A SYSTEM AND DEVICE FOR FOCAL tDCS: HIGH-DEFINITION(HD) tDCS

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TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS)

- application of currents delivered through the scalp to modulate brain activity.
- safe, easy to apply, **CHEAP!**
- number of disorders, rehabilitation and cognitive enhancement
SPATIAL TARGETING

“Conventional” Sponge-based Transcranial DC Stimulation

Stimulation Electrodes

Current flow and brain modulation
High-Definition (HD) Transcranial DC Stimulation

“Ring” Configuration

Brain

Stimulation Electrodes

Current flow and brain modulation
FEM ANALYSIS OF TRANSCRANIAL ELECTROTHERAPY FOCALITY

Conventional Transcranial (large pad)  High-definition (HD) Transcranial (4x1 Ring)
“CONVENTIONAL” tDCS
"CONVENTIONAL" tDCS

Datta et al., 2009
HIGH DEFINITION (HD)- tDCS
HD tDCS – 4x1

Hardware Development

Soterix Medical

Clinical Trials

NIH-NINDS
Eric Wassermann, Egas Caparelli Dáquer

MUSC
Mark George
Jeff Borckardt

Burke Rehabilitation
Dylan Edwards
Mar Cortes

Harvard (Spaulding)
Felipe Fregni
“Setup”
Analgesic effects in an experimental pain model......

Significant effect for sensory thresholds.
Targeting Validation

Transcranial Electrical Stimulation (TES) – short high-intensity pulse that triggers motor response (MEP)

Edwards et al., under review
PILOT CLINICAL STUDY 2: COMBINED TES & MODELING (BURKE REHABILITATION)

ANODE: F3
CATHODE: AF7, AFz, FC5, FC1

ANODE: C3
CATHODE: FC5, FC1, CP5, CP1

ANODE: P3
CATHODE: CP5, CP1, PO7, POz

Edwards et al., under review
ADVANTAGE OF HD CONFIGURATIONS:

- Retains advantages of conventional therapy
- Cortical regions can be “selectively targeted” using a HD system.
- Customizable (individualized therapy)

Procedures, implants…
Skull Defects / TBI
Stroke

Other configurations can be used: (4 X 4, 5X2…) based on application