

# Effective Use of Electroconvulsive Therapy in Late-Life Depression

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**Objective:** To review literature pertaining to the efficacy, safety, and tolerability of electroconvulsive therapy (ECT) in treating late-life depression.

**Method:** We undertook a literature review with an emphasis on research studies published in the last 10 years.

**Results:** There is a positive association between advancing age and ECT efficacy. Age per se does not necessarily increase the risk of cognitive side effects from ECT, but this risk is increased by age-associated neurological conditions such as Alzheimer's dementia and cerebrovascular disease. With appropriate evaluation and monitoring, ECT can be used safely in patients of very advanced age and in those with serious medical conditions. Several technical factors, including dose of electricity relative to a patient's seizure threshold, position of electrodes, frequency of administration, and total number of treatments, have an impact on the efficacy and cognitive side effects of ECT and need to be taken into account when administering ECT. Naturalistic studies have found that 50% or more of patients have a relapse of depression within 6 to 12 months of discontinuing acute ECT.

**Conclusions:** In recent years, there has been substantial progress in our understanding of the effect of technical factors on the efficacy and cognitive side effects of ECT. When administered in an optimal manner, ECT is a safe, well-tolerated, and effective treatment in older patients. Relapse of depression after response to ECT remains a significant problem, and there is a need for further research into the prediction and prevention of post-ECT relapse.

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## Clinical Implications

- With appropriate evaluation and monitoring, electroconvulsive therapy (ECT) is a safe and effective treatment in elderly patients, including those of very advanced age and those with significant medical comorbidity.
- Technical factors have a significant impact on the efficacy and side effects of ECT and need to be taken into account when administering the treatment.
- Despite the use of continuation antidepressant medication, relapse of depression after ECT remains a significant problem.

## Limitations

- Only 1 study, with a relatively small number of patients, has compared the efficacy and cognitive effects of high-dose right unilateral ECT with bilateral ECT. The findings of this study require replication in a larger group of patients recruited from more than 1 research centre.
- The optimal electrical dose for right unilateral ECT remains to be established.
- Data pertaining to the efficacy of continuation ECT are derived from uncontrolled or retrospective studies. However, data from the first controlled, prospective study of continuation ECT should soon be available.

**Key Words:** *electroconvulsive therapy, depressive disorder, aged, efficacy, side effects, continuation treatment, relapse*

A high percentage of patients who receive electroconvulsive therapy (ECT) have late-life depression (1). Among US community hospital inpatients diagnosed with recurrent major depression, persons aged 65 years or older were 7 times more likely to receive ECT than were persons aged 18 to 34 years (2). Several factors contribute to the higher rate of ECT use in elderly depression patients. Compared with younger patients, older patients are more sensitive to the adverse effects of psychotropic medications and, therefore, may be less able to tolerate a therapeutic trial of antidepressant medication (3). Further, the elderly are more likely to have comorbid medical or neurological conditions that may complicate the use of antidepressant medication or compromise response to pharmacologic treatment (3). The elderly are also more vulnerable than are younger persons to the physical and functional complications of severe depression, such as dehydration, malnutrition, and the effects of sustained inactivity. As a result, they are more likely to be referred for ECT, which may result in more rapid clinical improvement than that achieved with pharmacotherapy (4,5). Finally, psychotic and melancholic features of major depression are more prevalent in later life (6). These features predict response to ECT (7,8). Indeed, many psychiatrists consider ECT to be the treatment of choice for psychotic depression (9).

This article reviews the use of ECT in older depression patients. It focuses on recent research findings pertaining to efficacy, tolerability, and safety and also addresses the issue of post-ECT relapse of depression.

### Efficacy of ECT in the Elderly

Several studies have found a positive association between advancing age and response to ECT (10–12). O'Connor and others (11) reported the results of a study of 253 patients aged 18 to 85 years who had major depression and were treated with bitemporal ECT administered at a stimulus intensity 1.5 times the patient's seizure threshold. Among patients who completed the course of ECT, the rate of remission was 90% for those aged 65 years or older, compared with 90% for those aged 46 to 64 years and 70% for those aged 18 to 45 years. Tew and others reported rates of response among 241 patients with unipolar major depression who completed at least 5 treatments of unilateral or bilateral ECT administered at a stimulus intensity 2.5 times seizure threshold (12). Patients aged under 60 years experienced a significantly lower rate of response than did patients aged 60 to 74 years (54% vs 73%, respectively), while patients aged 75 years or over had an intermediate rate of response (67%). In both these studies, the average number of ECT treatments did not differ as a function of age. Younger patients in the Tew and others study had a lengthier depressive episode and were more likely to have pharmacotherapy-resistant depression before starting

ECT—2 factors associated with diminished response to ECT. Further, older patients were significantly more likely to have melancholic features, which, as previously noted, are a positive predictor of response to ECT. These clinical differences may well have contributed to the higher response rate in older patients. This is despite the fact that older age was associated with a higher burden of physical illness and greater cognitive impairment at baseline. O'Connor and others found that the higher rate of response among patients aged over 45 years was partly attributable to the greater prevalence of psychotic depression in later life (11). Thus, the superior response to ECT among older patients may not be due to aging per se but to clinical factors that differentiate them from younger patients.

### Optimizing ECT Efficacy

#### *Electrode Position*

With respect to the goal of maximizing efficacy, yet minimizing cognitive side effects, controversy continues about the use of unilateral vs bilateral electrode position. Right unilateral (RUL) ECT is thought to cause less cognitive impairment than bitemporal ECT, but bitemporal ECT is viewed by some as being more effective than unilateral ECT (13). Central to this controversy is the relation between electrode position and electrical dose relative to a patient's seizure threshold (seizure threshold is the minimum electrical intensity required to induce an adequate generalized grand mal seizure). Based on the results of randomized controlled trials (RCTs) comparing real ECT with sham ECT (that is, the repeated administration of anesthesia alone), it is well established that a generalized tonic-clonic seizure is necessary for ECT to exert its antidepressant effect (1). However, several studies have demonstrated that, while eliciting a generalized seizure is sufficient for the efficacy of bilateral ECT, this is not the case for RUL treatment (14–17). In a landmark study, Sackeim and others (14) found that RUL ECT administered at either low-dose (that is, just above the determined seizure threshold) or moderate-dose (that is, 2.5 times seizure threshold) was significantly less effective than either of these doses of bitemporal ECT. Response rates for low-dose and moderate-dose RUL ECT were 17% and 43%, respectively, compared with 65% and 63% for low-dose and moderate-dose bilateral treatment. These findings prompted Sackeim and his colleagues to undertake another RCT comparing moderate-dose bitemporal treatment with 3 doses of RUL treatment as follows: 1.5, 2.5, and 6 times seizure threshold (15). Consistent with their previous study, the lower doses of RUL ECT were considerably less effective than bilateral treatment. Conversely, the high-dose RUL treatment had efficacy comparable with moderate-dose bilateral treatment, with response rates of 65% in each group. The moderate-dose bilateral and high-dose RUL groups were also equivalent in number of treatments required

for response. Patients treated with moderate-dose bilateral ECT, however, had greater memory impairment at 1 week and 2 months after finishing ECT. These results led the authors to conclude that “right unilateral ECT at high dose is as efficacious as a robust form of bilateral ECT but produces less severe and persistent cognitive effects” (15).

There are, however, several caveats to Sackeim and others’ findings (15). Even though all patients had major depression, they were well enough to complete a battery of neuropsychological tests before starting ECT. Many elderly patients undergoing ECT have illness too severe for such testing, and thus it is unclear whether these results generalize to the most severely ill patients. Second, bilateral ECT was administered at a stimulus intensity 2.5 times seizure threshold. Prior research demonstrated that the antidepressant effect of bitemporal ECT is not sensitive to the dose of energy above seizure threshold, but cognitive side effects are (14). Thus, it is possible that a lower dose of bitemporal ECT (that is, 1.5 times seizure threshold) would have resulted in less severe and persistent cognitive impairment. Third, most patients who did not respond to a minimum 8 to 10 treatments of high-dose unilateral ECT eventually responded to bitemporal ECT. This raises the possibility that some patients preferentially respond to bitemporal ECT, regardless of the dose of unilateral treatment. Finally, Sackeim and others’ study (15) used a customized ECT device that could deliver an electrical dose well above the maximum of standard ECT devices (federal regulations limit the maximum output of ECT devices sold in North America to 576 millicoulombs). Of the 20 patients in the high-dose RUL group, 14 were initially treated at the maximum energy deliverable by a standard ECT device, and 2 patients required higher-than-conventional energy levels during the course of ECT. The mean age of patients in the high-dose RUL group was 54 years (SD 17). It has been consistently demonstrated that seizure threshold increases with advancing age, with some studies showing a greater increase in elderly men than in elderly women (for a review of studies see Boylan and others [18]). Further, seizure threshold may be higher in older patients with dementia (19). Sackeim and colleagues’ findings therefore raise the possibility that, in North America, it may not be possible to treat a substantial minority of elderly patients with RUL ECT at a stimulus intensity 6 times seizure threshold.

To date, debate concerning the use of unilateral vs bilateral ECT has focused on the use of bitemporal electrode placement. Bifrontal ECT, wherein electrodes are placed 5 cm above the outer angle of the orbit on a line parallel to the sagittal plane, has been investigated as an alternative to bitemporal ECT in 2 double-blind RCTs (16,21). In a study that used threshold-level (that is, low-dose) electrical stimulus to compare bifrontal, bitemporal, and RUL electrode placement,

both bilateral positions had superior efficacy to unilateral treatment (16); however, there was no significant difference between the bilateral placements in cognitive side effects 7 days or 3 months after ECT (20). Bailine and others compared bifrontal ECT with bitemporal ECT given at an electrical dose 1.5 times seizure threshold (21). Both electrode positions had similar efficacy in terms of the proportion of patients responding and the number of treatments required to attain response. After the last treatment, however, bifrontal ECT was associated with slightly less cognitive impairment than was bitemporal ECT. Further investigation of bifrontal ECT is required to determine how its efficacy and cognitive side effects compare with high-dose RUL treatment.

#### *Determining Seizure Threshold*

There is good evidence that the dose of electricity relative to a patient’s seizure threshold affects not only the efficacy of unilateral ECT but also cognitive side effects, regardless of electrode position (14,15,17). Stimulus dosing, whereby electrical stimulations are administered at subconvulsive levels until a generalized tonic-clonic seizure of at least 20 seconds’ duration is induced, is the most precise method for determining a patient’s seizure threshold. (See Frukacz and Mitchell [22] for examples of stimulus dosing protocols.) Stimulus dosing has been criticized as potentially increasing the risk of bradyarrhythmias, on the grounds that repeated subconvulsive electrical stimulations may result in a sustained parasympathetic response (23). These concerns, however, have not been borne out in studies that have routinely used stimulus dosing (24). To attenuate the parasympathetic response, some authors have recommended the use of atropine or glycopyrrolate (which does not cross the blood–brain barrier) prior to stimulus dosing, but it remains to be determined whether this strategy results in a clinically significant benefit.

Critics of stimulus dosing have proposed the “half-age method” for determining the dose of electricity for bilateral ECT (23). According to this method, the amount of energy (joules) is calculated at one-half the patient’s age. This method, however, is limited by the fact that there is tremendous interindividual variability in seizure threshold, with studies reporting anywhere from fourfold to thirty-fivefold variability within samples (15,18,25,26). Further, in a group of mixed-age patients, Boylan and others found that age accounted for only 13% of variance in seizure threshold (18), meaning that many other factors also contribute to the variability of this measure. Thus, the limitation of the half-age method is that it may result in an unnecessarily high dose of electricity in patients undergoing bilateral ECT and an underestimation of electrical dose in patients receiving unilateral ECT (26,27).

*Seizure Duration*

Length of seizure—beyond the widely quoted minimum criterion of 20 seconds of motor or 25 seconds of electroencephalographic manifestation—is not related to ECT efficacy (28). Even this minimum criterion is of uncertain scientific standing, since it is not experimentally derived but instead represents a consensus among ECT researchers (22,28). In many patients, especially older ones, seizure duration decreases and seizure threshold increases during the course of ECT (28,29). However, there is no correlation between change in seizure length and change in seizure threshold (30). Further, substantially suprathreshold stimulus intensities are associated with shorter, not longer, seizures (28). Thus, seizure duration alone should not serve as a marker of treatment adequacy (28). In the case of an older patient receiving low-dose bilateral ECT, it is reasonable to increase the dose of electricity (initially, by an increment of 50%) if there is a substantial reduction in seizure length between 2 consecutive treatments (for example, a decline from 50 seconds to 20 seconds) or if seizure duration falls below 15 seconds, assuming that the short seizure is not owing to medication effects or inadequate ventilation (28). Conversely, in the case of a patient receiving high-dose ECT, retitration of the electrical dose is the only accurate way of determining whether shortening of seizure length indicates the need for a higher stimulus intensity.

*Managing Medications With Anticonvulsant Effects*

Because of their anticonvulsant properties, barbiturates, benzodiazepines, and antiepileptic drugs can potentially interfere with seizure elicitation and expression. The dose of barbiturate anesthetic should be based on the patient's weight, also taking into account body mass, age, and previous anesthetic experience. Boylan and others found that methohexital did not affect seizure threshold or seizure duration when limited to a dose of 0.75 to 1.0 mg/kg (18). Frukacz and Mitchell reported that when thiopentone was given at a dose of 2.5 to 3.0 mg/kg, a significant proportion of patients had either no or very brief seizures (22). However, when a dose of 2.0 mg/kg was used, all patients had adequate seizures. Boylan and others did not find that the lorazepam dosage in the 48 hours prior to the first ECT session affected seizure threshold, but the dosage was limited to a relatively small range (mean dose 0.85 mg daily, SD 1.06) (18). Further, the mean age of patients in this study was under 60 years, and it is possible that an older group of patients would be more sensitive to the benzodiazepines' anticonvulsant effects. Many clinicians recommend avoiding the use of benzodiazepines in elderly patients during ECT, if possible. If a benzodiazepine is required, lorazepam at a dose of 0.5 to 1.0 mg daily is the most appropriate choice (3). Antipsychotic medications, which can lower seizure threshold, can be an effective alternative to benzodiazepines in the acute management of agitation or severe anxiety associated with

late-life depression (3). In patients with seizure disorder, antiepileptic medication should initially be maintained at a therapeutic dosage, because dosage reduction or discontinuation increases the patient's risk of experiencing seizures between ECT treatments (31). The dosage should be cautiously reduced only if an adequate seizure cannot be elicited (31). In the case of patients taking antiepileptic medications as mood stabilizers, it is preferable to withdraw the medications prior to ECT (28).

*Frequency of ECT*

Controlled studies have established that bitemporal ECT administered 3 times weekly results in more rapid improvement than treatment twice weekly, but there is no difference between the 2 schedules in the total number of treatments required to achieve response or in the percentage rate of response (32). Conversely, the more frequent schedule is associated with more retrograde amnesia, both immediately after finishing the course of ECT and at 1-month follow-up (32). Thus, twice-weekly administration may be the optimal schedule for bitemporal ECT in the elderly, unless clinical indications or other considerations (for example, length of hospitalization) require the more rapid antidepressant effect of thrice-weekly treatment. Comparable data on the frequency of RUL ECT are not available.

*Number of Treatments*

There is considerable variability in the number of ECT treatments required for response. As a result, the number of treatments in a course of ECT should be decided on a case-by-case basis. ECT is typically discontinued once symptoms remit or when symptoms reach a plateau of improvement after 2 consecutive treatments. Among elderly patients with major depression, 6 to 12 treatments are often required to achieve maximal benefit, but some patients may need more than 12 treatments. In the case of no response or minimal response, many experts recommend at least 10 to 12 bitemporal treatments before the depressive episode is labelled nonresponsive (11,15).

**Safety and Medical Issues**

The mortality rate associated with ECT is only 0.2 to 0.4 per 10 000 treatments, no higher than that expected with general anesthesia alone (33). Cardiovascular complications constitute the principal cause of ECT-related morbidity (1). Delivery of the ECT stimulus induces a brief parasympathetic response that can result in sinus bradycardia and hypotension (31). Not infrequently, transient asystole occurs (34). As the patient starts to seize, a discharge in catecholamines from the adrenal medulla results in increased heart rate and blood pressure (31). In patients with ischemic heart disease, this period of increased myocardial oxygen demand may increase the risk

of cardiac ischemia. In turn, ischemia is the main cause of arrhythmias. The primary preventive measure for these complications is adequate ventilation and oxygenation (31). In addition, in selected high-risk patients, beta blockers, calcium channel antagonists, or nitrates are often used to manage the effects of the sympathetic response to ECT (35,36). However, there has not yet been a controlled trial to determine whether this strategy has a clinically significant impact on ECT-related morbidity. Not surprisingly, cardiac complications of ECT are more likely to occur in elderly patients, particularly those with preexisting cardiovascular conditions. Nevertheless, several studies have shown that most complications are transitory and usually do not prevent the completion of the course of ECT (37–39).

ECT use in medically ill patients has been extensively reviewed elsewhere, and a detailed discussion is beyond the scope of this article. (For recent reviews, see Rabheru [40] and Tew and others [31].) There are no absolute contraindications to ECT, just relative ones (41). ECT has been safely and effectively performed in the presence of a wide range of serious medical conditions, including severe ischemic heart disease, aortic stenosis, chronic airways disease, and osteoporosis; aortic and cerebral aneurysms; brain tumours; epilepsy; and recent stroke (31,40). Patients with pacemakers and patients taking anticoagulants can safely undergo ECT (31,40). As with any treatment, the risks of ECT must be balanced against its potential benefit and the risks and benefits of alternative treatments or no treatment. It is worth emphasizing that untreated depression can have severe medical consequences in older people, including dehydration, malnutrition, skin breakdown or deep venous thrombosis secondary to prolonged immobility, and an increased risk of mortality (42). Further, untreated depression can adversely affect recovery from various medical and neurological conditions (42).

### Cognitive Effects

Impaired cognitive function is the most frequent adverse effect of ECT and arguably the main factor that has limited use of this treatment (1). As already noted, several technical factors, including dose of electricity relative to seizure threshold, electrode position, and frequency of treatment, can affect cognitive function and need to be kept in mind when balancing efficacy (rate and speed of response) against potential side effects.

It is unclear whether aging per se increases the severity and persistence of ECT-related cognitive effects. In a group of patients aged 20 to 65 years, moderately suprathreshold bitemporal ECT resulted in more severe impairment of verbal and visuospatial anterograde memory in older individuals tested 24 to 72 hours after the last ECT treatment (43). However, these deficits were marginal at 1-month follow-up and had

disappeared by 6-month follow-up. Conversely, Tew and others (12) and Wilkinson and others (10) did not find that older patients fared any worse than their younger counterparts in terms of change in Mini-Mental State Examination (MMSE) scores between baseline and the week after finishing ECT. Indeed, Wilkinson and others found that, when the MMSE was administered between 72 hours and 1 week after the last ECT treatment, MMSE scores improved above baseline in all age groups, but the magnitude of improvement was greatest in older patients. This paradoxical finding of improved cognition following ECT underscores the complicated interaction between cognitive impairment due to depression and cognitive impairment induced by ECT. Thus, while ECT can cause circumscribed anterograde and retrograde amnesia during and following the course of treatment, it can also result in improved global cognitive function as a result of improvement in depression.

Reports on ECT in patients with dementia, cerebrovascular disease, or Parkinson's disease suggest that these patients have increased risk of interictal confusion, compared with elderly patients without neurologic impairment (39,44–46). However, the confusion is usually transient. In fact, in several of these reports, patients' performance on the MMSE was again, on average, better at the end of ECT than before ECT (39,44,45). In these studies, ECT was usually administered 3 times weekly—the incidence of acute confusion may possibly have been less if patients had received ECT twice weekly.

### Relapse Prevention

Relapse of depression following response to ECT is a significant problem. Several studies have found that the relapse rate during the 6 to 12 months following acute ECT exceeds 50%, despite continued antidepressant medication (14,15,47–49). Relapse prevention remains a major challenge for the field. Inadequate response to antidepressant pharmacotherapy is a primary indication for ECT, yet antidepressant medication is usually prescribed as continuation treatment following ECT. Thus, after responding to ECT, patients are typically switched back to a treatment modality that had previously proven ineffective. It is not surprising, therefore, that resistance to antidepressant medication has been found to predict post-ECT relapse (15,50). One logical solution to this problem is to continue ECT after response. Currently available, albeit limited, data suggest that continuation ECT (C-ECT) is a safe, efficacious, and cost-effective way to prevent relapse (51). In a prospective study that assigned treatment based on clinical grounds, elderly patients assigned to C-ECT had a 6-month relapse rate for major depression of 11% ( $n = 1/9$ ). This rate was accounted for by 1 patient who stopped ECT and then relapsed. In comparison, the relapse rate in the continuation medication group was 67% ( $n = 4/6$ ) (52). A retrospective

case-controlled study of 58 patients with a mean age of 65 years (SD 19) found that the cumulative probability of relapse or recurrence within 2 years of an acute course of ECT was 7% for C-ECT and 52% for continuation pharmacotherapy (53). Nevertheless, despite the apparent benefits of C-ECT, there are barriers to its routine use. These include issues of patient acceptance and adherence, the need for sufficient resources to operate a sizable outpatient ECT program, intercurrent events that interfere with treatment continuity (for example, medical illness, transportation problems, or inability of caregivers to accompany the patient to treatment), and, in some countries, financial cost to the patient. Further, some departments of psychiatry do not provide ECT on an outpatient basis, meaning that some patients may have to travel a long distance to an outpatient ECT program. Thus, geography may also hinder patients receiving C-ECT.

Because of the barriers to routinely using C-ECT, investigators have examined whether other treatment approaches can lessen the risk of relapse. In a double-blind placebo-controlled study, Sackeim and others compared combined nortriptyline and lithium with nortriptyline monotherapy in preventing post-ECT relapse (50). Over the 24-week trial, relapse rates for placebo, nortriptyline monotherapy, and nortriptyline plus lithium were 84%, 60%, and 39%, respectively. Thus, even though the combination of nortriptyline and lithium was more effective than antidepressant monotherapy, the relapse rate associated with this treatment was still high.

Other strategies that have been proposed to reduce relapse rates include tapering ECT over a few weeks, rather than stopping it abruptly at the time of response, and starting the continuation antidepressant medication during ECT, rather than waiting until ECT is finished (50). Studies undertaken in the 1960s, in which patients took antidepressant medication in conjunction with ECT, found that continuation of the antidepressant after ECT was associated with a 6-month relapse rate of approximately 20%, compared with 50% to 70% in the control groups (54–56). However, at that time ECT was frequently used as a first-line treatment, and it is possible that some patients in these studies would have responded to the antidepressant medication and remained well on it, even if they had not received ECT. The relevance of these findings to current ECT practice is questionable, because many patients now referred to ECT have medication resistance. Indeed, the only study to have examined this issue in recent times reported a relapse rate that was considerably higher than that of earlier studies (57). In that study, 85% of the patients had received treatment for the index episode of depression prior to receiving ECT. The 6-month relapse rate among patients randomized to paroxetine from the start of ECT was 47%, compared with a rate of 65% among patients randomized to placebo. Mayer and others compared patients who started

antidepressant medication in conjunction with ECT with patients who started antidepressant medication after the last ECT treatment (58). Although these authors did not specifically examine relapse rates, they found no difference between the groups in mean Hamilton Depression Rating Scale (HDRS) scores 6 weeks post-ECT. Further, consistent with previous studies (54–56), starting antidepressant medication during ECT conveyed no benefit in terms of speed or eventual rate of response (58). Thus, the benefit of simultaneously treating patients with antidepressant medication and ECT to prevent relapse has yet to be proven.

Studies of patients with psychotic depression also reveal a high post-ECT relapse rate. Flint and Rifat reported that 53% of elderly patients with psychotic depression suffered a relapse or recurrence within 2 years of response to ECT, despite continuation treatment with an adequate dose of nortriptyline (49). In this study, ECT was given as a first-line treatment, and the high rate of relapse and recurrence could not be attributed to prior treatment resistance. Prompted by the observation that psychotic depression has a better rate of response to combined antidepressant and antipsychotic medications than to antidepressant monotherapy, Meyers and others investigated whether combination therapy improved post-ECT outcome in older patients with psychotic depression (59). These investigators, however, found that a combination of nortriptyline and perphenazine was no more effective than nortriptyline alone in preventing relapse of psychotic depression following response to ECT.

## Conclusions

In recent years, our understanding has progressed substantially regarding the effect of technical factors on ECT's efficacy and side effects. Based on current data, several recommendations can be made about the administration of ECT to older patients. First, to optimize efficacy and minimize cognitive side effects, it is important to individualize the dose of electricity. The most precise way to do this is to determine a patient's seizure threshold by means of stimulus dosing. Second, the choice of high-dose (at least 6 times seizure threshold) RUL vs low-dose (1.5 times seizure threshold) bitemporal ECT should be made on a case-by-case basis. Patients who have neurological conditions that may increase their vulnerability to the cognitive side effects of ECT are candidates for RUL treatment—assuming that the patient's seizure threshold allows an efficacious dose of unilateral ECT, not only at the start of treatment but also as treatment progresses (bearing in mind that seizure threshold increases during the course of treatment, especially in older patients). Low-dose bitemporal ECT should be considered in the following patients: those who have previously responded to bitemporal treatment but not to high-dose unilateral

treatment; those who are so sick that the most definitive treatment is needed (for example, for a stuporose patient refusing food or fluid); those whose cardiovascular or other medical concerns mandate the fewest possible treatments; and those whose seizure threshold precludes efficacious unilateral treatment. Based on these considerations, it is apparent that bitemporal electrode placement will be indicated for many elderly patients undergoing ECT. Further research is needed to determine whether bifrontal ECT has clinically significant advantages over bitemporal or high-dose RUL treatments in older patients. Third, twice-weekly administration appears to be the optimal schedule for bitemporal ECT in the elderly, unless other considerations require the more rapid antidepressant effect of thrice-weekly treatment. The relative merits of twice- vs thrice-weekly administration of RUL ECT in older patients have yet to be established. Finally, because there is considerable interindividual variability in the number of ECT treatments required for response, the number of treatments in a course of ECT should be decided on a case-by-case basis. If a patient is showing slow but ongoing improvement, there is no reason to stop at 12 treatments.

Despite advances in the administration of ECT, relapse of depression remains a significant problem. The logical solution is to continue with ECT beyond the acute phase of treatment, yet there are several barriers to the routine use of continuation ECT. The challenge facing researchers is to determine whether any other approaches to treatment can minimize the risk of relapse.

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## Résumé : L'utilisation efficace des électrochocs pour la dépression de fin de vie

**Objectif :** Examiner la documentation concernant l'efficacité, l'innocuité et la tolérabilité des électrochocs pour traiter la dépression de fin de vie.

**Méthode :** Nous avons entrepris une revue de la documentation axée sur les études de recherche publiées au cours des 10 dernières années.

**Résultats :** Il y a une association positive entre l'âge avancé et l'efficacité des électrochocs. L'âge à lui seul n'accroît pas nécessairement le risque d'effets secondaires cognitifs des électrochocs, mais ce risque est accru par des affections neurologiques liées à l'âge comme la maladie d'Alzheimer et les maladies cérébro-vasculaires. Avec une évaluation et une surveillance appropriées, on peut utiliser de façon sécuritaire les électrochocs chez des patients très âgés et chez ceux qui souffrent de graves troubles médicaux. Plusieurs facteurs techniques, dont la dose d'électricité relative au seuil épileptogène du patient, la position des électrodes, la fréquence d'administration et le nombre total de traitements ont une influence sur l'efficacité et les effets secondaires cognitifs des électrochocs. Il faut en tenir compte lorsqu'on administre des électrochocs. Les études naturalistes ont conclu que 50 % des patients ou plus ont une rechute de dépression entre 6 à 12 mois après avoir cessé des traitements aigus d'électrochocs.

**Conclusions :** Ces dernières années, notre compréhension de l'effet des facteurs techniques sur l'efficacité et les effets secondaires cognitifs des électrochocs a beaucoup évolué. Les électrochocs administrés de façon optimale sont sûrs, bien tolérés et constituent un traitement efficace pour les patients âgés. La rechute de la dépression après une réponse aux électrochocs demeure un problème important, et il faut davantage de recherche sur la prédiction et la prévention des rechutes post-électrochocs.