

Phenotyping Screens

Charles River Laboratories Transgenic Services offers the following phenotyping screens to assist in characterization of your rat or mouse model:

In-Life Analysis		Equipment and/or Comments
Clinical Observation	Assessment of physical characteristics and abnormalities, body weight, posture, and gait including digital photographs to document clinical observations.	This is the <i>in vivo</i> component of PhenoFirst SM , a comprehensive panel designed as a first thorough look at your model, identifying expected and unexpected phenotypes.
Primary Behavioral Observation	Assessment of gross behavioral changes in sensory abilities, motor coordination, and temperament.	
Growth Curve	Body weight obtained at different time points to develop a growth curve.	Custom designed to best fit your model and goals. Can include special diets.
Food and/or Water Consumption	Measurement of feed and/or water consumed over a given time period	Can include multiple diet types.
Body Temperature	Measurement of body temperature	Using implanted transponders
Reproductive Performance	Analysis of breeding records and genotype results to assess fertility, average litter size born and weaned, male to female ratio, and expected Mendelian ratio.	Custom designed to best fit your model and goals.
Reproductive Diagnostics	Based on analysis of reproductive performance, customized diagnostic plan to further characterize reproductive issues. May include sperm analysis, hormone levels, and histopathology of reproductive system. If suspect embryonic lethality, may also include timed mating followed by ultrasound diagnostics and/or histopathology and genotyping of embryos.	Sperm analysis is done using a Hamilton Thorne IVOS system. Parameters measured include total concentration, percent motility, percent rapid cells and morphology. Photographic documentation of abnormal sperm morphology is also available.
Characterization of Potential Embryonic Lethal KO Model	Timed matings are established and embryos are harvested at different stages of gestation for assessment.	Assessment may consist of genotyping to confirm presence of KO fetus, histopathology, and <i>in vitro</i> culture.
DEXA Scan	Measurement of body composition (i.e. percent body fat and bone density).	GE Lunar Corporation PIXImus2 DEXA Scanner. Specific region of interest can be analyzed.
Radiography	Assessment of organ size, bone density, skeletal malformations, and potential tumor burden.	Faxitron Specimen Radiography System MX-20/DX-50 with Digital Camera Faxitron X-Ray Co.
High-resolution Ultrasound Imaging	Multiple applications including non-invasive <i>in vivo</i> visualization of embryos (E5.5) through adult mice. 30 microns image resolution of anatomical and physiological structures. Microcirculatory and cardiovascular blood flow assessment. Visualization and measurement of atherosclerotic plaque in appropriate models.	VisualSonics Vevo 660 High-Resolution <i>in vivo</i> Imaging System with multiple scan heads including M-Mode Capture and Pulsed Wave Doppler
Electrocardiogram	ECG is measured in conjunction with Ultrasound screen.	Pulsed Wave Doppler includes ECG trace.
Grip Strength Measurement	Quantitative analysis of limb muscle strength.	San Diego Instruments (SDI) Grip Strength System.
Pain Sensitivity: Hot Plate Analgesia Meter & Tail Flick Analgesia Meter	Measurement of thermal pain response: Tail Flick Test - measures reflexive, spinally mediated response to noxious stimulation. Hot Plate Test - centrally mediated response to pain that requires neurological processing and results in specific behavior.	SDI Hotplate Analgesia Meter for screening of narcotic type analgesic drugs. SDI Tail Flick Analgesia Meter measures pain sensitivity in mice and rats as they respond to the application of heat to a small area of their tails.
Activity Level - Open Field System	Measurement of activity and movement including distance traveled, total number of movements, time spent in center of open field, and time spent in perimeter of open field.	SDI Flex-Field/Open Field Activity System tracks activity in X & Y dimensions including "nose pokes" in floor holes. Test paradigms include central vs. peripheral counts, fine movements vs. ambulation, habituation of activity, novel objects, etc.
Cognitive Analysis: Holeboard System and Barnes Maze	Holeboard System: Spatial learning/memory system used for testing animal's reactions to food rewards based on varying conditions. Barnes Maze: Spatial learning/memory task system using reinforcement and escape from a brightly lit platform into a dark, recessed chamber.	SDI Holeboard System is a fully automated spatial learning/memory testing system using food rewards. SDI Barnes Maze is similar to the Morris Water Maze and the Radial Arm Maze but without dietary restriction and less stress.
Motor Coordination and Balance: Rotarod	Rotarod: Rotating cylinder measures motor coordination and balance.	SDI Rotor-Rod System measures locomotor coordination motivated by fear of falling.

Gait Analysis - Footprint Pattern	Ataxia and gait abnormalities are quantitated from the footprint pattern. Measurements include distance between strides, variability in stride length and linear axis, base width between left and right hind paws, base width between right and left forepaws, and fore/hind paw overlap.	Paws are dipped in non-toxic ink/paint and mouse is placed at end of a dark tunnel lined with white paper. Footprint pattern is then analyzed.
Acoustic Startle Reflex	Measurement of gross hearing ability and of auditory threshold.	SDI SR Screening System for acoustic startle reflex, startle habituation and pre-pulse inhibition testing.
Blood Pressure	Noninvasive tail cuff measurements of systolic blood pressure and heart rate for both mice and rats.	Visitech Systems BP-2000 Blood Pressure Analysis System for both mice and rats.
Respiratory Functions	Measurement of ventilatory parameters such as respiratory rate, tidal volume and other respiratory functions including bronchoconstriction in conscious, unrestrained mice.	Whole body plethysmograph from Buxco Electronics.
Metabolism Measurements	Noninvasive metabolism measurements, including metabolic rate, respiratory quotient, O ₂ concentration and CO ₂ concentration, while simultaneously deriving ventilatory parameters in mice.	Whole body plethysmograph from Buxco Electronics with metabolism analyzer.
Pathology	Equipment and/or Comments	
Necropsy	Gross evaluation, organ collection and gross photographs.	Standard screens include basic and extended organ analysis or we will execute investigator-designed customized screens. Board-certified Veterinary Pathologists oversee all aspects of this program and are available for consultation and design to help you customize a screen which best fits your model and experimental goals. Some specialized tests (e.g. coagulation parameters and hormone analysis) are available through the use of outside labs.
Histopathology	Routine H & E staining and photomicrographs. Special stains and techniques are available.	
Clinical Pathology	Clinical Chemistries, urinalysis, CBC, differential and platelet count.	
Specialty Pathology	Histomorphometry, immunohistochemistry, and <i>in situ</i> hybridization can be used to assess functional changes.	
Other Services	Equipment and/or Comments	
Plasma Biomarker Analysis	Multi-Analyte Profiles (MAP) for a comprehensive evaluation of the response to disease, drugs, and the environment in laboratory animals. Assays to measure markers of infectious disease, autoimmunity, cardiovascular risk, as well as hormones, cytokines/chemokines, and acute phase reactants run on 50 ul of plasma.	Utilizing novel technology from Rules-Based Medicine one can accurately and precisely measure many biomarkers in a very small size. The small sample size allows <i>in vivo</i> screening at multiple time points over the course of the animal's life. This can be used to assess disease progression with or without the addition of drug treatment, diet modification, etc.
Colony Health Assessment	Standard and customized quarantine protocols define and confirm colony health status using sentinel mice and/or principal colony members.	Both standard and customized protocols are available to screen for the presence of adventitious viruses, bacteria, and parasites.
Background Strain Characterization	Use of nucleotide repeats (microsatellites) mapped to specific locations on each chromosome to evaluate genetic polymorphism, scanning all 19 autosomes and the X chromosome at approximately 15 centimorgan intervals. The Y chromosome is fixed through breeding.	This technology can be used as part of a marker-assisted accelerated backcrossing (MAX-BAX) or speed congenics program. By selecting individuals with the highest percentage of the preferred genetic background at each generation, one can reduce the time it takes to make a congenic strain in half.
Zygosity Testing	Assay allowing determination of two-fold difference in copy number between hemizygote and homozygote using quantitative PCR (Q-PCR).	We strongly encourage confirmation of zygosity of all breeders obtained from a collaborative source prior to large-scale colony expansion.
Expression Testing	Quantitative reverse transcription PCR (QRT-PCR) methods used to quantify the steady-state level of mRNA expression from a transgene or knockout construct.	Custom designed to best meet your experimental goals and characterize your model.
Transgenic Molecular Phenotyping Package	Utilizing Q-PCR, will determine transgene copy number and assay transgene expression levels within your genetically engineered mutant model.	The Molecular Phenotyping Package combines elements of zygosity testing and expression testing in a custom designed program to best fit your experimental needs.



CHARLES RIVER
LABORATORIES

1-877-CRIVER-1 • www.criver.com