Progress in Neurological Surgery
Vol. 1

Progress in Neurological Surgery

Volume I

Editors
H. Krayenbühl, Zürich ·
P. E. Maspes, Milan ·
W. H. Sweet, Boston

Assistant Editors
P. Paoletti, Milan • R. L. Wright, Boston

Advisory Board
R. Araña-Iniguez, Montevideo • M. David, Paris • J. Gillingham, Edinburgh
S. Obrador, Madrid • J. L. Pool, New York
T. Riechert, Freiburg/Br. • K. Sano, Tokyo • A. E. Walker, Baltimore

With 142 figures and 28 tables

BASEL (Switzerland) S. KARGER NEW YORK

Distributed simultaneously in North and South America, Australia, New Zealand and the Philippines by

YEAR BOOK MEDICAL PUBLISHERS, Inc., Chicago

Progress in Neurological Surgery

Vol. 1: VIII + 308 pages, 142 figs., 28 tab. sFr./DM 64.50 (1966)
Vol. 2: On the Subject of Glial Tumors (in preparation)
Vol. 3: On the Subject of Spontaneous Intracranial Hemorrhages (in preparation)

List of Contributors

Editorial Preface

In the last decade we have witnessed a ‘knowledge explosion’ less threatening to mankind than the widely feared and publicized ‘population explosion’. Indeed a broad and judicious utilization of the new knowledge may represent the best means we have to counteract the frightening rate of growth of population. We in neurosurgery share in an especially crucial way the obligation to use modern physicochemical techniques and the best clinical methods to improve professional competence in our domain, because inadequate or tardy therapy of disease of the central nervous system may have such devastating consequences in terms of protracted invalidism, not to mention death.

Two decades of relative peace in the world have seen contributions to new knowledge of the nervous system and careful appraisals of the results of applying old knowledge coming in from many lands and in many languages. The complex armamentaria and the highly trained teams of clinicians and investigators are no longer the peculiar perquisites of a small number of centers in a few countries. The consequent flood of original reports relevant to neurosurgery in numerous tongues can no longer be read, much less critically appraised, by any one person. It is with a view to meeting this situation that we have decided to embark on the publication of ‘Progress in Neurological Surgery’ at the rate of one volume per year. Every book will consist of a relatively small number of chapters each sufficiently limited in scope to permit a comprehensive résumé of the worldwide publications therein. We shall seek as senior authors individuals with great personal experience in their topics and as well a substantial international scope in their professional friendship so that hopefully the chapter will give not only worldwide coverage of the subject, but in
addition a critical appraisal of the value of the various contributions, and, when possible, at least a tentative conclusion as to the merits of conflicting points of view. Not only clinical articles but also those dealing with expanding fields of pure research directly relevant to our problems will be included.

The editors have the benefit of thoughtful help as to topics and senior authors from an outstanding widespread group of neurosurgeons on the Advisory Board. We should like however to have advice on these two important aspects of our job from any member of the profession willing to give them his intelligent attention. It is our hope that the relevant chapter in a recent number of ‘Progress in Neurological Surgery’ will constitute one of the first points of reference to which a practicing neurosurgeon will turn for up-to-date information on the practical management of a problem, and that its references will give him a useful point of departure for further study should he so wish. It was the initial thought of the Swiss and Italian editors that all contributions should be published in English and after substantial reflection we have all three agreed to this policy. The early predominance of the English language in contributions to neurological surgery, and the relative terseness and simplicity of this language have led us to this viewpoint. If this were to be the policy of the other largely international neurosurgical journals it would mean that many neurosurgeons would need learn but one other language than their native tongue in order to remain abreast of the field.

November 1965

H. Krayenbühl  
P. E. Maspes  
W. H. Sweet

Table of Contents

Ultrastructure and the Biology of Human Brain Tumors  
A. J. Raimondi, Chicago 1

Normal 2  
Cerebral Edema 16  
Human Brain Tumors 20
Echo-Encephalography
A. Jefferson and A. I. Hill, Sheffield 64

Introduction 64
A-Scan 69
B-Scan 88
Conclusion 89

Gamma-Encephalography after Ten Years of Utilization
in Neurosurgery
Thérèse Planiol, Paris 94

Method: General Trend 95
I. Technique 95
II. Selection of Tracers 96
III. Outline of Biological Premises 97

Present Views on the Interest in Gamma-Encephalography and its Techniques . 100
I. Main Statistical Results Published 100
II. Advantages and Shortcomings of the Different Techniques Used in
Gamma-Encephalography 102

Analysis of Results Obtained by the Contact Technique 103
I. Material, Tracers, Procedure 103
II. Analysis of the Findings. Criteria for a Gamma-Encephalographic
Diagnosis 106
III. Statistical Results 114
IV. Differential Diagnosis Among Various Processes Generating Radioactive
Foci 130
V. A Comparison of Results Obtained with RISA and Neohydrin Labelled
with Hg 203 133

Gamma-Encephalography and Different Diagnostic Techniques in Cerebral
Pathology 134
I. Association of Various Radio-Isotopic Techniques 134
II. Combined Out-Patient Examinations 134
III. Gamma-Encephalography and Neuro-Radiologic Explorations by
Contrast Medium 136
Discussion 138
Conclusions 143
Present State and Possibilities of Future Development of Radio-Isotope Scanning with Particular Reference to the Diagnosis of Brain Tumors
B. Conrad and W. Horst, Zürich

Introduction

1. The Clinically Proven Methods of Brain Tumor Diagnosis
   Gamma-Encephalography According to Planiol
   Positron Scanning According to Brownell and Sweet
   Isotope Scanning with Focussing Collimators

2. Synopsis of Parameters Relevant to Scintigraphy
   Depth of Focus
   Penetrability
   Picture Type
   Detector Sensitivity
   Spatial Resolving Power of Detectors
   Biochemical Parameters
   The Half Life of Isotopes
   Minimum Time for Measurements
   Resolving Power of Final Picture
   Elaboration and Presentation of Data

3. Consideration of Decisive Parameters in the Present Scintigraphic Methods
   Detector Sensitivity of Scanners and Gamma-Cameras
   Differences of Projection Systems in Scanners and Gamma-Cameras
   Dependence of Projection Systems on Detector Size in Scanners
   The Projection System of the Positron Camera

4. Future Possibilities of Isotope Scanning
   Tomography with Double-Positron Cameras
   Possibilities for Isolated Layer Scanning by Gamma—Gamma-Coincidence
   Methods
   A Proposal for Simultaneous Demonstration of Multiple Isolated Layers by Development of the Double-Positron Camera into a Triple-Coincidence Positron Camera

References
Cancer Chemotherapy 192
Alkylation Agents 192

IX

Antimetabolites 193
Antibiotics and Miscellaneous Agents 194
Chemotherapy Experiences at Roswell Park Memorial Institute 194
Comments and Discussion 198
References 200

The Treatment of Brain Tumors with Radioisotopes
F. Mundinger, Freiburg/Br 202

Introduction 202
Radioisotopes and Techniques Used in Irradiating Brain Tumors 207
Phosphorus 32 208
Au 198 210
Tantalum 182 and Iridium 192 217
Cesium 137 227
Cobalt 60 228
Results 236
Glioblastoma 239
Astrocytoma 241
Oligodendroglioma 244
Undifferentiated Ependymoma 245
Undifferentiated Meningioma 245
Conclusions 246
References 252

The Treatment of Intracranial Gliomas by Surgery and Radiation
J. L. Pool and R. P. Kamrin, New York 258

Introduction 259
Diagnosis 260
Headaches 260
Seizures 261
Emotional Disturbance 262
Nausea and Vomiting 262
Neurological Symptoms 263
Intracranial Hemorrhage 263
Infratentorial Gliomas 264
Diagnostic Tests 264
X-rays of the Skull 264
Electroencephalography 265
Radio-Isotope Brain Scanning 266
Echoencephalography 266
Lumbar Puncture 266
Cytology of spinal fluid 266
Arteriogram 267
Air Encephalogram 268
Tumor Characteristics 268
Astrocytoma Grades 1 and 2 268
Supratentorial 268
Infratentorial 269
Glioblastoma Multiforme (Astrocytoma Grades 3 and 4) 269

X

Oligodendroglioma 270
Ependymoma 271
Supratentorial 271
Infratentorial 271
Medulloblastoma 271
Hemangioblastoma 272
Multiple tumors 272
Metastases and Seeding from Gliomas 273
Treatment 273
Histological Verification 274
Biopsy Techniques 274
Surgical Treatment 276
Operative Technique 277
Cerebral and cerebellar gliomas 277
Thalamic and basal ganglia gliomas 280
Brainstem gliomas 281
Results of Surgical Therapy 283
Subtotal excision 283
Total excision 287
Reoperation 287
Radiation Therapy 288
Radiation Alone 288
Biopsy and Radiotherapy 289
Subtotal Excision and Radiotherapy 289
Discussion 290