

Placebo Analgesia in Older Age: Evidence from Event-Related Potentials

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Abstract : Placebo analgesia is a powerful cognitive endogenous pain modulation mechanism with high relevance in pain treatment. Older people would benefit, especially from non-pharmacologic pain interventions, since this age group is disproportionately affected by acute and chronic pain, while pharmacological treatments are less suitable due to polypharmacy and age-related changes in drug metabolism. Although aging is known to affect neurobiological and physiological aspects of pain perception, as for example, changes in pain threshold and pain tolerance, its effects on cognitive pain modulation strategies, including placebo analgesia, have hardly been investigated so far. In the present study, we are assessing placebo analgesia in 35 older adults (60 years and older) and 35 younger adults (between 18 and 35 years). Acute pain was induced with short transdermal electrical pulses to the inner forearm, using a concentric stimulating electrode. Stimulation intensities were individually adjusted to the participant's threshold. Next to the stimulation site, we applied sham transcutaneous electrical nerve stimulation (TENS). Participants were informed that sometimes the TENS device would be switched on (placebo condition), and sometimes it would be switched off (control condition). In reality, it was always switched off. Participants received alternating blocks of painful stimuli in the placebo and control condition and were asked to rate the intensity and unpleasantness of each stimulus on a visual analog scale (VAS). Pain-related evoked potentials were recorded with a 64-channel EEG. Preliminary results show a reduced placebo effect in older compared to younger adults in both behavioral and neurophysiological data. Older people experienced less subjective pain reduction under sham TENS treatment compared to younger adults, as evidenced by the VAS ratings. The N1 and P2 event-related potential components were generally reduced in the older group. While younger adults showed a reduced N1 and P2 under sham TENS treatment, this reduction was considerably smaller in older people. This reduced placebo effect in the older group suggests that cognitive pain modulation is altered in aging and may at least partly explain why older adults experience more pain. Our results highlight the need for a better understanding of the efficacy of non-pharmacological pain treatments in older adults and how these can be optimized to meet the specific requirements of this population.

Keywords : placebo analgesia, aging, acute pain, TENS, EEG

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