The Automated Tail Suspension Test: A Computerized Device for Evaluating Psychotropic Activity Profiles

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Animals when placed in water from which there is no escape will, after initial attempts to escape, adopt a characteristic immobile posture "behavioural despair."1–3) Another test, has more recently been proposed where immobility is induced in mice simply by suspending them for short periods by the tail.4) This test has been automated (ITEMATIC-TST)5 and measures two parameters: duration of immobility and the power of the movements.5)

The present paper will describe some results obtained with this apparatus which suggest that the automated tail suspension test would be useful for characterising the behavioural activity of different kinds of psychotropic compound.

Methods: The experiments used male NMRI mice, weighing 22–24 g obtained from the Centre d'Elevage Roger Janvier (France). Each experimental group contained 10 mice.

Testing consisted of suspending each animal in the apparatus using scotch tape and measuring the total duration of immobility and the power of the movements during a 6 min test. Six animals could be tested at one time and the randomisation schedule, behavioural measurements and statistical analysis (Dunnett's t-test) were carried out automatically by the ITEMATIC-TST. The minimal effective dose (M.E.D.) was the lowest dose exerting a statistically significant effect.

Results: The results obtained with desipramine, citalopram, clorgyline, diazepam, haloperidol and viloxazine are shown in Fig.

The tricyclic antidepressant desipramine caused a clear decrease in the duration of immobility and an increase in the power of the movements from the dose of 1 mg/kg i.p. Similar findings (not shown) were obtained with amitriptyline (M.E.D.: 4 mg/kg) and imipramine (M.E.D.: 2 mg/kg). Like with the tricyclic antidepressants, a clear decrease in immobility and an increase in the power of the movements were observed with the monoamine oxidase type A inhibitor clorgyline and the atypical antidepressant viloxazine (Fig.). Two other atypical antidepressants bupropion (M.E.D.: 4 mg/kg) and nomifensine (M.E.D.: 0.5 mg/kg) caused similar decreases in immobility with increases in the power of the movements (data not shown). The specific serotonin uptake inhibitor citalopram, like the other antidepressants, decreased the duration of immobility but had no clear effects on the power of the movements (Fig.). In contrast to these antidepressants, the neuroleptic haloperidol increased the duration of immobility but had no effects on the power of the movements. Similar profiles were observed with two other neuroleptics, chlorpromazine (M.E.D.: 2 mg/kg) and sulpiride (M.E.D.: 16 mg/kg)—data not shown. Similarly to the neuroleptics, the minor tranquillisers diazepam (Fig.) and chlordiazepoxide (M.E.D.: 16 mg/kg—data not shown) increased the duration of immobility but in contrast to the neuroleptics clearly decreased the power of the movements.

Comments: These results show that various kinds of antidepressants, like in the classical "behavioural despair" test, clearly decrease the duration of immobility in the tail suspension test. It should be noted that the atypical antidepressants bupropion, nomifensine and viloxazine, although possessing different mechanisms of action, show similar profiles to tricyclic and monoamine oxidase inhibitors in this behavioural test procedure thereby
confirming its predictive validity. Of particular interest are the results obtained with citalopram. This novel antidepressant, which appears to act primarily through a specific inhibition of serotonin uptake, was clearly active in the tail suspension test. This result suggests therefore an important difference from the classical “behavioural despair” test where serotonin uptake inhibitors have generally been found inactive.\(^1\)

Of further interest were the findings obtained with the neuroleptics and minor tranquillisers which possessed clearly different profiles of activity on the two parameters measured by the ITEMATIC-TST. The decrease in the power of the movements observed with the minor tranquillisers most probably reflects the myorelaxant activity of these compounds.

**Conclusion**: The fact that pharmacologically distinct classes of psychotropic compound have different profiles of activity on the two parameters measured in this automatic version of the tail suspension test suggest that the procedure, which is extremely rapid, may be useful as a primary screening test for characterising the psychotropic activity of novel compounds.

**References**


