# Traditional and novel behavioral models to evaluate pain and analgesia in preclinical studies

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Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Traditionally, animal pain research has focused on the sensory component of pain and a battery of models was developed. Sensory testing was performed on somatic structures which were readily accessible (e.g. hind paws and tails of rodents). However, over time research also focused on non somatic organs such as visceral hollow organs or nerves and led to models of visceral and neuropathic pain. Using acute or chronic inflammation introduced models of inflammatory pain. Recently, models which assess the affective component of pain have been developed.

While working with rodents allows for precise analgesic profiling of different molecular mechanisms in acute and chronic pain conditions, many confounding factors have been described which complicate the analysis of novel drug candidates. In addition, gender, species and even strain differences in nociception and analgesia have been described.

Thus, the analysis of knock-out mice is often biased by the genetic background of the originally used inbred strains.

A variety of stimuli is used in sensory testing, and many variables contribute to the experimental outcome, such as stimulus quality, intensity and kinetics. While most studies determine thresholds, qualitative assessment of animal pain behavior is required to address symptoms such as hyperalgesia. Careful selection of controls is essential since many aspects of analgesia can only be uncovered when comparing the treatment effects to the appropriate control groups.

A special feature of pain research is the possibility to translate animal models into early phases of clinical research. Quantitative sensory testing techniques are using similar stimuli and read-outs in volunteers and/or pain patients. Thus, pain research offers a chance to optimize clinical drug candidates for proof of concept studies.

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