

## AlgoMed - Recently Published Papers

### Fatiguing Trunk Flexor Exercise Decreases Pain Sensitivity in Postpartum Women

Deering R, Pashibin T, Cruz M, Hunter SK, Hoeger Bement M.

*Frontiers in Physiology*. 2019;10:315. (Milwaukee, WI, USA)

#### BACKGROUND:

Low back pain (LBP) is common in the general population and among postpartum women. Abdominal muscle exercise is often used to treat LBP, but it is unknown if fatiguing abdominal muscle exercise can produce exercise-induced hypoalgesia (EIH).

#### OBJECTIVES:

To assess pressure pain thresholds (PPTs) at rest and following fatiguing trunk flexor exercise (EIH) in (1) nulligravid and postpartum women to evaluate the impact of pregnancy and childbirth and (2) nulligravid women and men to examine sex differences.

#### METHODS:

Seventy healthy adults (31 postpartum women, 23 nulligravid women, 16 men) participated. Postpartum and nulligravid women were tested twice (16-18 weeks apart) to identify changes in EIH with postpartum recovery. PPTs were measured at the nailbed and superior rectus abdominis before and after exercise to investigate systemic and local EIH, respectively. Rectus abdominis muscle thickness was assessed with ultrasound.

#### RESULTS:

Postpartum women reported lower PPTs than nulligravid women at the abdomen ( $p < 0.05$ ) whereas postpartum women had lower PPTs at the nailbed during the first session only. Men reported higher nailbed PPTs ( $p = 0.047$ ) and similar PPTs at the abdomen than women ( $p = 0.294$ ). All groups demonstrated EIH at the abdomen ( $p < 0.05$ ). Systemic EIH was absent in postpartum and nulligravid women ( $p > 0.05$ ), while men demonstrated hyperalgesia. Local EIH was positively associated with muscle thickness for men and women, which was not significant at the second timepoint.

#### LIMITATIONS:

Acute exercise response may not reflect changes that occur with exercise training.

#### CONCLUSION:

Fatiguing trunk flexor exercise produced local EIH for all groups including postpartum and nulligravid women. Clinically, trunk exercises may be useful for acute pain relief for clinical populations that are characterized by pain and/or weakness in the abdominal region muscles in populations with abdominal pain syndromes.

<https://www.ncbi.nlm.nih.gov/pubmed/30971949>

## **A Fast Track to Hypoalgesia - The Anaerobic Exercise Effect on Pain Sensitivity.**

Samuelly-Leichtag G1, Kodesh E1, Meckel Y2, Weissman-Fogel I1.

*International journal of sports medicine.* 2018 Jun;39(06):473-81. (Haifa, Israel)

Maximal anaerobic exercise, is a short high intensity effort, involves activation of the hypothalamus-pituitary-adrenal axis, and may suggest hypoalgesic effects. In addition, this exercise-induced muscle pain may contribute to hypoalgesia via the pain inhibits pain phenomenon, which is related to the diffuse noxious inhibitory control (DNIC) mechanism. We aimed to investigate whether: 1) a single bout of 30 s maximal anaerobic exercise has an analgesic effect on experimental pain sensitivity; 2) DNIC is the underlying mechanism of anaerobic exercise-induced hypoalgesia (EIH). Fifty healthy subjects participated. The experimental group performed the 'Wingate Anaerobic Test' (WAT) and controls set on the bikes without exercising. Psychophysical tests, performed before and after the intervention, in local and remote areas, included: heat (HPT) and pressure pain thresholds (PPT); suprathreshold heat and cold pain stimulation; the conditioned pain modulation (CPM) paradigm testing the DNIC mechanism. Following WAT, PPT and HPT increased ( $p < 0.001$ ), pain ratings in response to heat and cold stimuli ( $p < 0.001$ ) and CPM ( $p = 0.029$ ) decreased compared with controls. No correlation was found between muscle pain, blood lactate level and EIH. To conclude WAT induces local and remote analgesic effects. The involvement of central pain modulatory processes with DNIC probably not the underline mechanism of EIH.

<https://www.ncbi.nlm.nih.gov/pubmed/29698982>

## **Psychophysical-psychological dichotomy in very early acute mTBI pain: A prospective study.**

Kuperman P, Granovsky Y, Granot M, Bahouth H, Fadel S, Hyams G, Ben Lulu H, Aspis O, Salame R, Begal J, Hochstein D, Grunner S, Honigman L, Reshef M, Sprecher E, Bosak N, Sterling M, Yarnitsky D.

*Neurology*. 2018 Sep 4;91(10):e931-8. (Haifa, Israel)

### **OBJECTIVE:**

To characterize the pain-related somatosensory and psychological presentation of very early acute patients with a mild traumatic brain injury (mTBI).

### **METHODS:**

Patients with an mTBI participated in a prospective observational study undergoing clinical, psychophysical, and psychological assessment within 72 hours after the accident. Healthy controls underwent similar protocol.

### **RESULTS:**

One hundred acute patients with an mTBI (age  $36 \pm 12.5$  [SD] years, range 19-67 years, 42 women) and 80 healthy controls (age  $43 \pm 14.3$  years, range 24-74 years, 40 women) participated. Patients with an mTBI demonstrated a pronociceptive psychophysical response in most tests such as less efficient pressure-pain threshold-conditioned pain modulation ( $0.19 \pm 0.19 \pm 0.09$  vs.  $0.91 \pm 0.10$  kg,  $p < 0.001$ ) and lower temperature needed to elicit a Pain50 response ( $44.72 \pm 0.26^\circ\text{C}$  vs  $46.41 \pm 0.30^\circ\text{C}$ ,  $p < 0.001$ ). Their psychophysical findings correlated with clinical pain measures, e.g., Pain50 temperature and mean head ( $r = -0.21$ ,  $p = 0.045$ ) and neck ( $r = -0.26$ ,  $p = 0.011$ ) pain. The pain-catastrophizing magnification subscale was the only psychological variable to show a difference from the controls, while no significant correlations were found between any psychological measures and the clinical or psychophysical pain measures.

### **CONCLUSIONS:**

There appears to be a dichotomy between somatosensory and psychological findings in the very early acute post-mTBI stage; while the first is altered and is associated with the clinical picture, the second is unchanged. In the context of the ongoing debate on the pathophysiologic nature of the post-mTBI syndrome, our findings support its "physical" basis, free of mental influence, at least in the short time window after the injury.

<https://www.ncbi.nlm.nih.gov/pubmed/30068635>

**Enhanced facilitation and diminished inhibition characterizes the pronociceptive endogenous pain modulatory balance of persons living with HIV and chronic pain.**

Owens MA, Parker R, Rainey RL, Gonzalez CE, White DM, Ata AE, Okunbor JI, Heath SL, Merlin JS, Goodin BR.

*Journal of neurovirology*. 2019 Feb 15;25(1):57-71. (Birmingham, AL, USA)

Chronic pain in persons living with HIV (PLWH) may be related to alterations in endogenous pain modulatory processes (e.g., high facilitation and low inhibition of nociception) that promote exaggerated pain responses, known as hyperalgesia, and central nervous system (CNS) sensitization. This observational study examined differences in endogenous pain modulatory processes between 59 PLWH with chronic pain, 51 PLWH without chronic pain, and 50 controls without HIV or chronic pain. Quantitative sensory testing for temporal summation (TS) of mechanical and heat pain as well as conditioned pain modulation (CPM) were used to assess endogenous pain facilitatory and inhibitory processes, respectively. Associations among TS, CPM, and self-reported clinical pain severity were also examined in PLWH with chronic pain. Findings demonstrated significantly greater TS of mechanical and heat pain for PLWH with chronic pain compared to PLWH without chronic pain and controls. CPM effects were present in controls, but not in either PLWH with or without chronic pain. Among PLWH with chronic pain, greater TS of mechanical pain was significantly associated with greater average clinical pain severity. Results of this study suggest that enhanced facilitation and diminished inhibition characterizes the pronociceptive endogenous pain modulatory balance of persons living with HIV and chronic pain.

<https://www.ncbi.nlm.nih.gov/pubmed/30414048>

## **Higher habitual dietary caffeine consumption is related to lower experimental pain sensitivity in a community-based sample.**

Overstreet DS, Penn TM, Cable ST, Aroke EN, Goodin BR.

*Psychopharmacology*. 2018 Nov 1;235(11):3167-76. (Birmingham, AL, USA)

### **RATIONALE:**

Caffeine is the most widely consumed psychoactive substance in the world. Caffeine administered acutely in a laboratory environment or as a medication adjuvant has known properties that help alleviate pain. However, much less is known about the potential impact of habitual dietary caffeine consumption on the experience of pain.

### **OBJECTIVES:**

The primary objective of this observational study was to determine whether caffeine consumed habitually as part of a daily diet was associated with experimental pain sensitivity using noxious stimuli in a non-clinical sample of 62 community-dwelling adults between 19 and 77 years old.

### **METHODS:**

Study participants monitored their daily dietary caffeine consumption (e.g., coffee, tea, soda, energy drinks, and chocolate) across a period of seven consecutive days using a caffeine consumption diary. On the seventh day of caffeine consumption monitoring, participants presented to the laboratory to complete experimental pain sensitivity testing. Noxious thermal and mechanical stimuli were used to obtain threshold and tolerance for painful heat and pressure, respectively.

### **RESULTS:**

Data analysis revealed that greater self-reported daily caffeine consumption was significantly associated with higher heat pain threshold ( $\beta = .296$ ,  $p = .038$ ), higher heat pain tolerance ( $\beta = .242$ ,  $p = .046$ ), and higher pressure pain threshold ( $\beta = .277$ ,  $p = .049$ ) in multiple regression models adjusted for covariates.

### **CONCLUSIONS:**

Results of this study completed with community-dwelling adults revealed that individuals who habitually consume greater amounts of caffeine as part of their daily diets demonstrate diminished sensitivity to painful stimuli in a laboratory setting.

<https://www.ncbi.nlm.nih.gov/pubmed/30187108>