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Emotional modulation of placebo analgesia

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Emotions expressed by people around us strongly influence our own pain experience. It has been observed that negative and positive scenes [6] and even emotional faces expressing sadness and happiness modulate pain [8]. Interpersonal interactions and social cues can drive expectations of analgesia and induce a reduction of the pain experience [2]. People who observed a live person or recording of others experiencing analgesia, showed placebo analgesic effects [4]. It remained unknown, however, whether merely observing faces depicting grimaces and smiles, influences the magnitude of placebo analgesic effects.

Valentini and collaborators investigated for the first time, the modulatory effects of a passive observation of emotional expressions on placebo analgesia [7]. Two intensities of laser energy ranging from non-painful to high pain levels were used during a conditioning phase in association with visual cues consisting of either red or green shapes. To make participants believe that the analgesic procedure was effective, the intensity of laser energy was consistently reduced when the green cue was presented. Participants were also instructed that the green cue would anticipate a reduction in pain perception via a sub-threshold electrical stimulation and that the red cue would indicate a control level of pain. This manipulation was complemented by the presentation of a 4-minute video-clip showing grimacing, smiling or neutral facial expressions. The purpose of this experiment was to explore how emotional valences modulate placebo analgesia. The authors found that the magnitude of placebo analgesia was modulated by observing positive and negative facial expressions and that the presentation of happy faces resulted in a larger placebo analgesia compared to that associated with neutral and grimacing faces [7].

It is likely that happy faces grabbed attention more than either grimacing or neutral faces, distracting participants from pain [5]. Participants may also have experienced sustained placebo analgesia while observing happy faces because smiling expressions reinforced expectations of benefits through a congruency among verbal instructions, conditioned cues and emotional expression. Attention and expectations have been demonstrated to work through separate mechanisms [1] therefore, the observed placebo analgesia is likely to be a synergistic interaction between cognitive components and affective states during pain processing.

The paradigm by Valentini et al. [7] included two distinct cues for analgesia and pain. The content of the verbal instructions anticipated analgesia and the video-clips included negative, neutral and positive valences. The grimacing face paired with green cues indicating analgesia created a conflict between expectations and instructions given at the

beginning of the study. This discrepancy may have resulted in a reduction of placebo analgesia. These findings deserve further exploration using techniques such as eye-movement recording, assessment of emotional changes and brain mapping approaches to help reveal the mechanisms underlying the relationship between attention and emotions in placebo analgesia.

Importantly, the authors demonstrated that the valence of faces significantly impact both intensity and unpleasantness of placebo analgesia indicating that emotional changes dramatically affect sensory and affective aspects of pain. Therefore, the study by Valentini et al. opens new research avenues in the emotional control of placebo analgesia and outlines the importance of further exploring the complex amalgamation of affective, cognitive and sensory processes occurring during placebo analgesia. Since this research has potential implications for management of pain and clinician-patient interactions [3], there is a crucial need to explore the neurobiological substrates of how emotional and affective states influence descending mechanisms of placebo analgesia in both healthy subjects and patients suffering from pain.

References

1. Buhle JT, Stevens BL, Friedman JJ, Wager TD. Distraction and placebo: two separate routes to pain control. *Psychol Sci.* 2012; 23(3):246–253. [PubMed: 22261568]
2. Colloca L, Benedetti F. Placebo analgesia induced by social observational learning. *Pain.* 2009; 144(1–2):28–34. [PubMed: 19278785]
3. Colloca, L.; Flaten, M.; Meissner, K., editors. *Placebo and Pain: From bench to bedside.* Oxford, UK: Elsevier; 2013. ISBN: 978-0-12-397928-5.
4. Hunter T, Siess F, Colloca L. Socially induced placebo analgesia: A comparison of a pre-recorded versus live face-to-face observation. *Eur J Pain.* 2013
5. Leyman L, De Raedt R, Vaeyens R, Philippaerts RM. Attention for emotional facial expressions in dysphoria: an eye-movement registration study. *Cogn Emot.* 2011; 25(1):111–120. [PubMed: 21432658]
6. Roy M, Piche M, Chen JI, Peretz I, Rainville P. Cerebral and spinal modulation of pain by emotions. *Proc Natl Acad Sci U S A.* 2009; 106(49):20900–20905. [PubMed: 19926861]
7. Valentini E, Martini M, Lee M, Aglioti SM, Iannetti GD. Seeing facial expressions enhances placebo analgesia. *PAIN.* 2014; 155:666–673. [PubMed: 24315986]
8. Yoshino A, Okamoto Y, Onoda K, Yoshimura S, Kunisato Y, Demoto Y, Okada G, Yamawaki S. Sadness enhances the experience of pain via neural activation in the anterior cingulate cortex and amygdala: an fMRI study. *Neuroimage.* 2010; 50(3):1194–1201. [PubMed: 19969094]