



BIOFEEDBACK

Rebuilding Fragile Foundations

Psychology and physical therapy have long been proven to be essential to the rehabilitation of torture and trauma survivors and to their return to normal life - but often the horrors of trauma over a prolonged time cut so deep that even a therapist cannot get close enough to act. DANIELA AROCHE attended the recent STARTTS clinical evening to find out more about neuro-feedback and fear extinction learning – two therapies delving deeper into the psyche to facilitate further treatment of Post-traumatic Stress Disorder (PTSD).

Introduction to PTSD

From remembering a complicated algorithm, to facilitating every day thoughts and movements or channeling instinctive reactions – the extraordinary control center that is our brain enables us to feel, think, analyze and react in perfect synergy.

But in the event of trauma - in any way, shape of form – that synergy is interrupted, and a deregulation of brain function occurs, overlapping the normal workings of the brain with an instinctive 'fight or flight' reaction.

The psychological effects are scaring - the extent of which depends on both the trauma suffered and the individual's own response and reaction – but in some cases the instinctive response to trauma is so strong that even long after the trauma has passed, and the danger is over, the initial 'fight or flight' response to once threatening stimuli continues – even once normal life has resumed.

This is described as Acute Stress Disorder, a predictive symptom of posttraumatic stress disorder – a chronic condition which can formulate from prolonged trauma.

Besides the obvious psychological impacts of exposure to prolonged trauma and the developing PTSD, research has also come to show that those who develop PTSD also suffer from physical changes to the brain – more specifically a few areas of the brain called the amygdalae, hippocampus and medial prefrontal cortex.

These are areas of the brain that work both independently and collectively to control emotions, fear reactions, learning, memory and stress management. Prolonged trauma severely affects these areas of the brain to the point where a subconscious record of the events, surroundings and other stimuli before, during and after the trauma, along with the initial 'fight or flight' reaction is ingrained in the brain.



The bottom line effect is that the individual then reverts to the 'fight or flight' instinctual reaction, whenever this stimuli – whether it be certain smells, movements, colours, surroundings or feelings experienced when the trauma first occurred – presents itself.

Essentially these triggers were encoded into their 'state' or unconscious memory at the time of trauma and so they are now strongly associated with the traumatic event, even when the actual person, place, action or object is not actually threatening.

Besides the obviously crippling effect that PTSD and its symptoms have on the individual, their partners, friends, family and their everyday lives – the most immediate problem lies in the fact that this particular type of trauma is particularly difficult to treat.

The condition is multi-layered, and with the PTSD symptoms acting as a shell against the deeper, psychological issues beneath - even extensive therapy sessions and traditional treatments are rendered ineffective – and in most cases, the therapists are not even able to get close enough (either mentally or physically) to the patient to work on the core issues beneath.

Clearly, this creates a serious barrier for the therapist and ongoing treatment, so the removal of this initial defence reaction and finding a way to retrain the brain to separate these every-day 'triggers' from the traumatic experience is essential so as to commence the in-depth psychological therapy.

Neurofeedback therapy (Neurotherapy) is based on the learned modification of brainwave activity by the process of operant conditioning. A patient is given positive or negative feedback about the state of brainwave activity via a computer game or by changes in volume or brightness of audio and visual signs from music or movie files. The patient is effectively observing their own brain activity in real time and can ultimately learn to modify this activity with practice and repetition.

Neurotherapy can help to promote the formation of new synapses (connections) between nerve cells in the brain, therefore improving efficiency of brain activity in patients with learning, behavioural or mood disorders.

Retraining the brain

The beauty of neuro-feedback is that it essentially helps the patient help themselves.

Of course, it's not as simple as that – but what neuro-feedback provides is a space whereby the patient can essentially 'control' the movements and direction of the neuro-feedback exercise by regulating their own brain waves or how they think and react to certain stimuli.

During neuro-therapy, EEG sensors are placed on the scalp and connected to high-tech electronic equipment which provides direct audio and visual feedback about brainwave activity. The sensors measure the electrical patterns coming from the brain, which are then relayed to the computer and recorded.

Ordinarily, brainwave patterns cannot be influenced because of a lack of awareness of them. However, when one can actually see their brainwaves on a computer screen a few thousandths of a second after they occur, the connection between thoughts, actions and the brainwaves they produce is exceptionally clear – and this creates the opportunity - and gives the patient the ability - to influence and change them by producing brainwaves at particular frequencies. This is called operant conditioning.

These brainwaves are then incorporated into the computer game by initiating a reaction from the characters or objects in the game.

At STARTTS (Service for the Treatment and Rehabilitation of Torture and Trauma Survivors), neuro-feedback sessions are supported by a trained counsellor, who supervises participants throughout the therapy.

This is also the first time neuro-therapy has been undertaken with refugee populations, and the therapy has produced

very positive results in patients who previously presented resistance to other therapies due to their prolonged exposure to trauma.

One of STARTTS counsellors, Mirjana Askovic, who works with patients participating in neuro-feedback, presents at the clinical evening and says that many of the patients have benefited from the therapy, with positive outcomes including a greater sense of emotional calm, reduction of fear response, ability to sleep better and increased body awareness to name a few.

Once neuro-therapy has alleviated the brains automatic survival fear reaction through reconditioning, patients are more able to absorb and take advantage of other, more common types of therapy, and continue on their road to recovery.

Acute Stress Disorder and fear extinction learning

There are a number of ways to treat PTSD, each method and therapy depending on the patient and their own receptiveness or resistance to the treatment.

The practice of fear extinction has been associated with eliminating or alleviating fear reactions in people who display symptoms of Acute Stress Disorder, which can develop into PTSD – essentially treating the initial symptoms of PTSD.

In typical extinction learning or fear-conditioning, a stimulus such as a tone or coloured card, is paired with an aversive event such as a shock. After several pairings of the stimulus and shock, the presentation of the stimulus itself leads to a fear response.

Extinction occurs when the event is presented on its own, without a shock several times – eventually the stimulus loses its negative association to the patient and can be presented without eliciting a fear response.

Although fear extinction learning has been regarded as process of "unlearning", in actual fact, it is rather a process of new learning - of fear inhibition.

DCS - Accelerating extinction learning

The guest speaker at this particular STARTTS clinical evening is Richard Bryant, Scientia Professor, and ARC Professorial Fellow in the School of Psychology, University New South Wales, and Director of the PTSD Unit at Westmead Hospital.

His work in the past few years has consisted of ongoing research into PTSD, including a range of studies on the psychological effects of trauma, and most recently developing the first assessment measures for acute stress disorder and consequently conducting the only controlled trials for acute stress disorder.

Bryant's current work also includes research into the medication D-cycloserine (Seromycin), originally an antibiotic used to treat tuberculosis which has been found to accelerate extinction learning.

When administered, D-cycloserine (Seromycin) or DCS, essentially boosts the activity of a brain chemical called NMDA, which is needed for fear extinction. NMDA (N-methyl-D-aspartic acid) is an amino acid derivative acting as a specific agonist that acts on the NMDA receptor, and therefore mimics the action of the neurotransmitter glutamate on that receptor.

This - coupled with the fact that the antibiotic currently displays little to no side effects - has made it a front-runner for treating the symptoms of acute stress disorder, and in this way avoiding the development of PTSD in those people who may be susceptible.

Of course, there are many types of therapy available in the treatment of trauma and PTSD, with each therapy's effectiveness dependant on the patient's resistance or receptiveness to the treatment.

Essentially, both DCS and neuro-therapy act as aids in the prevention, and/or treatment of PTSD – working at other ends of the scale with similar processes of training the brain – the hopeful end result being to use both methods in conjunction with other, more traditional types of therapy to help the patient overcome their trauma in the most effective way possible. ■

