Book reviews

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BEHAVIOURAL NEUROLOGY OF MOVEMENT DISORDERS.
Edited by William J. Weiner and Anthony E. Lang
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Although the fact that there is an underlying organic basis for mental dysfunctions in extrapyramidal diseases may, in itself, not be an entirely new concept (see also Hassler and Christ, 1984; Wolters and Schelten, 1994), it does merit more attention and every ‘extrapyramidal-minded’ neurologist, neuropsychiatrist and psychiatrist will, no doubt, welcome the publication of the book Behavioural Neurology of Movement Disorders.

The role of the basal ganglia in the regulation of movement is undisputed and for a normal functioning of these nuclei an adequate level of striatal dopamine is essential. Severe motor deficits may be seen following pre- and/or postsynaptic dopaminergic dysfunction, for instance, in the case of deficient endogenous dopamine production or deficient dopaminergic receptor functioning. However, it has also been recognized that signs of mental dysfunction may occur, even in the earlier stages of these functional disturbances. The symptoms vary from subtle cognitive defects to dementia and from depressive states to psychosis, as carefully documented in this book under review.

Current concepts concerning the function of the basal ganglia in behaviour are reviewed in the first chapters of this book by Saint-Cyr and Dubois with their co-workers. Because these chapters deal so adequately with the views on the underlying mechanisms (and this is indeed the main theme of the book) I would endeavour to reproduce this in a shortened version. Basal ganglia were initially thought to adjust pure motor control via an extrapyramidal system which ran to the brainstem and spinal executive motor system, parallel to the pyramidal system. It was largely due to the work of Denny-Brown that it became evident that the basal ganglia do not only fulfil a motor function, but are also responsible for the so-called internally driven motor strategies, in contrast to the rather externally/environmentally driven pure motor responses, as generated by the (pre)motor cortical areas. The behavioural domains of the basal ganglia can be defined to include the formulation of all motor response strategies. The striatum is involved in specific processes: initiation of behavioural programmes, mental activation, maintenance of external strategies for problem solving, retrieval of explicit information, activation of skills and acquisition of new procedures.

Experimental studies in primates have shown that limited lesions of the striatum induce deficits in rule acquisition, behavioural control, working memory performance and selected attention. Learning processes of the behavioural domains rely on a constant feedback with regard to the environmental contingencies. These processes include a strategic approach which has built-in flexibility to adapt to the numerous variations in the environment and to bring stability in the chaos caused by novel situations. The process, whereby these response patterns or habits are established, is referred to as procedural mobilization, in which the basal ganglia function as a self-organizing system, operating under the constraints of the biomechanics of the body, the perceptual limitations of the organism and the physical properties of the environment.

Based on more recent anatomical and physiological knowledge, an involvement of the basal ganglia in mental functions might, at least in part, be explained by the connective organization of the basal ganglia with the cerebral cortex. It has been acknowledged that these connections are primarily organized in five functionally segregated loops, consisting of parallel sequences of (pre)frontal cortico-striatal, striato-pallidal, pallido-/nigrothalamic and thalamocortical projections, most of which return to the cortical area of origin. The interconnected subregions of the (pre)frontal cortex and the striatum are involved in the same sensorimotor, associative and/or limbic domains. Basal ganglia may thus be roughly subdivided in areas that are important for the motor-sensory processing (putamen), the cognition (caudate nucleus) and affective components (nucleus accumbens).

It is reasonable to assume that the five different loops, each in its own specific domain, contribute to complex cognitive behavioural and/or motivational processes. The motor and oculomotor loops are thought to be involved in the programming of pure motor behaviour, the dorsolateral loop implicated in planning and flexibility of complex behavioural processes, the orbitofrontal loop involved with the inhibition of interferences from environmental cues and the anterior cingulate loop is thought to be concerned with initiation of motor behaviour on the basis of drive and motivation. Lesions in the pathway of the different loops are thought to interfere with the specific motor and/or cognitive functions. Cognitive and behavioural deficiency resulting from basal ganglia dysfunction becomes apparent as a slowing-down of information processing, frontal lobe-like symptomatology, impaired memory retrieval and personality changes such as inertia and depressed mood. These symptoms are referred to as ‘subcortical’ dementia.

Dopamine regulates the flow of information through all
basal ganglia–thalamo-cortical circuits, reaching the entire striatum. In this way it is involved in the same variety of functions that are supported by these multiple circuits. The executive syndromes and frontal-lobe type behavioural changes in patients with basal ganglia dysfunction (i.e. Parkinson's disease, Huntington's disease, progressive supranuclear palsy and multiple system atrophy) are coherent with these putative anatomical–functional relationships between the neo-striatum and the prefrontal cortex. Thus, a limited lesion of the globus pallidus is able to induce changes in behavioural activation or selectivity, comparable to those observed after extensive damage to the pre-frontal cortex or cingulum.

The basal ganglia may, therefore, be seen as part of a circuitry through which various cortico-thalamo-cortical loops process selective information concerning input from internal (self-generated) and external (cue-generated) sources. This circuitry plays an essential role in the phenomenon of 'set', defined by Saint-Cyr as the process whereby one develops, maintains, switches and blends strategies in order to adapt to the ever-changing environment. Two types of behavioural organization may be postulated: one concerns the elaboration of new behavioural schemes by constant interaction with the environment (permitting adaptation to new situations), the other organizes routine behaviour and skills. New strategies may be planned in the dorsolateral part of the prefrontal cortex, whereas their execution probably involves a large neuronal network including the fronto-striatal loops. Automatic programmes (normally repressed by the prefrontal cortex) may be selected by the basal ganglia when challenging situations require elaboration of new behavioural schemes. According to this hypothesis, the basal ganglia might be involved in stabilization and maintenance of mental sets, and constitute a buffer for procedural or over-learned skills. Basal ganglia dysfunction would thus disrupt the selection, activation and maintenance of procedural skills in both sensory-motor and behavioural domains, accounting for the deficits observed in adaptive behaviour, maintenance of mental sets and procedural learning.

Clinical syndromes representing basal ganglia dysfunction may manifest behavioural abnormalities including personality alterations, early and late cognitive changes, depression and drug-induced behavioural states. These syndromes comprise well-known entities such as Parkinson's disease (Ch. 3–8), progressive supranuclear palsy, multiple system atrophy and cortical basal ganglionic degeneration (Ch. 9), diffuse Lewy body disease (Ch. 10), Wilson's disease (Ch. 11), Huntington's disease (Ch. 12–14), tardive dyskinesia (Ch. 15), Tourette's syndrome (Ch. 17–21) and dystonia (Ch. 22). Other, more sporadically seen syndromes include Machado Joseph's disease, the parkinsonism dementia–amyotrophic lateral sclerosis complex, encephalopathic parkinsonism and prion-related diseases such as Creutzfeldt-Jakob's disease and Gerstmann–Straussler–Scheinker's disease (Ch. 9). These behavioural abnormalities are carefully described in several chapters. Identification and characterization of the underlying organic basis is essential for treating these mental dysfunctions.

In Parkinson's disease early cognitive defects (as dealt with in Ch. 6) include subtle changes in olfaction and contrast sensitivity, as well as executive function deficits, which influence performance of cognitive functions, particularly memory and visuo-spatial functions. Late cognitive changes (Ch. 7) may be the result of degeneration of subcortical structures with subsequent de-afferentation of cortical areas and associated neurochemical depletions, 'demodulating' cortical activity. As dopaminergic as well as noradrenergic, serotonergic, cholinergic and peptidergic pathways are affected in Parkinson's disease, late cognitive deterioration might be the result of a more generalized decay of neurotransmitter function. Alzheimer-type changes and dense cortical Lewy bodies, as frequently seen in these patients, also support this theory.

Frequently, depression is diagnosed in Parkinson's disease patients with psychomotor retardation, as well as fatigue, insomnia and weight loss. A straightforward depression as reaction to the severity of the physical impairment should, however, be related to the stage of illness and duration, quod non, according to Brown and Jahanshahi (Ch. 5). In depressed patients, whether or not suffering from Parkinson's disease, noradrenergic and serotonergic mechanisms are hypothesized to underly their condition. Low CSF levels of serotonin metabolites such as 5-hydroxy indolacetic acid are found consistently in these patients and treatment with serotonin-uptake inhibitors seems effective. Based on the organic interactions of depression and cognitive performance, as well as on anatomical and biochemical evidence, Mayberg and Solomon (Ch. 4) propose a unifying hypothesis of depression in Parkinson's disease. They suggest that a deficient ventral tegmental area dopaminergic projection to the orbitofrontal cortex may secondarily affect serotonergic cell bodies projecting to the dorsal raphe, as major cortical outflow to this structure originates in the orbitofrontal cortex. This may lead to characteristic metabolic and biochemical defects, focusing attention on the interactions between dopamine and serotonin in the depression of Parkinson's disease. However, dopamine suppletion and/or substitution does not interfere with depressive states and CSF homovanillic acid levels do not correlate with mood. More complex and multivariate psychological and/or biological models should therefore be considered to link Parkinson's disease with depression.

Psychotic manifestations in Parkinson's disease (Ch. 8) are mainly drug-induced syndromes associated with a clear sensorium (organic delusional syndromes and organic hallucinosis), although a concomitant confusional state may be seen (organic confusional psychosis). These dopaminomimetic psychotic manifestations were initially thought to be based on specific hypersensitivity of mesolimbic dopamine-facilitated receptors, though dysfunction of the serotonergic system (considering the association of psychotic manifestations with serotonin-related sleep disturbance and altered dreaming) seems more appropriate. Hallucinations usually
conform to boundaries imposed by actual concurrent sensory input and, as a rule, they concern individuals and experiences significant in the patient’s life. These syndromes react favourably to a decrease of dopaminomimetic medication, as well as to treatment with atypical neuroleptics. Most typical neuroleptics, on the other hand, increase the extrapyramidal symptomatology by their specific antagonistic effects on the dopamine D-2 receptors.

All this and more is dealt with at length and, in most parts, adequately in *Behavioural Neurology of Movement Disorders*. Even psychogenic movement disorders (somatoform disorders which must be considered seriously when their manifestations fluctuate with time, or when their manifestation is incongruent with normal presentation) receive considerable attention (Ch. 16). The book is provided with an adequate subject register. Indeed, *Behavioural Neurology of Movement Disorders* can be seen as a ‘must’ for every neurologist, neuropsychologist and psychiatrist who is interested in the field of extrapyramidal diseases.

**Erik Wolters**


**BRAIN TUMOR.**


Approximately 35,000 people per year are diagnosed as having a brain tumour in the United States and there is recent evidence that the number of patients presenting with brain tumours may be increasing in the older population. Whilst there is little doubt that an increasing amount of expertise and understanding is available to the specialists dealing with these tumours, the current outlook for patients with the more aggressive forms of brain tumour, particularly glioblastoma and anaplastic astrocytoma, remains grim. In recent years, and indeed in recent months, there has been an explosion of information in the fields of molecular and cellular biology, and in neuro-imaging. Thus, a new book devoted to brain tumours is timely and will be expected to help identify those aspects of neuro-oncology in which our knowledge and understanding has been poor in order to identify and further those areas of treatment that offer an improved outcome.

The editors have done a magnificent job in drawing together many authors who are clearly experts in their respective fields. It is a remarkable achievement to have persuaded so many who are not only experts, but also have widely published, framing to a great extent our approach to brain tumours, to contribute to this book. The philosophy of the book is declared at the end of the first chapter—‘Historical Perspectives’—in which the editors declare that: ‘There is now cause for cautious optimism with a better understanding of the pathogenesis and biology of brain tumours, improvements in imaging and surgical techniques, and especially in the development of gene therapies.’ In looking deeper into this book, it is appropriate to ask whether there is evidence to support this contention.

The book is divided into two equal sections. Section one deals with basic principles, from a discussion of cell development, through tumour classification, epidemiology and neurogenetics, to detailed descriptions of pathophysiology of brain swelling and the technology of neuro-imaging. There are detailed accounts of the background to stereotaxy of the surgical approaches for brain tumours. There is an unusually clear description of the principles of radiotherapy and a useful discussion of the various treatment regimens with a particular emphasis on the requirements that must be considered when looking at new treatment protocols. For example, what are the radiotherapists being asked to treat, what is the basis of tumour recurrence, and why are these tumours so resistant to most forms of treatment? It is pleasing to see that the differences in the management of childhood tumours, and the recognition of the special difficulties for paediatric neurosurgeons are acknowledged. The fact that a number of patients are now surviving to be considered for further treatment is discussed, and an issue of importance in the future will be whether treatment will be offered to patients based on symptomatic or imaging recurrence. Clearly, it makes sense to try and treat patients before neurological deficits occur, and modern imaging such as MRI, SPECT and PET now offer the possibility of selecting patients for clear signs of tumour recurrence prior to symptomatic deterioration. These patients are arguably going to form the basis of important cohorts for treatment with gene therapy and modified chemotherapy.

From the point of view of the student, the first section in the book provides a thorough grounding in the basic understanding required not only to realise problems inherent in the management of these tumours, but also to enlighten them as to problems complicating research in this area. There is enough detail here for the expert but, unfortunately, like most large texts, it is now already lacking in some of the newer developments in our understanding of tumour behaviour related to genotype and relationship of genetic abnormalities to tumour prognosis.

For the practising neurosurgeon, section two of the book is a goldmine of information. There is some variability in the quality of the information presented but, in general, the standard is extremely high with excellent figures and often exhaustive descriptions of particular types of tumour. There is certainly adequate technical information here but, in some chapters, there are nuggets of wisdom which are rarely found in other multi-authored texts. There is, for example, a wealth of understanding in the chapter on acoustic neuromas. It is