temporal relationship between treatment and the onset of manic symptoms was not entirely coincidental and therefore worthy of report.

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Radioreceptor Assay of Serum Neuroleptic Concentrations in Psychiatric Patients

Sir: We read with interest the report by Krska *et al*, (*Journal*, February 1986, **148,** 187–193), concerning the usefulness of radioreceptor assays for the measurement of plasma neuroleptic concentrations. We have been assessing the usefulness of a similar assay based on a lyophilised calf caudate preparation and ^{3}H-labelled spiperone ligand, which is available from Wellcome Diagnostics as a 200 assay kit (Lader, 1980). We have found this assay simple to use and reproducible, requiring only 0.2 ml of plasma for each duplicate analysis. The assay has been found to be linear between 15 and 1000 neuroleptic units per litre (1 NU/l equivalent to 1 nmol/l haloperidol).

In contrast to Krska *et al*, who investigated patients on long-term therapy, we are investigating the application of this assay to the management of acute schizophrenia and have so far studied nine patients. All our patients were previously untreated, fitted the RDC criteria for schizophrenia (Spitzer *et al*, 1975), and were treated with haloperidol in doses of between 1.5 and 60 mg per day according to clinical judgement. No other neuroleptic or psychotropic medication was prescribed. We found a significant linear relationship between daily dose of haloperidol and plasma dopamine receptor binding activity ($n = 11$, $r = 0.76$) similar to that reported by Krska *et al*. In three patients who were intensively investigated over a 4–6 week period there was a marked clinical improvement, as assessed on the CPRS rating scale (Åsberg *et al*, 1978). We found a direct relationship between dopamine receptor binding activity, dose and clinical improvement. However, due to the small number of patients, statistical significance could not be reached. This improvement was obtained on doses of between 9 and 20 mg/day haloperiodol, which achieved plasma neuroleptic concentrations of 14–48 NU/l.

Extrapyramidal side-effects, as assessed using the Simpson Rating Scale (Simpson & Angus, 1970), were completely unrelated either to dose or to plasma neuroleptic concentrations. This poor relationship between plasma neuroleptic activity and extra-pyramidal side-effects was confirmed in six additional patients. These findings underline the conclusion reached by Krska *et al*, that for chronic schizophrenics there was no simple relationship between plasma neuroleptic concentrations and side-effects. It is interesting that side-effects seem to be so poorly related to total plasma neuroleptic dopamine blocking "activity" as measured in a radioreceptor assay. This may be because the assay measures only the total plasma concentration of "active" drug *in vitro* rather than reflecting dopamine blocking activity in brain *in vivo*. Another major problem with the use of this technique is that dopamine receptor binding activity may differ from one neuroleptic to another by several orders of magnitude despite equivalent clinical effects. The results are therefore meaningless if the patient is on more than one neuroleptic drug at the same time, a situation which pertains frequently in clinical practice.

Although a number of early reports indicated that radioreceptor assays showed promise, more recent work has been equivocal (Dahl, 1986). It is likely that such assays offer very little advantage over alternative techniques, e.g., gas and liquid chromatography which are capable of measuring parent drugs as well as metabolites which may have activities on different neurotransmitter systems. Much more work is required before dopamine blocking radioreceptor assays can offer any useful information in the management of schizophrenic patients.

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References

ÅSBERG, M., MONTGOMERY, S. A., PERRIS, C. *et al.* (1978) A comprehensive psychopathological rating scale. *Acta Psychiatrica Scandinavica*. Supp. 271, 5–27.

DAHL, S. G. (1986) Plasma level monitoring of antipsychotic drugs – clinical utility. *Clinical Pharmacokinetics* **11,** 36–61.

LADER, S. R. (1980) A radioreceptor assay for neuroleptic drugs in plasma. *Journal of Immunoassay* **1,** 57–75.

SPITZER, R. L., ENDICOTT, J. & ROBIN, E. (1975) Preliminary report of the reliability of research diagnostic criteria applied to psychiatric case records in predictability. In *Psychopharmacology Preclinical and Clinical Correlations*. (eds. A. Sudilovsky, S. Gershon & B. Beer) New York: Raven Press.

SIMPSON, G. M. & ANGUS, J. W. S. (1970) A rating scale for extrapyramidal effects. *Acta Psychiatrica Scandinavica* Suppl. 212, 11–19

Neuroleptic Malignant Syndrome

Sir: In their recent review of the neuroleptic malignant syndrome (NMS) Drs Abbott & Loizon (*Journal*, January 1986, **148,** 47–51) recommended sodium dantrolene and bromocriptine as the best treatment options for this syndrome. We wish to suggest the possible use of electroconvulsive treatment (ECT) in NMS in addition to these treatment modalities.

Case Report: We recently treated a patient who presented a NMS which improved with ECT. This 23 year old male schizophrenic patient developed NMS on the fourth day