

## ECT/MEDICAL COMORBIDITY

*GOLD-STANDARD ELECTROCONVULSIVE THERAPY*—Michael A. Taylor, MD, Adjunct Clinical Professor of Psychiatry, University of Michigan Medical School, Ann Arbor

**Introduction:** historically, camphor oil used to induce seizures in mentally ill; electroconvulsive therapy (ECT) to induce seizure introduced in 1938; currently, ECT not widely available in United States (<10% of psychiatrists perform it), and usually thought of as last resort after medication trials exhausted; prototypical ECT practitioner male, >45 yr of age, and international medical graduate (IMG) who learned about ECT >10 yr ago in another country; in United States, no requirements for residents to train in ECT, and ECT competence certification not required; ECT often classed with alternative treatments, *eg*, biofeedback and phototherapy

**Maximizing ECT efficacy:** “one size does not fit all”; dosing and stimulus parameters must be individualized; treatments must be monitored by electroencephalography (EEG) and patient restimulated if induced seizure inadequate; bilateral electrode placement preferred to unilateral

Terminology: “dose” measured in millicoulombs (mC); energy needed to achieve mC dose measured in joules (J); resistance (also called impedance) is obstacle that energy must overcome to deliver mC dose; only 2 machines available in United States; Thymatron delivers maximum dose of 504 mC; MECTA delivers maximum dose of 576 mC

Individualized dosing: “active ingredient” grand mal electrical seizure achieved by overcoming patient’s seizure threshold; seizure threshold increases with age; *half-age dose-calculation method*—divide patient’s age by 2 and multiply machine’s maximum capacity by that percentage (*eg*, if patient 70 yr of age, divide 70 by 2 [=35] and multiply machine’s maximum capacity by 35%); *titration dose-calculation method*—start at very low dose (*eg*, 5%-10% of machine’s maximum capacity) and stimulate at successively higher doses until seizure achieved (seizure threshold); that dose then “multiplied by another number, depending on what else is being done”

Cognitive side effects: electricity from power source takes form of continuous sine wave; ECT machines convert that into brief pulses punctuated by brief rest periods, which minimizes cognitive problems; having pulses at narrow widths and low frequencies makes less work for machine (fewer joules) and reduces cognitive side effects; the longer the stimulus duration, the better (6 to 8 sec typical)

**Unilateral ECT or bilateral?** controversial; *bilateral*—electrodes placed on either frontotemporal area; electricity passes through midbrain, producing centrencephalic generalized seizure; unilateral always given initially on right side of head (to avoid area that controls verbal functioning on left side of frontotemporal region), with 1 electrode in right frontotemporal position and other in galea position, producing right cerebral hemisphere seizure that generalizes to rest of brain; found to reduce anterograde and retrograde amnesia; however, when patients asked to recall details about tester, those who received bilateral ECT recalled details as well as controls, whereas those

who received unilateral ECT forgot more details, presumably because visuospatial functioning concentrated in right hemisphere; whether ECT unilateral or bilateral, memory loss temporary, resolving within  $\approx$ 1 yr; *problems with unilateral ECT*—to be equivalent to bilateral, must be given at very high doses, which minimizes cognitive advantage; because of machine limitations, calculated high dose not available for some patients; high doses cannot be sustained throughout treatment course; when given at seizure threshold, unilateral ECT no better than placebo

**EEG monitoring of ECT:** essential in determining whether seizure occurred; in studies, when practitioner tried to determine whether seizure had occurred by observing patient, “there were too many false positives” (*ie*, occurrence of seizure cannot be determined accurately by observing patient); especially worrisome in unilateral ECT, in which 25% of practitioners said patient was having seizure when he or she was not; EEG also necessary to determine that seizure has ended before patient leaves treatment room; in some patients, especially younger ones, electrical seizure can continue for up to several minutes after motor seizure has ended; possible for some patients to go into status epilepticus, and EEG can help determine that

Determining efficacy of EEG: morphology of EEG tracing indicates quality of seizure; duration of seizure irrelevant; recruitment is time from electrical stimulation to when patient achieves full grand mal seizure with high amplitude and hypersynchronous activity; the shorter the recruitment and the denser the global power (high-amplitude period), the better; best seizure ends abruptly into electrical quiet; important to obtain preanesthesia EEG so change in tracing due to anesthesia not mistaken for seizure

Bottom line: remission rates higher when seizures consistently meet above criteria

*MANAGEMENT OF CO-OCCURRING PSYCHIATRIC AND MEDICAL CONDITIONS*—Curley L. Bonds, MD, Chair, Department of Psychiatry, Charles R. Drew University School of Medicine and Science; Associate Clinical Professor of Psychiatry, Neuropsychiatric Institute, University of California, Los Angeles

**Introduction:** depression more common with certain medical illnesses, including cardiovascular disease and HIV

### Educational Objectives

The goal of this program is to educate the clinician about electroconvulsive therapy (ECT) and the management of concomitant psychiatric and medical conditions. After hearing and assimilating this program, the clinician will be better able to:

1. Select patients who might benefit from ECT.
2. Maximize the efficacy of ECT.
3. Monitor the quality of ECT-induced seizures through electroencephalography.
4. Discuss the relationship between certain medical illnesses and depression.
5. Treat depression that occurs concurrently with medical illness.

infection; major depression associated with 4-fold increase in risk for mortality during first 6 mo after myocardial infarction (MI); mental stress can trigger decreased blood flow to heart

**Depression and heart disease:** platelet aggregation and reactivity and blood clotting affected by depression; beat-to-beat variability decreased in depressed individuals; depression associated with decreased compliance with exercise, diet, and medications

**Sertraline Antidepressant Heart Attack Randomized Trial (SADHART):** results suggest sertraline safe and effective treatment for recurrent depression in patients with recent MI or unstable angina and without other life-threatening medical conditions; study not powerful enough to show whether treating depression decreased morbidity and mortality, “but there seemed to be a trend in that direction”

**Blacks and heart disease:** after MI, blacks less likely than whites to receive certain interventions; more likely to have diabetes and hypertension, to delay seeking care, and to refuse angioplasty; *black women*—rate of death after MI 34% higher than in white women; physical recovery slower than in white women; less likely to have used hormone replacement therapy

**More on depression and heart disease:** depression associated with increased risk for coronary artery disease (CAD) in men and women; also known to increase CAD-related mortality in men but not in women; patients with depression and MI have altered autogenic tone (increased sympathetic activity and decreased parasympathetic activity)

Platelet factor 4 and  $\beta$ -thromboglobulin: plasma levels elevated in depressed patients with ischemic heart disease  
Cardiac autogenic tone: derangements may lead to ventricular tachycardia and fibrillation and sudden death

Cultural considerations: some studies suggest that blacks respond better to tricyclic antidepressants (TCAs) than to other antidepressants; however, increased side effects of TCAs occur in blacks, and may be result of slower metabolism; blacks have lower rates of major depression, dysthymia, and panic disorder than whites, and higher rates of phobic disorders; speaker suggests lower rate of depression is because symptoms of depression and ischemic heart disease (eg, fatigue and insomnia) overlap, and patients reluctant to report symptoms because they believe myth that depression is “normal” reaction to CAD

**Hostility and MI:** hostility stress-related condition that has been linked to increased mortality rate; no standardized scale for measuring hostility, but studies show higher hostility ratings predict higher risk for MI and death; patients with high hostility ratings  $\approx 25\%$  more likely to have restenosis of coronary arteries after percutaneous transluminal coronary angioplasty (PTCA) than patients with low hostility ratings

**Cardiovascular effects of antidepressants:** TCAs—increase heart rate; cause orthostatic hypotension; slow cardiac conduction; increase risk for sudden cardiac death; may reduce metabolism by 50% in black patients; have anticholinergic, antiadrenergic, and quinidine-like effects; *selective serotonin reuptake inhibitors (SSRIs)*—most extensively studied antidepressants in cardiac population; decrease platelet aggregation; no effect on heart rate variability or on QT segment variability (eg, bradycardia);

studies exist for fluoxetine, paroxetine, and sertraline; drugs with high protein binding (eg, SSRIs) may require adjustment of warfarin (Coumadin) levels; warfarin levels should be followed closely

**Depression and HIV infection:** depression among most common psychiatric disorders observed in HIV-positive patients;  $\approx 50\%$  of HIV-positive patients screen positive for psychiatric disorder; 33% screen positive for major depressive disorder during previous year; depressive symptoms may have adverse effect on immune function (studies suggest CD cells less healthy in patients with depression); in one study, chronic non-bereavement-related depressed mood predicted decline in CD4+ cell counts across 5-yr span in HIV-positive homosexual men; prevalence of depression higher among HIV-positive women than in those who are HIV negative; clinical studies suggest higher mortality among HIV-positive men and women with depression than among those without depression

**Neuropsychiatric complications of HIV infection:** incidence of delirium lower with newer treatments for HIV infection but still occurs; patients with HIV infection, especially those with end-stage disease, at increased risk for dementia; risk factors for dementia include patient not taking antiviral medications, having high viral load, being of older age, having anemia, using illicit drugs, and being female

**Treatment of HIV/AIDS-associated conditions:** can place patients at risk for depression; certain antiviral medications known to cause suicidal ideation and to alter cognition; other medications can be neuroprotective (neuroprotective agents given to patients with Alzheimer’s disease may be helpful in patients with HIV infection); literature suggests psychostimulants may improve appetite and mood and help patients function better; judicious doses of testosterone shown to improve mood and appetite, and may help to increase muscle mass; use antidepressants aggressively

**Cardiac disease and obesity:** people who have 10% weight gain by 20 yr of age have 50% increased risk for having cardiac disease later; those who have 10% weight gain by 20 yr of age and who smoke have 300% increased risk; unfortunately, obesity and smoking common in people with schizophrenia, and newer antipsychotic medications often have weight gain as side effect; modifiable risk factors for cardiac disease in people with schizophrenia include obesity, dyslipidemia, diabetes, hypertension, and smoking; nonmodifiable risk factors include sex, family history or personal history of cardiovascular disease, and age; if newer antipsychotic medications must be used, clinician must be more aggressive in helping patients control their weight

**Somatization and depression:** people from ethnic minorities more likely than whites to report physical symptoms of depression (eg, sleep disturbance, indigestion, headache, muscle aches and pains) rather than emotional aspects; challenging to diagnose depression in people with medical illness and physical complaints such as headache, backache, joint pain, and abdominal pain

Approaching the depressed patient: use medical model (ie, brain as organ); distinguish clinical depression from routine melancholia or sadness; emphasize improvements in neurovegetative function

Endicott substitution criteria: proposes that somatic symptoms in medically ill are substituted by nonsomatic alternatives; *eg*, change in weight and appetite substituted by tearfulness and depressed mood;

method can be used to identify psychological symptoms of depression that indicate presence of major depressive disorder in elderly patients with medical illness

### Suggested Reading

**Allison DB et al:** The distribution of body mass index among individuals with and without schizophrenia. *J Clin Psychiatry* 60:215, 1999; **Benbow SM et al:** Electroconvulsive therapy clinics in the United Kingdom should routinely monitor electroencephalographic seizures. *J ECT* 19:217, 2003; **Fink M et al:** Catatonia in autistic spectrum disorders: a medical treatment algorithm. *Int Rev Neurobiol* 72:233, 2006; **Girish K et al:** Seizure threshold in ECT: effect of stimulus pulse frequency. *J ECT* 19:133, 2003; **Hermann RC et al:** Characteristics of psychiatrists who perform ECT. *Am J Psychiatry* 155:889, 1998; **Hermann RC et al:** Diagnoses of patients treated with ECT: a comparison of evidence-based standards with reported use. *Psychiatr Serv* 50:1059, 1999; **Krystal AD, Coffey CE:** Neuropsychiatric considerations in the use of electroconvulsive therapy. *J Neuropsychiatry Clin Neurosci* 9:283, 1997; **Laghrissi-Thode F et al:** Elevated platelet factor 4 and beta-thromboglobulin plasma levels in depressed patients with ischemic heart disease. *Biol Psychiatry* 42:290, 1997; **Luber B et al:** Quantitative EEG during seizures induced by electroconvulsive therapy: relations to treatment modality and clinical features. II. Topographic analyses. *J ECT* 16:229, 2000; **Mayur PM et al:** Motor-seizure monitoring during electroconvulsive therapy. *Br J Psychiatry* 174:270, 1999; **Nobler MS et al:** Quantitative EEG during seizures induced by electroconvulsive therapy: relations to treatment modality and clinical features. I. Global analyses. *J ECT* 16:211, 2000; **Owen JE et al:** Psychiatric evaluations of heart-transplant candidates: predicting posttransplant hospitalizations, rejection episodes, and survival. *Psychosomatics* 47:213, 2006; **Perera TD et al:** Seizure expression during electroconvulsive therapy: relationships with clinical outcome and cognitive side effects. *Neuropsychopharmacology* 29:813, 2004; **Prudic J et al:** Effectiveness of

electroconvulsive therapy in community settings. *Biol Psychiatry* 55:301, 2004; **Prudic J et al:** Electroconvulsive therapy practices in the community. *Psychol Med* 31:929, 2001; **Scott AI, Cull RE:** Unilateral, prolonged, nonconvulsive cerebral seizure activity in ECT. *J ECT* 17:292, 2001; **Swartz CM, Manly DT:** Efficiency of the stimulus characteristics of ECT. *Am J Psychiatry* 157:1504, 2000; **Taylor MA, Fink M:** Catatonia in psychiatric classification: a home of its own. *Am J Psychiatry* 160:1233, 2003; **Taylor MA:** Use of suprathreshold electroconvulsive therapy. *Arch Gen Psychiatry* 58:607, 2001.

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#### Estimated time to complete the educational process:

Review Educational Objectives on page 3	5 minutes
Take pretest	10 minutes
Listen to audio program	60 minutes
Review written summary and suggested readings	35 minutes
Take posttest	10 minutes

ECT/MEDICAL COMORBIDITY

On a Test and Evaluation form, complete Pretest section **before** listening and Posttest section **after** listening.

1. When administering electroconvulsive therapy (ECT), \_\_\_\_\_ electrode placement is preferred.  
(A) Bilateral (B) Unilateral
2. The “active ingredient” in ECT is a grand mal electrical seizure, achieved by overcoming the patient’s seizure threshold; seizure threshold \_\_\_\_\_ with age.  
(A) Decreases (B) Stabilizes (C) Increases
3. In administering ECT, the \_\_\_\_\_ the electrical stimulus, the better.  
(A) Longer (B) Shorter
4. In determining whether an adequate seizure has been achieved with ECT, the best indicator is:  
(A) The practitioner’s experience (C) The duration of the stimulus  
(B) Electroencephalography (EEG) (D) The patient’s postprocedure mood
5. Recruitment is defined as the time elapsed from electrical stimulation to the patient’s achieving full grand mal seizure, as demonstrated by high amplitude and hypersynchronous activity on an EEG tracing; the \_\_\_\_\_ the recruitment, the better.  
(A) Shorter (B) Longer
6. Which of the following was found to be a safe and effective treatment for depression in patients with a recent myocardial infarction (MI) or unstable angina without another life-threatening medical condition?  
(A) Fluoxetine (B) Paroxetine (C) Sertraline
7. In patients with depression and coronary artery disease, the risk for mortality is higher in:  
(A) Women (B) Men (C) A and B
8. Which of the following are cardiovascular effects of tricyclic antidepressant medications?
  1. Increased heart rate
  2. Orthostatic hypotension
  3. Slow cardiac conduction
  4. Increased risk for sudden death
  5. Reduced metabolism in blacks  
(A) 1,2,4 (B) 2,3 (C) 1,2,3,4 (D) 1,2,3,4,5
9. Among HIV-positive patients, \_\_\_\_\_ screen positive for having had a major depressive disorder during the previous year.  
(A) Three quarters (B) One half (C) One third
10. Among patients with HIV infection, \_\_\_\_\_ are at higher risk of developing dementia than \_\_\_\_\_.  
(A) Men; women (B) Women; men

Answers to Audio-Digest Psychiatry Volume 36, Issue 05: 1-D, 2-B, 3-A, 4-A, 5-D, 6-B, 7-B, 8-B, 9-A, 10-B