

CLINICAL PHARMACOLOGY SECTION

Differential effect of atropine and hyoscine on human learning capacity

T. J. CROW* and I. G. GROVE-WHITE (introduced by G. R. KELMAN)

Department of Mental Health, University of Aberdeen, and Department of Anaesthetics, Aberdeen Royal Infirmary

Agents used in anaesthetic premedication impair the subject's capacity for subsequent memory recall, and there is evidence to suggest that hyoscine may be one such agent (Gauss, 1906; Pandit & Dundee, 1970). We have applied simple tests of learning capacity and a vigilance task to twelve normal volunteers after administration of hyoscine (0.4 mg), atropine (0.6 mg), or saline (1 ml) by intravenous injection. Each subject received each treatment in a crossover design.

Three tests of learning capacity were applied in order to assess recall after various intervals—a word list learning with immediate recall (3–30 s), a similar test with delayed recall (60–90 s) and a number-colour association test (20 minutes). The results obtained with these learning tests and the vigilance task are shown in Table 1.

TABLE 1. Mean number of correct responses \pm S.E.M.

Maximum score	Immediate recall 50	Delayed recall 50	No. colour associations 7	Vigilance task 27
Saline	27.9 \pm 1.6	14.3 \pm 1.3	7.0 \pm 0.0	20.3 \pm 1.2
Hyoscine	24.0 \pm 1.3†	10.2 \pm 1.3‡	5.9 \pm 0.5†	20.5 \pm 1.1
Atropine	25.9 \pm 1.3	14.1 \pm 1.7	6.9 \pm 0.1	20.3 \pm 1.2

† $P < 0.05$.‡ $P < 0.001$ for the comparison with results after saline.

Subjects receiving hyoscine showed a significant reduction in performance on both the delayed recall and the number-colour association tests, but no reduction in the vigilance task, and a much smaller reduction in the immediate recall test. There was no impairment after treatment with atropine. An analysis of the results of the immediate recall test showed that at the shortest intervals (3–12 s) there was no difference between the various treatment groups. According to some recent analyses of human learning processes (for example, Baddeley & Warrington, 1970) short term memory can be distinguished from longer term storage and recall in terms of this distinction our results suggest hyoscine may impair the transition from short to longer term storage without impairing either short term recall or intellectual capacity as assessed by a vigilance task.

REFERENCES

- GAUSS, C. J. (1906). Geburten in Kunstlichen dammerschlaf. *Archs Gynak.*, **78**, 579.
 PANDIT, S. K. & DUNDEE, J. W. (1970). Preoperative amnesia. *Anaesthesia*, **25**, 493–499.
 BADDELEY, A. D. & WARRINGTON, E. K. (1970). Amnesia and the distinction between long and short term memory. *J. verb. Learn. verb. Behav.*, **9**, 176–189.

Relationship of plasma concentrations of levodopa to clinical response in Parkinsonism

J. G. ALLEN, D. B. CALNE, C. A. DAVIES and J. L. REID*

Departments of Medicine and Clinical Pharmacology, Royal Postgraduate Medical School, London W12 OHS and Roche Products Ltd., Welwyn Garden City, Herts

There is a striking absence of a dose-response relationship in the treatment of Parkinsonism with levodopa and a considerable variation in the maximum tolerated