

Spherical Mount for Head Fixed Behavior

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Technology description

Researchers in the Department of Neuroscience, Princeton University have developed a unique apparatus which allows for head fixed experiments without using anesthesia and without inducing stress to the animal. The apparatus allows for mice or rats to run and behave freely while fixed in the laboratory. The animal runs on a styrofoam ball in a nearly unhindered way, while at the same time the head is fixed.

This device has use in behavioral neuroscience research where there is a great need to allow the animal to behave freely while fixed in the laboratory. The Spherical Mount for Head Fixed Behavior will allow the researcher to insert electrodes in the brain without miniaturizing all the instruments to allow the animal to carry them by itself. It is far easier to insert electrodes in the animal fixed than freely behaving. In order to record brain activity in a freely behaving animal, the recording device, whether a microscope or electrode array may need to be miniaturized and made portable. Removing this restriction allows many more types of experiments.

This apparatus also solves several problems encountered in these types of experiments. The spherical mount for head fixed behavior allows for the environment to be better controlled. In comparison to having the animal run around in an arena, the floor supporting the animal is a styrofoam ball, so can't provide fixed stable landmarks like a regular wood floor would. To control environmental cues, the spherical treadmill is a much superior paradigm than letting the animal freely behave. Other methods of restraint do not fix the head so rigidly making it less appropriate for imaging or recording. For example depriving the animal of water encourages the animal to keep its head fixed, but there still are residual motions. Another solution used is to hold the animal fixed in a tube restraining the animal. This is a very stressful paradigm for rodents, and greatly restricts the behavior. This prevents the animal from behaving normally. Furthermore experiments performed atPrincetonsuggest that the navigation system used by the animal is impaired under these circumstances.

The immediate application for the spherical mount for head fixed behavior would be for recording brain activity and eliminating environmental cues.

Institution

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