



# Could the clinical efficiency and the physiological mode of action of the Toggle-Recoil manual technique be explained by a mechanical oscillation transmitted to fascia ?

Sandra DELVAL<sup>1</sup>, Franck CIMALA<sup>2</sup>

<sup>1</sup> D.O. MROF (Toulouse, FRANCE) ; <sup>2</sup> BsC(Hons)Ost, CEESO Lyon headmaster, master's thesis supervisor (Centre Européen d'Enseignement Supérieur de l'Ostéopathie, Lyon, FRANCE)

Corresponding author : [sandradelval.osteo@gmail.com](mailto:sandradelval.osteo@gmail.com)

## Background



« Find it, fix it, and leave it alone »

Andrew Taylor STILL

The Toggle-recoil technique is used since the beginnings of osteopathy and chiropractics, in several of these practices : Mechanical Link, SAT, Hole-in-One, SOT. It aims at normalizing somatic dysfunctions using a vibration transmitted to elastic tissues of various degrees of density, from vascular tissue to internal bone tissue. Its global action on the body has an impact on homeostasis and biomechanics of the corporeal pattern. While its clinical efficiency is empirically acknowledged by osteopaths and chiropractors, its mode of action is not yet scientifically proven.

### OBJECTIVE :

=> We studied the hypotheses formulated by the authors on the basis of their clinical practice,

=> then compared them to recent scientific publications on fascia properties (Schleip), mechanotransduction (Ingber, Cañadas), biotensegrity (Fullford, Levin),

=> to make new hypothesis about the Toggle-recoil physiological action and its clinical consequences.

## Methods

### 1. Literature Review :

**Data bases :** PubMed, Science Direct, Ostmed, Google Scholar

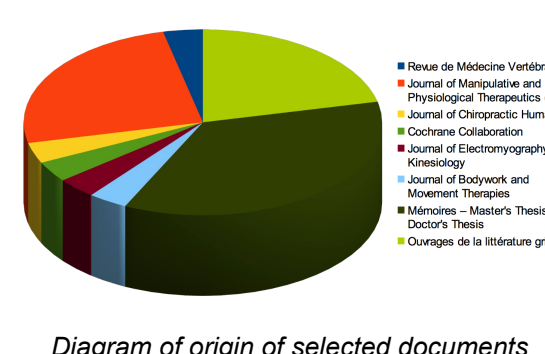
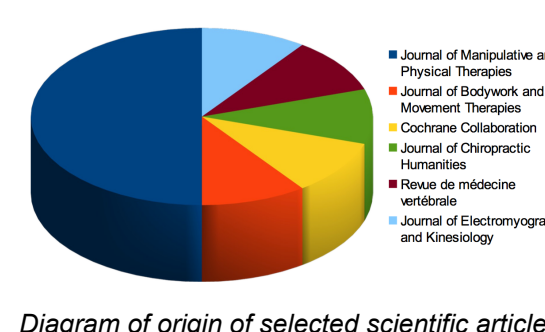
**Reviews :** Journal of Manipulative and Physical Therapeutics (JMPT), Journal of the American Osteopathic Association (JAOA), Journal of Electromyography and Kinesiology (JEK), Journal of Chiropractic Humanities (JCH), Journal of Bodywork and Movement Therapies (JBMT)

**Experts advices :** J.P. Barral DO, P. Chaffour DO MROF, J.C. Guimberteau MD, E. Prat DO MROF

### 2. Analysis, Synthesis and proposition of a model of the Toggle-Recoil technique :

Data bases were used to :

1. Propose a 2-phase new definition of the Recoil technique
2. Make hypotheses about the mode of action of the Recoil technique
3. Propose an analogy for modelling the Recoil technique in order to understand better its mechanism and confront its validity with clinical experience

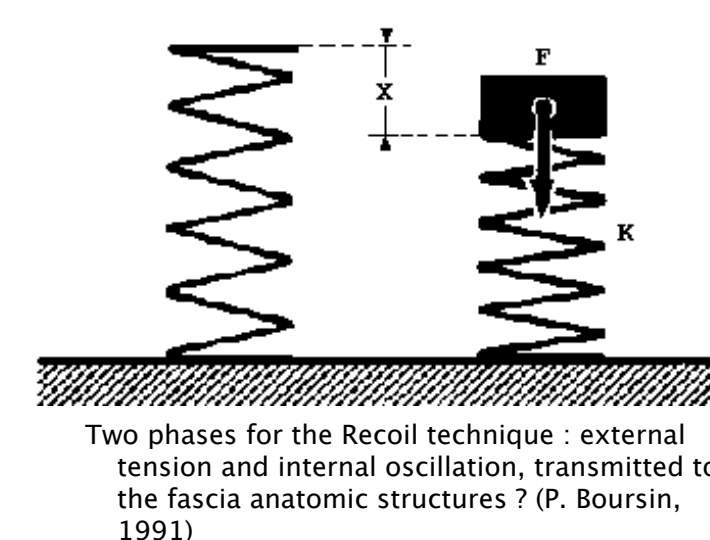


## Results

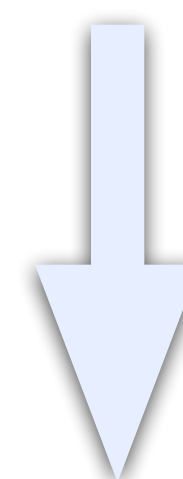
### 1. From the technical descriptions of the existing literature, a new definition in two phases of the Recoil technique has been established :

**1. Active structural phase : application of an external force by the operator : a local tensioning action**

**2. Passive, indirect, global phase : quick release of the tension to let an oscillating wave propagate** (indirect, fascial, local and remote target)



Two phases for the Recoil technique : external tension and internal oscillation, transmitted to the fascia anatomic structures ? (P. Boursin, 1991)



Endoscopic image of fascia recorded by J.C. Guimberteau MD

### 3. The oscillation transmitted to fascia anatomic structures could explain the clinical effects, biomechanical and physiological actions of the Recoil technique

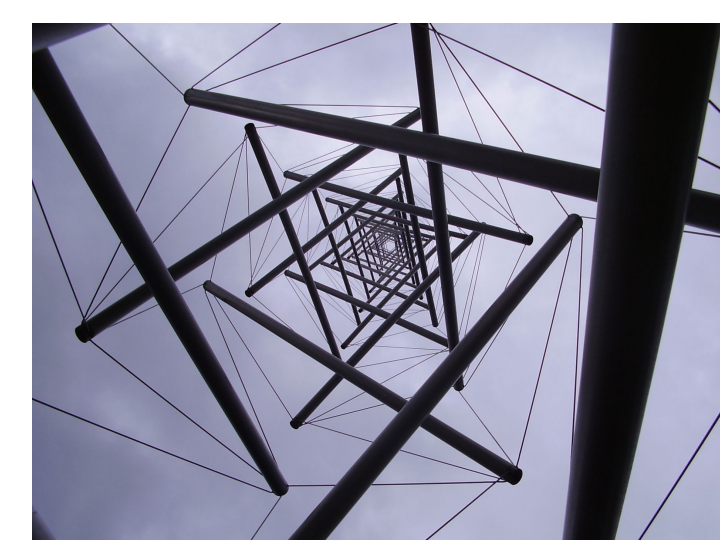
#### MICROSCOPIC ACTION :

**Mechanoreceptors in fascia** (Schleip) : OTG, Pacini, Ruffini, interstitial fibers II et IV, alpha nerves cells of the periosteum ; action on the inverse myotatic (Golgi) effect, reprogramming the dysfunction proprioceptive pattern / Modification of the somato-sensory activation (Pickar et Bolton) : myofascial effect, articular and visceral effect / Piezo-electric effect / Streaming potentials

**Mechano-transduction** : cell-reaction to the mechanical strain modifying its biochemical properties and ions fluxes by the integrins (Ingber). Cell reaction : extracellular matrix, magnetocytometry, possible explanation of the physiologic effects on homeostasis (Cañadas, INSERM)

#### MACROSCOPIC ACTION :

Modification of the corporeal pattern by **transmission of an oscillation to fascia at all scales** ? sensitive proprioceptive effect / biomechanical effect / **biotensegrity pattern**



Concept of Tensegrity (Needle Tower II, Kenneth Snelson)

### TAKE-HOME MESSAGE :

=> With fascia, anatomy is not considered anymore as a set of rigid segments linked by joints, but as a dynamic womb of viscoelastic elements in permanent pretension, reacting to external mechanical strains, in a permanent adaptation.

=> In this context the application and release of a compressive force can transmit an oscillation to all fascia structures. It could explain the global clinical effect of the Recoil technique, from the cell biochemistry to the biomechanical pattern of the body.

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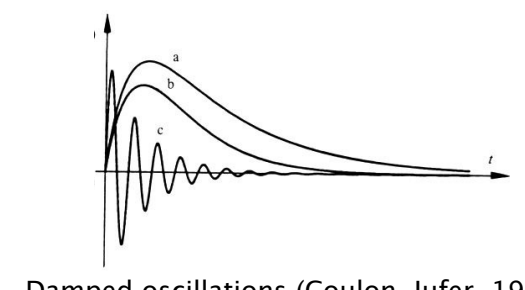
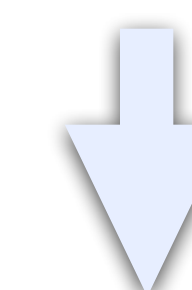
## Discussion

### SYNTHESIS BY PROPOSING A MODEL TO THE RECOIL TECHNIQUE : THE DAMPED HARMONIC OSCILLATOR

Considerations about the hypothesis on the mechanism of Recoil technique, from the cell to the corporeal pattern

#### First impulsion generating damped harmonic oscillations

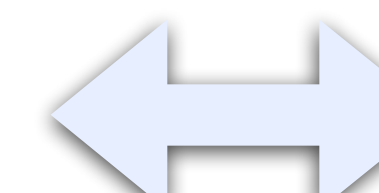
A damped harmonic oscillator could represent the structures put in tension by the clinician operator. Different strengths would be involved by the effect of composite beams. After the first tension and quick release (first impulsion), a wave would be transmitted to fascia and its structures would find their internal oscillation mode.



Damped oscillations (Coulon, Juffer, 1995)

#### Modelling the fascia reaction by the finite elements method

(Findley, 2008) / Application of the Newtonian mechanics, like the damped harmonic oscillator, to microscopic structures / mathematical integration : predict the response of fascia at the scale of the corporeal pattern.

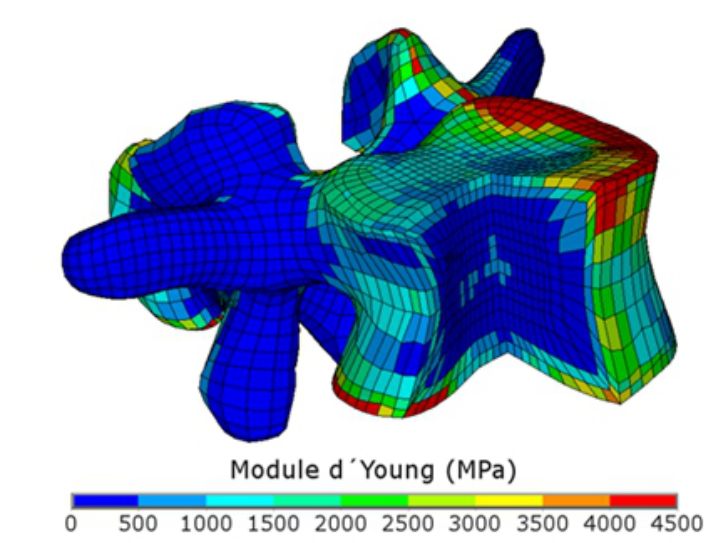


#### Viscoelasticity : reversibility / plasticity, strength / stiffness

• Damped reflections and transmissions would depend on the force vector of the first external strain : direction and intensity, and coefficient of internal strength of the oscillator.

• Analogy with the Recoil technique : parameters of the **tension** applied by the clinician operator (floating field, elastic reversible impulsion) and **strenght** depending on **viscoelasticity, stiffness, compliance** of the anatomic structures involved.

• Influence of physical general properties of the structure (bone, ligament, muscle...) / individual properties : age, state of health of the patient, medical history



Modelling a vertebra rigidity with the finite elements method, ENSAM

### MAIN IDEA :

propose an educational, explanatory model for the Recoil technique ; explain and understand better its mode of action and its clinical efficiency by the findings on fascia

## Conclusion

### PROPOSING A MODEL FOR THE RECOIL TECHNIQUE, LINKED WITH THE ANATOMIC NEW PARADIGM OF FASCIA

A new definition of the Recoil technique as a 2-phase technique has been proposed. The local and remote effects observed and the hypotheses of the authors and clinicians have been linked with the recent findings on anatomy, physiology of fascia and biotensegrity. From the results, considering the new anatomic paradigm of fascia as a dynamic, viscoelastic, continue, fractal womb in permanent pre-tension and adaptation, an explanatory model have been proposed to understand better this technique : the damped harmonic oscillator.

### PERSPECTIVE:

create a biomechanical model for the Recoil technique by the damped harmonic oscillator / predict the global effect on fascia at the scale of the human body by a mathematical integration / confront with clinical experience

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- NB : This poster is from my master's thesis realized in CEESO Lyon (2014) for the parts Background, Method and Results. The Discussion and Conclusion parts are posterior personal work.
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