Two- and Three-Dimensional Organization of the Body’s Trigger Points and Fascial Ratio System –

Foundations of the Myofractal™ Theory

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1. Introduction

The Myofractal™ theory conceptualizes the human body as a *self-organizing geometric ratio system* in which the fascial network maintains equilibrium between local and global tensions. The connective tissue network (fascia) is a continuous structure permeating the entire organism, coordinating the function of muscles, tendons, joints, and organs on both mechanical and informational levels (Schleip et al., 2012).

Clinical experience accumulated through decades of manual therapy has demonstrated that the body does not respond to intervention at isolated points; rather, the redistribution of tension and compensatory mechanisms occur within a *geometric system of ratios*. The release of a single point may induce structural rearrangements in distant body regions, indicating that fascia behaves not as a linear tissue but as a *self-similar, fractally organized network* (Findley, 2015; Stecco, 2019).

Both the classical trigger point theory (Travell & Simons, 1999) and contemporary fascial research (Stecco et al., 2013; Schleip et al., 2012) confirm that the body’s tension fields are functionally interconnected. Within the framework of the Myofractal™ theory, it is hypothesized that these connections are organized into *geometric ratio systems* based on the biomechanical principles of fractal geometry (Mandelbrot, 1983) and tensegrity (Fuller, 1975).

The Myofractal™ model distinguishes three fundamental levels of organization: the two-dimensional (2D) surface ratio system, the three-dimensional (3D) spatial ratio system, and the global fractal field that regulates the dynamic stability of the entire body. The model aims to provide a mathematical and biomechanical framework for the principles governing fascial balance, thereby creating a bridge between *empirical clinical experience* and *theoretical systematization* (Goldberger, 1996; West, 2012).

At its present stage, the Myofractal™ theory constitutes a theoretical thesis, yet it is founded on *empirical evidence* derived from decades of clinical practice in manual therapy. The model originates from systematic clinical observation and represents its theoretical synthesis; its experimental validation is currently in progress within the TP-GEO-Sellei-2025 research framework.

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2. Theoretical Background

The fascia, as a connective tissue network permeating the human body, plays a decisive role in both the structural and functional organization of human biomechanics. According to Schleip and colleagues, fascia is not a passive sheath but an *active proprioceptive and mechanosensitive organ* capable of perceiving tension changes and responding to them through *global structural adaptation* (Schleip et al., 2012).

Anatomically, fascia represents a continuous three-dimensional continuum that maintains constant spatial relationships among muscular and visceral components (Stecco et al., 2013). This continuity enables the investigation of geometric patterns that reflect the body's tension state in the form of *ratio relationships*.

Findley (2015) observed that fascial tensions often follow regular geometric patterns, suggesting *self-organizing behavior*. Fascia, therefore, is not merely an anatomical tissue but a dynamic, fractally organized network in which local changes induce *global rearrangements* (Goldberger, 1996; West, 2012).

From this perspective, the body's ratio system is not static but a *self-tuning mechanism*, where stability emerges through *ratio preservation* and *geometric self-similarity*. The Myofractal™ theory aims to formalize this ratio system mathematically within the biomechanical frameworks of fractal geometry (Mandelbrot, 1983) and the tensegrity principle (Fuller, 1975).

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3. Fascia as a Fractally Organized Network

The fundamental property of fractal systems is that their parts repeat the structural pattern of the whole in a self-similar manner (Mandelbrot, 1983). The behavior of fascia follows this exact structural logic: micro-level (cellular and fiber-level) tension distribution patterns are mirrored at the macro level (West, 2012).

Biomechanically, this means that every local tension variation fits within a larger spatial pattern. The body does not react at discrete points but through proportional responses: when one area is released, compensatory adjustments automatically occur elsewhere (Schleip et al., 2012; Stecco et al., 2013).

This phenomenon is described by the fractal dimension (Df), which characterizes the system's *scaling behavior* (Goldberger, 1996). When Df = 1, the system is linear (e.g., a muscle fiber); when Df = 2, it is planar (a fascial sheet); and when 2 < Df < 3, it forms a three-dimensional but self-similar structure, which is neither rigid nor uniform but *scalable and adaptive* (West, 2012).

The fascia operates precisely within this intermediate domain: it is neither a flat plane nor a solid volumetric structure but a fractal boundary field that responds proportionally to load. Stability thus arises not from material stiffness but from ratio preservation (Fuller, 1975).

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4. Organization of the Fascial Ratio System

4.1 The Two-Dimensional Fascial Ratio System (2D Model)

On the body's surface, tension does not distribute randomly. Based on manual experience and geometric analysis, the fascial plane follows triangulated ratio patterns among points of tension. These *ratio triangles* constitute the foundation of the two-dimensional fascial ratio system, in which local tensions and directional vectors are arranged in a defined, self-similar structure.

1. **Level 1 – Trigger point.**
   The smallest palpable unit is the trigger point — perceived as a single point but surrounded by three subtly proportioned tension vectors forming a microfield at the limit of tactile perception. This micro-tension field is not perceived as discrete points but as fine changes in tone, expressing the directional and intensity relationships of the fascia (Travell & Simons, 1999; Dommerholt et al., 2006; Fernández-de-Las-Peñas & Dommerholt, 2018). Traditionally, a trigger point is defined as a localized muscular contraction that produces referred pain upon pressure. The Myofractal™ theory extends this interpretation

geometrically: a trigger point is not merely a biochemical phenomenon but the *result of a three-directional tension ratio system* forming around it.

2. **Level 2 – Myodelta (triangle).**
   Three trigger points form a planar tension triangle — a myodelta. It represents the fascial ratio relationship in which angular and distance proportions define both the direction and distribution of tension (Stecco, 2015). The myodelta is not a static triangle but a dynamic relationship reflecting the fascia's *instantaneous tension state*. The proportion among its three points indicates whether the tissue in that area is tightening, pulling, or releasing — a planar fascial ratio that continuously self-harmonizes.

3. **Level 3 – Tension pattern (network of myodeltas).**
   On the body's surface, myodeltas interconnect to form a grid-like tension field. These fields alternate between contraction and relaxation, resembling a tartan pattern, where variations in density and spacing indicate energy distribution (Findley, 2015; West, 2012). This forms the surface fascial ratio field, the body's two-dimensional tension map.

Not every triangle between three trigger points is active: some carry tension while others remain neutral. This alternation produces a dynamic, ratio-based pattern. The surface ratio field behaves as a geometric resonance network — any local change (e.g., releasing a trigger point) initiates *re-tuning* throughout the entire field (Fuller, 1975).

Therefore, stability in the fascial plane arises not from rigidity but from ratio preservation — the body maintains balance through self-similar geometric ratios (Mandelbrot, 1983). The two-dimensional ratio system thus represents a self-similar planar fractal field, forming the geometric basis of fascial behavior on the surface and directly leading toward the three-dimensional organization.

4.2 The Three-Dimensional Fascial Ratio System (3D Model)

The spatial organization of the body can be understood as an extension of the two-dimensional fascial ratio system. While the 2D model describes surface (planar) tension patterns, the 3D model examines deep spatial relationships, where fascial tensions form proportional systems not only in planes but throughout space. This three-dimensional ratio field provides the geometric foundation of the body's global stability.

According to the Myofractal™ theory, the 3D structure comprises three hierarchical levels:

1. **Level 1 – Myodelta (spatial triangle):**
   A unit defined by three points, no longer planar but slightly distorted with a *depth (Z-axis)* component. Local fascial deformations create such distorted myodeltas, determining both the direction and depth of tension (Stecco, 2015; Schleip et al., 2012).

2. **Level 2 – Myoterta (spatial pyramid / tetrahedron):**
   Formed by three myodeltas and a fourth opposing point. The myoterta represents the smallest stable spatial configuration in which forces are balanced within a closed system (Fuller, 1975). It is the basic unit of spatial tensegrity, where tension and compression distribute proportionally, ensuring elastic equilibrium. The network of myotertas constitutes the deep fascial organization — the three-dimensional fractal field of the body.

3. **Level 3 – Myofascial ratio field (fractal field):**
   Myotertas interconnect in repetitive, self-similar patterns, forming the global ratio system of the body. This field is not static but a dynamic, continuously re-harmonizing network that proportionally redistributes mechanical loads. The fractal dimension here is $2 < Df < 3$, indicating a self-similar boundary field that is neither purely planar nor volumetric (Goldberger, 1996; West, 2012).

From a biomechanical perspective, the 3D ratio system describes the "intelligent stability" of fascia: the body reacts to external forces not as a rigid structure but as a ratio-preserving fractal network. When one point is released, energy redistributes across the entire tetrahedral field — this continuous *self-tuning* allows the human body to maintain equilibrium with minimal energy expenditure (Fuller, 1975; Schleip et al., 2012).

The 3D level of the Myofractal™ theory therefore describes the geometric–fractal tensegrity that governs the internal fascial architecture of the body. The interconnection of surface (2D) and deep (3D) fields forms a self-similar, ratio-based tension network, which underlies stability, adaptability, and energy distribution throughout the organism.

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5. Mathematical and Biomechanical Interpretation – Theoretical Foundations

At its current stage, the Myofractal™ theory does not represent an experimental verification but a theoretical framework — a geometric and biomechanical model describing bodily tension through proportional relationships. The goal is not measurement but the formulation of the mathematical logic underlying fascial self-organization (Fuller, 1975; Mandelbrot, 1983).

The system is governed by the laws of fractal geometry and scaling invariance (Mandelbrot, 1983; West, 2012). The fascial tension network is non-linear and self-similar: it organizes according to the same principles across all scales, only at different magnitudes (Goldberger, 1996).

This behavior is expressed by the fractal dimension (Df), representing the “degree of spatiality” of the system. According to the Myofractal™ theory, fascial behavior can be described within the range:

$2<Df<3$

meaning that the body’s tension field is neither purely two-dimensional (2D) nor entirely three-dimensional (3D), but functions within a fractal boundary field (West, 2012; Goldberger, 1996).

Fascia, therefore, is not merely tissue but a self-similar ratio system that proportionally redistributes mechanical loads. The relationship between tension and energy follows a logarithmic ratio law:

$E \propto \log(r-Df)$

where E is tension energy, r is the scaling ratio, and Df is the fractal dimension. This formula indicates that energy distribution in the body is non-linear and ratio-dependent: small ratio changes can induce large compensations, explaining the fascia’s self-tuning, tensegrity-like behavior (Fuller, 1975; Findley, 2015).

From a biomechanical standpoint, this model redefines stability: bodily equilibrium is not a fixed state but a continuous process of ratio equalization, where the fascia constantly re-harmonizes itself (Stecco, 2015; Schleip et al., 2012). This behavior constitutes the biomechanical basis of fractal stability — a self-regulating mechanism operating under the same ratio laws across all bodily levels.

Thus, the Myofractal™ theory presently stands as a theoretical construct, providing a framework for future empirical studies such as TP-GEO-Sellei-2025, which aims to validate whether the spatial arrangement of trigger points indeed follows a fractal ratio system.

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