potentiated. The importance of solving this problem may call for an unprecedented European-scale collaboration.

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Pathology, Phenomenology, and the Dopamine Hypothesis of Schizophrenia

SIR: The recent review by McKenna (*Journal*, September 1987, **151**, 288–301) is one more of a growing spate of hypothetical papers attempting to reconcile various pathological, clinical, and neurochemical findings into a unitary hypothesis for schizophrenia (Weinberger, 1987; Smajuk, 1987). Since there is no pretext for assuming that schizophrenia is a unitary and homogenous disease process, such exercises seem dangerous in that they limit rather than expand the avenues for research into the biology of schizophrenia. In addition, the three reviews cited make a case for differing unitary hypotheses; they beg the validity of each others claim's, and taken together argue for aetiological heterogeneity.

Notwithstanding this, there are also some specific points in Dr McKenna's argument requiring clarification. The hypothesis relies heavily on the assumption that the dopamine hypothesis in schizophrenia is unchallenged, ignoring the serious drawbacks to the dopamine theory (Hornykiewicz, 1982). In addition, the hope by Dr McKenna that the D_2 receptor binding seen in earlier single dose PET studies would be confirmed have not been realised. Using a more selective ligand (11C raclopide) and a more accurate semi-quantitative method, Farde *et al* (1987) were unable to show increased D_2 receptor numbers *in vitro* in drug-free schizophrenic patients. Finally, the heavy reliance of Dr McKenna's synthesis on prefrontal cortical dopamine and hippocampal dopamine systems extrapolated from animal studies is spurious, since in human tissue the levels of dopamine in these regions is negligible (Adolfsson *et al*, 1979) and D_2 receptor binding sites are not detectable *in vitro* or *in vivo* (DeKeyser *et al*, 1985, 1987), and, indeed, current attempts to identify a mesocortical dopamine system in man remains fruitless.

While Dr McKenna's article is an elegant review of the current status of the biology of schizophrenia, since the neurochemical substrates incorporated in his theory have not been demonstrated in man, care should be taken in its interpretation.

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HORNYKIEWICZ, O. (1982) Brain catecholamines in schizophrenia. A good case for noradrenaline. *Nature*, **299**, 484–486.

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WEINBERGER, D. R. (1987). Implications of normal brain development for the pathogenesis of schizophrenia. *Archives of General Psychiatry*, **44**, 660–669.

SIR: Dr Kerwin raises points concerning the existence of human limbic and cortical dopamine projections, the validity of the dopamine hypothesis, and the unitary nature of schizophrenia itself.

The existence of dopamine projections to the septo-hippocampal system and prefrontal cortex is generally accepted in primates, based on biochemical (e.g. Bjorklund *et al*, 1978) and histological (Porrino & Goldman-Rakic, 1982) findings. In man, the relevant evidence has been summarised by Camus *et al* (1986): both regions contain appreciable amounts of dopamine and its metabolites, which are significantly reduced in Parkinson's disease. Substantial numbers of D_2 receptors have been found in the human hippocampus. In the human prefrontal cortex, dopaminergic nerve terminals have been

visualised, but the presence of D_2 receptors is controversial, with the six or so studies being evenly divided. The most recent work suggests that they are present, but in much smaller numbers than D_1 receptors. In these circumstances, it seems unwarranted to dismiss the existence of a dopamine innervation of these regions.

The strengths and weaknesses of the dopamine hypothesis have been frequently rehearsed, most recently by Crow (1987). Briefly, its most serious drawbacks are the long time-course of the neuroleptic effect, its incompleteness in many patients, and perhaps also the relative lack of psychotogenic activity of direct dopamine agonists. These, though, must be balanced against the powerful, unrefuted circumstantial evidence implicating dopamine in psychotic and antipsychotic drug actions. *In vivo* receptor binding studies have the potential to test the dopamine hypothesis directly. The first such study on drug-naive schizophrenic patients was positive. The second (Farde *et al*, 1987) (which has not yet been reported in full) gave overall negative results. Even so, 10–30% increases in dopamine receptors were observed on the left side in 4 of the 15 schizophrenics, but in none of the controls (Farde *et al*, 1987).

Finally, it is possible, as Dr Kerwin suggests, to conceptualise schizophrenia as a collection of heterogeneous disorders. Clinically, however, none of the attempts to overthrow Kraepelin in this way have met with wide acceptance. Aetiologically, it may well be that schizophrenia will ultimately fragment into more than one disease entity (cf. Murray *et al*, 1985). Nevertheless, it is arguable that this will not invalidate the unitary pathogenetic basis of the core phenomenological syndrome.

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Behavioural Psychotherapy in General Practice – A Response

Sir: It is a little surprising, if I follow Professor Beech's reasoning correctly (*Journal*, September 1987, **151**, 411), that despite the paucity of knowledge and experience that he feels are required by psychiatrists, some psychologists in private practice or as authors of texts (Beech *et al*, 1982), or even within the NHS, should wish to use the title 'consultant' or 'doctor' (the latter legitimately from possession of a PhD, but both potentially misleading in the NHS) – as this is presumably partly with the idea (Anon, 1983) of attracting that indefinable, but desirable, aura (probably with quite primitive roots) which surrounds their medically qualified psychiatric colleagues.

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Heroin Abuse in India

Sir: Fraser *et al* (*Journal*, August 1987, **151**, 254–256) report on heroin abusers admitted to an acute psychiatric unit in Glasgow, and raise doubts about the value of hospital admission in the management of abusers. We had a somewhat similar experience with heroin abusers in New Delhi (Adityanjee *et al*, 1984) in the early 1980s.

Heroin abuse, which was conspicuous by its absence in all Indian epidemiological surveys on substance abuse carried out prior to 1980, made a dramatic and sudden appearance in the metropolitan cities of India (Saxena & Mohan, 1984). There were no cases of heroin abuse registered with the de-addiction clinic of AIIMS hospital, New Delhi, prior to 1980. Between January 1981 and May 1984 a total of 105 heroin abusers were registered with the de-addiction services. All the patients except one were males. Three-quarters of abusers were in the age group 21–30 years. More than two-thirds were unmarried. A little less than one-third were unemployed at the time of contact with de-addiction services. The duration of abuse was less than one year