was rapidly fatal. I would like to report a case of a man presenting with mania 6 weeks after the diagnosis of AIDS, which contrasts with the patient described by Thomas & Szabadi (1987) in that he appeared to respond to treatment; in addition, I can report on his condition 6 months later.

Case report: A 37-year-old homosexual man who was known to be HIV-positive presented with *Pneumocystis carinii* pneumonia. AIDS was diagnosed, and he was treated with intravenous co-trimoxazole. Six weeks later his pneumonia had resolved, but he was referred to a liaison psychiatrist because of odd behaviour.

On mental state examination he showed motor overactivity, elated mood, and was grandiose and disinhibited. He had pressure of speech and racing thoughts. He believed himself to have been sent on a mission to warn the world about AIDS, and also had ideas of reference. Cognitive function was normal on clinical testing. He had no personal or family history of psychiatric disorder and drank alcohol only in moderation.

All investigations other than computerised tomography (CT) scan were normal, but the latter showed generalised cerebral atrophy. Hypomania was diagnosed, and central nervous system involvement by HIV was strongly suspected. He improved and was discharged on zidovudine (AZT) only.

In view of the CT scan findings, formal psychometric testing was carried out by a clinical psychologist. This showed a marked reduction in psychomotor speed, perseveration, and some long-term memory loss; deficits consistent with the early stages of AIDS dementia complex (ADC) (Navia *et al*, 1986).

Following testing he declined psychiatric follow-up, but continued to see a health counsellor from the special clinic. He continues to take AZT, has returned to work, and is coping well 6 months later.

As HIV is believed to be neurotropic and lymphotropic (Levy *et al*, 1985), psychiatric manifestations may present early in the course of infection. As Drs Thomas & Szabadi pointed out, AIDS or HIV brain involvement must now be among the differential diagnoses of a psychosis in a person from a high-risk group. In the same discussion they also advocated HIV testing on psychotic patients who are intravenous drug abusers who have no previous history or other obvious precipitant. The implication of this is that all patients who are at high risk, who have severe mental illness, should be HIV tested. This raises important ethical issues; many of these patients will not be able to give informed consent, and the position of the Mental Health Act is unclear. Unless a patient is violent or self-harming, which most psychotic patients are not, routine precautions concerning blood contamination are enough to ensure staff safety. A positive HIV result will not alter immediate management, and when the patient is sufficiently recovered, counselling and possible HIV testing could be considered.

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Time and the Dopamine Hypothesis

SIR: From a neurobiological point of view it appears quite remarkable that the dimension of 'time' has been neglected in nearly all theories which attempt to explain psychic disorder by findings from basic science, including the dopamine-hypothesis questioned recently (*Journal*, October 1987, **151**, 455–459). The methodological reasons for that deficit were focused nearly 20 years ago in a statement by Kety: "It would take many biochemists a long time to find a noisy circuit in a radio receiver if they restricted themselves to chemical techniques" (Kety, 1959). In this respect, Dinan's paper marks a turning point by introducing basic electrophysiology into considerations on the origin of psychic disorder.

Dinan proposed that a electrophysiologically detectable pattern of neuronal activity, caused by a potassium conductance, could be a basic mechanism in information processing which finally could influence psychopathology.

The calcium-dependent potassium conductance (KCa) is activated by the excitation-coupled increase of intracellular calcium concentration (Gorman & Thomas, 1978). As a negative feedback mechanism it represents a functional basis of phasic changes in cellular output between activity and rest. It has been detected in big, often pyramidal neurons in different areas all over the brain, such as cortex, thalamus, hippocampus, hypothalamus, and locus coeruleus. The KCa is one of several potassium conductances which are functional targets for modulatory influences: many neuromediators change the size of KCa and modify thereby the temporal pattern of neuronal activity, such as noradrenaline (Aghajanian & Rogawski, 1983), acetylcholine (McCormick & Prince, 1986), and dopamine (Benardo & Prince, 1982); this is also found with peptides such as corticotropin-releasing factor and drugs such as lithium, caffeine and neuroleptics.

This rather universal mechanism may gain its specificity in a defined neurotransmitter pathway by the specific receptor population of the questioned neurons. For example, noradrenaline decreases the KCa via the alpha 1 receptor and increases it via the alpha 2 receptor (Aghajanian & Rogawski, 1983); the usually exciting transmitter acetylcholine increases a K conductance via a M2-receptor and produces thereby a special kind of inhibition, which enables phasic instead of regular activity (McCormick & Prince, 1986).

All these changes of the time course result in a different pattern of activity. Because of the relay function of these widely projecting neurons, it appears quite consequent that Dinan connected information-processing and, at the far end, cognition with this membranal function.

However, the mechanism proposed by Dinan involves dopamine as well as neuroleptics: an increase of the CaK due to dopamine (Benardo & Prince, 1986) may be decreased by neuroleptics. Thus, it appears to me that Dinan did not present an alternative to the dopamine hypothesis but supplied the functional part of it. It is to be expected that the introduction of the functional aspect may clarify some open questions regarding this and other neurotransmitter systems.

I am sceptical about the explanatory power of one isolated mechanism – functional pattern as well as receptor-binding – with respect to psychiatric disorders like schizophrenia. I would consider it as an enormous advantage in biologically-orientated psychiatry if one could define a cognitive or behavioural sub-syndrome based on such a functional pattern. After all, there is hope that the appearance of the time dimension in neurobiology will be followed by its consideration in classificatory and diagnostic instruments.

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SIR: Biological psychiatry has developed almost exclusively by focusing on biochemical data, primarily related to monoaminergic functioning. Few theories emerge which take the emphasis from monominergic neurones, which after all represent only a tiny fraction of all brain neurones. Little effort is usually spent in relating receptor binding data to electrophysiological activity in neurones. Dr Aldenhoff's claim that the 'time dimension' is lacking in nearly all biological theories of psychiatric illness is clearly correct. This 'time dimension' can only be incorporated if one uses electrophysiological data. A strictly quantitative analysis of transmitters and their receptors can never provide such a dimension. The tendency to ignore such reality has in my opinion hampered progress in psychiatric research. The dopamine hypothesis of neuroleptic action does not provide a bridge between receptors and cognitive functioning. As a theory it clearly has survival capacity, but in the 25 years since it was originally proposed it has not resulted in the synthesis of a single compound which has improved the treatment of psychotic illness. A glance at prescribing trends in any European country supports such a view. The vast bulk of drugs prescribed for the treatment of schizophrenia were originally discovered prior to 1960.

The calcium-activated potassium conductance theory which I propose (*Journal*, October 1987, **151**, 455–459) is far from flawless. Nonetheless, as Dr Aldenhoff states, it represents a shift of emphasis by introducing electrophysiological data into an area of psychiatric theory which has until now been characterised by tunnel vision for biochemical 'reality'. Whatever the importance (or otherwise) of the theory, the philosophical approach suggested has implications for biological theorising in psychiatry.

Dr Aldenhoff considers that my theory simply provides the functional component to the dopamine hypothesis and not really an alternative. Certainly, Bernardo & Prince (1982) found that dopamine increased calcium-activated potassium conductances, and it is possible that the conductance is maintained by a tonically released dopamine input, the action of which can be blocked by neuroleptics. However, this is unlikely in view of the fact that the conductance was unaltered in the presence of TTX, which would interfere with the release of an inhibitory input (Dinan *et al*, 1987).