Plantar Test for Thermal Stimulation

The original Hargreaves thermal stimulation for hyperalgesia

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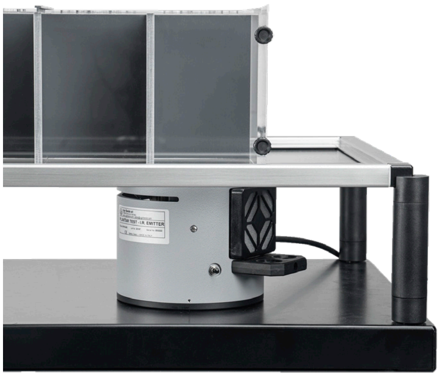
Plantar Test for Thermal Stimulation

The only available system which detects paw withdrawal latency automatically, thanks to a light detector embedded in the control unit.

Plantar Test for thermal stimulation complete system: touch-screen electronic unit, I.R. Emitter/Detector, Platform with semi-transparent glass panel, modular enclosures for up to 12 mice, 6 rats or 3 fat rats

Background



Plantar test for Themal Stimluation close up

In the late '80s Dr. Hargreaves invented a method to assess thermal pain sensation in unrestrained rodents by stimulating the single hind paw and thus allowing for unilateral/ contralateral experiments.

Ugo Basile made a science-grade instrument to perform this stimulation and automatically measure response, it became a gold-standard with more than 2,000 publications.

A thermal stimulus, generated by a focused light source is applied through a glass pane to the plantar surface of the hind paw of the animal and the response to this stimulus consists of withdrawal of the stimulated paw. Ideal for hyperalgesia measurements.

Typical device applications

Plantar Test I.R. Emitter/Detector

The plantar test has been used in experiments involving, hyperalgesia, pain sensitization or recovery of thermal pain response following neural injury and regeneration. The test is relatively straight forward and even beginners can master the measurement in a short period of time (Cheah et al. 2017).

Care must be taken to avoid urine and feces on the glass panel, which would alter the experiment results and habituation must be as long as needed for the animals to calm down after the initial exploration phase. Cheah et al. (2017) suggest to perform the habituation and baseline readings 1 week before the start of the experiment.

The amount of space, thanks to the modularity of the animal enclosures, should be adapted to the tendency to move of the strain in use and clear difference exists between rats and mice.

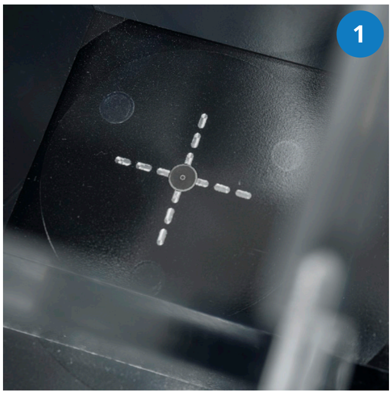
Product Description

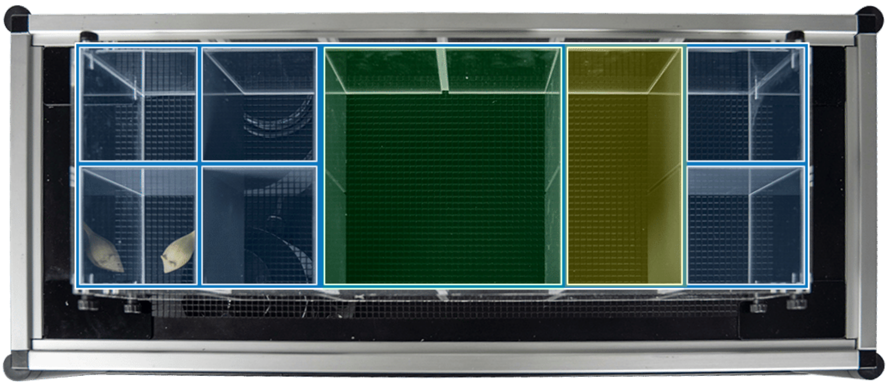
Thermal withdrawal latency was first described by Hargreaves et al. (1988).

The Ugo Basile is the only available system which detects paw withdrawal latency automatically, thanks to a light detector embedded in the control unit. It comes complete with:

- Emitter/Detector unit with strong and focused infra-red light source invisible to the animal (see pictures 1 and 2)
- Cross line engraved on the top of the emitter to ease the paw targeting
- Touch-screen electronic unit to set all parameters (light intensity, thresholds, etc.) and review data
- Data saving in the electronic unit and in the provided USB stick
- Data export of the USB stick data into .CSV file for easy analysis in Excel
- PC software for animal vivarium management
- Platform with semi-transparent glass panel to avoid animal distraction
- One model for Mice or Rats and high throughput with fully modular enclosures for up to 12 mice, 6 rats or 3 fat rats (see picture 3).

Compared to the Hot/Cold plate and to Tail Flick tests unilateral/ contralateral experiments with internal control was possible and enabled the researcher to discern a peripherally mediated thermal stimulation.





Modular enclosures for up to 12 mice, 6 rats or 3 large rats

Features	Benefits
Infrared, strong light source	Invisible to the animal, which is not distracted and high intensity stimulation for short-lasting experiments (a stimulation should not last more than 10-20 seconds, ideally only a few ones).
Embedded light detection	Automated paw withdrawal scoring with no experimenter bias and high accuracy
Optional manual score	The user can decide to manually score the paw withdrawal in those cases where the position of the paw is odd and the automatic detection is not possible
Touch screen control unit	Seamless configuration of the experiment parameters and easy review of data from the control unit
USB stick data export	No need to connect a PC and one-click data export for review in Excel
Modular animal enclosures	The dimension of the area available to the animal can be changed so that it is small but the animal is still unrestrained and amount of habituation can be reduced. High throughput: up to 12 mice and 6 rats

Main references

- Hargreaves K. M.et. al., 1988, "A new and sensitive method for measuring thermal nociception in cutaneous hyperalgesia", Pain
- Shiwu Guo et. al., 2022, "Akt/Aquaporin-4 Signaling Aggravates Neuropathic Pain by Activating Astrocytes after Spinal Nerve Ligation in Rats", Neuroscience
- Hideaki Nakajima et. al., 2020, "Distribution and polarization of microglia and macrophages at injured sites and the lumbar enlargement after spinal cord injury", Neuroscience Letters
- Tatsuhiro Fukutoku et. al., 2020, "Sex-Related Differences in Anxiety and Functional Recovery after Spinal Cord Injury in Mice", Journal of Neurotrauma
- Haiwang Ji et. al., 2020, "A Mouse Model of Cancer Induced Bone Pain: From Pain to Movement", Front. Behav. Neurosci.
- Tomoya Tanaka et. al., 2020, "Teriparatide relieves ovariectomy-induced hyperalgesia in rats, suggesting the involvement of functional regulation in primary sensory neurons by PTH-mediated signaling", Scientific Reports
- Menghon Cheah et. al., 2017, "Assessment of Thermal Pain Sensation in Rats and Mice Using the Hargreaves Test", Bio Protoc.

Specifications - Operation

I.R. Intensity	Adjustable in the interval 01-99 (in one digit steps)
Latency Time	0.1s steps
Cut off function	From 5 to 30 seconds
Measurement mode	Manual or Automatic
Start experiment	By start icon, push button or TTL input
Stop experiment	By start icon, push button, cut-off, or TTL input
Data export	.csv format, from USB key
TTL I/O	Input and output TTL signal

Specifications - General

Command input and readout	via 4.3" touch-screen
Power requirements	Universal input 100-240 VAC, 50-60Hz, 50W
Data Portability	via USB flash drive provided
Calibration	via appropriate I.R. Radiometer (not included)
Operating Temperature	10° to 40° C, 5% to 95% RH (non-condensing)
Sound Level	<54dB

Physical

Dimensions	135 (w) x 40 (d) x 50 (h) cm (required space on the table)
Weight	11.0Kg

Physical animal enclosure setup (internal dimensions)

Mouse	96mm x 96mm x 140mm (h) (max 12 animals)
Rat	96mm x 196 mm x 140mm (h) (max 6 animals)
Fat Rat	196mm x 196 mm x 140mm (h) (max 3 animals)

Ordering informations

37570	Plantar Test complete with: Plantar Test Controller (SKU 37570-001), Emitter/Detector Vessel (SKU 37570-002), Large Platform (SKU 37000-003), 4 Supporting column(SKU 37370-327, Modular Animal Enclosure(SKU 37000-007), Framed Glass Pane (SKU 37370-005).

Optional Items

37300	Heat-Flux I.R. Radiometer
37370-278	Additional Stimulation Base, complete with glass pane and animal enclosure
37100	Set of 2 Durham Holders for Orofacial Stimulation
37370-365	Replacement Bulb for Plantar Test

Extra warranty (standard 12 months + 12 months with product registration) available

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more than 40,000 citations in the main bibliographic search engines.

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