

# **Low back pain is augmented in two different strains of rats with obesity**

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## **Background**

Chronic low back pain is a common condition with high incidence, cost, and morbidity, with many patients failing to achieve adequate relief. In addition, the prevalence of chronic back pain is found to be higher in patients with obesity – a rising trend in the United States. Although obesity has been shown to correlate with augmented peripheral inflammation and pain sensitivity, the underlying mechanisms are still unclear. Further study is required to elucidate the link between obesity and inflammation in order to understand the etiologies of low back pain and to develop treatments for chronic pain conditions.

## **Aim**

To characterize the pain sensitivity responses in obese rats following localized inflammation of the lumbar DRG – an established inflammatory back pain model.

## **Methods**

Adult Long-Evans (LE) and Sprague-Dawley (SD) rats ate ad libitum a high-fat chow for 6 weeks and age-matched controls were fed normal low fat chow. To assess the direct effects of inflammation on low back pain, a previously described model was used in which the immune activator zymosan is deposited at the L5 dorsal root ganglion (DRG). Behavioral testing to evaluate pain sensitivity was conducted for up to 14 days after DRG inflammation. Mechanical sensitivity was tested with von Frey filaments on the heel region of the paw using the up-and-down method, and thermal sensitivity was measured by the Hargreaves method. Tactile allodynia was tested by applying light strokes with a cotton wisp and cold allodynia was tested by placing a drop of acetone on the paw.

## **Results**

Before surgery, the two LE groups were found to have no difference in pain responses. However, obese rats displayed a significantly higher mechanical pain response or mechanical hyperalgesia bilaterally by 7 days following local inflammation of the DRG. No significant difference was found in thermal hypersensitivity, tactile or cold allodynia tests. When the experiment was repeated with SD rats, larger significant differences between the high fat and low fat groups were observed in mechanical sensitivity, cold, and tactile allodynia. In both strains the percent body fat was increased by the high fat diet, but only the LE rats showed significantly higher body weight.

## **Discussion**

Based on our results, pain sensitivity does appear to be heightened in the setting of obesity following induction of inflammation. Future studies may explore the possible mechanisms by which obesity induces an augmented pain response.

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