



Fluorescence-guided neurosurgery—neuro-oncology and cerebrovascular applications (2019) by Constantinos G. Hadjipanayis and Walter Stummer (eds.)

149 pp., 74 illustrations, hardback with online supplemental material ISBN: 9781626237148
Thieme Publishers New York/Stuttgart

Hans-Jakob Steiger¹ 

Received: 1 February 2019 / Accepted: 4 February 2019 / Published online: 14 February 2019
© Springer-Verlag GmbH Austria, part of Springer Nature 2019

Thieme-Verlag presents with the current volume *Fluorescence-Guided Neurosurgery*, an attractive book that illuminates the established techniques of fluorescence-enhanced intraoperative visualization during neurosurgical operations from different perspectives and also presents innovative approaches. The editors Constantinos G. Hadjipanayis and Walter Stummer have succeeded in motivating a group of experts in the field to contribute to this multi-authored volume. The book consists of 20 chapters. After an introduction and a foreword, the first chapter outlines the technical basis of intraoperative fluorescence microscopy, and the established standard procedures with the fluorescent dyes 5-aminolevulinic acid (5-ALA), indocyanine green (ICG) and fluorescein are presented. Furthermore, possible improvements that could be imagined for the future are sketched here. In the following second chapter, Walter Stummer reviews the preconditions for conducting clinical studies and for certification of new medical devices and drugs. The following chapter provides a detailed overview of the established 5-aminolevulinic acid technique for high-grade glioma, especially with regard to the proven benefit for patients in terms of resection rate, better quality of life and longer survival time. The following chapters focus on the benefits of the 5-ALA technique for recurrent malignant glioma and on the potential application in low-grade gliomas, where the method has not been established as a standard yet, but apparently also could offer some benefit, provided methodological optimization. The following two chapters describe the application of the

different fluorescence techniques, 5-ALA, ICG and fluorescein for meningiomas and brain metastases. The potential of 5-ALA fluorescence for surgery of cerebral metastases is discussed in detail and then also the potential of fluorescence techniques for spinal cord tumours, in particular the 5-ALA technique for ependymomas and astrocytomas, and the ICG technique for hemangioblastomas and cavernomas. Further chapters also shed light on the application of the 5-ALA method in paediatric brain tumours, and on the general impact of fluorescence-guided resection in neurosurgical oncology in general and specifically for the case of malignant gliomas. The remainder of the book deals with fluorescence methods that are still under development. The so-called second-window ICG method, in which the ICG bolus is given 24 h preoperatively, seems to have some potential for intraoperative visualization of malignant tumours. ICG allows for a better visualization of the deeper tissue layers than the 5-ALA method that permits a purely superficial visualization only. In the final chapters, new fluorescence dyes targeting tumour receptors are presented, which could allow for more selective and efficient visualization of tumour cells. The novel fluorescent, cancer-selective alkylphosphocholine analogues, CLR1501 (green) and CLR1502 (near infrared), seem to have much potential here at the moment. The current state of confocal microscopy and Raman spectroscopy for neurosurgical oncology is also analysed in detail. The importance of fluorescence microscopy is also compared to the merits of intraoperative neurophysiological monitoring and intraoperative MRI imaging in a separate chapter. The concluding reviews outline the value of ICG microscopy for vascular pathologies, saccular aneurysms, arteriovenous malformations and, finally, extracranial bypass surgery.

The overall impression is that of an attractive volume, which contains interesting information for both residents and

✉ Hans-Jakob Steiger
steiger@uni-duesseldorf.de

¹ Department of Neurosurgery, Universitätsklinik, Moorenstr. 5, 40225 Düsseldorf, Germany

experienced specialists. The descriptions for the established applications are more interesting for residents. The emerging applications of the standard methods for meningioma, metastases, paediatric tumours and spinal cord tumours are fascinating also for the specialists. The reviews of the current experience with these applications all comprise also a summary of the case series and case reports published so far. The descriptions of the experimental techniques that are still under development are fascinating for the more experienced clinicians and also for the researchers involved in technical development themselves.

The chapters are generally characterized by a uniform appearance including a summary and a list of the pertinent literature. The discussions on experimental and emerging applications of new techniques regularly provide a simple introduction to the physical basics. The book is carefully crafted. The mainly photographic illustrations are attractive and generally

clear. Supplemental material with a number of videos is made available online.

In summary, this book contains interesting chapters for all readers. As mentioned earlier, the chapters of the first half are more relevant for younger colleagues or staff members of neurosurgical departments where fluorescence technology has been implemented for a short time only or where it should be implemented in the future. The chapters of the second half of the book are attractive for long-time users of fluorescence techniques, who want to focus on innovation, optimization and technical development. Thus, this volume is highly recommended to novices and advanced neurosurgeons concerned with oncological or vascular neurosurgery.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.