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The Effects of Voluntary Physical Exercise on Hedonic Drive and Hypothalamic Orexin in CD-1 Mice

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Purpose

The purpose of this study is to explore the direct relationship between physical exercise, hedonic drive, and Orexin. We hypothesize that wheel running will positively influence central Orexin, as well as hedonism in mice.

Background

- *Physical exercise* is reinforcing and rewarding.
- *Physical exercise* elicits the release of endorphins, dopamine and many neuropeptides that increase motivation to continue exercising.
- Physical exercise elevates *hedonic behavior*: an organism's propensity to seek out pleasurable stimuli.
- *Orexin*, also referred to as *hypocretin*, is a neuropeptide produced in the lateral hypothalamus that modulates sleep, arousal, hunger, and reward.
- *Orexin* has many projections, stimulating an array of brain regions, affecting many behaviors.
- *Orexin* projects to the mesolimbic pathway, which is highly involved in reward.
- *Orexin* is thus a target for therapies aimed at affective disorders, addictive disorders and metabolic disorders.

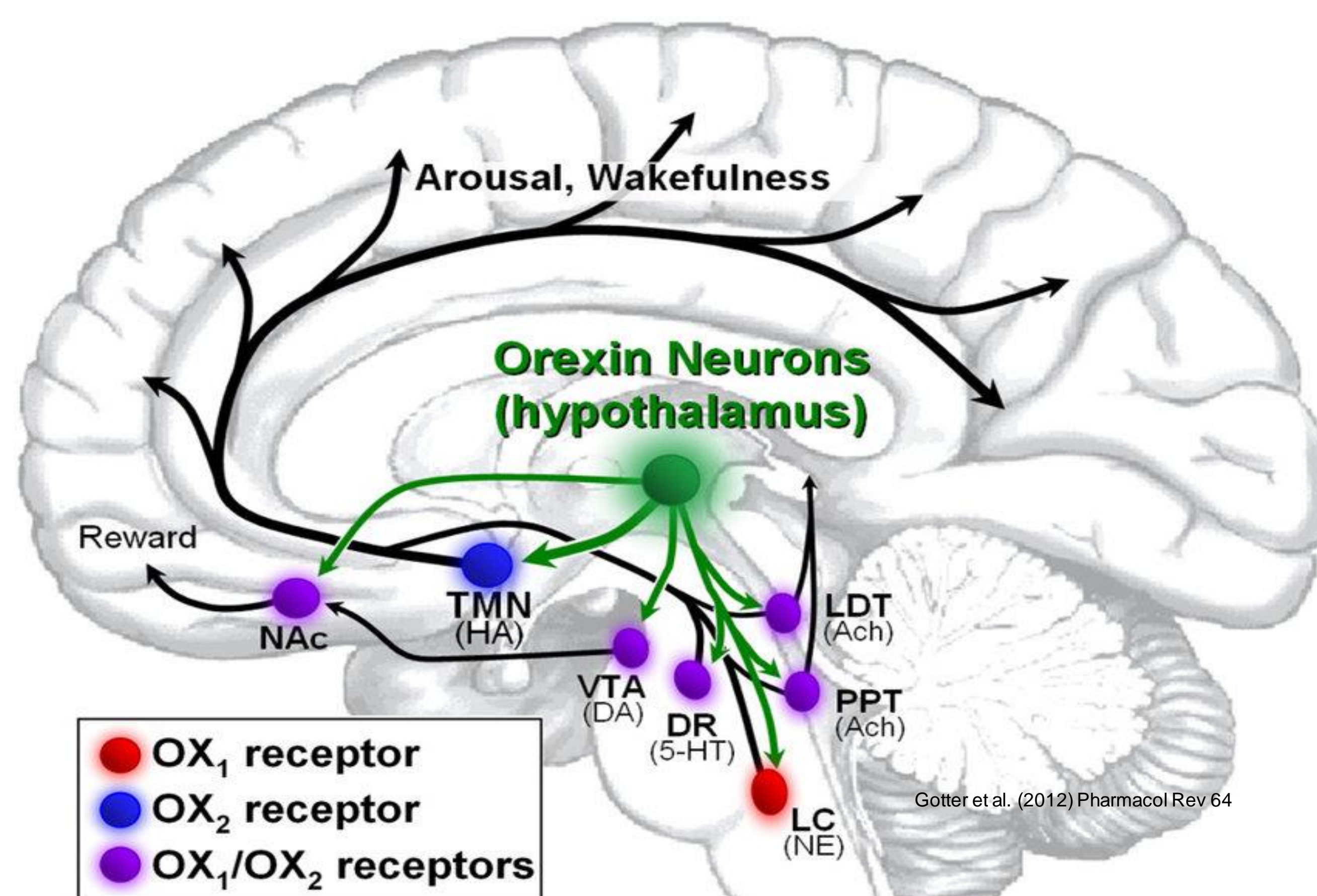


Figure 1. Central pathways of orexin

Methods

Experimental Parameters

- 23 male CD-1 outbred mice, 16 pair-housed throughout the course of the experiment. Remaining 7 were separated due to aggression
- Mice were split into a control and an experimental group, with only the experimental group having access to a running wheel
- Mice remained under experimental conditions for 7 weeks, followed by 6 days of behavioral testing, then followed by tissue collection

Home Cage and Behavioral Testing



Figure 2. Experimental cage with pair-housed mice and two running wheels.

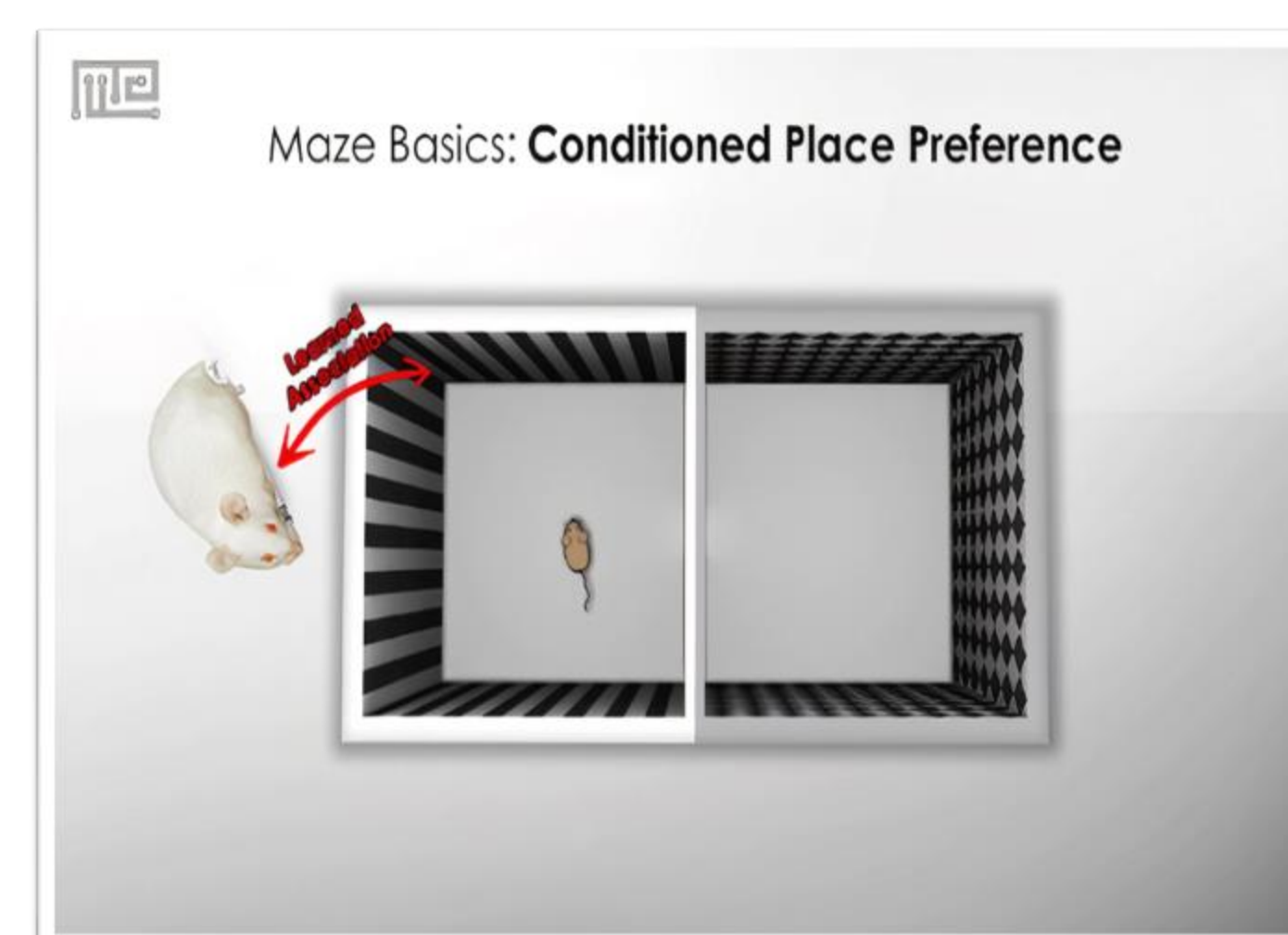


Figure 3. Conditioned Place Preference Apparatus. Bipartite chamber with female mouse urine

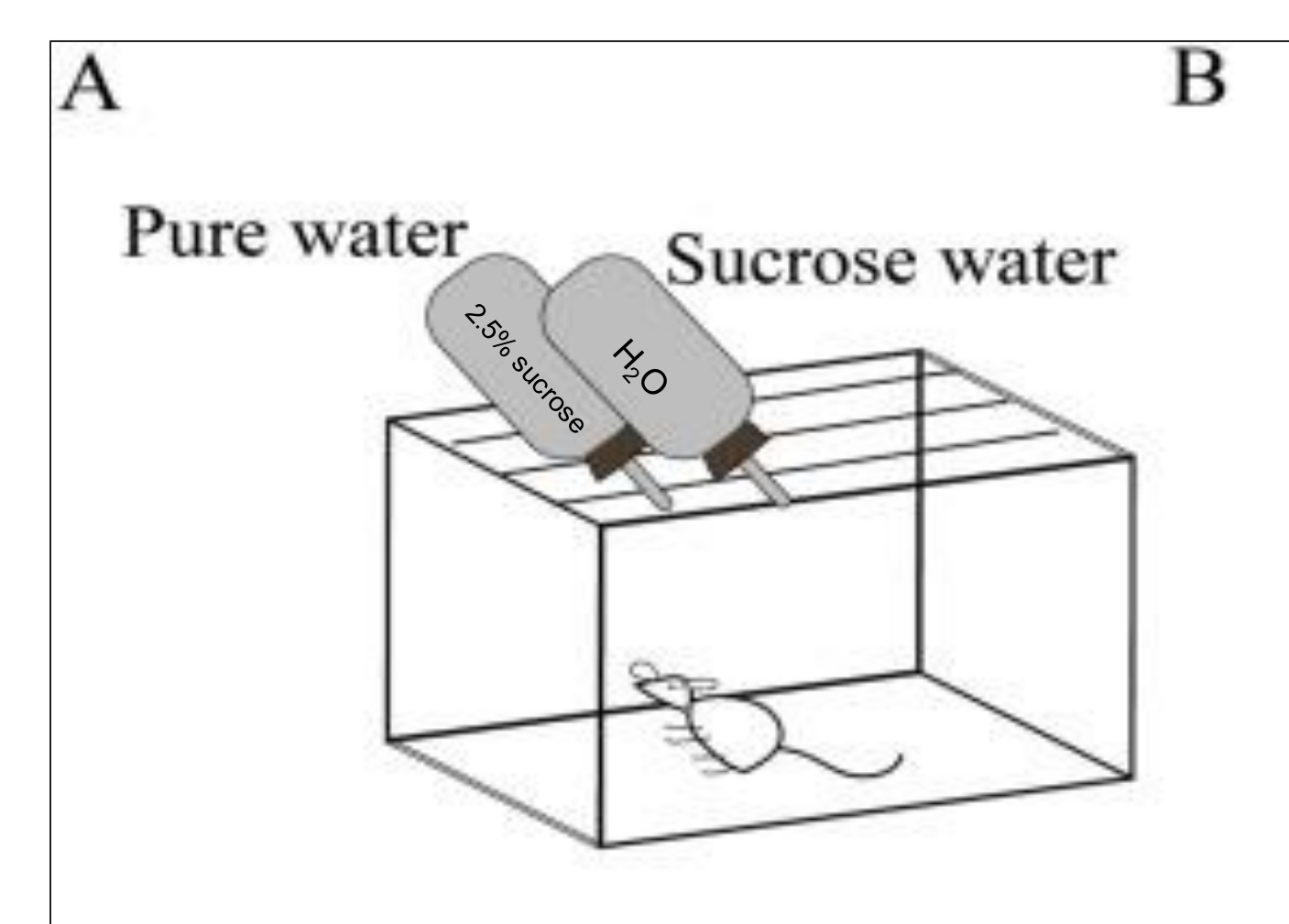


Figure 5. Sucrose Preference Test Apparatus. 1 bottle of 2.5% sucrose, 1 bottle of distilled water.

Physiological Measurements

- We measured orexin levels in the lateral hypothalamus, as well as dopamine receptor expression in the nucleus accumbens via TH concentration using qPCR methods with a TaqMan multiplex setup.
- We measured corticosterone levels from plasma samples using ELISA assay.

Results

- Coming soon!

Discussion

Limitations & Future Research