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Eye Movement Desensitization and Reprocessing for Posttraumatic Stress Disorder: A Pilot Blinded, Randomized Study of Stimulation Type

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Key Words
Eye movement desensitization and reprocessing · Posttraumatic stress disorder · Bilateral stimulation

Abstract
Background: Eye movement desensitization and reprocessing (EMDR) is becoming a recognized and accepted form of psychotherapy for posttraumatic stress disorder (PTSD). Yet, its mechanism of action remains unclear and much controversy exists about whether eye movements or other forms of bilateral kinesthetic stimulation contribute to its clinical effects beyond the exposure elements of the procedure. ***Methods:*** Twenty-one patients with single-event PTSD (average Impact of Event Scale score: 49.5) received three consecutive sessions of EMDR with three different types of auditory and kinesthetic stimulation (tones and vibrations): intermittent alternating right-left (as commonly used with the standard EMDR protocol), intermittent simultaneous bilateral, and continuous bilateral. Therapists were blinded to the type of stimulation they delivered, and stimulation type assignment was randomized and counterbalanced. ***Results:*** All three stimulation types resulted in clinically significant reductions of subjective units of distress (SUD). Yet, alternating stimulation resulted in faster reductions of SUD when only sessions starting with a new target memory were considered. ***Conclusions:*** There are clinically significant effects of the EMDR procedure that appear to be independent of the nature of the kinesthetic stimulation used. However, alternating stimulation may confer an additional benefit to the EMDR procedure that deserves attention in future studies.

Introduction

Eye movement desensitization and reprocessing (EMDR) has emerged in the last 10 years as a new treatment method for posttraumatic stress disorder (PTSD). It is now endorsed by a variety of independent reviews by academic and professional organizations as an empirically supported treatment for PTSD [1–8]. Several reviews and meta-analyses show effect sizes for EMDR treatment that are comparable to those of interventions such as exposure therapy, cognitive behavior approaches or psychopharmacology [9–12]. Yet, the unconventional

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emphasis of EMDR on requesting patients to move their eyes back and forth (or on other forms of alternating right-left sensory stimulation) while they re-experience aspects of traumatic memories has made it the subject of much controversy. Proponents of EMDR suggest that alternating eye movements, or other forms of alternating stimulation (such as sounds or tapping or vibration), facilitate the integration of information at a neural level [13–15]. Yet, detractors claim that such forms of stimulation are merely a placebo and that clinical benefits arise primarily from the exposure component of the procedure [16, 17]. Indeed, several reviews and one recent meta-analysis have argued that EMDR is at best equally effective as conventional exposure or cognitive behavior psychotherapy, and that the kinesthetic (eye movement) aspect of the procedure does not contribute to its effectiveness [16, 18, 19]. However, other reviews have identified numerous flaws in existing component analysis studies and underscored the need for additional research [3, 7, 20].

In this pilot study, we wished to address the question of whether alternating kinesthetic stimulation does or does not contribute to the effectiveness of EMDR in treating PTSD. Indeed, some component analysis studies have attempted to evaluate whether EMDR without eye movements or any other type of alternating sensory stimulation was as effective as EMDR with alternating sensory stimulation. The results of such studies in PTSD patients have been conflicting. Some have supported a benefit from the use of alternating stimulation (whether eye movements or binaural tones) [21–24] whereas others have found no additional benefit of adding alternating sensory stimulation to the remainder of the procedure [25–27]. However, all of these so-called 'component analysis' studies used eye movement vs. non-eye movement conditions, and this unblinded both therapists and patients to the nature of the intervention.

There is a strong need for studies looking at which components of EMDR may or may not be relevant to the clinical effectiveness of the method in patients suffering from PTSD in a blinded manner. We report here on a randomized pilot study of a blinded procedure we developed to evaluate the relative contribution of alternating sensory stimulation vs. nonalternating comparisons during evocation of traumatic memories in PTSD patients undergoing the EMDR protocol. In order to blind therapists to the nature of the stimuli being used, we relied on auditory and kinesthetic stimulation delivered through an electronic device in a manner that could not be detected by the therapist who was triggering the onset and offset of the stimulation. We compared three conditions: EMDR using intermittent alternating right-left stimulation, EMDR using intermittent simultaneous bilateral stimulation, and EMDR using continuous bilateral stimulation. We hypothesized that, if alternating sensory stimulation per se is necessary to produce therapeutic effects, subjects would show the greatest reduction in subjective disturbance from this condition of the study.

To our knowledge, this is the first study to address the contribution of alternating stimulation in EMDR using the standard of a controlled, randomized double-blind design.

Methods

Subjects

The study was reviewed and approved by the University of Pittsburgh Institutional Review Board. We recruited 21 adult subjects in the Pittsburgh area through advertising. All subjects had been exposed to a civilian trauma with one single trauma being clearly identified as precipitating symptoms. Examples of trauma included: motor vehicle accidents, work-related accident with physical trauma, loss of a child, and aggression with bullet wound. After providing written, informed consent, diagnosis of DSM-IV [28] PTSD was confirmed for all subjects by a SCID interview with a trained master's level clinician with more than 20 years of clinical experience in assessing and treating psychiatric conditions.

In order to be eligible for inclusion in the study, subjects were required to be between 18 and 75 years old. Subjects were excluded from the study if they suffered from a comorbid psychotic disorder, a dementing condition or a neurological condition affecting the central nervous system. They were also excluded from the study if they could not stop taking benzodiazepines for at least 1 week prior to the first treatment session. Subjects were allowed to continue other types of medications, including antidepressants, but doses could not be modified for the duration of the study. Similarly, they were not allowed to receive concurrent psychotherapeutic treatment. Twenty-one subjects met these inclusion/exclusion criteria and were enrolled in the study. One (male) subject experienced a worsening of symptoms after the first of the three experimental sessions (with the 'intermittent bilateral' stimulation) and withdrew from the study, yielding 20 subjects for analyses. Among these 20, 3 were male (mean age = 39, range = 35–43) and 17 were female (mean age = 45, range = 25–57).

PTSD symptoms had lasted on average for 45 months, with a range varying from 1 month to17 years (SD = 34 months). Five subjects had not received any previous therapy. Eleven had received supportive counseling, cognitive behavioral therapy, group therapy or nonspecific psychotherapy before entering the study. Eighteen subjects had been treated before the study with antidepressants and/or anxiolytics, all with only partial responses (by definition since they all continued to meet SCID criteria for PTSD). Eleven were on antidepressants throughout the study period.

The average score of patients on the Impact of Event Scale [28b] at entry into the study was 49 [by comparison, two recently published controlled studies of the effect of sertraline in PTSD used patient groups whose initial Impact of Event Scale scores were 38 (sertraline) and 37 (placebo) [29] and 39 (sertraline) and 40 (placebo) [30], respectively].

Therapists

Four therapists participated in the study. All had received both part I and part II of training in EMDR as provided by the EMDR Institute (Pacific Grove, Calif., USA). In addition, all had a minimum of 1 year of clinical experience with the method through their private practice. All four therapists reported using EMDR as the primary modality of treatment in their clinical practice and they participated in ongoing peer supervision groups for EMDR. All therapists were supervised in the use of the EMDR protocol as defined by the treatment fidelity guidelines of the EMDR Institute (Pacific Grove, Calif., USA) by the first author prior to the study and throughout the study period.

Stimuli

In contrast to the protocol used in classical exposure therapy, EMDR does not require the patient to focus on a specific trauma memory for any specific length of time. After evoking the trauma memory [image, main negative cognition, desired positive cognition, emotion, subjective units of disturbance (SUD), physical sensations], the therapist applies bilateral stimulation (typically for 30 s to a few minutes, depending on the patient's response as judged by the therapist) and encourages the patient to notice associative processes that bring up new memories, cognitions, emotions or physical sensations. Bilateral stimulation is then applied again from this new starting point, until no further associations are reported. At this point, patients are encouraged to return to the original trauma memory and the procedure starts again until the level of disturbance is reduced to 0 or 1. This phase of the EMDR protocol is then followed by other phases referred to as 'installation' and 'body scan' during which the patient is encouraged to focus on positive self-statements and which do not involve additional exposure to the trauma memory. In total, the amount of actual exposure to the trauma memory itself is much more limited than during classical exposure therapy (typically less than 5 min over the entire session).

Sensory stimulation was delivered at the times specified by the EMDR protocol [15] for durations determined by the clinical judgment of the therapist (typically 30 s to a few minutes depending on the display of emotions of the patient). At the flip of a switch controlled by the therapist, the stimulation was presented through headphones covering both ears as well as through small vibrating devices held in the palms of both hands.

Three different stimuli were used for the study: (a) 'alternating': auditory tones and hand vibrations alternating right to left at a frequency of 1 Hz; (b) 'intermittent bilateral': same tones and vibrations presented at the same frequency of 1 Hz but to both sides simultaneously; (c) 'continuous bilateral': same tones and vibrations presented continuously to both sides (custom device built by Neurotek Corp. for the purpose of this study – 5151 Ward Road, No. 3, Wheat Ridge, Colo., USA, 80033).

Therapists controlled the timing and duration of delivery of these stimuli but were not aware of the type of stimulation being used. Because of the individualized application of the protocol which is inherent to the EMDR procedure, the number of applications and total duration of the bilateral stimulation was different for each patient and each session. Patients were told beforehand that three different forms of stimulation would be used and asked to not report to the therapist which particular type they were receiving. They were told that the mechanism through which EMDR exercises its effects was not known and that we were exploring three different types of stimulation to compare their relative effectiveness.

Sessions and Study Design

Therapists reviewed the history and the videotape of the SCID interview prior to their first session with each patient.

All patients received three 90-min sessions of EMDR, each session with one of the three different stimulus types, in randomized counterbalanced order. Thus, subjects served as their own controls. The first session lasted 120 min, with the initial 30 min dedicated to clarification of the patient's history and the establishment of therapist-client rapport.

Therapists were required to follow the EMDR protocol defined by Shapiro [15] and were allowed to use the more advanced form of EMDR referred to as 'cognitive interweave' in accordance with their clinical judgment.

The protocol followed for the study differed from the Shapiro protocol only in that subjects were requested by therapists to rate their subjective level of disturbance (as described further below) after each set of stimulation.

Outcome Measure: SUD Levels

As the EMDR protocol specifies, therapists were required to obtain from the patient a score of 0–10 on a scale of SUD [31] assessing the patient's level of distress in relation to each specific traumatic memory being targeted for processing (a 'target' memory according to the EMDR procedure). They did so while eliciting the target memory and again after each set of sensory stimulation (patients were not asked to return to the target memory, but simply asked to rate their current level of disturbance following the stimulation).

Two measures of SUD were considered as dependent variables in the analyses. First, we examined the change in SUD level from the beginning to the end of the processing of a target trauma memory during a given experimental session (i.e., first SUD – last SUD for a given target during the session). Second, because the standard EMDR protocol in fact requires therapists to continue processing a particular memory until the SUD level is less than or equal to 1 prior to focusing on a different traumatic memory target, we examined the rate of change across the total sets of sensory stimulation for the target. Thus, we constructed a rate index by dividing the change score defined above by the total number of sets required before either the SUD level reached a level of 0 or 1, or the time limit of a given session was reached (90 min). The rate index indicates the average change in SUD score per set for a specific trauma memory.

Analyses

Analysis of variance (ANOVA) with repeated measures was used to analyze the data, since the randomized crossover design conforms to the traditional replicated 'Latin square' approach for which ANOVA is ideal [32]. In brief, the Latin square design included the six possible permutations, or sequences, of the three stimuli completed across the total of three sessions that subjects

attended (i.e., subjects could have received the stimuli in the order of alternating, intermittent bilateral, continuous bilateral; alternating, continuous bilateral, intermittent bilateral; intermittent bilateral, continuous bilateral, alternating, and so on). The data are then analyzed via an ANOVA with one between-subject factor (6 sequences) by one within-subject factor (time; the 3 sessions).

The key study hypothesis – that the effect of EMDR would differ across the three experimental stimuli (alternating stimulation vs. intermittent bilateral stimulation vs. continuous bilateral stimulation) – is carved out of the time × sequences effect and it is tested against the within-subject error term.

Results

Blinding

On 10 occasions, therapists were randomly asked to guess the nature of the stimulus that had been used for the session they had just completed. Therapist guesses showed poor agreement with actual condition (kappa = 0.34; 56.5% of guesses were correct vs. 50% expected by chance, χ^2 with 1 d.f. was 0.40, $p > 0.40$).

Integrity of Study Design with Crossover Procedure

Conforming to the requirement that the three sessions be of similar duration (90 min), there were similar numbers of sets for each type of stimulation. We also found no differences between the three types of stimuli in number of sets completed for a given target during a session [mean number of sets (SE): alternating = 17.30 (2.24), intermittent bilateral = 18.90 (1.53), continuous bilateral = 17.50 (1.89); $F(2, 14) = 0.96$, $p > 0.20$].

Furthermore, we found that the initial SUD score for a given target was similar across the three stimuli, providing no evidence of inadvertent bias in severity of selected targets across the stimuli conditions [mean initial score (SE): alternating = 7.89 (0.61), intermittent bilateral = 8.78 (0.50), continuous bilateral = 7.60 (0.51); $F(2, 14) = 0.18$, $p > 0.20$].

We examined target memory 'completion' under each form of stimulation, i.e., whether the SUD level of a given target had been reduced to 0 or 1 by the end of the session. If, at the end of a particular session, the goal of a low SUD rating (≤ 1) had not been reached, the next session continued with this same target memory (even though the nature of the sound and tactile stimulation did change, as required by the present study protocol). Regardless of the type of stimulation being used, when a target was continued into a new session, the average initial SUD level in the new session was lower for this 'old' target than for novel targets that had not previously been addressed [mean initial SUD for old targets revisited at a new session (SE) = 6.81 (0.69); mean for novel targets = 9.35 (0.44); $F(1, 7) = 9.17$, $p = 0.019$, controlling for type of stimulus]. Although all subjects, by definition, began a novel target at the first of their three sessions, only 10 of the 20 began a novel target at the second session. Seven of the 20 subjects began a novel target at the third session. (We could not find evidence of an association between being able to begin a novel target and which stimulus type subjects were receiving on either the new or the previous session.)

Because of the impact of old versus novel target memories on SUD levels (which led to a restriction on the range for change in SUD for old targets and hence a potentially inadequate test of study hypotheses), we present our results of testing major study hypotheses first for the entire group of 20 subjects, and then for the subgroup of 10 subjects who were able to begin novel targets at both their first and second sessions. We chose to focus on these 10 subjects with two sessions' worth of data (counterbalanced across stimulus type) rather than on the smaller group of 7 with three sessions' worth of novel targets because of the greater level of statistical power preserved with 10 subjects per session. Power achieved by incorporating the repeated-measures data for the 10 subjects was also greater than if we had simply examined data from all 20 subjects' first session only (in which, by design, 7 received the alternating, 6 received intermittent bilateral, and 7 received continuous bilateral stimulation).

Effects on SUD Level

When all sessions (i.e., those involving new targets as well as old targets that had been 'contaminated' by previous exposure during an earlier session) and all subjects were pooled, an ANOVA yielded no statistically reliable difference in the SUD change scores between the initial and lowest SUD for the three different types of stimuli [mean decrement in SUD (SE): alternating = 5.75 (0.75), intermittent bilateral = 5.90 (0.55), continuous bilateral = 4.80 (0.63); $F(2, 28) = 1.26$, $p > 0.20$]. It is noteworthy, however, that when pooling over stimulus type, the EMDR procedure – across all three stimulus types – led to an average reduction of 5.56 on the SUD scale [$F(1, 14) = 139.17$, $p < 0.001$].

There was also no significant difference between the rate of SUD change; in all three stimulus conditions, SUD scores changed by about one point on the scale per each set completed [mean rate of decline per set (SE): alternating = 0.95 (0.20), intermittent bilateral = 0.78 (0.19), con-

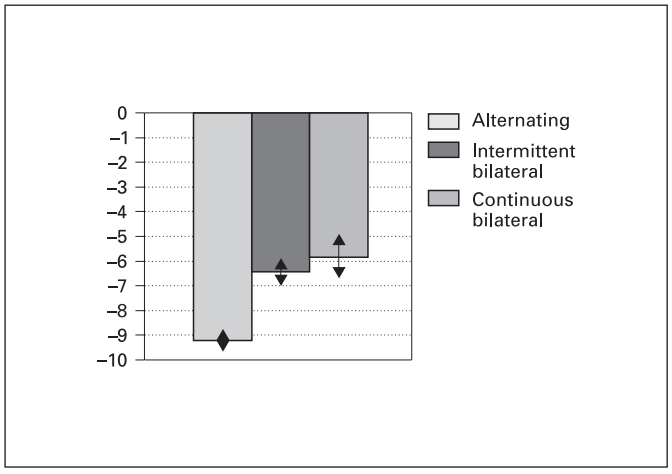

Fig. 1. Reduction in SUD level on a new target memory from beginning to end of a session, after eliminating data from targets that were worked on in more than one session [$F(2, 5) = 5.24$; $p < 0.064$].

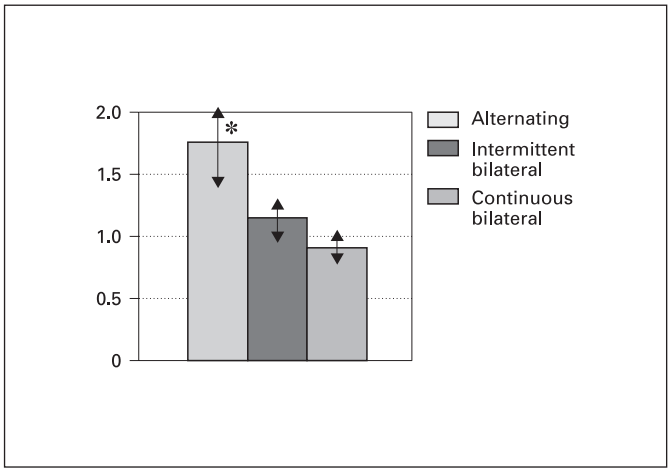

Fig. 2. Rate of SUD level reduction (average decrement in SUD per set of stimulation) on a new target memory, after eliminating data from targets that were worked on in more than one session [$F(2, 5) = 11.28$; * $p < 0.025$].

tinuous bilateral = 0.82 (0.19); $F(2, 28) = 0.79$, $p > 0.20$].

However, among the subgroup of subjects who began working on new target memories during their sessions (as opposed to continuing with old targets that were 'contaminated' by previous exposure during an earlier session), a different pattern of findings emerged. First, a marginally significant difference emerged for the size of the reduction in SUD score from initial to lowest SUD across the three types of stimuli [mean decrement in SUD (SE): alternating = 9.20 (0.37), intermittent bilateral = 6.44 (0.75), continuous bilateral = 5.83 (1.56); $F(2, 5) = 5.24$, $p = 0.064$; fig. 1]. Second, a statistically reliable difference emerged for the rate of SUD change per set, with the greatest change for the alternating stimulus [mean rate of decline per set (SE): alternating = 1.76 (0.51), intermittent bilateral = 1.15 (0.37), continuous bilateral = 0.91 (0.34); $F(2, 5) = 11.28$, $p < 0.025$; fig. 2]. A post hoc contrast analysis confirmed that the alternating stimulus was significantly more effective in reducing SUD levels than both of the other two types of stimulation [$F(1, 5) = 13.12$, $p = 0.017$; this p value exceeds the Bonferroni-adjusted p of $0.05/2 = 0.025$ required for this post hoc contrast].

Discussion

Our results must be considered in the context of several important study limitations. These include a small sample size, the restriction of clinical cases to single-event civilian PTSD, and the fact that we did not evaluate the contribution of eye movements (which remain the most common form of stimulation in EMDR in current clinical practice) but only of alternative forms of bilateral stimulation (a combination of auditory and kinesthetic stimulation). The EMDR protocol was modified to include a request of SUD after every stimulation which may have disrupted the normal course of processing of the traumatic material. In this pilot study, evaluation of clinical progress was limited to changes in the SUD scale, and did not include other conventional measures of clinical symptoms in PTSD. The within-subject design of the study resulted in carryover effects from one session to the next of the different forms of stimulation when applied to the same target memory, requiring us to eliminate a significant amount of the data from our analyses. Finally, perhaps the greatest limitation of this study is that it did not include a condition with no auditory or tactile stimulation which could have provided a better 'placebo' condition against which to compare the other forms of stimulation. We did not include a 'no stimulation' condition as the required number of patients for a four-condition Latin square design (as opposed to the current three-condition design) greatly exceeded the budget available for this study.

In this pilot therapist-blinded controlled study of the effect of different types of sensory stimulation during the EMDR protocol for patients with single-trauma civilian PTSD, two results stand out. First, the EMDR protocol led to a statistically significant reduction of subjective levels of distress associated with traumatic memories irrespective of the nature of the stimulation. Moreover, the size of the reduction was clinically significant. The patients who participated in this study had high levels of illness severity, as demonstrated by their high initial levels of PTSD symptoms, the average duration of illness of 45 weeks, and by the large proportions of subjects who had received psychotropic medications and psychotherapeutic interventions prior to entering the study. Therefore, the fact that all subjects' levels of disturbance in relation to their traumatic memories were reduced is important.

The second result that stands out is that, after we controlled for contamination of targets by exposure to other conditions, there was a statistically significant additional benefit conferred to the procedure by the use of alternating rhythmic sensory stimulation as compared to either simultaneous rhythmic stimulation or continuous stimulation. Various studies have reported specific effects of dual attention stimuli on emotion and memories in nonclinical populations [33–35]. This additional effect of alternating stimulation is compatible with the results of two other studies that have used random assignment of auditory stimulus type in a controlled manner and observed their effects on painful memories in nonclinical populations [36, 37]. Both studies found a superiority of alternating stimulation over simultaneous stimulation.

These preliminary results therefore suggest that there may be (at least) two components of the EMDR procedure that contribute to the reduction of distress in PTSD. The overall effect of the procedure, regardless of the specific nature of the stimulation, may be related to a number of aspects of the EMDR protocol that are common to several psychotherapy approaches for PTSD such as exposure therapy and cognitive-behavioral therapy [38–40] or to some aspects of the EMDR procedure that appear to be distinctly different from other therapy approaches [41, 42]. In a review of psychotherapies known to reduce fear, Marks and Dar [43] conclude that several nonexposure and noncognitive methods have also been found effective. They suggest that these involve 'an attention-training path that disengages feelings and thoughts from automatic action'. It appears that the alternating bilateral stimulation that is part of the EMDR procedure and that is normally combined with the other aspects of the treatment may contribute to this attention training and confer an additional benefit that deserves further attention in future studies. In particular, it would be important to compare alternating and continuous stimulation to a 'no stimulation' control, which may establish whether EMDR with any form of sensory stimulation is or is not superior to applying the EMDR procedure without any form of sensory stimulation. Such a study would be a more direct test of the need for any stimulation [44], as well as some of the extant hypotheses for the therapeutic effects of EMDR [45, 46].

Finally, we should emphasize that our study did not intend to compare the benefits of EMDR for PTSD with other treatment procedures such as exposure or to make claims about a specific treatment advantage of EMDR over other methods. Other investigators have explored this issue [47, 48], and have found generally comparable results for EMDR and exposure therapy, though EMDR did not require the additional hours of self-exposure or in vivo exposure. Recently, a new modified behavior therapy protocol has been tested in a study that documented impressive benefits in earthquake survivors after a single session which successfully set the stage for ongoing unsupervised self-exposure [49]. This suggests that the frontiers of what is possible to achieve in the treatment of PTSD continue to evolve with new treatment protocols and that it will become ever more important to define which aspects of new treatment procedures are most important to facilitate the best treatment results.

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References

1 Bleich A, Berstein J, et al: Guidelines for the Assessment and Professional Intervention with Terror Victims in the Hospital and in the Community. Jerusalem, National Council for Mental Health, Ministry of Health, 2002.

2 American Psychiatric Association: Guidelines for the Psychiatric Treatment of Acute Stress Disorder and Posttraumatic Stress Disorder. Washington, American Psychiatric Association, 2004.

3 Chemtob CM, Tolin D, van der Kolk BA, Pitman RK: Eye movement desensitization and reprocessing; in Foa EA, Keane TM, Friedman MJ (eds): Effective Treatments for PTSD: Practice Guidelines from the International Society for Traumatic Stress Studies. New York, Guilford Press, 2000, pp 139–155, 155, 333–335.

4 Clinical Resource Efficiency Support Team: The Management of Posttraumatic Stress Disorder in Adults. Belfast, Clinical Resource Efficiency Support Team of the Northern Ireland Department of Health, Social Services and Public Safety, 2003.

5 Evidence-Based Clinical Practice Guidelines. Department of Health, UK, 2001 (accessed on 05/15, 2001, at www.doh.gov.uk/mentalhealth/treatmentguideline/).

6 Canceil O, Cottraux J, et al: Psychothérapie: trois approches évaluées. Paris, Institut national de la santé et de la recherche médicale, 2004.

7 Veterans Administration/Department of Defense Clinical Practice Guideline Working Group: Management of Post-Traumatic Stress. Washington, Veterans Health Administration, Department of Veterans Affairs and Health Affairs, Department of Defense, 2003, Office of Quality and Performance publication 10Q-CPG/PTSD-04.

8 National Institute for Clinical Excellence: Post-Traumatic Stress Disorder (PTSD): The Management of PTSD in Adults and Children in Primary and Secondary Care. London, NICE, 2005.

9 Sack M, Lempa W, Lamprecht F: Study quality and effect sizes – A meta-analysis of EMDR-treatment for posttraumatic stress disorder. Psychother Psychosom Med Psychol 2001;51:350–355.

10 Maxfield L, Hyer LA: The relationship between efficacy and methodology in studies investigating EMDR treatment of PTSD. J Clin Psychol 2002;58:23–41.

11 Spector J, Read J: The current status of eye movement desensitization and reprocessing (EMDR). Clin Psychol Psychother 1999;6:165–174.

12 van Etten ML, Taylor S: Comparative efficacy of treatments for post-traumatic stress disorder: a meta-analysis. Clin Psychol Psychother 1998;5:126–144.

13 Levin P, Lazrove S, van der Kolk BA: What psychological testing and neuroimaging tell us about the treatment of posttraumatic stress disorder (PTSD) by eye movement desensitization and reprocessing (EMDR). J Anxiety Disord 1999;13:159–172.

14 Shapiro F: Eye Movement Desensitization and Reprocessing (EMDR) and the anxiety disorders: clinical and research implications of an integrated psychotherapy treatment. J Anxiety Disord 1999;13:35–67.

15 Shapiro F: Eye Movement Desensitization and Reprocessing: Basic Principles, Protocols and Procedures. New York, Guilford, 2001.

16 Lohr JM, Lilienfeld SO, Tolin DF, Herbert JD: Eye movement desensitization and reprocessing: an analysis of specific versus nonspecific treatment factors. J Anxiety Disord 1999;13:185–207.

17 Lohr JM, Tolin DF, Lilienfeld SO: Efficacy of eye movement desensitization and reprocessing: implications for behavior therapy. Behav Ther 1998;29:123–156.

18 Tolin DF, Montgomery RW, Kleinknecht RA, Lohr JM: An evaluation of Eye Movement Desensitization and Reprocessing (EMDR); in Vandercreek L, Knapp S, Jackson TL (eds): Innovations in Clinical Practice: A Sourcebook. Sarasota, Professional Resources Press, 1995, pp 423–437.

19 Davidson PR, Parker KCH: Eye Movement Desensitization and Reprocessing (EMDR): a meta-analysis. J Consult Clin Psychol 2001;69:305–316.

20 Perkins BR, Rouanzoin CC: A critical evaluation of current views regarding Eye Movement Desensitization and Reprocessing (EMDR): clarifying points of confusion. J Clin Psychol 2002;58:77–97.

21 Lohr JM, Kleinknecht RA, Tolin DF, Barrett RH: The empirical status of the clinical application of eye movement desensitization and reprocessing. J Behav Ther Exp Psychiatry 1995;26:285–302.

22 Lohr JM, Tolin DF, Kleinknecht RA: An intensive design investigation of eye movement desensitization and reprocessing of claustrophobia. J Anxiety Disord 1996;10:73–88.

23 Montgomery RW, Ayllon T: Eye movement desensitization across subjects: subjective and physiological measures of treatment efficacy. J Behav Ther Exp Psychiatry 1994;3:217–230.

24 Wilson D, Silver SM, Covi W, Foster S: Eye movement desensitization and reprocessing: effectiveness and autonomic correlates. J Behav Ther Exp Psychiatry 1996;27:219–229.

25 Boudewyns PA, Hyer LA: Eye movement desensitization and reprocessing (EDMR) as treatment for posttraumatic stress disorder (PTSD). Clin Psychol Psychother 1996;3:185–195.

26 Devilly GJ, Spence SH, Rapee RM: Statistical and reliable change with eye movement desensitization and reprocessing: treating trauma within a veteran population. Behav Ther 1998;29:435–455.

27 Renfrey G, Spates CR: Eye movement desensitization and reprocessing: a partial dismantling procedure. J Behav Ther Exp Psychiatry 1994;25:231–239.

28 American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, ed 4. Washington, American Psychiatric Press, 1994.

28b Horowitz M, Wilner N, Alvarez W: Impact of Event Scale: A measure of subjective stress. Psychosom Med 1979;41:209–218.

29 Brady K, Pearlstein T, Asnis G, Baker D, Rothbaum B, Sines CR, Farfel GM: Efficacy and safety of sertraline treatment of posttraumatic stress disorder. JAMA 2000;283:1837–1844.

30 Davidson JRT, Rothbaum BO, Van Der Kolk B, Sikes CR, Farfel GM: Multicenter, double-blind comparison of sertraline and placebo in the treatment of posttraumatic stress disorder. Arch Gen Psychiatry 2001;58:485–492.

31 Wolpe J: The Practice of Behavior Therapy, ed 4. New York, Pergamon Press, 1990.

32 Rosenthal R, Rosnow RL: Essentials of Behavioral Research Methods and Data Analysis. New York, McGraw-Hill, 1984.

33 Andrade J, Kavanagh D, Baddeley A: Eye movements and visual imagery: a working memory approach to the treatment of posttraumatic stress disorder. Br J Clin Psychol 1997;36:209–223.

34 Barrowcliff AL, Gray NS, Freeman TCA, MacCulloch MJ: Eye movements reduce the vividness, emotional valence and electrodermal arousal associated with negative autobiographical memories. J Forensic Psychiatry Psychol 2004;15:325–345.

35 van den Hout M, Muris P, Salemink E, Kindt M: Autobiographical memories become less vivid and emotional after eye movements. Br J Clin Psychol 2001;410:121–130.

36 Manfield P: Symposium II: the role of eye movements and other bilateral stimulation in EMDR – Double-blind alternating tone research. EMDR Int Assoc Annu Conf, Austin, June 2001.

37 Lamprecht F: Diagnosis and therapy of posttraumatic stress disorder. Helping to cope with memories. MMW Fortschr Med 2001;143:44–46.

38 Foa EB: Psychological processes related to recovery from a trauma and an effective treatment for PTSD. Ann NY Acad Sci 1997;821:410–424.

39 Linehan MM: Cognitive-Behavioral Treatment of Borderline Personality Disorder. New York, Guilford Press, 1993.

40 Marks IM, Lovell K, Noshirvani H, Livanou M, Thrasher S: Treatment of posttraumatic stress disorder by exposure and/or cognitive restructuring: a controlled study. Arch Gen Psychiatry 1998;55:317–325.

41 Rogers S, Silver SM: Is EMDR an exposure therapy? A review of trauma protocols. J Clin Psychol 2002;58:43–59.
42 Lee CW, Taylor G, Drummond PD: The active ingredient in EMDR: is it traditional exposure or dual focus of attention? Clin Psychol Psychother, in press.
43 Marks I, Dar R: Fear reduction by psychotherapies. Recent findings, future directions. Br J Psychiatry 2000;176:507–511.
44 Lohr JM, Tolin DF, Lilienfeld SO: Final comments on Lipke's critique of Lohr, Tolin and Lilienfeld (1998). Behav Ther 2000;23:145–147.
45 Barrowcliff AL, Gray NS, MacCulloch S, Freeman TC, MacCulloch MJ: Horizontal rhythmical eye movements consistently diminish the arousal provoked by auditory stimuli. Br J Clin Psychol 2003;42:289–302.
46 Stickgold R: EMDR: a putative neurobiological mechanism. J Clin Psychol 2002;58:61–75.
47 Power K, McGoldrick T, Brown K, et al: A controlled comparison of eye movement desensitization and reprocessing versus exposure plus cognitive restructuring versus waiting list in the treatment of post-traumatic stress disorder. J Clin Psychol Psychother 2002;9:299–318.
48 Taylor S, Thordarson DS, Maxfield L, Fedoroff IC, Lovell K, Ogrodniczuk J: Comparative efficacy, speed, and adverse effects of three PTSD treatments: exposure therapy, EMDR, and relaxation training. J Consult Clin Psychol 2003;71:330–338.
49 Basoglu M, Salcioglu E, Livanou M, Kalender D, Acar G: Single-session behavioral treatment of earthquake-related posttraumatic stress disorder: a randomized waiting list controlled trial. J Trauma Stress 2005;18:1–11.

Announcement

19th World Congress on Psychosomatic Medicine / 19ième Congrès Mondial de Médecine Psychosomatique

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