

NO, thereby relieving chronic angina; the identification of histochemical NADPH diaphorase reaction in brain as NO synthetase; how stimulation of excitatory pathways in brain stimulates the formation of cGMP, where NO is the intracellular messenger; and why in septic shock and chronic inflammatory disorders an excess of nitrate is excreted in the urine. The three isoforms of NO synthetase, Type I, II and III, and their genes, are clearly described. Section 2, which contains three chapters, covers the pathological implications of NO, and should be required reading for all students preparing for fellowship examinations in neurology, medicine and surgery. A unique aspect of this book is the inclusion in Sections 3 and 4 of experimental approaches, protocols, and techniques used for the measurement of nitric oxide. These are very helpful to any researcher wishing to venture into this new field.

This book, in paperback and inexpensive, is highly recommended to all graduate students, clinicians, and pharmacologists. It is by far the best introduction to this unique new field of research. The biochemistry may be somewhat densely written but is worth the added effort. The figures are clear and informative. There is a helpful glossary, and the two appendices are comprehensive tables of the distribution of constitutive NO synthase as determined by immunohistochemical study of peripheral tissues in which nitric oxide is identified as a neurotransmitter. Finally, research on the basic mechanisms and role of nitric oxide in health and disease is not static, and new discoveries are bound to appear in the future.

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THE NEUROPSYCHOLOGY OF DREAMS. 1997. By Mark Solms. Published by Lawrence Erlbaum Associates. 292 pages. \$C78.00

For years, neurobiological models of dreaming have been founded primarily upon animal-based research; research whose validity for this task is as uncertain as whether or how animals might dream. On the other hand, although the dreams of brain-damaged patients could provide much pertinent information about the brain's role in dream formation and recall, little systematic work has been accomplished in this area. With some exceptions¹, most of the available literature consists either of clinical descriptions of patients with diverse brain lesions or of selective reviews of these cases.²

Solms' *The neuropsychology of dreams* has almost single-handedly transformed this situation. The work is a masterful systematization of past and current research literature, an unveiling of a large sample of new patients, and a lucid theoretical statement on the human neurobiology of dreaming. The consequence of this work may well be to reinvigorate and reorient what has been a relatively sluggish and disorganized area of study.

Solms anchors his work in a 3-chapter review of the Charcot-Wilbrand Syndrome, of the research that was provoked by this syndrome, and of the necessity for distinguishing in this literature between (a) cessation or restriction of visual dream imagery and (b) global cessation or reduction of dreaming per se. He follows up this introduction with chapters reviewing the "neglected psychosurgical literature" and other abnormalities of dreaming previously discussed in the literature. This prepares the way for presentation of the "18 hypotheses" tested with his sample of 361 neuropsychological cases. These hypotheses are relatively specific in nature, e.g., Hyp #2: *Cessation or restriction of visual dream-imagery indicates*

a bilateral lesion in the medial occipito-temporal region, or Hyp #14: Increased vivacity and frequency of dreaming indicates a lesion (usually but not exclusively bilateral) in the anterior parts of the limbic system, or Hyp #17: Recurring nightmares indicate a discharging lesion in the region of the right temporal lobe, etc.

Solms' 361 cases were assessed during "routine clinical work" over a span of 4 years. They consisted primarily of patients with cerebrovascular disease (N = 83), neoplasms (N = 79) and trauma (N = 108) and included the entire spectrum of neurobehavioral symptoms (but primarily anosognosia, disinhibition, disturbed problem-solving, perseveration, adynamia and apraxia) and brain lesions (all major lobes are represented in the sample). All patients were administered a structured interview about changes in dreaming as a result of their neurological illness, including questions concerning sleep, dream recall, narrative complexity, emotional intensity, recurring nightmares, visual imagery, dream vivacity, and reality confusion, among others. Responses were also compared with a matched control group of 29 patients tested for suspected cerebral illnesses that were ultimately ruled out. Anatomical findings were available in the form of CT and MRI scans projected onto standardized templates; these allowed statistical assessments with chi-square and discriminant analyses.

The bulk of the remainder of the book consists of detailed descriptions of results. Although too numerous to summarize in this short review, Solms marshals substantial evidence that the recall and formation of dreaming is affected by neurological damage. In general, 337 of the patients (or 93.4%) reported having undergone a change in some aspect of their dream experience as a function of their neurological condition. Of these patients, 321 responded to a question concerning global cessation of dreaming (GCD) with 112 (or 34.9%) reporting that they had ceased dreaming since the onset of their neurological illness. This global change could be traced to parietal lobe involvement in almost half of the cases with equal distributions of right- and left-side lesions in 45 of 47 cases. Such results challenge the current notion that dreaming is lateralized to the left-hemisphere (e.g., left-infero-mesial occipitotemporal cortex).¹

This section of the book is also rich in descriptions of more specific, sometimes highly fascinating, dream disturbances. For example, the phenomenon of dream-reality confusions was identified in 5.3% of patients. Here, dreams become much more vivid and intense than even the most vivid of patient's normal dreams and can produce great distress. Solms discusses the hypothesis that such confusions are due to localized anterior limbic lesions, however, no one specific pattern of lesions has yet emerged. Other interesting abnormalities discussed are reduced frequency of dreaming, reduced narrative complexity and emotional intensity of dreaming, and increased frequency and vivacity of dreaming.

In a final chapter, Solms offers readers insights into the dreaming process based on human subjects. He proposes a model of normal dreaming that depends upon activation of an appetitive program (curiosity – interest – expectation) formulated by mediobasal-frontal mechanisms. This appetitive program is transformed into the hallucination of dreaming via a 3-stage process: (a) it is represented symbolically by left parietal mechanisms, (b) it is re-represented concretely (spatially) by right parietal mechanisms, and (c) it is converted into a "complex kinematic visual perception" by bilateral occipito-temporal mechanisms. Bizarreness of the experience is caused by a lack of external stimulation (implicating noninvolvement of primary visual cortex)

and of executive functions (implicating lack of dorsolateral frontal involvement). This model appears to support an animal-based model of dreaming that hypothesizes "orientational" functions (interest, surprise, startle) for central PGO activity^{5,6} much more than it does a model proposing PGO to be a random, chaotic process.³

Some minor, stylistic features of the work deserve mention because they reflect the author's general eye to detail. One is the generous use of tables to organize materials, be they collections of prior studies on a given theme, or sub-samples of patients from his own collection with similar symptoms. These tables allow the reader to easily size up the relative weight of evidence for a topic and to make easy comparisons between patient groups. A second noteworthy feature is a glossary of nosological terms which gives the less neuro-savvy reader easy access to definitions of highly specific terms used in the book (e.g., irremembrance, adynamia, anosognosia, etc).

Are there problems with this book? Yes, at least two that deserve mention, but neither of which is damaging enough to exclude the book from any reader's shelf. One is that most of the case descriptions and statistical analyses reported have nowhere first been published in peer-reviewed journals. Thus, the scientific value of most of the findings has not been established via the usual empirical channels and must remain uncertain. A second problem is that the author has not considered the most recent brain imaging studies of REM sleep and dreaming in his formulation of a dreaming model. Although these studies are consistent with his thinking on many points, on many others it is not an unfortunate oversight because of the potential value such studies will have in independently validating or failing to validate his ideas.⁴

In sum, Solms has produced a rare work that is as original and useful as it is comprehensive and well-organized. It is surely one of the most important books on dreaming to appear in the last 25 years, and by far *the* most important work on dream neuropsychology to have been published. The book will likely come to be considered essential reading for students of sleep medicine.

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2. Greenberg M.S Farah, MJ. The laterality of dreaming. *Brain and Cognition*. 1986; 5: 307-321.
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4. Hobson JA, Stickgold R Paceschott EF. The neuropsychology of REM sleep dreaming, *Neuroreport*, 1998; 9: R:1-R 14.
5. Kuiken D. Dreams and feeling realization. *Dreaming*, 1995; 5: 129-157.
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explain the recent explosion in our knowledge concerning the trigeminal vascular system and the role of some of the newer serotonin agonists on this system.

The first chapter of the book is concerned with the history of migraine from Sumerian times to the growing understanding of the condition throughout the Renaissance, the Victorian era, and the 20th century. There is a chapter on the classification of headache, which attempts to make the 1988 International Classification of Headache more understandable and useable. The chapter on the practical pathophysiology of headache is well set out and clear with excellent diagrams and tables detailing the mechanisms of headache production. The section on physical examination is well covered, emphasizing the appropriate taking of the history and appropriate examination as it pertains to the likely causes of head pain. The red flag headaches are particularly clearly defined, while an approach to a diagnosis is described in an algorithm which is easy to follow. Ultimately, this book is more designed for the general physician and family doctor rather than neurologists.

Investigations for headache patients are well covered. The chapter on tension type headaches attempts to clarify a rather muddy area. There is some discussion of post traumatic and cervicogenic headaches, which is adequate in a general book like this. Migraine is dealt with in more detail with treatments adapted from standard guidelines. The use of prophylactic medication is dealt with in adequate detail, but I am not sure why Pizotifen, which is one of the most commonly prescribed medications in Canada and Europe, and Depakene, and Epival are lumped under "other medications". I would have thought that they deserved a more prominent place.

The section on cluster headache is comprehensive and includes discussions on pericarotid syndromes and indomethacin-responsive headache syndromes which, though rare, can be important diagnostic considerations.

Other chapters deal with cranial neuralgia and facial pain, headaches of cerebrovascular origin, headaches of inflammatory origin, headaches caused by drugs, headaches in women and headaches in the elderly.

In short this book is an extremely valuable addition to the headache literature. The only problem I had was with the CD ROM included with the book, which is basically the book on CD ROM. There is some information at the front of the book which helps one get into the CD ROM. However, if one is to search for any of the references using a Med-Line search engine, this has to be accessed separately from the CD ROM. It would have been admirable if the reference sections of the book could be accessed in full directly through Med-Line. This is probably wishful thinking.

Overall I congratulate the authors on an excellent effort to simplify a sometimes complicated subject.

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CRITICAL DECISIONS IN HEADACHE MANAGEMENT. 1st Edition. 1998. By R. Giammarco, J. Edmeads and D. Dodick. Published by B.C. Decker Inc. 192 pages. Price unavailable

This addition to the growing library of books about headache is particularly well presented. For example, there are extremely clear diagrams dealing with the pathophysiology of headache, which help

GENE THERAPY FOR NEUROLOGICAL DISORDERS AND BRAIN TUMORS. 1998. By E. Antonio Chiocca and Xandra O. Breakefield. Published by Humana Press. 458 pages. \$ C 175.50

Chiocca and Breakefield, two outstanding scientists with research efforts in gene therapy, have recruited an impressive array of neuro-oncologists to fashion the first comprehensive volume on gene therapy for neurological disorders and brain tumors.