• The human organism naturally pulsates when it is safe.
• When it is confronted by a threat its pulsation reduces.
• The greater the threat the greater the reduction of pulsation.
• If the threat is severe enough the freeze/dissociation response will occur.
• The tremor mechanism helps to re-initiate the inhibited/frozen pulsation.
This muscle pattern creates the flexion response in the body that pulls the body forward into a fetal position during traumatic events.

- Masseter
- Sternocleidomastoid
- Diaphragm
- Quadratus lumborum
- Psoas & Iliacus (Iliopsoas)
- Adductors

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TRIUNE BRAIN

NEOCORTEX
Human Brain
Rational, logic, creative, belief systems, imagination

LIMBIC SYSTEM
Brain
Emotional
Fight/Flight
Basic Emotions
Fear, Anger, Hate, Hurt, Rage Mammalian

BRAIN STEM
Reptilian Brain
Instinctual
Respiration
Heart Rate
Blood Pressure
The tremors are evoked by brain stem reaction

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THE HIGHWAYS & 5 WAYS WE REGULATE AFFECT

Relationship
Movement
Interoception
Touch
Nutrition/meds
TRE/Tremors
TRE is built on the premise that it is completely natural to move towards a fetal response in relation to stress, anxiety, trauma.

It is likewise just as natural to have the tremor release response after the perceived threat has subsided.

From an evolutionary standpoint, it is inefficient to have evolved with an instinctual neuro-physiological defense response without having also evolved with a naturally activated neuro-physiological deactivation of the defense response.

*Tremoring* is the natural response of the body to reduce the high aroused state of the stressful and traumatic experience and reduce the physical contraction pattern.
TREMOR MECHANISM IN TRE
Tremors as explained in the studies of:

Psychology
Neurology
Physiology
Tremors have been used as diagnostic features in a variety of DSM-5.

- **Panic attacks** “trembling or shaking”;
- **Social phobia** “tremors”;
- **Generalized anxiety disorder** “trembling or feeling shaky”
- **Post Traumatic Stress Disorder** (PTSD); “trembling”.

The science of psychology has viewed body tremor as part of the pathological expression of the disorder.

The self-induced therapeutic tremors of TRE are recognized as the neurophysiological attempt of the human organism to reduce autonomic nervous system (ANS) reactivity after the threat or danger has ended.
More than 10 distinct types of tremor, with varying patterns of onset and degrees of progression, have been identified.

<table>
<thead>
<tr>
<th>Rest tremors,</th>
<th>Isometric tremors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postural tremors</td>
<td>Parkinson’s tremors</td>
</tr>
<tr>
<td>Kinetic tremors,</td>
<td>Cerebellar tremors</td>
</tr>
<tr>
<td>Involuntary tremors</td>
<td>Simple tremors</td>
</tr>
<tr>
<td>Intentional tremors</td>
<td>Essential tremors</td>
</tr>
</tbody>
</table>

Generators of Tremor and Anatomical Pathways
Several brain areas play a key-role in tremorgenesis
### Table 2. Main Disorders Associated with Tremor

<table>
<thead>
<tr>
<th>Type of Tremor</th>
<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest tremor</td>
<td>Parkinson’s disease</td>
</tr>
<tr>
<td></td>
<td>Drug-induced Parkinsonism</td>
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<tr>
<td></td>
<td>Stroke</td>
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<tr>
<td></td>
<td><strong>Post-traumatic tremor</strong></td>
</tr>
<tr>
<td>Postural tremor</td>
<td>Essential Tremor</td>
</tr>
<tr>
<td></td>
<td>Enhanced Physiological tremor</td>
</tr>
<tr>
<td></td>
<td>Cerebellar diseases</td>
</tr>
<tr>
<td></td>
<td>Multiple Sclerosis</td>
</tr>
<tr>
<td></td>
<td><strong>Post-traumatic tremor</strong></td>
</tr>
<tr>
<td></td>
<td>Drug-induced postural tremor</td>
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<tr>
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<td>Kinetic tremor</td>
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<td></td>
<td>Essential Tremor</td>
</tr>
<tr>
<td></td>
<td>Multiple Sclerosis</td>
</tr>
</tbody>
</table>
Self-Induced Therapeutic Tremor SITT

THERAPEUTIC TREMOR RELEASE EXERCISE (TRE)

Self-Induced Therapeutic Tremor

TRE: SITT has specific unique qualities:

1. **Postural or isometric (static) activation**
   (The tremors can be activated by holding a posture or by being passively relaxed.)

2. **Augmented at rest**
   (The tremors are assisted in their continuation by remaining in a rest position.)

3. **Wide distribution/migratory**
   (The tremors travel throughout the body. They do not only occur in the muscles that we have stressed.)

4. **Variable amplitude and frequency**
   (Amplitude explains how much the tremors move the organism.
   The bigger the movement the lower the frequency
   Low frequency = big movement (high amplitude)
   High frequency = smaller movement (low amplitude)
“IF THE ANIMAL...SURVIVES THE FREEZE RESPONSE, THESE SURVIVAL MEMORIES NEED TO BE STORED AS AN EVENT IN THE PAST, AVAILABLE FOR FUTURE USE BUT NO LONGER REPRESENTING IMMINENT THREAT” (P.97).

“THIS PROCESS OF SORTING OUT, SAVING, AND DISCARDING MEMORIES IS ACHIEVED BY A VERY IMPORTANT PHYSIOLOGICAL PROCESS CALLED THE FREEZE DISCHARGE” (P. 97).

“...THE PURPOSE OF THE FREEZE DISCHARGE IS TO COMPLETE THE ACT OF ESCAPE IN PROCEDURAL MEMORY SO THAT THE SENSORYMOTOR ACTIVITY IS REMEMBERED AS A SURVIVAL TOOL FROM THE PAST-NOT SOMETHING THAT REMAINS IMMINENT AND UNRESOLVED” (P.99)
PTSD AS A CORRUPTION OF MEMORY

Explicit

Declarative

Episodic

Implicit

Emotional

Procedural

Most Conscious ————- ————- ————- ————- ————- ————- -Least Conscious

“Cold”, Facts

“Warm”, Emotional Tone, Texture, Nuance

“Hot”, Sensations of surprise, fear, anger, disgust, sadness, joy, curiosity

“Hot”, Learned Motor Action, Emergency Response-FFF Behaviors, Behaviors of Approach and Avoidance, Proprioception, Interoception, Nociception, Neuroception
1960: Rhythmic Neuromuscular Stimulation (RNS): method (the technique that today's vibration methodology is based on) dates back to 1960 when Professor W. Biermann, from the former East German Republic, described so-called "cyclical vibrations" as being capable of improving the condition of the joints (by stretching muscles and tendons) relatively quickly. (Cardinale & Bosco, 2003).

1970: Vibrational therapy: Vibration on human muscles was utilized by Russian scientist Vladimir Nazarov in the 1970s, on gymnasts in training for Olympic gold because numerous studies demonstrated that low-amplitude and low-frequency mechanical stimulation of the neuromuscular system had positive effects on athletic performance (Issurin & Tenenbaum, 1999; Cardinale & Bosco, 2003; Torvinen et al., 2002; Bosco et al., 1999).
1990: **BIOMECHANICAL STIMULATION [BMS]**: Over time vibrational therapy developed as a serious field of research known as *Biomechanical Stimulation* ([BMS], Bosco et al., 1999). It was then used in physical therapy and rehabilitation programs to:

1. correct restricted body mobility,
2. improve range of motion,
3. coordination of musculoskeletal and nervous systems
4. increase the rate of healing injuries
5. increase bone density
6. provide pain relief and
7. heal tendons and muscles

(Bosco, Cardinale, & Tsarpela, 1999; Bosco et al., 2000; Bosco et al., 1999).

2000: **WHOLE BODY VIBRATION**: Biomechanical stimulation has since evolved into the most recent form of vibrational therapy known as *whole body vibration*. Whole body vibration has been recently proposed as an exercise intervention because of its potential for:

1. increasing force generating capacity in the lower limbs
2. positively altering muscle blood volume
3. increasing muscle strength

CENTRAL PATTERN GENERATORS

NEURAL NETWORKS THAT CAN PRODUCE TREMORS (AND OTHER MOVEMENTS) WITHOUT BRAIN COORDINATION

REQUIRE A THRESHOLD OF STIMULATION TO INITIATE

SOME HAVE AFFERENTS TO BRAIN STEM & LIMBIC SYSTEM THAT ARE LINKED TO INTEROCEPTION, PROPRIOCEPTION, AND THREAT-SENSITIVE BRAIN CIRCUITS

THOUGHT TO STIMULATE NEUROPLASTICITY IN SPINAL NEUROLOGY REACHES HIGHER BRAIN AREAS DISINHIBITING CONTRACTUAL PATTERNS

BY REGULATING INTEROCEPTION, PROPRIOCEPTION, THREAT-SENSING, SPINAL NEUROLOGY AND CONTRACTUAL PATTERNS THERE IS THE POTENTIAL TO INCREASE EMOTIONAL REGULATION.
Self-induced Therapeutic Tremor SITT

THERAPEUTIC TREMOR RELEASE EXERCISE (TRE)

High frequency = low amplitude
(fast tremors = small movements)

Low frequency = high amplitude
(slow tremors = large movements)
DEFENSE CENTERS OF EXCELLENCE FOR PSYCHOLOGICAL HEALTH AND TBI

MIND-BODY SKILLS FOR REGULATING THE AUTONOMIC NERVOUS SYSTEM

“ROUTINE PHARMACEUTICAL AND PSYCHOLOGICAL INTERVENTIONS ARE OFTEN A LAST RESORT FOR HELPING PEOPLE MANAGE STRESS AND THEIR EMOTIONS” (P1).

“...EVOLVING RESEARCH INDICATES THAT BODY-BASED TECHNIQUES SUCH AS ASANA YOGA, TRE, AND TCM MAY HELP REGULATE STRESS HORMONES, RELAX POSTURAL TENSIONS, AND AFFECT PHYSIOLOGICAL STATES ASSOCIATED WITH CHRONIC STRESS AND ANXIETY, ULTIMATELY PROVING HELPFUL FOR RESTORING HOMOEOSTASIS” (P. 22).
An interdisciplinary research project was conducted to examine the effects of exercise-induced tremors. Sixty-one students (33 control group, 28 intervention group) volunteered to participate in this research. After performing the exercise routine six times over a two-week period, the STAI X-1 showed a significant reduction ($p < .05$) in anxiety-present and an increase in anxiety-absent in both the subscale and total scores. The Heart Rate Variability (HRV) data showed changes in the desired direction. These results suggest that these tremors might have therapeutic values for post-stressor recovery.
TRE RESEARCH: SHARON JOHNSON

Four separate interventions utilizing psychological insights and practices facilitated in psycho-educational group interventions for stress and burnout were presented over 10 weeks for 15 hours to 50 educators in four secondary schools by independent qualified facilitators. A control group of 20 teachers also took part in the study.

Preliminary findings suggest that teachers were able to significantly reduce learner burnout in the trauma release exercise, transactional analysis and three brain interventions. In coding analysis, trauma release exercises and transpersonal body techniques led to calm and relaxation, increased body awareness and improved self-understanding as well as providing self-help tools. Transactional analysis provided classroom tools and enhanced social connection. There was more cognitive understanding of stress transactions with transactional analysis; calm and emotional healing with transpersonal psychology and more centeredness and groundedness reported by teachers who undertook trauma release exercises.
EEG recordings from the brain at rest compared to the tremor phase demonstrate that TRE positively influences brain wave activity in a way that is similar to meditation. TRE induces surges of beneficial alpha waves (green peaks) in many areas of the brain that are known to play a role in self-awareness, happiness and physical well-being.

Research contribution made by: Dr. Riccardo Cassiani-Ingoni cassianiingoni@gmail.com
Autonomic Nervous System

**Sympathetic Nervous System (SNS)**
- Mobilization system for the fight/flight response

**Parasympathetic Nervous System (PNS)**
- Rest/Digest, Calm
- Social Engagement
- Tend/Befriend, Pause/plan

Polyvagal Theory

**Sympathetic Nervous System (SNS)**

**Parasympathetic Nervous System (PNS)**

**Ventral Vagal**
- Parasympathetic Rest/Digest, Tend/Befriend, Pause/plan, calm
  - Social Engagement

**Dorsal Vagal**
- Parasympathetic Immobilization response

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(3) Dorsal Vagal PNS Immobility Response

(1) Ventral Vagal PNS Social Engagement

Self-regulation

PTSD Cycle – re-traumatization

POLYVAGAL CURVE