Mouse Behavior in Virtual Reality System under Optogenetic Manipulation via UCNPs

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Method Article

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Abstract

It describes the motor test of mouse via virtual reality system.

Introduction

Reagents

Equipment

Titanium alloy head bar (about 5 × 30 mm), dental cement (C&B Metabond, Parkell, US), VR system (JetBall TFT, Phenosys Inc), lasers of 808, 980 and 1532 nm.

Procedure

1. Mouse was injected with viruses in M2 area.
2. Titanium alloy head bar was implanted opposite to the virus injection side with two skull screws and dental cement before behavior training.
3. After 3-day recovery, mice were trained to run on a jetball with one-dimension corridor or two-dimension open field scene displayed on VR system screens. The one-dimension corridor was 200 m long and two-dimension open field was 20 m x 20 m.
4. Head-fixed mice ran on the jetball for 2 min per session under the conditions of no NIR light, NIR light at 808 nm, 980 nm, 808&980 nm, and 808&980&1532 nm, respectively.
5. For independent multi-color modulation, the power density of NIR light at 980 nm was increased while the power density of NIR light at 808 nm was constant.
6. Mice would rest for more than 5 min for next trials, and the trial orders were randomly chose. Running distances of mice were recorded and measured.