

IS A GRANDMAL SEIZURE NECESSARY AND SUFFICIENT FOR THE EFFICACY OF ELECTRO CONVULSIVE THERAPY?

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ABSTRACT

This paper highlights the recent research findings which suggest that the old teaching that a grandmal seizure is both necessary and sufficient for the efficacy of electroconvulsive therapy (ECT) is not correct. It is necessary, but not sufficient. The stimulus intensity should be adjusted so that it is far above the seizure threshold in order to get maximum efficacy of ECT.

Key words : ECT, stimulus intensity, seizure threshold

It is now established that ECT is a very useful and safe treatment for a selected group of psychiatric patients, especially in major depression. The technique of ECT is made more sophisticated by modifying it with anaesthetics and muscle relaxants. More elaborate machines are produced to monitor the amount of current used so that the side effects can be reduced and the therapeutic efficacy increased. Such machines use brief pulse square wave constant current and have integral EEG and ECG units, in contrast to old machines which use sine wave stimulus and have no integral EEG and ECG units. Traditionally it has been thought a grandmal seizure is both necessary and sufficient for the maximum efficacy of ECT. Hence the standard treatment has been to administer the same electrical dose to virtually all patients. It was assumed that higher dose of electricity increased the cognitive side effects without influencing the efficacy of ECT. But recent research findings suggest that the stimulus intensity is a significant factor in the efficacy of ECT.

Robin and Tissera (1982) showed that patients treated with either high energy pulses or high sinusoidal wave ECT responded significantly better than patients treated with low energy pulse ECT, thus suggesting that the

amount of current is relevant to the therapeutic outcome of ECT. Although the earlier studies suggested the importance of stimulus intensity for the efficacy of ECT, it was Sackeim et al. (1987) who comprehensively established the importance of the electrical dose in determining the efficacy of ECT. In a study using an electrical intensity just above each patient's seizure threshold, Sackeim et al. (1987) found that titrated low dose bilateral ECT had a powerful antidepressant effect but that the effect of right unilateral ECT depends on electrical dose. To test the above hypothesis, Sackeim et al. (1993) randomly assigned 96 patients with depression to receive right unilateral or bilateral ECT at either a low electric dose (just above the seizure threshold) or a high dose (2.5 times the seizure threshold). Symptoms of depression and cognitive function were assessed before, during, immediately after and 2 months after ECT. They were followed up for one year to assess the rate of response. Response rates of low dose unilateral ECT, high dose unilateral ECT, low dose bilateral ECT, and high dose bilateral ECT were 17%, 43%, 63% and 65% respectively. Both high dose groups had more rapid improvement than the low dose groups. Low dose right unilateral ECT resulted in generalized seizures

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of adequate duration, but with little therapeutic efficacy. This contradicts the view that the duration of seizure provides a valid index of effective treatment, and indicates the need to identify more useful markers. It also contradicts the longstanding belief that the generalised seizure provides both the necessary and sufficient conditions for the efficacy of ECT. It now appears that the generalised seizure is necessary, but not sufficient to ensure a clinical response. The finding that there are electrical dose-response functions for ECT offers new avenues to investigate the mechanisms of action of this treatment. Sackeim et al. (1993) reported that the efficacy of treatment, speed of response, and short term cognitive side effects were not associated with the absolute electrical dose administered, but with whether or not the dosage substantially exceeds the seizure-threshold. For example for unilateral ECT to be effective, the electrical dose should be at least 2.5 times the seizure threshold. Seizure threshold is the minimum electrical stimulus which produces an adequate seizure. This threshold can vary within an individual and between individuals. Various factors influence seizure threshold. It increases with age and after a number of ECT; males have a higher threshold (Sackeim et al. 1987). Girish et al. (1998) have reported that higher the headsize, higher the threshold. They have also postulated that the sex differences in seizure threshold may be due to the headsize factor (Girish et al. 1998). Seizure threshold increases with antiepileptic drugs and decreases with proconvulsants such as caffeine, theophylline and some neuroleptics.

The work of Sackeim et al. (1993) strongly suggests that higher dose of stimulus in ECT is associated with both greater effectiveness and faster rate of improvement while bilateral ECT is more effective than unilateral ECT. On the debit side, bilateral electrode placement and higher electrical dose are associated with more cognitive side effects.

Sackeim et al. (1993), based on their above findings have recommended a dose titration method (stimulus dose technique) to find out the adequate dose of electric stimulus. The

patient is given in the first sitting a low intensity (low threshold) stimulus which is gradually increased till the patient gets a full convulsion. If the patient does not get a convulsion after 3 trials, it will be repeated next day. Once the seizure threshold is determined, the course of ECT starts and the electrical stimulus is adjusted during the course of ECT, depending on clinical response.

Despite the impressive empirical basis to Sackeim's work and the widespread incorporation of these principles, the stimulus dose technique is not widely accepted in some centres and has attracted some criticism (Petrides & Fink, 1996; Abrams, 1992; Swartz & Abrams, 1994). In the stimulus dose technique, the patient gets subthreshold seizures which can have cardiac complications because of the vagal overactivity. The method can be cumbersome and dangerous. Swartz and Abrams (1994) have suggested an empirical technique of adjusting the electrical dose without finding the seizure threshold. They used the age of the patient to adjust the 'percent energy' in the Thymatron ECT machine. When the 'percent energy' is adjusted as equal to the age of the patient to start with, they found that this technique was simple and effective. Petrides & Fink (1996) recommended that the 'percent energy' can be adjusted as equal to half the age of the patient to get a good therapeutic effect.

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