



Journal of Interdisciplinary Cycle Research

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Circadian Variation of the Atropine Effect on the Running Performance of Mice Treated with 1,2,2-Trimethylpropylmethylphosphonofluoridate (soman)

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The effect of atropine on the running performance of mice impaired by the cholinesterase inhibitor soman and its circadian variation was investigated. A rotating (14 rpm) mash wire drum, 20 cm in diameter, was used. Prior to the experiment and after the running period (60 min) a neurologic screening program was performed. Various parameters were checked in each animal and the results were summarized to five scores (reflexes, activity, muscle strength, autonomic reactions and behavior). Seven animals per group, attributed at random, received either 0.9% saline s.c. and i.p., 50% of the LD₅₀ of soman s.c. and saline i.p. or 50% of the LD₅₀ of soman s.c. and atropine (10 mg/kg) i.p., respectively, in a double-blind procedure. The number of animals unable to run the full time period of 60 min and the running time were recorded. The circadian variation was tested by performing the experiment at six equidistant time points over the 24 h scale. The results were analyzed according to the cosinor method. No significant circadian variation in the running performance was observed in mice receiving saline (control animals) or soman alone. The controls exhibited a prominent 24 h rhythm only in the "activity" score. In mice treated with soman alone distinct circadian variations in all scores could be verified. In animals receiving soman and treated with atropine a marked improvement of the running performance, compared to soman alone, was observed. The effect showed a significant 24 h rhythm with its maximum towards the end of the activity period (5:45 a.m. = 22:45 HALO). There was also an indication for a 12 h period. A paralleled significant variation of all neurologic scores was also observed in these animals, most striking in the "activity" score.