

# EMDR (Eye Movement Desensitization and Reprocessing): A Different Option in Psychotherapy

Önder Kavakcı<sup>1</sup>, Orhan Doğan<sup>2</sup>,  
Nesim Kuğu<sup>3</sup>

<sup>1</sup>Assoc. Prof., <sup>2</sup>Prof. Dr., <sup>3</sup>Assoc. Prof.,  
Cumhuriyet University Medical Faculty, Department  
of Psychiatry, Sivas

## ÖZET

EMDR (göz hareketleri ile duyarsızlaştırma ve yeniden işleme): Psikoterapide farklı bir seçenek

Göz hareketleriyle duyarsızlaştırma ve yeniden işleme (EMDR: Eye Movement Desensitization and Reprocessing), son yıllarda oldukça ilgi çeken terapi yöntemlerinden biridir. Bu ilginin bir nedeni, özellikle Travma Sonrası Stres Bozukluğu (TSSB) tedavisindeki etkinliğinin pek çok çalışma ile gösterilmiş olmasıdır. EMDR, bilgi işleme süreçlerini kolaylaştırarak ve travmatik anı parçalarının bütünleşmesini sağlayan yenilikçi bir terapi yöntemidir. Bu yaklaşımla bilginin gelecekte daha iyi işlevsellik sağlayacak şekilde işlenmesi sağlanabilir. Son yıllarda, tedavi kılavuzlarında ve meta analizlerinde EMDR, önerilen tedaviler arasında belirtilmektedir. Travma ve sonrası bozuklukların görülme sıklığı oldukça yüksektir. Buna karşın, Türkçe alanyazında bu bozuklukların tedavi seçenekleri ile ilgili yayınlar oldukça sınırlıdır. EMDR'nin etki mekanizması henüz tam olarak aydınlanmamıştır. Shapiro bir uyumsal bilgi işleme modeli önermiştir. Daha sonra, çeşitli araştırmacılar laboratuvar ve görüntüleme yöntemlerine dayanan çeşitli nörobiyolojik modeller önermişlerdir. Bu çalışmada, EMDR ve sekiz evresi açıklanmış, bir olgu örneği, seans kayıtları ile sunulmuş uygulamaları gösterilmiş ve bu tekniğin çalışma biçimi açıklanmış, etki mekanizması ile ilgili önerilen nörobiyolojik modeller özetlenmiş, Türkiye'de EMDR ile yapılan az sayıdaki yayın gözden geçirilmiştir. Bu tekniğin ruh sağlığı çalışanlarının uygulamalarına daha çok girmesi, hem uygulayıcıların psikiyatrik bozukluklar üzerindeki yetkinliklerini arttıracak hem de travma ve benzeri bozukluklardan yakın hastalara hızlı iyileşme şansı verecektir.

**Anahtar kelimeler:** Travma, TSSB, EMDR, terapi, nörobiyoloji

## ABSTRACT

EMDR (eye movement desensitization and reprocessing): a different option in psychotherapy

In recent years, there has been an interest in using the EMDR (Eye Movement Desensitization and Reprocessing) therapy. One of the reasons for this interest may be its effectiveness shown by numerous studies, especially, conducted with individuals who suffer from Post Traumatic Stress Disorder (PTSD). The EMDR is known to be an innovative approach that accelerates information processing and facilitates the integration of fragmented traumatic memories. This process is stated to allow better integration of the information that a person has to handle in the future. Recent practice guidelines and meta-analyses have designated the EMDR as a first-line treatment for trauma. Although the prevalences of trauma and trauma related disorders are high in Turkey, there has been a limited number of published studies highlighting treatment options. The EMDR's mechanism of action has not yet been fully explained. Shapiro has proposed an adaptive information processing model. Later, based on laboratory and neuroimaging methods, a number of neurobiological models have been suggested. The present study explained the EMDR and its eight-phases. A case example with session records was provided to show the application and operation of the technique. After that, leading neurobiological models which attempt to explain the mechanisms of action of the EMDR were summarized. Finally, few studies conducted in Turkey using the EMDR were reviewed. Given the effectiveness of the EMDR regarding trauma and related disorders, the utilization of the technique by a broad number of mental health professionals may not only increase the professionals' competency on psychiatric disorders, but also may provide patients suffering from these disorders a chance to recover in a relatively short period of time.

**Key words:** Trauma, PTSD, EMDR, therapy, neurobiology

DOI: 10.5350/DAJPN2010230307

Address reprint requests to:  
Dr. Önder Kavakcı, Cumhuriyet Üniversitesi Tıp  
Fakültesi Psikiyatri AD, Sivas - Turkey

Phone: +90-346-258-0867  
Mobile: +90-530-419-9192

E-mail address:  
okavakci@yahoo.com

Date of acceptance:  
July 02, 2010

## INTRODUCTION

EMDR is a method combining elements of several well-known approaches, including the

psychodynamic, cognitive-behavioral, and client-centered approaches (1). Many studies have shown that EMDR is effective in Post Traumatic Stress Disorder (PTSD) (2-4). A review study conducted in

recent years showed that Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) and EMDR are superior to other therapies in the treatment of PTSD (5). A meta-analysis study focused on PTSD therapies found EMDR and Trauma-Focused CBT to be effective at similar levels (6). In this study, we summarize the EMDR technique, the application of EMDR, and the neurobiological mechanism suggested for EMDR. We then explain the application by presenting a PTSD case, with session records, related to an adult trauma without complications.

### **Emergence of EMDR**

In 1986, Francine Shapiro made her first observations about EMDR and began trying her technique in various conditions. As she gained experience in EMDR, she enriched this method by making use of other treatment approaches as well (7). The first controlled clinic research on EMDR was conducted in 1988. Since then, many studies have been conducted on the effectiveness of EMDR and it has been rapidly accepted as a technique. Although EMDR was widely criticized in the beginning (8) while awaiting further development of the technique, research results, and the establishment of application guidelines, in recent years no critical publications have been seen. The "Journal of EMDR Practice and Research", mainly dealing with EMDR and EMDR research, has been published since 2007.

### **Trauma and EMDR**

According to the EMDR approach, the memory of trauma is stored dysfunctionally in the memory, and this past experience is called the "node". The node is a biologically stored experience located in the center of memory networks and can be undone therapeutically. These dysfunctionally stored memories are the fundamental reason that dysfunctional reactions occur and the sense of self is reduced. Since current experiences are connected to existing memory networks, they may settle inappropriately when in contact with a dysfunctionally stored memory. Experiences stored in the memory are composed of information such as images, thoughts, and sensations. The information

may be stored in the "frozen" memory system without being fully processed, and therefore unable to connect with other information on a neurobiological level (9). Traumatic experiences occurring in childhood years in particular are usually stored this way. These memories may be a traumatic experience having an obvious effect on the person, like rape or war, and called "T"; numerous events (stressor) causing negative beliefs like "I'm worthless," or "I'm inadequate" in the person him or herself (particularly childhood experiences) and called "t"; or experiences where the stressor is chronic (10). Underlying interrelated target memories (nodes) are stored in their original state (unchanged-unprocessed) and affect the present considerably. The cause of nearly all disorders in the present is hidden in past experiences. Many people may experience similar problems again and again throughout their lives due to their unprocessed traumatic memories. When these memories are processed, the information moves from disorder to functionality. Processing information removes dysfunctional data from the frozen state and carries it towards a more reconciliatory. The data moves from disorder to functionality and positivity increases as higher reconciliation is realized (9).

The first hypothesis on the modus operandi of EMDR was developed by Shapiro. According to Shapiro's Adaptive Information Processing (AIP) model, if information is troublesome or traumatic, it is not processed completely. Initial perceptions about the incident will be stored in the memory along with the distorted thoughts (cognitions) and perceptions they are associated with. People's current maladaptive behaviors are a result of these troublesome memories remaining unprocessed. "Intrusive" symptoms of PTSD are assumed to stem from unprocessed perceptions, and affective and cognitive elements of the trauma. Eye movements and other bilateral stimulus (such as bilateral aural or tactile stimulus) are assumed to stimulate the processing of information (1). Various studies have shown that EMDR and similar eye movements decrease the vividness of affects and images related to the memory (11). A decline in the distress and related avoidance ensures desensitization, which may speed up the processing of information. Images of the event may become less apparent and more accessible, and thus information about the

memory may join adaptive information. Consequently, an increase in the connections in the memory network is assumed (9).

## EIGHT PHASES OF EMDR

EMDR proceeds in eight phases. The first two phases are completed in one session, while the number of sessions for the other five may vary. Working with traumatic memories is almost always troublesome for the patient. Thus the EMDR therapist turns to the patient's own resources and tries to help him/her develop abilities to deal with negative affect. To enable the processing of all the memory networks related to the traumatic memory, the therapy generally begins with the event experienced in the earliest part of the person's life. First the traumatic memories are focused on and resolved, and then EMDR turns to current situations. The processing causes emotional disturbance, and continues until no active symptomatic reaction and unease remains. In addition to processing traumatic or troublesome memories, EMDR is used to help develop the special abilities and behaviors needed to live a healthy and functional life.

**Phase one:** This phase looks at the patient's history, evaluates the patient's readiness for EMDR, develops a treatment plan, and determines suitable targets for EMDR treatment.

**Phase two:** This is the preparation and stabilization phase, which includes establishing a therapeutic relationship, determining achievable targets, and educating the patient about his/her symptoms. In this phase, the patient is taught self-calming techniques. These techniques are used to help the patient maintain his/her balance between and during sessions and to close incomplete sessions. They are also useful for keeping the patient in treatment.

**Phase three:** Processing of the traumatic memory begins. An image representing the target memory is determined. The patient is asked about perceptions, cognitions, emotions, and body sensations evoked by this image. Each traumatic memory forms a negative cognition about the self in people. The patient is asked to determine the cognition he/she has about his/her self "currently" when thinking about the target memory. The patient's cognition about him/herself is not

reconciliatory (such as I'm insufficient, I can't protect myself, I'm not someone who deserves to be loved). Afterwards, the patient is asked which positive belief (cognition) he/she wants to have when he/she looks at the target image now. A more functional thought such as "I can be successful, I'm someone worthy of being loved, I'm now safe" is determined. The validity of the cognition scale is a single-article scale suggested by Shapiro; a score between one = completely invalid and seven = completely valid is given. The patient is asked to determine how convincing and valid he/she considers the desired positive cognition when he/she looks at the image. Determining the positive cognition constitutes an achievable target for the therapy. It may also facilitate the processing of information by establishing a relationship between the target traumatic memory and the remedial emotional information right from the start (10). The patient's determining of the target image and defining the accompanying negative cognition stimulates memory networks and evokes strong emotions. The patient is asked to become aware of and identify these emotions and notes are taken. The patient determines the level of his/her disturbance on the "Subjective Unit of Disturbance (SUD)" scale. SUD is a grading of the disturbance felt, with a score between zero and 10 (zero = no disturbance and 10 = highest imaginable disturbance). After determining the level of the disturbance caused by the image on this scale, the patient is asked to determine where on his/her body where he/she feels this disturbance the most. This focus allows him/her to recognize and label his/her purely perceptive symptoms (for instance, a sensation of strangulation around the throat) and differentiate these from cognitive interventions (for instance, I'm desperate).

**Phase four:** In this phase, the patient is asked to focus on the target image, the negative cognition, and the related emotions and body sensations. The instruction "Just let it be, just let it happen, we will talk about this at the end of the set, don't brush aside anything that comes to mind as insignificant, each new piece of information that comes to your mind is somehow related, if you want to stop, just raise your hand" is given and the bilateral stimulation is started. This phase is the desensitization phase and continues until the subjective unit of disturbance (SUD) scale for

the target memory drops to zero.

**Phase five:** This phase begins with the patient remembering the target memory without experiencing any discomfort. The patient is encouraged to voice his/her feelings about this memory and efforts are made to strengthen his/her insight. This insight is generally acceptance of the self and the new positive self-perception (10).

**Phase six:** This is the body scan phase. The patient is asked to keep track of whether there is any tension in his/her body when focusing on the target image and positive cognition. According to the AIP model, information stored in a disruptive manner is experienced physiologically. The EMDR operation is therefore not deemed complete until the traumatic memory targeted in the beginning is remembered without any body sensations. If the patient reports disturbing body sensations, processing continues until he/she relaxes.

**Phase seven:** This is the closure phase. In this phase, the therapist decides whether the processing has been sufficiently achieved. If there has not been sufficient processing, the session is completed with the self-calming techniques developed in phase two and exercises such as safe place visualization, and the patient is told that he/she will resume processing in the new session. All patients are informed that processing may also continue between sessions.

**Phase eight:** This is the reevaluation phase and the starting phase of every session following the first application. The therapist asks the patient to remember the target memory studied in the previous session and evaluate the effects of the treatment. The effect of the treatment is evaluated and information is obtained on matters needing further focus. New targets are determined and a new EMDR session is started.

**Safe place:** Since working on traumatic experiences is quite disturbing and patients frequently experience such conditions as overstimulation and feeling on edge, patients are taught techniques to help them control themselves and relax prior to the EMDR application. One of these is the safe place exercise allowing the patient to easily regulate his/her emotional states. The patient is asked to remember or imagine a place evoking a sense of safety and comfort in him/her. He/she is asked to define the emotions and the location

of pleasant physical sensations he/she feels when focusing on this image. Bilateral stimulation is given as he/she focuses on these emotions and sensations. He/she is asked about his/her feelings, and if he/she feels better, four to six more sets are applied. Afterwards, he/she is asked to find a keyword to define this image, such as comfort, beach, trees, or mountain. Four to six sets are applied, asking him/her to focus on the image of the place where he/she is emotionally safe, positive sensations, and the keyword. He/she is asked to repeat this application by him/herself and is thus able to experience comfort upon remembering the image without any bilateral simulation. He/she is recommended to use this safe place during and between sessions when distress heightens (10).

**Detection of positive and negative cognition:** Cognition reflects the comments of the person on his/her self. Traumatic experiences bring about the development of insurmountable negative beliefs in victims. Negative cognition is the person's negative self-evaluation about the event, even if the traumatic experience is in the distant past. It causes dysfunctional emotions when remembered or evoked, becomes generalized in neural networks, and feeds the person's negative self-beliefs. Negative beliefs limit the person, lower his/her self-value, and discredit the self. Negative cognition is determined with the question "What is your most negative belief about yourself when you think about that event?"; it is in the areas of responsibility (like I don't deserve to be loved, I'm a bad person, I'm worthless), safety/vulnerability (like I can't be sure of myself, I can't trust in my decisions, I can't protect myself, I'm in danger) and control/choices (like I'm powerless, I'm weak, I can't succeed, I'm inadequate) (10). Positive cognition is the state desired when the event is remembered and is distilled from the positive affect. It is the exact opposite of negative cognition. It strengthens self-value. It is determined with the question. "When you think about that event, how would you like to define yourself and what would you like to believe about yourself at the moment?" When positive belief is established following successful treatment, it provides a basis for the person to make new choices for him/herself, develop positive feelings about his/her own value, and achieve new skills. The perception of the past is changed with the treatment; the positive cognition developed becomes

generalized and affects the evaluation of the moment and expectations for the future (10).

Below, a trauma case is presented with session records and the application of EMDR is explained.

ED is a 29-year-old single male, working as a customer representative in a company. He lives in Sivas with his family. He went to Tokat for a training meeting held by his company in August 2008. While returning from Sivas with four colleagues, they crashed into a car that had suddenly come on the road. The woman driving the car they crashed into died. ED was sitting next to the driver and survived the accident with injuries. ED underwent treatment in hospital for some time. He had 60 stitches in his hand, his cruciate ligament was torn, and bruises formed under his eyes. He returned to work three months later. He did not go to Tokat for three or four months. On the first day he went to Tokat, he hit a dog in the same vicinity. He did not stop his car, he only looked back from the mirror and saw the injured dog. He said "the dog had a spiteful look on its face". ED came to the clinic for a consultation seven months after the event.

After the accident, even though he did not drive, he came to the clinic with complaints of intense feelings of guilt, haunting images about the accident, remembering the event frequently, recurring nightmares about something hitting him, excessive sweating, and unwillingness to pass by the site of the accident. He said that he had to pass by there because of his job and that he could only do it if he had a big vehicle in front of him and kept behind that vehicle. He has not wanted to talk to anyone about the accident since it happened. He complained about emotional dullness, inability to rejoice or cry, hyper-vigilance, and distractibility after the accident.

The Trauma Evaluation Scale of Foa et al., tested for Turkish validity and reliability by Işıklı (12), was administered to ED. He received a score of 32 out of 51. This score in the scale was interpreted as medium-severe PTSD symptom level. ED also meets the DSM-IV-TR PTSD criteria. He was told about the post-traumatic stress disorder and his treatment options. His consent was obtained for the application of EMDR.

### Session One

After deciding on the application of EMDR with

ED, the therapist discovered the scenes that disturbed the patient about the event and decided to focus first on the moment of the first crash; ED had difficulty in defining a clear image about the first accident, however, and the therapist therefore decided to start with image of the moment of hitting the dog.

**Therapist (T):** When you visualize the moment of hitting the dog, what kind of image/scene do you see?

**Patient (P):** A spiteful look, as if it had human mannerisms. I did not dare get out of the car. Its leg was broken.

**T:** When you look at that moment, which emotions come along with that image?

**P:** Pessimism.

**T:** Hmm. And when you look at that scene, what do you think about yourself?

**P:** I'm guilty.

**T:** And when you look at that image is there any belief, any thought that seems unconvincing to you, but you wish you were able to say about yourself?

**P:** I did everything I could.

**T:** On a scale from one to seven, how convincing do you think this belief is for you?

**P:** Three.

**T:** OK, I want you to look at that image again. When you look at it, where in your body do you experience its discomfort the most?

**P:** My brain.

**T:** And if you were to grade this discomfort on a scale of zero to 10, zero for not discomforting at all and 10 for the biggest imaginable discomfort, what do you think is the discomfort of that moment for you?

**P:** Eight.

**T:** OK. And now, I'll ask you something else. If I asked you what place you feel most comfortable, peaceful and safe in to date, what would you say?

**P:** The ski lodge. I feel very comfortable, safe, and happy.

**T:** Fine. Now visualize the ski lodge and remember your safety, happiness and comfort there. And follow my finger while remembering these.

The therapist administered a brief EM (eye movements) set.

**T:** How are you now?

**P:** I'm fine, it felt good.

**T:** Good, now stay with this, EM...

**T:** Now, I want to return to the accident scene we talked about a little while ago. Visualize that scene. Remember your emotions, thoughts about yourself, sensations in your body with that scene, and follow my finger now. Just relax EM...

**T:** Yes, take a deep breath. Now, what do you see?

**P:** A crowd had gathered around. I can remember that moment now...

**T:** Good, continue, EM...

**T:** What do you see now?

**P:** My friend came to my mind, nothing else. My hands were sweaty.

**T:** Good, continue, EM...

**T:** Take a deep breath, yes. What do you see now?

**P:** I said, "Phone the director, I don't want to go there again". I remember that.

**T:** Let's continue, EM...

**T:** What do you see now?

**P:** Three or four people got in and out of the ambulance. My memory was working well. There was a doctor, they showed me two persons, and I said I didn't recognize them. I remember this.

**T:** Good, continue, EM...

**P:** After the accident, the neighbor woman looked at my face, and turned her face away. My face was in terrible shape. I remember that moment.

**T:** Hmm, good. Continue, EM...

**P:** I hit the dog, the license plate fell off. I drove on for two kilometers; a truck followed me, stopped me and gave the license plate to me.

**T:** Hmm, good. Continue, EM...

**P:** After I reached Tokat, I saw blood on the left side of the car. I had it washed off. I said that a red car rubbed against it and told them to apply wax polish.

**T:** Good. Continue, EM...

**P:** I didn't use the same road on the way back. I came through Erbaa. I can go there now.

**T:** How are you now, how is your body?

**P:** Fine, my body is also fine.

**T:** If we return to the image in the beginning, what is the discomfort you feel thinking about that moment now? Out of 10?

**P:** Six.

**T:** OK, let's continue, EM...

**T:** What do you see now?

**P:** I remember the words of the police officer. He'd said

that the vehicle we hit was black and its lights has been turned off, that the driver's safety belt had not been fastened, that she wouldn't have died if her seatbelt had been fastened.

**T:** OK, let's continue, EM...

**P:** On record, the shepherd said "I didn't hear any braking sound", he only heard the crash. The deceased woman had received her driving license 15 days earlier. My friend couldn't see that vehicle at all in the dark, these facts give me some comfort. When setting off, I'd made everyone in the car fasten their seatbelt, I'd joked that our driver is a novice. I think God did not want us to die.

**T:** OK, let's continue, EM...

**P:** A notice came a few days ago. It says "will you make a complaint about your friend", we'll appear in court, I remember that.

**T:** What is your discomfort caused by the event now? Out of 10?

**P:** Three.

**T:** As far as I understand, the driver of the car you crashed into was a novice, she hadn't fastened her seatbelt, it was dark outside, it was a black car and its lights were turned off, right? Follow my fingers, EM...

**P:** I feel better now, after what you said. She had her 13-year-old child with her, he had said "There's a car, don't go on the road", I remember that now. He had fastened his seatbelt.

**T:** What is your discomfort caused by the event now? Out of 10?

**P:** One or two.

**T:** How are your emotions and your body now?

**P:** Fine, I'm comfortable.

**T:** OK, I'm now stopping as we're out of time, we'll continue next week. I want you to keep a diary. I want you to write down anything you realize, think or feel about what we worked on today throughout the week; important or unimportant, write down everything, and let's have a look at them next week. We activated your memory about the event here, and your brain has started processing the event, this can continue throughout the week. If you have any distress about what we worked on here, I want you to remember the ski lodge, remember that place, remember your sense of safety and comfort there, you can calm yourself down in this way. Now I'd like to hear you

impressions about the experience you had today. What did you experience throughout the session?

Here, the therapist listens to the patient's experiences and impressions during the EMDR session (debriefing). He tries to make out whether there's material that should be worked on, whether there's any problem, misunderstanding or another problem he should be mindful of. The first seven phases of EMDR have been completed at this point of the session. Phase eight consists of evaluating the week, determining new material to work on, and having a look at the diary in the next session.

As seen in this case, patients remember the event as if they were living it again during the application, and initially their disturbance may intensify. As processing continues, comforting aspects about the experience not remembered in the beginning are recalled, there are more reminiscences, and awareness of different aspects. In this case, the memories of two separate accidents were coded in connection with each other in the patient's memory. Thus we observe that sometimes the patient remembers scenes from the first accident and sometimes from the second accident during eye movements. Since the memories were coded in connection with each other in the patient's memory, when a traumatic memory is processed with EMDR, we see that this is generalized and nodes belonging to other traumatic experiences with a similar theme are also resolved. Generally, the earliest traumatic memory must be processed for this to happen. Also in this case, the sense of guilt stemming from both the memory of hitting the dog and the traumatic experience in the first accident was removed by working on just one of them. The therapist went along with the patient's preference and agreed to work on the "I'm guilty" negative belief about the event. Negative cognitions related to the area of responsibility, such as I'm guilty, I did a bad thing, I'm bad, I'm disgraced, are frequently seen with traumatic experiences. In such a case, even though a cognition like "I'm in danger" can also be expected, it seems that the traumatic experience resulting with death of the woman, his hitting the dog and furthermore not stopping, caused him to develop a negative cognition related to the area of responsibility.

While EMDR is being applied, the therapist generally does not intervene, does not comment,

guide, or ask questions. The aim is have the patient find resolution from his/her own resources. When the patient cannot make any progress and processing is blocked, the therapist may make a therapeutic intervention during the application of EMDR in the session (13). However, EMDR therapists prefer not to use this type of cognitive intervention. In this session, the therapist makes a cognitive intervention "As far as I understand, the driver of the car you crashed into was a novice, she hadn't fastened her seatbelt, it was dark outside, it was a black car and its lights were turned off, right?" towards the end of the session. Here, the intervention was made by recalling information already known but not used by the patient, and applying eye movements immediately thereafter. The therapist does not talk or argue with the patient in any way after the intervention, he just makes the intervention and continues the application. If the intervention is functional, the patient will use it to overcome the blockage.

The processing continues until the degree of discomfort caused by the traumatic experience in the sessions drops to zero. If the SUD level cannot be reduced to an acceptable level such as zero or one, the session is completed with a relaxation exercise or a safe place exercise. After the discomfort level is reported as zero, the therapist questions the validity of cognition (VoC) where he/she visualizes the image of the traumatic experience on a scale from one to seven; the therapist wants the patient to hold the image visualized and applies bilateral stimulation until validity reaches a level of six to seven. At this stage, eye movement sets are shorter (about 10 sets) than sets during the processing of the negative content.

## Session Two

**T:** How are you, how was your week? Were you able to keep a diary?

**P:** I'm fine, I didn't keep a diary but something interesting happened. I stopped at the site of the accident this time. I looked around the site, I found my business card, and it was still there seven months later. I went there with a physician friend of mine working in Tokat. Later I visited the family of the deceased woman. While I was in hospital, the husband of the

deceased woman visited me, I didn't know that. He said "I was as sorry for you as for my wife". I looked very bad. They welcomed me, which gave me comfort. They said "It's God's will". My sense of guilt decreased even further after this visit. I've slept soundly since the last session, I haven't had any nightmares. I also feel that my sweating has gone down, but it hasn't stopped entirely. I still have some difficulty focusing my attention and I still feel somewhat on edge while driving. After the event, I used essitopram (10 mg/day) for four months, I stopped using it two months ago. It didn't help at all, it was only keeping my nerves under control.

After this information, the therapist and the patient talked about new material to work on, and they worked on his being taken to the hospital in an ambulance after the accident and his hospital days in session two.

In session three, the patient reported that there was no avoidance left, that he could mention the event comfortably, and that in contrast to the past, when he could only pass by the area of the accident by going behind a big vehicle, he could now pass the area of the accident in his car without any problem. The patient's nightmares stopped after the first session. He reported that his sweating had almost stopped after the second session. When he was evaluated using the Foa Posttraumatic Diagnostic Scale, his score had dropped to two points from 32 points before the first session. He did not meet any of the PTSD criteria in DSM-IV-TR. In the follow-up evaluation three months later, we saw that the patient's condition remained satisfactory and that there were no PTSD symptoms.

### Neurobiological Models Suggested For EMDR

This case shows that EMDR works quite rapidly compared to conventional therapy techniques. Our observations have shown that therapists generally believe that the more complicated and more difficult the technique, is the better one. This may explain why it took a long time for EMDR to gain acceptance. For this reason, researchers studied the underlying mechanism of EMDR further. Following Shapiro's adaptive information processing model, various researchers have developed models on the biological effect mechanisms of EMDR on the basis of laboratory

experiments and neuro-imaging study findings. Most of these are based on the possible changes in the Anterior Cingulate Cortex (ACC) during EMDR therapy. In particular, these changes include the disconnection between rostral, the more affective region of the ACC, and caudal, the more cognitive-oriented sub-region (14-16). Bergman (17) asserts that EMDR stimulates the cerebellar processing center, resulting in the activation of dorsolateral and orbitofrontal cortices. According to him, EMDR causes further integration of neocortical areas and traumatic memories in general semantic networks.

Denny (18) put forth an inhibition model. According to this model, an orientation reflex caused by EMDR suppresses the chaos formed by traumatic memories (the concept of orientation reflex expresses a change or novelty making the organism more sensitive and changing the organism's start response – such as, for example, the pupil's response to faint light). Armstrong and Vaughan (19) also suggested a model where re-evaluation and change is seen through suppression of the orientation reflex in the neuronal model of the unconditioned stimulus.

Andrade et al. (20) suggested a model in which eye movements reduce the vividness of traumatic images disrupting the function of the visuospatial sketchpad (VSSP) of working memory. MacCulloch and Feldman (21) stressed the somatic effect of bilateral stimulation of the brain in their theories on the biology of EMDR. They suggested an "exploratory reflex"; according to this mechanism, "EMDR application creates a condition around the subject where he does not perceive any danger. This effect creates de-arousal and pleasant visceral sensations as a reflex." A memory about emotional trauma or stress matches with the relaxation response provided by EMDR and the patient is able to work on the memory. Barrowcliff et al. (22) showed that eye movements during EMDR therapy decrease the vividness, emotional value, and electro-dermal over-arousal that accompany negative autobiographic memories, in contrast to when the eyes are fixed.

Stickgold (16) developed a model based on sleep physiology studies in his article on the neurobiology of EMDR. According to him, PTSD can change normal brain functioning during REM sleep. EMDR meets the special physiological state required for the memory

integration that takes place during REM sleep; this state is needed for healing. Repetitive saccadic eye movements can induce the REM-producing mechanisms of the brain stem. This orientation response in the form of an REM-like state facilitates the cortical integration of traumatic memories. Systems activated by EMDR shift the brain, by themselves, to a memory processing mode similar to REM sleep. This REM-like state allows integration in associative cortical networks without the intervention of episodic reminiscences regulated by the hippocampus. EMDR is more useful than REM sleep for two reasons. First, in contrast to REM sleep, during EMDR treatment the patient is able to decide what to hold in his/her mind and therefore what to process him/herself before the beginning of bilateral stimulation. Second, accompanied by careful direction from the therapist, the level of anxiety and fear can be kept low during EMDR treatment.

Rasolkhani-Kalhorn and Harper (23) suggested a model based on depotentialization in the limbic system. Laboratory studies conducted on animals indicate that potentialization of synapses in various areas of the limbic system are the first step in the formation of the memory of fear. Depotentialization of these synapses will result in the deletion or alteration of memories of fear. The basic mechanism of depotentialization is the activation of "low-frequency stimulation." The authors found in their research that circuits potentialized within the limbic system become variable and quite prone to depotentialization during the recollection of the memory. They claimed that the brain can be stimulated with low-frequency stimulation during EMDR treatment, which can calm or alter traces of fear memories. They also stated that the basic effect is hippocampus and amigdala-centered and that the depotentializing effect of bilateral stimulation extends across the brain and includes the ACC.

According to the mechanism suggested by Kaye, EMDR acts on the ACC and allows the integration of neocortical information. The top region of the ACC functions in the cognitive processing of information, and the bottom region in its affective processing. During EMDR, stimulation has a bilateral effect on the ACC; it acts in opposite directions and suppresses cognitive and semantic processing reciprocally and allows resolution of the node. Secondly, with the

activation caused by resource development application and novelty search effects in EMDR, dopaminergic Ventral Tegmental Area projections on the ACC can contribute to healing (24).

Bergman (25) developed his views on the acting mechanism of EMDR in his article published in 2008. Trauma memory is reported as localized in the right side of the brain. Bilateral stimulation allows communication between hemispheres and integration of the trauma material with speech and language areas. With the effect of EMD, the restoration of hemispheric laterality, memory integration, somato-sensorial integration, and – as a result of synchronization of dynamic-neural networks – somato-sensorial-cognitive integration occur. During the trauma, the thalamo-cortical attachment is disrupted; EMDR activates the thalamus, which repairs this disruption.

Bergman (26) also evaluated findings from neuro-imaging studies in a recently published article and claimed that with successful EMDR treatment, the following are achieved: 1) emotional regulation by way of a decrease in prefrontal lobe activity, 2) prevention of limbic over-arousal with increased regulation of the association cortex, 3) a decrease in over-consolidation in traumatic episodic memory and intrusions with a decline in temporal lobe activity, 4) a reduction in flashbacks regulated by the occipital region with a drop in occipital activation, 5) ensurance of the functional balance between the limbic and prefrontal areas, and 6) thalamic restoration through increased thalamic activation. He stated that the results of neuro-imaging studies contribute to the restoration of memory function, operational memory/concentration, and affect regulation.

The neurobiological mechanisms suggested in EMDR literature thus far have been summarized. Future studies in this field will expand our knowledge of PTSD, memory, and the operation of EMDR, and will allow us to offer more advanced treatment options.

Although EMDR seems to be a good choice for working on trauma, there are few publications about EMDR in Turkey, which suggest that the technique is not sufficiently known. Gürel (27) stated in a case report that he applied two sessions of EMDR to a patient in the physiotherapy and rehabilitation clinic who had post-traffic accident PTSD and personal

injury and who had not previously accepted any kind of treatment. The patient got over the effect of the traumatic memories and accepted the treatment process. His healing process continued and improved in the follow-up. Tutarel-Kışlak (28) found EMDR to be effective in the treatment of those with anxiety sensitivity related to trauma or in special conditions in his study with 19 university students on reducing anxiety sensitivity. In another study by Tutarel-Kışlak (29), in a patient who was visually impaired case with traumatic experience, the EMDR method was applied by tapping the knee, and his trauma symptoms were seen to decrease considerably after a two-session application and in the follow-up. Konuk et al. (30) applied an average of five-session, 90-minute EMDR to 47 cases diagnosed with PTSD after the 1999 earthquake and found that there was a considerable decline in PTSD symptoms according to the reports of participants; the researchers observed that the satisfactory condition of the patient was maintained in the follow-up six months later.

## CONCLUSION

Studies in recent years have drawn attention to the relationships between many diseases such as dissociative disorders (31), conversion disorder (32),

chronic pain (33), autoimmune diseases (34), circulatory system disease (35), and trauma. Intervention in and treatment of trauma as soon as possible is thus extremely important. We believe that mental health employees should widely use the easily-learned EMDR technique, which enables a quick response, alongside drug treatment, cognitive behavioral approaches, and group applications in their interventions aimed at trauma.

EMDR was also used in chronic pain (36), phantom pain (37), specific phobia (38, 39), PTSD in children (40), and stress-related dermatological disorders (41) other than PTSD and was reported to have positive results. Moreover, EMDR is among suggested methods in various treatment guides (42, 43). Studies about PTSD in Turkey and our clinical observations indicate that trauma and trauma-related disorders can be quite widespread. In conclusion, EMDR seems to be a good choice for mental health employees seeking to work on trauma, as it is easy to learn and apply in a very short time, and may get quick results.

## Acknowledgements

The authors would like to thank Ass't Prof. Dr. Emine Gül Kapçı for her suggestions and corrections to the draft.

## REFERENCES

1. Shapiro F. Eye movement desensitization and reprocessing (EMDR): Clinical and research implications of an integrated psychotherapy treatment. *J Anxiety Disord* 1999; 13:35–67.
2. van der Kolk BA, Spinazzola J, Blaustein ME, Hopper JW, Hopper EK, Korn DL, Simpson WB. A randomized clinical trial of eye movement desensitization and reprocessing (EMDR), fluoxetine, and pill placebo in the treatment of posttraumatic stress disorder: treatment effects and long-term maintenance. *J Clin Psychiatry* 2007; 68:37-46.
3. Lazrove S, Triffleman E, Kite L, McGlashan T, Rounsaville B. An open trial of EMDR as treatment for chronic PTSD. *Am J Orthopsychiatry* 1998; 68:601-608.
4. Scheck MM, Schaeffer JA, Gillette C. Brief psychological intervention with traumatized young women: the efficacy of eye movement desensitization and reprocessing. *J Trauma Stress* 1998; 11:25-44.
5. Bisson J, Andrew M. Psychological treatment of post-traumatic stress disorder (PTSD). *Cochrane Database Syst Rev* 2007; 3:CD003388.
6. Seidler GH, Wagner FE. Comparing the efficacy of EMDR and trauma-focused cognitive-behavioral therapy in the treatment of PTSD: a meta-analytic study. *Psychol Med* 2006; 36:1515-1522.
7. Shapiro F. Efficacy of the eye movement desensitization procedure in the treatment of traumatic memories. *J Traumatic Stress* 1998; 2:198-223.
8. 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.
9. Shapiro F, Maxfield L. Eye Movement Desensitization and Reprocessing (EMDR): Information Processing in the Treatment of Trauma. *J Clin Psychol* 2002; 58:933–946.
10. Shapiro F. Eye movement desensitization and reprocessing: Basic principles, protocols and procedures. Second ed., New York: Guilford Press, 2001; 4-126.
11. 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; 40:121-130.

12. Işıklı S. Travma sonrası stres belirtileri olan bireylerde olaya ilişkin dikkat yanlılığı, ayrışma düzeyi ve çalışma belleği uzamı arasındaki ilişkiler. Doktora Tezi, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara, 2006.
13. Gilson G, Kaplan S. The therapeutic interview in EMDR: Before and beyond. A Manual for Trained Clinicians. 2000.
14. Bergman U. [Speculations on the neurobiology of EMDR. Traumatology 1998; 4:4-16.](#)
15. Corrigan F. Mindfulness, dissociation, EMDR, and the anterior cingulate cortex: a hypothesis. [Contemp Hypnosis 2002; 19:8-17.](#)
16. Stickgold R. EMDR: A putative neurobiological mechanism of action. [J Clin Psychol 2002; 58:61-75.](#)
17. Bergmann U. Further thoughts on the neurobiology of EMDR: The role of the cerebellum in accelerated information processing. [Traumatology 2000; 6:175-200.](#)
18. Denny N. An orienting reflex/external inhibition model of EMDR and thought field therapy. [Traumatology 1995; 1:1-6.](#)
19. Armstrong MS, Vaughan K. An orienting response model of eye movement desensitization. [J Behav Ther Exp Psychiatry 1996; 27:21-32.](#)
20. Andrade J, Kavanagh D, Baddeley A. Eye movements and visual imagery: A working memory approach to the treatment of post traumatic stress disorder. [Br J Clin Psychol 1997; 36:209-223.](#)
21. MacCulloch MJ, Feldman P. Eye movement desensitization treatment utilizes the positive viscerale element of the investigatory reflex to inhibit the memories of post-traumatic stress disorder: a theoretical analysis. [Br J Psychiatry 1996; 169:571-579.](#)
22. Barrowcliff AL, Gray NS, Freeman TCA, MacCulloch MJ. Eye-movements reduce the vividness, emotional valence and electrodermal arousal associated with negative autobiographical memories. [J Forens Psychiatry Psychol 2004; 15:325-345.](#)
23. Rasolkhani-Kalhorn T, Harper ML. EMDR and low frequency stimulation of the brain. [Traumatology 2006; 12:9-24.](#)
24. Kaye B. Reversing reciprocal suppression in the anterior cingulate cortex: A hypothetical model to explain EMDR effectiveness. [Journal of EMDR Practice and Research 2007; 2:88-99.](#)
25. Bergman U. The Neurobiology of EMDR: Exploring the thalamus and neural integration. [Journal of EMDR Practice and Research 2008; 4:300-314.](#)
26. Bergman U. EMDR's Neurobiological mechanisms of action: A survey of 20 years of searching. [Journal of EMDR Practice and Research 2010; 4:22-42.](#)
27. Gürel D. Tıbbi tedaviye karşı olumsuz tutum gösteren fiziksel ve ruhsal travmalı bir hastanın iki seanslık göz hareketleri ile duyarsızlaştırma ve yeniden yapılandırma tekniği ile iyileşme süreci: Olgu sunumu. [Türkiye Klinikleri J Med Sci 2004; 24:689-696.](#)
28. Tutarel-Kışlak Ş. Kaygı duyarlılığını azaltmada göz hareketleriyle duyarsızlaştırma ve yeniden işleme (EMDR) tedavisi. [Turkish Journal of Psychology 2004; 19:49-65.](#)
29. Tutarel-Kışlak Ş. Görme engelli bireyde göz hareketleriyle duyarsızlaştırma ve yeniden işleme tedavi yönteminin dize hafifçe vurma alternatifinin uygulaması: bir olgu sunumu. [Türk Psikoloji Yazıları 2004; 7:77-90.](#)
30. Konuk E, Knipe J, Eke I, Yuksek H, Yurtsever A, Ostep S. [The effects of eye movement desensitization and reprocessing \(EMDR\) therapy on posttraumatic stress disorder in survivors of the 1999 Marmara, Turkey, earthquake. Int J Stress Manag 2006; 13:291-308.](#)
31. Sar V, Akyüz G, Doğan O. Prevalence of dissociative disorders among women in the general population. [Psychiatry Res 2007;149:169-176.](#)
32. Sar V, Akyüz G, Dogan O, Oztürk E. The prevalence of conversion symptoms in women from a general Turkish population. [Psychosomatics 2009;50:50-58.](#)
33. Sharp TJ. The prevalence of post-traumatic stress disorder in chronic pain patients. [Curr Pain Headache Rep 2004;8:111-115.](#)
34. Boscarino JA. Posttraumatic stress disorder and physical illness, result from clinical and epidemiologic studies. [Ann NY Acad Sci 2004; 1032:141-153.](#)
35. Gander ML, von Känel R. Myocardial infarction and post-traumatic stress disorder: frequency, outcome, and atherosclerotic mechanisms. [Eur J Cardiovasc Prev Rehabil 2006; 13:165-172.](#)
36. Grant M, Threlfo C. EMDR in the treatment of chronic pain. [J Clin Psychol 2002; 58:1505-1520.](#)
37. Schneider J, Hofmann A, Rost C, Shapiro F. EMDR in the treatment of chronic phantom limb pain. [Pain Med 2008; 9:76-82.](#)
38. De Jongh A, van den Oord HJ, Ten Broeke E. Efficacy of eye movement desensitization and reprocessing in the treatment of specific phobias: Four single-case studies on dental phobia. [J Clin Psychol 2002;58:1489-1503.](#)
39. De Jongh A, Ten Broeke E, Renssen MR. Treatment of specific phobias with Eye Movement Desensitization and Reprocessing (EMDR): protocol, empirical status, and conceptual issues. [J Anxiety Disord 1999; 13:69-85.](#)
40. Ahmad A, Larsson B, Sundelin-Wahlsten V. EMDR treatment for children with PTSD: results of a randomized controlled trial. [Nord J Psychiatry 2007; 61:349-354.](#)
41. Gupta MA, Gupta AK. Use of eye movement desensitization and reprocessing (EMDR) in the treatment of dermatologic disorders. [J Cutan Med Surg 2002; 6:415-421.](#)
42. Benedek DM, Friedman MJ, Zatzick D, Ursano RJ. APA Guideline Watch: Practice Guideline for the treatment of patients with acute stress disorder and posttraumatic stress disorder, 2009;1-12.
43. National Collaborating Centre for Mental Health (NCCMH). Post-traumatic stress disorder. The management of PTSD in adults and children in primary and secondary care. National Clinical Practice Guideline No. 26. London: Gaskell and the British Psychological Society, 2005.