EEG and eyeblink response to different acupuncture modalities: preliminary results from four pilot studies
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A. Why EEG & EBR?

- **Encephalography** (EEG) records electrical activity on the scalp, and is useful for investigating rapidly changing cortical brain states
- **Eyeblink rate** (EBR) is a marker for central dopamine function, and is also inversely correlated with parasympathetic activity

B. OUR RESEARCH QUESTIONS

1. How do the EEG & EBR respond to stimulation at different acupoints?
2. How do the EEG & EBR respond to different modalities of acupuncture?
3. How do the EEG & EBR respond to electrical stimulation at different frequencies?
4. In particular, does stimulation ‘drive’ the EEG or blinking at 10 Hz more than 2.5 Hz?

C. OUR PROTOCOL

(All interventions in balanced order)

**Pilots 1-3**

Points: LI4 to LI4 (LI42), ST36, Left or Right LI4 to ST36
Parameters: 2.5 Hz or 10 Hz (256 μs)
Modalities: manual (MA), electro (EA), transcutaneous (TEAS)

**Pilot 4**

Left or Right ear (shenmen, concha), 2.5 Hz or 10 Hz, TEAS

D. OUR RESULTS

**EEG (Pilot 1, N=7)**
- Stimulation on the Right resulted in greater relative spectral power than on the Left *
- Stimulation of ST36 resulted in greater relative spectral power than at LI4 *

**EBR (Acupoint results)**

**Pilot 2 (N=12)**
- Mean EBR was higher during stimulation on the Left than on the Right, but only after 10 minutes of stimulation
- Mean EBR was higher during ST36 than LI4 stimulation (for MA and EA)

**Pilot 3 (N=6)**
- Mean EBR was higher during stimulation on the Left than on the Right during first MA and EA treatments in each session, but lower during second MA and EA (and both TEAS) treatments
- Mean EBR was higher during LI4 than ST36 stimulation during first treatments in each session, but lower during second treatments (MA, EA, TEAS)

**Pilot 4 (N=1)**
- Mean EBR was higher during TEAS on the Left than on the Right ear

**EBR (Modality results)**

**Pilot 2**
- EBR increased more with EA than MA *
- EBR increased more with 20 minutes than 5 minutes of EA

**Pilot 3**
- EBR during EA usually increased compared to during prior MA *
- EBR decreased again after EA *
- EBR is usually greater for TEAS than MA [See lower right Figure]

Blinks occurred with less delay following pulses during 10 Hz than 2.5 Hz TEAS (timescales normalised) * [See Figures on left]

E. OUR CONCLUSIONS

- EEG and EBR respond differently to MA, EA and TEAS at different acupoints
- EEG and EBR changes are sometimes parallel, sometimes opposite
- ‘Dosage/order’ effects suggest that EA has a greater effect on dopaminergic function or arousal than MA
- Blink may be facilitated more by 10 Hz than by 2.5 Hz TEAS

Detailed information available at www.qeeg.co.uk/electroacupuncture/eablink.htm

Asterisked results (*) show statistical significance

F. WHERE NEXT?

These findings need to be replicated and extended:
- Are results similar at other acupoints?
- What are the effects of interventions such as laser acupuncture?
- Does the yinyang model help to explain our results?
- Does baseline EBR indicate responsiveness to acupuncture?
- Does acupuncture have a ‘balancing’ effect on EBR?

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