The MU Neurobehavioral Core Facility: Progressing from Molecules to Behavior

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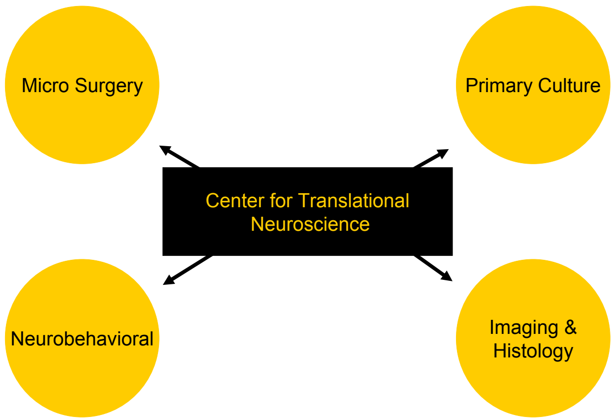
The Center for Translational Neuroscience Research at the University of Missouri has been established to promote understanding and treatment of neurological disorders, provide centralized facilities that encourage sharing of technology and expertise, and foster greater productivity through synergy.

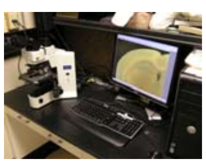
The Center consists of four cores that provide expertise and state-of-the art research facilities.



Why Study Behavior?

An important component of modern neuroscience research is the ability to measure systematically and objectively different aspects of behavior. Behavioral analysis is crucial to a strong neuroscience research program because it evaluates the impact of molecular or neurochemical changes on the functioning of the entire organism.

A unique strength of the MU Translational Neuroscience Center is the presence of "bench" scientists working at the molecular level in pathology, biochemistry and genetics in collaboration with neurobehavioral experts. The Center's modern facilities and trained personnel are available to the MU neuroscience community to help design, conduct and evaluate behavioral research. This will help translate research from the molecular laboratory to the human clinic.



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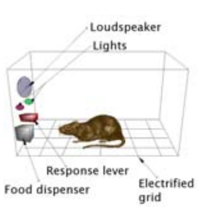
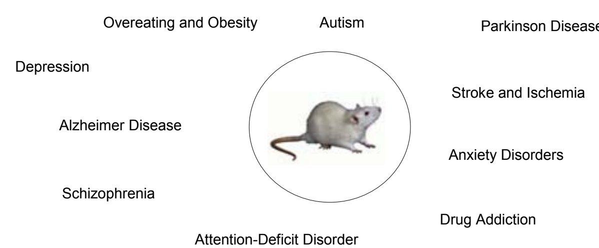


What Can Animal Behavior Tell Us About Humans?

Behavioral research can be used to validate the role of a neruoscientist's specific molecular target (e.g., receptor, gene or enzyme) in a particular behavior (e.g., emotions, learning and memory or locomotor activity) and subsequently create whole systems that a neuroscientist can use to study a particular pathological state (e.g., depression, drug addiction or obesity).

Researchers in the Neurobehavioral Core have expertise in behavioral techniques that model many pathological states in humans.

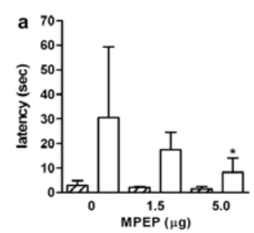


Examples of Research Techniques Used at the Core Facility

Barnes Maze

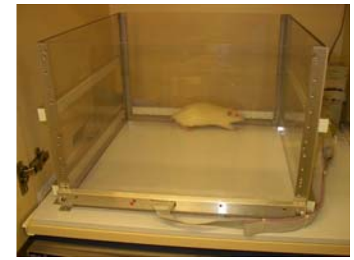
The Barnes maze is a tool used in psycholgocial laboratories to measure spatial learning and memory. Ongoing work by Center researchers with transgenic mice has identified a role for a specific in the learning and memory impairments found Alzheimer disease and other degenerative disorders.

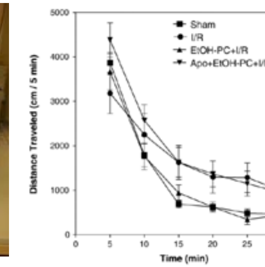
Shuttle/Avoidance Box



Avoidance learning is the process by which an individual learns a behavior or response to avoid a stressful or unpleasant situation. Avoidance learning is subject to drug treatment (e.g., a "cognitive enhancer") or neurodegeneration (e.g., Alzheimer disease). For example, in studies performed by Center researchers, infusion of a glutamate receptor blocker into the brain decreases learning about an aversive outcome (shock; Simonyi et al [2007] Neurobiol Learning & Memory 88: 305). These data suggest a role for this brain region in cognitive-degenerating diseases and a target for the development of anti-Alzheimer disease drugs.

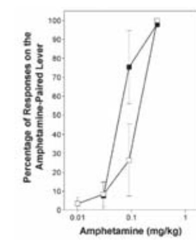
Locomotor Activity





In the locomotor activity procedure the ambulatory behavior of rodents is measured. Locomoto behavior is subject to change as a result of drug treatment (e.g., methamphetamine injection) o neural insult (e.g., ischemia). For example, in studies performed by Center researchers, ischemia/reperfusion induces a noticeable increase in locomotor behavior in gerbils; however, pretreatment with alcohol can prevent I/R-induced hyperactivity (Wang et al [2007] Free Radica Biol & Med 43: 1048). This suggests that alcohol could be protective against stroke-induced behavioral damage, findings supported by molecular neuroscience and epidemiological researc

Operant Responding



Operant responding is based in learning theories proposed by Thorndike and Skinner where responses (e.g., lever pressing) result in, or prevent, the delivery of an outcome (e.g., food or shocks). As a result, behavior can be shaped and modified based on the response-outcome relationship. For example, the mild psychostimulant modafinil increased the psychological prop of amphetamine in studies performed by Center researchers (Dopeheide et al [2007] Eur J Pharmacol 568: 112). This suggest that modafinil could be a treatment for methamphetamine and dependence.

Rotarod

Rotarod treadmills are used to assess the effect of drugs, motor coordination and fatigue resistance on mice and rats Ongoing work by Center researchers has found that botanical phenols can minimize ischemia/reperfusion-induced impairments in rotarod performance. This suggests phenols could aid recovery following stroke.

Want to Learn More About the Center or Behavioral Research at M

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