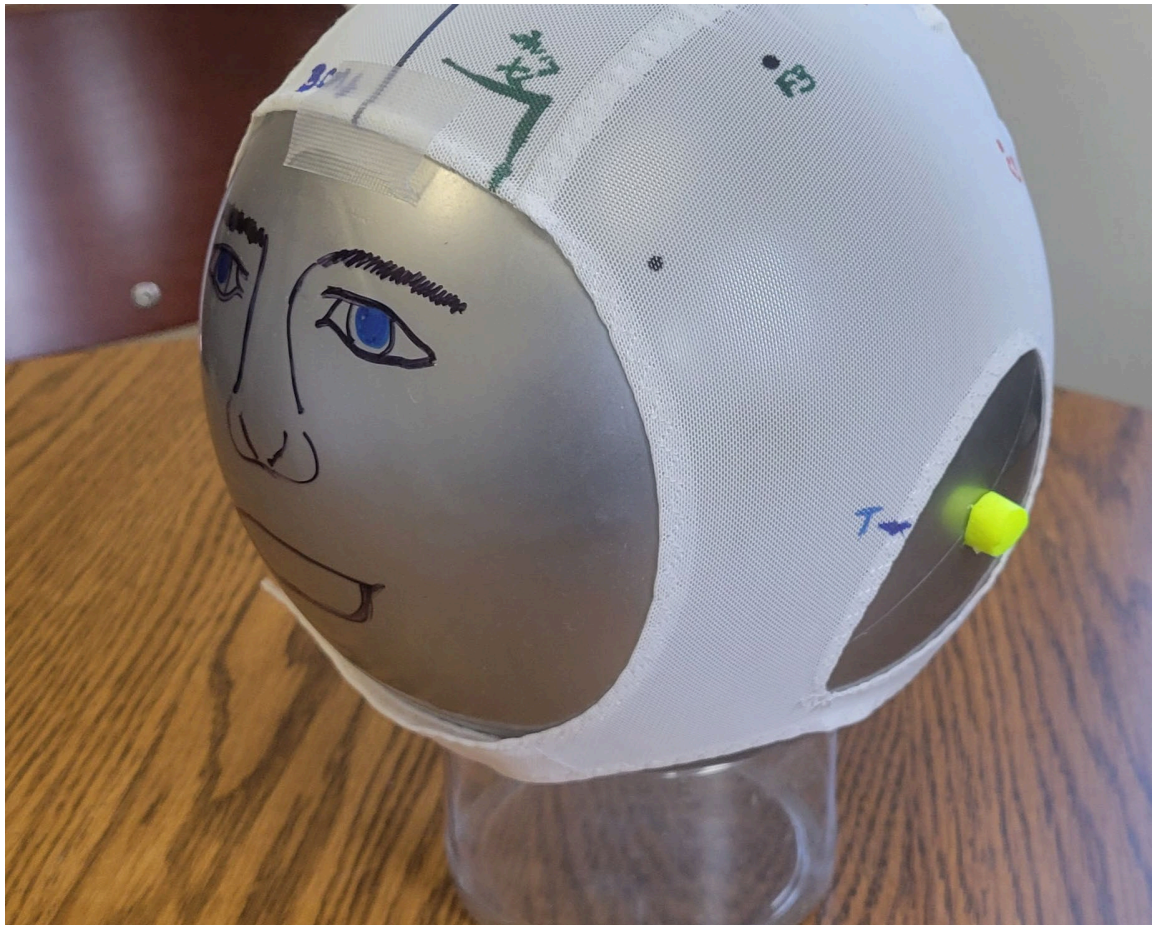


# TRANSCRANIAL MAGNETIC STIMULATION- FOR THE WIN

## WHITE RIVER JUNCTION VA

# BACKGROUND

- 14 million adults in the US struggle with depression.
- In 2015 Veteran health Administration noted 19.8% prevalence of depression in our population.
- Transcranial Magnetic Stimulation is advantageous as it is a safe, non-invasive treatment.
- It does not require the use of any form of medication, does not require anesthesia or sedation, and the patient remains awake and alert during the entire treatment.
- TMS is performed with: no seizures, no systemic side effects, no weight gain, no sexual dysfunction, no sedation, no nausea, no dry mouth, no adverse effects on concentration or memory and no device-drug interactions.

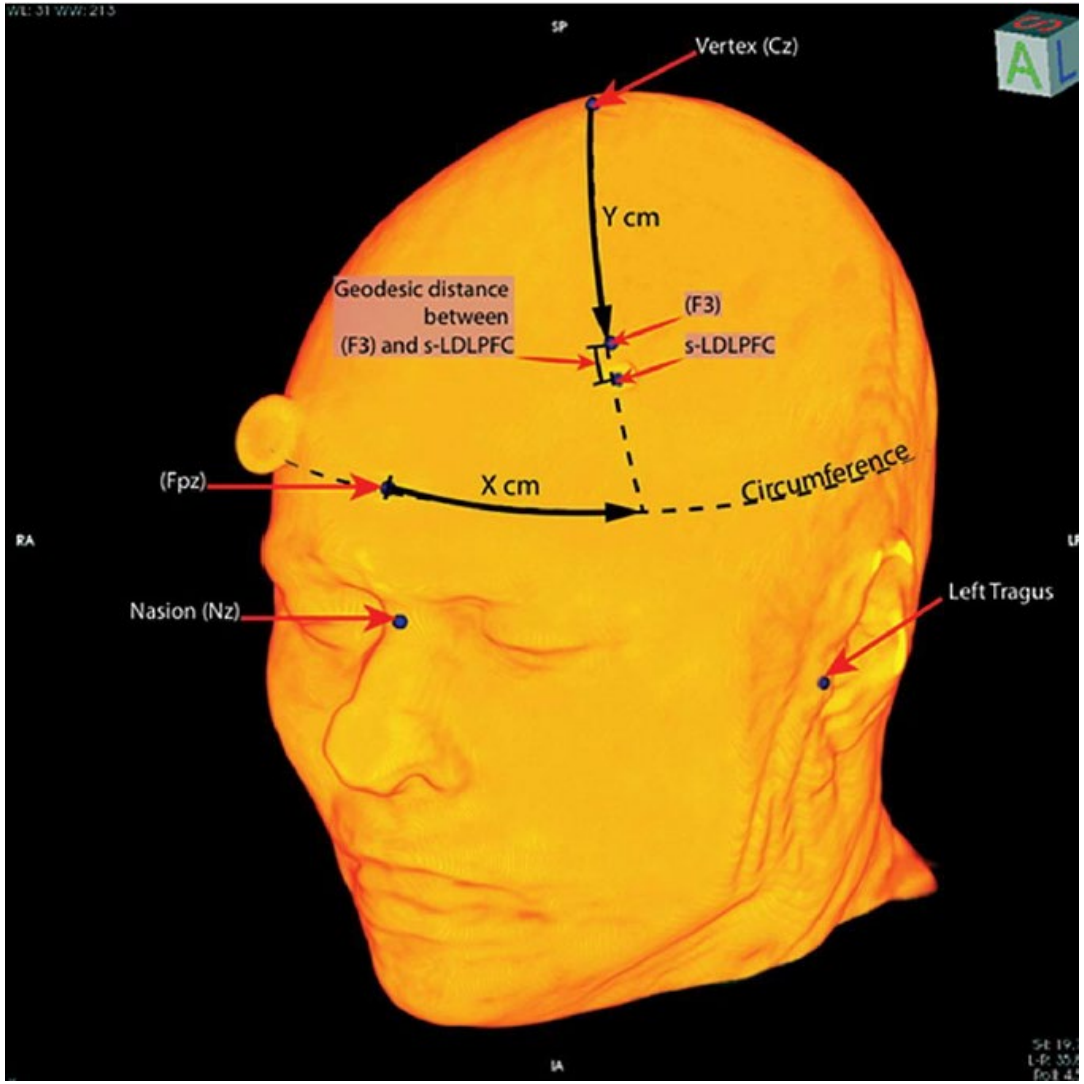


# PURPOSE AND METHOD:

- Original TMS pulsing machine invented in 1985 by Anthony Barker for spinal cord stimulation
- Treatment for major depressive disorder studied in 1993
- First double-blind study 1997
- TMS FDA approval in 2008 for MDD
- TMS approval for pain w/ migraines 2013
- TMS approval for OCD 2018 (Brainsway Deep TMS system)


# WHY THE DLPFC?

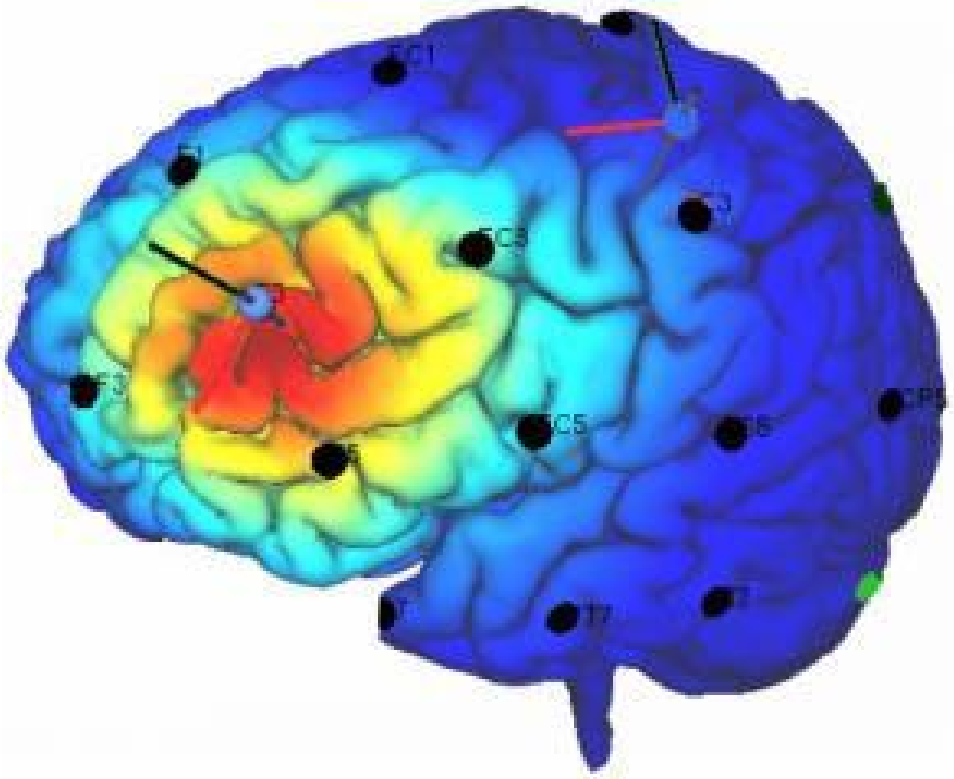
- The advent of MRI has increased our understanding of the brain and how it is affected by depression. Scientist have been able to see which areas of the brain become activated or deactivated during depression and recovery.
- The Dorsal Lateral Prefrontal Cortex "DLPFC" is metabolically underactive in major depressive disorders.
- The magnetic pulses of TMS only reach a depth of a few millimeters, however it is determined that there is a connection between the DLPFC on the surface of the brain and the deep brain structures.
- The brains connectivity allows the pulses delivered to the DLPFC to reach into the limbic system and thus stimulate the neurons there



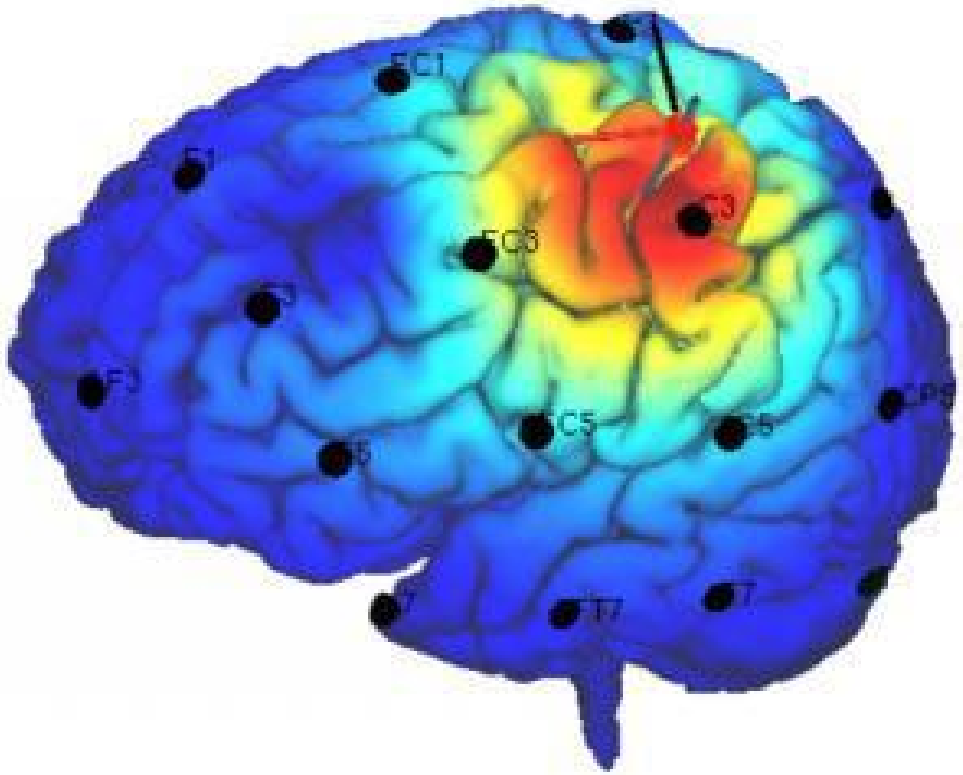

- **Measurements used to determine location of MT site:**
- **Head Circumference _____**
- **Nasion to Inion (N-I) _____ Half N-I _____**
- **Tragus to Tragus (T-T)____ Half T-T _____ 20% T-T _____**
-
- **(F3) (computer algorithm) :**
  **Distance along Circumference from midline (X) _____**
  **Distance from Vertex Adjusted (Y)_____**
- **Target Order:**
- **Stimulator Output: _____ %MT:_____ Protocol Intensity: _____**

Electrical Field Models of TMS Coil Placements

## Dorsolateral Prefrontal Cortex (DLPFC)




## Motor Cortex (MC)



- **Candidates for rTMS?**

- To ensure patient safety, the following criteria must be met:
- Current diagnosis of treatment resistant depression
- No previous history of epilepsy
- No metal in the head or above the shoulders that may be affected by magnetic fields such as:
  - Aneurism clips or coils
  - Brain Stents
  - Bullet Fragments
  - Cardiac pacemakers or defibrillators
  - Cochlear implants
  - Cerebral shunts

## Benefits and Advantages of rTMS:

- Safe, with high tolerability
- Minimal Side Effects
- Does not affect cognitive function
- Patients are able to resume daily activities right after treatment
- May be used with or without medications

## Possible Side Effects:

- Most common side effects from rTMS are headache and nausea
- Mild to moderate discomfort at the stimulation site
- Twitching of facial muscles
- *In rare cases, rTMS can cause an unintentional seizure. This can occur in less than 0.1% of patients.

# Introducing: Watson


APP
NEW
YEAR


BAHAMAS
BLESSED
BEYOND
MEASURE


**QIDS: Quick Inventory depressive symptoms**:
5 or below= no depression
6-10 mild depression
11 to 15 moderate depression
16-20 severe depression
Over 21- very severe depression

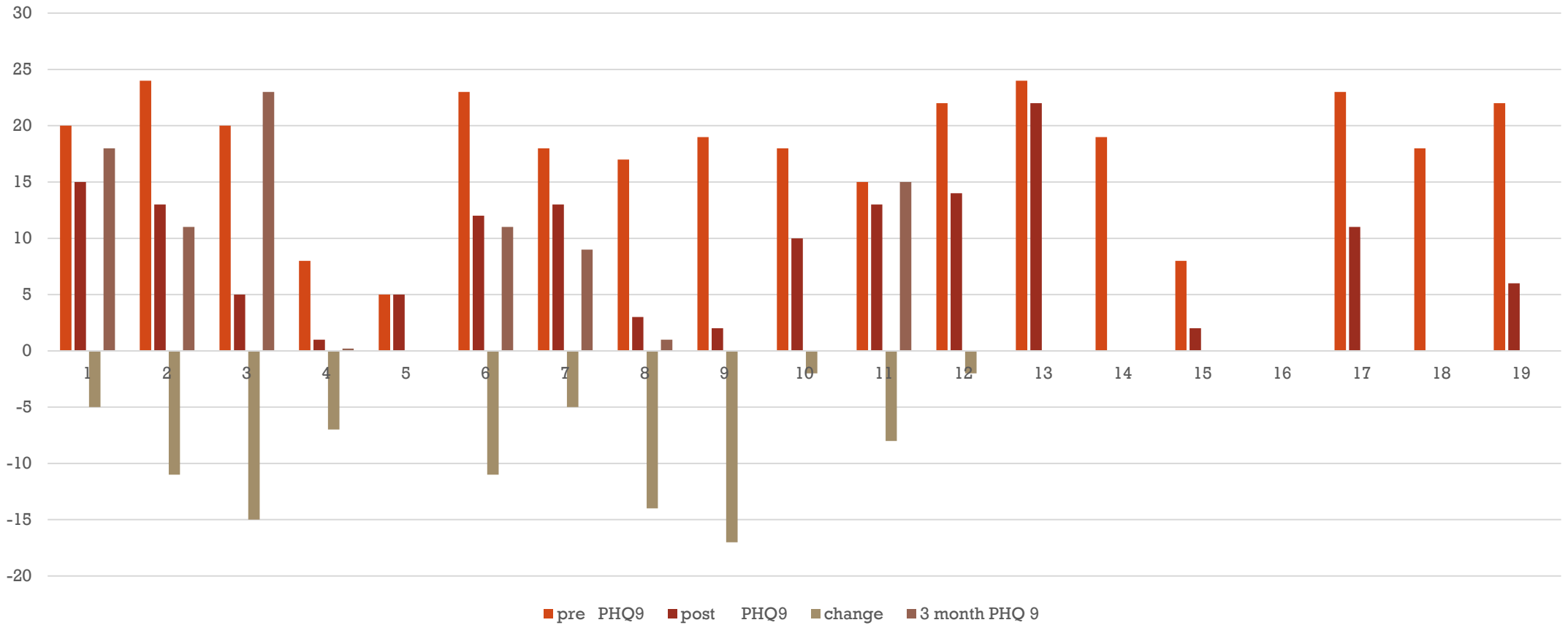
**PCL 5:**
Post traumatic stress disorder checklist.
33 or higher Significant

**PHQ 9 patient health questionnaire:**
5-9 mild depression
10-14 moderate depression
15-19 moderately severe
>20 severe depression

# OUR DATA

- 24 veterans completed or currently in treatment, starting Oct 2021. 3 females
- •4 dropped out before completing treatment, all completed at least 10 treatments
- •Main reason: transportation difficulty
- •One drop out due to intolerability
- •Most with diagnosis MDD active. Some referred for maintenance of depression already in remission from previous treatment. One patient with catatonia but not depressive symptoms
- •High degree comorbidity with PTSD
- •High level treatment refractoriness
- •High percentage previous hospitalization on GE

# PHQ 9

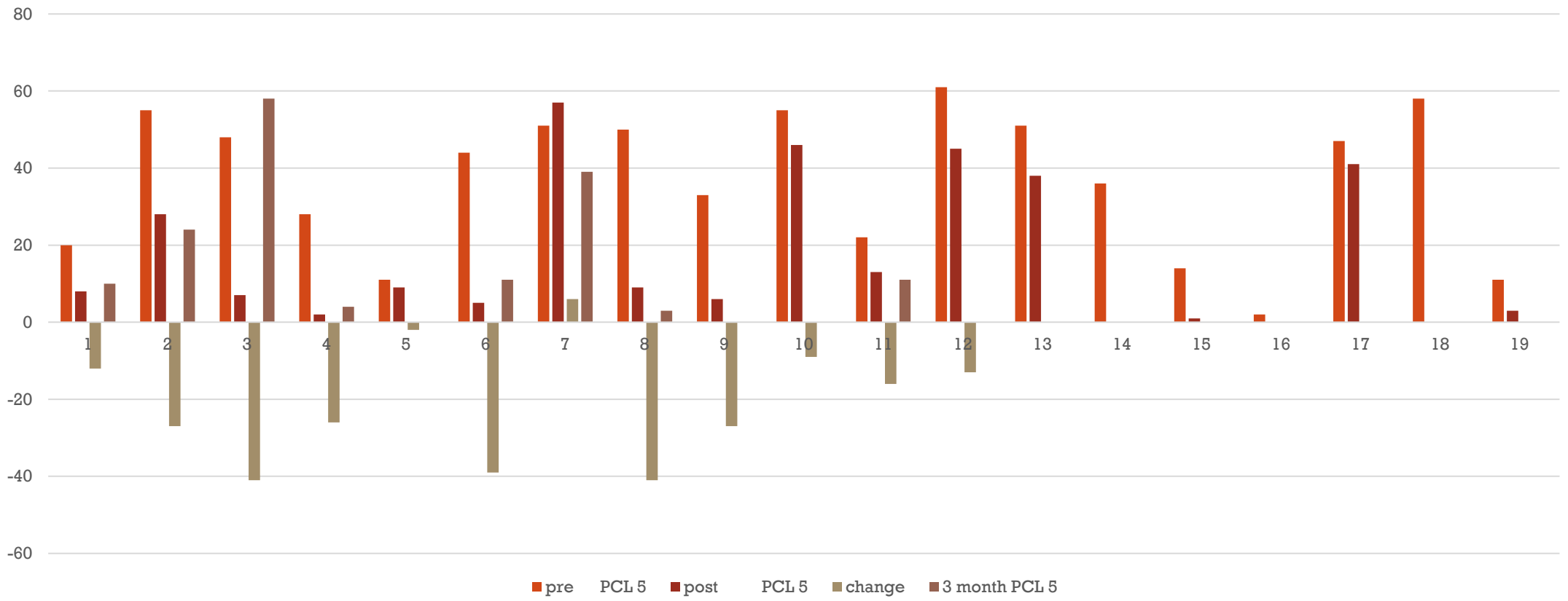



PHQ9 diagnostic tool used to Screen patient for presence and Severity of depression

Average pre PHQ9=17
Average post PHQ9=8
Average 3-month PHQ9=10

82% = 25% drop
47% = 50% drop
35% = remission

# PCL 5

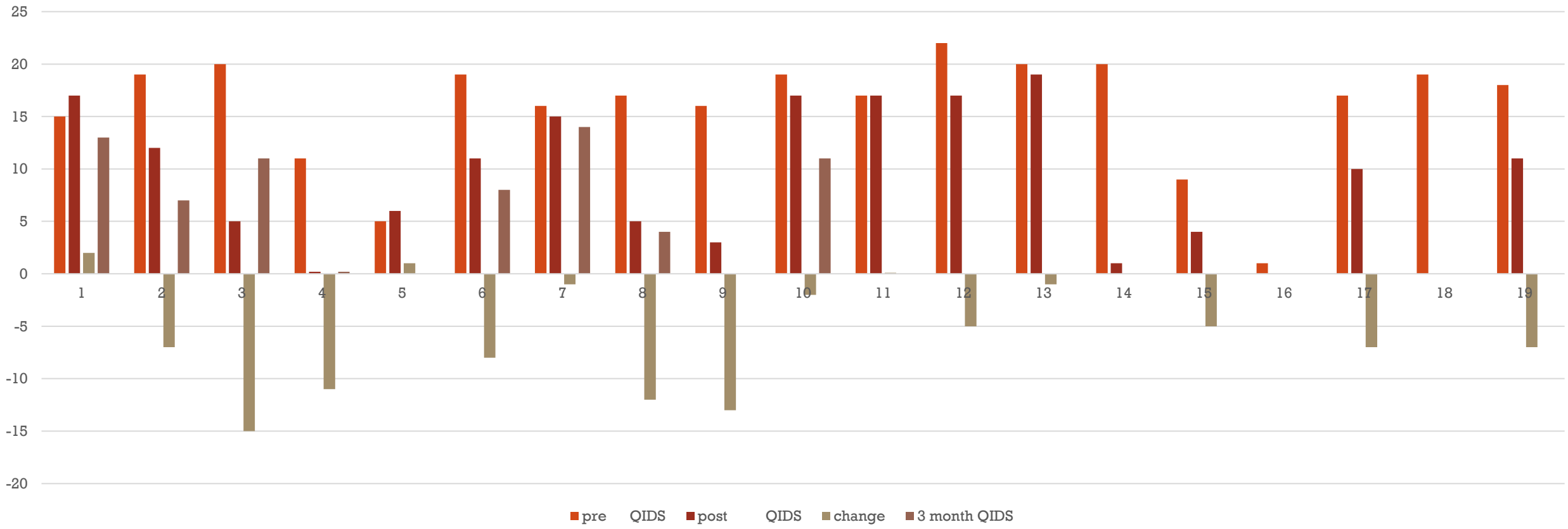



PCL5 assesses symptoms of Post traumatic stress disorder.

Average pre PCL5= 37
Average Post PCL5=19
Average 3-month PCL5=19

those w/ starting scores over 32:
83% = 10 point drop
54% = 20 point drop
50%= remission (score under 32)

# QIDS




QIDS:
Quick Inventory of Depressive Symptoms

Average pre QIDS= 16
Average post QIDS=10
Average 3-month QIDS= 8

69%= 25% decrease
38%= 50% decrease
38%= remission (score under 5)

# Data Summary

- Generally excellent tolerability and completion rates
- High patient satisfaction with treatment
- Excellent responses for depression and PTSD in patients who have quite treatment-resistant history
- Measurement-based care to inform treatment decisions
- 70-80% of patients have some clinically meaningful response to treatment based on assessment scores of depression and PTSD.
- 35% achieve remission of depression, 50% achieve remission of PTSD based on PCL-5 scores
- Good durability of responses so far-most veterans who achieve remission remain in remission at 3-(and 6-month) follow up.

# CASE STUDY:

- Patient X:
- 55 YOM w/ hx of anxiety, major depressive disorder, PTSD, chronic joint/back/knee pain. Denies any benefit from psychiatric medications trialed over the past 10 years "I still feel depressed, lost, and anxious". Depression started when he was a teenager. Has felt depressed most days of the week for years. Gets frustrated with people quickly. Passive Suicidal ideation once a month or so which he tries to "push aside". Has been in therapy for 10 + years. Pre tx depression and PTSD symptoms in severe range. Received 38 treatments of rTMS.

- Post tx assessment:
- Patient had slow and steady improvement in his mood throughout his TMS course so that after 4-5 weeks of treatment we was close to remission from depression and by completion of treatment, he had achieved remission of depression. He continues to have some anxiety symptoms which are not improved by TMS. He is thrilled with the benefit he has received from TMs and tolerated the course well. He is engaged in psychotherapy (DBT) and benefitting from that. He has had significant improvement in quality of life, despite experiencing severe knee pain from an accident during his course (not occurring in TMS).
- His depression and PTSD symptom scores are all in the minimal symptom range.

- 3 month follow up:
- Feels that the benefits of TMS have sustained over the course of the time since he finished TMS, ongoing enjoyment in life, although notes some anxiety. Discusses he continues to work with therapist regarding anxiety, stressors, and communication strategies. Veteran reports he is feeling much better since doing TMS and feels it has been a positive experience. He reports he is able to think about himself and those around him in a different way.
- His depression and PTSD symptom scores remain in the minimal symptom range.

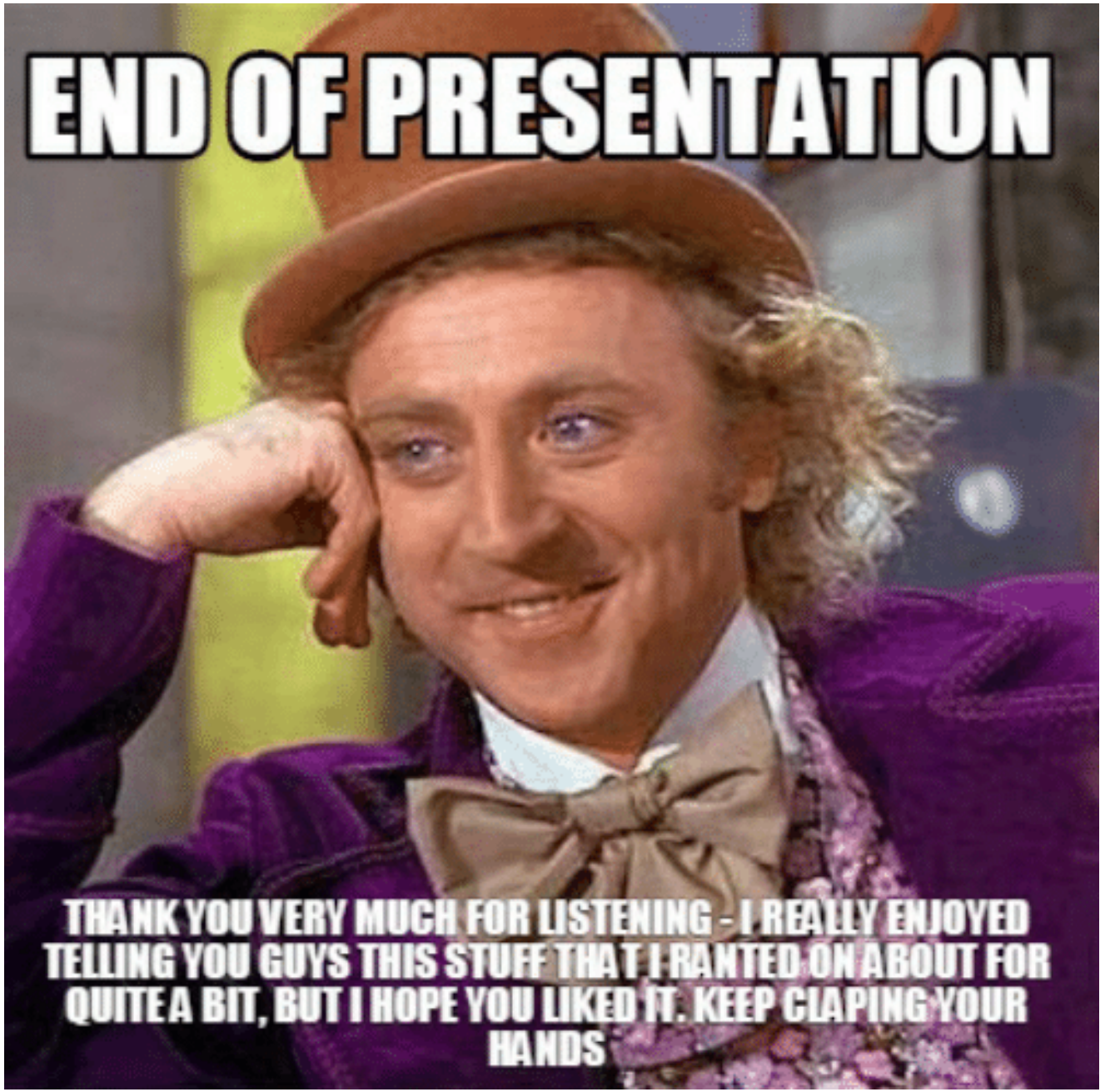
- 6 month follow up:
- The patient continues to deny depressed mood but endorses lingering symptoms of anxiety. However, the patient attributes this to psychosocial stressors (work and caregiver duties) Assessment scores remain minimal.

| | PHQ9 | QIDS | PCL5 |
|---|---|---|---|
| pre treatment | 17 moderately severe | 17 severe depression | 50 severe |
| week 1 | 14 | 16 | 46 |
| week 2 | 14 | 14 | 48 |
| week 3 | 13 | 13 | 46 |
| week 4 | 17 | 16 | 48 |
| week 5 | 13 | 11 moderate | 38 |
| week 6 | 6 mild | 12 | 20 mild |
| week 7 | 5 | 6 mild | 8 minimal |
| post treatment | 3 minimal | 5 remission | 9 minimal |
| 3 month follow up | 1 minimal | 4 remission | 3 minimal |
| 6 month follow up | 4 minimal | 6 mild | 12 minimal |

# CONCLUSION

- Overall, TMS is a promising new therapy. TMS research and literature suggests that daily, left prefrontal TMS for 6 weeks has antidepressant effects that are clinically meaningful, with low side effects and no drug-drug interactions. The remission outcomes are at least as robust as next choice antidepressant medication. Therapeutic effects, once obtained appear at least as durable as other antidepressant treatments.

# Happy anniversary!



END OF PRESENTATION
THANK YOU VERY MUCH FOR LISTENING - I REALLY ENJOYED TELLING YOU GUYS THIS STUFF THAT I RANTED ON ABOUT FOR QUITE A BIT, BUT I HOPE YOU LIKED IT. KEEP CLAPING YOUR HANDS

- **Who are the rTMS Clinicians?**

- The rTMS Team includes:

- Anne Felde, M.D- rTMS Psychiatrist and Director of rTMS program
- Rebekah Young, RNBC- rTMS Coordinator and Operator
- Michelle Adams, RN- rTMS Operator
- Paul Holtzheimer M.D. - rTMS Psychiatrist
- Robert Powell D.O. - rTMS Psychiatrist
- William Burch M.D.,PhD. - rTMS Psychiatrist

References:


- Wisco et. al. Posttraumatic Stress Disorder in the US Veteran Population: Results from the National Health and Resilience in Veterans Study. J Clin Psychiatry 2014;75(12):1338-1346
- Philip NS, Barredo J, Frank M, Tyrka AR, Price LH and Carpenter LL. Network Mechanisms of Clinical Response to Transcranial Magnetic Stimulation in Posttraumatic Stress Disorder and Major Depressive Disorder. 2018 Feb 1;83(3):263-272
- Perera T, George MS, Grammer G, Janicak PG, Pascual-Leone A, Wirecki TS. The clinical TMS society consensus review and treatment recommendations for TMS therapy for major depressive disorder. Brain stimulation. 2016;9(3):336-346
- Philip NS, Aiken EE, Kelley ME, Burch W, Waterman L, Holtzheimer PE. Synchronized transcranial magnetic stimulation for posttraumatic stress disorder and comorbid major depression. Brain Stimulation. 2019;12(5):1335-1337.
- Transcranial Magnetic Stimulation (TMS) Service. Johns Hopkins Medicine. Psychiatry and Behavioral Sciences Web site. https://www.hopkinsmedicine.org/psychiatry/specialty_areas/brain_stimulation/tms/. Published 2020. Accessed 7/1/22.
- TMS Therapy. https://www.clinicaltmssociety.org/tms. Published 2020. Accessed 7/1/22.