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**NEUROGENIC TREMOR¹ THROUGH TENSION, STRESS AND TRAUMA
RELEASING EXERCISES ACCORDING TO D. BERCELI IN THE TREATMENT OF
POST-TRAUMATIC STRESS DISORDER PTSD****Andreas Herold**

Вправи для зняття напруги, стресу та травматичного досвіду (TRE) складаються з семи вправ, які використовуються для стимулювання нейрогенного тремтіння. Метою цього тремтіння є зменшення симптоматики посттравматичних синдромів стресових розладів ПТСР і наступних скарг, що викликаються стресом. У даній статті описуються основні аспекти синдромів ПТСР, методика вправ TRE, наукова пояснювальна модель, основний принцип вправ і центральні аспекти саморегуляції.

Ключові слова: травма, стрес, фізичні вправи, нейрогенне тремтіння, саморегуляція, травмотерапія, посттравматичний стресовий розлад ПТСР

Tension, Stress and Trauma Releasing Exercises (TRE) are a sequence of seven exercises used to trigger neurogenic tremor. The aim of this tremor is to reduce symptoms of post-traumatic stress disorder PTSD and other stress-induced symptoms. This article describes the basic features of PTSD, the TRE method, the scientific explanatory model, the principle behind the exercises and the main features of self-regulation.

Key words: trauma, stress, physical exercises, neurogenic tremor, self-regulation, trauma therapy, post-traumatic stress disorder

Упражнения для снятия напряжения, стресса и травматического опыта (TRE) состоят из семи упражнений, служащих для стимулирования нейрогенного дрожания. Целью этого дрожания является уменьшение симптоматики посттравматических синдромов стрессовых расстройств ПТСР и последующих жалоб, вызываемых стрессом. В данной статье описываются основные аспекты синдромов ПТСР, методика упражнений TRE, научная объяснительная модель, основной принцип упражнений и центральные аспекты саморегуляции.

Ключевые слова: травма, стресс, физические упражнения, нейрогенное дрожание, саморегуляция, травмотерапия, посттравматическое стрессовое расстройство ПТСР

Introduction

Today, post-traumatic stress disorder (PTSD) is more topical than ever before. The papers, and the news on television or the internet are always reporting on natural catastrophes such as earthquakes, floods, tsunamis, typhoons etc. In addition to this are the acts of violence caused by humans, such as domestic violence, child mistreatment and abuse, rape, acts of war, terrorism, torture, political internment etc. Accidents and medical procedures can also have a traumatic effect.

The ICD-10 definition of trauma is an “exceptional threat” or a “catastrophic level of stress,

¹ Recently renamed SITT Self-Induced Therapeutic Tremor (Berceli 2014)

likely to cause a deep despair in almost everyone” (ICD-10: F 43.1, page 207ff.). An event that causes a trauma-related disturbance in one person may elicit a different response in another, who may recover after a certain time and show few or none of the symptoms of PTSD. The traumatic event should not just be considered from the viewpoint of the event ((severity type I – single trauma), type II – multiple trauma (Maercker 2009, page 138ff.)) but also from the perspective of personality and subjective reality (genetics, life story, social integration, resilience etc.). It is the subjective experience of the traumatic situation that is relevant, “the experience of complete helplessness, powerlessness and being at the mercy of somebody/something outside of one’s control is what matters” (Wöller 2006, page 11ff.).

Some people who go through a traumatic event go on to develop symptoms of PTSD which are extremely debilitating and prevent them from leading a normal, fulfilled life: these include intrusive thoughts, stressful dreams/nightmares, flashbacks, symptoms of dissociation and immobility, acute triggers, hyper and hypoarousal, sleep disturbances, avoidance of situations and unwanted thoughts and other symptoms such as depression, anxiety, compulsions and obsessions (Maercker 2009, page 17ff., Sachsse 2004, page 53ff.).

Each large psychotherapy school has developed its own approach to the treatment of post-traumatic stress disorder: cognitive procedure (Horowitz M.J. 2013), psychodynamic, imaginative procedure (PITT Reddemann, 2008, TRIBM Spangenberg 2015), Gestalt therapy (Butollo et al. 2002, Butollo & Karl 2014), combined methods such as EMDR (Shapiro 1998) and brainspotting (Grand 2014), resource-oriented procedure (Sack 2010), mindfulness-based procedure (Folette et al. 2015), body-related therapies (Somatic Experiencing, Levine 1998, 2004), sensorimotor therapy (Ogden et al. 2010), body therapy according to Rothschild (Rothschild 2000), yoga (Emerson & Hopper (2012)) and the procedure presented here (Tension, Stress and Trauma Releasing Exercises TRE) according to Dr. David Berceci (Berceci 2010, 2012, 2014).

Explanatory model/Etiological concepts

Cognitive Model

According to Horowitz (1976/1997), cognitive patterns (attitudes, beliefs, self-image) are altered by the traumatic event. In particular, “the negative interpretation of the trauma and its consequences may lead to a persistent awareness of the threat and the injury” (Maercker 2009, page 44ff.). The patient’s health can be restored if the cognitive patterns altered by the trauma and the control processes (avoidance, defense, denial) are triggered.

Emotional model

Children learn to regulate their emotions when they interact with their parents. The development of emotional tolerance and the regulation of emotions is learnt as they develop (Lammers 2007 page 48ff.) Serious disorders of emotional regulation and the loss of self-regulation are described especially in association with prolonged developmental traumas (Wöller 2006, page 75ff.). A flood of traumatic emotions is produced by corresponding triggers. The reduced affect regulation and impulse control caused by this (flight and fight reaction) is often interpreted by outsiders as inappropriate behavior. “The aggression shown by the traumatized neurotic is not intentional or deliberate. Their aggression is always impulsive and cannot be stifled for long”: (Kardiner 1941, page 97, quoted after Van der Kolk 2000). Disturbed mentalization, the ability to think about one’s own emotions or that of others and adopt an empathetic attitude can manifest as a disorder of reduced emotion regulation. The main features of emotion regulation have been studied

in recent years with research into the neurobiology of trauma (Rüegg 2011, Van der Kolk 2014, Scaer 2014).

Neurobiological model

From a neurobiological viewpoint, post-traumatic stress disorder PTSD may be considered as a stress processing disorder. In English, PTSD stands for post-traumatic *stress* disorder. The interplay between the information processing systems in the brain (sensory association fields of the neocortex, brain stem, basal ganglia, thalamus, limbic system) is reduced (Rüegg 2011). Research has shown (Van der Kolk 2000, page 200ff.) that disorders exist at the level of psychophysiological effects (over-excitation and loss of stimulus discrimination ability), neurohormonal effects (elevated level of noradrenalin, large fluctuations in cortisol concentrations (Sachsse 2004, page 48ff.), reduced serotonin concentration, increased opioid concentration and neuroanatomical effects (reduced hippocampus volume, chronic activation of the amygdala, reduced activation of Broca's center during flashbacks).

During a traumatic event, the following are activated as a survival reaction: the psychophysical system (autonomic nervous system ANS, sympathetic and parasympathetic branch) and the neurohormonal system (activation of the hypothalamic-pituitary-adrenal axis HPA). These produce the reaction pattern of fight, flight freeze (immobility). The fight or flight response (heightened arousal) is triggered by the activation of the psychophysical (ANS) and neurohormonal system. Immobility, freezing (physical) and dissociation (cognitive, mental) are organized by the simultaneous activation of both branches of the ANS (Levine 2010, page 71ff., Scaer 2014, page 81ff.).

In threatening situations impulses are transmitted by the psychophysical system to the musculoskeletal system, enabling the fight, flight and freeze response. The contraction sequences follow the given reaction patterns. If, during a traumatic event, it is not possible to perform the necessary movements, habitual muscle contractions will occur, which are very frequently controlled by the procedural memory (Scaer 2014 page 67ff.), that lead to pain. "Myofascial pain is (very commonly AH) stress-related, (...) any movement of the body, that is associated in any way with previous failed defensive movements, is highly likely to activate a reflex-type tension" (Scaer 2014, page 277ff.). Muscle cramps occur in particular in the muscle groups of the head, neck, shoulders, erector spinae muscles, hips and legs. The ilio-psoas muscles should be highlighted, as these are subject to reflex-type contractions in a threatening situation (Berceli 2012, S. 29ff.). The muscles of the foot joints, calf muscles, the quadriceps muscle, adductors, diaphragm, sternocleidomastoid muscle and masseter muscle are frequently also involved (Berceli 2014).

Tension, Stress and Trauma Releasing Exercises (TRE)

David Berceli, a former Catholic priest, with a PHD in clinical social work and a certified bioenergeticist, has lived in numerous conflict zones such as Israel/Palestine, Sudan, Uganda, Kenya, Yemen, Egypt and Lebanon. He has stayed in areas that have seen military action. Berceli reports (Berceli 2010b, Berceli DVD) that during a grenade attack during the war in Lebanon he took shelter in a cellar with eight other people of varying nationalities. While the bombs rained down, he observed everyone huddling into the fetal position. In the threatening situation the same automatic reflex-type movements were adopted by everyone. "During any traumatic experience the extensor muscles are inhibited so that the flexor muscles can contract." (Berceli 2010b, page 149). This position helps to protect the internal organs and may create a feeling of safety. As already

stated above, the following muscles are primarily involved: the calf muscles, the quadriceps muscle, the adductors, the diaphragm, the neck muscles and the muscles of mastication. The main muscle groups that contract in a threatening situation are the ilio-psoas muscle, the trunk, including the pelvis and legs. The ilio-psoas contracts when we assume the fetal position. The compensatory reaction of the erector spinae muscles leads to chronic backache in numerous traumatized people, since the tension in the ilio-psoas is chronically increased.

Berceli has observed that many people who have been traumatized go on to develop a spontaneous tremor. Many attempt to suppress this reaction. Children tremble spontaneously. The tremor in adults is often prevented in the presence of children, so that children do not interpret this tremor as anxiety of the adults (Berceli 2010, page 47ff.). “Tremor is essentially a natural mechanism of the body, so that it can discharge the high level of tension and chemical substances which overload the body at the time of a traumatic incident. The trembling process discharges the body of excessive energy and it returns to a state of rest and relaxation. In fact the ability to shake off a trauma is one of the most archaic reactions of the human animal (Berceli 2012, page 33).

Peter Levine, founder of Somatic Experiencing Trauma Healing, also describes how, after an accident when he was run over by a car, he was “overcome by a spontaneous tremor that was able to discharge enormous survival energy” (Levine 2010, page 34) (...) “that he had learned to accept and welcome primitive tremors and trembling and spontaneous body movements, instead of fearing and suppressing them” (Levine 2010, page 38).

Behavioral biology has taught us that following life-threatening situations (attack by a predator), mammals shake off the pent-up energy during the flight reaction or freeze reaction. There are numerous videos on YouTube that document this tremor. It is a natural mechanism that helps mammals to discharge the compressed energy following a threat and allows them to continue to live “normal” lives. Mammals in the wild are not able to develop PTSD, because after developing the freeze reaction after being attacked by prey, they always develop this tremor response. In Levine’s (Levine 1997, 2010) Somatic Experiencing Trauma Healing (SE), the concept of discharge of pent-up energy represents a primary feature in the treatment of PTSD. “Trauma symptoms are not caused by the external event. They develop when excessive energy is not discharged by the body. This energy remains trapped in the nervous system and can have a devastating impact on body and mind” (Levine O.J,Bl.4).

The TRE exercises may be used in groups, in individual therapy and as a self-help method alone at home.

Mechanism of action of tremor

The subjective effect of the tremor triggered by the seven TRE exercises (see below for description of the exercises) is experienced by almost all people as a feeling of peace and relaxation, a reduction of hyperarousal, an improved body image, a greater ability to tolerate affects (containment) and an enlarged Window of Tolerance (Ogden et al. 2010, page 67ff).

According to Scaer (2007, page 19ff.) (Berceli 2010a, page 3ff.), the tremor mechanism can reduce or inhibit the activity of the amygdala, so that the neuronal networks with trauma content become slowly erased in the procedural memory. The neurogenic tremor appears to be able to erase negative neural nets and form positive neural nets. Scaer confirms that the freeze or immobility response is imprinted forever in the procedural memory unless it is erased by the discharge action.

Cassiani-Ingoni (Berceli 2010a, page 4ff. no bibliographical reference) describes the effect

of the tremor mechanism in this way: repeated trembling causes a change in the neuro-muscular interface i.e. changes are detected at the level of the neurotransmitters. Changes in the proprioceptive information may occur in the central and peripheral nervous system.

Using an EEG, Cassiani-Ingoni was able to prove that similar brainwave activity is triggered by the tremor mechanism as occurs during meditation (Berceli 2014). Alpha-waves are known to be associated with feelings of peace and relaxation, happiness and self-awareness.

Camarotti (Berceli 2010a, page 6ff. no bibliographical reference) describes that neurogenic tremor regulates the release of serotonin and cerebral GABA and as a consequence reduces hyperarousal due to the reduced activity of the amygdala.

The TRE exercises

A short description of the TRE exercises and the tremor mechanism (Berceli 2012, Berceli DVD)

Exercise 1

Tilt both feet (if possible remove shoes and socks) onto their edges so they are facing in the same direction, with one foot on its outer edge and the other on its inner edge. Stay in this position for 30 seconds and then do the same on the other side for another 30 seconds. Continue with this exercise until you have done five repetitions on either side. Then stand on both legs and shake them vigorously.

Exercise 2

Shift your weight onto one foot, with the other foot remaining on the floor to maintain your balance. If you have problems with your balance you can put one hand on the wall. Lift the heel of the standing foot as high as possible and then lower it again to the floor. Repeat this movement until, on a stress scale of 1-10, you achieve a personal stress level of 7. This may cause a tension, a burning or a mild pain in the calf. This is completely normal, however you can decrease the stress slightly. Then stand on both legs and shake the worked leg vigorously to relieve the pain, burning or tension. Then work the other leg.

Exercise 3

Hold one foot behind the body using the hand of the same side. Bend the knee of the standing leg as low as possible as if you were going to sit down, and then lengthen it again (squats). The heel remains on the floor. Repeat this movement until on a stress scale of 1-10, you achieve a personal stress level of 7.

Exercise 4

Stretch your legs wide apart until you feel a tension in the muscles of the inner sides of the legs. Bend forward until you touch the floor. You should feel a stretch in the inner side of the thighs (adductors) and in the backs of the knees (hamstring tendons). Take three deep breaths. Walk both hands slowly towards one of your feet. Take three slow and deep breaths holding this position. Then walk your hands to the other foot. Hold this position for three deep breaths. Then walk your hands back to the middle and stretch your arms backwards through your legs. Hold this position for three deep breaths. At the end of the exercise return slowly to the upright position.

Exercise 5

Clench both fists and place them directly behind you above your pelvis. Push your pelvis slightly forwards until there is a slight arch in your back. You should feel a stretch in the front side of your thigh. Then turn gently to the back, starting from the hips, open your mouth and look behind

you into a corner of the room. Turn, again starting from the hips, in the opposite direction and look behind you. Then come to the upright position again.

Tremor exercise 1 against the wall

Lean with your back against a wall, as if there were a chair under you. This will load the thigh muscles (quadriceps). You may start to feel a slight pain, burning, tension or even a tremor in these muscles after a few minutes. As soon as it starts to hurt, move approximately 5 cm further up the wall. The tremor may become more pronounced and the pain subside. After approximately five minutes of tremor, peel yourself off the wall and allow your upper body to hang forwards. The tremor may increase; remain in this position for approximately three to four minutes.

Tremor exercise 2 on the floor (preferably lying on a mat)

Lie down on a mat on the floor with knees open and the soles of your feet touching. Lift your pelvis from the floor for one minute and make sure that the knees remain relaxed and wide apart. Place your pelvis back on the floor and leave your knees open and relaxed for a further minute. Move your knees approximately 5 cm closer together. Find the position that triggers a tremor. Simply allow the involuntary movements of the tremor or shaking to happen, until you feel it is time to stop. To end the exercise, stretch out the feet. Another alternative is to place the soles of the feet flat on the ground. Keep the knees slightly apart and the tremor and shaking will resume. Allow this movement to spread into your pelvis and your lower back region. To end the exercise, allow your feet to slide back until they are flat on the ground. You may turn on your side if you prefer this position.

If you experience anything unpleasant during the tremor (thoughts, pictures, physical sensations), you can interrupt the tremor mechanism at any time by letting your feet slide down (see self-regulation below).

Integration

When the tremor has ended, you should rest for a while and integrate your experiences. If you are working in a group or with a TRE practitioner, additional integration can occur through the spoken exchange. If you are exercising on your own, it is beneficial to make brief notes of your experiences.

Self-regulation

Self-regulation plays an extremely important role during the tremor in the TRE process. (See Boon et al. 2013, Vohs & Baumeister 2011)

If someone does not have sufficient capacity for self-regulation, cognitions, emotions or sensations during the tremor cannot be regulated.

It is very important that the physiological excitation that occurs during the TRE process is regulated: very strong feelings result in hyperarousal, very weak feelings (numbing) in hypoarousal.

In the majority of traumatized people, the window of tolerance (Ogden et al. 2010, 67ff.) is narrow. The aim of the tremor mechanism is to enlarge the window of tolerance.

The aim of self-regulation during the TRE process is to teach clients to tolerate physical sensations, cognitions or emotions without becoming overloaded.

If the tremor process is performed too quickly or for too long, after too rapid an activation of the parasympathetic nervous system immobility, freezing and dissociation can set in again. Therefore it is very important to be able to recognize the first signs of overload (holding one's

breath, tension, nervousness). If it proves too much for the clients, the tremor process should be stopped. Overload can occur in the first few minutes of the tremor it may become more intense when the tremor starts.

To stop the process, the client is asked to stretch out their legs in order to ground themselves and orientate themselves.

The TRE exercises should later be carried out by clients on their own at home as a form of self-help method, after they have learned them in a group or on their own with a practitioner. The main principles of self-regulation should be understood and practiced. The aim is to be able to work with TRE alone and without the assistance of the practitioner.

Duration of the tremor

A commonly-asked question is how frequently should the TRE exercises be performed, and for how long? In Bercelli 2012, page 102, Bercelli describes that these exercises are natural for the body, and can therefore be performed every day without causing any harm. (...) Once you have started doing the exercises, and you have performed them for the first time, and you have experienced no negative physical, psychological or emotional reactions, they can be repeated every second day. In this way the body will slowly adjust to the tremor and allow the tension in the body to slowly reduce. After a while, the exercises will not have to be done so often, maybe approximately every three days or twice a week. However, if you are performing the exercises less often the body will start to build up stress again and become tense. Therefore the exercises will have to be performed more frequently again.

Two example cases: TRE with soldiers from the ATO (anti-terrorist operation) war zone in the Ukraine

(Translation from Russian into German by A. Herold)

A psychiatrist in a psychiatric clinic in the town of V, Ukraine, reports that she had ten sessions with a soldier who had returned from the ATO (war zone in Eastern Ukraine). During the first session he was able to perform the exercises in a limited capacity only because of the trauma he had suffered. But the second time he was able to participate more actively and was able to perform the exercises as they should be done.

During the first three sessions the soldier reported that he felt a tremor in his feet and also in his body, but very mild, somewhere deep inside. The tremor was barely noticeable on the outside. During the course of the sessions a tremor developed in the right foot (his left foot was wounded), however it subsided rapidly. Then the tremor developed in both feet, and was noticeable on the outside and also within the body. Initially, no tremor developed in the upper body, the shoulders or the arms. His hands had only a slight tremor. During the last session there was a significant tremor in the legs when he was exercising against the wall and then also on the floor. After we performed an intervention with a hand towel (wringing out the towel), a tremor developed in the shoulders and arms. The tremor was not very powerful, but it could be clearly seen. During this time the soldier reported that he felt a deep relaxation and peace. He had not felt so relaxed since returning from the ATO war zone. His sleep also improved significantly, and the feeling of inner tension and the headaches subsided.

A clinical psychologist, the head of a crisis intervention center in the small town of S. in Ukraine, reports on the following case: it relates to a soldier who had taken part in hostilities in the

ATO zone. During a grenade attack the patient was propelled away by a shock-wave caused by the projectiles, and suffered concussion. He was otherwise unharmed. When admitted for rehabilitation he complained of pain in the arms, hands and feet. His muscles were very tense, he was not sleeping well and he was very agitated.

Four sessions of TRE were carried out. As the patient had suffered concussion, exercise 4 (with the head bent forwards) was not performed and only the floor tremor exercise was done.

During the first session, the leg muscles, calf muscles and quadriceps muscle quickly began to tremble very intensely. As a result, the pelvis began to move a lot. The patient's eyes were closed. He was asked to remain in contact with the therapist and report how he felt. We were only able to do five minutes in the first session.

At the end he reported that his legs felt like cotton wool. When he was blown up he also had the feeling that his legs were made of cotton wool, and he became anxious and panicky. The therapist asked him to orientate himself, to sit up and feel the ground and slowly stand up with her assistance. He then proceeded to walk around the room with the therapist's help, stamping his feet. The feeling of cotton wool in the legs disappeared and the patient reported that he was very tired and would like to sleep.

During the next three sessions the muscles of the legs and the pelvis trembled and there was also a tremor in the arms and ribcage. The cotton wool feeling in the legs did not recur again. During the exercises the breathing movement was superficial, later it became deeper and a clear exhalation was audible.

After using TRE the patient reported that the pain in his muscles had disappeared. Initially he had experienced a strong feeling of relaxation and later this changed to a feeling of vitality. His sleep significantly improved.

Efficacy studies

D. Berceli's website (www.traumaprevention.com/research) presents seven studies on the efficacy of TRE; these were predominantly performed in the USA and South Africa. As far as the German-speaking countries are concerned, Nibel (2015) presented his own investigations at the Conference of the Association of Ergonomics (Gesellschaft für Arbeitswissenschaft) in Karlsruhe (27.2.2015). His findings were: better body awareness and body image, psychological changes, such as clarity of thought and feeling, greater self-efficacy and self-confidence, positive changes in social relationships, fewer negative symptoms such as inner unrest, anxiety, the disappearance of specific health disorders such as pain, tingling and tinnitus (PowerPoint slide 13).

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