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Review Article

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Is Pain Perception Altered in People With Depression? A Systematic Review and Meta-Analysis of Experimental Pain Research

Trevor Thompson, Christoph U. Correll, Katy Gallop,
Davy Vancampfort, and Brendon Stubbs

While clinical studies suggest depressed patients may be more vulnerable to pain, experimental research is equivocal. This meta-analysis aimed to clarify whether depression is associated with altered pain perception in response to noxious stimulation and to identify factors that might influence this association. A search of major electronic databases suggests the effects of depression on pain perception are variable and depend upon multiple factors. The contrasting pattern for ischemic vs. other noxious stimuli suggests that stimulus modality is a key factor, which could help explain discrepancies across clinical and experimental findings.

ON THE COVER

Chronic pain is a major cause of suffering, disability, lost work, and health care expenses. A rat model of ganglionic field stimulation was developed to test analgesic effects in the context of neuropathic pain. This work demonstrates that electrical stimulation of the dorsal root ganglion in rats reverses neuropathic pain behavior and provides a rewarding effect to animals with spontaneous neuropathic pain. This image shows histology findings in animals with GFS electrode placement. See Pan et al, page 1349.

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Original Reports

1273**Does Caregiver Behavior Mediate the Relationship Between Cultural Individualism and Infant Pain at 12 Months of Age?**

Monica C. O'Neill, Rebecca Pillai Riddell, Hartley Garfield, and Saul Greenberg

This study aimed to understand the relationship between caregiver culture and infant pain expression at the 12-month immunization, and discern if a mechanism subsuming this relationship was the quality of caregiver behaviors (emotional availability). Based on the Development of Infant Acute Pain Responding Model, a mediation model was developed to examine how caregiver behaviors negotiate the relationship between caregiver heritage culture and infant pain. Caregivers who self-reported heritage cultures that were more highly individualistic tended to show greater emotional availability, which in turn predicted decreased infant pain expression at both 1 and 2 minutes post-needle.

1281**Somatic Awareness and Tender Points in a Community Sample**

Andrew Schrepf, Daniel E. Harper, David A. Williams, Afton L. Hassett, and Steven E. Harte

Somatic awareness (SA) refers to heightened sensitivity to a variety of physical sensations and symptoms. Few attempts have been made to dissociate the relationship of SA and affective symptoms with pain outcomes. The authors used a validated measure of mood and anxiety symptoms to predict the number of tender points found on physical examination in a large cross-sectional community sample. The findings suggest that somatic awareness is most strongly related to the spatial distribution of pain sensitivity and that further assessing it may improve our understanding of the relationship between psychological factors and pain.

1291**Codeine Shopping Behavior in a Retrospective Cohort of Chronic Noncancer Pain Patients: Incidence and Risk Factors**

Chouki Chenaf, Jean-Luc Kabore, Jessica Delorme, Bruno Pereira, Aurélien Mulliez, Lucie Roche, Alain Eschalier, Noémie Delage, and Nicolas Authier

Codeine is a widely used opioid analgesic but studies on its misuse in chronic non-cancer pain (CNCP) are still lacking. The aim of this study was to assess the one-year incidence of codeine shopping behavior in a cohort of CNCP patients and to identify the associated risk factors. On multivariate analysis, risk factors associated with shopping behavior were younger age, mental health disorders, concurrent use of anxiolytic benzodiazepines, and prior use of strong opioids. Shopping behavior for codeine was not infrequent in CNCP patients. Appropriate use of codeine from the perspective of both patients and 21 healthcare providers should be encouraged.

1302

Feasibility and Safety of a Virtual Reality Dodgeball Intervention for Chronic Low Back Pain: A Randomized Clinical Trial

James S. Thomas, Christopher R. France, Megan E. Applegate, Samuel T. Leitkam, and Stevan Walkowski

Whereas the fear-avoidance model of chronic low back pain (CLBP) posits a generic avoidance of movement that is perceived as threatening, the authors have shown that individuals with high fear and CLBP specifically avoid flexion of the lumbar spine. Accordingly, this group developed a virtual dodgeball intervention designed to elicit graded increases in lumbar spine flexion while reducing expectations of fear and harm by engaging participants in a competitive game that is both entertaining and distracting. All participants completed a pregame baseline and a follow-up assessment of lumbar spine motion and pain expectations during standardized reaches to targets. For the standardized reaching tests, there were no significant effects of changes in lumbar spine flexion, expected pain, or expected harm. However, virtual dodgeball was effective at increasing lumbar flexion within and across gameplay sessions. Participants reported strong positive endorsement of the game, no increases in medication use, pain, or disability, and no adverse events.

1318

Preserved Capacity for Placebo Analgesia in the Elderly

Nathalie Wrobel, Tahmine Fadai, Stefanie Brassens, and Ulrike Bingel

The prevalence of chronic pain rises with increasing age. It has been suggested that mechanisms responsible for the development of chronic pain overlap with mechanisms involved in aging, potentially implicating age-related changes in descending modulatory pathways. This raises the question of whether other forms of endogenous pain modulation, in particular placebo analgesia, become compromised with age. This research found that the placebo analgesic response was comparable between younger and older groups of healthy study participants. The preserved capacity for placebo analgesia highlights the potential to utilize non-pharmacological analgesic treatment strategies in this age group and to exploit placebo mechanisms.

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Altered Pain Perception and Fear-Learning Deficits in Subjects With Posttraumatic Stress Disorder

Josef Jenewein, Jeannine Erni, Hanspeter Moergeli, Christian Grillon, Sonja Schumacher, Christoph Mueller-Pfeiffer, Katayun Hassanpour, Annina Seiler, Lutz Wittmann, Ulrich Schnyder, and Gregor Hasler

There is growing evidence that fear learning abnormalities are involved in the development of posttraumatic stress disorder (PTSD) and chronic pain. More than 50% of PTSD patients suffer from chronic pain conditions. This study examined the role of fear learning deficits in the link between chronic pain and PTSD. Fear learning deficits represent a potentially promising and specific psychopathological factor in pain conditions associated with PTSD. Deficits in safety learning may increase fear and, consequently, pain sensation. These findings may contribute to elucidating the pathogenesis of the highly prevalent comorbidity between PTSD and pain disorders, and to developing new treatments.

1334 **The Association Between a History of Lifetime Traumatic Events and Pain Severity, Physical Function, and Affective Distress in Patients With Chronic Pain**

Andrea L. Nicol, Christine B. Sieberg, Daniel J. Clauw, Afton L. Hassett, Stephanie E. Moser, and Chad M. Brummett

Evidence suggests that pain patients who report lifetime abuse experience greater psychological distress, have more severe pain and other physical symptoms, and greater functional disability. The aim of this study was to determine the associations between a history of lifetime abuse and affective distress, fibromyalgia-ness, pain severity and interference, and physical functioning. Our findings support a novel biopsychosocial paradigm in which affective distress and fibromyalgia-ness interact to play roles in the association between abuse and pain.

1349 **Dorsal Root Ganglionic Field Stimulation Relieves Spontaneous and Induced Neuropathic Pain in Rats**

Bin Pan, Hongwei Yu, Gregory J. Fischer, Jeffery M. Kramer, and Quinn H. Hogan

Chronic pain is a major cause of suffering, disability, lost work, and health care expenses. Since chronic pain is poorly treated, development of new therapeutic options is a high priority. Dorsal root ganglion (DRG) electrical stimulation (ganglionic field stimulation, GFS) is effective in relieving clinical pain, but its mechanism is unknown. A rat model of GFS was developed to test analgesic effects in the context of neuropathic pain. This work shows that electrical stimulation of the DRG in rats reverses neuropathic pain behavior and provides a rewarding effect to animals with spontaneous neuropathic pain. This confirms analgesic efficacy of DRG stimulation in an animal model, and provides a platform for preclinical exploration.

Letters to the Editor

1359 **Defining Activity Pacing: Is It Time to Jump Off the Merry-Go-Round?**

Nicole Andrews and Michael Deen

1363 **Response to Andrews and Deen on Defining Activity Pacing**

Madelon L. Peters, Rosa Esteve, Carmen Ramírez-Maestre, and Alicia E. López-Martínez

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