Wisconsin Public Psychiatry Network Teleconference (WPPNT)

- This teleconference is brought to you by the Wisconsin Department of Health Services (DHS) Bureau of Prevention, Treatment and Recovery and the University of Wisconsin-Madison, Department of Psychiatry.
- The Department of Health Services makes no representations or warranty as to the accuracy, reliability, timeliness, quality, suitability or completeness of or results of the materials in this presentation. Use of information contained in this presentation may require express authority from a third party.

Transcranial Magnetic Stimulation: TMS

A proven non-drug treatment for depression

Presented by:
Dr. Leslie Taylor, MD & Ian Cox

TMS Center of Madison

- Opened in January of 2013
- Collaboration between Rosecrance and Connections Counseling

Understanding the Problem

Major Depression: A Large Patient Population Currently Being Underserved

16.1 Million
US Adults with MDD

7.2 Million
Treated

4.5 Million
Poorly Served

Lack of efficacy

Intolerable side effects

Top 10 Causes of Disability
A Major Burden for Society Today

1. Lower Respiratory Infections
2. Diarrhea
3. Unipolar Major Depression
4. Ischemic Heart Disease
5. HIV/AIDS
6. Cerebrovascular Disease
7. Premature Birth
8. Birth Trauma
9. Road Traffic Accidents
10. Neonatal Infections
Brain Activity is Reduced in Depression

A PET Scan measures vital functions such as blood flow, oxygen use and blood sugar (glucose metabolism).

Source: Mark George, M.D. Biological Psychiatry Branch Division of Intramural Research Programs, NIMH 1993

Repeated Activation of Left Prefrontal Cortex is Known to Produce Antidepressant Effects

- Neuroimaging studies have documented changes in functional connectivity between tissue directly stimulated by NeuroStar TMS and in deep brain regions known to be involved in mood regulation.

Figure reproduced with permission of MJ Dubin, MD, PhD, Weill Cornell Medical College.

Treating the Brain as an Electrochemical Target

Brain activity can be altered through:

TMS: focused, non-invasive & non-systemic
DRUG THERAPY: action is anatomically diffuse and systemic

Theory of Neuroplasticity

Unstimulated

Stimulated

Brain Activity can be altered through:

Best Practices Treatment Guideline for Depression

Based on 2010 APA guidelines and NeuroStar TMS Therapy® indication for use.

STAR*D Study demonstrates that current treatment has limited effectiveness
Likelihood of discontinuing treatment increases with each new medication attempt

<table>
<thead>
<tr>
<th>Treatment Attempt</th>
<th>Discontinuation Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Line</td>
<td>8.5%</td>
</tr>
<tr>
<td>One Prior Treatment Failure</td>
<td>13.1%</td>
</tr>
<tr>
<td>Two Prior Treatment Failures</td>
<td>35.2%</td>
</tr>
<tr>
<td>Three Prior Treatment Failures</td>
<td>41.4%</td>
</tr>
</tbody>
</table>


Neuronetics, Inc. (data on file)

Adverse Events occurring at an incidence >5% and 2x the rate of placebo treatment


Primary Differences: TMS vs ECT

TMS
- Non-invasive
- Minimal Side Effects
- No Seizure
- Active participant during the session
- Brief Interruption in one’s day

ECT
- Invasive
- Significant Risk of Side Effects
- Seizure Required
- Anesthesia Required
- Cannot Drive afterwards

NeuroStar TMS Therapy® System

- Cleared in October 2008 by the FDA for the treatment of patients with major depression.
- Utilizes a highly focused MRI-strength magnet to stimulate nerve cells in an area of the brain thought to control mood.
- Stimulating these neurons, causing the release of neurotransmitters and clinical effects.

TMS in Clinical Practice

- Non-invasive
- No anesthesia or sedation
- No systemic side effects
- No negative impact on cognition
- Tolerable treatment with less than 5% discontinuation rate
- 37 minute outpatient procedure easily performed in a physician’s office
- 6 week treatment course
- Antidepressant medications may still be used during TMS treatments

Releases neurotransmitters
Increases cerebral blood flow
Increases glucose metabolism
Proven Safety and Tolerability Profile

- Non-systemic, avoids the side effects commonly associated with antidepressant medications
  - No adverse effect on cognition
  - No adverse effect on sleep
- Excellent treatment adherence with less than 5% discontinuation rate due to adverse events
- Post marketing experience confirms a rare risk of seizure with NeuroStar TMS (<0.1% per patient)

**MEDICATIONS:**
- Other adverse events: nausea, vomiting, diarrhea, dyspepsia, constipation, dizziness, headache, muscle twitching,乏力, pain, paresthesia, paraesthesia, and other pain or discomfort.

**NEUROSTAR:**
- Eye pain, toothache, muscle twitching, facial pain, pain of skin.

Product Labeling for currently marketed antidepressants (Neuronetics, Inc., data on file).

Top Behavioral Health Hospitals Provide TMS Therapy

- Johns Hopkins Hospital
- Mayo Clinic
- McLean Hospital, Belmont, Mass.
- New York-Presbyterian University Hospital of Columbia and Cornell
- UCLA Semel Institute for Neuroscience & Human Behavior
- McLean Hospital
- Sheppard and Enoch Pratt Hospital

Proven Efficacy Demonstrated Through Randomized Controlled Trials

In an NIMH-funded, independent, randomized controlled trial, patients treated with TMS using the NeuroStar TMS System were four times more likely to achieve remission compared to patients receiving sham treatment ($P = 0.0173$, odds ratio = 4.05)

O'Reardon, et al. (2007) Biological Psychiatry; George, et al. (2010) Arch Gen Psychiatry
Consistent Response and Remission Rates Across a Broad Range of Treatment Resistance

1 in 2 Patients Respond, 1 in 3 Patients Achieve Remission

LOCF Analysis of intent-to-treat population

% of Patients (N=257)

CGI-S Outcomes in Acute Phase

% of Patients (N=257)

CGI-S Outcomes Post Acute Phase

NeuroStar is the Only TMS System with Proven Durability Measured Over 12 Months

68% of study population in response, 45% in remission

LOCF Analysis of intent-to-treat population

Areas of Ongoing Research in Investigator-Initiated Studies

TMS Therapy: Real World Outcomes

Case Study: Jack

Jack is a 60-year-old male referred by his psychiatrist. He has a history of depression that dates back to 1998. He was hospitalized in Fort Collins, Colorado. He has been on medication and in counseling since essentially that time. He is diagnosed with PTSD, Major Depression and possible Bipolar 2 Disorder. Jack suffered sexual abuse and verbal abuse at the hands of his parents and other family members when he was a child. He was initially diagnosed with Major Depression and started on Prozac. This did not work for him. He remembers trying Wellbutrin and Paxil. Wellbutrin was not effective and Paxil gave him serious side effects. Throughout the years he has also been on Effexor, Cymbalta and Seroquel, with minimal to no efficacy. He has been on lithium for the last 13 years and Lamictal for approximately ten years. He took Namenda for about three months several months ago but this was not effective either.

Jack: Progress over 6 weeks

"I'm not sure how many weeks its been [since I finished] maybe 4, but doing great. I wake up every day and stop and then say, I'm not depressed! I asked my wife if it's a sin to feel this good. Thanks for giving my life back!!!"  - Jack
Where Can I find Help?

More than 650 NeuroStar® Locations in the U.S.

Does Insurance Cover the Cost of TMS?

230M Covered Lives

Madison Area Insurance Providers

CPT® Category I Codes

Source: Current Procedural Terminology, 2013, American Medical Association CPT® is a Registered Trademark of the American Medical Association