

# Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) for Military-Related Post-Traumatic Stress Disorder

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**ABSTRACT** Objectives: This article describes a new, brief exposure-based psychotherapy known as Accelerated Resolution Therapy (ART) that is currently being evaluated as a treatment for combat-related post-traumatic stress disorder (PTSD). Methods: We describe a case report of an Army veteran with combat-related PTSD who was treated with 2 sessions of ART and experienced significant clinical improvement. We then discuss the theoretical basis and major components of the ART protocol, including use of lateral left–right eye movements, and differentiate ART with evidence-based psychotherapies currently endorsed by the Department of Defense and Veterans Administration. Results: The number of military personnel who have served in the wars in Iraq and Afghanistan and are afflicted with PTSD is likely in the hundreds of thousands. The ART protocol, which is delivered in 2 to 5 sessions and without homework, uses the psychotherapeutic practices of imaginal exposure and imagery rescripting (IR) facilitated through sets of eye movements. In addition to its brevity, a novel component of ART is use of IR to “replace” negative imagery (and other sensations) with positive imagery. Conclusions: This theoretical description of ART and single case report provide a rationale for future formal evaluation of ART for treatment of military-related PTSD.

## INTRODUCTION

Post-traumatic stress disorder (PTSD) is a disabling anxiety disorder that may occur after witnessing a traumatic event, and that evokes a combination of re-experiencing, avoidance, numbing, and arousal symptoms.<sup>1</sup> Comorbidity rates of disabling symptoms are often >80%<sup>2</sup> and may include sleep disturbance, depressive disorders, panic disorder, substance misuse or dependence, high somatic symptom severity, and an increased risk of suicidal behavior.<sup>3–5</sup> From the Operation Iraqi Freedom (OIF)/Operation Enduring Freedom (OEF)/Operation New Dawn (OND) conflicts, prevalence estimates of PTSD vary dramatically from 2 to 31%,<sup>6–9</sup> owing to substantially different methodologies including sampling method, combat experiences, PTSD ascertainment criteria, and treatment versus nontreatment seeking samples. A recent meta-analysis among military personnel who served in Iraq or Afghanistan since 2001 reported a postdeployment PTSD prevalence of 5.5% in population samples and 13.2% in operational military units.<sup>7</sup> Notwithstanding the magnitude and

sources of this variability, several facts with respect to military-related PTSD are clear: (i) the number of military personnel who have served in the OIF/OEF/OND conflicts who are afflicted with PTSD is likely in the hundreds of thousands, (ii) those exposed directly to combat are at higher risk of developing PTSD,<sup>10,11</sup> and (iii) the current Department of Defense (DoD)/Veterans Administration (VA) mental health treatment system is overtaxed to meet the very high current treatment need.<sup>12</sup>

Based on decades of research, the DoD and VA have formally endorsed several first-line cognitive behavioral therapies (CBT) for service members and veterans with PTSD. These therapies include prolonged exposure (PE) therapy,<sup>13–17</sup> cognitive processing therapy (CPT),<sup>13,15,17–19</sup> and eye movement desensitization and reprocessing (EMDR).<sup>17,20,21</sup> Of these, PE, an exposure-based form of CBT, is often the preferred standard of care in DoD and VA facilities with an increasing number of clinicians being formally trained. Although the published evidence base is substantial, all of the current first-line, evidence-based therapies endorsed by the VA and DoD are lengthy. To illustrate, PE consists of 10 sessions (approximately 90 minutes each) with corresponding homework assignments.<sup>14</sup> The homework requirement is extensive—two major assignments each day that require 1.5 to 2 hours to complete.<sup>22</sup> This equates to an approximate 30 to 35 hours of actual treatment commitment over several weeks. In addition, treatment success is far from absolute. In clinical trials of PE, dropout rates of up to 50% have been reported,<sup>23–25</sup> along with nonresponse rates between 20 and 67%.<sup>25,26</sup> This article describes a new, brief exposure-based psychotherapy known as Accelerated Resolution Therapy (ART). Although not specific to military-related PTSD, ART was developed in 2008 with the goal of

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addressing, to the extent possible, the principal limitations of existing evidence-based therapies, including lengthy treatment regimens and variable and often high rates of dropout and nonresponse. This therapy, which is delivered in 2 to 5 sessions and without homework, has recently shown empirical evidence of effectiveness for treatment of symptoms of PTSD and comorbid depression among civilians, including at 4-months post-treatment,<sup>27,28</sup> and is currently being formally evaluated as a treatment for combat-related PTSD. Herein, we provide a detailed case report of a veteran treated with ART, describe the ART protocol, and offer theoretical explanations for how major components of the ART protocol may work. As a preface, we acknowledge an absence of brain imaging or mechanistic studies needed to objectively determine the underpinnings of ART, as well as no controlled data of comparative effectiveness against existing evidence-based therapies for PTSD.

### **CASE REPORT OF ART**

The following case report of use of ART is from an Army veteran enrolled in the DoD-funded randomized controlled trial entitled “Accelerated Resolution Therapy (ART) for Psychological Trauma” (ClinicalTrials.gov Identifier: NCT01559688). For the purpose of ensuring anonymity, minor details such as age have been changed slightly. The veteran provided written consent for use of anonymous description of the case report, and the trial protocol was approved by the USF Institutional Review Board (IRB #00000210). The study participant was not selected at random among all veterans treated with ART, but rather on the nature of his principal trauma being due to an improvised explosive device (IED), characteristic of service in the wars in Iraq and Afghanistan. He sought treatment for memory of the IED incident because he feared his PTSD symptoms would prevent him from being a good father and husband, and would deny him the life he desired. He stated it was time for him to do whatever it took to deal with his PTSD, and thus, was highly motivated to receive treatment with ART. He was referred for ART by his psychiatrist after remaining symptomatic following cognitive behavioral therapy.

The study participant was a Caucasian male age 34 who served in combat missions in both Iraq and Afghanistan. Clinically, he presented with a score of 50 on the PTSD checklist-military version (PCL-M)<sup>29,30</sup> indicating presence of PTSD symptomatology. In addition, he endorsed the number of threshold items on the PCL-M<sup>30</sup> that are suggestive of a diagnosis of PTSD, and also screened positive on the PTSD subscale of the 125-item Psychiatric Diagnostic Screening Questionnaire (PDSQ).<sup>31,32</sup> From the PDSQ, it was found that elevated subscale scores in addition to PTSD were present for generalized anxiety disorder and hypochondriasis. By trial inclusion criteria, the participant stated no current suicidal or homicidal intention or ideation. From the Combat Exposure Scale,<sup>33</sup> the participant reported going on combat patrols or dangerous duty more than 50 times, being under

enemy fire for more than 6 months, being surrounded by the enemy more than 25 times, and in danger of being injured or killed between 3 and 12 times. Principal health-related complaints at study entry were nightmares with intrusive memories, sporadic physical reactions (racing heart, trouble breathing), anxiety in crowds, feeling distant from family, and problems with concentration. The participant had a history of previous individual psychotherapy, and at entry, was taking five medications for indications of depression, anxiety/panic disorder, narcolepsy, allergies, and asthma.

The participant underwent 2 sessions of ART during a 10-day period. In the first session, the traumatic scene that was treated (processed) using imaginal exposure (IE) and imagery rescripting (IR) (described later) involved an IED that went off under the participant’s vehicle. The memory included being ambushed and under heavy fire, the concussive sound and force of the IED that killed the other vehicle occupants, barred all exit, and set him on fire, along with the smell of diesel fuel, smoke, and burning flesh. In the ART session, the participant, with coaching from the clinician, was able to recall the traumatic scene without accompanying physiological distress; experience relief by reimagining a more pleasant version of events; and reported a reduction from 10 to 2 on the Subjective Units of Distress Scale. In the second ART session, the trauma that was processed using IE and IR (described later) was death of a parent because of cancer while he was on leave from tour in Afghanistan. Again, he was able to recall distressing circumstances and images associated with the death of his parent without accompanying physiological distress, reimagine a more pleasant version of events, and his reported score on the Subjective Units of Distress Scale dropped from 9 at the beginning of the session to 0 at the end of the session. By the third night after session 1, the participant reported being able to sleep through the night for the first time since being able to remember and also reported improved short-term memory and concentration. At the completion of therapy assessment, the initial score of 50 on the PCL-M (possible range of 17–85) had dropped to 19. At 3-month follow-up, the score on the PCL-M was 21. The participant remained on antianxiety and antidepressant medication, but was no longer taking medication for sleep dysfunction. Follow-up was not extended beyond 3 months.

By descriptive self-report, the patient described his day as filled with his attention divided between any given task and managing intrusive feelings, images, and thoughts. He described his nights as anxiety producing because of anticipated constant nightmares. He clearly communicated his reluctance in revisiting these memories because of the time and energy put into “trying not to think about it.” The initial session which focused on the single IED incident (memory) did bring up additional combat- and service-related memories, although the primary focus was the identified event. Following the session, the participant reported relief at being able to think about these events without experiencing the

previous distress experienced, as if the event were occurring in the present. He stated he was surprised by his ability to now speak about the event without taking cover. The session lasted nearly 2 hours and his relief was noticeable following the session as he was able to verbalize details of the event including those previously forgotten, and to place this event in both the context of his service and life narrative.

Results from the case study described earlier are consistent with those recently published among civilians,<sup>27,28</sup> and those among service members and veterans from an interim analysis of an ongoing DoD-funded trial.<sup>34</sup> In brief, among civilians ( $n = 54$ ), the mean reduction on the PCL-civilian version (PCL-C) after treatment with ART was  $-22.8 \pm 13.5$  points, effect size = 1.72,  $p < 0.0001$ ; and at 2-months post-treatment was  $-24.5 \pm 12.4$  points, effect size = 1.98,  $p < 0.0001$ .<sup>27</sup> In interim analysis of the DoD trial ( $n = 30$ ), which is comparing ART to an attention control regimen that consists of either fitness assessment/planning or career assessment/planning, the pre/post difference score on the PCL-M was  $-20.3 \pm 14.9$  points for the ART group compared to  $-1.8 \pm 6.0$  points for the attention control group; effect size = 1.27,  $p = 0.0003$ .<sup>34</sup> In terms of interpretation, a reduction of  $\geq 10$  points on the PCL-C(M) has been defined to represent “reliable” and “clinically meaningful” change.<sup>35</sup>

## MAJOR COMPONENTS AND THEORETICAL BASIS OF ART

The ART protocol consists of 2 major components and the use of bilateral eye movements, all of which draw from existing theoretical and clinical research. As a preface, and with all psychotherapies, motivation to get better on the part of the veteran highly influences treatment success. In the first major component of ART, “IE” is used whereby patients are asked to recall (verbally or nonverbally) details of the traumatic event while focusing their attention on physiological sensations, thoughts, and emotions. A postulated underlying mechanism for the benefit of using this technique is loosening of the association between unconditioned and conditioned stimuli.<sup>36,37</sup> During this process, the patient, with coaching from the ART clinician, becomes composed into a relaxed and alert state of mind, then is exposed to reactivation of the targeted memory for a very short period (30–45 seconds). This short period of exposure to the memory is immediately followed by identification and diminishment (or eradication) of the emergence of any uncomfortable emotional or somatic symptoms. Moving back and forth between “viewing” (recalling) of the memory and awareness of physical and emotional sensations in the body, the ART clinician steers the patient toward two complete phases of short-lived exposure to the targeted memory. Sets of eye movements (described later) are used during this phase.

In the second major component of ART, “Imagery Rescripting” (IR) is used to change (replace) negative traumatic sensory material and images to positive material. IR is broadly defined as working directly with imagery to change

meanings and ameliorate distress.<sup>38</sup> This is consistent with the work of Smucker<sup>39</sup> who noted that much of the cognitive–affective disturbance associated with intrusive trauma-related memories is embedded in the traumatic images themselves, and that modifying the traumatic imagery becomes a powerful, if not preferred, means of processing the traumatic material. Similarly, Conway et al<sup>40</sup> have stated that for PTSD memories to become less intrusive, they need to be integrated with other, more positive memories, rather than being avoided and hence remaining distorted and threatening in their content. Sets of eye movements are used during this phase, and the actual positive rescripted material is formulated (envisioned) by the patient. If the patient has difficulty in imagining a positive solution, the ART clinician provides prompts, such as asking the patient to shine a flashlight to “see” the solution.

## USE OF EYE MOVEMENTS DURING IE AND IR

During therapy, the patient (e.g., veteran) follows the therapists’ hand back and forth moving their eyes from left to right, with 40 bilateral eye movements performed per set. During this process, the patient is not speaking, but rather “watching” their scene (traumatic experience) in their mind like a movie. In some instances, the patient can watch their entire scene from beginning to end with a single set of eye movements; in most instances, several sets of eye movements are needed to watch (imagine) the entire scene. The process of “watching” the scene from beginning to end while performing eye movements is carried out multiple times. The first time through, the patient describes physical sensations that are elicited from watching the scene, such as tightness of the chest. Sets of eye movements are used to “process” (reduce/eliminate) these sensations. This is repeated a second time. The third time that the patient is asked to watch their scene, he/she is asked to imagine changing (replacing) the scene from negative to positive by changing the imagery and sensory components of the material to anything they choose (like the “director” of a movie). As the new positive scene is continually reviewed, the patient reports that it becomes increasingly more difficult to access the original distressing images. Treatment of the scene is considered complete (successful) when only the replacement scene can be accessed, although, the factual content of the original scene remains in memory. A typical way that an ART session is closed is to ask the patient to envision a beautiful bridge, and then use any metaphor of their choosing to further eliminate any distressing images before crossing the bridge to the other side, which represents moving on.

## POSTULATED ROLE OF EYE MOVEMENTS IN ART

As described above, the ART protocol makes frequent use of lateral left–right (saccadic) eye movements throughout the IE and IR components of trauma processing. Stemming from the EMDR literature, there is controversy and inconsistent findings as to the extent to which eye movements add

incremental clinical value to the psychotherapeutic elements of EMDR.<sup>41-44</sup> However, a recent meta-analysis by Lee<sup>45</sup> concluded that eye movements do alter processing of emotional memories and yield additional value in EMDR treatments. This conclusion is consistent with nonclinical laboratory studies that have shown use of eye movements to have larger decreases in the vividness and/or emotionality of autobiographical memories compared to control conditions such as finger tapping,<sup>46</sup> spatial tapping,<sup>47</sup> and no eye movement.<sup>48-50</sup>

Still, how is it that sets of eye movements, which are not used in PE and CPT, may help to process traumas in PTSD? A first possible explanation deals with enhanced memory retrieval to aid in cognitive processing.<sup>51</sup> Cognitive psychologists have found that a brief period of bilateral saccadic eye movements, before the retrieval phase of a memory experiment, improves memory retrieval in a wide array of tasks, including recall of early childhood memories<sup>52</sup> and recognition of details in a visual event narrative.<sup>53,54</sup> A second explanation deals with taxing of memory. Emotional memories tend to have an episodic form rich in sensory detail, and trauma recovery is likely to occur when these memories lose their sensory richness.<sup>55</sup> Consistent with hypotheses from working memory theory, holding an emotional memory in mind and performing another task such as eye movements disrupts the storage of this information and the episodic quality is thereby reduced<sup>45</sup> including rendering the traumatic images less vivid and emotional.<sup>46,49</sup> A third explanation is that eye movements elicit an orienting response<sup>56-58</sup> that theoretically activates an "investigatory reflex" in which first, an alert response occurs and then, a reflexive pause produces dearousal in the face of no threat. This reflex results in a state of heightened alertness and permits exploratory behavior in which cognitive processes become more flexible and efficient.<sup>59</sup> A fourth explanation is through reciprocal inhibition.<sup>46</sup> With this theory, the potential relaxation effect of eye movements over the course of IE may influence (reduce) the future emotionality of thinking about the traumatic experience. Finally, by way of indirect analogy, rapid eye movements (REMs) during sleep, of which the majority are in the horizontal direction,<sup>60</sup> are critical for memory consolidation.<sup>61</sup> Moreover, REM sleep is characterized by rapid horizontal saccades and increased interhemispheric EEG coherence.<sup>62</sup> The extent to which the sets of eye movements used in ART parallel some elements (and benefits) of REM sleep is unknown.

### POSSIBLE MECHANISM OF ACTION

Development of PTSD has been described as a consequence of failed memory processing when the brain fails to appropriately consolidate and integrate "episodic" memory into the "semantic" memory system.<sup>55,63</sup> Indeed, PTSD memories are not well integrated with other long-term autobiographical knowledge.<sup>63</sup> A recent meta-analysis of functional neuroimaging studies of PTSD reported evidence in support of a neurocircuitry model that is characterized by hyperactivation

of the amygdala (emotional memory) and hippocampus, and lower activation and imbalance in the medial prefrontal cortex.<sup>64,65</sup> In theory, disinhibition of the amygdala produces a vicious spiral of recurrent fear conditioning in which unambiguous stimuli are more likely to be appraised as threatening, sensitizing key limbic areas, and lowering the threshold for fearful reactivity.<sup>66</sup>

Whether by use of ART or potentially other therapies, it is fortuitous that brain processes during fear-based memory retrieval are malleable and receptive to change, a state known as reconsolidation.<sup>67</sup> Importantly, the period of memory malleability is finite, with recent studies determining that the time frame lasts less than 6 hours in humans and up to 6 hours in rats.<sup>67,68</sup> During the time this "reconsolidation" window is open, the memory is receptive to the introduction of new material (i.e., as initiated during ART). It is postulated that the ability to add new material to a memory can be advantageous from an evolutionary standpoint, a condition referred to as "adaptive update mechanism."<sup>68</sup> New material that is introduced during this finite reconsolidation period results in a positive change (significant reduction in the fear response, as measured through skin conductance response), and importantly, the change appears to be long lasting out to at least 1 year and perhaps permanent.<sup>68</sup> This memory malleability provides rationale for the use of IR in the treatment of PTSD and potential long-term sustainability of treatment benefit with ART.

### BRIEF COMPARISON OF ART VERSUS OTHER EVIDENCE-BASED THERAPIES

Clinically, the major distinctions between ART and PE, CPT, and EMDR (i.e., evidence-based therapies formally endorsed by the DoD and VA) can be briefly summarized as follows:

- (1) Length of therapy. By protocol, ART is delivered in 2 to 5 sessions, each lasting approximately 1 hour (but sometimes longer) and with no homework assignments. As stated above, PE consists of 10 sessions (approximately 90 minutes each) with corresponding homework assignments<sup>14</sup>; CPT is delivered over 12 sessions lasting 60 to 90 minutes with practice of skills outside of therapy sessions<sup>69</sup>; EMDR consists of 8 to 12 weekly 90-minute sessions.<sup>20</sup> Of note, the brevity of ART is consistent with the protocol of Arntz and Weertman<sup>70</sup> who stress that there is no need (clinically) for prolonged exposure, per se, in the treatment of PTSD.
- (2) Image replacement. The ART protocol uses the voluntary image replacement technique, a form of IR, with the aim to "replace" negative imagery (and other sensations) with positive imagery. Rescripting is directed by the ART clinician who prompts a preferred reimagining of the event in which the patient imagines a new narrative replacing unpleasant images, sensations, sounds, thoughts, and event outcomes to a preferred narrative. This differs from PE in which the aim is to extinguish the conditioned emotional

“response” to the traumatic stimuli. In concept, “changing” the images automatically not only extinguishes the conditional emotional response to the traumatic stimuli but also creates a positive set of emotional responses associated with the new images or rescripted narrative; thus, ART aims to not only desensitize but also promote an association with the positive affectively driven resolution to the narrative. Most importantly, the images are “replaced” in such a way that allows the retention of the historical and factual aspects of the memory, yet without distressing recall. In addition to PE, CPT focuses on challenging and “modifying” maladaptive beliefs related to the trauma, but not changing imagery or other sensations. EMDR has a focus on “desensitization,” as opposed to actual replacement of negative images as with ART.

- (3) “Silent” therapy. During the IE component of the ART protocol, the patient need not verbalize any details of the previous traumatic experience. CPT, PE, and EMDR typically involve verbal and/or written recall of the trauma. With ART, all that is required is that the patient be able to visualize in their mind the previous traumatic experience, like watching a movie from beginning to end. Indeed, during therapy, the ART clinician will inquire with the patient as to whether they were able to “watch” their scene from beginning to end as the associated physiological sensations are being reduced or eliminated. Thus, the ART clinician simply needs to know where the patient leaves off in their “scene” so that the sensations that are drawn out by viewing the scene can then be processed.
- (4) Use of metaphors. The ART clinician may frequently make use of metaphors to achieve the desired IE and IR components. For example, in reducing sensations during the IE phase, a patient who reported sensations of “pins and needles” in their legs might be directed (metaphorically) to place these pins and needles in a drawer of a sewing cabinet.
- (5) Use of eye movements. The ART protocol uses sets of eye movements to help process the traumatic material. This is similar to EMDR only, but differs in two important ways. First, ART tends to use more sets of eye movements within a given session, and by protocol, requires that after each set of eye movements that a “sensation check” be done so as to try to the extent possible to keep the patient in a relaxed, presumably parasympathetic, physiological state. In addition, ART processes sensations regularly after the patient views their “scene,” thus aiming to remove negative sensations and reinforce positive sensations every step of the way in a standardized fashion. Second, ART uses sets of “40” eye movements. Stated simply, this specific number (unlike EMDR which uses a variable number) was determined based on anecdotal observations of hundreds of cases of ART whereby 40 left–

right eye movements appeared to maximally facilitate trauma processing, while at the same time, not overtax mental capacity.

## FUTURE DIRECTIONS

ART was developed in 2008, with formal research study (principally among civilians) initiated in 2010.<sup>27,28</sup> Future directions with respect to the military center on two principal areas: (i) comparative effectiveness studies against the current therapies that are endorsed by the DoD and VA and (ii) mechanistic studies with a focus on brain imaging and measures of the autonomic nervous system to examine “how” ART appears to effectively resolve trauma. Regarding the latter, a key target will be to measure neurophysiological changes not only before and after treatment completion with ART but also after specific elements, including before and after use of the Voluntary Image Replacement technique.

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