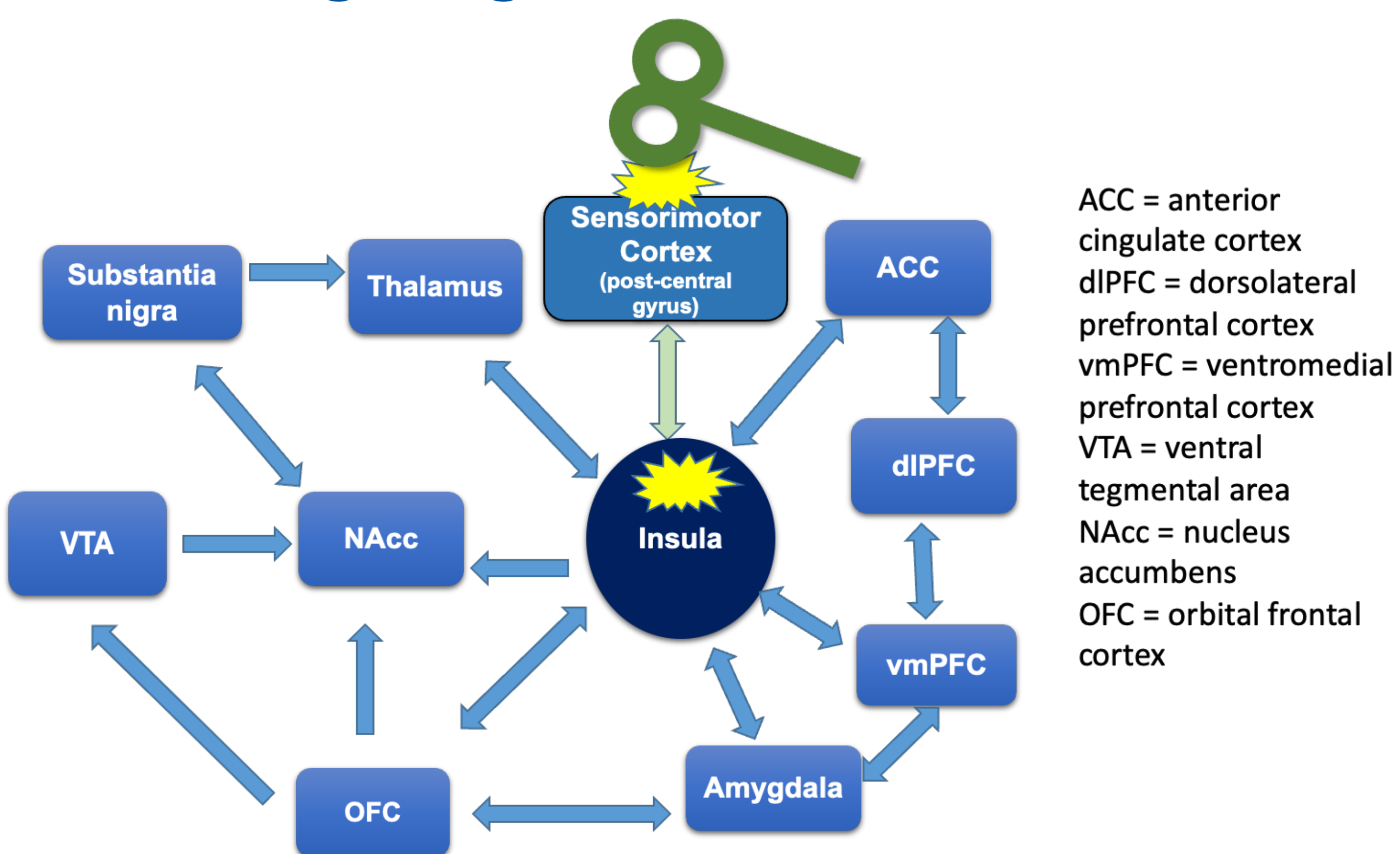


Noninvasive Neuromodulation for Addiction

TMS-STOP Study: Background

- Smoking is leading cause of preventable disease, disability & death
- Tobacco use disproportionately affects Veterans with PTSD
- 3X more likely to smoke
- Decreased odds of successful quitting
- 12-month bio-verified cessation only 4.5-8%
- 60-70% of Veterans who smoke express interest in cessation
- Transcranial magnetic stimulation (TMS) is an innovative, noninvasive intervention for brain stimulation FDA approved for depression, OCD, and smoking cessation
- Since the brain is an electrochemical organ, electrical fields can be applied to the brain to modulate neural activity
- TMS creates a rapid fluxing magnetic field, leading to neuronal depolarization inducing neural circuitry changes

Targeting the Insula with TMS

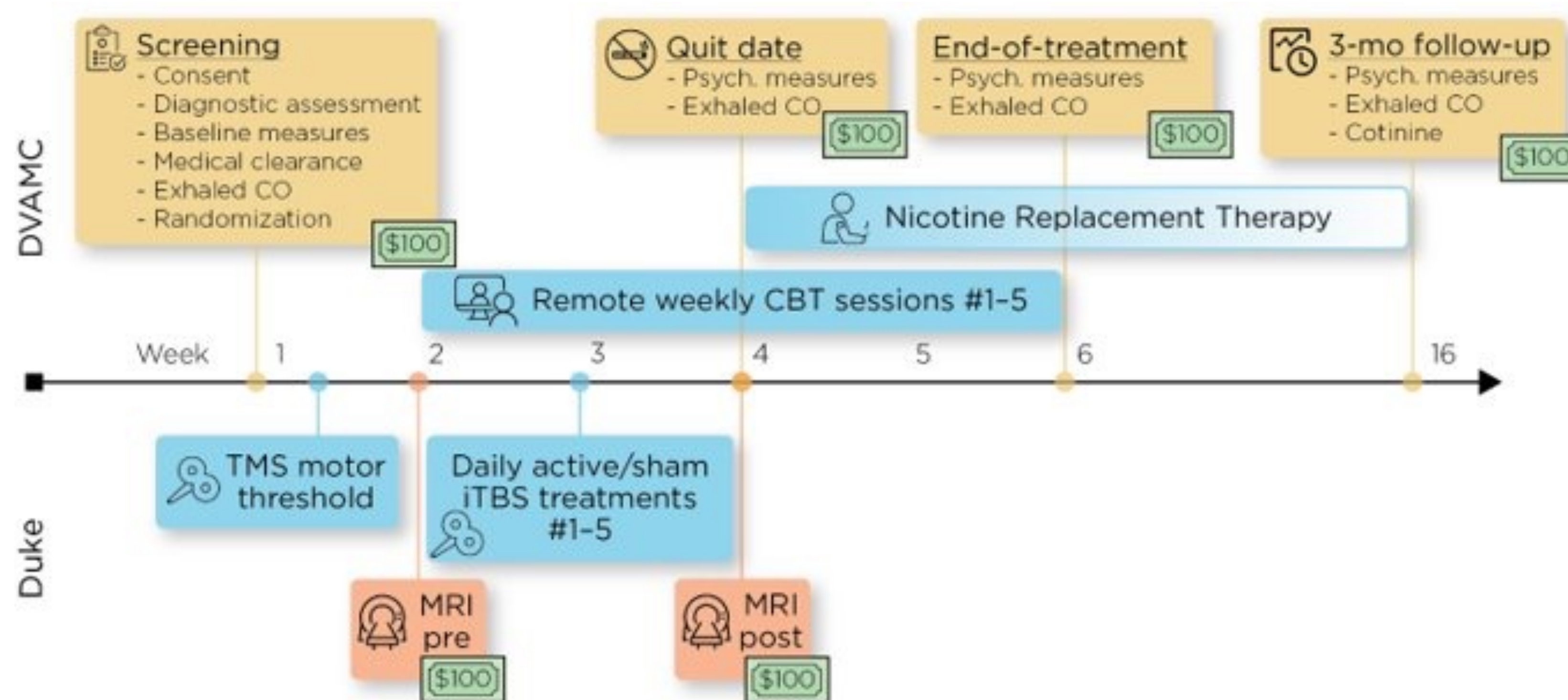


Methods

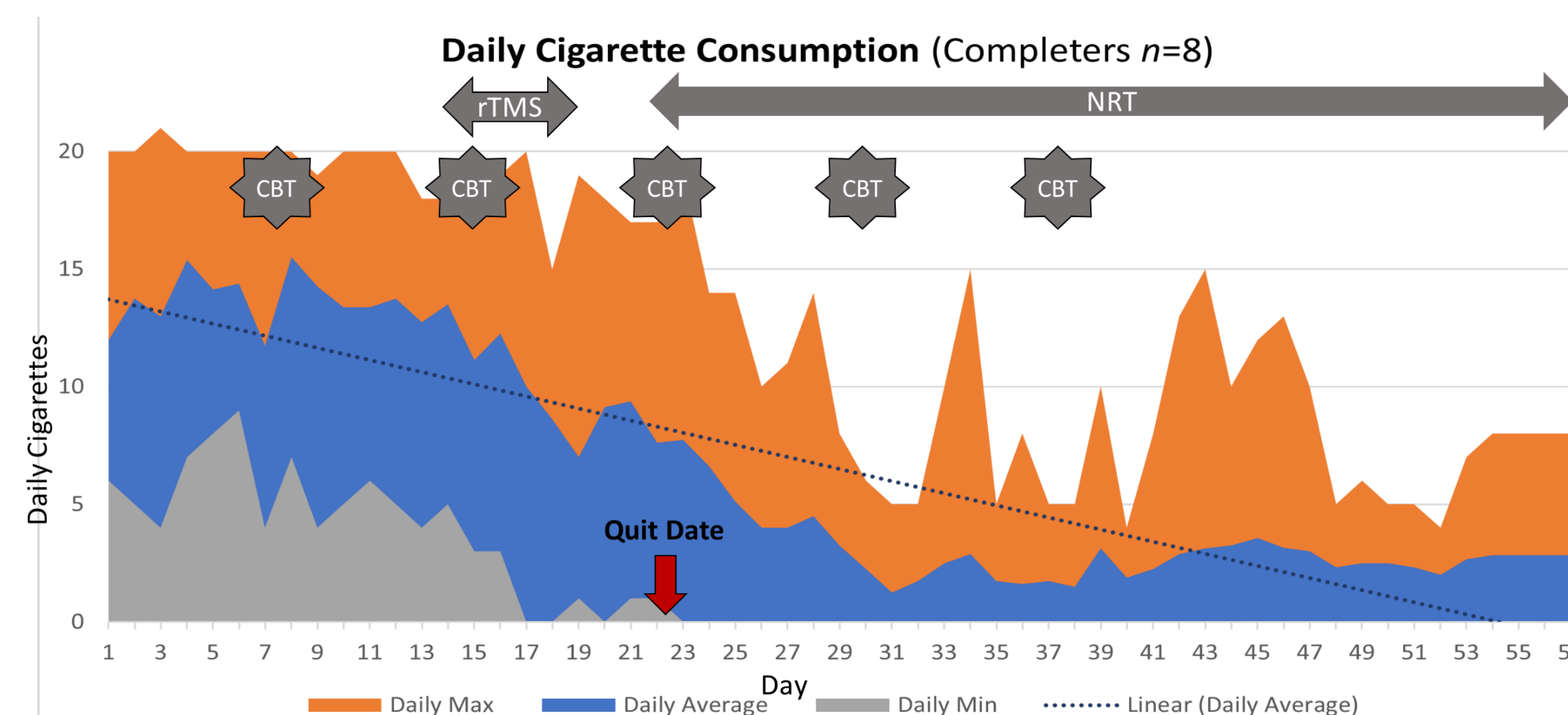


Participants were recruited from the Durham VA Health Care System. Eligibility included: US veterans aged 18-55, smoking 10+ cigarettes/day, with PTSD diagnosis

Study Design



Preliminary Results



- Results indicated decreased daily max and average cigarette consumption (n=8)
- Average acceptability scores of tMS and overall treatment (9.1/10) exceeded predefined goal of 7/10
- No serious adverse events (SAEs) including seizures, most common AEs included headaches
- 8/10 completers, 80% retention rate meeting predefined goal of 80%

Future Directions

- Aim 1:** Determine preliminary effect size estimates using 7-day point prevalence smoking abstinence at end-of-treatment and 3 months
- Aim 2:** Demonstrate target engagement of neurocircuitry using changes in functional connectivity (FC) between the rTMS cortical target and right posterior insula

Conclusions

- Individualized rTMS over post-central gyrus (insula-targeted) combined with CBT and followed by NRT appears to be safe, feasible, acceptable
 - Requires neuroimaging and neuronavigation
 - Efficacy being tested in ongoing RCT
- Five sessions of insula-targeted rTMS with 5 weeks of CBT and NRT led to reductions in cigarettes per day, carbon monoxide level, and cigarette craving intensity
- Treatment was reported to be highly acceptable, indicating a future potential to reduce smoking in this tobacco use disparities group

WIKIStim Project

Background

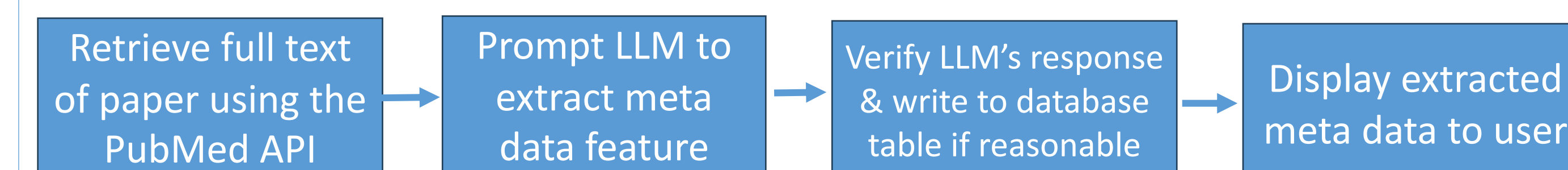
WIKIStim.org is an online wiki that catalogues research papers related to neuromodulation to increase access to scientific literature and data.

- Optionally accompanied by metadata (e.g., design, sample size, primary outcome)
- Current metadata process is manual extraction by the uploader

Goal of this team

Reimagine & transform the process for extracting metadata from manual input by the uploader to being an automated system using Large Language Models (LLMs)

New process under development:

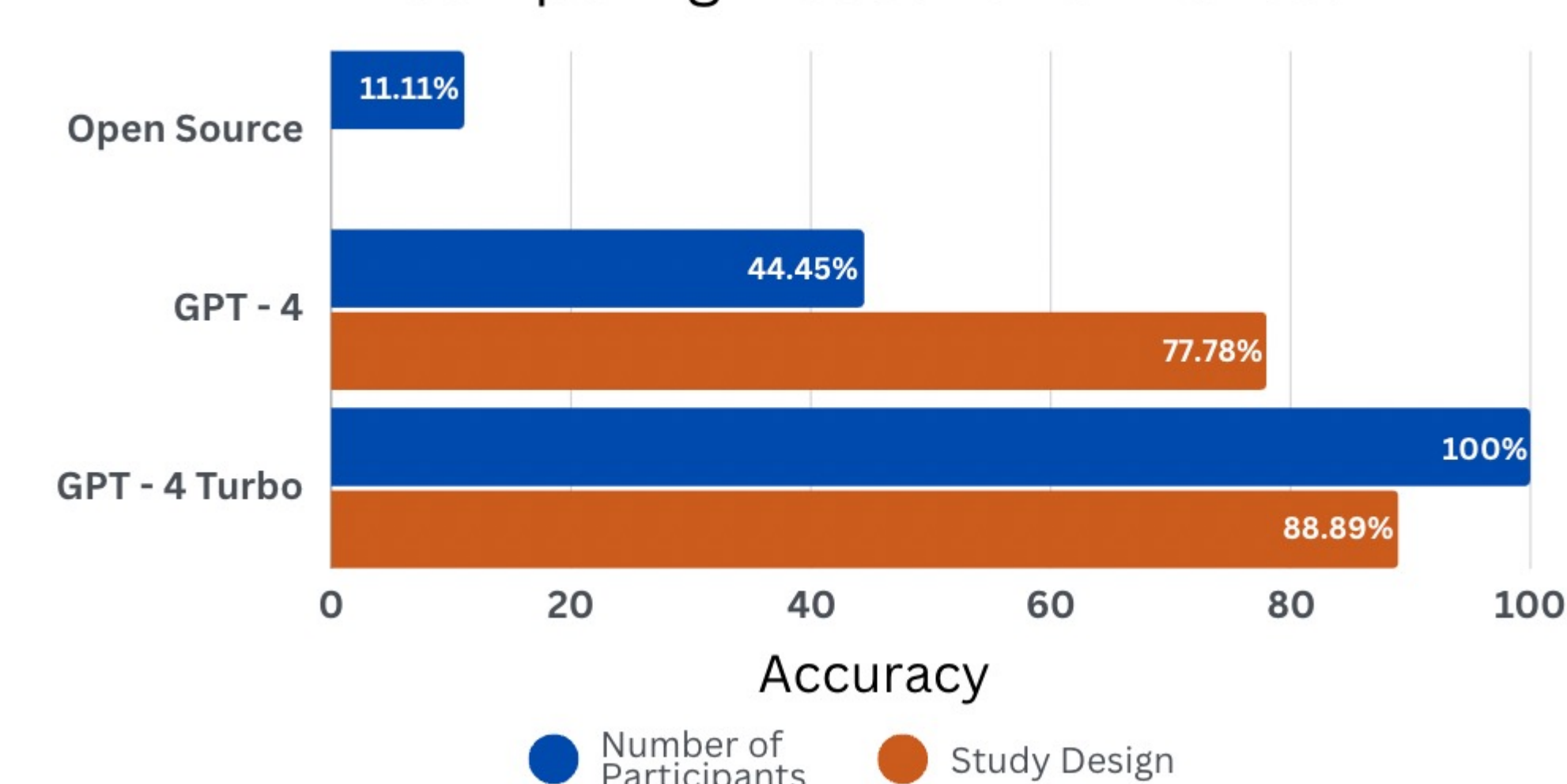


Experimentation & Current Achievements

To bolster reliability and reproducibility, we analyzed responses for two features: study design & sample size across 18 papers

- Compared responses against our "ground truth" responses directly obtained from Wikistim
- We found that GPT-4 turbo replicates the metadata manual extraction with an accuracy varying from 89% to 100%

Comparing Model Performances



Limitations and Next Steps

Limited features tested so far

- Expanding to more features (e.g., definition of success, trial duration, and pain location)

Lower performance with complex features (i.e. study design)

- Exploring our prompting techniques and implementing a more sophisticated approach



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