Session VII: Language Breakout

Recorder: Turkeltaub

General discussion points:

The group had general interests in aphasia, especially in naming, and nonfluent aphasias. There was a consensus on the desire to use tDCS for the next step in treatment studies because of its flexibility in location of use, less need for very restrictive exclusion criteria, and no need for MRIs. The theoretical background for this work was based on maladaptive activity in R frontal lobe inhibiting recovery in the left hemipshere. One paper published by Monti 2008 on 8 chronic nonfluent aphasics used 10 minutes of cathodal tDCS over L "frontotemporal" area (reference on R shoulder), compared to anodal and sham. Patients improved by 33% immediately after one treatment with cathodal stimulation. This result was surprising given prior success with inhibitory rTMS to the right hemisphere. Using tDCS, it would make more sense to do anodal stimulation to left hemisphere regions based on the particularities of the lesion (in contrast to previous rTMS studies using right hemisphere stimulation). The group agreed that Dr. Naeser's approach, empirically studying the best responding area for each subject, would be most likely to succeed.

Study Aims- Phase 1 study to evaluate whether tDCS may be useful for improving naming in fluent, nonfluent, and mixed aphasias.

Subjects- Inclusion criteria: any aphasic subject with one left sided cortical stroke. Ideally we would recruit 8 frontal, 8 temporoparietal, 8 mixed subjects. Exclusion criteria: standard tDCS safety criteria, no other strokes. *Questions remained regarding exclusion criteria based on seizure history and medications.*

Design

2x2x2 design: (Location x Hemisphere x Stimulation polarity)

- Frontal (middle frontal gyrus above BA44/45- in order to hit) vs. temporoparietal junction
- Right vs. Left stimulation
- Anodal vs cathodal. (we discussed current shunting issues related to encephalomalecia from lesions- aware of this concern)

Aim for 1 testing session/week.

Stimulation Parameters: 1.5mA using 5cm x 5cm electrode x 20 min to one of the sites above. The contralateral shoulder will be reference for all conditions. *Consider an additional session for best anodal + best cathodal site.*

- Post-stimulation testing starts 4 min into stimulation to allow for onset of tDCS effect.

Testing materials: Standard naming stimuli taken from Snodgrass, BNT, etc. Materials are patient-specific to ensure subjects start in the same range of accuracy on naming performance. We planned to examine subtests of naming tasks including objects, animals, actions, for instance. Pretest during each session.

- 30 trials- data are accuracy, latency, error types. Compare post-stimulation performance to pre-stimulation and to baseline measures (using multiple stimulus sets to establish means and SD for each subject)
- We will repeat the best responding area for each subject and post-test using additional items looking for generalization of effects.

Discussion of study design:

When should we actually initiate testing in relation to delivery of tDCS?
Motor behavioral effects begin to separate very early in stimulation.

Is there a literature of whether you get enough current density in the brain using a shoulder electrode? One study showed similar current density compared to cephalic references, but the direction of the current is in question. There are some reports of decreased effect using extracephalic electrodes. There are some modeling data on current density for cephalic vs. extracephalic references, but empiric experience is probably of more value.

Are there safety data for left shoulder references with regard to cardiac arrhythmia?
Use a large electrode- there's no reason for the current to run through the heart rather than diffusing throughout. There is no data indicating a cause for concern, but it shouldn't be totally discounted.

Criticism- This design is asking for too much- too many different types of subjects, too many conditions.