

Modulating spinal activity with hypnosis: Electrophysiological studies in healthy humans

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INTRODUCTION

The management of pathological pain is complex and requires a comprehensive approach which must go beyond simple pharmacological treatment and include psychological and social elements. Hypnosis is increasingly used as an analgesic technique in clinical settings. However, its physiological mechanisms remain little known. Hypnosis is defined as a state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestions. Hypnotic analgesia (HA) is a reduced sensitivity under a hypnotic suggestion. Considering the importance of spinal activity in chronic pain, the aim of this project is to study the impact of on neurophysiological markers of spinal activity induced by somato-sensory stimuli.

METHODS

Two hypnosis techniques :

- Global HA: global analgesia for the whole body
- Focused HA (FHA): analgesia localized on one part of the body

Two neurophysiological markers of spinal activity:

- N13: spinal component of the somatosensory evoked potentials (SEPs)
- RIII: Nociceptive component of the nociceptive withdrawal reflex (NWR)

before

during

after

STUDY 1 : Effect of global HA on N13

- Global HA
- Conditions: Before, during and after global HA
- Stimuli: 2x500 electrical stimuli delivered at 4Hz on the median nerve at motor threshold.
- spinal and cortical SEP recording

before

during

after

STUDY 2 : Effect of FHA on N13

- FHA
- Conditions: Before, during and after FHA
- Stimuli: 2x500 electrical stimuli delivered at 4Hz on the median nerve at motor threshold. Stimuli will appear in a randomized way on each arm.
- spinal and cortical SEP recording

before

during

after

STUDY 3 : Effect of FHA on RIII

- FHA
- Conditions: Before, during and after FHA
- Stimuli: 2x20 electrical stimuli on the feet in the territory of the medial plantar nerve.
- NWR recording

HYPOTHESES

- STUDY 1:** Decrease in the amplitude of N13 during HA compared to before and after if HA can modulate spinal transmission
- STUDY 2:** Decrease in the amplitude of N13 when the stimulation occurs on the “protected” arm compared to the unprotected one during the FHA. No changes in the amplitudes should be observed before and after FHA.
- STUDY 3:** Decrease in the amplitude of RIII when the stimulation occurs on the “protected” foot compared to the unprotected one during the FHA. No changes in the amplitudes should be observed before and after FHA.

CONCLUSION

The aim of this project is to evaluate whether hypnosis can globally and selectively modulate spinal activity induced by somatosensory stimuli, which would allow for a better understanding of the mechanisms of HA and lead to a more effective utilization.