## Expression of $\alpha_1$ adrenergic receptor subtypes by afferent fibers that innervate rat masseter muscle

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**Aims:** In temporomandibular disorders sufferers, muscle pain is more severe in individuals who have undergone a traumatic stress. Why stress exacerbates masticatory muscle pain in these individuals is not known. One possibility is that under conditions of stress there is an interaction between the sympathetic and sensory nervous systems. This study investigated whether trigeminal ganglion neurons that innervate the masseter muscle express $\alpha_1$ adrenergic receptor subtypes to identify whether a direct interaction between the sympathetic and sensory nervous systems is feasible.

**Methods:** Masseter muscle ganglion neurons were identified by injection of the fluorescent dye fast blue into the masseter muscle of 4 Sprague Dawley rats (2 male, 2 female). Trigeminal ganglion sections were stained for $\alpha_{1a}$, $\alpha_{1b}$ or $\alpha_{1d}$ adrenergic receptors, as well as the transient receptor potential vanilloid 1 (TrpV1) receptor. Sections were examined with a Leica confocal microscope. The percent of masseter ganglion neurons expressing each receptor was calculated.

**Results:** Masseter muscle ganglion neurons expressed $\alpha_{1a}$ ($29 \pm 9\%$), $\alpha_{1b}$ ($34 \pm 4\%$) and $\alpha_{1d}$ ($19 \pm 13\%$) adrenergic receptors. Expression of all three $\alpha_1$ receptor subtypes was higher in female rats than in male rats. Expression of $\alpha_{1b}$ receptors was more commonly found on larger diameter masseter ganglion neurons. Overall $11 \pm 3\%$ of masseter ganglion neurons expressed the TrpV1 receptor, which suggests they served a nociceptive function. The TrpV1 receptor was co-expressed by about ~10% of $\alpha_{1a}$ and $\alpha_{1b}$ receptor positive masseter ganglion neurons.

**Conclusions:** Afferent fibers that innervate the masseter muscle express all three $\alpha_1$ adrenergic receptor subtypes. Agonists at the $\alpha_1$ receptor have been previously shown to depolarize trigeminal ganglion neurons, which suggests that activation of these receptors on masseter muscle afferents would be excitatory. The expression of $\alpha_1$ receptors by putative nociceptors that innervate the masseter may permit a direct interaction between the sensory and sympathetic system that contributes to pain in this muscle.

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## Buprenorphine alleviation of pain does not compromise the rat monoarthritic pain model

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**Aims:** This study investigated the effects of buprenorphine treatment on pain and welfare parameters and model specific parameters in a rat model of monoarthritis to eliminate unnecessary pain from this model.

**Methods:** 32 male Sprague Dawley rats were divided into four groups: (1) A negative control without arthritis receiving no analgesia. (2) A positive monoarthritic control group receiving no analgesia, but subcutaneous saline injections twice a day. (3) A positive control with monoarthritis receiving subcutaneous carprofen once a day and saline once a day. (4) A group with monoarthritis receiving subcutaneous buprenorphine twice a day. Monoarthritis was induced with an injection of 0.02 ml Complete Freund's Adjuvant intra-articularly in the left tibiotarsal joint. Treatment with analgesia was initiated at day 15 and the rats were euthanized at day 23.

**Results:** The induced monoarthritis elicited a pronounced acute inflammation. Several parameters such as bodyweight, mobility, stance, joint-stiffness and lameness scores were affected. A marked mechanical hyperalgesia in the tarsal area was observed by Electronic Von Frey testing, but no severe compromise of the animal welfare was seen at any time. Signs of chronic development began to appear from day 10 after the monoarthritic induction. No significant change in serum cytokines and faecal corticosterone measurements was found after administration of buprenorphine. A minor decrease in body weight was seen, and a higher pain tolerance to mechanical stimuli was observed, indicating pain alleviation. The histological examination confirmed monoarthritic development in all monoarthritic rats and revealed periarticular lesions suggesting diffusion of adjuvant from intra-articular injection site to the periphery.

**Conclusions:** The study demonstrated that buprenorphine has an analgesic effect in the adjuvant induced monoarthritic rat model, without obvious interference with the development of arthritis.

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## Association between pain, disability, widespread pressure pain hypersensitivity and trigger points in subjects with neck pain

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**Aims:** Mechanical neck pain (MNP) and whiplash-associated disorders (WAD) represents two groups of subjects with a different pathogenesis, since current evidence supports that WAD subjects presents greater sensitization than MNP. Nevertheless, it is still unclear the relationship between neck pain, neck disability, widespread pressure pain hypersensitivity (sign of sensitization) and trigger points (TrPs) in these two groups of neck pain subjects. The aim of the current study was to investigate these associations in MNP and WAD subjects.

**Methods:** Forty-six MNP and fifty-one WAD subjects underwent the following examination: pressure pain thresholds (PPTs) in the upper trapezius and tibialis anterior muscles, TrP examination in