that the orienting polarity between ground and space – earth and sky – that I’ve taught since 1994 amounts to tensegrity of perception. When a body yields weight to the ground and is simultaneously oriented in the surrounding space, then the person’s movement acquires a welcome elegance, fluidity, and connectivity. Coordination changes for the better. We’ve felt this in our own bodies and we see it when it takes hold in our clients: the body’s compression members are floating more willingly in their soft-tissue matrix because the person’s orientation has shifted. Spatial perception makes the body more expansive inside, tensegrally expansive, and thus, more able to fully function as a whole system.

Neuroscientists have told us that the space around our bodies, our peripersonal space, is mapped in our brains (Blakeslee and Blakeslee 2007). It helps to point this out to clients – that the space around our bodies is part of the body neurologically. Otherwise spatial perception may seem too flimsy to provide actual support. For most people, expansive spatial perception has to be experienced many times before it becomes a reliably supportive factor in their posture and movement. Culturally, physical education has been Newtonian, focused on muscles and levers, not on what we feel. It can take time to create new maps of stance, support, openness, adaptability, responsiveness. Perceptual change can change our outlook as well as our coordination, and thus can re-direct behavior.

Awareness of the space around your body helps maintain the space within your body. We embody more space when we occupy more space. This is powerful. And, it’s a rare client for whom new embodiment is automatic or even easy. The body-mind connection isn’t a straight line, and often the journey to becoming bigger inside and out requires some careful navigation. What has kept this client occupying so small a space? This question must be alive in the therapeutic field between the client and practitioner. Titration is always appropriate in our interventions.

Three Ways to Go About It. I’ve used three main approaches to helping clients experience and value spatial awareness. I think of the first one as ‘marketing’ – selling the client on the benefit of paying attention. I first invite the person to focus tightly on an object. Once s/he is doing that, I ask for self-observation in various ways – how s/he is breathing, for example. I then challenge the client’s balance either by giving a small push, or asking the person to stand on one leg. Most are able to feel a moment of imbalance and insecurity. Then we build a contrasting state by bringing attention to peripheral vision and sustaining the sense of peripheral awareness while looking again at the object. Most people feel more grounded and balanced when they allow themselves to be aware of their surroundings.

The somatic meditation from Your Body Mandala below (Bond 2018, 49) is an example of my second approach. It invites the client to become familiar with the back of his/her body. Most people’s lives are so sagitally-directed that becoming aware of the space behind their bodies is novel. I have found this intervention to be a helpful shortcut to awareness of the ‘backspace’. It has the added benefit that the client feels his/her cervical vertebrae moving more freely. The lesson that spatial awareness

Figure 3: The Little Boy Logo.
helps decompress the body is built into this intervention.

**Somatic Meditation: Moving from the Back of Your Head**

Standing comfortably, turn your head to look to your right as far as it feels comfortable. Then look to your left. Look up to the ceiling and down to the ground. Notice how it feels to move your neck.

Remind yourself that the ground is supporting your body from below and take a moment to consciously yield the weight of your ankles into the ground. Yield your pelvis, your shoulder blades, and your elbows. At the same time, be aware of the space surrounding your body.

From there, mentally divide your head into a back and a front. Everything behind your ears is the back of your head, and everything from your ears forward is your face. Spread your palms and fingers across the back of your head (see Figure 4). Close your eyes and take a moment to let your head feel the contact of your hands. It's easy for your hands to feel the contact: let your scalp feel it also.

Next, turn your head in various directions by using your hands to move the back of your head. Your face remains passive.

Notice that when the back of your head is going to the left, your face turns to the right. When the back of your head moves to the right, your face turns to the left. When the back of your head goes down, your face moves upward. When you look down, the back of your head goes up.

Now, relax your arms and continue looking around, letting the back of your head lead the action. Your face is a passenger, riding on the back of your head. Notice how your neck feels when you move your head in this manner.

My third approach involves using ideokinetic vectors. Implying magnitude and direction, a vector in this context is a potential for action. Any point on or within the body can be the source point of a vector. If you locate bregma on the crown of the head and find the perineal node in the center of the perineum and then let those two points move in opposite directions, you invite expansion through your midline.

The arm-rotation exercises (see https://bit.ly/2TSAmyd) that Dr. Rolf taught employ idiokinetic vectors. Expanding the arms' midlines between glenohumeral joints and palms and carefully going through those quarter-turn rotations invites tensegral organization of the arm and shoulder girdle.

Another effective vector point is the tibial tuberosity. When these ‘shin points’ are active in walking, the feet land toward the fronts of the calcanei rather than on the back edges, softening heel strike and promoting resilience through the whole system. Of course, this is most effective when the midline has lengthened.

Vectors can be located along the vertebral bodies, giving each vertebral segment its own trajectory (see Figure 5). For forward folding we can imagine vectors extending from the vertebral spines. In the yoga cat/cow movement we can alternate between vectors on the back (cat) and vectors on the front (cow). When a vector is hard to imagine or access, it may be the locus of an emotional holding pattern or compensation from injury. Such places need careful negotiation to return to functionality. (Chapters 10 and 11 of Your Body Mandala offer several ways to work with vectors and emotional holding patterns.)

When I practice yoga, I let my attention travel along these various vectors – midline, arm lines, shins, front and back spine vectors – all expanded into the space around me (Figure 6), supporting me as I move from asana to asana. Sometimes I imagine the same silken threads that you see in Guimberteau’s magnifications (Figure 1) as being present in the space around my body, vectors that move through every cell and organ, sustaining me in the space. Like the microfibrils, dividing and rearranging to maintain the volume of the microvacuoles, my imaginary filaments dynamically revise their relationships as they maintain my interior space. When I practice living within an environment of vectors, it feels as though I don’t have to work so hard to maintain balance.

**Synergy**

The 360° field of awareness that kept our ancient forebears alive has been replaced by narrow, sagittal focus on a screen or traffic lane, or on whatever symptom currently troubles us. Our responsibility as practitioners is twofold: first to cultivate mindful body awareness in ourselves so
that we may model it to our clients, and second, to promote that awareness as a primary benefit of SI sessions.

SI releases restrictions, emancipating space within the body and facilitating balance and integration. This changes how we occupy our bodies and how we move through our lives. Too often, however, the somatic epiphanies of a session fade with re-entry into the hectic world we live in. SI practitioners can help clients sustain the emancipation and grace of a session by anchoring those moments to conscious proprioception. Those perceptions need then be anchored to daily interactions. Spatial orientation is key to the maintenance of tensegral expansion.

Buckminster Fuller considered tensegrity to be a law of the universe, viewing planets as compression elements held in place by the invisible but pervasive tension force of gravity. He thought that everything in the universe tries to stabilize itself and conserve energy through continuous tension and local compression.

Tensegrity of perception might not really be a thing – after all, I made it up. But I like thinking that the way humans perceive has the same structural organization as a molecule or a solar system.

Mary Bond studied with Ida Rolf from 1969 to 1972. Formerly Chair of the U.S. Rolf Movement faculty, she has been involved in the development of movement education for SI from the early days with Judith Aston and has been profoundly influenced by the work of Hubert Godard. She is the author of Balancing Your Body, The New Rules of Posture, and Your Body Mandala and producer of Heal Your Posture: A Video Workshop. It is her joy to share her perspective of movement education.

BIBLIOGRAPHY

SI releases restrictions, emancipating space within the body and facilitating balance and integration. This changes how we occupy our bodies and how we move through our lives.
A Life of Mind and Action

Review of *Fascia Pioneer: Dr. Thomas W. Findley Jr* by Suzanne Petkus Becker

Reviewed by Jason DeFilippis, Certified Advanced Rolf™

I was happy to be asked to write a review of *Fascia Pioneer: Dr. Thomas W. Findley Jr.* (Blurb: 2018). This book is the new biography of our colleague Tom Findley, who is not only a Rolf but a medical doctor, researcher, and a founder of the Fascia Research Congress. I worked for Tom as a research assistant and structural integrator upon graduating from the Rolf Institute® in 2004. At the time I was impressed with many of his qualities, among them his ability to cut through to the heart of a matter, and also his humility. I was thus pleasantly surprised to learn that he allowed a biography to be written. Through the book we see Tom as a person who has cultivated his mind, body, and spirit with vigilance and courage – and he continues to do so: Tom was diagnosed with prostate cancer in 2010, which was caught late and had metastasized.

The biography begins with Tom’s lineage, an ancestry filled with high-achieving, well-resourced, ethical people. This section is interesting in light of how Tom embodies the patterns of his ancestry. He seems to have used these gifts, which he attributes to “being lucky,” to work towards progress in science, humanity, and the well-being of himself, and his family. The middle section of the book deals with his education and career. Later in the book, we learn more about Tom’s spiritual experiences.

Tom’s father, Thomas Wagner Findley, was kind, smart, creative, spiritually focused, and somewhat emotionally detached. As a research chemist and professor, he invented many things, including the preparation process of what we know as epoxy, an invention that may have given the Allies an advantage during WWII. Tom Senior was also an activist, and involved in the civil rights movement, before choosing to spend most of the rest of his life living mostly off the grid, always on rivers, occasionally doing some teaching and consulting. Tom’s mother, Hilda Rachel Findley-Knier, is from a Pennsylvania farming family who were precise in their work and “heavily involved” in standardizing for the Department of Agriculture. She was good-humored, strong, adventurous, cheerful, and sympathetic – and clearly intelligent as she graduated from the eighth grade when she was eleven years old. She later had a career teaching college-level mathematics. Hilda was in a car accident while working on her PhD, and this resulted in a life lived with pain. Her suffering seems to have played a part in Tom’s unique and very hands-on approach to healing.

Tom was raised in Illinois. We learn that he was also an ambitious learner, often far beyond his years in his attempts to teach himself. He attempted to feed himself before he could understand the principle of keeping the spoon right-side-up, then progressed to conducting science experiments at the age of five, and progressing through school quickly. He was the high school valedictorian, but used that status to take the blame for another student who got in trouble for activist expression, knowing that he could weather the consequences better than she. Besides this demonstration of his strong sense of ethics, we see more of his character in the nickname he was given in college, Fearless Findley, because he faced challenges with curiosity, efficiency, and confidence.

Tom’s medical school mentor was Francis Wenger, a physiatrist. Wenger persuaded Tom to become a physiatrist, and Tom persuaded Wenger to become a Rolf. Upon graduating medical school, Tom entered a residency program combined with doctoral studies, a path that afforded him a career “that would focus on clinical practice with basic theory and applied measurements in rehabilitation research.” While he worked at the Kessler Institute for Rehabilitation, he trained in structural integration, and also persuaded Kessler to have other staff trained in our work. When he later entered private practice, he continued to have institutional roles that allowed him to do research, and brought his skills to bear in studies researching manual therapy and acupuncture. All in all, in his career he has been author or co-author of “at least 115 publications.”

Through his career we see theme of Tom backing up his rebellious nature and activism with accomplishment. When Tom saw something that wasn’t right he went about correcting it, sometimes at risk to himself, or to his job. He often took on work that needed to be done for patient advocacy but was in addition to an already grueling schedule. For instance, he fixed wheelchairs during his medical residency and for a long time after that, knowing that patients needed to be mobile in order to be empowered...
so that they could heal. We read of him showing only appropriate patience for medical systems that do not run well and are not efficiently organized with respect to the alleviation of human suffering. Tom stepped up, and brought his fine mind, cultivation, and his political capital to bear. The assertion of good values under sometimes very challenging and risky circumstances runs throughout Tom’s life, and is an inspiration.

I found it fun and inspiring to read about his achievements in his threefold career as a clinician, research scientist, and structural integrator, and it brought to mind what I noted ago working for him – how efficiently he navigated the often slow-moving and bureaucratic culture of science. The creation of the Fascia Research Congress along with fellow Rolfers and researchers Robert Schleip and Eric Jacobsen (and many others) was quite an achievement that continues to bear fruit for the field of Rolfing® Structural Integration. As former Research Director of the Dr. Ida Rolf Institute™, Tom used his acumen and clout to help bring our work into the scientific conversation.

I was struck over and over again by the novelty of Tom’s thought process and how he has lived his life. He has always been a valuable member of any organization he belonged to, and that allowed him a certain amount of license to do things the way he wanted. Instead of moving at the pace of the group, Tom has been able to move through the world in accordance with his own values and goals, earning the moniker “pioneer” given to him in the book’s title. That he was a pioneer in fascia, our world, has been to our benefit.

These days, Tom is retired from his research position at a VA hospital and from his private practices as a physician and structural integrator. Life is challenging both physically and emotionally, but always the consummate scientist, Tom has been using himself as a test subject and progressing the field of research in the study of cancer. With less worldly activity, his presence has turned more inward. I met with Tom recently for an interview, which you can read on page 67. He seemed on some level content with being in the moment; exercising, tending to his illness, and sometimes just waiting. One of his favorite activities is watching the birds outside of his porch window. Fascia Pioneer: Dr. Thomas W. Findley Jr. is available in hardcover, softcover, and digital download editions at http://www.blurb.com/b/8734297-fascia-pioneer-dr-thomas-w-findley-jr.
HIGHLIGHTS FROM THE 2018 INTERNATIONAL FASCIA RESEARCH CONGRESS HOSTED IN BERLIN

Dedicated to the newly emerging field of ‘Fascia Studies’, the Fifth International Fascia Research Congress (FRC) was held in Berlin November 14-15, 2018, providing a forum for high-level fascia exploration. The Dr. Ida Rolf Institute™ (DIRI) and European Rolfing® Association (ERA) were proud Platinum Co-Sponsors of the event, and a large number of members of the Rolfing community were in attendance.

DIRI Board Chair Rich Ennis opened the event on behalf of the Institute, and also made closing remarks along with the presentation of a research tuition scholarship that offers free DIRI tuition for fascia researchers. “It was an honor to provide comments to the entire Congress at both the opening and the closing of the FRC in Berlin. We shared a booth with the ERA which provided an excellent venue for conversation with fellow attendees”, said Rich.

Advanced Rolfing Instructor Russell Stolzoff presented a poster on the latest research he has been involved in at Western Washington University. Certified Advanced Rolfer™ Bruce Schwind, Basic and Advanced Rolfing Instructor, held a workshop at the FRC on the temporomandibular joint.

DIRI Executive Director Christina Howe noted, “We were thrilled to be at the forefront of this conversation on fascia. Dr. Ida Rolf was one of the pioneers of fascia back in the 1900s and founder of Rolfing Structural Integration, which has helped and continues to help many.”

The FRC brings together the latest and most relevant fascia science, helping foster understanding and collaboration among scientists working in fascia research and the various clinical professionals who address fasciae in their work with clients and patients. For more information, visit fasciacongress.org.

Prior to the FRC, the ERA held a membership meeting with workshops. Rich Ennis and Christina Howe presented on the rebranding efforts and curriculum updates underway in the US school. There was a lively and informative slate of presentations by Pedro Prado, Mary Bond, Jonathan Martine / Suzanne Picard, and Bibiana Badenes. There was also a panel discussion featuring Robert Schleip, Adjo Zorn, and Franz Mechsner, and sessions with Peter Schwind, Rita Geirola, Pedro Prado, Jon Martine and Suzanne Picard, Mary Bond, and Stefan Dennenmoser.

http://fasciacongress.org/2018-congress/

REGIONAL TRAINING APPROVED IN GEORGIA COMMENCING 2019

After a lengthy process the Dr. Ida Rolf Institute™ is now approved to offer Regional Training in Georgia! Libby Eason, will be the lead instructor. Contact the Institute at 303.449.5903 for information.

2019 ADVANCED ROLFING® TRAINING

AT1.19 – Boulder, CO
Dates: Phase I – May 6-24, 2019
Phase II – September 9-20, 2019
Instructors: Ray McCall & Carol Agneessens
Cost: $6,500 + $50 fees

AT2.19 – Durham, NC
Dates: Phase I – October 14 - 31, 2019
Phase II – January 13 - 30, 2020
Mon – Thurs 9am to 6pm
Instructors: Russell Stolzoff & Bethany Ward
Cost: $6,500 + $50 fees

AT3.19 – Venice, CA
Dates: Phase I – October 21 - November 7, 2019
Phase II – March 16 - April 2, 2020
Mon – Thurs 9am to 6pm
Instructors: Jan Sultan & Juan David Velez
Cost: $6,500 + $50 fees
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