

# The Journal of Pain

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## Original Reports

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### Empathy Predicts an Experimental Pain Reduction During Touch

Pavel Goldstein, Simone G. Shamay-Tsoory, Shahar Yellinek, and Irit Weissman-Fogel

Studies have provided evidence for pain-alleviating effects of tactile stimulation, yet the effects of social touch are still unexplored. This study examined the analgesic effects of social touch and tested the moderating role of the toucher's empathy. Tonic heat stimuli were administered to females; their partners either watched or touched their hands, a stranger touched their hands, or no one interacted with them. The results revealed diminished levels of pain during partners' touch compared to all other control conditions. The authors note that pain perception models should be extended, taking into account psychological characteristics of observers.

1058

### The Association Between Clinical Characteristics of Migraine and Brain GABA Levels: An Exploratory Study

Maria-Eliza R. Aguila, Trudy Rebeck, Andrew M. Leaver, Jim Lagopoulos, Patrick C. Brennan, Markus Hübscher, and Kathryn M. Refshauge

Migraine is prevalent and disabling yet is poorly understood. One way to better understand migraine is to examine clinical characteristics and potential biomarkers such as gamma-aminobutyric acid (GABA). This work explored whether relevant disease characteristics of migraine are associated with brain GABA levels. Higher pain and central sensitization scores were associated with increased brain GABA levels in individuals with migraine. These findings offer preliminary evidence for the usefulness of measuring pain and central sensitization in migraine, and provide some support for the possible role of GABA in migraine pathophysiology and its potential as a diagnostic marker.

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#### ON THE COVER

Migraine is prevalent and disabling yet is poorly understood. One way to better understand migraine is to examine clinical characteristics and potential biomarkers such as gamma-aminobutyric acid (GABA). This work explored whether relevant disease characteristics of migraine are associated with brain GABA levels. This illustration, provided by the authors, was stylized from an output of the editing process of GABA, particularly of the creatine signal after frequency correction. See Aguila et al, page 1058.

**1068 United States National Pain Strategy for Population Research: Concepts, Definitions, and Pilot Data**

Michael Von Korff, Ann I. Scher, Charles Helmick, Olivia Carter-Pokras, David W. Dodick, Joseph Goulet, Robin Hamill-Ruth, Linda LeResche, Linda Porter, Raymond Tait, Gregory Terman, Christin Veasley, and Sean Mackey

In 2016, the US Department of Health and Human Services and the Interagency Pain Research Coordinating Committee of the National Institutes of Health released the National Pain Strategy, which sought to “provide a comprehensive, population health-level strategy for pain prevention, treatment, management, education, reimbursement, and research that includes specific goals, actions, time frames and resources.” Objectives included estimating chronic pain prevalence, studying pain treatment with electronic health care data, and developing metrics to assess progress in reducing chronic pain impact. In this paper, the research work group reviews concepts relevant to achieving these aims. In addition, the authors report pilot test data developed to inform initial steps taken to achieve these population research objectives.

**1081 Resident Macrophages in Muscle Contribute to Development of Hyperalgesia in a Mouse Model of Noninflammatory Muscle Pain**

Wei-Yi Gong, Ramy E. Abdelhamid, Carolina S. Carvalho, and Kathleen A. Sluka

Macrophages play a role in innate immunity within the body, protect the organism against disease, and are located in nearly every tissue type including muscle. Classical macrophages can arise in response to stress, and secrete pro-inflammatory cytokines that subsequently activate nociceptors to produce hyperalgesia and pain. Prior studies show mixed results for the role of macrophages in development of hyperalgesia after injury. The authors hypothesized that resident macrophages are critical for the development of chronic muscle pain after repeated acid injection. This article presents evidence for the role of macrophages in the development of chronic muscle pain using a mouse model, and suggests macrophages could be a potential target to prevent transition of acute to chronic muscle pain.

**1095**    **Examining Committed Action in Chronic Pain: Further Validation and Clinical Utility of the Committed Action Questionnaire**

Robert W. Bailey, Kevin E. Vowles, Katie Witkiewitz, Gail Sowden, and Julie Ashworth

Psychosocial treatments for chronic pain conditions, such as Acceptance and Commitment Therapy, have highlighted minimizing pain avoidance behaviors and increasing engagement in valued activities as key treatment targets. Committed action is considered essential to the pursuit of a meaningful life, entailing a flexible persistence over time in living with one's values. To date, only one study has examined the association between measures of committed action and important aspects of pain-related functioning. This work analyzed the reliability of the Committed Action Questionnaire (CAQ) in a sample of 149 chronic pain patients, performed an analysis of its factor structure, and examined how CAQ scores uniquely account for variance in functioning. These findings provide further support for the CAQ as a measure of adaptive functioning in those with longstanding pain.

**1105**    **Pain by Association? Experimental Modulation of Human Pain Thresholds Using Classical Conditioning**

Victoria J. Madden, Valeria Bellan, Leslie N. Russek, Danny Camfferman, Johan W. S. Vlaeyen, and G. Lorimer Moseley

This study tested whether classical conditioning could modulate pain thresholds to laser stimuli. Classical conditioning is a form of associative learning in which a neutral stimulus acquires motivational features after being paired with another, biologically evocative stimulus that inherently elicits an unconditioned response. When applied to pain, the classical conditioning framework predicts that a non-noxious stimulus may come to elicit a pain response after being paired with a noxious stimulus that is inherently perceived as painful. This work lays a critical foundation for further investigations of classical conditioning as a possible driver of persistent pain.

**1116**    **Effects of Prolonged and Acute Muscle Pain on the Force Control Strategy During Isometric Contractions**

Christian A. Mista, Michael J. G. Bergin, Rogerio P. Hirata, Steffan W. Christensen, Kylie Tucker, Paul Hodges, and Thomas Graven-Nielsen

Musculoskeletal pain is associated with multiple adaptations in movement control. This research sought to determine whether changes in movement control acquired during acute pain are maintained over days of pain exposure. The authors report that persistent movement-evoked pain changes force direction from the pain-free direction. Acute pain leads to increased variation in force direction, regardless of persistent movement-evoked pain preceding the acutely painful event. These differences provide novel insight into the search for and consolidation of new motor strategies in the presence of pain.

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**Opposite Associations Between the rs3845446 Single-Nucleotide Polymorphism of the *CACNA1E* Gene and Postoperative Pain-Related Phenotypes in Gastrointestinal Surgery Versus Previously Reported Orthognathic Surgery**

Kojiro Amano, Daisuke Nishizawa, Tsutomu Mieda, Miki Tsujita, Akira Kitamura, Junko Hasegawa, Eiichi Inada, Masakazu Hayashida, and Kazutaka Ikeda

This study used a correlational design to examine the impact of the rs3845446 single-nucleotide polymorphism (SNP) of the *CACNA1E* gene on postoperative pain-related phenotypes in two groups of patients who underwent gastrointestinal surgery. Carriers of the minor G allele of the rs3845446 SNP had higher opioid requirements after laparoscopic colectomy when intravenous patient-controlled analgesia was used, while reporting higher pain scores after open gastrointestinal surgery when postoperative analgesia was managed with continuous epidural analgesia and rescue analgesics. These results suggest that pain-related phenotypes after gastrointestinal surgery are enhanced in carriers of the minor G allele.

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**Erratum**

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