Title

Summary of a study of changes in behaviours and brain chemistry in rats that have been given a psychoactive drug that induces schizophrenia-like symptoms in humans.

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Introduction:

The motivation for this research was to advance studies into behavioural and physiological changes in rats caused by the anaesthetic phencyclidine (PCP, commonly known as the recreational drug “angel dust”). This type of study is common when investigating how existing anti-psychotic drugs work, or developing new anti-psychotic drugs.

Title of Study:

Effects of withdrawal from repeated phencyclidine administration on behavioural function and brain arginine metabolism in rats

Source of Study:

Pharmacology, Biochemistry and Behavior 153 (2017) 45–59

Research laboratory:

University of Otago, Dunedin, New Zealand

Approvals:

No evidence of a specific approval for this study was given, but it was claimed that all experimental procedures were carried out in accordance with the regulations of the University of Otago Committee on Ethics in the Care and Use of Laboratory Animals.

Funding:

No funding information was given but the Department of Anatomy, University of Otago supported the project, and the technical staff in the Department of Anatomy and School of Pharmacy assisted. One researcher was a recipient of the Summer Studentship Scholarship from the Brain Health Research Centre, University of Otago.

Purpose:

To see how different withdrawal durations after repeated PCP administration affect behaviour, residual behaviour, and brain arginine metabolism in young male rats. PCP produces schizophrenia-like symptoms in humans, and changes in arginine related chemical processes are associated with schizophrenia in humans.

Method:

Two groups of 18 male rats were used in the study. One group was injected with PCP dissolved in saline solution once daily for 12 days, and the other group was injected with saline only, as control animals. The two groups were then divided into four groups of 9 so that two experiments could be carried out. The experiments studied the behaviours of the rats when faced with the following tests:

Y-maze. In this test a rat is placed by a tunnel with three arms and its exploratory behaviour is recorded.

Open field. In this test a rat is placed in the centre of an open area and its exploratory behaviour is recorded.

Object recognition. A rat is presented with two objects to examine. After a period, one of them is replaced with a new object. The rat's learning and memory behaviour is recorded.

Forced Swimming. A rat is placed in a tank two thirds filled with water and its behaviour is recorded, and the time taken before it gives up swimming (indicating despair).

Water maze test. A rat is taught to find platforms, one of which is submerged, in a tank of water, and its learning and memory behaviour is recorded.

Experiment 1: After a period of 4 days when no injections were given, the rats were tested in the Y-maze, open field, object recognition, forced swimming for 15 minutes and 5 minutes, and water maze test. Three days after completion of testing, the rats were killed.

Experiment 2: After a period of 24 hours when no injections were given, the rats were tested in the Y-maze and open field. Two days after completion of testing, the rats were killed.

After each experiment, the rats were killed by decapitation (cutting off their heads) and their brains were removed for the arginine metabolism study. No

anaesthetic or other pain management was given in case it affected the results of the brain chemistry analysis.

Results:

Statistical tools were applied to the data. There were differences in the behavioural scores for Y-maze and open field tests between 4 day (experiment1) and 24 hours (experiment 2) withdrawal periods showing impaired performance after 24 hours but not after 4 days. Changes in arginine metabolism were related to behavioural changes by regression analysis. However, the arginine metabolism products were different from those in human studies.

Conclusion:

Due to limitations of the study, further research is needed.

END OF SUMMARY

Comments:

A 2011 study of EEG during decapitation of rats suggests that unconsciousness occurs a few seconds after decapitation, and brain death 1 –2 minutes later. It claims decapitation is a “not inhumane” method of euthanasia. However, the same report states that in other studies decapitation as a means of euthanasia is not free from controversies, and is still not generally accepted as a humane means of killing (PLoS One. 2011; 6(1): e16514. Decapitation in Rats: Latency to Unconsciousness and the ‘Wave of Death’ Clementina M. van. Rijn, Hans Krijnen, Saskia Menting-Hermeling, and Anton M. L. Coenen).