Sleep Deprivation and Motor Learning

PRESENTER:
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BACKGROUND

- Sleep is important for motor learning
- Acute sleep deprivation is hypothesized to impair motor learning
- We are testing the hypothesis using the Pasta Matrix Reaching Task and Ladder Rung Walking Test to assess motor learning deficits following sleep disruption
- These two tests assess walking, limb placing, inter-limb coordination, and skilled forelimb reaching

METHODS

PASTA MATRIX REACHING TASK

Pilot Testing Completed:

1. Habituated mice to pasta and apparatus
2. Recorded and trained mice to reach for pasta through the apparatus slit
3. Assessed limb preference and number of pasta pieces grabbed and broken

LADDER RUNG WALKING TEST

Pilot Testing Completed:

1. Habituated mice to ladder apparatus
2. Assessed and scored walking pattern on ladder rungs

To be completed next:

1. *Gentle touch with paintbrushes to maintain wake to assess learning curve and performance on Pasta Matrix Reaching Task and Ladder Rung Walking Test*

EXPECTED RESULTS

- Performance on the reaching and ladder tasks will be decreased following acute sleep deprivation

DISCUSSION

- This has the potential to inform future studies of sleep deprivation, motor learning and electroencephalography (EEG)
- Future research may transfer the knowledge to an neurodegenerative disease mouse model to assess acute sleep deprivation on motor learning performance
- Potential for translation of knowledge for understanding the importance of sleep in humans

Sleep deprivation is predicted to impair motor learning in mice.

Figure 1. Side view of Pasta Matrix Reaching Task apparatus. Mouse reaches through the slit to obtain pasta which assesses skilled forelimb reaching.
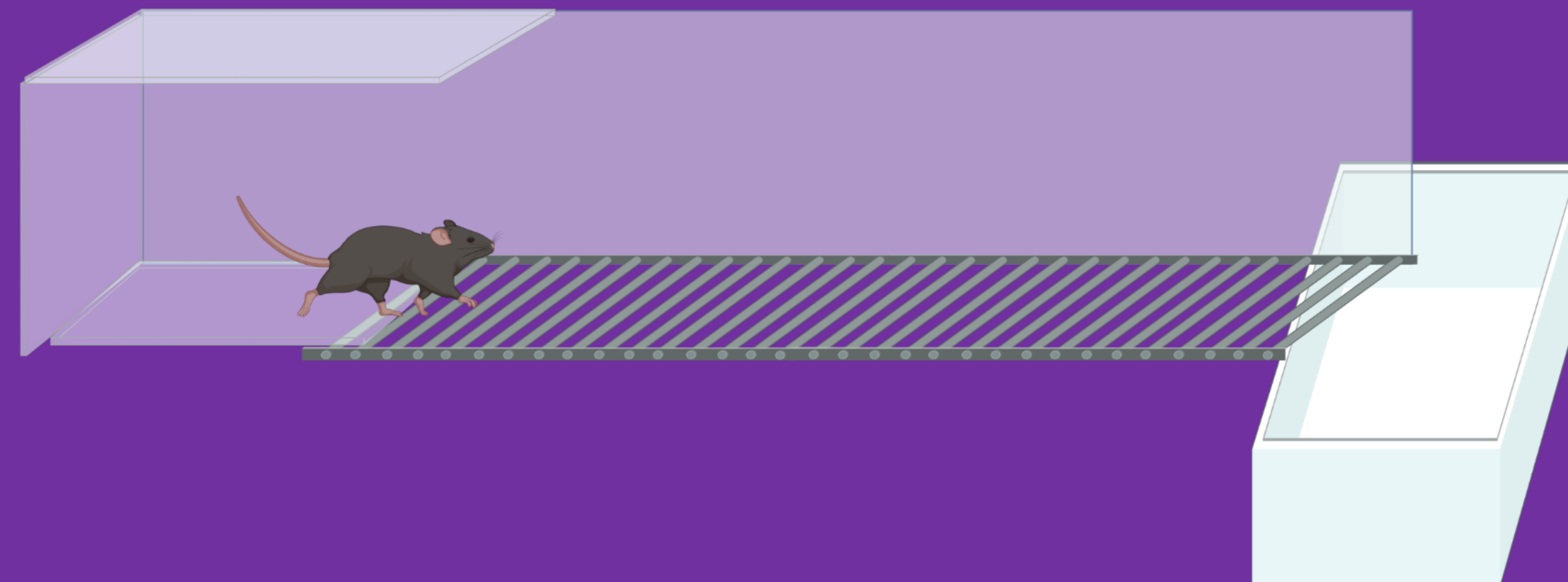

Figure 2. Side view of Ladder Rung Walking Test apparatus. Mouse walks across the ladder from start to home cage which is scored in a video analysis to assess walking ability.
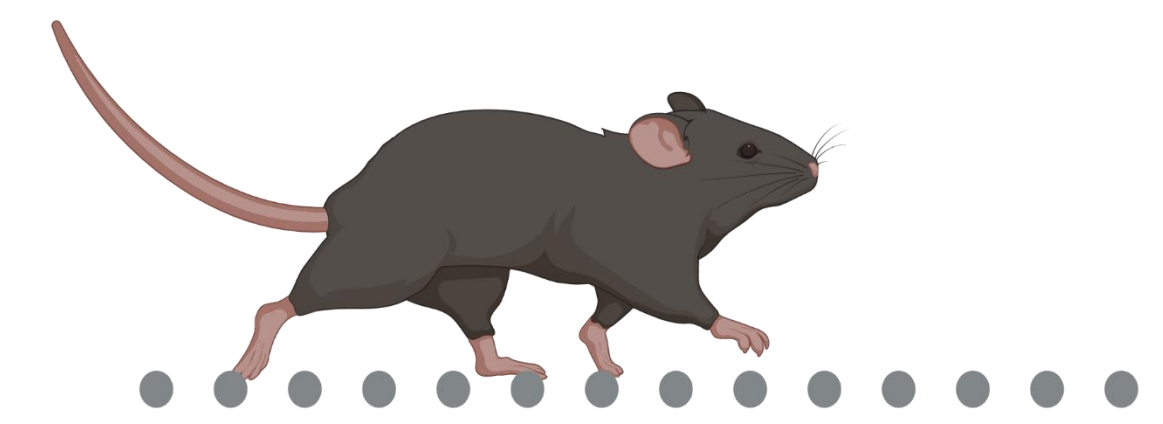

Figure 3. Side view of Ladder Rung Walking Test apparatus video recording to assess walking ability using a 7-point scale (adapted from Metz & Whishaw, 2002)

Figure 4. Front view of Ladder Rung Walking Test apparatus scored as a 0, total miss on the 7-point scale (adapted from Metz & Whishaw, 2002)

REFERENCES

Metz, G. A., & Whishaw, I. Q. (2002). Cortical and subcortical lesions impair skilled walking in the ladder rung walking test: A new task to evaluate fore- and hindlimb stepping, placing, and co-ordination. *Journal of Neuroscience Methods*, *115*(2), 169–179. https://doi.org/10.1016/s0165-0270(02)00012-2

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