STRUCTURAL INTEGRATION

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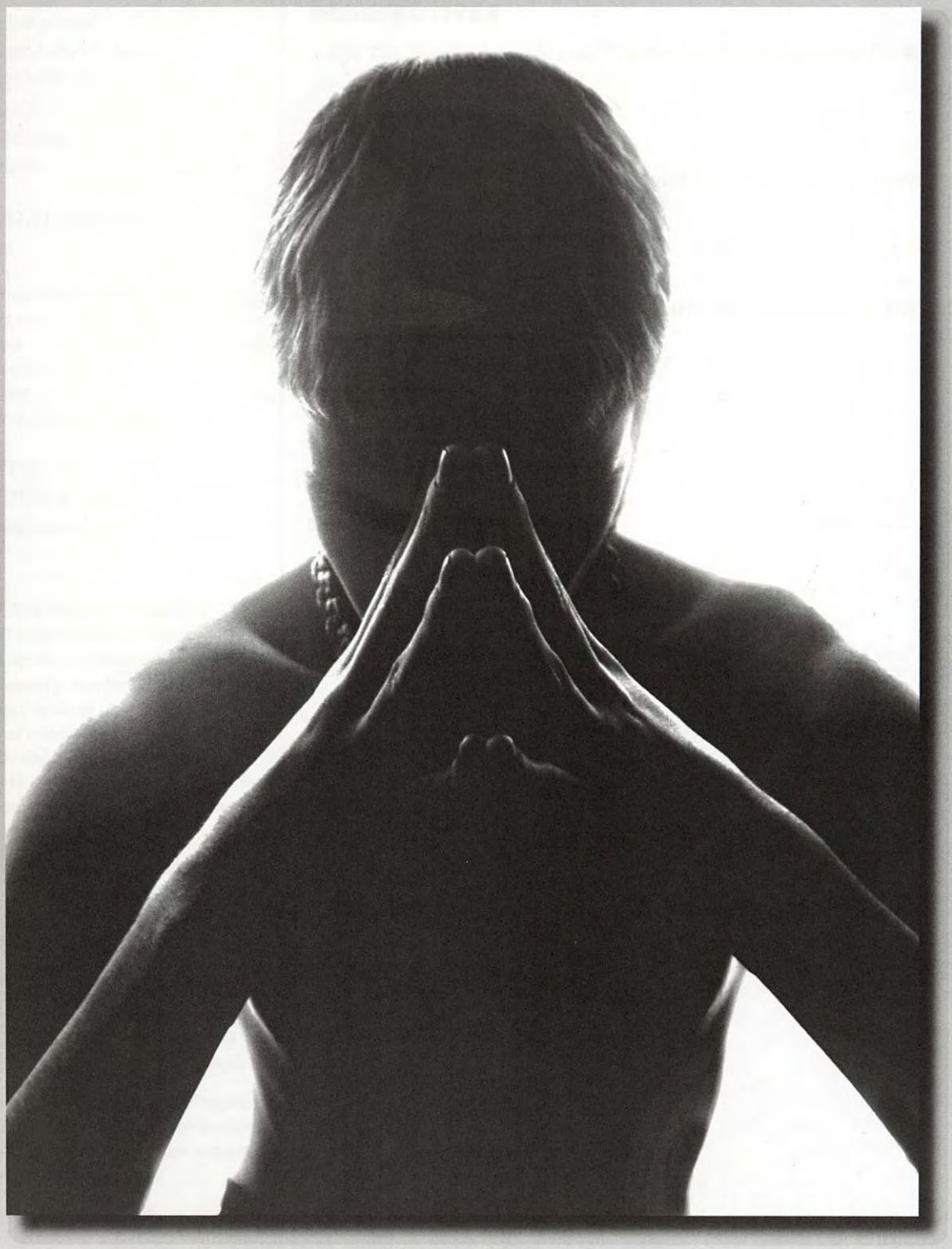

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Ask the Advanced Faculty

This issue inaugurates a new column, "Ask the Advanced Faculty."

The Rolf Institute's members are encouraged to submit questions for future issues to marketing@rolf.org.

"How important is it to address articular restrictions in the context of a basic Rolfing® series? What special training or care is needed when working this layer? Are the answers different depending on the location of the restrictions?"

Response by Michael J. Salveson, Advanced Rolfing® Instructor

Dr. Rolf developed the basic Ten Series of Rolfing to organize the body at the musculo-tendinous level, working all the associated fascial connections. While musculo-tendinous structures and their fascial web obviously influence bony position and hence articular relationships, Dr. Rolf did not intend the basic series to work specifically with ligaments or articular surfaces. She knew that there was a dramatic increase in complexity when working directly with ligaments and articular surfaces, and that working at this level required detailed anatomical knowledge and a high level of manipulative skill to negotiate the decompensating process.

The reason she was so careful is that deep ligamentous structures are often held in dynamic tensional chains or interrelationships, such that changing one aspect of the relationship can precipitate decompensating changes throughout the chain. Often, conditions in the body do not support a level of continuity that allows distant parts of the chain to adapt successfully to changes made somewhere else. We are all familiar with the complex relationships within the spine. For example, changing lumbar structures often provokes compensatory strains in the cervical spine. Repositioning the sacrum can create strain at the cranial base if conditions do not support easy adaptation. When working with the ligamentous bed and articular surfaces, it is important that the practitioner have the ability to resolve unexpected strains that surface when other articular restrictions are released.

Let me make an important distinction concerning "articular restrictions". When a joint is "stuck", the joint surfaces are not able to move in a normal fashion relative to each other and movement of the joint will not follow the normal axis of motion. This will interfere with the balance of the soft tissue around the joint, making normal patterning of the myofascial tissues unlikely. A joint can be "stuck" as a result of local, recent strain or it can be "stuck" as a result of chronic, established and well-compensated strain. In the former case, releasing the joint will likely not involve distant, complex compensations. Chronically restricted joints however, when released, will usually trigger a reaction in the next restriction in the chain or in a joint that is reciprocally compensated, e.g., sacrum/cranial base. Releasing a recent restriction (a stuck vertebral joint, for example), will simply allow the structure to return to a more neutral position within its existing pattern. Releasing a chronically "stuck" and imbalanced joint requires rebalancing the ligaments that control both the motion and the resting position of the joint and will always involve a shift in the existing pattern, within which the joint finds its neutral position. Releasing a joint always involves restoring its neutral position.

So, I would say on the one hand that releasing articular restrictions in the context of a basic Rolfing series is not high on the list of objectives to be accomplished. If diligent, careful and appropriate work is done to pattern the myofascial web, many local, recent articular restrictions will be corrected by virtue of more normal action on the part of the muscles influencing the joint. The joints will open in the course of releasing the myofascial restrictions.

On the other hand, there will be joints that are held in asymmetrical neutral positions and have restricted and asymmetrical motion due to chronic ligamentous strain, thickening, and shortening. Achieving the most profound results possible with Rolfing entails releasing and rebalancing these joints by working within the ligamentous bed, the deepest layer of the fascial network. It is not possible, however, to master all the subtleties of touch and the myofascial-release techniques required to effectively apply the basic Ten Series and learn to work effectively in the ligamentous bed within the time frame of the Basic Training. That is why the training of Rolfers is staged as it is and work with the deep ligamentous bed and chronic articular restrictions is presented in the Advanced Training.

In summary then, I have found that in releasing articular restrictions, the most important distinction is not where the restriction is (although it is a consideration), but whether it is recent and acute or whether it is longstanding, well-compensated, and involves chronically thickened and imbalanced ligaments. It is more likely that releasing the former in the context of a basic Ten Series will proceed without complication than releasing the more chronic restrictions. The other issue crucial to effective articular release is the quality of continuity evoked in the joint. Is the joint able to move easily in every axis of its normal motion, along the planes of motion established by the anatomical shape of its articular surfaces? In other words, does it rest in an easy neutral position? Only a joint resting easily in its neutral position is likely to remain unrestricted.

The Assisting Experience: Three Perspectives

By Merlin Madrid, Wanda Silva, and Bethany Ward
Certified Advanced Rolfers

Having known each other from past trainings, we were excited and pleased when we found ourselves assisting basic Rolfing® training classes during June and July of 2006. One evening, we all ended up sitting in Bethany's rented condo, comparing notes about our experience. Merlin had assisted several Unit I classes, but Wanda and Bethany were newbies, assisting Units III and II, respectively.

Although the classes were different, we each felt strongly about how much we were getting from the assisting experience. Each had been drawn by the opportunity to immerse herself in Rolfing from a classroom perspective, to work closely with highly talented instructors, to give back to the community, and to give our bodies a rest from the grind of private practice. We also agreed that leaving our practices for six to eight weeks was challenging on many levels.

In the following sections, we each present a bit of our experience, for others considering assistant teaching.

UNIT I - MERLIN MADRID

Being a Unit I teaching assistant is exciting and challenging. Assisting allows you to review information you had forgotten and apply your skills as a Rolfer® to a large group of people at once. What you learned in your training is only part of what you need to be a great assistant. As an assistant, it's your job to help things move smoothly and to provide each instructor with the materials and support he or she needs in order to present information brilliantly. Sometimes you deliver information to the class, and you may do some demos, but mostly you answer questions, and help with anatomy palpations and Skillful Touch training. Your biggest job is letting others lead the class while you help in any way you can to make their job easier.

Unit I teaching assistant duties require you to be able to coordinate activities with instructors and staff including: maintaining and preparing the classroom for each teacher, copying handout materials, setting up and breaking down audiovisual equipment for lectures and tables for Skillful Touch or anatomy palpation, distributing demo materials such as clay, for constructing anatomical models, and working with the Rolf Institute® of Structural Integration staff to replenish clean sheets and perishable items. Alerting staff to student needs and directing students to the appropriate staff may fall under your responsibilities, also.

Working with Students

The Unit I assistant is the one consistent fixture in the class. You "take the temperature" of the class and report to each teacher "where" the class is and what students' needs may be. You need to be available to students and approachable without crossing the student/teacher boundary. Students often confide things to you that they won't tell the instructors—sometimes in the hope that you will relay the information, and sometimes just to vent.

It's your responsibility to make students aware of classroom and kitchen duties and check that they are performing them. Since multiple classes are using the facilities, class assistants see to it that students clean the room and kitchen before leaving. Working with students is both the best part of your job and the hardest.

Assisting: Challenges & Benefits

Challenges:

- Being present and available for nine hours a day, four or five days a week, for a six-week period.
- Being away from your practice for six weeks.
- Travel time to and from the Institute (two hours per day for me).
- Lunch hour is often taken up with student concerns.

Benefits:

- Re-experiencing your basic training information without the pressure of testing.
- Sharpening your palpation skills.
- Sharpening your skill at "being present" for your clients.
- Connecting with students and making great friendships with future colleagues.
- A great experience professionally and personally.

UNIT II – BETHANY WARD

A couple of years into my practice, I found myself fantasizing about taking the basic Rolfing training over again. With the experience I'd gained from my practice, I knew I'd see and experience the information with new eyes. I love the idea that mastery comes from returning your attention over and over to the same material and finding new connections and implications. That's what I was looking for, and I definitely found myself on that path as a teaching assistant.

I was eager to review my old notes (and about five other Ten Series compilations) and see what I'd forgotten or missed the first time through. This did serve me well and I learned a great deal. What surprised me the most was how much I learned just from working closely with the main instructor. Although our styles were different, when I returned to my practice, I was amazed at how much of her touch had rubbed off on me (forgive the pun). We didn't exchange much work, so it wasn't due to that. Rather, it seemed that by sheer proximity in a highly energetic environment, my touch entrained with hers. What a gift!

Additionally, communicating the work to students who are not fluent in "Rolferese" and Rolfing dogma requires that you fill in spaces in your knowledge and understanding. It's not enough to be able to get changes in tissue. You have to be able to explain what you're doing. I believe this

makes you a better Rolfer because the more clearly we hold our intentions, the more efficient we become at achieving them. You also get better at explaining the process to clients, which allows them to participate more actively. Lastly, clearer, more concise communication means you'll be better equipped to explain Rolfing® to potential clients—making you more effective at marketing.

Unit 2 assistants take a model through a Ten Series. Rolfing a client in the teaching context demands you perform several skills concurrently. In my basic training, teachers told me to check in with myself, check in with my client, then see if I could maintain awareness of both systems at the same time. Just when I started to get a hang of the latter, assisting took me to the next level. Now I was striving to be aware of my client, myself, a classroom of students, and the main instructor. Needless to say, I've found I have room for improvement.

Duties

In Unit II, the main duties include demos, assisting students as they take each other through the Ten Series plus three movement sessions, and helping students as they work through practicums. Depending on which instructor you work with, you may have opportunities to lecture. I have a business degree, so I offered to discuss practice building and procedure. Students jumped at the topic and we had a lively discussion. If you think you have something valuable to contribute to the class, don't hesitate to discuss this with the lead instructor. Class time is packed, so there may not be time for additions to the curriculum, but if you offer your ideas early in the process, it may turn out to be a useful addition and add a fresh perspective when the class needs a break.

Skills

In addition to learning to stay connected with yourself, your client, and the class, Unit II requires you to:

- Discuss your client's structure and patterns with the class, and share your strategy, while maintaining language and connection that support the client.
- Respond to questions from the class as well as the client, as they come up.
- Understand the traditional Ten Series and create demo sessions that are effective, relevant, and concise.

One skill that can be challenging for new assistants is remembering to talk to the class while you work with your model. This gets easier with practice, but is often a skill that has to be developed.

Another thing new assistants worry about is making their demos appear smooth and polished. I got some great advice from Certified Advanced Rolfer® Larry Koliha, a Skillful Touch instructor. Larry told me, "Don't be afraid to change your mind or direction in front of the class. It lets them see what Rolfing is really like." He related a story from his first assisting experience: "In the middle of a demo, I went over and put some cream on my hands. I told the class, 'I'm doing this because I have no idea what I'm going to do next.' It's important that students see us stop and think. There is no grand plan that we stick to when clients aren't responding the way we think they should. You have the 'recipe', and you have your strategy, but sessions still go minute-by-minute. We talk to students about adaptability, now you need to show them what it looks like."

UNIT III - WANDA SILVA

I still remember my Unit III. It was a very intense training with eighteen students. Robert Schleip was the lead instructor, and Mario Finato from Italy was our teaching assistant. I still remember all that I learned from them, and I witness it in my work with my clients and in my life.

At the end of the training, Mario said something that has stuck with me: "Love your job. Don't be afraid. Keep the fire of your clients safe." I keep these words in my mind, in my heart, and in my office.

Ten years after learning from the very kind, present, and skillful assistant Mario, I found myself assisting a Unit III with sixteen students. I can now describe Unit III from the other side, being the assistant.

Assisting the Class

I realized how important it is to review the classical Ten Series in order to talk about it, to think about it, and remember the reasons for doing it. After many years of practice, attending all kind of workshops, and experiencing work from a wide range of practitioners, we end up including others' knowledge, magical moves, and so on in our work, which is why it's so good to review the basics and have to explain how powerful Dr. Rolf's Ten Series is. In Unit III, we are once again able to observe classroom clients and refresh our ability to see structural changes. We pay attention to things that we might miss in our practices, because we get rushed or a bit lazy. When you have to explain to beginners, you must return to beginner's mind—and eyes—and remember how Rolfers see, and what we look for.

When we teach, the effects of our actions are very different than as a student. We need to think and say exactly what we know and what we have experienced, because we need to able explain how and why. The words we choose need to be intentional for the purpose of teaching, rather than performing. In this position, we also learn so much.

Assisting requires you to spend hours reviewing and preparing yourself for the lectures and demos. The best surprise is that we know things we didn't realize we knew. The work we have been doing for years becomes obvious in our understanding and our ability to communicate that understanding. As an assistant, we increase our comprehension of the Ten Series. We remember each step and its beginnings and the reasons behind them. Like Peter Melchior said, "The ten-session series is the base on which you build all the later work, whatever you are going to do."

When I came back to my office, I felt the value of teaching show up in my practice. I felt renewed and excited. I found myself observing this great process with fresh eyes and a deeper understanding. Also, taking two months off from your regular practice is a good break for your body.

Family & Practice

As for families, two months away assisting is a long time. Upon my return, I could certainly tell that my teenager had felt my absence. But clients are another story. Although they will miss you, when they hear you are leaving to be a teaching assistant, most clients view it positively. It boosts your credibility. Many clients realize that you will return with more skills, so even the extended absence from your practice is not really a negative aspect.

CONCLUSION

Like anything worth doing, you make sacrifices when you assist. Planning can ease some of the challenges. If you're leaving clients for two months, it helps to

give them appropriate notice and work with them to try to leave them at the best place possible in their process. You may want to provide contact information for other area Rolfers, or match certain Rolfers with clients if you think they'd be a good fit. Clients appreciate this extra effort, are less likely to feel abandoned, and usually come back when you return. Again, most clients are impressed that you're going to be working at the Rolf Institute® of Structural Integration.

Although some assistants report a lull in their practices right after they come back from an extended leave, this is not inevitable. It may depend on how busy your practice is in general. If things are a little slow, an extended absence may cause you to lose momentum. But if your practice is busy, you may very well be able to schedule ahead, and return to business as usual when you get back.

Assistant pay, per diem, and travel reimbursement have increased significantly from years past. The Institute has done a good job with this. This said, if you have a full practice, you'll probably take a pay cut for a couple of months if you decide to assist. But you are getting paid to learn, you are getting to work with amazing Rolfing practitioners, you're getting to proliferate the work, and you are getting to give back to the community. Not surprisingly, we're all deeply grateful for the opportunity and eager to assist again.

On The Need of a Coherent Psychological Perspective for Rolfing®

By Nicholas French, Ph.D., Certified Advanced Rolfer

The half-known hinders knowing. Since all of our knowing is only half, our knowing always hinders our knowing.

– Goethe

For some time I've had the nagging sense that something is missing from the framework of Structural Integration. *Something important*. What's missing is a coherent psychological perspective. If one were recognized, defined and added to the context of our work, it would extend our understanding of the work; help us work more effectively and easily; elicit deeper and even longer lasting changes in clients (including us); and thus make the work even more appealing.

Making a psychological perspective explicit would not append something novel to Rolfing®. To the contrary, it would reaffirm an early component of our work that often has been de-emphasized or even ignored. With clients who have painful, anxiety-provoking symptoms, the primary focus of our work is the physical, and we have learned how complex a web that is. It should be apparent that our species has developed an equally complex web of emotional stimuli for successfully relating to the environment; and that recognizing and addressing it will improve clinical outcomes.

This is not about turning Rolfers into psychotherapists. However much Rolfing and psychotherapy might seem related, they are very different disciplines, each requiring its own specialized training. What's more, they involve very different contracts with the client. And not every Rolfer® is keenly interested in psychology, in any event. Although I want to identify what I see as a significant deficiency, I propose no specific remedy; my goal is simply to present the question.

A BIT OF BACKGROUND

While Ida Rolf and the first teachers she trained did address the phenomenon that structural work elicits emotional responses[1], the treatment of the subject lacked consistency. Any precious class time spent on emotional response was idiosyncratic, guided by the teacher's experience or preference. It ranged from gestalt work to metaphysics to astrology to pearls of wisdom from Werner Erhard's EST training. The basic theme was to respect the clients' need to "vent"; to give them "space"; and to trust that as the physical structure and autonomics achieved finer balance, similar equilibrium would appear on the emotional level. Some teachers—uninterested in psychology or unwilling to divert time from other topics—simply let practitioners fend for themselves. Overall, support for students learning how to deal with their clients' psychological process was erratic, and the basic advice offered usually left students wanting more.

The confusion—or at least ambivalence—has persisted institutionally. Until very recently, this was one of the FAQs that appeared on the Rolf Institute's web site:

Q: What about the emotional and psychological effects of Rolfing?

A: It is impossible to touch the physical body without touching the emotional body. … The nature and quality of accessing and resolution of emotionally charged material may be the most profound portion of a client's Rolfing experience. [2]

Juxtapose this acknowledgement of the importance of the psychological effects with the answer's final sentences: "*However, the client should not enter the Rolfing process [anticipating] such a major release but should remember that a Rolfer's actual expertise is integrating and balancing connective tissue. The emotional component, as attractive or dreaded as it may be, remains an ancillary aspect of the Rolfing process and not its primary intention.*"

While Rolfing is not psychotherapy, the presence of this FAQ and the suggestion that the psychological aspect is either "attractive or dreaded" indicates both the importance clients place on their emotional experience, and the ambivalence in our training. From this declaration of the importance of the psychological aspect of Rolfing, a potential client might assume that our training addresses it in some detail. Unfortunately, that perfectly reasonable assumption would be wrong.

The ambivalence and confusion might be part of the legacy of our founder. In her book (Ch. 17: "Many People Refer to This Drama as Pain"), Dr. Rolf says within the space of a few pages:

> A negative emotional shock can be severe enough to knock out normal physiological functioning, causing loss of consciousness or even death. [3] … The apparent mechanism of response to psychic shock is often myofascial. [4] … We emphasize...that behavior is usually chemistry, is usually physiology. [5]

Though she asserts that behavior is influenced by chemistry, the reader could be forgiven for a certain bewilderment. There's an old anecdote about Dr. Rolf once snapping, "There's no such thing as psychology; it's all perverted physiology!" But another of her former students has reminded me that at other times, she said the exact opposite.

Nonetheless, psychology, in its most level-headed form, is intrinsic to the work as Ida Rolf developed it. She once noted, "If you really want to understand this process, then every time you work with someone, keep asking yourself, 'How did this person get to be this way?'" This advice compels us to consider how any physical injury, stress pattern or compensation is unavoidably bound up with its emotional reflections, as the physical and emotional are always an aggregate and never discrete elements. We are constantly faced with the living evidence of that fact, and anyone who has hit upon a way to support a client's resolution of emotional pain knows how powerful it is in evoking deeper physical change. Doesn't that demand that we pay more attention to the psyche?

WHAT A COHERENT PSYCHOLOGICAL PERSPECTIVE OFFERS

If we can formulate a well-balanced psychological viewpoint and reduce the confusion, it will heighten the reputation of our work. And, beyond providing support for us and our clients and enhancing the efficacy of the work, a pragmatic psychological context could even be *interesting*. I emphasize this because psychology can be deadly dull when presented with an imperious, patronizing tone, as though studying it leaves one somehow more enlightened. (Don't forget that psychology can be used for self-defense and aggression as well as for healing.) Any grounded and coherent psychology simply helps us wake up to life. I admit to a lifelong fascination with the psyche; and surely I'm not alone going through life wondering, "What the hell is going on here?" and "Who am I, and who are they—*really*?"

What first got my attention about Rolfing was Dr. Rolf's clarity and eloquence regarding the interrelationship of mind and body. I was a psychotherapist restless to find a method that was truly effective. Although I'd heard glowing reports of Rolfing having produced all kinds of improvements in physical and emotional well-being, I remained skeptical. But when I heard Dr. Rolf quoted as having said: "The body is the personality exploded into three dimensions"—and even more arresting, "No psychotherapy, no matter how good, will be as deep, as effective nor as lasting unless there is also deep, concomitant physical change"—Rolfing had my attention. I well knew how the travails of childhood endure in the flesh as well as in the emotions, and that they have enormous power to distort our lives and health—so my gut said she was absolutely correct. In 1972, I found the only Rolfer in the Boston area and made an appointment, even if only to prove that this "miraculous" new stuff was nonsense. But after my first hour, everything was *very* different. I was hooked. I had to meet this Dr. Rolf to find out what else she knew.

Ida Rolf was one of the most impressive people I've ever known. Intellectually gifted, educated as a scientist, and a keen observer of *Homo sapiens*, she also heeded her intuition. At first, that seemed odd, as intuition can't be pinned down or measured, and certainly can't be replicated. Perhaps it was, in part, the influence of Einstein, who once wrote, "Intuition is a sacred gift; the rational mind its faithful servant. We have, however, created a society in which we honor the servant and have forgotten the gift."[6] I was intrigued that when she lectured on "levels of knowing," she drew a sharp contrast between the cause-and-effect models of Descartes and Newton, and the relativity of Einstein. The former, she said, could help us learn how to take bodies apart, but unless we appreciated the relational aspects of the latter, we'd never be able to put those bodies back together at a higher level of organization. Trained as a scientist, she nevertheless recognized that rational, linear thinking, by itself, was not the whole picture her students needed to consider.

I'd like to emphasize that point strongly, because I see it as directly relevant to the potential for the development of our work, or to its possible deterioration. To grow up and be schooled in traditional Western thought is to be deeply affected by its rational, linear tradition. There's a perfectly valid reason for that: it's logical and quite effective. Rationalism is the foundation of our sciences and our philosophies; refined to a dazzling extent, it has produced previously unimaginable achievements in science and technology. No wonder it shapes so powerfully how we approach the world of phenomena.

Yet as Dr. Rolf pointed out, it doesn't cover the ground completely. As Jung wrote in 1955: "Grasping of the whole is obviously the aim of science...but it is a goal that necessarily lies very far off because science, whenever possible, proceeds experimentally and in all cases statistically. Experiment, however, consists in asking a definite question that excludes as far as possible anything disturbing and irrelevant. It makes conditions, imposes them on Nature, and in this way forces her to give an answer to a question devised by man. She is prevented from answering out of the fullness of her possibilities since these possibilities are restricted as far as possible...The workings of Nature in her unrestricted wholeness are completely excluded. If we want to know what these workings are, we need a method of inquiry which imposes the fewest possible conditions, or if possible no conditions at all, and then leaves Nature to answer out of her fullness."[7]

As I understood her, Dr. Rolf had no desire to abandon the scientific tradition, but rather hoped to wake us up to the ways we were unquestioning of—one might say, seduced by the power of—rational, linear thinking; and to get us to see where it might be incomplete. Just as the earliest anatomists lost the full awareness of relatedness in the body by discarding the fascia in their eagerness to catalogue the more identifiable parts, linear thinking tends to facilitate the illusion that an object can exist in isolation. It also tends to neglect elements and processes that are not as easily defined because they exist in or as complex relationships. Thanks to Dr. Rolf's grasp of the total human organism, we have learned that while these features might be absent from the linear model, they are essential to comprehending the whole.

The rationalistic paradigm has conditioned our thinking so thoroughly that most of us tend to be asleep to its limitations unless we work constantly to remind ourselves to wake up to what's missing. As a passionate physicist friend once wrote, "We'd better understand how science is imprinted in us, because it affects us. Those who insisted that rationality is more important than experience had the unfortunate effect of removing us farther from nature, just as the use of linear, phonetic language restructured our ability to perceive nature. Causality is a convenience, but it's like a snapshot, it stops time. The irrational [that which is beyond reason] is the ground of emergent phenomena, while logic tends to choke it off. We try to isolate parts of the natural harmony and resonance of the universe and figure them out logically, and all the while, our intuition keeps pointing to the harmonies of nature. People like things clean and orderly, like smooth, unbroken pavement—*but life always lurks in the cracks*."[8]

The logical paradigm keeps popping up, for example, as a quasi-medical, or fix-it aspect in Rolfing. It is too easy to be seduced by symptoms, especially when clients are focused on them. Also, it's seductive to be treated like a doctor with magical powers. Eventually though, tired of chasing symptoms, we do well to remember two of Ida Rolf's warnings: "If you work on their symptoms, they will get worse. You must work with the roots of the symptoms," and, "If you're interested in pathology, leave here and go to medical school, that's what they're interested in. What I'm aiming for is a higher potential for human existence." She was always quick to point out the larger perspective. More than once in class, knowing that the sciences were hypnotizing us, she would remind us, "What we're doing here is, we're trying to learn to *see*."

Again, please understand—I'm not discounting the rational, scientific aspect of our work. I simply think the momentum of that paradigm tends to overshadow our awareness of and respect for those aspects that have fewer straight lines, and may therefore seem less real. Rationality can give one a sense of certainty, which is always pleasing to the ego. Non-linear thinking is not black or white; it encourages uncertainty, and that's an acquired taste. Ambiguities can be uncomfortable; but they've plagued humankind for millennia, and show no signs of disappearing.

Toward the end of her life, when asked for the billionth time how Rolfing® works, Ida Rolf replied, "I don't really know how it works. I just know that if you do it the way I taught you, it works." How many of us have suddenly been completely uncertain about whether what we just did with our hands elicited that lovely change—or whether it was an emotional response? What if the change happened in relation to a mixture of our moves, the emotions, the music that was playing and the shifting light through the windows?

Potential for positive change is enhanced when we are open to such "illogical" ideas. Beginning with my very first client, whose quite dramatic improvements defied all textbook medical possibilities, I realized I'd learn more if I relaxed my white-knuckled grip on reasonableness. I think it has worked. I know it's been fascinating—and much more fun.

HOW DOES ALL THIS MATTER?

First, by challenging any assumption that I always know exactly what I'm doing, there's a better chance I'll see something new. Seeing amazing yet inexplicable changes through Rolfing forced me to seek other interpretations. My exploration of psychosomatic theories led me to the writings of C.G. Jung, the brilliant founder of Analytical Psychology. Awed by the depth of Jung's work, I eventually applied and was accepted for training as a psychoanalyst. My work in Rolfing prepared me to appreciate certain parallels in Jung's work. For example, while Dr. Rolf spoke of Rolfers serving not as therapists but as catalysts within the greater ordering field of gravity, Jung spoke of serving the organizing tendency of the ineffable Self[9], the objective psyche. Both characterized the therapeutic process as the application of diligent attention, sensitivity and compassion to help the client release long-frozen stuck places, thereby allowing a greater wholeness to emerge naturally and spontaneously. We all know that to be witness to the sudden expression of that healing moment—in any mode of treatment—is to be awed and deeply moved.

Working in both disciplines has, however, left me even less hopeful of identifying any boundary between psyche and soma. That the person has been semantically cleaved into two elements might seem to simplify and clarify the study of the human being, but it also creates a dilemma: how can the two be reunited? The "psychosomatic" concept has not resolved the dilemma; the term does no more than pay lip service to a cause-and-effect relationship still poorly understood. There remain two supposedly distinct quantities, and further effort to analyze them only exacerbates the dilemma. As Jung said in 1935: "Body and mind are the two aspects of the living being, and that is all we know. Therefore I prefer to say that the two things happen together in a miraculous way, and we had better leave it at that, because we cannot think of them together."[10] Compare Rolf: "...In spite of sophisticated measuring devices, we do not know at what point in the chain of events the physiological process of nerve transmission becomes 'psychical'," [11] and, "...Any evaluation of a human as a whole requires an understanding of psychophysical response, the rich sensational fabric through which a man perceives his world and the interrelation of psyche and soma."[12] Jung worked the rest of his life to define how the two happen together, and many others have joined in the endeavor, including Dr. Rolf. It's even possible that in following this work, each of us is walking the same path.

Over the years, I have come to believe that however well we apply the principles Dr. Rolf pioneered, it is ultimately the client's trust and acceptance that permits the client to open at a very deep level and allow real physical change to happen. If that is true, our efficacy is in large part dependent upon the quality of the Rolfer-client relationship; and any way we can enhance our understanding of that relationship is critical. Here is where psychology is valuable.

ONE PSYCHOLOGICAL PERSPECTIVE

First, I must acknowledge my bias. There are many models of psychotherapy, most of them dealing with thoughts, memories and feelings that are consciously available to the client. My own interest and training, however, have concentrated on psychoanalysis, also called depth psychology. This discipline works with the unconscious, which by definition cannot be known directly, but details of which can be inferred from dreams, fantasies, artwork and patterns revealed by active complexes. Learning to discern such information is a challenge not unlike the first step in Rolfing training—learning to see not by staring[13], but by allowing information to come to us. It is a bit mysterious, which for me is part of its fascination. Just as quantum physics has provided theoretical validity to some metaphysical ideas[14], Jung's extensive investigations of the unconscious have established firmer footing for some previously dismissed ideas of interpersonal communication, such as telepathy and telekinesis.

Working in two practices, I view both protocols as informing and supporting each other. That is, my Rolfing experience helps me to absorb a wider spectrum of information in analysis; and my analytic experience helps me to see and sense more in Rolfing by providing additional theoretical models and broader perspectives.

This touches on a subject I find endlessly fascinating. Years ago, I had the pleasure of interviewing renowned linguist Noam Chomsky. When I spoke of the limits of a linear form of language and the difficulty of finding words to describe my experience of the world, he gently corrected me, "Actually, it works the other way 'round. Once we've been taught a language, it's the language itself which determines our experience of the world."

Consider the phenomenon of learning a new word or concept, which then seems to appear at every turn. Of course, the word or concept was around all the time, but somehow had not been seen. When English explorer Captain Cook and his crew came ashore on a particular South Pacific island, the inhabitants greeted them with awe. In fact, though they recognized the existence of the landing party and its rowboat because these things were similar to their own bodies and canoes, the inhabitants were, as psychologist Rollo May observes, "…unable to see Captain Cook's ship when it sailed into their harbor because they had no word, no symbol for such a ship. Because of the way in which our unconsciously held beliefs influence our perceptions, it

is less accurate to say 'I believe it when I see it' than to observe that 'I'll see it when I believe it.'" [15]

Several concepts from Jungian work show how a psychological perspective is useful to Structural Integration:

The Container

This begins with a pleasant, quiet room in which to meet with clients. It also includes respect, confidentiality and the highest caliber work we can possibly offer. But of paramount importance is the Rolfer's® state of mind, which enables the establishment of a relationship adequate to hold all the diverse demands and experiences of a ten-session series so often described as "life-changing".

Jung used the image of the alchemist's retort, or vas, as a metaphor for the therapeutic container. As scientific as early alchemy was intended to be, many alchemists were really seeking spiritual attainment. The story about turning lead into gold garnered financial support, but was primarily a cover to avoid condemnation for heresy, which would have been fatal. Selecting alchemy as an analogy emphasizes the importance of consciously relinquishing one's ego in service of a higher purpose. As esoterically as the work was described in old texts, it was always agreed that a successful outcome demanded that the practitioner recognize his or her limitations of knowledge and control, always remembering that *something greater* was the determining factor, and that to lose sight of that proportion was to risk real danger.

For Jung, that something greater was the overall organizing archetype of the Self. Ida Rolf made the same point: "Remember, you are not the therapist, you are a catalyst. Gravity is the therapist. " I believe Dr. Rolf knew that in helping our clients so effectively, we would often be treated as great and wonderful healers, and would thereby be at risk of falling into hubris, the exaggerated self pride or self-confidence they saw as challenging the gods, often resulting in deadly retribution. While total surrender of the ego might appear to be an impossible goal, actively reminding ourselves of that ideal does help us to perceive the value of others, to encourage compassion, and to discourage abuses.

The more the work is placed above satisfying personal desires, the more the container is strengthened. Rolfers are much less likely to justify selling a client some really cool product for personal profit, or talking themselves into believing that in the presence of true love, having sex with the client would be just fine. When such boundary violations are shunned not for fear of getting nailed for ethics violations, but instead because they would cause the client pain and confusion and damage the entire fabric of the relationship, that choice for higher ideals is also, in some way, communicated to the client. Obviously, this touches on my assertion that the way the Rolfer® values and holds the total field of the work—theoretical, physical and emotional—determines the quality, depth and lasting effectiveness the client will experience.

Intrinsically linked with the idea of the secure container are the significance and the importance of how emotions, as well as verbal and manipulative information, are transacted in the therapeutic encounter. I don't think it's possible to overstate the sensitivity of communication—both conscious and subliminal—between Rolfer and client.

Transference and Counter-transference

Generally understood as a form of communication that occurs below the threshold of consciousness in any exchange of words and gestures, these terms come from the early days of psychoanalysis, and refer to unconscious dynamics in the therapeutic relationship. Both transference and counter-transference are considered normal and necessary aspects of psychoanalysis.

Transference is a form of *projection*, the mechanism by which qualities or feelings one cannot tolerate or accept as being part of one's personality are projected onto someone else without knowing it, and then are seen as actually belonging to that other. What's so tricky about projection is that we don't know that we're doing it because it is, by definition, unconscious and involuntary. Since it is unwitting and spontaneous, projection explains how we can suddenly feel strong negative emotions toward—or fall in love with—a stranger. For example, in negative projection, one might feel:

—How dare that stupid, selfish driver cut in front of me when *I'm* the one who's in a hurry and my appointment must be more important!

—With all humility, I know that my belief is strong, my heart is pure, and my God tells me I must crush my enemy, the Great Satan.

By the same mechanism, positive projection might show up as:

—It's true, we met only two months ago at that Valentine's Day concert, but you are what I've dreamed of, are so special (perhaps like mother, father or ex-spouse).

—There's just no doubt about it, Elvis (or Dale Earnhart or JFK, etc.) was the greatest ever, and that's why he is my hero and I've decorated my house like this (being unwilling to risk going all out for *my* dreams).

Even over-simplified, such samples indicate projection's constant presence in the fabric of human relationships.

In the therapeutic relationship, transference refers to material the client projects onto the practitioner, and is generally considered not only normal, but also essential in forming a bond strong enough to withstand the challenges the work involves. (This assumes a strong, safe container.) Counter-transference refers to material the practitioner projects onto the client. This, too, is normal, and occurs in two common forms. In its positive aspect, it contributes to the therapeutic bond; and, by offering material detectable in the practitioner's own feelings (emotionally or physically) that can be brought to consciousness, makes a potent contribution to the healing process. The negative aspect opens the door to abuse of power (typically in manipulating the client's dependency rather than autonomy, or in acting out sexually) and can damage or destroy the container and with it, any beneficial therapeutic outcome.

I have heard that a Boston University study during the 1970s or 80s[16] estimated that in the first ninety seconds of any two people meeting, an average of approximately 7,500 bits of information are exchanged—most of them non-verbal. Whether the number is accurate or not, the point is that whenever two people are together, there's a hell of a lot more going on at the unconscious level than the conscious level. This presents both a challenge and an opportunity for the analyst (and, I submit, for the Rolfer). Tuning in to that communication takes practice and is at least a little mysterious—like learning to see in our work—but with practice, it can be reliable and just as important.

At the first meeting between client and Rolfer®, both are deluged with information, only a fraction of which is registered con-

sciously. This is not a simple meeting, either; both parties have a more charged focus than if they were meeting at, say, the water cooler. The client has heard that 1) most of her clothes must come off, 2) it's going to hurt and 3) she is going to change; all of this normally induces anxiety. The Rolfer® wants to ease that anxiety and deliver the quality of transformation that caused him to undertake a challenging training in a little-known art. Throw into the mix, whether it registers consciously or not, that something about the Rolfer reminds the client of someone she once loved, or feared or hated —or all three—and the Rolfer has his own ghostly, unconscious impressions, too. The person who knows this is happening and has developed some ability to tune into it is going to have an easier time sorting out the jumble of impressions and meeting the client where the client actually is. Then the ground can be cleared for building a strong container, a space in which the client feels safe, respected and nurtured. This is where the best possible outcome of the series is made possible—or impossible.

Projective Identification

This phenomenon is even more challenging. Have you ever, at some point in a session, had the uncanny sense that though no words were being spoken, a powerful, but faint or subliminal dialogue was going on? This usually feels so insubstantial one is tempted to shrug it off as a flight of imagination.

I have in mind the day I was working with a client in the early sessions of a standard series. Living with generalized pain, she'd been diagnosed with Chronic Fatigue Syndrome; and while she was very quiet as we worked, she seemed tight and "prickly." When, out of simple curiosity, I shifted my focus from her physical structure to what might be happening in her emotional process, I began to feel anger. Surprised, because up to that moment I had been in a very good mood and had no apparent reason to be angry, I let my eyes relax and concentrated on what I was feeling. With that, the emotion rapidly intensified—and with a shock, I realized that I felt as though I wanted to hurt the woman. I looked up and noticed that she was staring intently at the ceiling. Since I had no conscious thought or desire to hurt the client, the sadistic impulse felt quite alien, like an intrusion—and the mechanism of *projective identification* popped into my mind.

Also called *participation mystique* (from anthropologist Lévy-Brühl), this phenomenon refers to an emotional defense in which a part of the client's own personality is projected onto another person—in this case, the Rolfer (me)—and the Rolfer is then experienced by the client as containing that projected quality. (If alert, one may notice and identify the projected content by its emotional character. This a *good thing*, and can be quite helpful.) In this way, the client identifies with the Rolfer, and actually attains some influence over the Rolfer. The uncanny part is that the Rolfer who is the object of the projection can be dramatically affected both physically and emotionally by that silent, non-physical means. What makes it even more remarkable is that all this is transacted *sub rosa*, silently and below the surface, where very likely neither participant is aware of what's happening. Evidently, the notion of someone's "bad vibes" having a real impact isn't so outlandish after all.

In the case described, I would speculate that this client experienced in a particular way the need to ease her deep anxiety about being in a passive role in her underwear, with a large man putting his hands on her. In such cases, complexes from our history are triggered even by subtle similarities. It's possible, for example, that she was physically abused as a child by an angry, punitive male, and associated her survival with being a quiet, passive victim. It's then possible to see how such a scenario fits with what I experienced: to fit me into her defensive re-enactment of surviving a previous trauma, she had to cast me as angry and abusive, literally wanting to cause her pain—and I, blissfully unaware, suddenly found those feelings in me. Imagine, if you will, what might have followed in her series (if actually completed) and her life if I had reacted reflexively from one of my own angry complexes by doing something that caused her even a little pain. Fortunately, I both noticed the phenomenon *and had a concept to link with it*, and the echoes of her old trauma were eased rather than increased.

Again, Jung: "…It frequently happens that the [Rolfer] offers a hook to the projection, and even lures it out. This is generally the case when the [Rolfer] himself is not conscious of the quality in question: in that way it works directly upon the unconscious of the [client]. *For all projections provoke counter-projections* when the object [Rolfer] is unconscious of the quality projected upon it by the subject [client], in the same way that a transference is answered by a counter-transference from the [Rolfer] when it [the transference] projects a content of which he is unconscious but which nevertheless exists in him...Like the transference, the counter-transference is compulsive, a forcible tie, because it creates a 'mystical' or unconscious identity with the [client]...Thus the transference and counter-transference, if their contents remain unconscious, create abnormal and untenable relationships which aim at their own destruction."[17]

Let me apply Jung's words to the case at hand. Because I, too, have a history that involved pain, rage and feeling victimized by bigger people (are there any among us who haven't?), there was in me an unconscious "hook" to both evoke and catch her projection. Here you can imagine the iron peg in a horse shoe game catching the shoe with a resounding "Clang!" Activated by her projection, my unresolved anger sought a target to complete the equation, someone on whom I could take revenge—and there she was! It was a horribly perfect fit, *and all of this happened in utter silence*. This forcible, mystical and unconscious tie can have immense power. A colleague once called me for emotional support regarding his shame and depression following a sexual encounter during a Rolfing® session. What was particularly striking, and at first hard to believe, was his description of having been "taken over by passion—like a possession—and really not realizing what I'd done until it was all over." Now I can appreciate his description from another angle.

The point is, my own awareness of the projective identification phenomenon gave me a wider range of options. Instead of just suppressing the angry feeling and forging ahead—or, worse yet, responding unconsciously to her projection by actually hurting her—I could use my knowledge to support her process. I chose to respond by trying to start a subliminal dialogue; I formed (and "beamed" at her) the thought that I did not want to hurt her. Over several sessions, she was able to relax into the work and soften, allowing old memories and emotions to surface. Eventually, she allowed a recollection of early sexual abuse. Though I was drawing upon my analytic training, *I was working entirely within the Rolfing protocol*. I was not, for example, asking about dreams or history. However, my analytic training had instilled a keen sense of the value of a secure container,

and offered me more ways of detecting and responding to her pain within it.

The hands-on nature of Rolfing has shown me just how powerful it is to both give and receive simple touch. Dr. Rolf used the image of touch being a two-way conversation: "Even seeing is touching at a distance." One dramatic example of that connection—and vulnerability—was borne out by recently reported research showing that human touch elicits a biochemical response very like that in infants when they are nursing.[18] Because touch is so potent and generates such powerful transference and counter-transference, it must never be taken lightly. We must acknowledge that our work involves real intimacy and deal with it openly.

I believe that emphasizing fix-it work in Structural Integration is a tragic leap backward from Dr. Rolf's gift to us, as though we should retreat from the edge of holism, challenging as it is, and regress to the simple cause-and-effect mechanics found in almost every other treatment model. With that regression, we unwittingly but emphatically accentuate the separation between Rolfer® and client. Perhaps that's why some prefer the fix-it approach. But we do not have to give up healthy boundaries to allow a sense of being part of a shared field with the client, thereby accessing more effective ways of communicating. Of course, venturing into the realm of the unconscious without recognizing its depth and having some guidance in navigating in it does have real dangers. All of this testifies to the advantage of having a psychological frame of reference.

Once again, I am not suggesting that Rolfers should be recalled to some sort of psychology boot camp, nor am I proposing assembling a catalogue or clipboard checklist of psycho-techniques. I propose that first we find a way to organize the body of psychological information that already exists in the assets of the Rolf Institute® of Structural Integration—its members—and then use what we've discovered to guide us in refining its relevance to the work we know already contains it, but often expresses it in primitive, untested or disorganized ways. I contend that this would strengthen our work, not complicate it. By using psychology to inform our current capabilities, we will enhance our ability to recognize and respond to the needs of the moment. The benefits of this approach would flow not from specific ideas, but from fostering a porous state of mind that lets us find ways to address the endlessly changing metaphors of the human psyche. If that sounds a little imprecise, well—you've got it right.

Think back to how difficult it was to see what your teacher saw—and how exciting it was when you realized you were beginning to do so! Or to when you began to see how different textbook anatomy was from living, changing, human anatomy. Then consider how studying new methods not only enhanced your abilities, but also opened your eyes to challenging and exciting new worlds. My point? The psyche is an equally essential aspect of our work—and just as exciting.

I must confess that this has been one of the hardest articles I've ever written. I kept thinking that each of you has already experienced the phenomenon of the psychological field in your work and has your own sense of how it works. What kept me coming back to the keyboard was remembering how some specific additional training opened new seeing for me that deeply changed my work, and the hope that I could share that potential.

1 It's fairly well known that Dr. Rolf envisioned the development of three Rolfing® schools for research and training: one scientific, one psychological and one metaphysical.

2 Italics are mine.

3 Rolf, I.P., *Rolfing: The Integration of Human Structures*, p. 277.

4 *Ibid*, p. 277.

5 *Ibid*, p. 280.

6 Compare: "Healing is the intuitive art of wooing nature." –Ida P. Rolf.

7 Jung, C.G., *Synchronicity: An Acausal Connecting Principle*, C.W.8, par. 864.

8 Lumley, E., Unpublished papers.

9 For the purposes of this paper, "self" refers to the personal, or individual entity; "Self" refers to Jung's archetype of the ordering principle of wholeness.

10 Jung, C.G., *The Tavistock Lectures*, C.W. 18, par. 70.

11 Rolf, *op.cit*, p. 282.

12 *Ibid*, p. 283.

13 As in Dr. Rolf's warning, "Stop staring—you'll go blind!"

14 One of Dr. Rolf's hunches: "They may discover some day that what some call metaphysics is what's occurring at the sub-atomic level."

15 Quoted in *The Alchemy of Healing: Psyche and Soma*, Whitmont, E. (1993). North Atlantic Books, p. 42.

16 To date, I have not been able to locate the study.

17 Jung, C.W. 8, *The Structure and Dynamics of the Psyche*, par. 519. The words "Rolfer" and "client" have been substituted for clarity in this discussion.

18 I regret that I have not yet found a citation for that statement, which was reported to me by my late wife Janie, who for years was a Rolfing Movement® faculty member. I sure wish I knew where she got it.

To Boldly Go…

By Raymond Bishop, Ph.D.
Certified Advanced Rolfer®, Rolf Movement Practitioner

Although hardly an ardent Trekkie, I have a favorite episode to which I frequently refer in my classes. Said episode, "The Empath," while not one of the more popular ones, had a profound effect on me, for reasons that were at the time painfully clear. This rather simple morality tale centered on a young mute woman who (along with the captain and his faithful senior offices) is held prisoner by an alien race. The alien captors seem bent on torturing the inveterate trio in an increasingly gruesome manner. What we soon learn is that the young mute is an empath--a sensitive able to transmute the suffering of others through touch. The purpose of the sadistic treatment of all concerned is to teach the young empath altruistic compassion by putting her in the presence of suffering and caring humans. Through this horrific experiment, the aliens hope to instill in her (and, by example, her empathic race) a willingness to overcome their fear of suffering so that they might willingly use their exceptional powers of healing for the greater good.

The scene that remains imprinted in my mind was the moment when the conflicted empath finally touched the badly injured "Bones" and his wounds disappeared from his body, briefly transferred to the empath and soon faded away, leaving the empath weak and spent. That such a graphic scene should still seem so poignant may speak more of some aberration in my masochistic psyche than the power of its imagery. What seemed disturbingly clear was that I, like so many highly sensitive individuals who ultimately found their way to bodywork, resonated with the heroine of this sentimental tale, in some odd way knowing that my reality was not dissimilar from hers. This issue would emerge many times in my life and, in various guises, would frequently show up in my practice.

Along similar lines, I recall a story shared in my first craniosacral class about a middle-aged nurse who had attended this class earlier that year. After the student completed the first exercise, she looked at the instructor with tears in her eyes and said: "Oh, I just can't do this. I feel everything." She promptly got up and left the room, never to return. The point was not to frighten us but to suggest that such gentle and passive work could open doors to places deep within our clients and that such experiences could be not only powerful but also emotionally overwhelming for any sensitive and unprotected practitioner.

Thoughts of such an experience filled me not at all with trepidation, but rather a sense of connection and profound recognition, even though I had hardly begun to learn the rudiments of my craft. What struck me as strange was not that the student left but that everyone in the room would not feel this way more times than not. Furthermore, dancing in this realm held a strange fascination for me, rather like my wild imaginings of whirling dervishes or yogis as they slipped into sublime states of altered consciousness.

Unfortunately, however, my initial experiences with this empathic realm were anything but ecstatic, but rather, exquisitely painful trance-like states that were frequently frightening, overwhelming, and debilitatingly painful.[1] These unpleasant impressions were clearly "not me," but rather some distorted transmogrification of my client's reality, often searing with pain and noxious olfactory assaults that initially overwhelmed me. Let me say before I proceed, that I do not in any way consider these experiences atypical, that their effects were transitory, and that I over time learned to process them much quicker than my melodramatic language might so far suggest.

The following two short examples will prove illustrative of my experience. During my first visceral manipulation class with Structural Integration instructor Liz Gaggini in 2000, she was explaining that the pancreas is not an organ but more accurately a gland and that glands are not very happy about being touched and become irritated quite quickly. I should also point out that this was a normal, healthy pancreas as far as Liz could determine. Within a few seconds of Liz making very light contact with the student's pancreas, I began to sweat. This sweating began almost immediately and continued uninterrupted throughout the entire palpation. I suspected that I was too close and began defensively backing up during the demo and soon found myself pressing into the mirrored wall about 20 feet away. In an effort to protect myself, I was reflexively jamming myself into the wall as if I could mitigate this unremitting assault. As soon as the palpation was over, the sweating and intense sensation of heat immediately stopped and, while I felt a bit weak for several minutes, I was able to ask questions coherently and try to explain my bizarre behavior to my fellow students many of whom I know to be exceptionally sensitive and intuitive practitioners.

The second incident happened last year. A friend flew me to his home in northwest Montana to do some sessions with a woman about 70 years old with spondylothesis (stress fractures in the vertebral arch that cause the vertebrae to slide forward and painfully impinge on the spinal cord and nerve roots). My first night there we went out to dinner and perhaps not entirely coincidentally met the woman and her family—who I suspect hoped we might be dining there. After meeting and touching her I received a wealth of emotional and nociceptive information that was unpleasant and hard to filter out. During the subsequent meal, the woman's pain was so palpable that I had great difficulty eating. At irregular intervals, I felt excruciating pains shooting up my back into my head. They were searing and rather like sustained electrical surges. They persisted throughout the meal and since the woman was sitting next to us, I had difficulty discreetly explaining to my friend what was wrong with me. He clearly could see that I was uncomfortable. When we left, I told him about my experience; fortunately, he was trusting enough not to dismiss my experience as nonsense. The next day, after he prodded me to do so, I told the client what I had felt and she reported that she frequently had the identical sensation and that it often incapacitated her for days at a time.

She did not seem upset or surprised by this discussion. Rather, it created an immediate

bond between us. Such a reaction is not always to be expected. In general, we must be very careful how we share this sort of information, as we will often be met with confused questioning or outright fear. The fear factor here is huge and should never be minimized. Injudicious or abrupt sharing of personal information you sense can prove very upsetting and in many instances will send the client running for cover. Just as a therapist must be extremely deliberate and careful in the pacing with which he introduces questions and difficult issues, so an intuitive may choose to withhold information that may not now be appropriate for the client to receive and internalize. In many cases, in fact, such sensitive information retrieved need not be shared.

Having such an awareness and using it to shape your words and techniques may incalculably deepen your clients' experience at a subconscious level. Also, you should never forget that such information might well put you in a tricky position of power—a position that you must always approach with humility and respect, as the possibilities for inadvertent abuse are rife. Too much information is a very dangerous thing and you must always put the client's needs and psychological abilities to hear and integrate ahead of any well-intentioned need to share information you assimilated through non-ordinary sensing and touching.

With all these caveats in mind and many others that an empath would certainly learn as he worked, it would seem that there are certain therapeutic arenas where such sensitivity might prove particularly useful. Once a highly sensitive individual learns how to moderate the input he receives, certain fields would naturally attract him. For instance, those modalities that are more passive and require monitoring and effecting subtle changes in the client's system or the fields that emanate from said individuals would be a natural "fit" for an empath. Unquestionably, many so wired do choose such specialties and develop loyal clients who appreciate and gratefully respond to their gifts. Such would seem a natural marriage of kindred spirits and fill an important need not met by Western allopathic practitioners. Medical intuitives, shamanic healers, Barbara Brennan practitioners, sound healing practitioners, energetic healers and those proficient in certain subtle osteopathic techniques would certainly feel at home in these and similar modalities, ones where their empathic gifts are more likely to be refined and developed. Of course, one need not be an empath to be an osteopath, but when engaging in certain subtle types of sensing, having access to the wealth of sensory impressions available to empaths would certainly enrich the experience and guide the therapist as he patiently waited for a healing force to manifest or for some subtle shift in the client's system.

This notion of the wealth of sensory data accessible to empaths leads us rather indirectly to a connection, however seemingly oblique, with a world I find fascinating--that inhabited by autistics. Much of what we know about their world is provided by a relatively small group of high-functioning autistics and those who suffer from the related condition called Asperger's syndrome. One such individual, Temple Grandin, has written three books on her life as an autistic and her fascinating work with animals. There have also been several books and novels written by and from the perspective of young autistics, such as the imaginative mystery novel, *The Curious Incident of the Dog in the Night-Time* by Mark Haddon. From such insightful sources, we develop a much clearer understanding of how a few members of this remarkable community process and experience their worlds. As to how the vast majority function and process, we can only speculate at this juncture.

One of the most common experiences described by autistics is their sensitivity to jarring stimuli whether it is loud noises, bright lights, or too much sensory input. They report having an aversion to large crowds; in self-protection they retreat internally and may engage in repetitive behaviors that calm themselves. They also have difficulty interpreting ambivalent meanings and social behaviors that we accept as normal. One reason for this seems to be an inability to generalize and a concomitant focus on details. They also seem to "see in pictures" rather than process their environment verbally as most of us do. [2]

What particularly struck me in the many books I have read on the subject were autistics' problems with sensory input, their visual processing of incoming data and their penchant for focusing on details. All of these features sounded profoundly and disturbingly familiar to me as I suspect they may to many others similarly wired. I go back to that nurse who said she felt too much during her first craniosacral palpation, the relatively direct CV-4, and left the room in emotional overwhelm, retreating from intense stimuli as we all instinctively do. Dealing with the sensory input that surrounds us is painful for sensitives and autistics in part because both groups have poor filtering skills. However, this sensitivity that distances for survival may also act as a bridge between individuals with kindred processing problems. This unconventional insight may have some implications for neophyte sensitives who might be drawn to autistics without quite understanding the attraction.

Potential advantages of empathic practitioners working with autistics became clear to me in my work with two young autistic boys last year. The more profoundly impaired of the two was a ten-year old with apparently minor brain damage who could not speak and had poor coordination and profound learning and processing difficulties. The first time he and his parents came to the office he was extremely agitated and acted out so badly—rocking, screaming, shaking—that his father had to remove him from the waiting area and hold and comfort him several times.

What gradually became clear was that he was reacting to a group seminar that was taking place in the back of the center where some rather intense emotional work was going on. These folks broke for lunch at one point during this protracted emotional outburst. As they paraded by, I suspect their emotionally raw state was "read" by my client who simply panicked because he could not filter out all this unresolved leaking distress. When I finally figured out this rather obvious fact (this was, after all, my first such case so be tolerant gentle reader) I explained my insight to his parents who were not entirely convinced. Yet it seemed I was correct; once the participants in the seminar left, he calmed down and we got some work done. Of course, some damage had already been done so this settling took some time but, generally, the session went quite well.

Several minutes into the session, I started observing a pattern of behavior that did not seem random and seemed to indicate some sort of communicative effort on the part of my young client. As I moved from area to area in a generally planned manner, I noticed certain responsive patterns in the boy. Some were subtly withdrawing and some seemed more clearly a moving into me, as if my client were guiding me in

choices of where to work and for how long. The child was never static and seemed to be constantly resisting, redirecting, or assisting me. At first, I suspected that I was looking for meaning where there was none; that my desire to "prove" that I was effecting change was coloring my perceptions, offering deceptive suggestions of implicit meaning and that in fact his actions were purely random and a function of either involuntary responses or chance coordinations between my work and his self-directed movement. And yet, there it was, over and over again.[3] I tentatively remarked on this seeming pattern to the child's parents who seemed totally mystified by my suggestions. Their skepticism seemed to throw a wet blanket on my insights, and yet I found it harder and harder to see these patterns as random. I sensed that the boy was broadcasting an ever-stronger signal on some unfamiliar yet resonant frequency.

The kicker came at the end of our short session, some 20-25 minutes in duration. He appeared restless and began making sounds that seemed disapproving or perhaps irritated--it was hard to tell. I quickly removed my hands and said: "So we are done for today, are we?" He did not respond directly but slowly began to sit up and soon got off the table. Then a most remarkable confirmation of my observations occurred. Instead of walking back to his parents, he slowly leaned over the table and pushed his butt out away from the table and stood there expectantly. I was totally floored by this action. In an instant I understood that he wanted me to work some more on his hamstrings and that he somehow knew that this would be a perfect way to both tense and present them to me so that I could easily and directly work along their taut bellies. When I expressed my surprise to his parents, they seemed so confused both by his actions and my interpretation of them that they just sat watching in stunned silence. This just had to be right. I did perhaps two minutes of moderately direct work on these chronically hypertoned hip extensors and when he had had enough, he simply stood up and watched me. "Done for today", I announced confidently.

I had one final surprise. He began to slowly walk towards me and seemed to want some more direct contact. I was again confused and asked his parents what they thought was his intention. His mother said that he wanted me to hold him and after getting his parent's permission, I allowed him to climb up onto my lap while I held him firmly until his curiously distressed dad abruptly picked him up and took him out of the room. Apparently, such behavior was extremely unusual for him, particularly with a new therapist. A deep connection had been made and he was expressing his gratitude. A very special moment for us both.

After the child left, I told his mother that I did not believe that he was retarded but in some ways incredibly intelligent and that his kinesthetic awareness and communication skills were exceptional—in fact, more highly developed than in any child with whom I had worked. Unfortunately, this proved too odd an observation for her to accept. It blatantly contradicted all her previous experiences, since all other therapists had not said any such thing in her several years of seeking treatment for this exceptional and, I suspect, gifted boy.

When she asked me why no one else who had worked with him had ever said or observed the things I had, my immediate answer was that perhaps they just didn't know how to listen to him. I believe that the unconventional nature of my work created much confusion in these loving parents, yet they continued the therapy for a few months. Also, I have no specific answer as to why other skilled and perhaps better-trained specialists failed to interpret or manifest the behaviors I watched unfold with wonder and joy. Such speculations might seem to reek of judgment and narcissistic self-aggrandizement. "The facts, ma'm, just the facts."

The sessions were special for me and my young charge who experienced genuine excitement at the prospect of our sessions and seemed to slowly blossom as a person. He soon became more happy and communicative in his special way and also experienced some interesting improvements in his walking and coordination. I suspect that my ability to connect to this child was largely a result of some deep connection between us and that the nature of this connection seemed to have more to do with problems of processing sensory input and communicating our discomfort to others than some special skill that my excellent training afforded me. Unlike the Star Trek heroine, I had no fear of feeling or suffering too much. Rather, accessing through my naturally distorted lens some fractured dimensions of this child's jumbled reality felt more like coming home than some alien "fantastic voyage." For those of us who live with the often-painful reality of processing the world empathically, the trade-offs are huge, particularly once we learn how to entrain with others without becoming a prisoner of their painful realities.

NOTES

1. An important question that I have never been able to answer is why traumatic experiences are easier to read and see than those of a gentle or positive nature. But such seems to be the case in my experience.

2. All this is beautifully explained in Temple Grandin's and Catherine Johnson's *Animals in Translation: Using the Mysteries of Autism to Decode Animal Behavior* (New York: Scribner, 2005) and in Grandin's earlier *Thinking in Pictures: And Other Reports from My Life with Autism* (New York: Vintage, 1995).

3. I have dealt with these issues of perceptual bias for seeing pattern in my recent article: "The Pattern Conundrum: or, What Is the Sound of One Hand Rolfing®?" *Structural Integration*, Vol. 32, No. 4 (Winter/December 2004): 20-24.

Physical Thoughts About Structure: The Elasticity of Fascia

By Adjo Zorn, Certified Advanced Rolfer

Aristotle wrote that a heavy object (e.g., a big stone) falls faster than a light one (e.g., a leaf). This would seem so obvious- any child would agree. (It seems almost as obvious as geocentrism—the fact that the sun circles the earth once every day.) The "obvious" was so obvious that it took about 2000 years until there was a man crazy enough to doubt the obvious and question whether Aristotle had it right. He did this by asking Nature herself, in her languages of pure mathematics and dirty experiment. He is said to have thrown heavy and light stones from the leaning tower of Pisa and rolled stones down inclined ramps... He eventually found out that what seemed "obvious" was wrong. Without friction, small, light stones roll and fall as fast as big, heavy stones. He also supported the radical notion of heliocentrism. By relegating questions about nature to the experimental method, deeming it the highest authority, Galileo established modern science and lost his freedom. Although this example could suggest that doubting the obvious can bring trouble, this article will nevertheless question a sacred cow in our world of structural bodywork: the supposed inelasticity of collagen.

When early generations of physiologists started to examine and classify various kinds of human connective tissue they found-among other stuff-some obviously elastic material, which they called *elastin*. But mainly they found an obviously tight material, which they called *collagen* (from the Greek *kôlla*, or glue; when cooked a long time, collagen becomes an amorphous glue). This distinction between the "elastic" and "nonelastic" material has been deemed-and still may seem to be-obvious. It is my view that it is as misleading as a glue-related expression for collagen, even though it is still found in the majority of books about physiology and Rolfing®. For example, I consider *Structural Bodywork* (Smith 2005) to be one of the most precise books about bodywork. Unfortunately, on the subject of the elasticity of fascia, we find the usual confusion: Collagen "has a tensile strength greater than steel; this means that its individual fibers are very inelastic. They...do not stretch" (p. 72).

To explain the "artificial" riddle of how elastic fascia can be made from inelastic collagen, rules of applied mechanics have to be contravened (denying the elastic fiber elongations in Figure 1). As a matter of fact, quite the opposite is true, with steel as well as with collagen: both wonderfully exhibit elasticity. So it is a pity that even many of the most scientific papers in well-established physiology journals make a distinction between "elastic" fibers and "collagenous" fibers. It is possible that this confusion could cause harm, because a wrong understanding of connective-tissue changes can lead to the wrong treatment.[1]

So, what is elasticity and why is elastin usually-and inadequately- regarded as being "more elastic" than collagen? According to the majority of physicists, elasticity is not a *quantity* but a *quality*, so it cannot be either "more" or "less". Under stress, a more or less solid body has three ways of reacting (i.e., qualities): it can break or it can plastically deform (in either of these cases it remains in its new shape), or it can behave in an elastic way (returning to its original shape). There can also be a combination of these three. Deformations can be very small and almost invisible. Plasticity, as a result of inner friction and rupture, swallows the applied energy like a car bumper. In contrast, elasticity is a behavior that stores and returns the whole amount of energy. Elasticity allows deformation but restores the original shape when the load/stress is taken away, as seen in a bouncing soccer ball.

If you were designing the body's fascia to move around in the earth's field of gravity, would you want it to fracture with each impact? To constantly yield without a return to its original shape? Of course not. It is probably okay if a little friction is produced-especially during a cold winter — but fascia should mostly behave in an elastic manner. That is why "God" or "evolution" invented collagen (more precisely, the collagen-glycosaminoglycan-complex), a material that is wonderfully elastic under tensile stress (Egan 1987, Sasaki 1996).

Fascia is often described as being "viscoelastic", meaning that there is some viscous liquid inside, producing resistance and friction. Viscoelasticity is a form of "plastoelasticity", meaning a mixture of plasticity and elasticity. The energy going into viscous friction produces heat and the force is dissipated-the stretched fascia will not return on its own to the point where the

Figure 1. At left, in a perfect spring an increase in applied force causes increased stretch. The curve demonstrates that double force produces double stretch (Hooke's law). The curve's steepness depends on stiffness: the stiffer the material, the less steep the curve.

In the middle chart, we see that as pressure is exerted on the initially slack spring, it elongates significantly under a minimum of force.

At right is a chart summarizing in principle many curves described by Yahia (1999), with my addition for elastin, which is not included in Yahia's work. The similarity to the middle chart's curve is clear. The loss due to viscosity makes the elongation of the fascia lag behind in stretching as well as in returning. The greater the circumscribed area, the greater the loss of energy.

stretching started. Muscles have to do the rest of the work. For example, under normal physiological conditions, an Achilles tendon returns approximately 93% of the applied stress energy and loses only 7% to mostly viscous friction (Ker 1999).

The big difference between collagen and elastin is *stiffness*. Stiffness is the value of how little an elastic material stretches under a certain load. It is a quantity that can be counted and compared and is equal to the slope of the stress-strain curve (see Figure 1). Collagen is much stiffer than elastin. A collagenous tendon usually stretches at maximum to about 110% of its original length before it breaks, whereas elastin can elongate approximately 230% (Ker 1999, Heine). We could say that under the same load, collagen loses much less of its form than elastin does. Or, to put it another way, collagen can take much more loading before stretching as much as elastin. Or, even more simply, elastin is softer than collagen. Under conditions of physiological usage, both stretch to very different elongations but take and return the same amount of energy (almost all of it).

The tensile *strength* of a material should not be mixed up with elasticity or stiffness. It is another quantity: the maximum amount of tensile stress that a material can be subjected to before fracture.

The low value for stiffness makes the elastic behavior of elastin much more obvious. With collagen, the high value for stiffness has important advantages. First, it protects the body's shape. The way it does this is like climbing ropes made of woven nylon, which are required by law to be quite stiff. (A jumping or running human structure should hold its contents as firmly as the packaging of a sensitive electronic device delivered by mail order.) As a falling body, you might think you'd prefer the smooth landing provided by a nice, soft, long-stretching bungee cord, but it is more likely that your body would reach the ground and smash before the bungee cord stopped its fall. (For bungee jumping to be fun, a long, free space to fall must be guaranteed.) Secondly, the high level of stiffness of collagen protects muscles from exhaustion: if they had to move bony levers through soft, long-stretching elastin tendons, they would have to move much further and do much more work. Thirdly, the stiffness of collagen makes movement faster, which protected us from becoming prey [moving bones via soft elastin tendons would make us very slow (McMahon 1990)].

Tensile stiffness is called "Young's modulus" and measured in gigapascal (GPa). Human tendons have a tensile stiffness a little less than solid nylon. The Young's modulus of a human tendon is 1.5 gigapascals (Alexander 2002), while that of nylon is 3-7 GPa (http://en.wikipedia.org/wiki/Young's_modulus). If we compare collagen with steel (ca. 200 GPa), we should compare elastin with rubber (0.01-0.1 GPa).

Which is more elastic, steel or rubber? It might seem obvious that steel is not elastic because there is not much visible elasticity. But somebody like crazy Galileo might experiment by throwing a steel ball and a rubber ball onto the ground and measuring the height to which they rebound. (If you try this yourself, the "ground" must be strong and elastic enough that it is not destroyed or plastically deformed by the steel ball. The best surface would be a steel plate.) Usually the steel ball will rebound to a greater height than the rubber ball. This is because elasticity is not about losing shape in an impressive manner but about returning energy. The greater deformation of the rubber ball as it hits the ground produces more internal friction and more energy is lost.

As far as I know, the friction in pure elastin structures has never been measured. It is very likely that it is higher than in pure collagen structures because the longer stretching of elastin requires more movement of the viscous liquid, thus producing more friction. Seeing it this way, elastin is much "less elastic" than collagen.

Why do fascia and tendons need to be elastic at all? First of all, together with bones they form shock absorbers to prevent or minimize injury. A fall directly onto your skull would give you the feeling of what happens without these shock absorbers. In contrast, landing on your feet puts many effective shock-absorbing devices (made out of collagenous fascia, tendons, ligaments, interosseous membranes, and retinaculi) between your skull and the ground. The same structures act like springs, making the movement of a running human body resemble an elastic ball bouncing up and down easily. This way, muscles don't need to lift the weight of the body with each step (see Zorn and Caspari in *Structural Integration*, March 2003). Other than running, it is not clear yet how elastic fascia facilitates human gait. The Fascia Research Project at the University of Ulm, including Certified Rolfers Dr. Robert Schleip and myself, is currently planning a research project on the function of human lumbodorsal fascia in walking (www.fasciaresearch.de). If you do the right "functural integration" bodywork, you might become an expert in *ballistic walking* (Mochon 1981). With adequate gait style, the Achilles spring is stretching before and recoiling during each toe-off phase by about 7 mm. (Fukunaga 2002). With such a gait pattern, some African women are able to carry the equivalent of 20% of their body weight without any muscular effort (Heglund 1995).

What is elastin for? Its low stiffness value is needed for structures that have to be able to change shape a lot, like the wall of the aorta (which has to stretch to accommodate the volume of blood from each heartbeat), the pulmonary alveoli (which have to provide the whole increased volume required with each inhalation), and the ligamentum nuchae (especially in quadrupeds that eat grass from the ground but at other times walk tall with a head of heavy antlers).

So why is elastin often found in collagen-dominant tissue? What can a rubber rope do alongside a steel rope? (i.e., Does it ever have the opportunity to work?) This is not clear yet. To me, the most convincing speculation is that elastin is kind of "the memory of the tissue" in cases of damage. If the collagen fibers are torn apart (while absorbing damaging energy like a car bumper), there is still the elastin, which has only elongated, to try to put everything back to where it belongs. It is important to note, however, that elastin lacks the strong resistance of collagen. If, for example, somebody has had a whiplash or a sprained ankle, he/she should move or be moved carefully and loading of the tissue be avoided until the elastin has pulled the tissue back to where it came from and the collagen is repaired right at the fresh tears. Enduring load prevents the elastin from pulling everything back (this can happen easily), then the new collagen bridges over long gaps and grows into a hypermobile and distorted structure.

What is still a big mystery for me is the purpose of the ligamenta flava. I cannot believe what I usually read. How can this soft sheet help to extend or stabilize the vertebral column when it is so close to the vertebrae's movement axis (Kapandji 1974, Konz 2006) and completely surrounded by many massive stiff collagenous ligaments more distant from the movement axis?

What is there that would change much in its length or volume? Maybe the purpose of the ligamenta flava is rather to provide a tube for the spinal cord, like the aorta does for the blood stream? If you, dear reader, can find error in my thinking or offer any information, please be so kind as to contact me.

Now we can reasonably assume that Aristotle knew more about the elasticity of tendons than the glue makers did. After all, he taught Alexander the Great the natural sciences, and one factor behind Alexander's success was his pioneering large-scale use of torsion catapults (Fox, 2005) that used animal sinews (collagen). After the crucial siege of Tyre, he even gratefully canonized one of them. These devices were later called *ballista* from the old Greek word *ballô*-"to throw". Galileo built his own telescope (one of the first) and observed the movement of planets and moons. It is a pity that he did not have a microscope-he could have observed the movement of human limbs, coined the expression *ballistin* instead of *collagen*, and saved us some confusion.

1 According to Wright and Johns (1960), "Certain heredity connective tissue diseases show hypermobility of the joints and decreased elasticity of the skin. The lax skin is often mistakenly said by physicians to show increased elasticity, a confusion of terms which has probably been the basis of certain theories about the nature of the defect in these patients; the elasticity is decreased, not increased."

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Ligaments: A Source of Work-related Musculoskeletal Disorders

By Moshe Solomonow, Ph.D., M.D.

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Moshe Solomonow will be one of the keynote presenters at the First International Fascia Research Congress in Boston in October 2007. The Rolf Institute® of Structural Integration is one of the cosponsors for the Congress. The Rolf Institute Research Committee (RIRC) founded the Congress to stimulate dialogue between top researchers in the field of fascia research and connective tissue practitioners. RIRC members Valerie Berg, Steve Evanko, Tom Findley, Nicholas French, Eric Jacobson, Robert Schleip, Bethany Ward, and David Wronski (Findley's assistant) are directing the Congress with the assistance of cosponsors, including the International Association of Structural Integrators, the Massage Therapy Foundation and the Veteran's Biomedical Research Institute.

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ABSTRACT

The mechanical and neurological properties of ligaments are reviewed and updated with recent development from the perspective which evaluates their role as a source of neuromusculoskeletal disorders resulting from exposure to occupational activities. Creep, tension-relaxation, hysteresis, sensitivity to strain rate and strain/load frequency were shown to result not only in mechanical functional degradation but also in the development of sensory-motor disorders with short- and long-term implication on function and disability. The recently exposed relationships between collagen fibers, applied mechanical stimuli, tissue microdamage, acute and chronic inflammation and neuromuscular disorders is delineated with special reference to occupational stressors.

Author Keywords: Ligaments; Muscles; Reflexes; Risk factors; Ergonomics

ARTICLE OUTLINE

1. INTRODUCTION

There are several ligaments in every joint in the human skeleton and they are considered as the primary restraints of the bones constituting the joint. Ligaments are also sensory organs and have significant input to sensation and reflexive/synergistic activation of muscles. The muscles associated with any given joint, therefore, also have a significant role as restraints. In some joints, such as the intervertebral joints of the spine, the role of the muscles as restraints is amplified. The role of ligaments as joint restraints is rather complex when considering the multitude of physical activities performed by individuals in routine daily functions, work and sports, the complexity of the anatomy of the different joints and the wide range of magnitude of the external loads. The functional complexity of ligaments is amplified when considering their inherent viscoelastic properties such as creep, tension–relaxation, hysteresis and time or frequency dependent length–tension behavior. As joints go through their range of motion, with or without external load, the ligaments ensure that the bones associated with the joint travel in their prescribed anatomical tracks, keep full contact of the articular surface, prevent separation of the bones from each other by increasing their tension, as may be necessary, and ensuring stable motion. Joint stability, therefore, is the general role of ligaments without which the joint may subluxate, cause damage to the capsule, cartilage, tendons, nearby nerves and blood vessels, discs (if considering spinal joints) and to the ligaments themselves. Such injury may debilitate the individual by preventing or limiting his/her use of the joint and the loss of function. Unstable joints are also known to drastically modify the intra-articular pressure and the muscular activity about the joint, resulting in early onset of osteoarthritis, pain, disability and eventually the need for joint replacement surgery. Dysfunctional or ruptured ligaments, therefore, result in a complex syndrome, various sensory–motor disorders and other long-term consequences which impact the individuals well-being, employer, skilled work force pool and national medical expenses.

2. LIGAMENT STRUCTURE

Ligaments consist of closely packed, parallel collagen fibers which appear to have various degrees of undulation (or helical) form along the axis of each fiber at a resting length. There are also short cross fibrils which connect the axial fibers to each other. The helical shape of various wave size of each fiber or group of fibers (bundles) gives rise to a process called "recruitment". As axial stretching of a ligament is applied, fibers or bundles with a small helical wave appearance straighten first and begin to offer resistance (increased stiffness) to stretch. As the ligament is further elongated, fibers or fiber bundles of progressively larger helical wave straighten and contribute to the overall stiffness. Once all the fibers are straightened a sharp increase in stiffness is observed. Overall, the recruitment process gives rise to a non-linear length–tension relationship of a ligament shown in Fig. 1 (see also next section).

The geometric shape of a ligament and its insertion into the bones associated with their joint give rise to another "recruitment" process. The medial collateral ligament of the elbow, for example, is a thin fan-shaped structure where the collagen fibers radiate from a relatively small, focal area in the distal humerus, but terminate on a large segment of the ulna. This type of geometric arrangement recruits different

bundles of the ligament at different elbow angles. At full extension the anterior fibers are stretched and offer resistance, whereas with flexion, the anterior fibers gradually relax as more posteriorly situated fibers straighten and stretch.

The intraspinous ligament, for example, has a membrane-like arrangement with the fiber direction set diagonally to the axis of the spine, such as to provide the optimal forces during a relevant component of the range of motion of the intervertebral joint in flexion.

Even the simplest, rope-shaped ligaments, such as the anterior cruciate ligament undergoes a type of regional recruitment; the rotation (screw home) mechanism during knee extension causes the ligament to twist in addition to its axial stretch, recruiting different fiber bundles.

Overall, the mostly collagen (75%), elastin and other substances structure of ligaments is custom tailored by long evolutionary processes to provide various degrees of stiffness at various loads and at various ranges of motion of a joint, while optimally fitting the anatomy inside (inter-capsular) or outside (extra-capsular) a given joint. The various degrees of helical shape of the different fibers allows generation of a wide range of tensile forces by the fiber recruitment process, whereas the overall geometry of the ligament allows selective recruitment of bundles such as to extend function over a wide range of motion. The large content of water (70%) and the cross weave of the long fibers by short fibers provides the necessary lubrication for bundles to slide relative to each other, yet to remain bundled together and generate stiffness in the transverse directions.

3. MECHANICAL PROPERTIES

Ligaments are functional (effective) under tension, or when stretched and completely non-functional in compression or when shortened below their resting length. The general response of ligaments to stretch or tension is rather complex and non-linear, and subjected to several phenomena which are time-dependent, such as creep, tension–relaxation, strain rate and hysteresis. Ligament length–tension (or strain–stress) behavior is also temperature-dependent, exhibiting reduced capability to sustain load as temperature increases, while at the same length [82].

The general length–tension (or strain–stress)

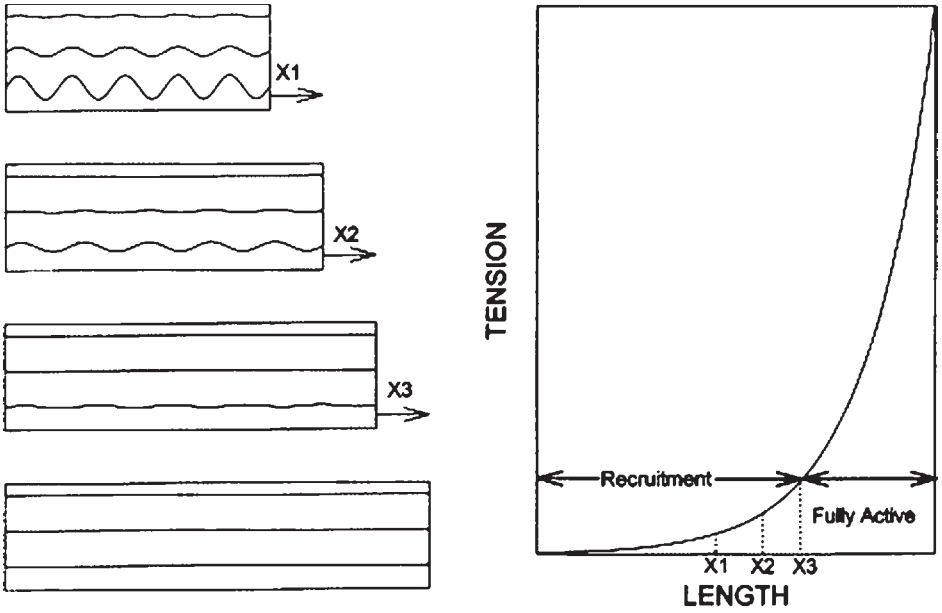

Fig. 1. The length–tension behavior of a ligament is shown on the right. On the left, the progressive recruitment of collagen fibers is shown for several elongations.

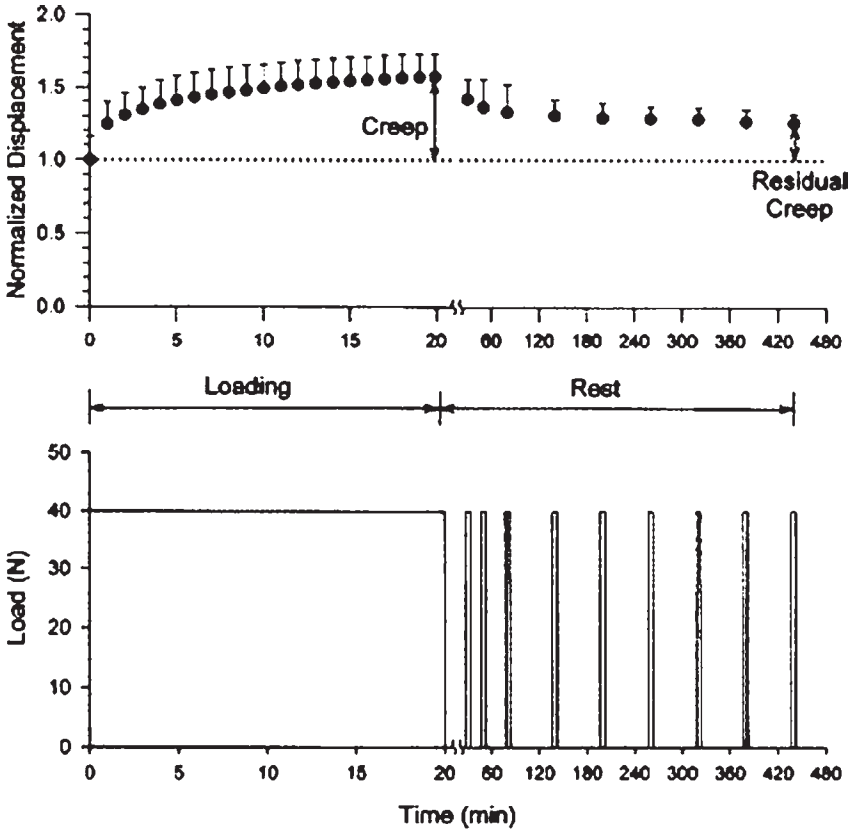

Fig. 2. The response of the supraspinous ligament to a constant load applied for a 20 min period exhibit the development of creep. The recovery during 7 h rest was not complete. In the rest period, short (6 s) loading tests were applied to determine the residual creep [72].

behavior of a ligament is non-linear as shown in the schematic diagram of Fig. 1.

The initial segments of the curve demonstrate rather large strain for very small increase in load. Once all the waves in the collagen fibers of the ligament have been straightened out, and all of the fibers were recruited, additional increase in strain is accompanied with a fast increase in tension. The resting length of ligaments is a difficult issue to establish due to the complexity of measurements in vivo. Some interesting data, however, show that the anterior cruciate ligament in the knee has relatively no changes in length between 60° to full flexion, and a fast increase in strain when extending the knee from 60° to full extension [56]. In that study, the authors normalized the measurement to show negative strain in the flexed range, whereas the same data could be presented as zero strain. It is conceivable that the resting length is near or just above the origin of the length–tension curve.

When a constant load is applied to a ligament, it first elongates to a given length. If left at the same constant load, it will continue to elongate over time in a exponential fashion up to a finite maximum. This elongation over time is termed "creep", and is expressed as the percent elongation relative to the length it arrived to immediately after the load was applied. Fig. 2, depicts the response of a ligament to a constant load over time, as well as the creep. The recovery of the creep with rest, after the load was removed is also shown [72].

When ligaments are subjected to a stretch and hold over time (or constant elongation) the tension–relaxation phenomena is observed. The tension in the ligament increases immediately upon the elongation to a given value. As time elapses, the tension decreases exponentially to a finite minimum while the length does not change. Fig. 3 depicts the tension–relaxation phenomena associated with the constant elongation paradigm, as well as its recovery following rest [29].

The tension developed in a ligament also depends on the rate of elongation or strain rate [49]. In general, slow rates of elongation are associated with the development of relatively low tension, whereas higher rates of elongation result in the development of high tension. Fast stretch of ligaments, such as in high frequency repetitive motion or in sports activities are known to result in high incidents of ligamentous damage or rupture. Fig. 4 depicts the length–tension curve for a supraspinous ligament stretched at different rates [13]. From the figure, it is evident that the supraspinous ligament can develop up to 50% more tension at a given length if stretched at 200%/s, relative to 25%/s. Fast rates of stretch, therefore, may exceed the physiological loads that could be sustained by a ligament safely, yet it may still be well within the physiological length range.

In occupational activities, minimizing the speed of motion for a given task can contribute toward safer working conditions, especially when such tasks are repetitive.

Another important behavioral property of ligaments is its inability to track the same length–tension curve when subjected to a single stretch–release or load–unload cycle, i.e. hysteresis. This phenomenon is also associated with repetitive motion when a series of stretch–release cycles are performed over time. When the ligament is stimulated repetitively with constant peak load, the hysteresis develops along the length axis, i.e. the ligament length limits increase with each cycle reflecting the hys-

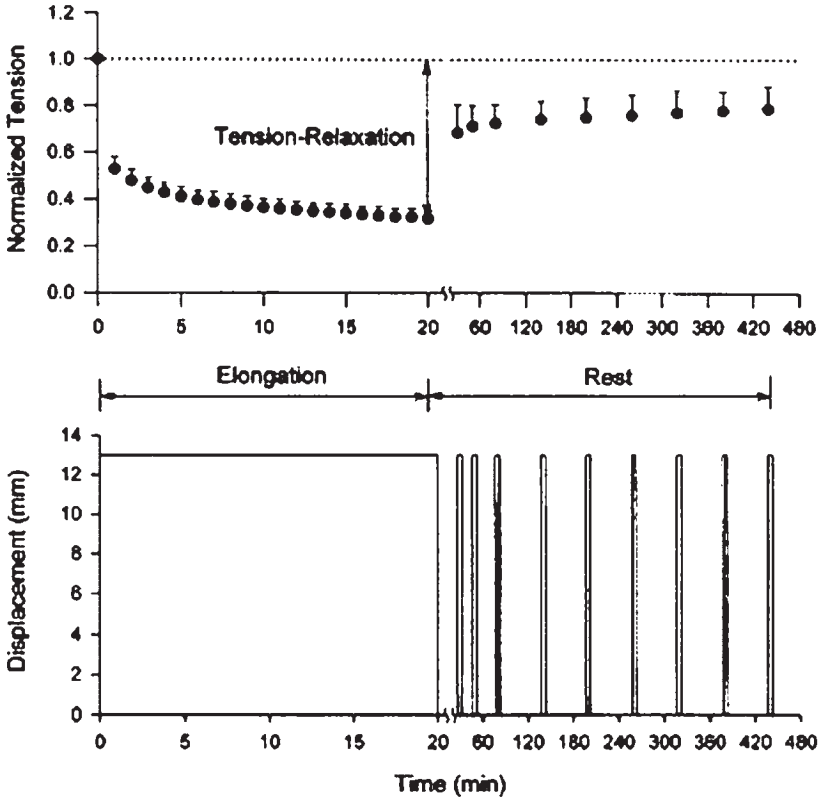

Fig. 3. The response of the supraspinous ligament to a constant elongation applied for a 20-min period exhibits the development of tension–relaxation. The tension did not fully recover during the 7 h rest [29].

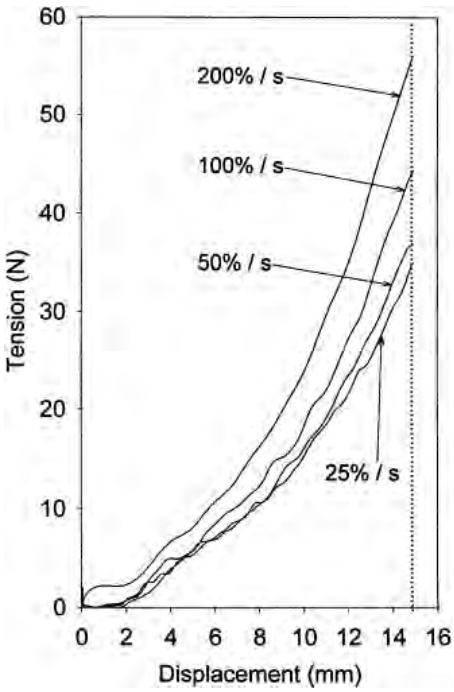

Fig. 4. The length–tension relation of a ligament when stretched at different rates. Increasing the rate of stretch from 25%/s to 200%/s develops nearly 50% more tension in the supraspinous ligament [13].

teresis associated with the development of creep as shown in Fig. 5B.

Conversely, when cycles of constant peak stretch are applied, the peak tension decreases in sequential cycles, reflecting the on-going development of tension–relaxation. Fig. 5A depicts the hysteresis exhibited under constant elongation [8 and 67].

The impact of hysteresis, therefore, is manifested by gradually decreasing tension in the ligament, development of joint laxity, reduced joint stability and increased risk of injury. Repetitive occupational tasks should be limited in duration and allow sufficient rest periods to facilitate recovery of normal ligament function.

Ligament behavior is also dependent on the frequency of load application and unloading, such as in repetitive occupational tasks. Cyclic loading of a ligament with the same peak load, but at a higher frequency, results in larger creep development and longer period of rest required for the full recovery of the creep [36]. The data in Fig. 6 show the peak displacement of the supraspinous ligament subjected to a peak load of 40 N, but at two different frequencies: 0.1 and 0.5 Hz. The data show that the initial displacement at 0.1 Hz is larger than the initial displacement at 0.5 Hz, but the creep developed at the end of 20 min is much larger for the loading frequency of 0.5 Hz. Similarly, the recovery of the creep takes much longer when loading at 0.5 Hz.

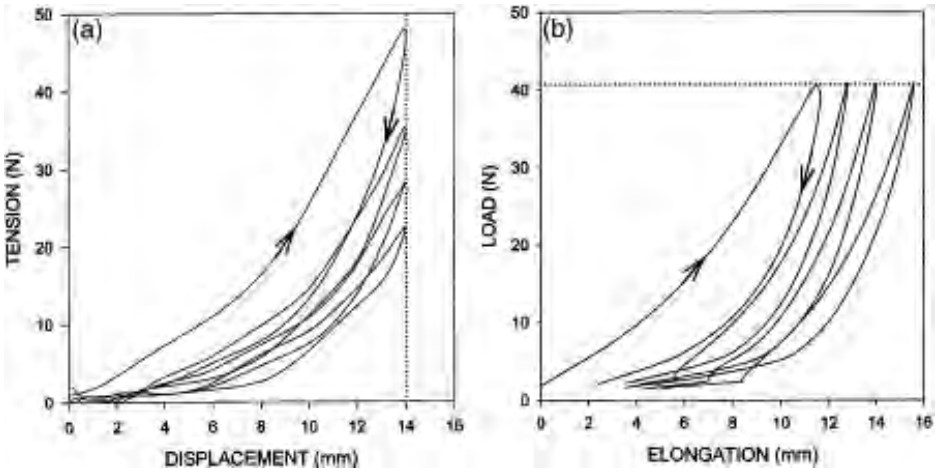

Fig. 5. (A) The hysteresis associated with cyclic stretch of the same peak magnitude. (B) The hysteresis developed in a ligament when subjected to cyclic load of the same peak magnitude [8 and 67].

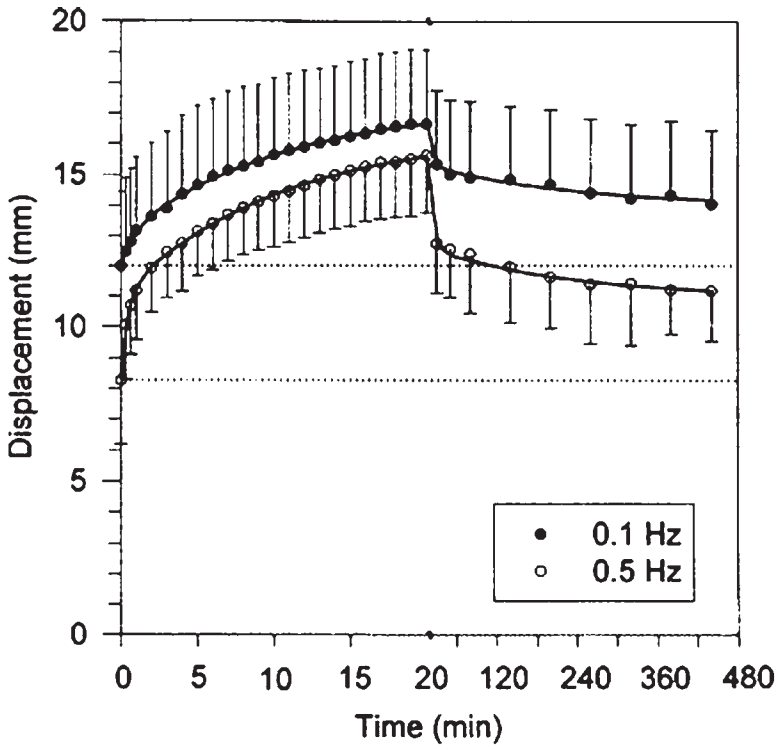

Fig. 6. The development of creep and its recovery in the supraspinous ligament subjected to cyclic loading at 0.1 and 0.5 Hz [36].

Occupational tasks requiring repetitive motion at high frequency, therefore, induce larger creep in the ligaments of the workers, require longer rest time to recover, and probably induce larger risk for cumulative creep from one work session to the next, in the same day and from day-to-day. Larger creep results in increased laxity of the joint as the work goes on, and the associated risks as discussed above.

4. RECOVERY OF CREEP AND TENSION–RELAXATION WITH REST

The recovery of the creep developed in a ligament during a sustained loading is a relatively unexplored issue. Some early assessments in healthy humans and in vivo animal models show that creep developed over relatively short periods of 10–60 min of loading did not fully recover at the end of up to 2 h of rest [9, 12 and 40]. Crisco et al. [9] observed, however, that nearly full recovery was measured after 24 h rest. Recent evidence demonstrate that both creep and tension–relaxation induced in a 20–50 min of loading or stretching a ligament, respectively, demonstrated 40–60% recovery in the first hour of rest, whereas full recovery is a very slow process which may require 24–48 h [8, 19, 29 and 66]. Fig. 2 and Fig. 3 provide experimental illustrations of the recovery of creep and tension–relaxation over 7–8 h of rest after the loading or stretch. It is evident, therefore, that loading or stretching a ligament over relatively short periods induces changes in its length–tension behavior that may last 20–40 times longer than the duration of the loading/stretching. This phenomenon has significant implications on the ability of a ligament to protect and stabilize joints in workers who are subjected to sequential periods of static or cyclic activities during a given day. As the work–rest periods go on, the ligament exhibit cumulative creep and reduction in its ability to protect the joint, causing the later part of a work period (or day) to be

more prone to injury. Since full recovery of the creep with rest also requires more than 24 h, there would be a cumulative creep from the previous work day at the beginning of a new work day. The phenomenon of inter- and intra-day cumulative creep is illustrated with experimental data from the supraspinous ligament in Fig. 6 and Fig. 7, and may provide valuable insights to the mechanical aspects of the development of cumulative trauma disorders.

5. RESPONSES TO INCREASED PHYSICAL ACTIVITY AND INACTIVITY

Ligaments are adaptive to exercise or series of repetitive functions and to immobilization. Moderate exercise or occupational activities followed with sufficient rest and recovery results, over time, with increase in the strength of a ligament, as well as in its size and collagen content [20, 77, 78, 79, 80, 83, 89 and 86]. These changes indicate enhanced collagen metabolism in response to the stimulus. Indeed, such stimulus was shown to increase the total number of collagen fibrils in the ligament, as well as in the fibril diameter [41, 42, 44, 45 and 89]. Overall, moderate repetitive stimulation of ligaments coupled with appropriate rest and recovery allows the tissue to hypertrophy, increase its strength and protect joint stability in persons exposed to more demanding physical activity [76].

Conversely, immobilization or reduced physical activity is accompanied with degenerative changes in the ligaments structure and function consisting of decreased collagen fiber diameter, fibril density and fibril number and overall collagen mass and its metabolism [1, 4, 32 and 77].

Furthermore, the immobilization seems to have significant impact on the ligament–bone junction (or insertion to the bone). Immobilization results in increased osteoclastic activity, resorption of bone and disruption of the pattern of diffusion of the ligament fibers into the bone [85]. Overall, immobilization or decreased physical activity results not only in weaker and thinner ligaments, but also in weaker attachment to the bones of the respective joint, increasing the risk for potential injury if drastic increases in physical activity are implemented. This is important to note when workers return to activity after prolonged sickness, unemployment or holiday. Similarly, changing position from one job to another where different type of physical functions are performed requiring relatively dormant joints to be fully engaged may result in high exposure to injury. A gradual "work in" period in such circumstances may be a safe method to avoid exposure to injury.

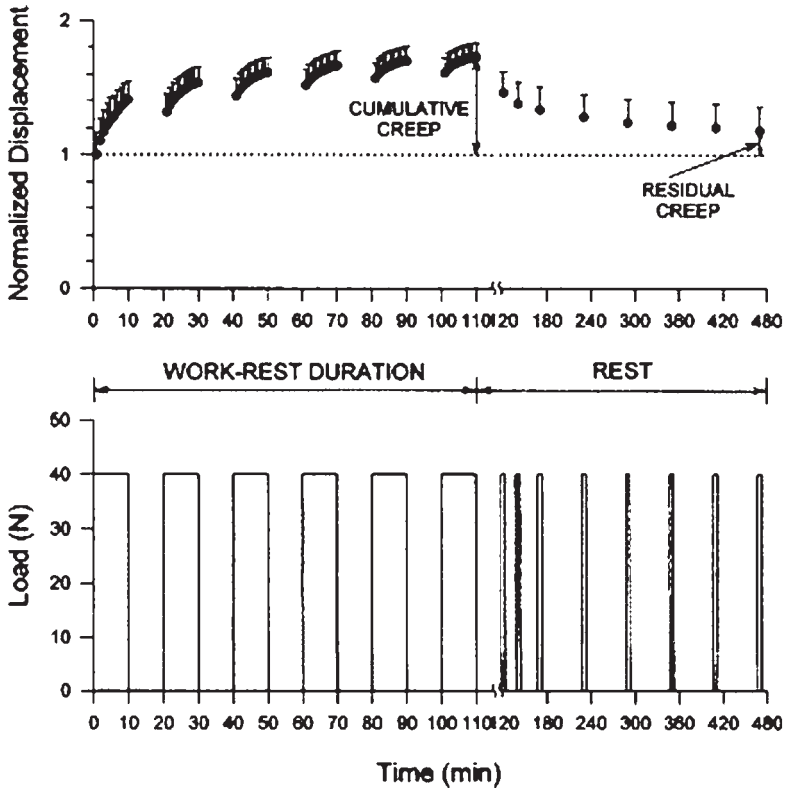

Fig. 7. The development of cumulative creep in the supraspinous ligament over a 120 min duration consisting of six sessions of 10 min static flexion followed by 10 min rest and its recovery pattern over 7 h of rest. Note that only partial recovery of creep developed in the first 10 min of load occurred, and that the residual creep, as well as final creep accumulated over the work–rest session. Only partial recovery was seen at the end of 7 h rest, leaving residual creep for the next work day.

6. LIGAMENT INFLAMMATION

Inflammatory response in ligaments is initiated whenever the tissue is subjected to stresses which exceed its routine limits at a given time. For example, a sub-injury/failure load, well within the physiological limits of a ligament when applied to the ligament by an individual who does not do that type of physical activity routinely. The normal homeostatic metabolic, cellular, circulatory and mechanical limits are therefore exceeded by the load, triggering an inflammatory response.

Similarly, static or repetitive loading of a ligament, within its physiological limits, when extended over a period of time result in creep which is an expression of a micro-damage within the collagen fibers structure of the tissue. The micro-damage triggers inflammatory responses as well [5, 14, 17 and 39].

Inflammatory signs consisting of swelling, redness, elevated temperature and pain demonstrate that a healing process is underway. The collagen fibers are undergoing changes in cellular, metabolic and vascular condition in order to improve the mechanical properties of the ligament such that it may be able to negotiate with the increased demand to physical activity. The inflammation also manages the breakdown and removal of damaged protein and the importation of new protein to repair and reconstruct the micro-damage and hypertrophy the tissue.

Acute inflammation, therefore, represents the healing or upgrading of the ligament's properties and if left undisturbed by additional over-exposure to stress or intervention of anti-inflammatory drugs will allow recovery and upgrading of the ligament [34].

Another case where acute inflammation is present is when physical activities presenting sudden overload/stretch cause a

distinct damage to the tissue which is felt immediately. Such cases, as a sudden loss of balance, a fall, collision with another person, exposure to unexpected load, etc., may result in what is called a sprain injury or a partial rupture of the ligament. Acute inflammation set in within several hours and may last several weeks and up to 12 months. The healing process, however, does not result in full recovery of the functional properties of the tissue. Mostly, only up to 70% of the ligaments original structural and functional characteristics are attained by healing post injury [82].

The inflammation process described above is designated as acute inflammation which is distinctly different from a chronic inflammation.

Chronic inflammation is an extension of an acute inflammation when the tissue is not allowed to rest, recover and heal. Repetitive exposure to physical activity and reloading of the ligament over prolonged periods without sufficient rest and recovery represent cumulative micro-trauma. The resulting chronic inflammation is associated with atrophy and degeneration of the collagen matrix leaving a permanently damaged, weak and non-functional ligament [34]. The dangerous aspect of a chronic inflammation is the fact that it builds up silently over many weeks, months or years (dependent on a presently unknown dose-duration levels of the stressors) and appears one day as a permanent disability associated with pain, limited motion, weakness and other disorders [57]. Rest and recovery allow only partial resolution of the disability [82]. Full recovery was never reported.

7. LIGAMENTS AS SENSORY ORGANS

While ligaments are primarily known as mechanical apparatus responsible for joint stability, they have equally important sensory functions. Anatomical studies demonstrate that ligaments in the extremity joints and the spine are endowed with mechanoreceptors consisting of: Pancinian, Golgi, Ruffini and bare nerve endings [6, 15, 18, 22, 23, 28, 43, 50, 51, 53, 54, 60, 61, 63, 68, 87, 88 and 90]. The presence of such afferents in the ligaments confirms that they contribute to proprioception and kinesthesia and may also have a distinct role in reflex activation or inhibition of muscular activities.

Studies of patients with ruptured ACL exhibit decreased ability to accurately position/reposition their limbs, indicating defective kinesthetic sensation [62]. Similarly, such patients also demonstrate defective reflexive responses to joint loading that may disturb stability indicating that a deficit in proprioception is present as well [3, 65 and 69]. Overall, the decrease or loss of function in a ligament due to rupture or damage does not only compromise its mechanical contributions to joint stability, but also sensory loss of kinesthetic perception and fast reflexive activation of muscles and the forces they generate in order to enforce joint stability.

8. LIGAMENTO-MUSCULAR REFLEX

It was suggested, as far back as the turn of the last century, that a reflex may exist from sensory receptors in the ligaments to muscles that may directly or indirectly modify the load imposed on the ligament [48]. Experiments performed in the 1950s resulted in conflicting data and no conclusion [2, 11, 46, 47, 73 and 74]. A clear demonstration of a reflex activation of muscles by stimulation of the anterior cruciate ligament (ACL) was finally provided in 1987 [65] and reconfirmed several times since then [3, 10, 55, 30 and 31]. It was further shown that such a ligamento-muscular reflex exists in most extremity joints [16, 21, 33, 58, 59, 68, 52 and 70] and in the spine [26, 27, 75 and 71].

Biomechanical data demonstrate that the muscular activity elicited by the reflex from the anterior cruciate ligament always acts to prevent the distraction of the joint [24, 25, 35, 37 and 38], as well as reduce the strain in the ACL [56], establishing the functional objective of such reflex, synergistic activity of muscles and ligaments to maintain joint stability.

Recently, new evidence support that the ligamento-muscular reflex may also have inhibitory effects on muscles associated with that joint [69 and 81]. Indeed, such inhibition may prevent extremely large forces from developing in muscles that increase the stress in the ligaments. A typical case is demonstrated by inhibition of large quadriceps forces during extension in the range of motion of 60° to full knee flexion [7]. It is well established that quadriceps force in that range of motion contributes toward distraction of the knee [24], as well as increasing the strain in the ACL [56]. The reflex inhibition, therefore, also serves to protect the ligament.

Ligamento-muscular reflexes, therefore, may be inhibitory or excitatory, as may be fit to preserve joint stability; inhibiting muscles that destabilize the joint or increased antagonist co-activation to stabilize the joint.

Indirect control of joint stability, via the ligamento-muscular reflex, by activating muscles that do not cross the joint is observed in the ankle joint. Stimulation of the medial collateral ligament of the ankle results in activation of the intrinsic muscles of the foot. The force generated by these muscles increases the arch of the foot and thereby corrects or prevents eversion and the associated joint instability [70].

Another special case is the ligaments associated with the shoulder. The capsule surrounding the joint exhibits thickening bands on its superior, anterior and posterior region, as well as in its inferior region which constitutes relatively weak ligaments. In some cases the thickening is hardly noticeable, confirming the relatively minor mechanical role of these ligaments. The four bands, however, are well endowed with the four types of mechanoreceptors, indicating an increased importance of their sensory role in perception of joint position and in ligamento-muscular reflex activation [22 and 68]. Similarly, there are several articular nerves supplying the afferents in these ligaments and a complex, vivid reflexive activation of the muscles associated with the rotator cuff [21, 33 and 68]. The muscles, therefore seem to be a major component in maintaining the stability of the shoulder.

The reflex from the ligaments, therefore, can provide muscular assistance for the preservation of joint stability directly (by muscles crossing the joint) or indirectly (by muscles not crossing the joint) using muscular activation or inhibition.

9. NEUROMUSCULAR DISORDERS

Considering the ligaments' mechanical properties (length–tension, creep, tension–relaxation, hysteresis, etc.), together with its sensory–motor functions (kinesthesia, proprioception and reflex activation/inhibition of muscles) and biological behavior (hypertrophy, degeneration, inflammation and healing) can motivate one to form several hypothesis regarding its role in triggering neuromusculoskeletal disorders.

Workers engaged in daily performance of static or repetitive activities over periods of

weeks or months will exhibit first hypertrophy of the ligaments, but still subjected to creep, tension–relaxation and hysteresis. The ligament becomes lax over a day's work and cannot exert sufficient tension to maintain the motion of the bones on track and maintain even pressure distribution on the cartilage surface, while supporting the same external loads. Such degradation of function can cause increased exposure to injury as the work day progresses, while at the same time causing gradual degeneration of the articular surfaces of the joint, leading to osteoarthritis.

The development of cumulative creep in the ligament may build up at some point to trigger sufficient micro-damage in the collagen fibers with the acute inflammation becoming chronic and consequently degeneration of the ligament and permanent disability [34 and 57].

While the two disorders presented above are widely recognized due to long experience in the orthopaedic and rehabilitation clinics, the interaction of the mechanical and sensory (reflexive) properties of ligaments and the potential disorders that can result is still unexplored. As ligaments develop creep, tension–relaxation and hysteresis, the length or tension sensory thresholds of the various afferents are shifted significantly in the range of motion and with the loads experienced by the ligament through the same motion [13 and 67]. The direct results of such sensory thresholds shift is degradation in kinesthetic and proprioceptive perception that lead to inaccuracies of movement and dysfunctional reflexive activation of muscles.

Solomonow et al. [72] described a neuromuscular disorder, consisting of five distinct components, associated with static loads applied to lumbar ligaments. The first component consists of a gradually decreasing reflexive muscular activity which is directly related to the creep developed in the ligaments, eliciting a shift in the sensory trigger thresholds of the reflex.

The second component consists of spasms observed during the static loading (lumbar flexion) period, elicited by the micro-damage in the collagen fibers and relayed reflexively by pain receptors.

The third component was observed in the first hour of rest after the static loading. This was expressed as a transient hyperexcitability of reflexive muscular activity. The hyperexcitability was attributed to

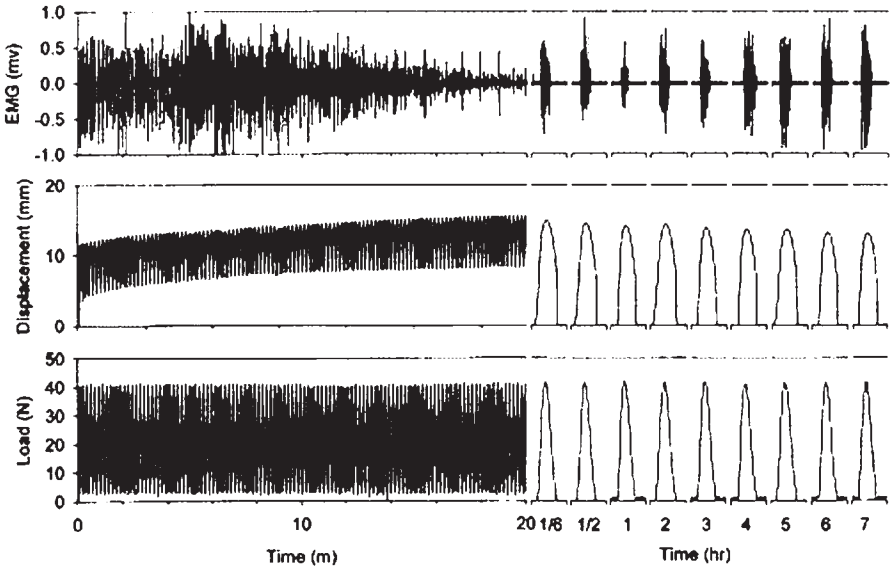

Fig. 8. Experimental recordings of multifidus reflexive EMG during 20 min of static lumbar flexion followed by 7 h of rest. Note the simultaneous development of creep and its recovery.

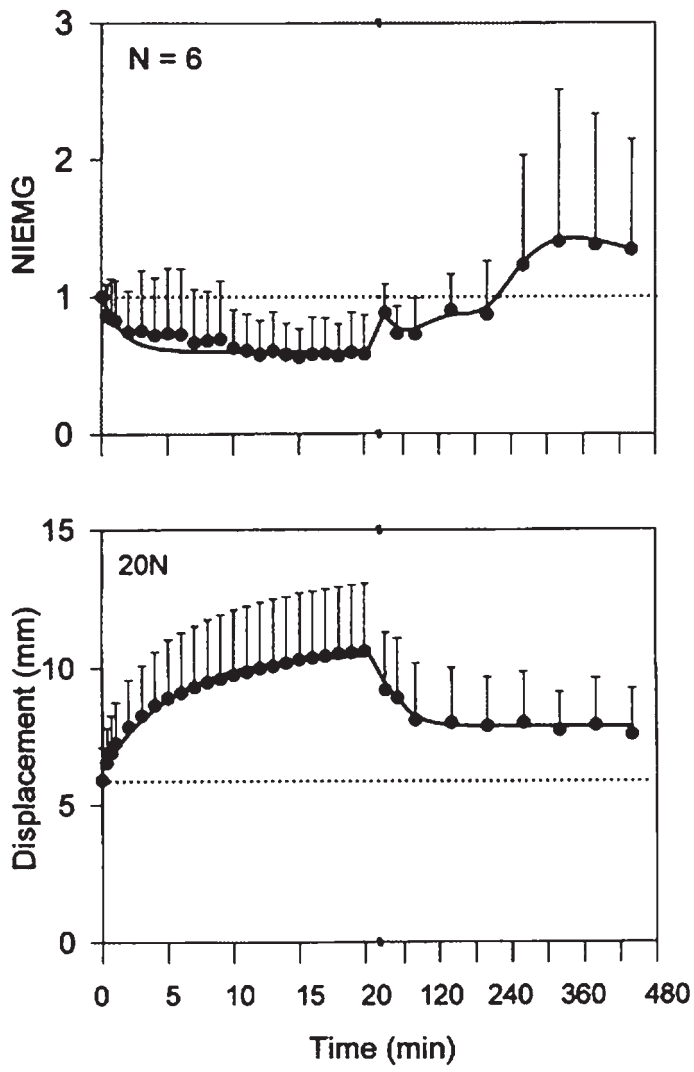

Fig. 9. The pooled mean normalized and integrated EMG and mean displacement from Fig. 8, together with few other preparations subjected to the same protocol.

the attempt of the musculature to protect the severely stretched ligament from any further development of micro-damage until substantial recovery of creep took place.

The fourth component consisted of a relatively prolonged reflex muscular hyperexcitabiltiy that gradually increased from the second to the sixth hour of rest after static loading of the lumbar ligaments. The amplitude of this "morning after" hyperexcitability was much stronger than the initial hyperexitability by two- to three-fold and seemed to last over 24 h. This component was correlated to the development of inflammation in the supraspinous ligament [66], which dictated the time constants of the development and decay of the hyperexcitability.

The fifth component of the disorder is the slow exponential recovery of the reflexive EMG to its normal (initial) level as rest time progresses.

Similar responses were observed by Claude et al. [8] when cyclic loading of lumbar viscoelastic tissues were performed.

Fig. 8 shows recording of reflexive EMG from the multifidus muscles while the lumbar spine and the supraspinous ligaments are subjected to cyclic anterior flexion for 20 min followed by 7 h of rest. The development of creep and its recovery and the corresponding spasms and two hyperexcitabilities are noticeable in the different phases.

Fig. 9 shows the pooled, processed data of Fig. 8, together with a few other in vivo specimen subjected to the same cyclic anterior flexion of the lumbar spine. Note the creep and its recovery with rest as well as the five components of the neuromuscular disorder.

Fig. 10 shows a schematic of the five components of the neuromuscular disorder associated with creep during the loading period and the following rest.

The mechanical properties of the viscoelastic tissue of ligaments (and other such tissues as discs, facet capsule, doroslumbar fascia, etc.) could give rise to or be the source of a neuromuscular disorder. Prolonged exposure of a joint to static posture allows the development of creep (in a constant load condition) or tension–relaxation (in a constant displacement condition). Data obtained from normal, healthy young subjects shows that spasms develop in the musculature during the static activity and significant modification of muscular activity, primarily hyperactivity, is observed after the loading period [7 and 64]. The above results obtained from the ACL in the knee and from the lumbar spine reinforces the assertion made earlier concerning the similar behavior of the ligamento-muscular reflex in most, if not all, the major joints.

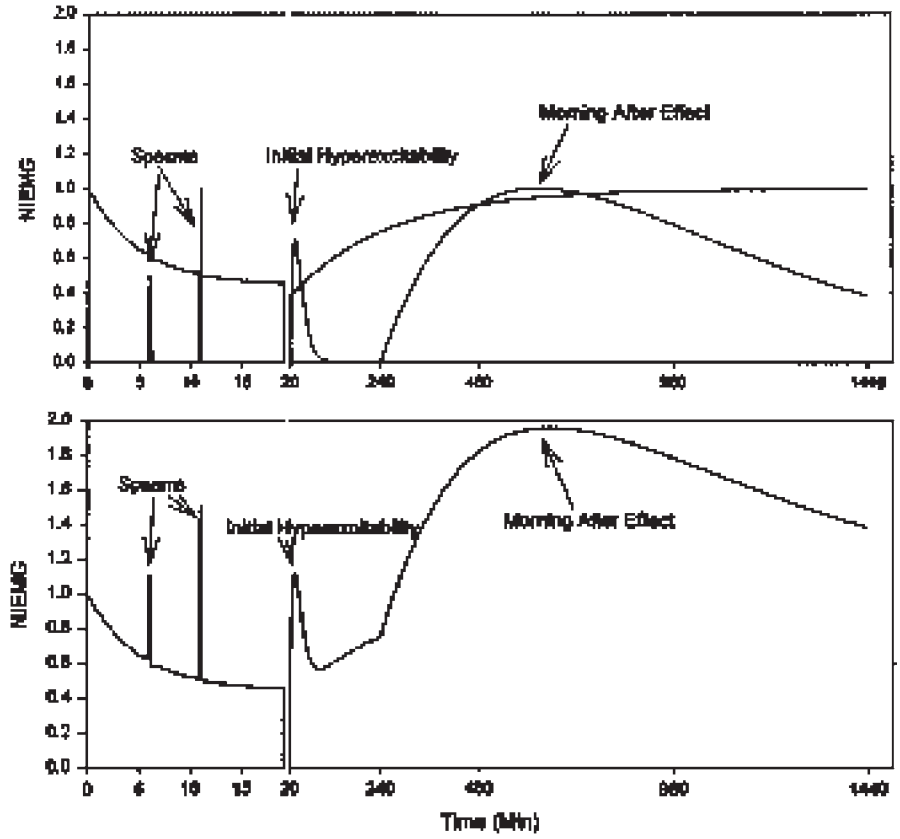

Fig. 10. A schematic of the five components neuromuscular disorder resulting from static load applied to the ligaments.

10. CONCLUSION

It is evident that ligaments evolved to become the optimal biological passive tissue to provide the function of joint stability. Ligaments are also adaptive to the extent that increase and decrease in physical activity is accompanied with hypertrophy and atrophy, respectively. Their normal function, however, is dependent on a dose–duration–rest formula which is not known at the present. Sufficient rest between periods of physical activity seems to be of paramount importance for long-term healthy, normal function, and such data are just becoming available.

Due to the mechanical properties of viscoelastic tissue, two classes of disorders originate from ligaments; mechanical and neuromusculoskeletal. Mechanical deficits such as joint laxity, instability, osteoarthritis, sprain, rupture, etc., are the direct result of creep, tension–relaxation, hysteresis and time/frequency dependence of the length–tension of ligaments.

The same mechanical factors are also manifested with complex sensory–motor disorders (or syndrome) associated with changes in kinesthetic and proprioceptive perception, reflex activation of muscles and overall performance. Inflammatory responses of viscoelastic tissues, a result of mechanical stimuli seems to be a significant factor in the development of cumulative trauma disorders in workers maintaining jobs that require daily performance of static and repetitive motion.

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VITAE

Moshe Solomonow, Ph.D., M.D. (Hon) is a Professor and Director of Bioengineering and of The Occupational Medicine Research Center at Louisiana State University Health Sciences Center in New Orleans, Louisiana. He received the B.Sc., and M.Sc. in Engineering and the Ph.D. in Engineering and Neuroscience from the University of California, Los Angeles.

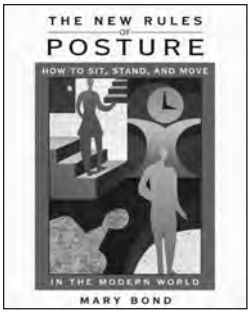
He is the Founding Editor of *The Journal of Electromyography and Kinesiology*, and serves on the Editorial Board of several bioengineering and medical journals. Dr. Solomonow is a consultant to the National Science Foundation, National Institute of Health, Center for Disease Control, The Veterans Administration and scientific agencies of several European and Asiatic governments and Canada. He was a council member of the International Society of Electrophysiological Kinesiology, the International Society of Functional Electrical Stimulation, and the IEEE-Biomedical Engineering Society. He published over 120 refereed journal papers on motor control, electromyography, muscle, ligament and joint biomechanics, electrical muscle stimulation, prosthetics and orthotic systems for paraplegic locomotion, and supervised more than 150 engineering, physical therapy, medical students and orthopaedic residents, as well as postgraduate students and fellows from several countries.

Dr. Solomonow organized the EMG Tutorial Workshop in the ISB Congress, the Canadian Society of Biomechanics, The Human Factors and Ergonomics Society, and The Society for Clinical Movement Analysis, was on the organizing committee of numerous conferences and gave keynote and symposia lectures in many others. He received the Crump Award For Excellence in Bioengineering Research (UCLA), the Distinctive Contribution Award.

The New Rules of Posture:

How to Sit, Stand and Move in the Modern World **by Mary Bond**

Reviewed by Valerie Berg, Certified Advanced Rolfer®



I have a shelf of thick, detailed books on human movement, which I use from time to time. I have never sat and read any movement book cover to cover until Certified Advanced Rolfer® and Rolfing Movement Practitioner Mary Bond's recent book, *The New Rules of Posture*.

Who is a movement book for, and much less another posture book? Everyone, it turns out—from clients who have repeatedly asked for a list of the things to remember from their sessions, to faculty needing to remember exercises and ways to teach embodiment of structural integration function, to Rolfers who never took movement classes or ones who haven't been exposed to what is being taught at the Rolf Institute® of Structural Integration these days.

Mary Bond has taken her years of experience, added Hubert Godard's work and her understanding of what is now taught as part of our basic training curriculum, and written a book that puts all our theories, practice and experiential exercises into one manual of how to keep our bodies upright and healthy in our present culture.

Finishing the book, I felt as if I had been taken on a Rolfing-series tour through function. She takes us through breath, stability, orientation and motion. She includes only brief discussions of connective tissue and structural integration, but the book is clearly written by a Rolfer who can talk about posture from our unique point of view and in a holistic manner.

There is just enough anatomy in it for an untrained person to get the real basics of what is going on in sitting, standing or walking. She clearly explains "core," a word much overused, and used only in the context of fitness, in our modern world. Nothing is too dense or too shallow for immediate use. I have had the "core" concept of transverse abdominus explained to me 100 times; Bond clearly explains what it means and what to do with it.

This is the book our clients ask us to write for them. Like Rolfing itself, it is not a pain-oriented book. However, in moving us through numerous rich exercises that create awareness with knowledge and new patterns of movement, there is an implication that pain would be relieved by changing our relationship to gravity, easing our over-stabilizing, and adding orientation to ground and sky to our movements.

Bond consistently weaves in the cultural and worldview influences on our ability to be upright and functioning with ease. She includes our own cultural "prisons," such as computers, chairs, and cars. The book is not, however, merely another collection of exercises that people don't have time to do. Her explanations lead the reader from the cognitive to the sub-cortical experiences of sensation, to the change of patterns—much as we do in our offices every day with our clients.

She skillfully writes in a manner that, by the end, leaves us feeling integrated; it's not a piecemeal fix-it book. By the time she discusses the neck, head and jaw, we have established support and fluidity in the rest of our bodies, much as the Rolfing Ten Series does. Each "posture zone", as she calls them, relates to the next, and the next. This is a book all Rolfers could keep in the office for clients' use, and also utilize to keep our own bodies at ease while working.

Fascia Research Congress

October 4 - 5, 2007
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Want to do research but not sure exactly how to go about it? Are you thinking about an advanced degree but uncertain of how to design your research? Want to do research right in your office just by recording what you see?

If you are interested in designing a research project, whether you have experience or not, come join our study group. Join Tom Findley, M.D., Ph.D., The Rolf Institute's Research Director in taking you through the process of designing a research project. He will use an actual model and see it through from inception to completion. He will discuss such topics as design, methods, literature searches, how to read and understand a research paper, how to find funding, and grant writing.

This study group will meet both in person (1-2 times per year) and via telephone (1-2 times per month). We are looking for committed people who are willing to participate fully. Regular attendance is required and essential for the success of this project. We will begin with an in-person meeting followed by scheduled conference calls.

This group will start soon and has a limited number of participants, so if you think you're interested, contact us now!

Laura J. Curry, (781) 492-7653, info@rolfingstudio.com

The Review of Latest Research and Implications for your Practice: Preparation for the Fascial Conference

with Thomas Findley, Ph.D.

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Learn the basics of research from the Rolf Institute® of Structural Integration, Research Director Tom Findley. This class will get you ready for the Fascia Research Congress by covering these topics:

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This class will deepen your understanding of what we witness day after day in our practices: that there is a consistency in what Rolfing® accomplishes. We will cover how to record this and understand it, and what to do with the knowledge. Tom Findley also works at the Center for Healthcare Knowledge Management at the VA Medical Center New Jersey, where he is certified in the practice of Structural Integration.

Dates: May 19-20, 2007

Location: NYC/NJ area

Tuition: $200

Coordinator: Laura Curry, (781) 492-7653, info@rolfingstudio.com

Graduates

Unit II, May 26, 2006 Boulder, CO
From left to right, front row: Brian Wallrich, Vera Pavolna, Adam Nickamin, Shanna Blake. Back row: Guest, Ionie Bergs, Amy Larimer, Sharon Sugden, Sally Klemm (Instructor), Robert Stegner, Kristine Nishimura, Mark Swan.
Not shown: Jason Mixter (Assistant Instructor), Owen Duncan and Jessica Welch (students).

Unit III, December 14, 2006 Boulder, CO
From left to right, front row: Ellen Presnell (Assistant Instructor), Kevin McCoy (Instructor), Cheryl Van Der Horn, Lisa King, Michele Scholen, Julia West.
Back row: Regina Markle, Shane Sellers, Mark Swan, Dawn St. Clair, Jonathon Grossart.

Advanced Training, January 19, 2007, Europe
From left to right, front row: Erika Gornott, Susanne Kirchner, Jan Sultan (Instructor), Harvey Burns. Middle row: Samartha Deva, Rosemarie Burkhardt, Monica Marinelli, Christina Crivellari, Margrit Nägeli-Neff. Back row: Walter de Mello Neto, Alan Richardson, Hubert Ritter, Sabine Ehrlich, Remo Reichle Brigitte.

2007 Class Schedule

BOULDER, COLORADO

Unit I:
Foundations of Rolfing Structural Integration/FORSI

January 8 – February 19, 2007
Coordinator: Michael Polon

June 4 – July 16, 2007
Coordinator: Michael Polon

August 27 – October 8, 2007
Coordinator: Michael Polon

Advanced Foundations of Rolfing Structural Integration/AFORSI

March 11 – March 24, 2007
Instructor: John Schewe

July 15 – July 28, 2007
Instructor: Juan David Velez

September 9 - September 22, 2007
Coordinator: John Schewe/Suzanne Picard

Unit II: Embodiment of Rolfing & Rolf Movement Integration

January 8 – March 2, 2007
Instructor: Duffy Allen
Principles Instructor: Lael Keen

April 2 - May 25, 2007
Instructor: Jane Harrington
Principles Instructor: Jane Harrington

June 4 – July 26, 2007
Instructor: Libby Eason
Principles Instructor: Carol Agneessens

September 24 – November 15, 2007
Instructor: TBA
Principles Instructor: Jane Harrington

October 15 – December 14, 2007
Instructor: Harvey Burns
Principles Instructor: Mary Bond

Unit III: Clinical Application of Rolfing Theory

March 5 – April 27, 2007
Instructor: Thomas Walker
Anatomy Instructor: Michael Murphy

June 4 – July 27, 2007
Instructor: Ray McCall
Anatomy Instructor: John Schewe

August 20 - October 12, 2007
Instructor: Russell Stolzoff
Anatomy Instructor: Juan David Velez

October 15 – December 14, 2007
Instructor: Jon Martine
Anatomy Instructor: Jon Martine

Advanced Training
Instructors: Ray McCall, Advanced Instructor & Jon Martine, Assistant/Co-Instructor

Phase I: April 30 - May 18, 2007

Phase II: August 6 - 17, 2007

Rolf Movement Training
Modular Format
Location TBA
Dates: TBA

SEATTLE, WASHINGTON

Advanced Training (Extended Format)
Instructors: Tessy Brungardt, Advanced Instructor & Michael Murphy, Assistant/Co-Instructor.

Phase I: April 30 – May 18, 2007

Phase II: July 30 - August 10, 2007

GERMANY

Phase I: Foundations of Rolfing Structural Integration

July 30- August 18, 2007
Instructors: Giovanni Felicioni, Konrad Obermeier, Pierpaola Volpones

Phase II: Embodiment of Rolfing & Rolf Movement Integration

October 8 - November 28, 2007
Instructor: Pierpaola Volpones

Phase III: Clinical Application of Rolfing Theory

January 28 - March 21, 2008
Instructor: Ray McCall

AUSTRALIA

Advanced Unit I / AFORSI

June 4-16, 2007
Instructor: John Smith

Unit II

Oct.29-Dec. 21, 2007
Instructor: Ashuan Seow

Unit III

April 7 –May 30
Instructor: Micheal Stanborough

BRAZIL

Phase I

June 2-4 & 6-7, 2007

Phase 2

July 21-23 & 25-26, 2007
Instructor: Liz Gaggini
Salvador – Bahia

UNIT III

October 8th – December 13th, 2007
Instructors: Pedro Prado, Cornelia Rossi and Paula Mattoli
Pousada Fazenda Maristela – Tremembe – São Paulo

Advanced Training
Instructors: Hubert Godard and Pedro Prado

February 11th – March 14th, 2008
Island of Santa Catarina

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November 5-November 29, 2007
Instructors: Lael Katharine Keen and Kevin Frank

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