Matrix Repatterning: *The Structural Basis of Health*

By George B. Roth, B.Sc., D.C., N.D.

Dr. Roth is a graduate of the University of Toronto, Canadian Memorial Chiropractic College and the Ontario College of Naturopathic Medicine and has studied osteopathic medicine at Doctors' Hospital North, Columbus, Ohio. He is the developer of Matrix Repatterning and is the Director of Education at the Matrix Institute. Dr. Roth has presented seminars at numerous hospital and university-based symposia throughout North America. He is the co-author, with Kerry D'Ambrogio PT, of Positional Release Therapy (Elsevier, 1997), and the author of The Matrix Repatterning Program for Pain Relief (New Harbinger, 2005).

Introduction

As many clinicians in the field of physical medicine have realized, diagnosis and treatment focused solely on the area of symptoms, is often frustrating and fruitless. Symptoms such as pain, especially in chronic conditions, are often the result of secondary or compensatory mechanical stresses created within the body in response to a primary site of tissue injury. For example, the local pain associated with a fracture of the leg will be reduced once a cast is applied. Within a few days however, the patient may begin to experience pain and discomfort in other parts of the body, such as the knee, hip, lower back or neck, as these structures are forced to compensate for the loss of mobility originating in the immobilized limb. The altered ranges of motion may create patterns of strain in the secondary sites, resulting in abnormal movement, irritation, inflammation and pain. In addition, these compensatory areas of strain tend to be aggravated intermittently. Intermittent noxious stimuli are interpreted by the nervous system as potential threats to the organism, which are more likely to give rise to a conscious awareness of pain.

A primary site of tissue injury often results in a source of restriction similar to the casted leg example. This may become a constant source of irritation, to which the CNS tends to adapt as 'background information'. As such, it may eventually drop below the threshold for conscious pain perception. In summary, both mechanical compensation and neurological adaptation often obscure the primary site of injury.

Matrix Repatterningincorporates objective and reproducible methods, based on a scientific foundation of structural pathophysiology. Itis a revolutionary manual approach, which addresses the *primary* sources of structural imbalance and dysfunction at the cellular level, in an efficient and effective manner. Treatment is gentle and painless, and results in global biomechanical reorganization, encouraging the body towards normal, pain-free function.

The Tensegrity Matrix

Recent research suggests that the structural and biomechanical properties of the body are key factors in how it functions in health and disease. With improved imaging technology, an emerging field of scientific exploration has revealed a clearer understanding of cellular and tissue ultrastructure. These discoveries, which have focused on histology, cellular physiology, microbiology and biophysics, have challenged our previous concepts of structure and function. This revised model of organic structure explains some of the complex interrelationships, which exist between each and every component of the body. It extends the basic concept of tissue response to injury, beyond the level of joint, muscle and ligament, to include the deeper framework of the body, right down to the cellular and molecular levels.

It is now known that the internal structure of each cell (cytoskeleton), as well as the tissues lying between the cells (extracellular matrix or ECM), is composed of protein and polysaccharide filaments forming a continuous framework, which we refer to as the *Tensegrity Matrix*.[4, 7]Thesestructures are, in turn, constructed of molecular elements, such as carbon, which have specific structural, mechanical and electronic properties.The application of the concept of tensegrity to biological systems, elaborated by Stephen Levin, M.D.[2] and Donald Ingber, M.D., Ph.D.[3], among others, holds that the body tissues are composed of interconnected *tension icosohedra* (complex triangular trusses), which inherently provide a balance between stability and mobility. This structural model explains many of the observed phenomena related to body support, movement, response to stress and trauma, as well as the effects of therapeutic interventions. According to Ingber, a key investigator who has elaborated on the mechanical and physiological properties of the cytoskeleton, this model explains the biomechanical properties of the entire body.

Figure 1: The Architecture of Life,
D. E. Ingber, Scientific American, Jan. 1998

"Molecules, cells, tissues, organs, and our entire bodies use "tensegrity" architecture to mechanically stabilize their shape, and to seamlessly integrate structure and function at all size scales. Through use of this tension-dependent building system, mechanical forces applied at the macroscale produce changes in biochemistry and gene expression within individual living cells. This structure-based system provides a mechanistic basis to explain how application of physical therapies might influence cell and tissue physiology."[3]

Donald E. Ingber, M.D., Ph.D.

"The word 'tensegrity' is an invention: a contraction of 'tensional integrity'. Tensegrity describes a structural-relationship principle in which structural shape is guaranteed by the finitely closed, comprehensively continuous, tensional behaviors of the system and not by the discontinuous and exclusively local compression member behaviors. Tensegrity provides the ability to yield increasingly without ultimately breaking or coming asunder."

Buckminster Fuller, 1961[1]

Note: Kenneth Snelson, a student of Buckminster Fuller, is credited with the first demonstration of the application of tensegrity, using cable and strut models, dating back to 1949.

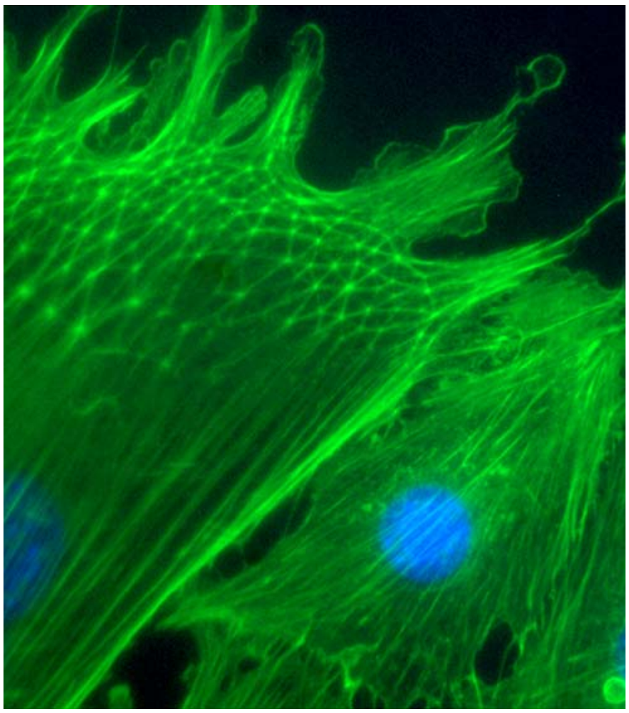


Figure 2: Cytoskeleton Showing Tensegrity Structure

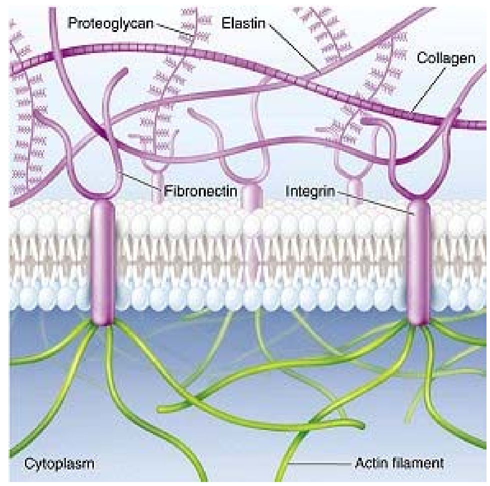
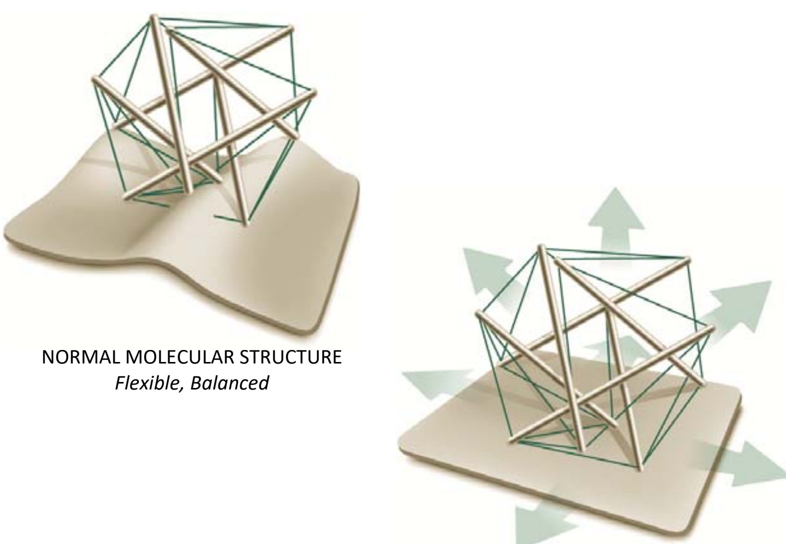


Figure 2a: Extracellular Matrix



NORMAL MOLECULAR STRUCTURE
Flexible, Balanced

RESTRICTED MOLECULAR STRUCTURE
Rigid, Expanded

Based on:
"The Architecture of Life"
Scientific American 1998

Figure 3: Normal and Restricted Tensegrity Structure

The tensegrity matrix is the underlying structure of biological tissue at the molecular level. It explains the biomechanical, electrical and physiological properties of life on this planet. Mechanical stress due to physical injury, as well as electrical or neurological stimulation, may alter the physical properties of the cellular and intercellular elements of the matrix, causing it to change from a flexible state to an expanded and rigid state. Thus, the apparent hypertonicity or fibrosis of muscle and fascia, as well as the enlargement of bone, which has now been documented as a consequence of injury (see: Figure 4, below)[9], can be seen as an altered electro-mechanical relationship at the molecular level (see: Figure 3).

Primary Restrictions

When the force of an injury – either strain or impact – enters the body, it is rapidly transmitted throughout the tensegrity matrix and thus throughout the body. Moderate forces are easily dissipated due to the elastic properties of the matrix. Excessive force however, beyond a certain threshold, may be absorbed by the tissues and cells, causing the molecular elements to be raised to a higher energetic state (see: Figure 3, above). In certain parts of the body, which are higher in density due to the presence of water (fluid-filled viscera) or the hydroxyappetitecrystalline matrix of bone – the mechanical energy is more readily transferred to the molecular structure of the tissues. The dense matrix of these tissues results in a focusing effect of the mechanical energy of the injury. Research conducted by investigators at the University of California, have discovered that injury to bone, causes certain glue-like collagen strands between the trabeculaeto uncoil, resulting in a *permanent* enlargement of the structure (see: Figure 4, left).[9]

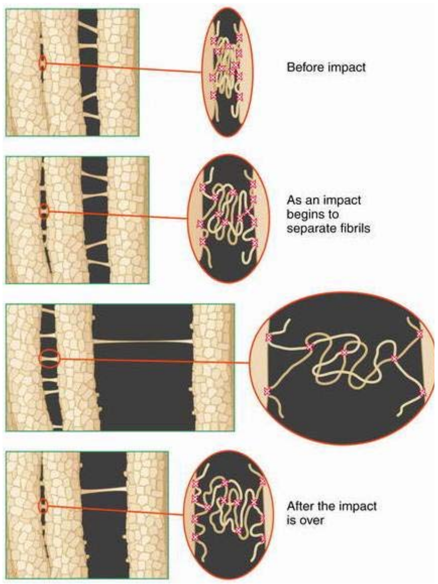


Figure 4 – Response of the fascial elements of bone to impact injury

Water is the densest substance in the body. Fluid-filled internal organs (such as the heart, liver, spleen and kidneys) tend to absorb much of the force of injury, leading to so-called 'internal injuries'. Visceral structures react like water balloons, rapidly expanding with impact and transferring these forces to surrounding structures, such as the spine, rib cage, pelvis and cranial vault.

Cells are bound to each other through binding sites located on the cell membrane and are connected to surrounding cells by the extracellular matrix (ECM)[7]. Therefore, a source of restriction due to injury in one part of the body, is instantaneously transmitted to surrounding structures. The tensegrity matrix represents a continuous kinetic chain, which explains how patterns of tension arising from one primary restriction, create tension and aberrant motion in structures throughout the entire body. This results in biomechanical dysfuctionand increased strain on pain sensitive structures, such as fascia, muscles and joints. The resulting *strain patterns* are illustrated in Figure 5.The primary restriction – the ultimate source of the dysfunction – however, is often painless after the acute phase and only becomes painful upon direct stimulation (tender or trigger points).

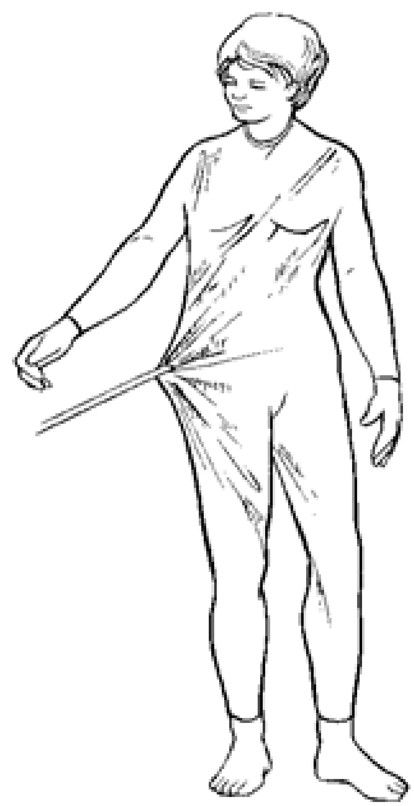


Figure 5 – Strain Patterns

The Resistance Barrier

The resistance barrier is the background state of tone of the tissues of the body, which is a direct extension of the inherent state of the tensegrity matrix. The resistance barrier is detected by manual pressure or stress on a part of the body and may be determined by the degree of "give" in any one particular area. The manual pressure is applied gradually until the practitioner notices a slight opposing resistance or counter-pressure into the testing hand, almost as if the body is pushing back. This perceived barrier is in direct proportion to any and all primary restrictions in the body due to the interconnected nature of the matrix. A change in the resistance barrier will occur when an electromagnetic field is positioned over a primary restriction (see: ***Scanning***, below), or when treatment is completed. The resistance barrier is also the appropriate interface required to generate the treatment process, which culminates in a resolution of a certain amount of tissue resistance (see: ***Release***, below).

Electrical Properties of the Body

Each cell in the body generates electrical energy in the form of a differential charge across the cell membrane. The tissues of the body (intracellular and extracellular elements) are efficient semiconductors. Under normal conditions, electrical current measured in microamps, is conducted throughout the body, and appears to be an essential element of cellular homeostasis and metabolic well-being. The use of ECG (electrocardiography) and EEG (electroencephalography) to assess the function of the heart and the brain, respectively, makes use of these properties. In bone,osteocytes undergo deformation associated with movements, such as compression, flexion and torsion. Pressure gradients, caused by these tissue stresses, create a flow of extracellular fluid around the osteocytes,resulting in piezoelectric effects and the formation of electric fields called "streaming potentials."[8]

In addition, the nervous system may be viewed as a system of hard-wired electrical circuits, or 'phone lines' which communicate electronic information throughout the body. The fascial system, which is comprised of the cellular and extracellular matrix andnow appears to be able to transmit information in the form of electrical and even photonic signals[7], may be considered to be analogous to the internet. Various influences, such as injury, chemical imbalance and even neurological overstimulation due to stress, may lead to changes in the electrical properties of tissue.[6]The molecular and cellular changes at the site of primary restrictions appear to a produce reduced electrical conduction and increased electrical resistance and/or capacitance.[10]These changes result in a local areas of static electrical charge and increased tissue resistance and rigidity.

Scanning

Nerves are essentially electrical circuits, and therefore areas of the body with more of these circuits will generate a stronger electrical field. The hand contains a large concentration of nerve endings and therefore it produces a relatively strong electrical field. This may be one of the reasons we automatically place our hand on an injured area, such as a bumped knee or elbow, without even thinking about it. Placing the hand or a biocompatible electromagnetic field over a part of the body appears to introduce a normalizing influence, which results in a reduction in tension in the area of injury. This may be due to the principle of ***induction***, which is the introduction of an electromagnetic field in proximity to a structure, which has the potential to generate electrical current. The stronger field is said to *induce* current in the adjacent structure.*Scanning*utilizes this principle to determine the location of the primary restrictions.

In the Matrix Repatterning scanning procedure, one hand is used to monitor the tissue resistance in an area of the body, referred to as the ***indicator***, while the other hand is systematically placed on a series of other locations. Alternatively, a **MatrixPulse™ Scanner**, which produces a specifically modulated pulsed magnetic field (similar but stronger than the field generated by the hand) may be used to scan the body. The response of the Indicator (see below) is used to verify the location of the primary restrictions.

The**Global Assessment** is a systematic scanning procedure used by Matrix Repatterning practitioners to determine the presence of any current or persisting primary restrictions. It involves the testing of approximately 36 anatomical sites.

Indicator

The *indicator* is any part of the body used to verify the location of a primary restriction. Various parts of the body may be used as an indicator to test the rest of the body, based on convenience for the practitioner and/or comfort for the patient. Common areas include the rib cage, the shoulder girdle, or any large muscle belly. Since the fascial system of the body is interconnected, via the tensegrity matrix, as a continuous fabric or *kinetic chain*, when the scanning hand or Matrix Scanner is placed over a primary restriction, that source of tension is temporarily reduced, resulting in a slight relaxation of the entire body. Monitored at the indicator site, this results in a sense of greater 'give' or depth of excursion. Therefore, the part of the body being scanned, which caused the indicator to relax, is considered to be a primary restriction.

Figure 6 – Use of Matrix Scanner and Indicator

Treatment – The "Release"

Treatment is applied to the identified tissues associated with the primary restriction. This involves a gentle form of manual pressure, along specifically determined mechanical vectors. The so-called release process appears to be the result of the generation of piezoelectric current and the resulting release of the static or stored electrical charge in the area of treatment. This allows the molecular structure of the cells and the extracellular matrix to return to the relaxed state. In addition, the use of electromagnetic stimulation, supplied by a device such as the MatrixPulse™ Scanner, can facilitate the release of locally stored electrical charge at the site of tissue injury. As each of several vectors of restriction is released in this manner, the injury or primary restriction is restored to a normal state of tissue tone. The therapeutic process involves the identification of any and all primary restrictions accumulated over a lifetime, and their systematic treatment in priority sequence. This typically leads to a restoration of optimal biomechanical and physiological function, resulting in an improvement in overall well-being.

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