NCT04762368

Official Title: Improving Vision in Adults with Macular Degeneration, Study 2: The Effect of Concurrent Perceptual Learning and Brain Stimulation.

Date Last Updated: April 9, 2021

*Note: *All subjects will attend both Velux study 1 and study 2.*

Inclusion Criteria (taken from Velux grant application)

- Diagnosis of AMD (age 60+) or JMD (current age 18+).
- Visual acuity (VA); between 6/9-6/96 in the better eye
  - These VA limits were broadened from the grant to increase recruitment.
- Best-corrected near visual acuity of 4.0M at 40 cm or better in the better eye
- Stable vision in previous 3 months (patient report)
- Central vision loss

Exclusion Criteria

- Diagnosed dementia.
- Not fluent in reading English (Waterloo) or Chinese characters (Hong Kong).
- Any ocular surgery (including anti-vegF injections) within the duration of the study.
  - Situations where Anti-VEGF injections are allowed:
    1. Chronic and continuous injections for at least 1 year
    2. Injections stopped at least 2 months before participation
    3. Injections in the untested eye
- Ocular pathology other than JMD or AMD that can significantly reduce central vision.
  - example: mild cataract of grade 2 or below is acceptable
- Severe hearing impairment.

Contraindications for tDCS – these contraindications are historically required by UW ethics.

- Suffer from epilepsy, have had an epileptic seizure, or family history of epilepsy.
- Any metal implant (excluding tooth fillings) or electric implant in head.
- Active electric implants anywhere in body
- Implanted medication pump or implanted electronic device, including pacemaker or defibrillator
- Heart disease, neurological condition, or have had neurological or cardiac surgery.
- Recurring headaches
- Skull fracture or head injury
- Head or Brain surgery
- Pregnancy
- Skin Condition
- Taking any medication on the list on Form A
- Excessive alcohol (>2 standard drinks) or slept dramatically less than usual in the last 24 hours.

Protocol Outline

Day 0(&+1): HK protocol of visual span assessment (only applies for Chinese characters)

- May separate into 2 days to finish

1. Select the tested eye (same with the eye of Velux study 1) and occlude the other eye. Print size is 1.5 x CPS obtained from the RSVP result of study 1.
2. Temporal visual span

- Horizontal direction: Chinese trigrams presented horizontally at the centre, for 5 exposure durations.
  - ☐ 5 exposure durations x 9 trials by 4 blocks
- Vertical direction: Chinese trigrams presented vertically at the centre, for 5 exposure durations.
  - ☐ 5 exposure durations x 9 trials by 4 blocks

3. Spatial visual span
   - Horizontal direction: Chinese trigrams presented horizontally for 0.2s, In 9 different character positions.
     - ☐ 9 positions x 5 trials by 4 blocks
   - Vertical direction: Chinese trigrams presented vertically for 0.2s, In 9 different character positions
     - ☐ 9 positions x 5 trials by 4 blocks

Day 1: Screening and RSVP Pre-test

- Separate for 1 week with Day 0 if visual span measures were applied

1. Consent form and signature
2. Distance trial frame refraction, Final ETDRS or equivalent in HK VA
   - Initial decision of the eye to use (eye that meets the criterion, with better VA. If are both similar, measure MNREAD in both eyes)
3. MNREAD in better eye (or both eyes, if distance VA is similar)
4. Decide on eye (if similar, choose eye with best MNREAD acuity, or if still similar, patient's preferred eye. If no preference, the right eye, or if subject comes to study 1, select the same eye).
5. Eye dilation checks (IOP and angles)
6. Full RSVP test [45+ minutes]
   - 5 print sizes by 5 reading speeds, selected based on the MNREAD test results.
7. Freiburg crowded and uncrowded tests, and contrast sensitivity. (randomized order)
8. Eye dilation for OH check and for microperimetry, do fixation and microperimetry tests.
   - If microperimetry fails, use modified tangent screen and Amsler at the beginning of the following session
   - Microperimetry first, then OH check
9. Blind-selection of stimulation codes to determine if participant is active/sham
   - Use a shared program between research sites to ensure balanced groups

Training Days:

1. two training sessions per week for 3 weeks (6 sessions total)
   - Will re-evaluate. If too many scheduling conflicts, will move to 1 per week.
2. Each session comprised of 2 blocks, each roughly 25 minutes and 5 minute break in between
   - Blocks comprised of separate abbreviated RSVP procedures.
     - 4 print sizes, 4 speeds per print size, 3 trials each.
     - All trial types interleaved within blocks as possible
     - Initial print sizes to be used, in logMAR units:

        - [CPS-.32, CPS-.16, CPS, CPS+.16]
    - Precise length of block determined by reading speed. Number of trials remains constant.
3. Electrical stimulation for 25 minutes during first block.
    - Must use the stimulation code generated during the first session to maintain double blind

RSVP Post-test:

1. Full RSVP
2. Freiburg crowded and uncrowded test, and contrast sensitivity (randomized order).
3. Distance VA and MNREAD
4. MoCA cognitive test
5. Eye dilation for OH check and for microperimetry, do fixation and microperimetry tests •
    If microperimetry already failed, use modified tangent screen and Amsler instead.
    - Microperimetry first, then OH check.
6. HK protocol: horizontal and vertical temporal and spatial visual span. Print size uses 1.5 x CPS obtained from the post-RSVP result.

30 Day Follow Up (Re-run primary and secondary outcomes, including covariates)

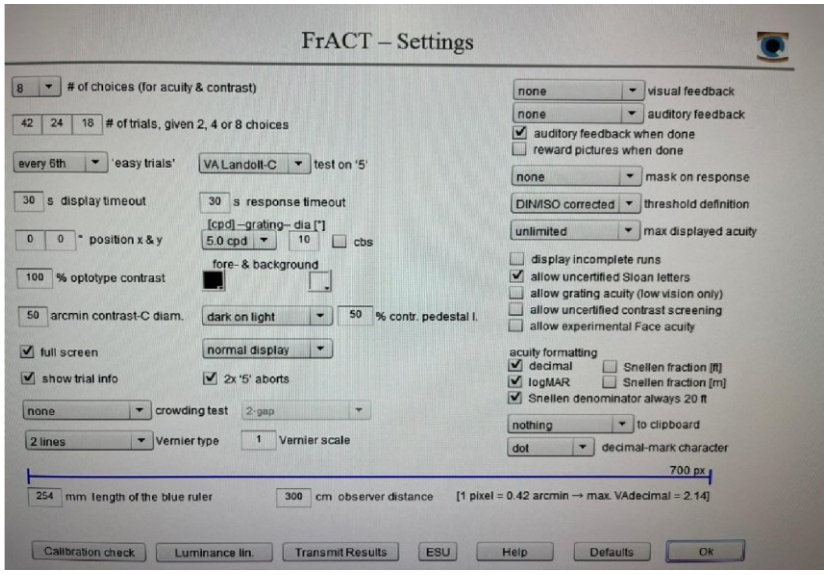
1. Full RSVP
2. Freiburg crowded and uncrowded test, and contrast sensitivity (randomized order).
3. Distance VA and MNREAD
4. Eye dilation for OH check and for microperimetry, do fixation and microperimetry tests •
    - If microperimetry already failed, use modified tangent screen and Amsler instead.
    - Microperimetry first, then OH check.

tDCS settings:

- Anode over Oz, Cathode over randomly selected cheek. Same check used for all sessions of the same participant.
- 25 minutes stimulation of 2mA, 30 seconds ramp up and ramp down, max impedance of 30 kohm

FrACT settings:

1. Running Crowded, Uncrowded, and Contrast test.
    a. Calibrate monitor w/ a device, as per FrACT instructions
    b. Crowded test: frame(ring) 2-gap
2. Image of rest of settings below


FrACT – Settings
8 # of choices (for acuity & contrast)
42 24 18 # of trials, given 2, 4 or 8 choices
every 6th 'easy trials'
VA Landolt-C test on '5'
30 s display timeout
30 s response timeout
0 0 ° position x & y
[cpd] – grating – dia [°]
5.0 cpd 10 cbs
100 % optotype contrast
fore- & background
50 arcmin contrast-C diam.
dark on light 50 % contr. pedestal l.
full screen
normal display
show trial info
2x '5' aborts
none crowding test
2-gap
2 lines Vernier type
1 Vernier scale
none visual feedback
none auditory feedback
auditory feedback when done
reward pictures when done
none mask on response
DIN/ISO corrected threshold definition
unlimited max displayed acuity
display incomplete runs
allow uncertified Sloan letters
allow grating acuity (low vision only)
allow uncertified contrast screening
allow experimental Face acuity
acuity formatting
decimal
Snellen fraction [ft]
logMAR
Snellen fraction [m]
Snellen denominator always 20 ft
nothing to clipboard
dot decimal-mark character
700 px
254 mm length of the blue ruler
300 cm observer distance
[1 pixel = 0.42 arcmin → max. VAdecimal = 2.14]
Calibration check
Luminance lin.
Transmit Results
ESU
Help
Defaults
Ok