

Automated longitudinal testing offers a cost-effective, high-throughput way to monitor various slowly developing behavioral changes in rats or mice, such as depression or age-related diseases (Alzheimer, Huntington) or chronic pain. The animal is observed continuously in an instrumented home cage environment (PhenoTyper®), fully automated and without any human interference. This avoids the confounding effects of novelty, stress, transportation and handling.

General methods

Longitudinal testing concerns the continuous behavioral monitoring of the animal. This can be preceded by experimental treatments (e.g. social stress or early-life events) modeling a specific psychopathology in this case a surgical procedure to induce the development of neuropathic pain. As the animals have little restrictions in spontaneous behavior, they have various possibilities to organize exploration, eating, drinking and sleeping patterns. A large number of activity parameters can be computed per time bin, providing insight into changes in the distribution of activities in time and space (circadian rhythmicity).

Delta Phenomics can conduct a wide variety of longitudinal tests. The specific details of the protocol depend on the research question.

Example study: Neuropathic pain¹

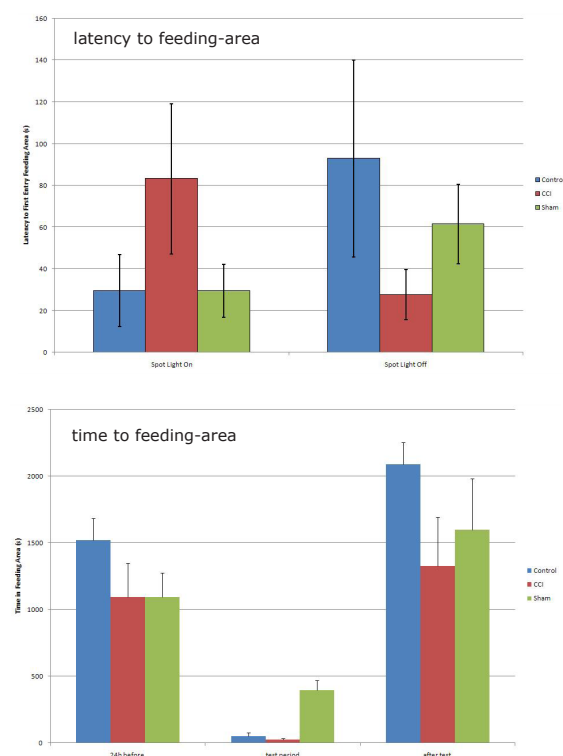
Test protocol

We used a well known animal model: the induction of neuropathic pain in the hind leg of the rat by a constriction of the sciatic nerve (*Nervus ischiadicus*). As a surgery procedure is required to induce chronic pain, two different sources of pain have to be distinguished: acute pain due to the surgery and the slowly developing pain as a consequence of reactions of the nerve to the constriction.

Behavioral parameters

The results show acute consequences of the constriction injury of the sciatic nerve on various parameters e.g. eating behavior, distance moved, velocity and frequency of moving during the first week after surgery. The following weeks more long-term effects of the constriction were noticed on how the animals explored their home cage: time spent in shelter, time spent on the shelter. In addition, effects of pain on anxiety as measured in the home cage, have been demonstrated, which seems indicative of a change at the emotional level in the animals with neuropathic pain. The effects of pain on a sensitized anxiety response underline the notion that the behavioral changes are due to the experience of pain and not a mere nociceptive response.

Pain effects anxiety



Parameters relevant for the response to a bright light spot on the feeding-area during the first 3 hours of the dark (i.e. active) period: latency to first entry of the feeding-area and time spent in the feeding-area 24hr before, during (3 hr) and after the test (3 hr). Control (n=5), sham (n=5) and chronic constriction injury (n=4) (CCI) animals. Data is presented as mean values per hour.

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