

^{99m}Tc-HMPAO SPECT AFTER SINGLE AND REPEATED SUBANAESTHETIC KETAMINE IN HEALTHY DOGS

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Abstract

Ketamine has been proven to possess rapid antidepressant effects. The mechanisms responsible for ketamine's antidepressant effects remain unclear, but a possible explanation could be that ketamine interacts with regional cerebral blood flow (rCBF). Therefore, rCBF was evaluated after single and repeated ketamine infusion in dogs. The study involved three groups of dogs with one group receiving saline, one group receiving ketamine at a dose of 0.5 mg kg⁻¹, and one group receiving ketamine at 2 mg kg⁻¹ (n = 24). Each animal received in total five ketamine or saline infusions, with one week interval. Single Photon Emission Computed Tomography (SPECT) scans with ^{99m}Tc-hexamethylpropylene amine oxime were performed before the start of the infusions and 24 hours after the first (single) and last (repeated) infusion. In all groups, the total dose of ketamine or saline was administered intravenously over 40-minutes. A one-way repeated measure ANOVA was set up to assess perfusion index for each ketamine dose for the left frontal cortex (alpha = 0,05). The remaining 11 brain regions were post hoc assessed.

Perfusion index was significantly increased in the left frontal cortex and in the thalamus 24 hours after single (1.15 ± 0.03 and 1.18 ± 0.04 respectively) and repeated (1.15 ± 0.02 and 1.19 ± 0.05 respectively) ketamine compared to baseline (1.11 ± 0.02 and 1.15 ± 0.05 respectively) in the 2 mg kg⁻¹ group.

This dog model shows that subanaesthetic ketamine can increase neuronal perfusion and therefore alter neuronal function in brain regions involved in psychiatric disorders.

Ethical statement

This study was approved by the local Ethical Committee of the Faculty of Veterinary Medicine, Ghent University (EC 2015_130 and EC 2016_60) and all procedures were performed according to good animal practice.