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Evaluation of a novel rodenticide: acute sub-lethal effects of a methaemoglobin-inducing agent

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Abstract

In a series of experiments the welfare of para-*aminovalerophenone (PAVP) sub-lethally poisoned rats (*Rattus norvegicus*) was assessed. The experiments: (i) examined the acute methaemoglobin (MetHb) profile over time; (ii) refined the LD50 estimate for PAVP in adult female rats; (iii) developed and validated three neurological tests; and (iv) assessed rats for neurological deficit following prolonged methaemoglobinaemia. The results from the first three experiments were used to refine the sub-lethal study. In the sub-lethal experiment 20 rats were gavaged with a single dose of 40 mg kg^{-1} PAVP (based on an LD50 estimate of 43.3 mg kg^{-1}). Control rats (n = 10) were treated with the carrier only. Eleven (surviving) PAVP-treated rats and controls were assessed over a two-week period. Rats were tested for forelimb grip strength, stability on an inclined plane and the ability to remove tape wrapped around a forepaw in order to determine deficits in motor functions and sensorimotor integration. Signs of recovery began 3–6 h post-dosing, with all animals showing no outward signs of poisoning within 48 h, and over the 14-day post-treatment monitoring period they gained weight and increased their food consumption. There was no significant overall difference in performance between PAVP-treated and control rats in any of the three neurological tests. In the inclined plane test, performance of sub-lethally PAVP-poisoned rats appeared to be temporarily impaired with treated animals slipping at a lower angle than controls on day two. During the tape removal test, four PAVP-treated rats failed to remove the tape within the 3-min time limit on one occasion each (4/77 occasions) up to seven days post-dosing. The severity and duration of signs following acute sub-lethal PAVP poisoning appeared to be lower than those reported for existing rodenticides. It is likely that the results presented in this study extend to other MetHb-inducers.*

Keywords: *animal welfare, hypoxaemia, methaemoglobin (MetHb), methaemoglobinaemia, rat, sub-lethal*