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# OPEN ACCESS



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# Levodopa-induced dyskinesia mouse model

In 1 collection

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#### **ABSTRACT**

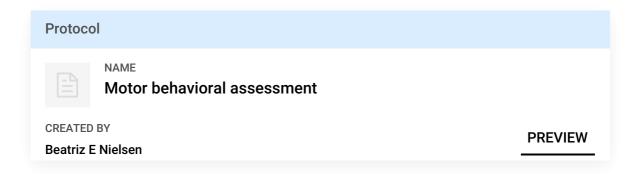
This protocol describes a mouse model of levodopa-induced dyskinesia (LID) and the behavioral assessment of its motor deficits. It includes open field locomotor activity and scoring of abnormal involuntary movements (AIMs). **Keywords: ASAPCRN** 

## Levodopa-induced dyskinesia mouse model development

1 Generate unilaterally high dose 6-OHDA-lesioned mice (protocol linked below):



2 3 weeks after 6-OHDA injections, verify unilateral dopamine depletion by assessing forelimb use assymetry in the cylinder test (protocol linked below).



- 3 Start daily intraperitoneal (i.p.) injections of 2.0 mg/kg of L-DOPA (3,4-dihydroxy-L-phenylalanine) plus 12 mg/kg of benserazide hydrochloride dissolved in sterile saline for 7-8 days.
  - Behavioral motor tests (open field and dyskinesia) are formally conducted in different days at the end of the treatment (days 7 and 8).
  - Acute brain slices for electrophysiology recordings must be prepared 30min − 1 h after the last L-DOPA administration, while mice are still in the dyskinetic period.

### **Expected result**

Contralesional rotations and levodopa-induced dyskinesia (LID) abnormal involuntary movements (AIMs) typically begin within 00:10:00 of injection, last approximately 02:00:00, and terminate spontaneously.

# **Open field: locomotion**

1h

- **4** Set up behavior room:
  - Place up to four clear plastic cylinders (25.4 cm diameter; 30.5 cm height) with a mat below and an overhead mounted camera (organized in two rows 2x2).
  - Set up lighting minimizing total room light, reducing shadows within the chamber, and ensuring camera is able to detect the mice.
  - Clean each cylinder with 70% ethanol.
  - Turn on camera, adjust zoom and focus.
  - Capture a background video or image before placing the mice in the cylinders.

#### Habituation:

- Bring mice to the behavior room in their home cages and leave undisturbed for at least 30-40 minutes.
- No previous habituation to the open field arena is required.
- Inject i.p. the last dose of L-DOPA and benserazide (day 7 or 8) and place mice into cylinders (one mouse per cylinder).
- 6 © 00:30:00 after last L-DOPA injection, start video recording for another 00:30:00 period.

1h

- 7 Remove mice from cylinders and return them to home cage.
- 8 Clean the cylinders between mice with 70% ethanol and allow to fully dry before starting another group of mice.

**9** Post-hoc analysis:

Run tracking EthoVision software to calculate the following parameters:

- Total distance traveled.
- Mean velocity.
- Rotations (threshold: 90-180°, minimum distance traveled: 2 cm).

Equipment	
EthoVision	NAME
Software	TYPE
Noldus	BRAND
RRID:SCR_000441	SKU
https://www.noldus.com/ethovision-xt	LINK
RRID:SCR_000441	SPECIFICATIONS

# Dyskinesia: Abnormal Involuntary Movements (AIMs) score

Dyskinesia is assessed using the Abnormal Involuntary Movement score (AIMs) (Cenci and Lundblad, 2007).

### **CITATION**

Cenci MA, Lundblad M (2007). Ratings of L-DOPA-induced dyskinesia in the unilateral 6-OHDA lesion model of Parkinson's disease in rats and mice..

LINK

https://doi.org/10.1002/0471142301.ns0925s41

### Set up behavior room:

- Place clear plastic cylinders (25.4 cm diameter; 30.5 cm height) with a mat below.
- Clean each cylinder with 70% ethanol.
- Handheld camera (cell phone camera is sufficient).

### Habituation:

- Bring mice to the behavior room in their home cages and leave undisturbed for at least 30-40 minutes.
- 11 Place mice into the cylinders (one per cylinder).

Record 00:01:00 video for each mouse (time= 0 min).

- 1m
- Inject i.p. the last dose of L-DOPA and benserazide (day 7 or 8) in the first mouse. After

  00:01:00 inject the second mouse and so on until all mice are injected (maximum of 20 mice in 20 minutes).
- 1m
- 14 © 00:20:00 after the first injection, start 00:01:00 video recording mice following the same order as injections in step 13.
- 21m
- Repeat step 14 every 00:20:00 for a total period of 02:00:00 (There must be videos recorded for 0 min, 20 min, 40 min, 60 min, 80 min, 100 min and 120 min time points for each mouse).
  - 2h 20m

- Return each mouse to its home cage. Clean cylinders and mats with 70% ethanol.
- 17 Post-hoc analysis:

Score for each of the three body segments: axial, limb, and orolingual (ALO) AIMs. The AIM scale ranges from 0 to 4 for each body segment during a 1-minute period.

For each segment:

- 0 = normal movement.
- 1 = abnormal movement for <50% of the time.
- 2 = abnormal movement for >50% of the time.
- 3 = abnormal movement for the entire period that can be interrupted by sensory stimuli (e.g. hitting the cylinder).
- 4 = continuous abnormal movement, uninterruptible.

### Note

Take into account that rotations with all four limbs on the floor is not scored as axial dyskinesia. The mouse must be on 2 feet and with its trunk twisted.

Total AIM score is calculated as the sum of scores for AOL, being 12 the maximum score in 1 minute.

An integrated AIM score can be calculated as the area under the curve (AUC) in a plot of total AIM score vs time for the total duration of the dyskinetic episode (2h).