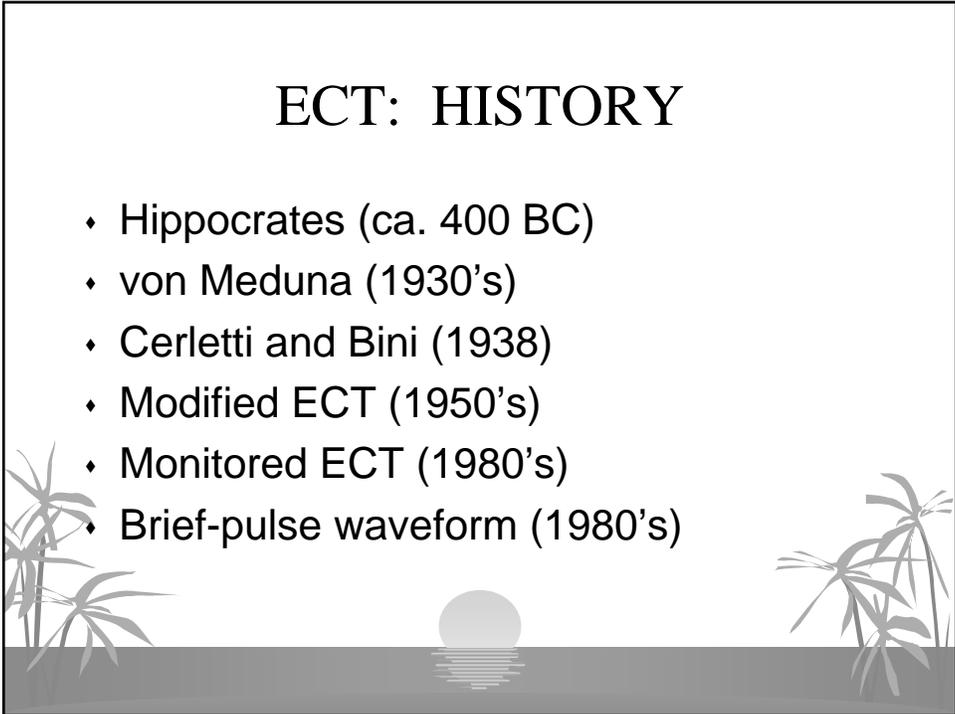




ELECTROCONVULSIVE THERAPY

Jonathan T. Stewart, MD

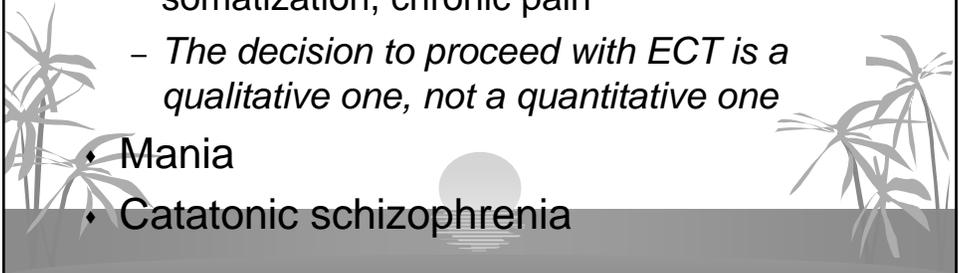
Professor in Psychiatry and Geriatric Medicine
University of South Florida College of Medicine
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ECT: HISTORY

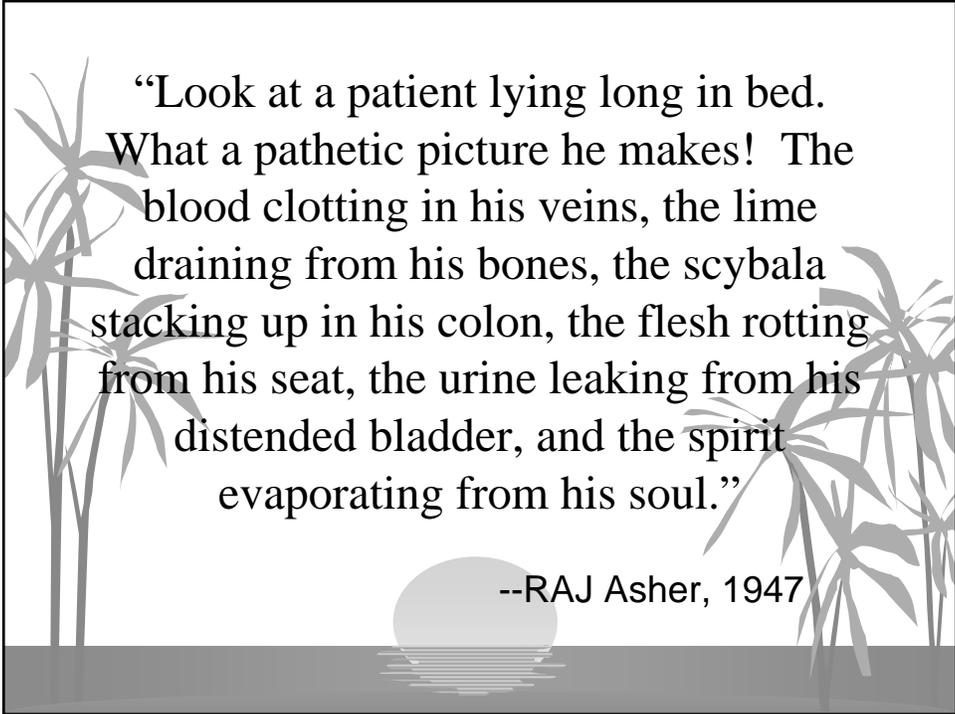
- ♦ Hippocrates (ca. 400 BC)
- ♦ von Meduna (1930's)
- ♦ Cerletti and Bini (1938)
- ♦ Modified ECT (1950's)
- ♦ Monitored ECT (1980's)
- ♦ Brief-pulse waveform (1980's)

INDICATIONS

- ♦ Major depression (unipolar or bipolar)
 - Good prognosis: anorexia, psychomotor retardation, catatonia, mood-congruent delusions, older age
 - Poor prognosis: hysterical phenomena, somatization, chronic pain
 - *The decision to proceed with ECT is a qualitative one, not a quantitative one*
 - ♦ Mania
 - ♦ Catatonic schizophrenia
- 

OTHER INDICATIONS

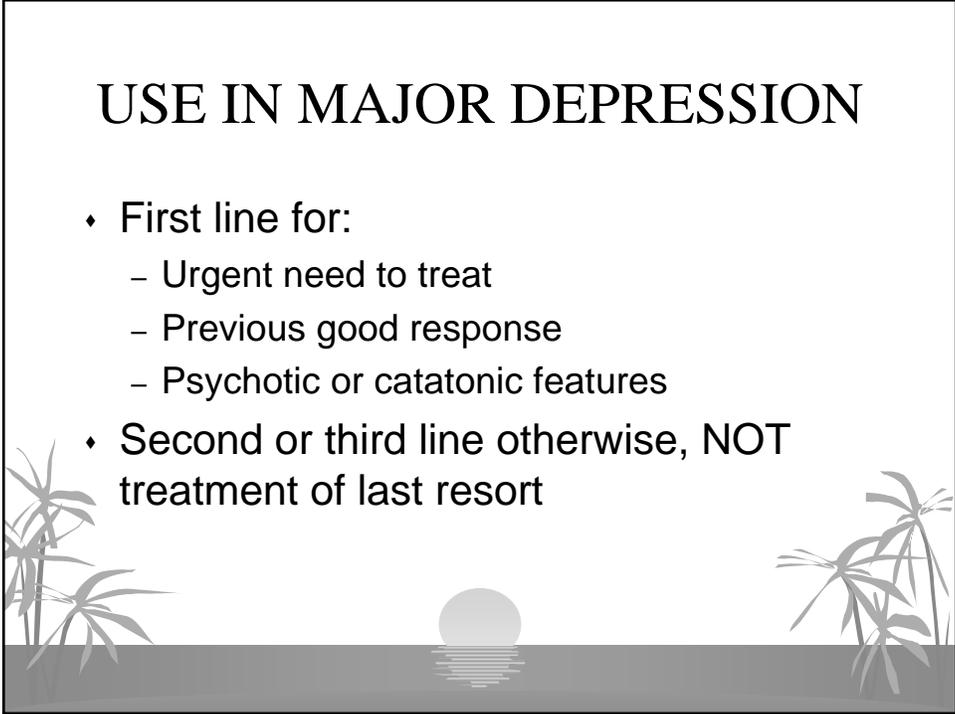
- ♦ Parkinson's disease (refractory illness, on-off)
 - ♦ Refractory epilepsy or status epilepticus
 - ♦ Neuroleptic malignant syndrome
 - ♦ Agitation in dementia?
 - ♦ Failure to thrive?
- 



“Look at a patient lying long in bed.
What a pathetic picture he makes! The
blood clotting in his veins, the lime
draining from his bones, the scybala
stacking up in his colon, the flesh rotting
from his seat, the urine leaking from his
distended bladder, and the spirit
evaporating from his soul.”

--RAJ Asher, 1947

USE IN MAJOR DEPRESSION

- ◆ First line for:
 - Urgent need to treat
 - Previous good response
 - Psychotic or catatonic features
 - ◆ Second or third line otherwise, NOT treatment of last resort
- 

MECHANISM OF ACTION

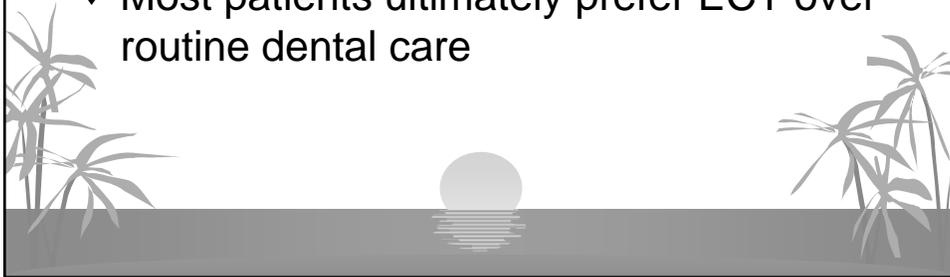
- ♦ Unclear, but clearly due to the seizure, clearly NOT due to to amnesia or “punishment”
- ♦ Seizures increase catecholamine synthesis and turnover, leading to downregulation of beta-adrenergic receptors
 - Increased dopamine may play some role
- ♦ May somehow relate to anticonvulsant, possibly antikindling properties

SIDE EFFECTS

- ♦ Reversible short-term memory deficit
 - Even reversible after “regressive ECT”
- ♦ Headache, muscle soreness
- ♦ Broken bones and teeth (extremely rare since advent of modified ECT)
- ♦ Anaesthesia risks
- ♦ Cardiac risks
 - Responsible for 2/3 of ECT deaths

BOTTOM LINE FOR THE PATIENT

- ♦ Mortality is lower than for normal childbirth in a hospital or any surgical procedure (2 to 4 per 100,000 treatments)
- ♦ Most patients ultimately prefer ECT over routine dental care

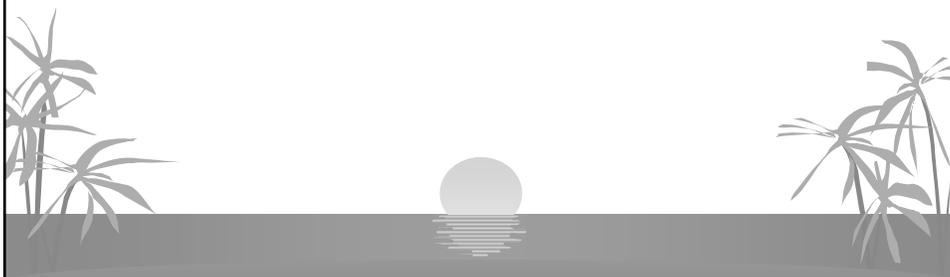


ECT AND THE HEART

Vagal stimulation
(stimulus, Valsalva)



Sympathetic
response



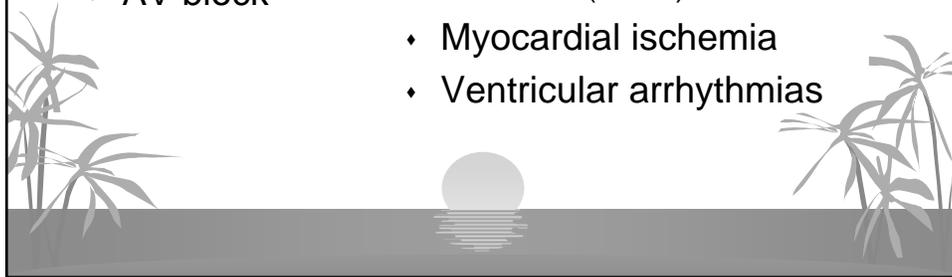
ECT AND THE HEART

VAGAL

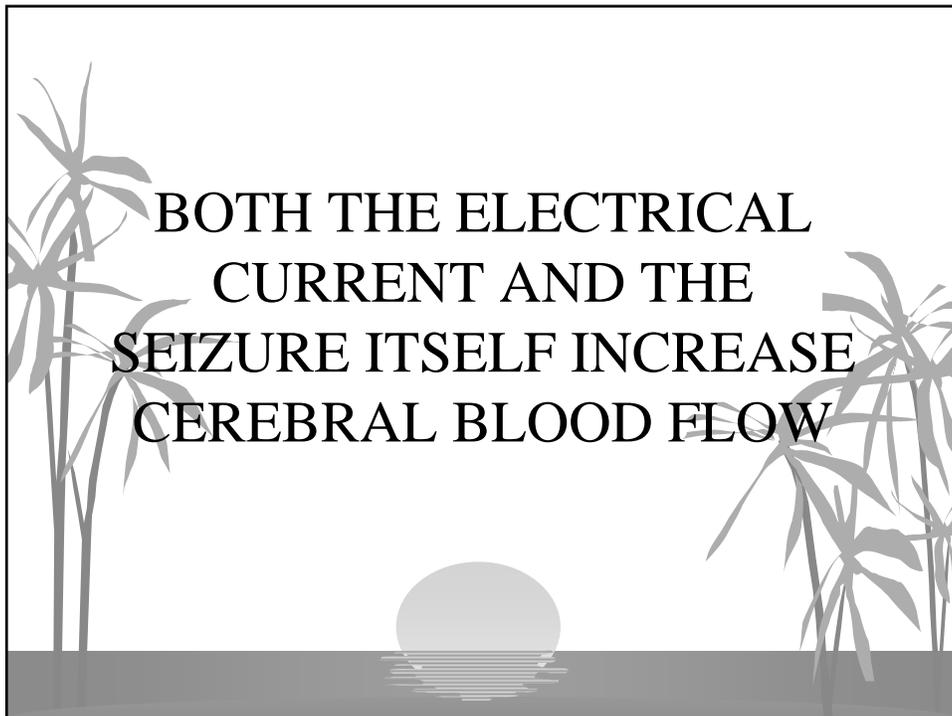
- Bradycardia
- Asystole
- Atrial fibrillation
- AV block

SYMPATHETIC

- Tachycardia (≈ 40 bpm)
- Elevated BP (≈ 50 mmHg)
- Increased myocardial O_2 demand ($\approx 2-4x$)
- Myocardial ischemia
- Ventricular arrhythmias

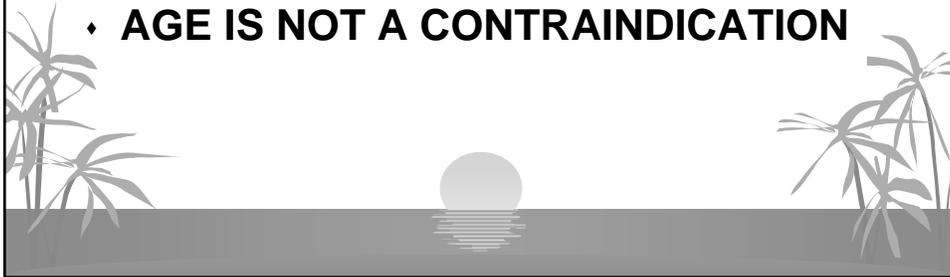


**BOTH THE ELECTRICAL
CURRENT AND THE
SEIZURE ITSELF INCREASE
CEREBRAL BLOOD FLOW**

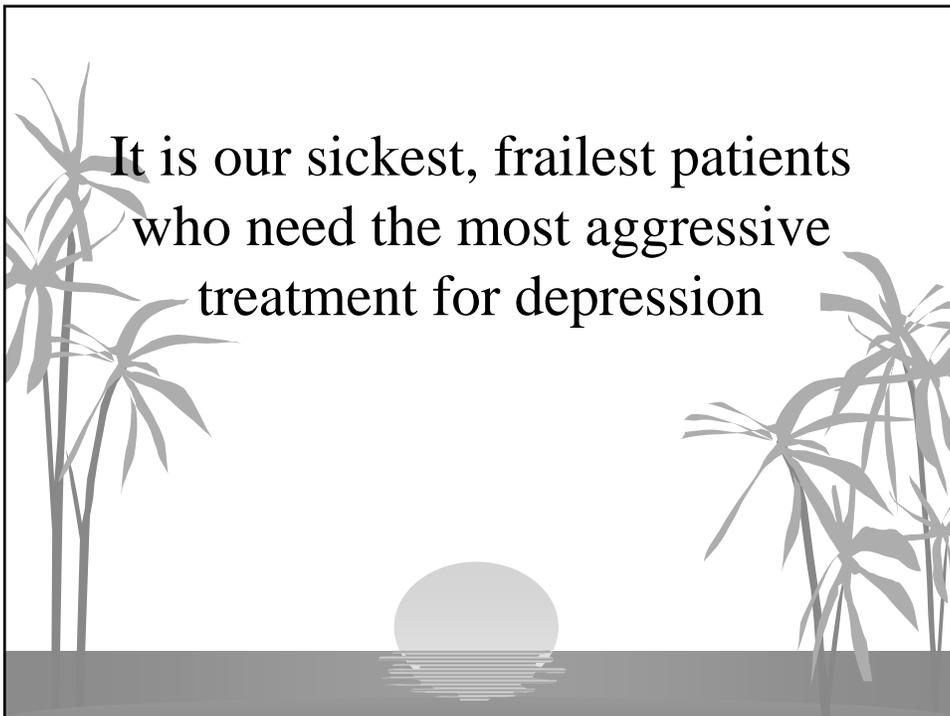


VERY STRONG RELATIVE CONTRAINDICATIONS

- ♦ Increased intracranial pressure
- ♦ Recent CNS bleed
- ♦ Recent myocardial infarction
- ♦ Pheochromocytoma
- ♦ **AGE IS NOT A CONTRAINDICATION**



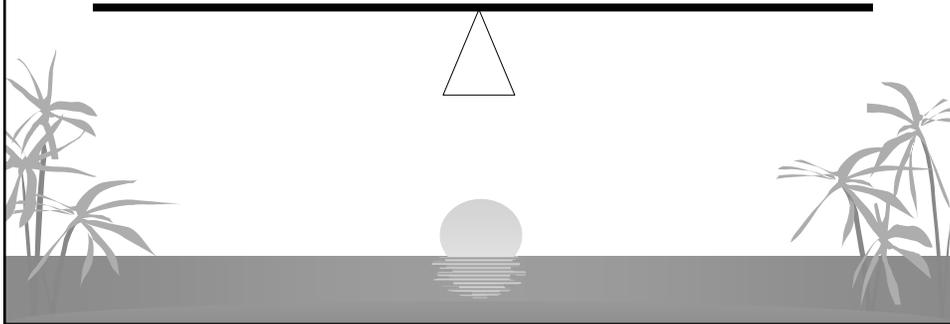
It is our sickest, frailest patients
who need the most aggressive
treatment for depression



IT'S ALL ABOUT BALANCING RISKS AND BENEFITS

**Risks
of
ECT**

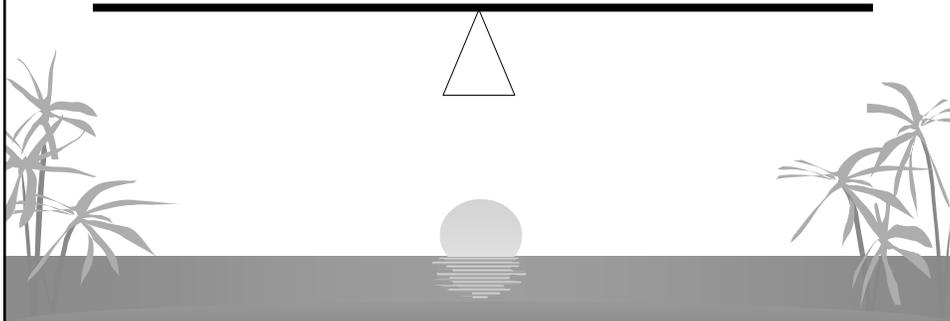
**Risks of
not
treating**



IT'S ALL ABOUT BALANCING RISKS AND BENEFITS

**Damned if
you do**

**Damned if
you don't**



WHO MAKES THE DECISION?

- ♦ The treating psychiatrist makes this decision
- ♦ Consultants will advise about risk and about modifications to mitigate risk, but will not “clear the patient for ECT”
- ♦ The procedure involves a collaboration between the psychiatrist and the anaesthesiologist

SPECIAL POPULATIONS

- ♦ Coronary artery disease
- ♦ Atrial fibrillation
- ♦ Pacemakers and AICD's
- ♦ Brain tumors
- ♦ Seizure disorder
- ♦ Osteoporosis
- ♦ Pregnancy

PREPARATIONS FOR ECT

- ♦ Discontinue all psychotropic drugs, *especially benzodiazepines*, possibly cholinesterase inhibitors
- ♦ Informed consent
- ♦ Second opinion (Florida statute)
- ♦ Anaesthesia work-up
- ♦ Neurologic exam, neuroimaging study
- ♦ Spine films (?)

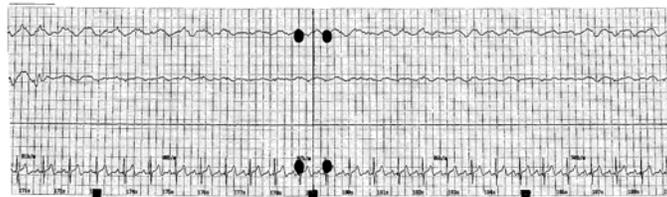
PRE-OP ORDERS

- ♦ NPO after midnight
- ♦ Void prior to ECT
- ♦ Flush hep lock
- ♦ Pre-op meds

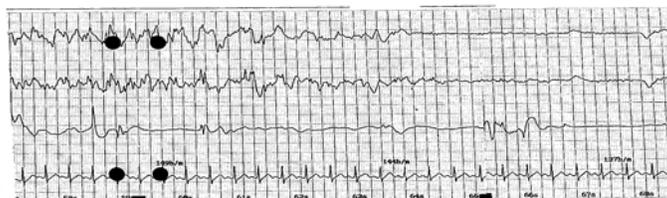
USUAL COURSE

- ♦ Six to twelve treatments, given three times per week (can reduce to twice-weekly to decrease confusion)
- ♦ Aim for 25 to 60 sec. seizures by EEG, good postictal suppression
- ♦ Treat until patient plateaus or is back to baseline, then two or three more treatments

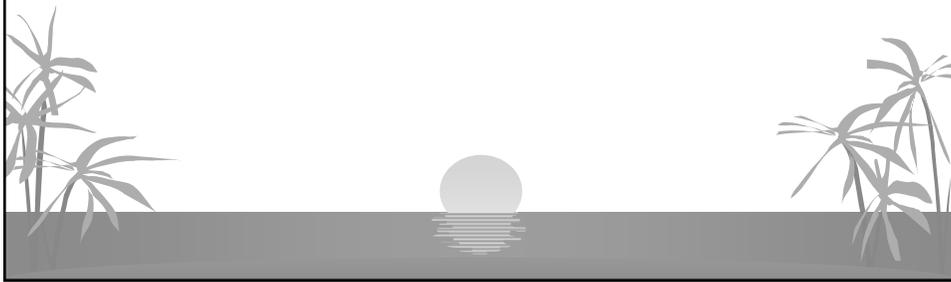
Poor postictal suppression



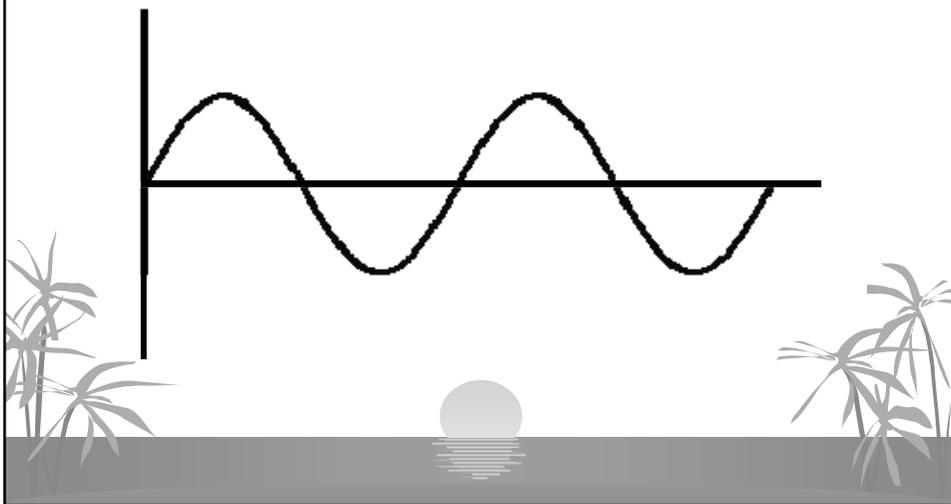
Good postictal suppression



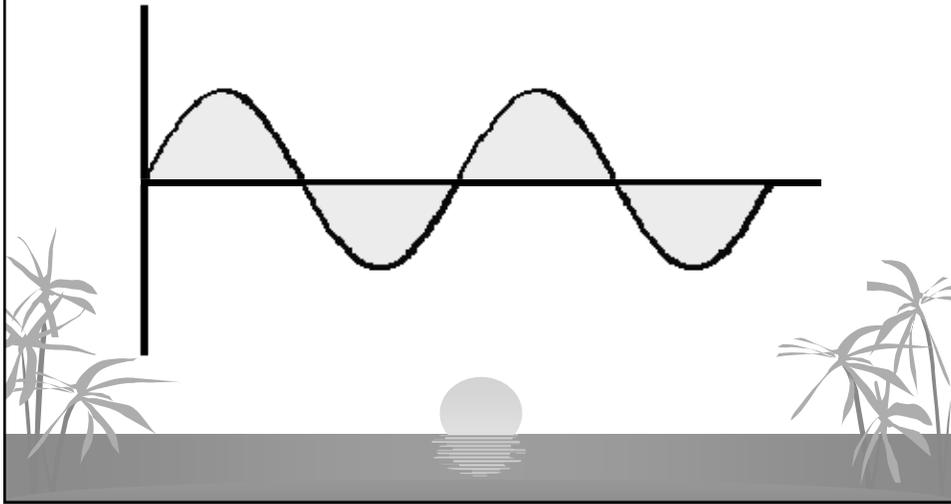
SINE WAVE vs. BRIEF-PULSE WAVEFORM



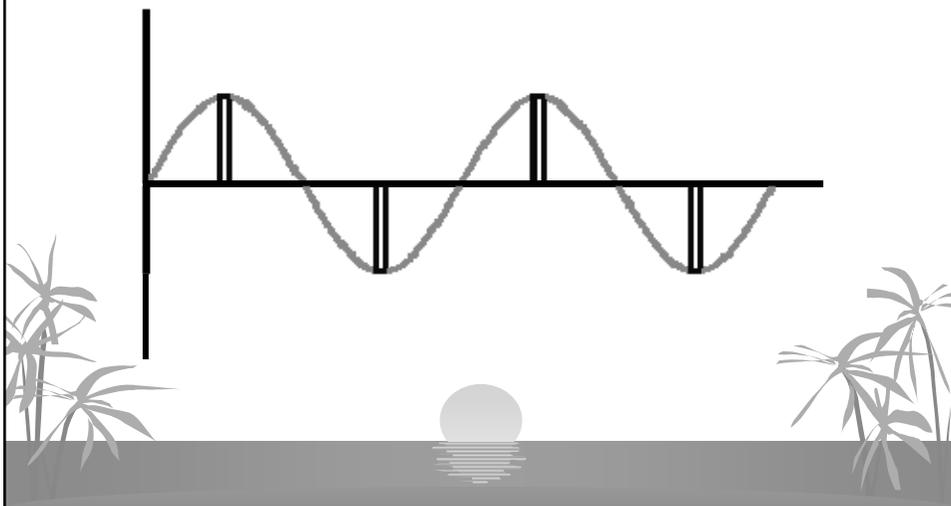
SINE WAVE STIMULUS



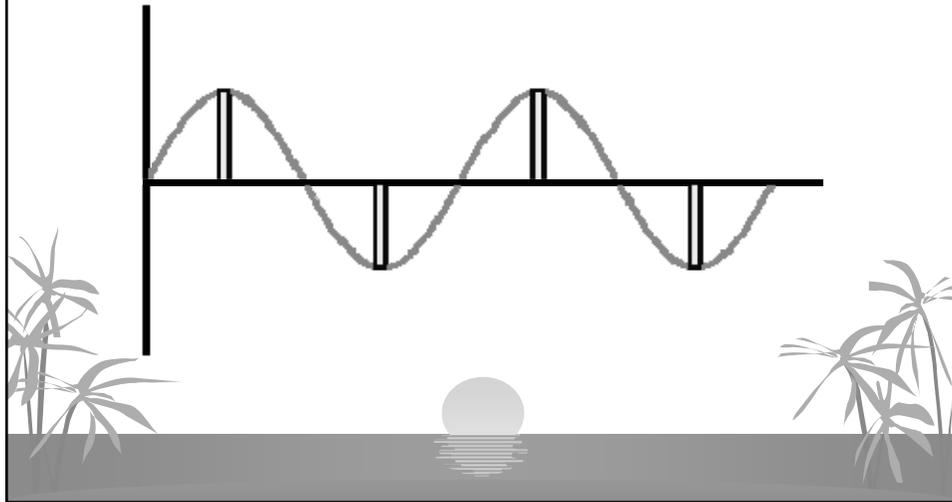
SINE WAVE STIMULUS



BRIEF-PULSE STIMULUS



BRIEF-PULSE STIMULUS



ELECTRODE PLACEMENT

- Less memory deficit with unilateral non-dominant placement (usu. D'Elia placement)
- But,
 - Many patients don't respond to unilateral treatment
 - May require more treatments
 - Seizure may not generalize
 - Stimulus needs to be further suprathreshold than for BL treatment
 - Memory deficit less problematic with brief-pulse machines
- Why take chances?
- Bifrontal placement may be more promising

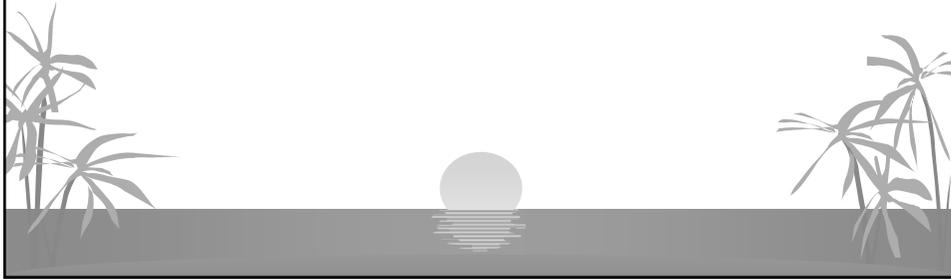
MEDICATIONS FOR ECT

- Induction agents: methohexital, etomidate
- Paralytics: succinylcholine (or short-acting curare derivatives for pseudocholinesterase deficiency [1 in 3000])
- Sympatholytics: labetalol, esmolol
- Vagolytics: glycopyrrolate, atropine
- For status epilepticus: midazolam, diazepam

POST-ECT AGITATION

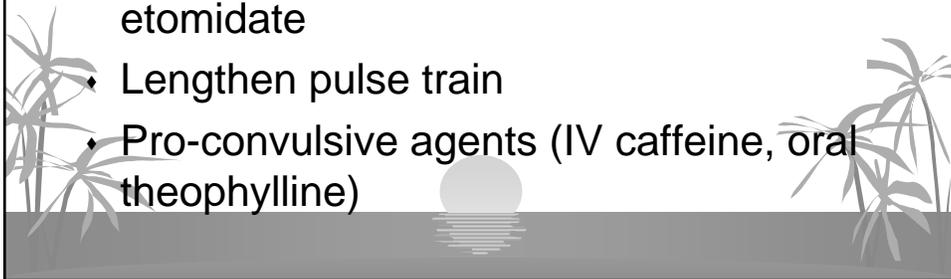
- Problematic in 1 to 12% of series
- Predicted by suboptimal muscle relaxation
- Must rule out nonconvulsive status epilepticus
- Best treatment is time, maintenance of safety
- Can use midazolam or droperidol

HAVING SEIZURES RAISES
THE SEIZURE THRESHOLD,
AND SO DOES GETTING OLD



MANAGEMENT OF HIGH SEIZURE THRESHOLD

- ◆ Hydration
- ◆ Prep and place electrodes properly
- ◆ ***Aggressive hyperventilation***
- ◆ Reduce induction agent, consider etomidate
- ◆ Lengthen pulse train
- ◆ Pro-convulsive agents (IV caffeine, oral theophylline)



PROPHYLAXIS AFTER ECT

- ♦ Absolutely essential—almost all ECT-treated depressions will eventually recur
- ♦ A previously effective antidepressant probably won't work
- ♦ New class of antidepressant (?)
- ♦ Lithium
- ♦ Maintenance ECT (usually one treatment every four to eight weeks)

“For extreme diseases, extreme methods of cure...are most suitable.”

--Hippocrates, ca. 400 BC