

Visual cortical excitability in chronic migraineurs treated with erenumab: preliminary results of a study with sound induced flash illusions

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Background:

- Perception of the surrounding environment results from the interaction of multiple sensory stimuli
- Modulation of perception can be explored by sound-induced flash illusions (SIFI): when a single flash is presented with two or more beeps, it is often perceived as multiple flashes (fission illusion)¹
- Such illusion is associated to changes in visual cortical excitability
- Migraineurs show an abnormal visual cortical excitability, even interictally

Methods:

- 30 chronic migraine (CM) patients without aura (mean age 50 yrs +1.8; 24 F), who started erenumab (140mg monthly) preventive therapy
- 30 healthy subjects (HS - 25 females) in the same age range
- We used a software able to show a transient single flash presented together with concurrent beeps
- Subjects had to count aloud flashes seen each time (5 tests randomly presented several times: 1FxB, where x goes from 0 to 4; F=flash, B=beep)
- Patients were examined at the beginning (t0) and after 3 months of 140mg erenumab treatment (t3)
- Comparisons were performed through ANOVA with Duncan's test for post-hoc analysis

Results:

- ANOVA showed that HS refer a higher number of flashes compared to CM (p=0.0002)
- Such difference remained unchanged at t3 (p=0.00003)
- No significant changes of illusions scores were observed in patients between t0 and t3 (p=0.4559) at rmANOVA
- However, planned comparisons showed a significant increase of 1F4B condition scores between t0 and t3 (p=0.0297)

Discussion:

- In agreement with previous evidence, CM patients showed less fission illusions than HS
- 3-month erenumab 140 mg therapy was not able to restore normal fissions perception
- even if a significant but limited SIFI increase was observed for the condition 1F4B at t3 in CM.
- more time is needed for cortical excitability changes to occur? Maybe even because anti-CGRP MABs do not cross blood-brain barrier?

Conclusion:

- SIFI study represents a cheap, very well tolerated and effective tool to explore cross-modal audio-visual perception and, indirectly, visual cortical excitability
- **CM patients show an increased visual cortical excitability compared to HS**
- Erenumab 140 mg 3-month therapy was **not** able to **restore normal fission illusions perception in CM**, though slight changes are detectable
- Such drug, acting on the **last phases** of migraine attacks and **peripherally**, does not act on cortical excitability
- The robust visual cortical hyperexcitability of CM patient is specific for migraine condition and, as such, hardly modifiable by treatment

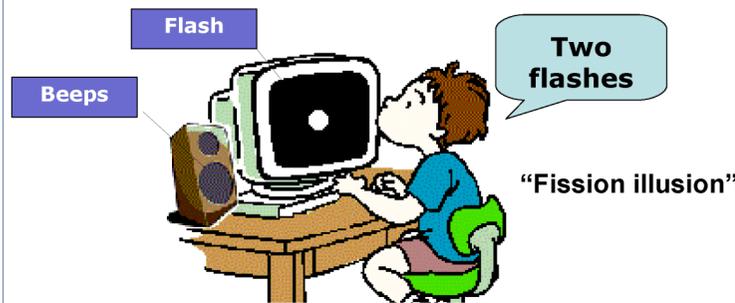


Figure 1. Exemplification of fission illusion

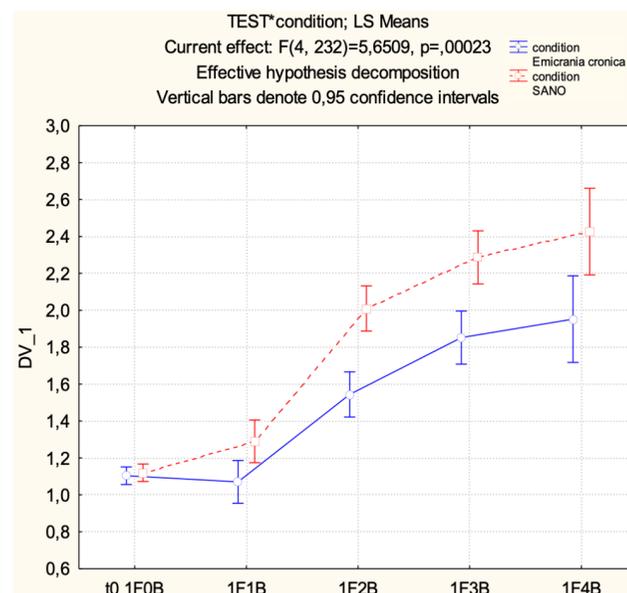


Figure 2. ANOVA comparing SIFI perceived by migraineurs (blue line) and healthy subjects (red dotted line)

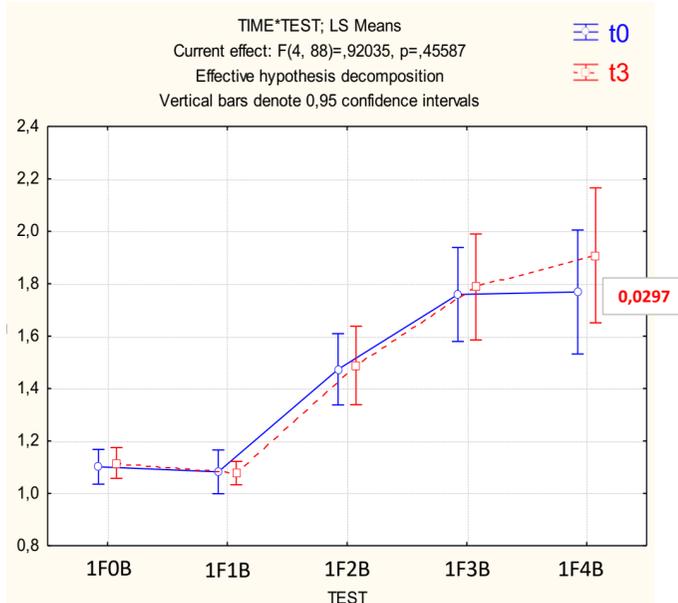


Figure 3. ANOVA comparing SIFI perceived by migraineurs at t0 (blue line) and at t3 (red dotted line). 1F4B shows a significant change at post-hoc Duncan's analysis

References:

1. Shams, L., Kamitani, Y., & Shimojo, S. (2000). What you see is what you hear. *Nature*, 408(6814), 788
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3. Brighina, F., Bolognini, N., Cosentino, G., Maccora, S., Paladino, P., Baschi, R., Vallar, G., & Fierro, B. (2015). Visual cortex hyperexcitability in migraine in response to sound-induced flash illusions. *Neurology*, 84(20), 2057–2061.