



# Department of Physical Therapy and Rehabilitation Science

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## Equipment

The NCRR houses the following equipment for use:



### **Open Field (Kinder-Scientific)**

The open field activity is used to determine differences in overall activity and can be used to assess anxiety. The field is divided into zones monitored by EthoVision videotracking software (Kinder). Data are converted into zone map files and recorded as active time (defined as time in which a new beam is broken), distance moved, rearing times and events, corner entries, center entries, and percent of time spent in the center.

### **Morris Water Maze (Noldus Software)**

Mice are tested for their ability to locate a hidden submerged platform in a pool (140cm in diameter) filled with warm, opaque water. Mice are trained first to locate a visible platform, and then to locate a hidden platform; in a subsequent trial, the hidden platform is then removed. Time to reach the platform (latency, path length, and swimming speed) is recorded with a video tracking system.

### **Elevated Plus Maze (Kinder-Scientific)**

Used to assess emotionality and reactivity, the plus maze consists of two enclosed arms and two open arms, at right angles to each other. Mice are placed onto the center of the maze and allowed free access to all four arms. Time spent on each arm is recorded by photo beams, and the percentage of time spent in open/(open+enclosed) is determined.

### **Elevated Zero Maze (Kinder-Scientific)**

This is a test of anxiety levels similar to the plus maze. Like the plus maze, the arena is elevated and consists of two open areas and two closed areas (both of equal area). Both of

these areas are equipped with rows of infrared photocells interfaced with a computer. The animal is placed in the arena and allowed to explore for 10 minutes while white noise is played to eliminate distracting sounds. A computer tracking system is used to record the animal's movements around the arena. From this data, we can see how much time the animal spent in each portion of the arena as well as many other parameters. The elevated zero maze is used to assess emotionality and reactivity. While the open areas are, by design, anxiogenic, the animal is free to move into the closed areas. The mice do not suffer adverse effects from this test.

### **Rotarod (Ugo Basile)**

The rotarod test is used to screen for motor deficits, including deficits that might influence performance in learning and memory tests. The task requires the mouse to balance on a slowly rotating rod; time on the rod is recorded.

### **Rod Walking**

This test is used to assess motor coordination and integrity of the vestibular system. Mice are placed in the center of a horizontal rod and their ability to balance on the rod is recorded.

### **Inclined Plane**

This test evaluates motor strength and muscle tone in mice that are placed on a plane at varying angles. The maximal angle is recorded whereby the animal can maintain position for at least five seconds.

### **Grip Strength Meter (Columbus Instruments)**

The Grip Strength Meter is designed to measure both fore and hind limb grip strength in mice. This instrument employs a digital gauge in a single stand configuration in which the grip bars can be interchanged so that the fore and hind limb measurements can be done. The forelimb measurements are done with the meter in the tension peak mode to freeze the reading as the subject is pulled away from the grip bar. The hind limb measurements are done with the meter in the compression peak mode to freeze the reading as the subject's hind limbs are pulled over the grip bar towards the meter.

### **CatWalk (Noldus)**

The CatWalk is a video-based analysis system to assess locomotor deficits and pain-induced gait adaptations in voluntarily walking mice. The CatWalk consists of a glass plate on which a mouse walks; light is detected at those areas where the animal makes contact with the glass plate. A video camera captures the illuminated footprints and sends these to a computer running the CatWalk software. Information collected includes position, timing, pressure, and dimensions of paw print.

### **Tail Flick (Ugo Basile)**

The Tail Flick instrument is used to assess tail sensitivity to a thermal stimulus. A mouse is gently restrained by hand or in an acrylic holder with the tail placed over a window through which an intense beam of light is focused. The animal's response to the thermal stimulus is a tail flick, and the latency time is recorded.

### **Hot/Cold Plate (Ugo Basile)**

The Hot/Cold Plate is used to assess sensitivity to heat or cold in unrestrained animals. The plate tests sensitivity to a range of temperatures from 4 degrees Celsius to 66 degrees Celsius. The time to a foot lick or shake behavior is recorded.

### **UCSF Paw Thermal Stimulator**

The Paw Thermal Stimulator or Hargreaves is used to assess the response to stimuli generated by a focused light source. An unrestrained mouse is placed in a clear duplex animal cage that is positioned on a glass table. A hind paw is stimulated from below, through the glass table. The response to this stimulus consists of withdrawal of the stimulated paw. The latency to a stereotypic withdrawal response is recorded.

### **Von Frey Filaments (Semmes Weinstein)**

These are used to assess sensory threshold and allodynia. The sensitivity of the paw to mechanical stimuli is assessed in unrestrained mice using Von Frey Filaments. The mouse is placed in an enclosure with a metal mesh floor. A Von Frey Filament of 0.5mm diameter is moved toward the paw at a controlled rate. The latency to a stereotypic withdrawal response and the force applied is measured using filaments of varying diameter.

### **Forced Exercise/Walking Wheel System (Lafayette Instrument)**

The exercise/walking bed supports up to 12 mouse exercise/walking wheels. The wheels incorporate a swing-hatch for easy animal loading and removal. The handheld LCD interface permits a single exercise/walking speed, exercise time, rest time, and number of cycles.

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