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SECOND EDITION

Comprehensive Review in Clinical Neurology

**A Multiple Choice Question Book
for the Wards and Boards**

**Esteban Cheng-Ching
Lama Chahine
Eric P. Baron
Alexander Rae-Grant**



Wolters Kluwer

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S E C O N D E D I T I O N

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Comprehensive Review in Clinical Neurology

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for the Wards and Boards*

S E C O N D E D I T I O N

Preface to the Second Edition

Students of neurology, regardless of their discipline, their level of training, and the stage of their career, are often struck at once by how fascinating neurology is, but also how challenging it can be to learn. The latter stems from the complexity of the nervous system; its anatomy, physiology, and pathology, as well as the overlap between neurology and other disciplines, including psychiatry, medicine, neurosurgery, and pediatrics. The classic textbooks in neurology are invaluable for all students of neurology. However, early in our own training and through our involvement with neurology resident education, the need for texts on neurology that are both comprehensive and yet efficient, practical, and accessible was apparent. The first edition of this book was born out of that recognized need. We chose a multiple-choice question format to allow for readers to test their own knowledge, but included comprehensive answer explanations to maximize the amount of information presented in relation to each question. Where possible, questions were case-based, as we believe that it is through illustration of plausible clinical scenarios that learning occurs most effectively. Diagrams, imaging, electrophysiologic, and pathology findings are used to illustrate key points as well. A “buzz word” section at the end of each chapter allows the reader to go through a quick review.

In this second edition, based on abundant positive feedback that we were humbled and delighted to receive, we have preserved the structure of the first edition. This new edition, however offers additional questions and images as well as updated references. Importantly, we are excited that this edition will offer greater and more versatile opportunity for digital access. We hope that the readers of this book will benefit from this comprehensive review, and enjoy learning neurology.

ESTEBAN CHENG-CHING
LAMA CHAHINE
ERIC BARON
ALEXANDER RAE-GRANT

Preface to the First Edition

Anyone who studies neurology immediately recognizes not only its fascinating complexities but also the many different types of learning skills that one calls upon to understand it and commit it to memory. As medical students rotating in neurology, and later as neurology residents and fellows, it was clear to us that while there were great and grand neurology textbooks written by giants in the field, a study guide that offered clear explanations, simplifying complex concepts, and presenting information in an easily understandable format, while allowing for study of large amounts of information in a timely manner, was not available. As our board examinations neared, we were unable to identify a board review book that satisfied the minimum criteria for what we felt was the ideal study guide: comprehensive yet concise, case-based, with an abundance of images and diagrams, and perhaps most importantly, a question-and-answer (Q&A) multiple-choice type format. As chief residents organizing board review sessions for our neurology resident colleagues, we found this format to be the most effective and enjoyable way to learn neurology. With these criteria in mind, we envisioned and set out to write *Comprehensive Review in Clinical Neurology*.

In neurology perhaps more than any other specialty, clinical vignettes increase learning efficiency by illustrating examples and placing sometimes challenging neuroscience concepts into clinical practice. With this in mind, the majority of questions in this book are case-based. A multitude of radiographic and pathologic images are carefully selected to supplement information in the cases while also contributing to knowledge of these respective areas. The anatomic diagrams and other graphics provide visual aids to consolidate information presented in the discussions. The book is organized so that the reader can review chapters in their entirety or select individual questions from each chapter for review. Despite the Q&A format, topical review is possible with this book as well: the chapters are organized by topics, the index is comprehensive, and most importantly, reference is made in the discussion to different questions related to a specific concept. This book is strengthened by the renowned specialists who painstakingly reviewed the chapters and contributed valuable suggestions and images.

We feel that *Comprehensive Review in Clinical Neurology* will be useful to the whole spectrum of those learning neurology, from medical students and junior residents beginning their neurology education to senior neurology residents and fellows studying for the neurology board examination, and even to staff physicians reviewing for maintenance-of-certification examinations. Because neurology is a key component of all specialties related to neuroscience, psychiatrists, neurosurgeons, geriatricians, and psychologists will benefit from this book as well. We hope that readers of this book will enjoy it and learn from it.

ESTEBAN CHENG-CHING
LAMA CHAHINE
ERIC BARON
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To our families, for their time, support, and love.

To my wife Catalina, for being there for me every step of the way... Always...

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To all who have supported me: Thank you.

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Thank you to my loving wife Jen and son Luke for making life so colorful, to my mother, father, and brother for shaping my life and who I am, and to God for leading the steps of my life...

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Nutritional and Toxic Disorders of the Nervous System: Dr. Edward Covington.

Abbreviations

| | | | |
|-------|---|-------|--|
| ACA | Anterior cerebral artery | HIV | Human immunodeficiency virus |
| ACTH | Adrenocorticotrophic hormone | HSV | Herpes simplex virus |
| AED | Antiepileptic drug | HTLV | Human lymphotropic virus |
| AIDS | Acquired immunodeficiency syndrome | Hz | Hertz |
| AMPA | Alpha-amino-3-hydroxy-5-methyl-4-isoxazole-propionate | ICA | Internal carotid artery |
| ANA | Antinuclear antibodies | ICP | Intracranial pressure |
| ATP | Adenosine triphosphate | ICU | Intensive care unit |
| AVM | Arteriovenous malformation | INR | International normalized ratio |
| BPM | Beats per minute | L | Liter |
| CJD | Creutzfeldt–Jakob disease | MCA | Middle cerebral artery |
| cm | Centimeter | μL | Microliter |
| CMAP | Compound motor action potential | mEq | Milliequivalents |
| CNS | Central nervous system | mL | Milliliter |
| CSF | Cerebrospinal fluid | MLF | Medial longitudinal fasciculus |
| CT | Computed tomography | mm Hg | Millimeter of mercury |
| DLB | Dementia with Lewy bodies | mm | Millimeter |
| DNA | Deoxyribonucleic acid | MR | Magnetic resonance |
| DWI | Diffusion weighted imaging | MRA | Magnetic resonance angiogram |
| ECA | External carotid artery | MRI | Magnetic resonance imaging |
| EEG | Electroencephalogram | MRV | Magnetic resonance venogram |
| EMG | Electromyography | Ms | Milliseconds |
| ESR | Erythrocyte sedimentation rate | NCS | Nerve conduction studies |
| FDA | Food and drug administration | NMDA | N-methyl-D-aspartic acid |
| FDG | Fluoro-deoxy-glucose | NSAID | Nonsteroidal anti-inflammatory drugs |
| FLAIR | Fluid-attenuated inversion recovery | NTD | Neural tube defect |
| FTD | Frontotemporal dementia | PCA | Posterior cerebral artery |
| GABA | Gamma-aminobutyric acid | PCR | Polymerase chain reaction |
| GTP | Guanosine triphosphate | PET | Positive emission tomography |
| | | PPRF | Paramedian pontine reticular formation |

xii Abbreviations

RBC Red blood cell count
REM Rapid eye movements
RNA Ribonucleic acid
SAH Subarachnoid hemorrhage
SNAP Sensory nerve action potential

STIR Short TI inversion recovery
TIA Transient ischemic attack
VDRL Venereal disease research laboratory
WBC White blood cell count
WHO World Health Organization

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S E C O N D E D I T I O N



Figure 1.1 Directions of gaze. Courtesy of Dr. Gregory Kosmorsky.

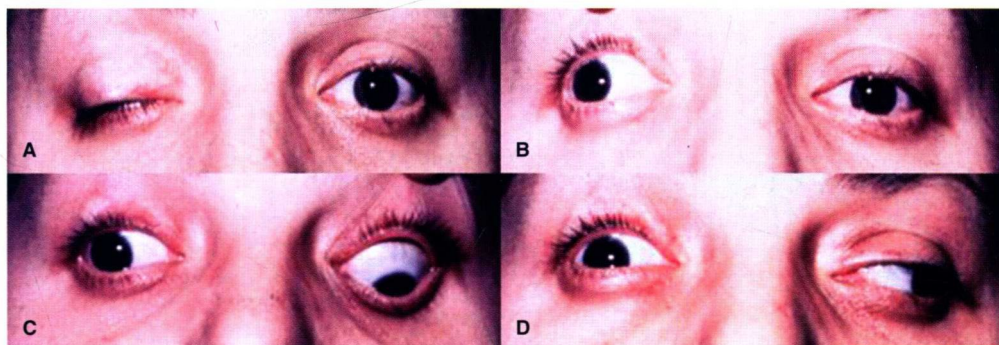


Figure 1.2 Directions of gaze. **A:** looking forward in primary gaze; **B:** looking forward in primary gaze with right eyelid lifted; **C:** looking down; **D:** looking left. Courtesy of Dr. Gregory Kosmorsky.

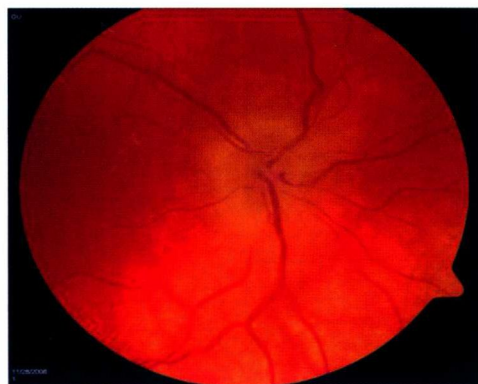


Figure 1.3 Courtesy of Anne Pinter.

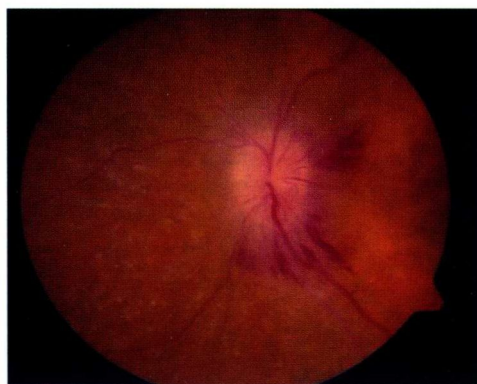


Figure 1.4 Courtesy of Anne Pinter.

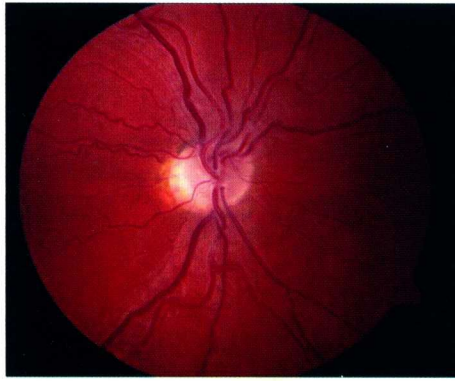


Figure 1.5 Courtesy of Anne Pinter.

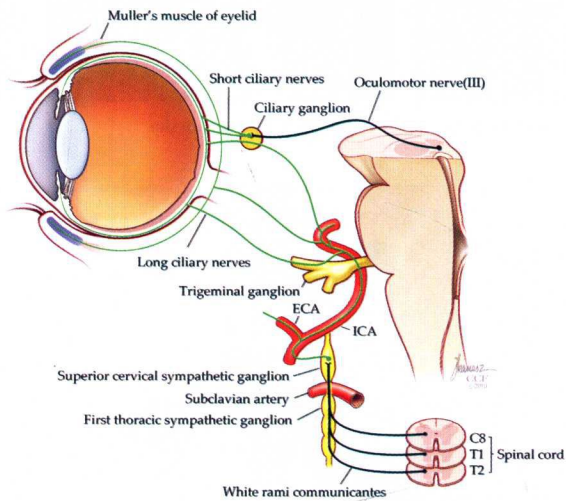


Figure 1.6 Sympathetic innervation to the eye. ECA; ICA. Illustration by Joseph Kanasz, BFA. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2015. All rights reserved.

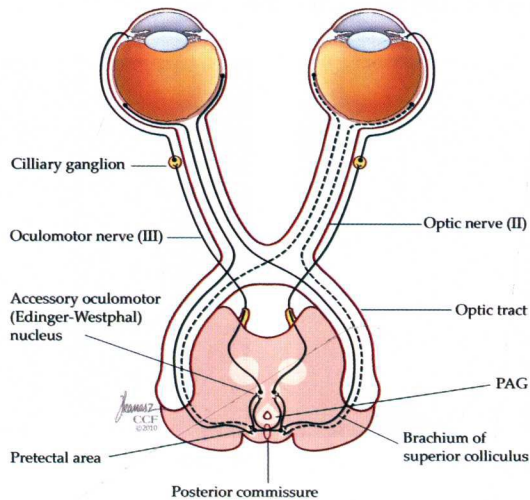


Figure 1.7 Pupillary light reflex. Periaqueductal gray (PAG). Illustration by Joseph Kanasz, BFA. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2015. All rights reserved.

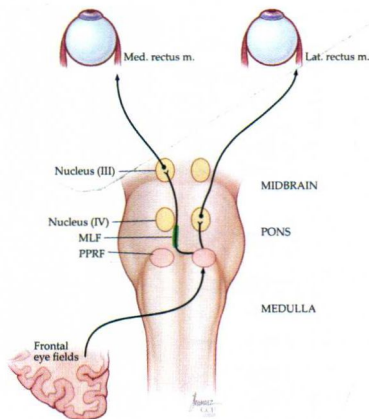


Figure 1.8 Pathways of horizontal gaze. MLF, medial longitudinal fasciculus; PPRF, paramedian pontine reticular formation. Illustration by Joseph Kanasz, BFA. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2015. All rights reserved.

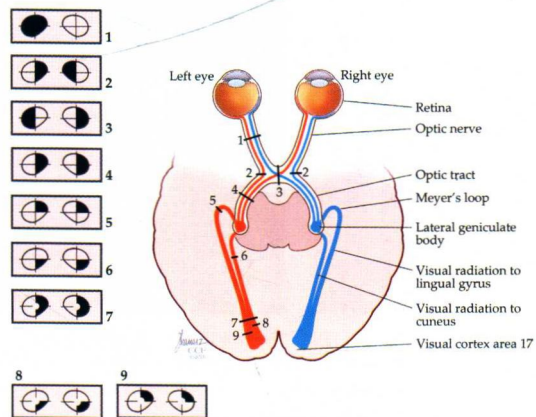


Figure 1.9 Visual pathways. Illustration by Joseph Kanasz, BFA. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2015. All rights reserved.

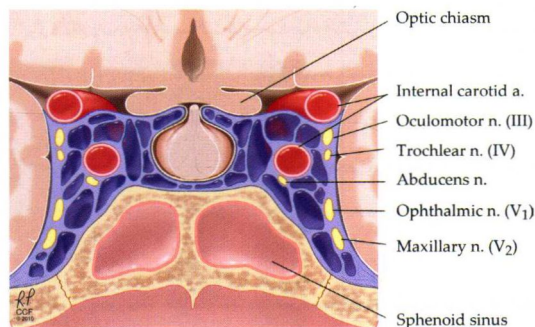


Figure 1.10 Cavernous sinus. Illustration by Ross Papalardo, BFA. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2015. All rights reserved.

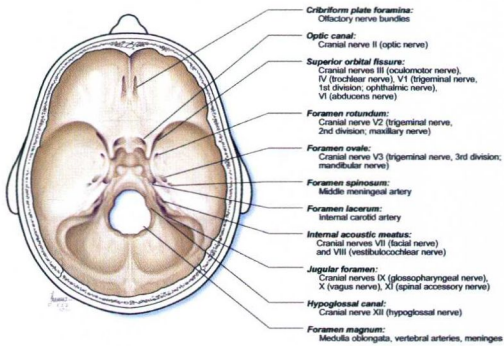


Figure 1.11 Skull foramina and contents. Illustration by Joseph Kanasz, BFA. Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography © 2015. All rights reserved.

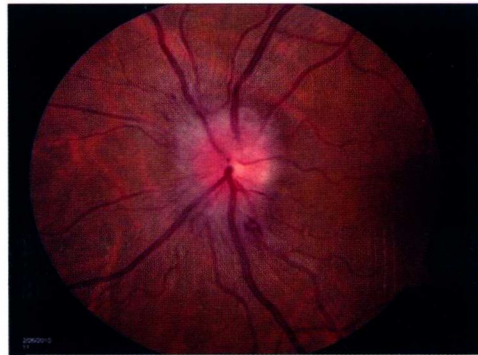


Figure 4.3 Funduscopy of left eye. (Courtesy of Anne Pinter.)

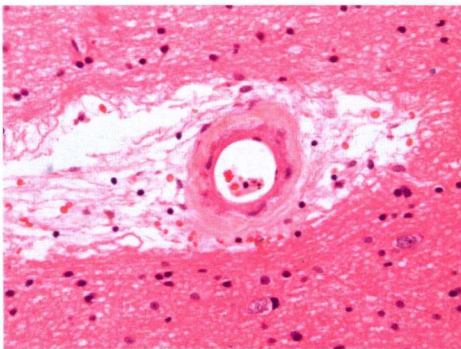


Figure 2.17 Brain specimen. Courtesy of Dr. Richard A. Prayson.

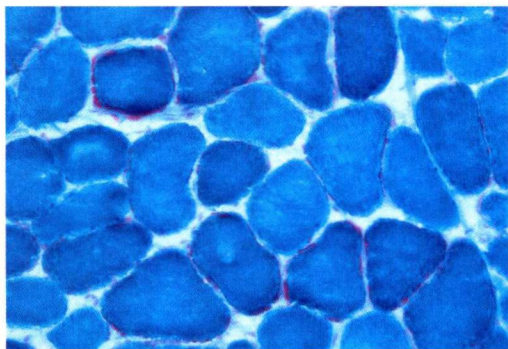


Figure 5.6 Muscle specimen. (Courtesy of Dr. Richard A. Prayson.)

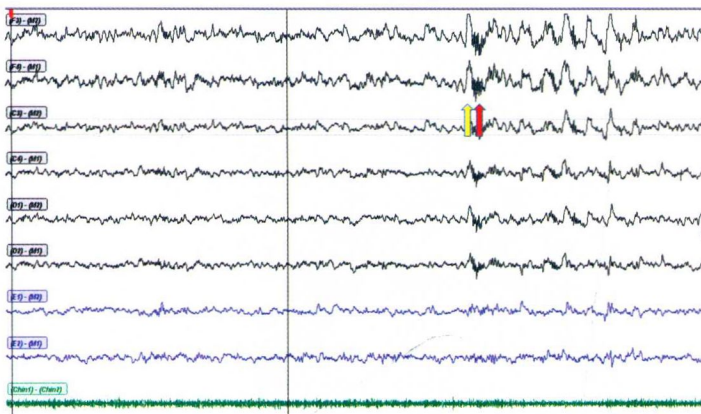


Figure 5.12 A 30-second period of sleep as seen on polysomnogram.

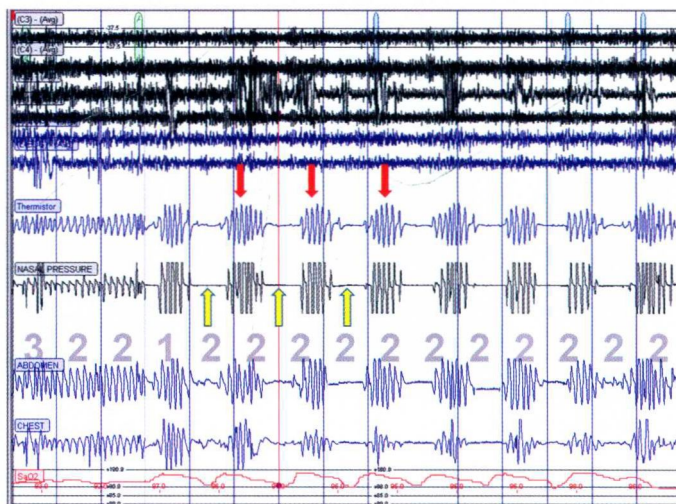


Figure 5.13 A sample 5-minute period of sleep captured on polysomnogram.

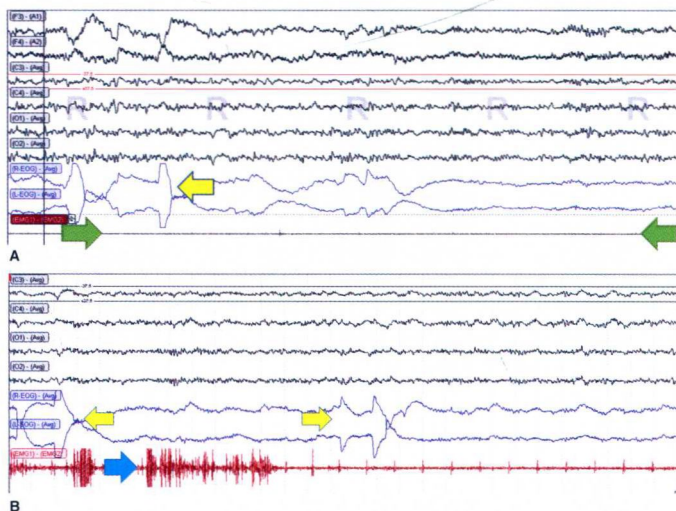


Figure 5.14 A sample of sleep captured on polysomnogram.

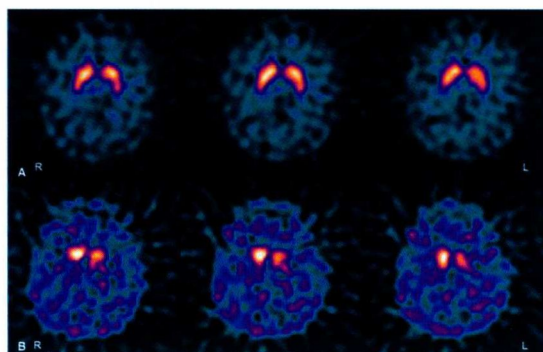


Figure 6.5 Brain DATscan SPECT. **A:** Control case. **B:** Case depicted in this question. (Courtesy of Dr. Jacob Dubroff.).

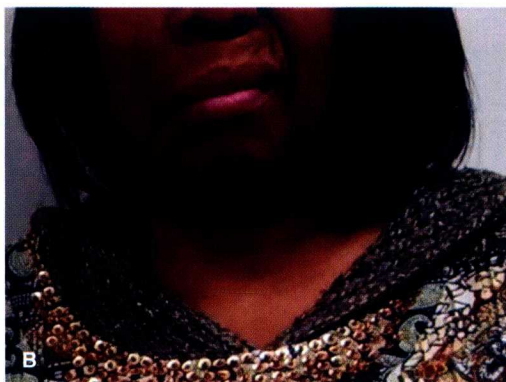


Figure 6.6 Photos of the patient depicted in question 62.

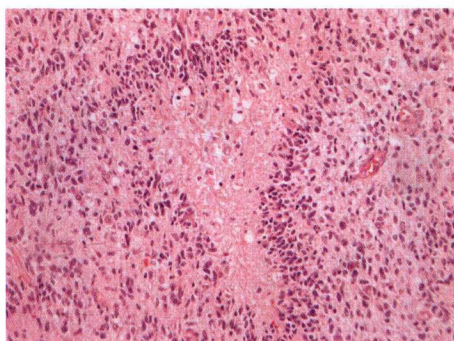


Figure 8.3 Brain specimen. Courtesy of Dr. Richard A. Prayson.

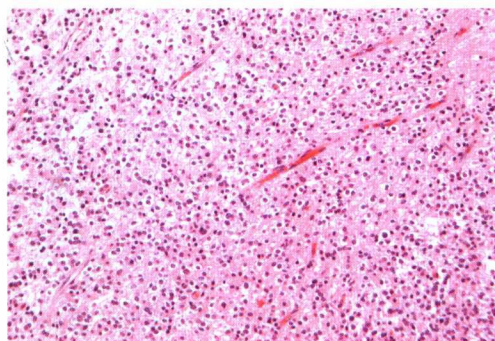


Figure 8.6 Brain specimen. Courtesy of Dr. Richard A. Prayson.

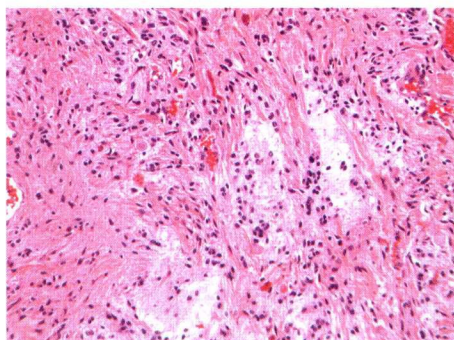


Figure 8.5 Brain specimen. Courtesy of Dr. Richard A. Prayson.

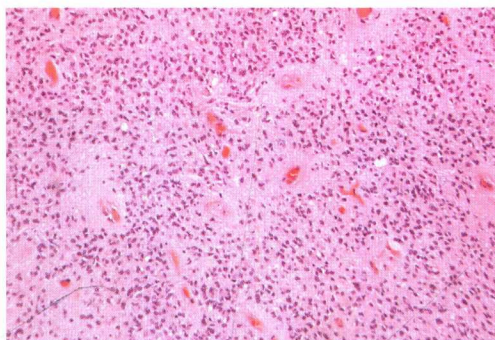


Figure 8.7 Brain specimen. Courtesy of Dr. Richard A. Prayson.