model, cold pressor test, cutaneous electrical and thermal stimulation and intradermal capsaicin induced hyperalgesia. Pain testing was carried out at baseline, 24, 48, 72 and 144 h after application of the drugs. Compared to placebo buprenorphine significantly attenuated tibial pressure pain ($P = 0.007$) as well as pressure pain in the UVB induced primary hyperalgesic area ($P = 0.006$). On the other hand fentanyl attenuated cold pressor pain compared to placebo ($P = 0.005$). The two drugs were equipotent and better than placebo to thermal pain stimulation ($P = 0.0001$). They drugs failed to show significant analgesic effect to NGF induced muscle soreness, cutaneous electrical stimulation and to capsaicin induced hyperalgesia. In equipotent doses buprenorphine attenuated bone associated pain and primary hyperalgesia more than fentanyl. These tissue and modality differentiated effects may reflect clinical observations that opioids act differently.

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Pretreatment with opioids enhances afferent induced long-term potentiation in the rat dorsal horn

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Objectives: Opioids are increasingly used against chronic non-malignant pain. Long-term opioid treatment may be associated with the development of hyperalgesia. Long term facilitation (LTF) of C-fibre evoked firing of wide dynamic range neurons in the spinal dorsal horn in response to conditioning stimulation (CS) of afferent fibres is a widely studied cellular model of spinal nociceptive sensitization. In a rat model with recording of single neurone responses we have previously demonstrated that seven days of opioid pretreatment enhances the stimulus-evoked LTF (Fig. 1, Haugan 2008 [1]). In this study we looked at the effect of long-term pretreatment with morphine on longterm potentiation (LTP) of C-fibre evoked dorsal horn field potentials, a widely used model of spinal hyperexcitability.

Methods: Female rats (Sprague-Dawley, $n = 16$) were implanted with subcutaneous Alzet mini-osmotic pumps during short-lasting Isoflurane anaesthesia. The rats were randomised to either s.c. infusion of morphine (20 mg/kg/d) or saline (NaCl 9 mg/ml) and blinded to the experimenter. After 7 days the rats were anaesthetised with intraperitoneal urethane (1.4–1.65 g/kg). C-fibre evoked field potentials in the spinal cord dorsal horn were recorded at the level of segments L4-L5. Both the potentiating stimulation (100 Hz, 4 trains, each train 2 s duration, 10 s intervals) and the test stimulation (single stimuli) were given to the sciatic nerve at C-fibre strength.

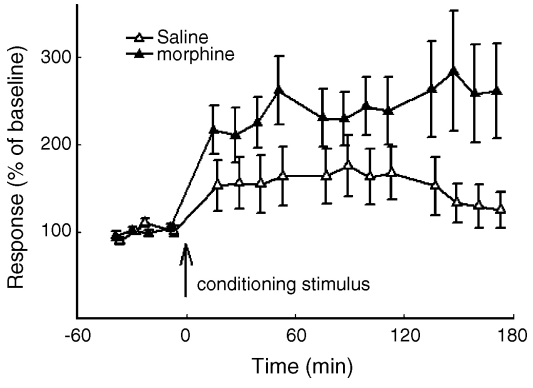

Fig. 1. Extracellular single unit recordings. From Haugan (2008).

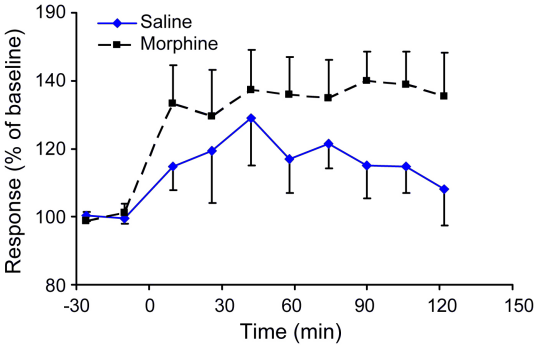

Fig. 2. Field potentials after conditioning stimulation after treatment with morphine or saline.

Results: There was a tendency that seven days of morphine pretreatment increased the potentiation of C-fiber evoked field potentials by conditioning stimulation compared to the saline group (Fig. 2).

Conclusion: Our results support our previous findings and indicate that animals treated with long term opioid show amplification of stimulus-induced central sensitisation compared to opioid naïve animals.

Reference

[1] Haugan F, Rygh LJ, Tjølsen A. Ketamine blocks enhancement of spinal long-term potentiation in chronic opioid treated rats. Acta Anaesthesiol Scand 2008;52:681–7.

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Pigs in pain—Porcine behavioural responses towards mechanical nociceptive stimulation directed at the hind legs

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Objectives: In recent years, pigs are used increasingly for biomedical translational research and often considered superior to rodent models. However, only very few pain assays for quantification of behavioural nociceptive responses are available for pigs. This experiment is part of a larger project aiming at developing pain assays for pigs, and the present aim was to examine behavioural responses towards mechanical cutaneous stimulation applied to the caudal part of the metatarsus on the hind legs of pigs using an IITC Electronic von Frey Anesthesiometer.

Methods: Nine slaughter pigs (bodyweight 54 ± 0.7 kg) were subjected to handheld nociceptive mechanical stimulation using the electronic von Frey anesthesiometer (max 1000 g). The animals were kept in one group and tested while slightly fixated in a testroom, to which they had been habituated. Each nociceptive test consisted of 4 single stimulations.

Results: The animals responded behaviourally after single stimulations of 12–1000 g (8% censored) and had a mean threshold for leg movements of 540 ± 85 g. Neither the type of behavioural responses (four categories from slight leg movements to kicking)