

Visual cortical excitability in patients with fibromyalgia: A study with sound induced flash illusions

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Background and aims

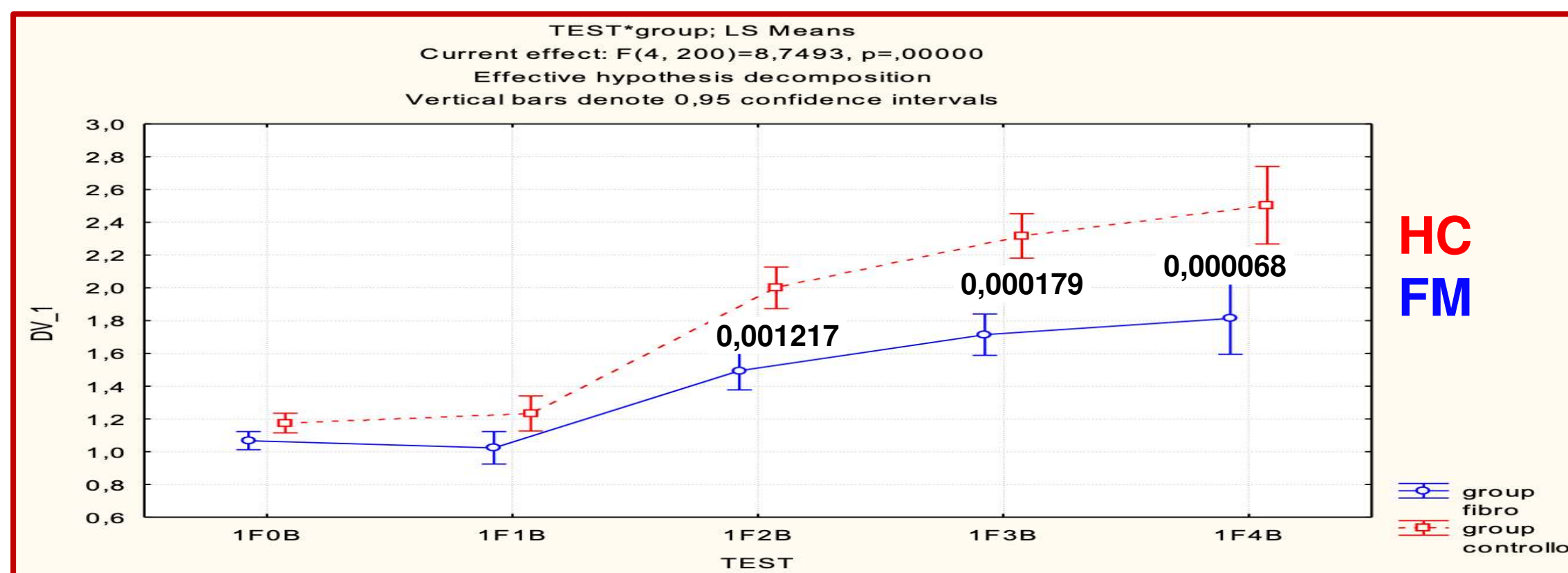
- Fibromyalgia syndrome (FMS) is a complex disorder currently underdiagnosed and often very poorly responsive to pharmacological treatment.
- Widespread musculoskeletal pain is the main symptom and it is associated with many heterogeneous symptoms, ranging from affective disturbances to cognitive dysfunction and central fatigue.
- Pathophysiology of the disease remains still obscure. Studies [1, 2, 3] have demonstrated that excitability of pain-processing areas and response to incoming somatosensory stimuli are abnormally enhanced in FMS.
- To explore if such facilitation represents a more general sensorial activation not strictly related to pain, we evaluated excitability of visual cortex, an area not directly involved in pain processing, through Sound-Induced Flash Illusion [4].
- SIFI are cross-modal illusions, strictly dependent upon visual excitability, where visual perception is influenced by auditory input. When a single flash is accompanied by multiple beeps, it is perceived as multiple flashes (fission illusion), conversely when 2 flashes are accompanied by one beep, they are perceived as one (fusion illusion). SIFI are reduced when visual cortical excitability increases.

Methods and materials

- 28 FM patients (mean age 45yo ± 8.53; 26F)
- 24 healthy controls (HC – mean age 44yo ± 9.68; 22F)
- dimly illuminated room.
- participants sat ~57 cm in front of a CRT computer monitor (resolution 1024×768, refresh rate 75 Hz)
- Single flash and concurrent beeps trials.
- **Task:** to count aloud flashes seen each time (total duration ~5 minutes).
- 5 trials randomly presented 9 times: **1FxB**, where x goes from 0 to 4; F=flash, B=beep).
- We compared FM patients scores to HC ones using a rmANOVA, then we performed a post-hoc Duncan's analysis.

Results and Conclusions

- Our data show a highly significant reduction in fission and visual cortical excitability in FM patients. illusions in FM patients compared to healthy controls (particularly when 1 flash is accompanied by three or four beeps, $p < .0005$)
- Our results suggest an increased visual excitability that could favor the hypothesis of a general sensorial activation, non strictly linked to pain, in FM. This could make more light on pathophysiological mechanisms of disease likely opening also new ways for treatment. SIFI represent an easy and effective tool to explore cross-modal audio-visual perception.



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[3] Mhalla et al. Alteration of cortical excitability in patients with fibromyalgia. *PAIN.* 2010;149(3):495-500. doi:10.1016/j.pain.2010.03.009

[4] Shams L, Kamitani Y, Shimojo S. What you see is what you hear. *Nature.* 2000;408(6814):788. doi:10.1038/35048669