

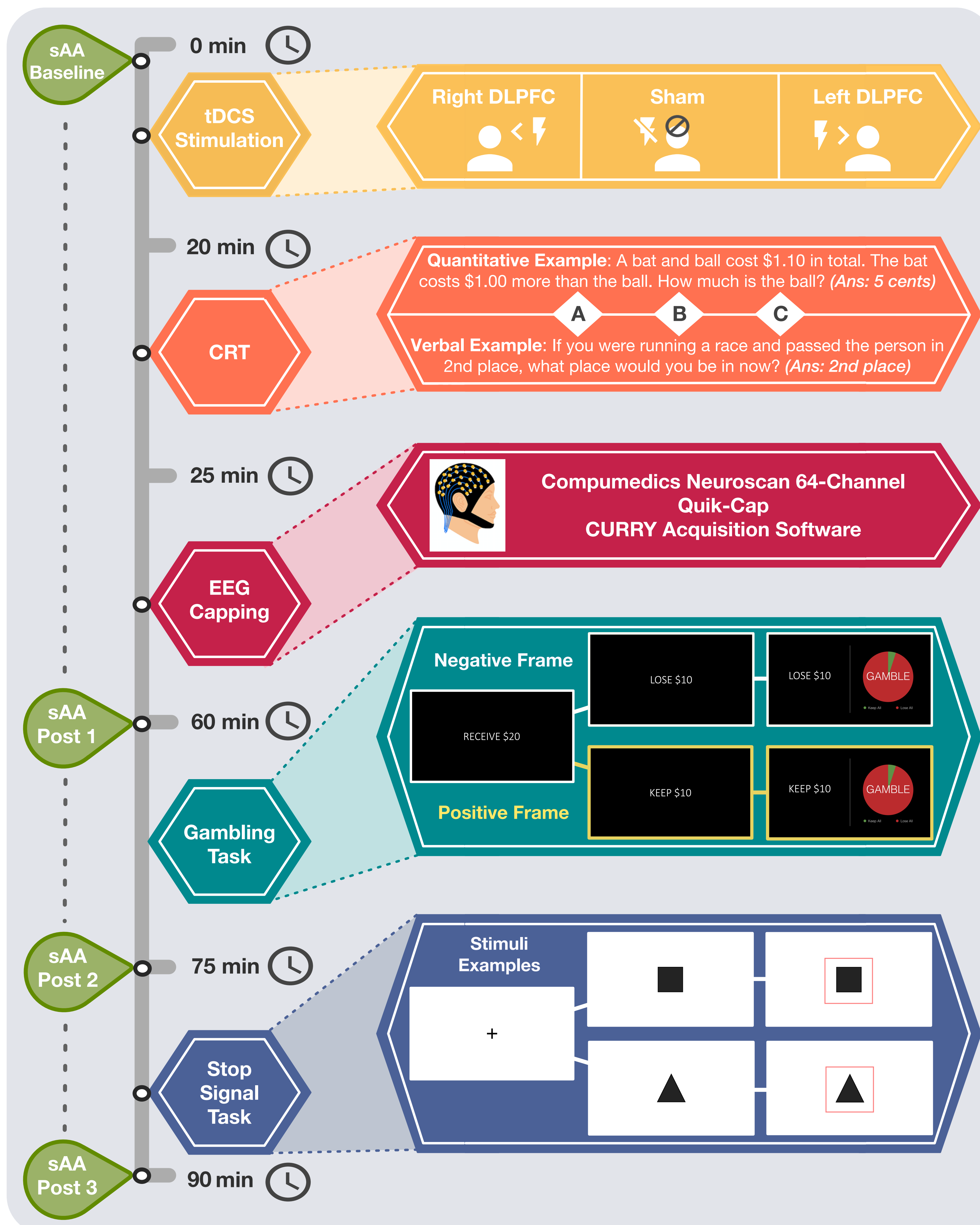
Introduction

- Norepinephrine (NE) plays a critical role in one's arousal, attentional control, and working memory; however, the effects of NE modulation during tDCS stimulation remains widely unknown¹.
- Therefore, a key objective of the study is to create a reliable protocol for salivary alpha amylase collection (a biomarker of NE production) in order to observe the changes of NE production with respects to tDCS stimulation.

Method

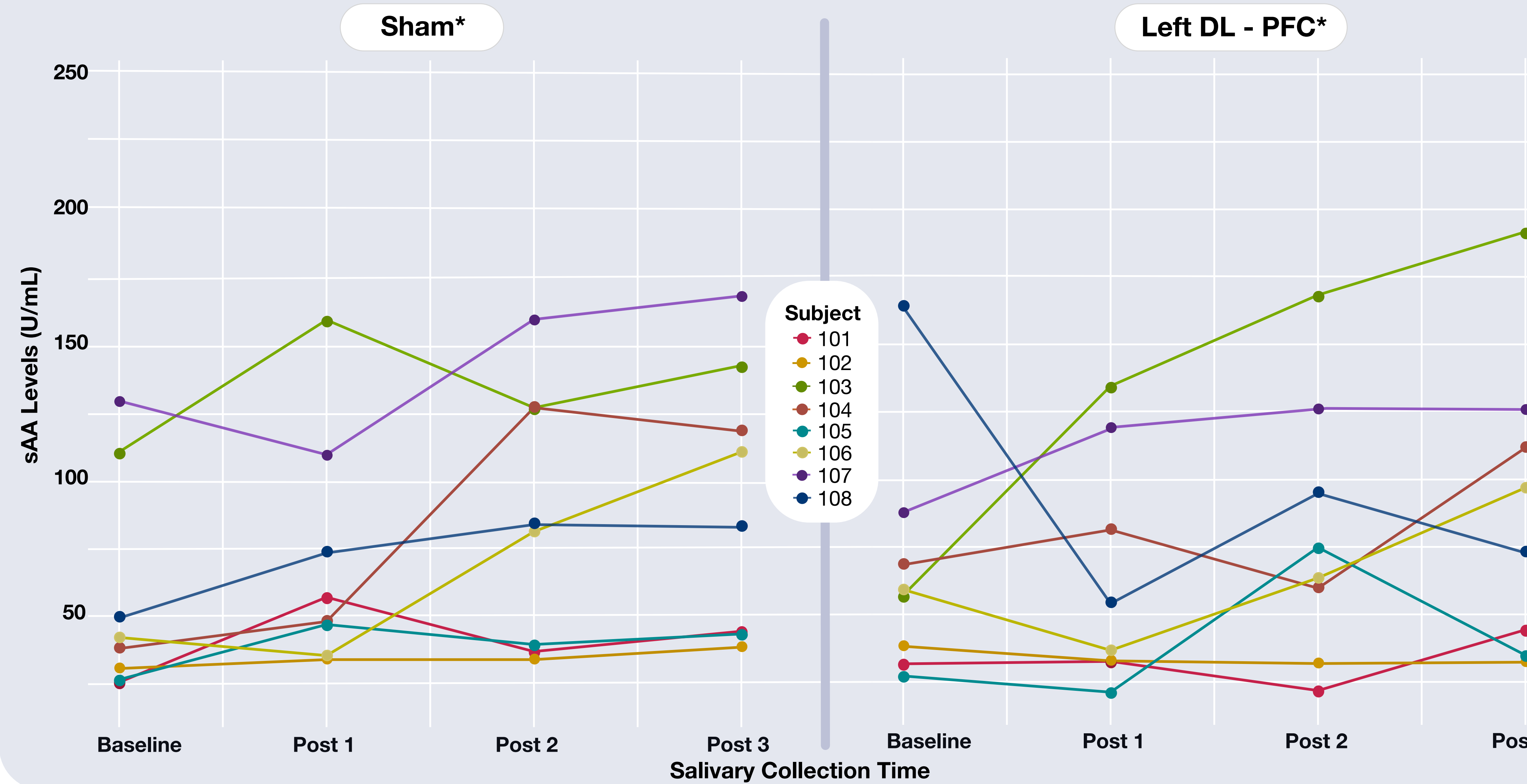
- 8 participants (8 Male; age M = 21 years, SD = 3.2)
- Participants underwent a total of 3 weekly visits, each consisting of one 20-minute tDCS stimulation (2mA) of the right dorsolateral PFC, left DL-PFC, or sham.
- Afterwards, participants completed a Cognitive Reflection Task (CRT).
- Following EEG capping, a Financial Gambling Task (FGT) was given to measure frame consistency in decision making.
- FGT was followed by a visual Stop Signal Task (SST) with varying stop signal latencies to measure impulse inhibition in ranging difficulty.
- Salivary alpha amylase samples (0.25 - 1 mL) were collected in timed intervals.

Illustrated Experimental Timeline



Results & Findings

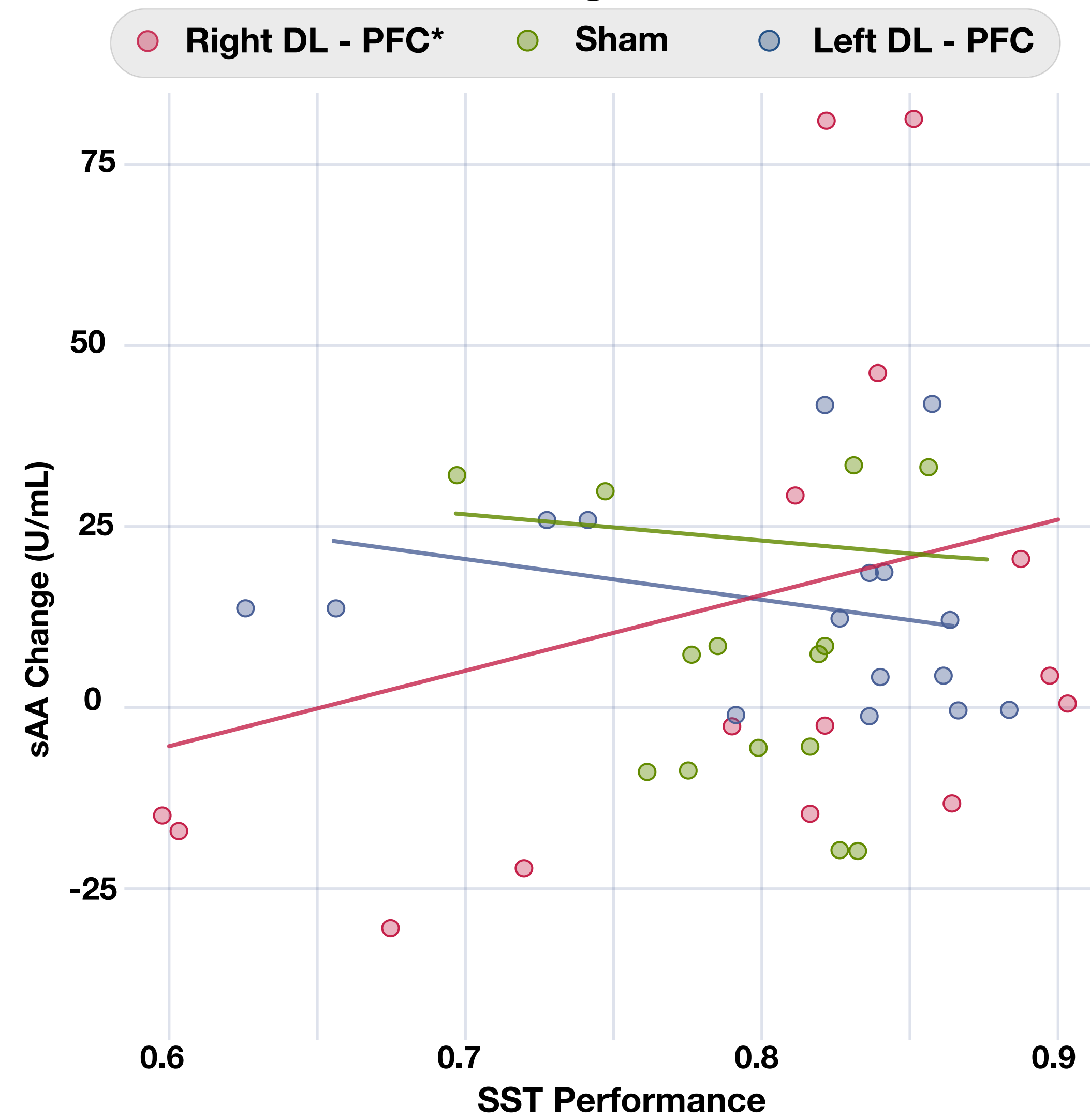
sAA Levels Across Participants



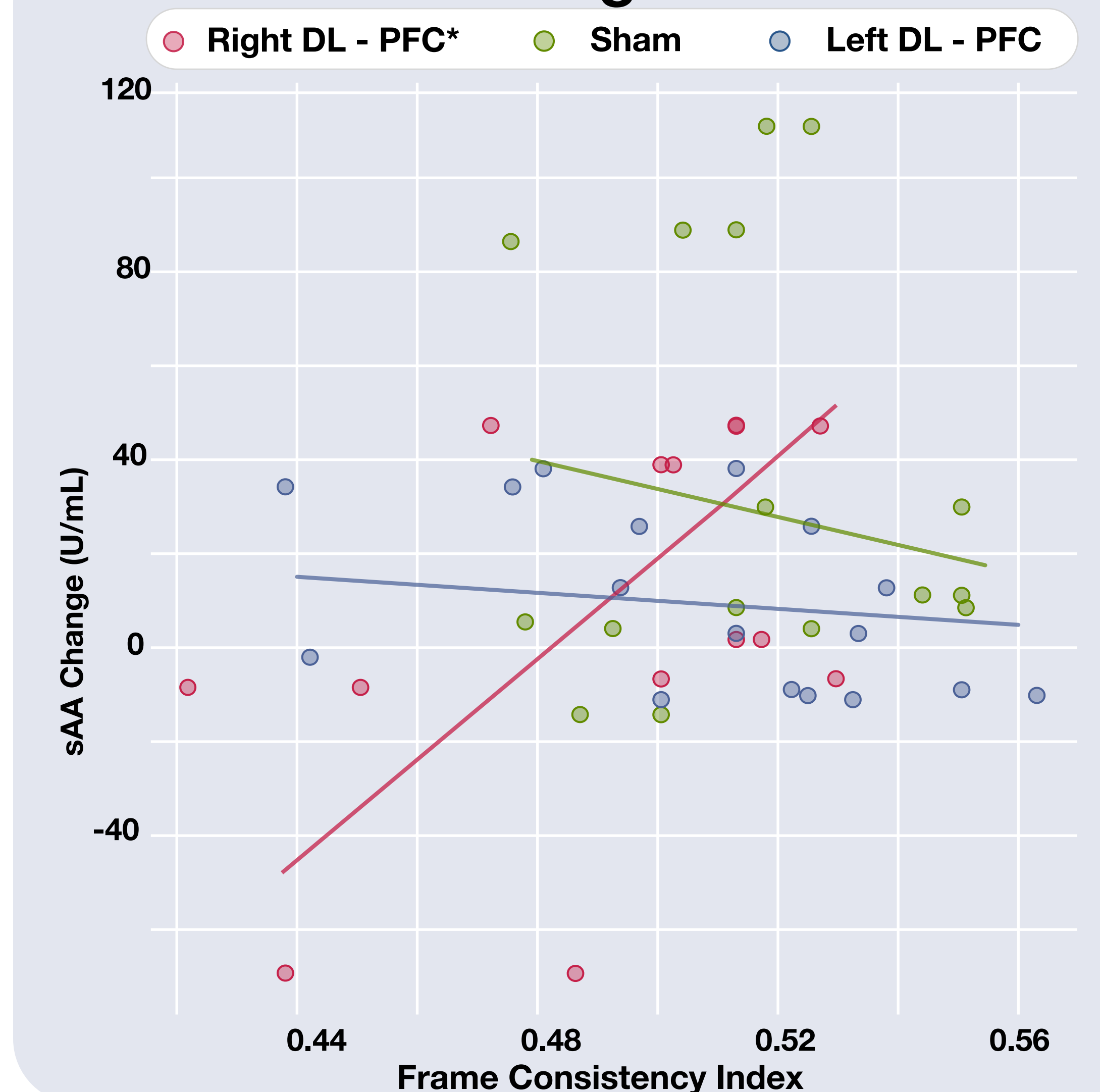
Average sAA Across Stimulation



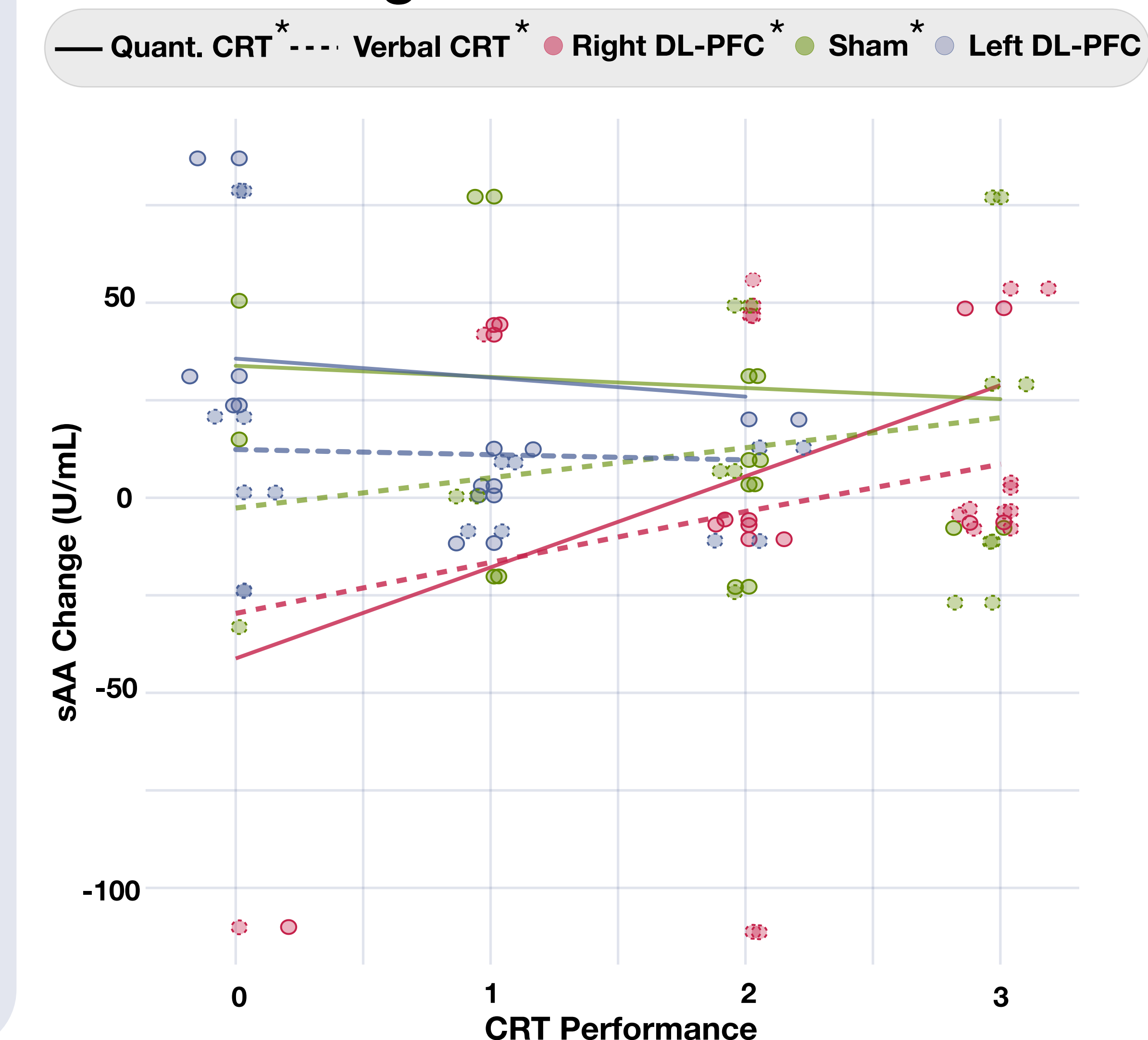
sAA Change vs. SST



sAA Change vs. FCI



sAA Change vs. CRT Performance



Discussion

- Results suggest that norepinephrine release of the LC-NE system following tDCS stimulation can be studied using salivary alpha-amylase to explore optimization of task performance on select decision-making processes^{1,2}.
- Together, stimulating lateral PFC sites may differentially modulate norepinephrine release across time when controlling for individual subject variability.
- Follow up studies utilizing both a more robust and diverse sample size are needed to investigate how changing sensitivities in norepinephrine sAA levels relate to changes in prefrontal processes such as impulse control, attenuation, and analogical reasoning in both general and clinical populations (e.g., traumatic brain injury patients).

References

- Unsworth, N., Robison, M.K. (2017). A locus coeruleus-norepinephrine account of individual differences in working memory capacity and attention control. *Psychonomics Bulletin & Review*, 24(4), 1282-1311.
- Aston-Jones, G., Cohen, J.D. (2005). An integrative theory of locus coeruleus-norepinephrine function: Adaptive gain and optimal performance. *Annual Review of Neuroscience*, 28(1), 403-450.

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