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## **Rehabilitation through flotation-REST (Restricted Environmental Stimulation Technique)**

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### **Background**

Persons with nonspecific pains in the neck, shoulders and back often have a concomitant problem of high stress load and sometimes even of anxiety and depression. Relaxation exercises are an effective method for reducing physiological and psychological responses to stress (Sandlund & Norlander, 2000). To initiate stress-reduction therapy and relaxation training in order to reduce stress and increase the sense of "mindfulness" usually involves great difficulties. It has previously been shown that people in the greatest need of relaxation training are also those who have the most difficulty in implementing and completing such training (Maslach, 1998). Many different techniques (with some scientific support for their effectiveness) of relaxation are described, such as meditation, Tai-Chi, yoga and qigong. These methods often require long and regular practice before benefits become apparent.

The positive effects that are described in various relaxation techniques may be expected to arise from the deep relaxation achieved, which simultaneously triggers the so-called relaxation response (RR). This is a significant factor because people who have been affected by illness for a long time have also developed a crisis response and, as is well-known, people in acute crisis are not as a rule susceptible to rehabilitation efforts. Not until the re-orientation phase, can patients benefit from more professionally oriented interventions.

### *Relaxation response - RR*

Different kinds of relaxation techniques, if effective, often lead to specific psychological and physiological changes called the relaxation response (RR) (Benson, 1975), which is identified as the physiological opposite of "fight-flight response" or stress response (SR) (Esch, Fricchione & Stefano, 2003). The RR is associated with instantly occurring physiological changes that include reduced sympathetic nervous system activity, reduced metabolism, and lowered heart rate, blood pressure, and respiratory rate (Bleiche & Boro, 1977). At the psychologic level, individuals typically experience RR techniques as genuine rest, recovery, better sleep quality, less need for alcohol and psychoactive medication, as well as an increased sense of control and efficacy in stressful situations (Setterlind, 1990).

There are hundreds of methods for change and personal development and many of them have been around for thousands of years while others have been developed in and after the 1970s. Modern methods as autogenic training (Smith, 1993), physioacoustic procedures (Norlander, Sandholm & Anfelt, 1998) and biofeedback (Setterlind, 1990) are examples of techniques developed to induce relaxation and to trigger the RR. Also pharmacological treatment is aimed at triggering the RR, for example, by calming medication. Pharmacological treatments alone rarely succeed in successfully treating stress-related disorders (Lundberg & Wentz, 2004).

In order to successfully trigger RR, at least two main factors are necessary, namely, reduced sensory stimulation and decreased body movements (Ben-Menachem, 1977). A crucial and serious problem often observed is that people most in need of relaxation techniques are usually those who have most difficulty to participate in and complete the various forms of relaxation exercises - which is the necessary condition to trigger the RR (Maslach, 1998). High stress load also increases the risk of drug abuse. Drinking alcohol can, by example, provide an immediate relaxation for a person in severe stress (Norlander, 1999), a factor which may explain why anxiety and stress can often lead to alcoholism. There is a need for safe and effective RR-inducing techniques for persons suffering from high stress load. This situation strongly suggests that new technologies must be developed and carefully evaluated.

### *Flotation-REST*

Flotation-REST (Restricted Environmental Stimulation Technique) is a method that effectively and safely manages to trigger the relaxation response (RR), even in individuals with severe stress problems. Since the flotation-REST method provides an effortless deep relaxation, this is a feasible and valuable treatment for people at an early stage to facilitate the transmission to the reorientation phase. It has been shown that the effect of a rehabilitation program diminishes if delayed too long. Early relaxation therapy treatment can make it possible to introduce rehabilitation efforts at an earlier stage, thus ensuring a faster return to work.

During the flotation-REST an individual is immersed in a sound and light isolated tank with salt warm water (Bood, 2007, Kjellgren, 2003; Norlander, Bergman & Archer, 1998). The water is heated to skin temperature (about 35-36 ° C) and is saturated with magnesium sulphate, which is gentle to the skin. The salinity of the water is saltier than the Dead Sea. The darkness and silence during the treatment helps to reduce the sensory impressions from the external environment. In such a sensory isolation attention and thoughts are more and more directed towards 'mindfulness' or the intuitively and visually "here-and-now 'state', ie. what in psychology is called primary processes. At the same time the secondary processes are reduced, which means that abstract thoughts and ideas about problems or things that have happened or might happen ("then-and-then" thinking) decreases. It is restful and psychologically beneficial to experience recurring episodes of the "just be" state (Norlander, 2006).

Human Performance Laboratory at Karlstad University has an extensive experience of treating patients using flotation tanks. The flotation tank is constructed so that the participant has full control and can stop when he/she so wishes. The lid is easy to open from the inside as well as from the outside. By pressing the buttons inside the tank, the participant can turn on a light in the tank or call for staff. Water salinity is very high which gives a good carrying capacity. The high buoyancy in combination with the very low water level (about 3 dm) gives maximum security. The water is several times filtered and processed automatically between each use, both mechanically and by ultraviolet light. Each participant floats in completely clean water. At the same time it must be emphasized that the flotation-REST is a "mild" form of REST and there are no reports in the literature of hazards or problems to subjects/patients.

### *Research about flotation tanks - the pioneers of the first wave*

Early experiments with sensory isolation reported negative effects for participants (Zubeck, 1973), but later experiments with REST for a limited time in the flotation tanks elicited a number of positive effects (see below). The method was initially developed in order to train pilots and astronauts in sensory deprivation and in "weightless" condition. Sport psychologists discovered that flotation tanks could successfully be used in order to provide more effective

control of the negative effects of stress, to enhance the mental training and to improve recovery after strenuous workouts and races (Hutchison, 1984). Results from the "pioneers" of the flotation tank research showed increased well-being and relaxation (Mahoney, 1990), mild euphoria (Schulz & Kaspar, 1994), increased originality (Forgays & Forgays, 1992, Suedfeld, Metcalfe, & Bluck, 1987), improved sleep (Ballard, 1993) and reduced stress and anxiety (Fine & Turner, 1982, Schulz & Kaspar, 1994; Suedfeld, 1983, Suedfeld & Borrie, 1995, Turner & Fine, 1984), as well as indication that the technique is a suitable complement to psychotherapy (Jessen, 1990). These early research findings are reviewed by Kjellgren (2003) and by Bood (2007). A meta-analysis made on the basis of pioneering research in 27 studies with a total of 449 participants (van Dierendonck & te Nijenhuis, 2005) showed that the floating-REST had positive effects on several physiological measures (eg, lower levels of cortisol and lower blood pressure) and that the method leads to increased wellbeing and improved performance.

#### *Research about flotation tanks - the second wave*

The Flotation Tank Research began as a small scale project in Karlstad in 1998 through a partnership with Olympic Support Center in Örebro. A year later the first flotation tank was installed in Karlstad, and in 2003 the Human Performance Laboratory at Karlstad University was inaugurated, with three flotation tanks. The researchers in Karlstad were clear about the need for floating tank research to be carried out according to established methodological principles. Therefore, controlled studies, power calculations and systematic exploration about the various possible placebo effects have been performed; also several qualitative studies have been carried out. Two dissertations and some 20 articles have been published. The results of these can be summarized as follows:

- \* sensory deprivation in flotation tank induces an altered states of consciousness and a "here-and-now" state, i.e. primary processes (Kjellgren, 2003)
- \* the technique has the ability to trigger the relaxation response even in patients with very severe stress problems (Bood, 2007)
- \* cognitive tests assessed directly after flotation sessions indicate that convergent problem solving abilities are impaired but originality is improved (Norlander, Bergman & Archer, 1998; Norlander, Kjellgren & Archer, 2003; Sandlund, Linnarud & Norlander, 2001)
- \* results indicate that athletes experience less perceived exertion during marksmanship after flotation and elite archers performed more consistently after the Flotation-REST condition (Norlander, Bergman & Archer, 1999)
- \* reduction of MHPG (stressrelated metabolit) (Kjellgren, Sundequist, Norlander & Archer, 2001) with prolactin first increasing and then returning to the original level (Bood, Sundequist, Kjellgren, Norlander, Nordström, Nordenström, & Nordström, 2006)
- \* in most cases it is sufficient with a program consisting of two flotation treatments a week for three weeks, then one week without floating, followed by a further three-week period (i.e. a total of 12 flotation treatments in 7 weeks) to activate the relaxation response and thus allow recovery of the body and psyche (Bood, 2007)
- \* in most cases there are no major differences in efficacy between 12 and about 30 flotation sessions (Bood, Sundequist, Kjellgren, Nordström & Norlander, 2007)
- \* typical effects of 12-float program is that patients' sleep quality improved (18% - 23%), optimism increased (8% - 10%), stress decreased (25% - 31%), anxiety was reduced (25% - 27%), depression was reduced (24% - 32%) and pain decreased (48% - 57%) (Bood, 2007)

\* a follow-up study showed that the beneficial effects persisted after four months (Bood et al., 2006). A qualitative case study that combined flotation tank treatment with psychotherapy showed beneficial effects for patients 18 months after (Åsenlöf, Olsson, Bood & Norlander, 2007)

\* a study of a 12-float program where pain was measured using the PAI (Pain Area Inventory) revealed that 22% of patients became pain-free, 56% showed significant improvement, 19% experienced no improvement and 3% experienced more pain. In conclusion, 78% of patients were helped by the method (Bood, Sundequist, Kjellgren, Nordström & Norlander, 2005)

\* for more difficult conditions as fibromyalgia and WAD (Whiplash Associated Disorder) often a slightly longer treatment is needed before the pain begins to subside (Edebol, Bood & Norlander, 2008). The difficulty with these patient groups are often experienced increased pain at the beginning of the treatments, and it is important that staff provide extra support and encouragement until the initial phase has been overcome

\* very good results with the combination of flotation-REST and psychotherapy. Therapists' impression is that this combined treatment is both faster and more effective (Kjellgren, Buhrkall & Norlander, 2010; Kjellgren, Buhrkall & Norlander, 2011; Åsenlöf, et al., 2007)

\* men and women perceived the extent and frequency of their pain similarly prior to and following the treatment, and both genders reported improvement due to flotation-REST (Bood, Kjellgren & Norlander, 2009). Similar findings were obtained with regard to anxiety and sleep quality. There were no significant gender or treatment differences regarding energy. There were, however, gender differences on depression, suggesting that women, compared with men, displayed higher depression scores prior to the flotation-REST treatment. The women improved in terms of depression scores due to the treatment and then achieved the same levels as the men. For the first time it was shown that both genders improved their ability to endure pain (i.e. higher scores for the upper threshold) following successful treatment.

\* alcohol use as well as use of medical drugs is reduced during treatment periods (Bood, et al., 2005)

\* qualitative studies dedicated to analyse experiences of altered states of consciousness during sensory deprivation in the flotation tank have been performed (e. g., Kjellgren, Lyden & Norlander, 2008)

\* The method does not seem to depend on placebo effects such as expectation (Norlander, Kjellgren & Archer, 2001), attention (Bood et al., 2005) or personality (Kjellgren, Lindahl & Norlander, 2009). It is difficult but not impossible to investigate placebo effects in this area. In the first study participants who had previously had extensive experience of altered states of consciousness and participants without such experiences were included. In addition, there was one 'strict' condition and one fantasy-evoking condition where vivid descriptions of what may happen in the tank were presented. In the second study, half of the persons got normal attention in time to meet the staff at the laboratory while the other half received twice as much time with the staff. Finally, in the third study participants with a "highly sensitive" personality were compared with those without this trait. Taken together, these three studies suggest that placebo effects cannot explain the beneficial results obtained.

\* a majority of the participants had signed up for the program out of interest or in response to Human Performance Laboratory advertisements. They then went through an evaluation of their pain and symptoms conducted by a pain doctor. It is obviously a disadvantage that most participants volunteered rather than were referred, but if we have not experienced any differences between the majority who came on their own accord to the laboratory and the minority that was referred. Further, a controlled study with patients referred (Landström,

Bood, Kjellgren & Norlander, 2007) showed similar improvements for flotation tank group in terms of perceived pain as for the other studies.

*Research about flotation tanks - the third wave*  
YES, WHAT ABOUT THE THIRD WAVE?

### **Research on flotation-REST at Karlstad University**

#### *Books*

Kjellgren, A. (2003) *The Experience of flotation-REST (Restricted Environmental Stimulation Technique): Consciousness, Creativity, Subjective Stress and Pain*. Karlstad, Sweden: Karlstad University Studies.

Bood, S. Å. (2007). *Bending and Mending the Neurosignature. Frameworks of influence by flotation-REST (Restricted Environmental Stimulation Technique) upon well-being in patients with stress related ailments*. Karlstad, Sweden: Karlstad University Studies.

#### *Articles in peer-reviewed journals*

Norlander, T., Bergman, H., & Archer, T. (1998). Effects of flotation REST on creative problem solving and originality. *Journal of Environmental Psychology, 18*, 399-408.

Norlander, T., Bergman, H., & Archer, T. (1999). Primary process in competitive archery performance: Effects of flotation REST. *Journal of Applied Sport Psychology, 11*, 194-209.

Sandlund, E. S., Linnarud, M., & Norlander, T. (2001). Effects of stress versus flotation-REST relaxation on creativity and literacy skills in advanced English as a Second Language (ESL) composition. *RASK. International Journal of Language & Communication, 15*, 95-113.

Norlander, T., Kjellgren, A., & Archer, T. (2001). The experience of flotation-REST as a function of setting and previous experience of altered state of Consciousness. *Imagination, Cognition and Personality, 20*, 161-178.

Kjellgren, A., Sundequist, U., Norlander, T., & Archer, T. (2001). Effects of flotation-REST on muscle tension pain. *Pain Research and Management, 6*, 181-189.

Norlander, T., Kjellgren, A., & Archer, T. (2003). Effects of flotation- versus chamber-restricted environmental stimulation technique (REST) on creativity and realism under stress and non-stress conditions. *Imagination, Cognition and Personality, 22*, 341-357.

Kjellgren, A., Sundequist, U., Sundholm, U., Norlander, T., & Archer, T. (2004). Altered consciousness in flotation-REST and chamber-REST: Experience of Experimental Pain and Subjective Stress. *Social Behavior and Personality, 32*, 103-115.

Bood, S. Å., Sundequist, U., Kjellgren, A., Nordström, G., & Norlander, T. (2005). Effects of flotation-REST (Restricted Environmental Stimulation Technique) on stress related muscle pain: What makes the difference in therapy, attention-placebo or the relaxation response? *Pain Research and Management, 10*, 201-209.

Bood, S. Å., Sundequist, U., Norlander, T., Nordström, L., Nordenström, K., Kjellgren, A., & Nordström, G. (2006). Eliciting the relaxation response with help of flotation-REST (Restricted Environmental Stimulation Technique) in patients with stress related ailments. *International Journal of Stress Management*, *13*, 154-175.

Bood, S. Å., Sundequist, U., Kjellgren, A., Nordström, G., & Norlander, T. (2007). Effects of flotation-REST (Restricted Environmental Stimulation Technique) on stress related muscle pain: Are 33 flotation sessions more effective as compared to 12 sessions? *Social Behavior and Personality*, *35*, 143-156.

Åsenlöf, K., Olsson, S., Bood, S. Å., & Norlander, T. (2007). Case studies on fibromyalgia and burn-out depression using psychotherapy in combination with flotation-REST: Personality development and increased well-being. *Imagination, Cognition and Personality*, *26*, 259-271. doi:10.2190/9338-1352-Q6K7-0183

Landström, A., Bood, S. Å., Kjellgren, A., & Norlander, T. (2007). Treating stress related pain in a clinical sample with flotation-REST: A further report on improvements on pain assessed by the Pain Area Inventory (PAI). *Social Behavior and Personality*, *35*, 1279-1280.

Edebol, H., Bood, S. Å., & Norlander, T. (2008). Case studies on chronic whiplash associated disorders and their treatment using flotation-REST (Restricted Environmental Stimulation technique). *Qualitative Health Research*, *18*, 480-488. doi:10.1177/1049732308315109

Kjellgren, A., Lyden, F., & Norlander, T. (2008). Sensory isolation in a flotation tank: altered states of consciousness and effects on well-being. *The Qualitative Report*, *13*, 636-656.

Edebol, H., Kjellgren, A., Bood, S. Å., & Norlander, T. (2009). Enhanced independence and quality of life through treatment with flotation-Restricted Environmental Stimulation Technique) of a patient with both Attention Deficit Hyperactivity Disorder and Aspergers Syndrome: a case report. *Cases Journal*, *2*. Retrieved August 5, 2009, from <http://casesjournal.com/casesjournal/article/view/6979> doi: 10.4076/1757-1626-2-6979

Bood, S. Å., Kjellgren, A., & Norlander, T. (2009). Treating Stress related Pain with Flotation-REST: Are there differences between women and men? *Pain Research and Management*, *14*, 293-298.

Kjellgren, A., Lindahl, A., & Norlander, T. (2009). Searching for placebo effects: Do sensitive personality and breathing instructions influence the experience of flotation-REST (restricted Environmental Stimulation Technique)? *Individual Differences Research*, *7*, 212-221.

Kjellgren, A., Lindahl, A., & Norlander, T. (2010). Altered states of consciousness and mystical experiences during sensory isolation in the flotation tank: Is the highly sensitive personality variable of importance? *Imagination, Cognition and Personality*, *29*, 135-146.

Kjellgren, A., Buhrkall, H., & Norlander, T. (2010). Psychotherapeutic treatment in combination with relaxation in flotation tank: Effects on 'burn-out-syndrome'. *The Qualitative Report*, *15*, 1243-1269.

Kjellgren, A., Burkhall, H., & Norlander, T. (2011). Preventing sick-leave for sufferers of high stress-load and burn-out syndrome: A pilot study combining psychotherapy with the flotation tank. *International Journal of Psychology and Psychological Therapy*, *11*, 297-306.

*Conference papers, posters, national and popular articles*

Not included here.