Electroconvulsive Therapy at Duke:
A Treatment Modality Evolves over Seven Decades

Richard D. Weiner, M.D., Ph.D.
October 12, 2017
Hans Lowenbach, MD: pre- Duke

- 1905: Born Duisberg, Germany
- 1929: MD from University of Hamburg
- 1930-4: Neurosciences Postdoc training Cologne & Max Planck Institute
- 1935-6: Fellow, Norwegian Acad. Science
- 1936-8: Ships surgeon, whaling exped.
- 1938-40: Junior faculty, Johns Hopkins
Hans Lowenbach, MD: Duke

• **1940:** joins Duke psychiatry faculty
• **1949-51:** USAEUR Neuropsychiatry Consultant, Germany
• **1951-3:** Interim Chair, Duke Dept. Psychiatry
• **1975:** Retired as tenured full professor
• Consultant to NC VA & State Hospitals
• President, NC Neuropsychiatric Assn
• Reached rank of Colonel, USAR
Conflicts of Interest

- Present research funding from NIMH
- Co-inventor (with Andrew Krystal, MD, MS) on Duke software patent licensed to Mecta, Corp. (ECT device manufacturer) [I do not receive personal royalties]
Outline of Presentation

• ECT – what is it and why is it still important as an important treatment alternative

• How has ECT evolved over the past seven decades and how have Duke faculty and staff played an important role in this evolution
What is ECT?

- **An index course of ECT** is a series of electrically induced grand mal type seizures administered, in conjunction with general anesthesia and muscular relaxation, to produce a clinical remission in a severe acute episode of mental illness of specific types. (typically lasts 6-12 treatments at 3/week)

- **Continuation/maintenance ECT** is a prophylactic series of treatments administered to prevent relapse and/or maintain remission in mental illnesses responsive to an index ECT course.

*APA, 2001*
Who receives ECT?

**Diagnostic Indications**
- Major depression (unipolar & bipolar)
- Catatonia
- Mania
- Schizophrenia

**Strategic Indications**
- Severe & ‘treatment resistant’
- Urgent need for rapid response
Major depression is a major public health problem

- Depression is a common mental disorder
- Globally, more than 300 million people of all ages suffer from depression
- Depression is the leading cause of disability worldwide, and is a major contributor to the overall global burden of disease
- At its worst, depression can lead to suicide

WHO factsheet on depression – updated Feb, 2017

16.6% lifetime prevalence of major depression
6.7% 12 month prevalence of major depression

Major Depression: What are available treatments for an acute episode other than ECT?

• Antidepressant meds
• Pharmacological augmentation
• Psychotherapy
• Other neuromodulation techniques
• Medical management, if cause non-psychiatric
Efficacy of Real vs ‘Sham’ ECT in treatment of depression

<table>
<thead>
<tr>
<th>Trial</th>
<th>Number of participants</th>
<th>Standardised effect size (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson 1963\textsuperscript{10}</td>
<td>12</td>
<td>-1.078 (-2.289 to 0.133)</td>
</tr>
<tr>
<td>West 1981\textsuperscript{11}</td>
<td>25</td>
<td>-1.255 (-2.170 to -0.341)</td>
</tr>
<tr>
<td>Lambourn 1978\textsuperscript{15}</td>
<td>40</td>
<td>-0.170 (-0.940 to 0.600)</td>
</tr>
<tr>
<td>Freeman 1978\textsuperscript{12}</td>
<td>40</td>
<td>-0.629 (-1.264 to 0.006)</td>
</tr>
<tr>
<td>Gregory 1985\textsuperscript{13}</td>
<td>69</td>
<td>-1.418 (-2.012 to -0.824)</td>
</tr>
<tr>
<td>Johnstone 1980\textsuperscript{14}</td>
<td>70</td>
<td>-0.739 (-1.253 to -0.224)</td>
</tr>
<tr>
<td>Pooled fixed effects</td>
<td></td>
<td>-0.911 (-1.180 to -0.645)</td>
</tr>
<tr>
<td>Pooled random effects</td>
<td></td>
<td>-0.908 (-1.270 to -0.537)</td>
</tr>
</tbody>
</table>

*Note: The standardised effect size is a measure of the magnitude of the effect of ECT compared to sham ECT, with negative values indicating a benefit of ECT.*

*Source: Lancaster 2003; 361: 799–808*
### Major Depression: ECT vs Meds

<table>
<thead>
<tr>
<th>Trial*</th>
<th>Number of participants</th>
<th>Standardised effect size (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steiner 1978(^{16})</td>
<td>12</td>
<td>0.369 (-0.840 to 1.578)</td>
</tr>
<tr>
<td>Wilson 1963(^{10})</td>
<td>12</td>
<td>-0.513 (-1.663 to 0.637)</td>
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<tr>
<td>Davidson 1978(^{17})</td>
<td>19</td>
<td>-1.389 (-2.449 to -0.328)</td>
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<tr>
<td>McDonald 1966(^{18})</td>
<td>22</td>
<td>-0.930 (-1.813 to -0.047)</td>
</tr>
<tr>
<td>Gangadhar 1982(^{19})</td>
<td>32</td>
<td>1.287 (0.406 to 2.169)</td>
</tr>
<tr>
<td>MacSweeney 1975(^{20})</td>
<td>27</td>
<td>-0.714 (-1.492 to 0.065)</td>
</tr>
<tr>
<td>Dinan 1989(^{21})</td>
<td>30</td>
<td>-0.196 (-0.926 to 0.534)</td>
</tr>
<tr>
<td>Janakiramaiah 2000(^{22})</td>
<td>30</td>
<td>-1.095 (-1.863 to -0.328)</td>
</tr>
<tr>
<td>Folkerts 1997(^{23})</td>
<td>40</td>
<td>-1.336 (-2.032 to -0.640)</td>
</tr>
<tr>
<td>Herrington 1974(^{24})</td>
<td>43</td>
<td>-1.497 (-2.174 to -0.821)</td>
</tr>
<tr>
<td>Stanley 1962(^{25})</td>
<td>47</td>
<td>-1.342 (-2.047 to -0.638)</td>
</tr>
<tr>
<td>Medical Research Council 1965(^{26})</td>
<td>204</td>
<td>-0.559 (-0.883 to -0.234)</td>
</tr>
<tr>
<td>Greenblatt 1964(^{27})</td>
<td>242</td>
<td>-1.683 (-2.020 to -1.346)</td>
</tr>
</tbody>
</table>

**Pooled fixed effects**

-1.010 (-1.170 to -0.856)

**Pooled random effects**

-0.802 (-1.290 to -0.289)
ECT vs Paroxetine: Cross-over Study

Treatment-Resistant Depression:

- **STAR-D (Sequenced Treatment Alternatives to Relieve Depression)** [www.star-d.org](http://www.star-d.org)
  - 4041 subjects from 41 sites (2000-4)
  - 4 sequential levels of pharmacological or psychotherapeutic interventions including augmentation
  - Level 1: aggressive 12 week response on citalopram
  - Level 1 remission rate: 30%
  - Level 2 (i.e. Level 1 failures) remission rate: 30%
  - Level 3 (i.e. Level 2 failures) remission rate: 20%
  - Level 4 (i.e. Level 3 failures) remission rate: 10%
Major Depression: ECT Remission Rate

Phase I of PRIDE Study

FIGURE 1. Remission, Response, and Dropout in a Study of ECT and Venlafaxine in Geriatric Depression

*Remission was defined as having a score ≤10 on the 24-item Hamilton Depression Rating Scale (HAM-D) on two consecutive ratings; response was defined as having at least a 50% decrease in HAM-D score from baseline to last assessment.*
Case 1: Tx Resistant Depression

- Middle-aged MD with recurrent major depressive episode of 6 months duration
- Failed multiple adequate medication trials with aggressive augmentation strategies
- Functionally incapacitated with severe psychomotor retardation, prominent vegetative features and suicidal ideation
- Initial MADRS 49/60 (very severe)
- After index ECT course and several maintenance treatments, MADRS 0/60 and patient back at work without cognitive difficulties
Case 2: Urgent response needed

• 18 y/o brought to Duke from out of state for BL lung transplant.
• No psychiatric history
• After one month of hospitalization on ICU, patient has sustained multiple serious medical complications and no appropriate cadaveric lungs are yet available.
• Patient becomes depressed, then catatonic, with no acute response to benzodiazepines or antidepressant medications.
• Surgeons take patient off transplant list.
• Psychiatry consult team told if no substantial psychiatric improvement in 2 weeks, patient will be transferred for palliative care (essentially ensuring fatal outcome)
• ECT consult placed, and ECT deemed clinically indicated (although high risk for ECT, risk of not doing ECT much greater)
• Parent receives emergency legal guardianship & provides informed consult
• Index course of BL brief pulse ECT provided on ICU (safest place)
• Patient attains full clinical remission, is re-instated on transplant list, receives successful BL lung transplant, and is discharged back home to continue pulmonary rehab.
Electroconvulsive Therapy Augmentation in Clozapine-Resistant Schizophrenia: A Prospective, Randomized Study

Georgios Petrides, M.D., Chitra Malur, M.D., Raphael J. Braga, M.D., Samuel H. Bailyne, M.D., Nina R. Schooler, Ph.D., Anil K. Malhotra, M.D., John M. Kane, M.D., Sohag Sanghani, M.D., Terry E. Goldberg, Ph.D., Majnu John, Ph.D., Alan Mendelowitz, M.D.

Objective: Up to 70% of patients with treatment-resistant schizophrenia do not respond to clozapine. Pharmacological augmentation to clozapine has been studied with unimpressive results. The authors examined the use of ECT as an augmentation to clozapine for treatment-refractory schizophrenia.

Method: In a randomized single-blind 8-week study, patients with clozapine-resistant schizophrenia were assigned to treatment as usual (clozapine group) or a course of bilateral ECT plus clozapine (ECT plus clozapine group). Nonresponders from the clozapine group received an 8-week open trial of ECT (crossover phase). ECT was performed three times per week for the first 4 weeks and twice weekly for the last 4 weeks. Clozapine dosages remained constant. Response was defined as ≥40% reduction in symptoms based on the psychotic symptom subscale of the Brief Psychiatric Rating Scale, a Clinical Global Impressions (CGI)-severity rating <3, and a CGI-improvement rating ≤2.

Results: The intent-to-treat sample included 39 participants (ECT plus clozapine group, N=20; clozapine group, N=19). All 19 patients from the clozapine group received ECT in the crossover phase. Fifty percent of the ECT plus clozapine patients met the response criterion. None of the patients in the clozapine group met the criterion. In the crossover phase, response was 47%. There were no discernible differences between groups on global cognition. Two patients required the postponement of an ECT session because of mild confusion.

Conclusions: The augmentation of clozapine with ECT is a safe and effective treatment option. Further research is required to determine the persistence of the improvement and the potential need for maintenance treatments.

Acute ECT risks/adverse effects

(all Ontario ECT – 2003-2011)

• Mortality
  w/i 24 hours of ECT < 0.4/10,000 treatments
  w/i 7 days of ECT 1/10,000 treatments
  w/i 30 days of ECT 2.4/10,000 treatments

• Morbidity
  – common: headache, muscle pain, nausea, amnesia
  – rare: e.g., serious cardiovascular event, status epilepticus
    or spontaneous seizure, pneumonia, pulmonary embolus
  w/i 7 days of ECT 9.1/10,000 treatments
  w/i 30 days of ECT 16.8/10,000 treatments
Long-Term Mortality with ECT: 
*Philibert et al, 1995*

**Methods:** 192 S’s, 65 or older, unipolar depression

**Mortality @ 500 days**

- ECT  8%*
- no ECT  18%

* ECT lower long-term mortality (p < 0.05)

Notable 1st person accounts of ECT

Surgeon and author Sherwin Nuland discusses the development of electroshock therapy as a cure for severe, life-threatening depression -- including his own. It's a moving and heartfelt talk about relief, redemption and second chances.

https://www.ted.com/talks/sherwin_nuland_on_electroshock_therapy
Optimization of ECT safety & efficacy

**Initiate ECT services**
- Acquire equipment and supplies
- Train staff to use these

**Effect**
- Provide access to this treatment modality

**Implementation at Duke**
- **Lowenbach** - early 1940 – first ECT in Southern USA (close to first in all of USA)
- Had custom ECT device constructed (none available in USA at time)
- **Lowenbach** – began ECT research in animals mid 1930’s, continued with human studies throughout 1940’s
- Published description of Duke ECT program in NC Med J in 1943
Selected Lowenbach clinical ECT papers

Am. J. Psychiatr. 98:828-833, 1942

NC Med. J. 4:123-128, 1943

Note quote from Hamlet:
“Diseases desperate grown by desperate appliance are relieved, or not at all”
Selected Lowenbach ECT research papers

**THE ELECTROENCEPHALOGRAM IN ELECTRICALLY INDUCED CONVULSIONS IN RABBITS**

BY

H. LÖWENBACH and R. S. LYMAN

*From the Henry Phipps Psychiatric Clinic, Johns Hopkins Hospital, Baltimore, Md., U.S.A.*

*(RECEIVED 28TH AUGUST, 1940)*

**J. Neurol, and Psych. 3:336-342, 1940**

Very early ictal EEG recording (written at Johns Hopkins just prior to Lowenbach and Lyman leaving for Duke)

**J. Neuropath and Exp. Neurol. 33:139-71, 1944**

Important early paper establishing the safety of currents used with ECT at the microscopic level
Optimization of ECT safety & efficacy

‘unmodified’ → ‘modified’ ECT

- Muscular relaxation and general anesthesia
- Physiological monitoring of BP, HR, respiration, blood oxygen content

Effect

- Eliminate musculoskeletal trauma
- Allow more oxygen & glucose to brain during seizure
- Improved cardiovascular and pulmonary safety
- Allowed access to patients with more severe medical co-morbidity

Implementation at Duke

- W.P. Wilson, in 1954 was lead author on a series of 3 papers in AMA Arch. Neurol. Psychiatr. (to become AGP) on the clinical use and cardiovascular and metabolic effects of succinylcholine modified ECT.
Optimization of ECT safety & efficacy

**Concern re ECT technique limitations**

- Existing stimulation techniques were non-physiological and unsafe
- Early scientific literature supported these concerns
- New ECT devices now might be capable of correcting these deficits.

**Effect**

- Existing stimulation techniques might be exposing patients to excessive cognitive adverse effects with ECT

**Implementation at Duke**

- In 1977, Weiner, with mentoring from W.P. Wilson, receives VA CDA funding to test hypothesis that brief pulse stimuli and R UL stimulus electrode placement might optimize ECT safety while not compromising efficacy in the treatment of major depression
Optimization of ECT safety & efficacy

Sine wave \(\rightarrow\) brief pulse stimulus waveform

- **Postulated Effect**
  - Brief pulse \(\rightarrow\) less amnesia, but equal efficacy
  - Right UL electrode placement \(\rightarrow\) less amnesia, but equal efficacy
  - Stimulus electrode and electrode placement effects are additive

BL \(\rightarrow\) RUL stimulus electrode placement

- **Implementation at Duke**
  - Beginning in 1977, Weiner & colleagues undertook an initial and replication study randomly assigning patients with MDE to brief pulse vs sine wave and, simultaneously, to RUL vs BL electrode placement.
  - Results of both studies found above hypothesis to be accurate
Acute memory impairment as a function of stimulus waveform and stimulus electrode placement


**TABLE 2. Acute Memory Impairment (Two to Three Days Post-ECT vs. Baseline Scores)**

<table>
<thead>
<tr>
<th></th>
<th>p-Values (2 x 2 + 1 ANOVAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BL &gt; UL</td>
</tr>
<tr>
<td><strong>Anterograde Deficits</strong></td>
<td>(Based on Delayed Recall)</td>
</tr>
<tr>
<td>Verbal paired associates</td>
<td>0.002</td>
</tr>
<tr>
<td>Paragraph recall</td>
<td>NS</td>
</tr>
<tr>
<td>Unfamiliar faces recogni-</td>
<td>NS</td>
</tr>
<tr>
<td><strong>tion</strong></td>
<td></td>
</tr>
<tr>
<td>Complex figure reproduc-</td>
<td>NS</td>
</tr>
<tr>
<td><strong>tion</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Retrograde Deficits</strong></td>
<td></td>
</tr>
<tr>
<td>Famous events recall</td>
<td>0.0001</td>
</tr>
<tr>
<td>Famous faces recall</td>
<td>0.006</td>
</tr>
<tr>
<td>Personal memory recall</td>
<td>0.0001</td>
</tr>
<tr>
<td>Global self-rating of memory function</td>
<td>NS</td>
</tr>
</tbody>
</table>


Acute and long-term (6 month) autobiographic memory impairment (using Duke Personal Memory Questionnaire) as a function of stimulus waveform and stimulus electrode placement


**FIGURE 1.** Acute personal memory impairment. Ordinate represents percent of baseline items not recalled two to three days post-ECT (+ standard error).

**FIGURE 2.** Long-term personal memory impairment. Ordinate represents percent of baseline items not recalled at both two to three day and six-month post-ECT test sessions (+ standard error).
Optimization of ECT safety & efficacy

**Development of an actual ECT "Program"**

- Strong support of Dept. & DUH leadership
- Attending level program leadership and presence
- Implementation of ‘ECT Suite’
- Dedicated nursing leadership

**Effect**

- Maintenance of high quality of care
- Increasing capability for OP and maintenance ECT
- ↑ ability to do ECT-related research
- Capability for world-class ECT training

**Implementation at Duke**

- **C. Edward Coffey**, after residencies in both psychiatry and neurology, and with mentorship of R. Weiner, became Medical Director in 1984
- **Martha Cress** as dedicated nurse leader
- Strong relationship with Dept. Anesth.
- State-of-art ECT suite opens in DH So.
- Popular psychiatry resident ECT elective and internationally recognized week-long ECT CME program
Optimization of ECT safety & efficacy

Growth of Duke ECT Program

New Leadership in 1991 (Weiner/Falcone)

Implementation at Duke

- **Clinical**
  - Coordination of care with weekly ECT Rounds
  - 7 day/week care management services
  - Achieve & maintain high patient satisfaction

- **Research**
  - Develop/test new ways of optimizing acute and long-term outcome
  - Investigation of characteristics of cognitive deficits associated with ECT & imaging correl.

- **Education**
  - Develop new educational tools
Duke ECT Program: Numbers of Treatments

inpatient  outpatient
Components of state-of-art ECT

• **Pre-treatment**
  – ECT consult
  – Anesthesia pre-op eval
  – Patient/family education
  – Focus on treatment alliance with patient/family
  – Informed consent
  – Availability for questions
  – Nursing intake assessment prior to each treatment
  – Intravenous access prior to each treatment
  – ECT psychiatrist assessment of treatment plan prior to each treatment

• **At treatment**
  – Anesthesia & muscle relaxation
  – BP, HR, resp, oximetry, ECG, and EEG monitoring
  – Modern ECT device
  – Stimulus dosing based on patient seizure threshold
  – Ultra-brief pulse stimuli
  – Unilateral non-dominant stimulation
  – Use of EEG seizure characteristics to guide dosing

• **Post-treatment**
  – PACU level post-procedural recovery
  – Assuring patient stable before leaving ECT suite & after arrival home
  – Ongoing care management
  – Weekly ECT rounds
  – Coordination of care with continuity treatment team

*Time in treatment room: 10-15 min
Time in recovery room: 30 min*
<table>
<thead>
<tr>
<th>Name(s)</th>
<th>Topic</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weiner et al</td>
<td>Safety &amp; efficacy of RUL vs BL and sine wave vs brief pulse ECT</td>
<td>RUL &amp; brief pulse with less amnesia 2-3d &amp; 6 mo post index ECT course, but with = efficacy</td>
</tr>
<tr>
<td>Weiner et al</td>
<td>Extent &amp; persistence of EEG slowing following ECT</td>
<td>Acute EEG slowing is commonly present but uncommon at 6 months and then only with sine wave BL ECT (supports differences in memory effects)</td>
</tr>
<tr>
<td>Coffey et al</td>
<td>Longitudinal f/u brain MRI post-ECT</td>
<td>No MRI brain abn acutely or at 6 mo post index ECT course</td>
</tr>
<tr>
<td>Coffey et al</td>
<td>Validation of Duke stimulus dosing paradigm</td>
<td>Duke protocol for stimulus dose titration represents an easy and effective means of establishing seizure threshold &amp; thereby allowing stimulus dosage to be optimized for each patient</td>
</tr>
<tr>
<td>Coffey et al, Krystal et al</td>
<td>Investigation of pharmacological &amp; anesthetic means of improving ECT seizure adequacy</td>
<td>Ketamine anesthesia, caffeine infusion, use of flumazenil represent ways to provide effective ECT in situations with high seizure threshold or inadequate ictal EEG response</td>
</tr>
<tr>
<td>Krystal et al</td>
<td>Determination of measures of EEG seizure adequacy with ECT</td>
<td>Ictal EEG adequacy measures have significant relationship with treatment outcome and can be used to guide stimulus dosing</td>
</tr>
<tr>
<td>McCall et al</td>
<td>Effects of ECT on sleep</td>
<td>Polysomnographic measures improve with ECT</td>
</tr>
<tr>
<td>Steffens et al</td>
<td>Brain MRI correlates of treatment response with ECT</td>
<td>Increased subcortical grey matter hyperintensity associated with poorer ECT efficacy in geriatric depression</td>
</tr>
<tr>
<td>Lisanby et al</td>
<td>PRIDE Study: effects of symptom based maintenance ECT plus venlafaxine/lithium vs these meds alone on maintenance of remission following index course of UBP RUL ECT plus venlafaxine</td>
<td>Combination of maintenance UBP RUL ECT plus venlafaxine/Lithium better maintains remission than the med combo alone. Findings also support the use of symptom-titrated maintenance ECT, initiated by 4 weekly maintenance treatments</td>
</tr>
<tr>
<td>Lisanby et al</td>
<td>Efficacy and safety of magnetic seizure therapy (MST) with ECT</td>
<td>MST offers promise as a means to decrease ECT-related cognitive deficits</td>
</tr>
<tr>
<td>Peterchev et al</td>
<td>Develop models of electrical field distribution within the brain for ECT, MST and other forms of brain stimulation</td>
<td>These models have significance in terms of elucidating underlying brain mechanisms subserving both beneficial &amp; adverse effects of ECT &amp; MST</td>
</tr>
<tr>
<td>Peterchev et al</td>
<td>Investigation of intracerebral electrical field distributions as a function of applied peak stimulus current</td>
<td>Theoretical electrical field modelling lays construct for current amplitude-titrated ECT</td>
</tr>
</tbody>
</table>
A Novel Strategy for Continuation ECT in Geriatric Depression: Phase 2 of the PRIDE Study

Charles H. Kellner, M.D., Mustafa M. Husain, M.D., Rebecca G. Knapp, Ph.D., W. Vaughn McCall, M.D., M.S., Georgios Petrides, M.D., Matthew V. Rudorfer, M.D., Robert C. Young, M.D., Shirlene Sampson, M.D., Shawn M. McClintock, Ph.D., Martina Mueller, Ph.D., Joan Prudic, M.D., Robert M. Greenberg, M.D., Richard D. Weiner, M.D., Ph.D., Samuel H. Bailine, M.D., Peter B. Rosenquist, M.D., Ahmad Raza, M.D., Ph.D., Styliani Kaliora, M.D., Vassilios Latoussakis, M.D., Kristen G. Tobias, M.A., Mimi C. Briggs, B.A., Lauren S. Liebman, B.A., Emma T. Geduldig, B.A., Abeba A. Teklehaiananot, M.S., Mary Dooley, M.S., Sarah H. Lisanby, M.D., the CORE/PRIDE Work Group

Objective: The randomized phase (phase 2) of the Prolonging Remission in Depressed Elderly (PRIDE) study evaluated the efficacy and tolerability of continuation ECT plus medication compared with medication alone in depressed geriatric patients after a successful course of ECT (phase 1).

Method: PRIDE was a two-phase multisite study. Phase 1 was an acute course of right unilateral ultrabrief pulse ECT, augmented with venlafaxine. Phase 2 compared two randomized treatment arms: a medication only arm (venlafaxine plus lithium, over 24 weeks) and an ECT plus medication arm (four continuation ECT treatments over 1 month, plus additional ECT as needed, using the Symptom-Titrated, Algorithm-Based Longitudinal ECT [STABLE] algorithm, while continuing venlafaxine plus lithium). The intent-to-treat sample comprised 120 remitters from phase 1. The primary efficacy outcome measure was score on the 24-item Hamilton Depression Rating Scale (HAM-D), and the secondary efficacy outcome was score on the Clinical Global Impressions severity scale (CGI-S). Tolerability as measured by neurocognitive performance (reported elsewhere) was assessed using an extensive test battery; global cognitive functioning as assessed by the Mini-Mental State Examination (MMSE) is reported here. Longitudinal mixed-effects repeated-measures modeling was used to compare ECT plus medication and medication alone for efficacy and global cognitive function outcomes.

Results: At 24 weeks, the ECT plus medication group had statistically significantly lower HAM-D scores than the medication only group. The difference in adjusted mean HAM-D scores at study end was 4.2 (95% CI = 1.6, 6.9). Significantly more patients in the ECT plus medication group were rated “not ill at all” on the CGI-S compared with the medication only group. There was no statistically significant difference between groups in MMSE score.

Conclusions: Additional ECT after remission (here operationalized as four continuation ECT treatments followed by further ECT only as needed) was beneficial in sustaining mood improvement for most patients.

Duke ECT Education/Training

• Psychiatry resident ECT Elective
  – Taken by ca half of resident group
  – 7-8 h/wk; full or half-year
  – Weekly ECT administration, seminar, ECT rounds & consults
  – Opportunity for research
  – Many National ECT leaders have taken this experience, e.g. McCall, McDonald, Conway, Husain

• Anesthesiology residents & nurse anesthetist trainees

• Medical & nursing students

• Other trainees
Educational Manual for ECT Practice

- Resident project
- 3 published editions by APPI
- Japanese Ed.
Duke ECT Museum
Duke ECT Visiting Fellowship

- Week-long program, 15 times/year
- Take 3 MD’s/week
- Over 1000 MD attendees
- From every state & 26 countries
- Also have nurses program

Japanese attendee’s experience published in Japanese psychiatric journal
Duke ECT: National Leadership

- **American Psychiatric Association Task Force on ECT**
  - Chair (Weiner 1978-2007; Lisanby 2007-2015; McDonald 2015-present)
  - Representing APA with FDA
  - Representing APA with State regulatory issues regarding ECT (Texas, New York)
  - Preparing comprehensive clinical recommendations on ECT Practice

- **International Society for ECT and Neurostimulation (ISEN)**
  - Multiple presidents & other officers with Duke connections

- **National Network of Depression Centers (NNDC)**
  - ECT Task Group Chairs: Weiner & Husain

- **Journal of ECT**
  - Present Editor-in-chief: McCall

APA ECT Recommendations: 1990 & 2001

French, Spanish, and Japanese translations
ECT at Duke affiliated hospitals

**Central Regional Hospital**
- Presently only NC state hospital doing ECT (ca 4-5 per ECT day)
- IP only (Duke ECT ‘inherits’ discharged OP’s needing ECT, as well as ECT IP’s with serious medical co-morbidities)
- Duke loaned initial ECT devices & provided consultation & anesthesia
- Multiple Duke-related ECT studies
- Davidson: 1974-1982
- No ECT: 1982-1989
- McCall & Shelp: 1989-1993
- Cassidy: 1993-present
- ECT nursing: Shirley Austin

**Durham VA Medical Center**
- Presently only NC VAMC doing ECT (average 2-3 per ECT day)
- Duke loaned initial ECT devices
- Multiple Duke-related ECT studies
- McCall:
- Weiner: -2001
- Holsinger: 2001-Present
- ECT nursing: Faye Tate
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A truly interdisciplinary effort

- ECT attendings: Weiner, Moore, Dennis, et al
- ECT nurses: Grace Falcone et al
- Anesthesiologists: Dhanesh Gupta, et. al
- Nurse anesthetists
- Psychiatry residents
- Anesthesiology residents
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- DUH administrative leadership: Sara Emory, Carey Unger
- PDC administrative leadership
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- Research faculty & staff and … especially
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