

Johns Hopkins Engineering

Methods in Neurobiology

Introduction to Behavioral Tests
in Neurodegeneration



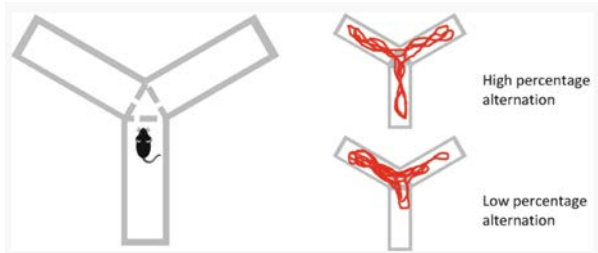
Examples of behavioral test used in neuroscience and neurodegeneration

Test	Species	Special Considerations
<i>Basic motor and sensory function</i>		
Homecage activity	Rat, mouse	Can be done acutely or over 24-hr cycle
Rotarod	Mouse	Requires training
Hot plate (nociception)	Rat, mouse	Care must be taken to avoid injury
<i>Learning and memory</i>		
Morris water maze	Rat, mouse	Requires multiple days of training
Barnes maze	Rat, mouse	Requires multiple days of training
Radial arm maze	Rat, mouse	
Object recognition	Rat, mouse	
Fear conditioning	Mouse	Can be cued or contextual, requiring different neural circuits; subject to extinction and reinstatement
<i>Social behavior</i>		
Social interaction/preference	Rat, mouse	Requires a conspecific target, isolation housing is recommended prior to testing
Sexual behavior	Rat	Should be assessed during dark cycle
Maternal behavior	Rat, mouse	

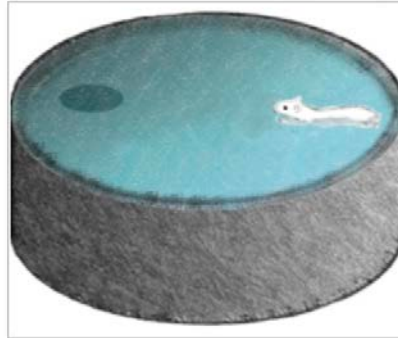
<i>Anxiety and depression-like behaviors</i>		
Forced swim test	Rat, mouse	Rats typically require two swim sessions for sufficient immobility
Tail suspension test	Mouse	
Elevated plus maze	Rat, mouse	Highly sensitive to prior handling/testing
Light/dark box	Mouse	
	Rat, mouse	Responses vary by age, should be conducted in a soundproof chamber
Prepulse inhibition	Rat, mouse	Similar to acoustic startle
<i>Reward</i>		
Conditioned place preference	Rat, mouse	Requires multiple training sessions; subject to extinction and reinstatement
Sucrose preference	Rat, mouse	
Self-administration	Rat, mouse	Most commonly done in rats; various reinforcers can be used; subject to extinction and reinstatement

Behavioral test to assay learning and memory in ND

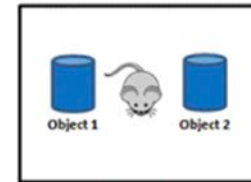
Y Maze



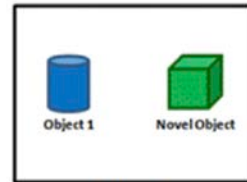
Morris Water Maze



Novel Object Recognition



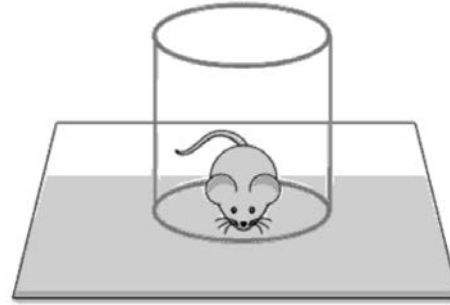
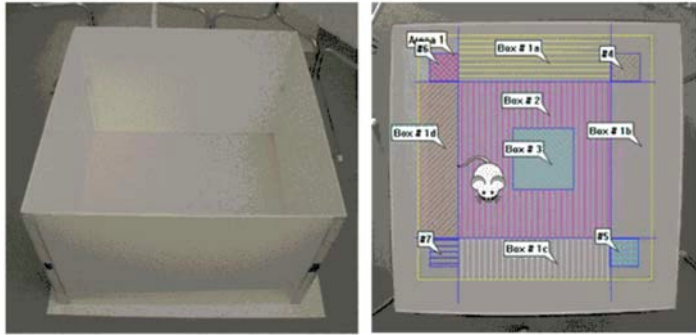
Training Day



Testing Day

Behavioral test to assay motor function in ND

Open Field task



Cylinder Test

Limb clasp



References

Slide	Reference
2	Teegarden, S. 2020 Behavioral Phenotyping in Rats and Mice. Labome https://www.labome.com/method/Behavioral-Phenotyping-in-Rats-and-Mice.html
3-4	Behavioral and functional neuroscience laboratory. Stanford Medicine. https://med.stanford.edu/sbfnl/services/bm/sm/CylinderTest.html

