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# **Atlas of Confocal Laser Scanning In-vivo Microscopy in Ophthalmology – Principles and Applications in Diagnostic and Therapeutic Ophtalmology**

R.F. Guthoff · C. Baudouin · J. Stave

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**Atlas of Confocal Laser Scanning In-vivo  
Microscopy in Ophthalmology –  
Principles and Applications in Diagnostic  
and Therapeutic Ophthalmology**

With 692 Figures, 183 in Color,  
and 2 Tables

 Springer

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## Foreword

Early and reliable diagnosis in ophthalmology usually depends on the recognition of minute changes of normal structures. The functional consequences due to such pathologic alterations are the only aspect of concern to the patient. However, ophthalmologists look for reproducible morphologic criteria essential in defining health and disease.

Clinico-pathologic correlations including “biomicroscopy” and “biocytology” have been a very rewarding approach to improve definitions of the phenotype. The spectrum of methods range from angiography and macroscopic observation in vivo to images obtained from fixed and stained tissue in the laboratory using standard light and electron microscopy, as well as localizing molecular biology approaches. In addition to these established methods, refinements of high resolution in vivo imaging techniques, such as ultrasound biomicroscopy (USB) and optical coherent tomography (OCT), as well as computer tomography, nuclear resonance tomography and positron tomography, enhance the sensitivity of detecting changes in structure.

Rudolf F. Guthoff and his group in Rostock have opened a new door in our profession, making us aware of the potential of confocal laser scanning in vivo microscopy. They have expanded the limitations of clinical observation – in vivo ophthalmic histopathology – which doubtlessly will permit more accurate and earlier diagnosis in the future.

Until recently in vivo confocal microscopy, despite convincing images published, remained a tool for research laboratories with an interest in clinical applications of prototype instruments. The Heidelberg Retina Tomograph HRT

II, a fully developed and widely accepted tool for optic disc analysis, is the electronic and software foundation for the Rostock Cornea Module. This high magnification confocal anterior segment microscope brings new insight to the scientifically interested clinician.

In vivo confocal microscopy started to compete with and complement established methods of imaging the living structure to deliver information based on cellular and subcellular tissue elements.

We do not yet fully understand how living texture is displayed without the various staining techniques that conventional histopathology is based on. Every ophthalmic clinician should be curious to learn how this new method will allow the integration of personal knowledge and experience into the present diagnostic armament. The authors are the leading experts in this methodology. The outline of the book is convincing, the text concise and readable, and the figures are excellent, as you would expect from a Springer publication.

This book should be available in every ophthalmic library and on the desk of all ophthalmologists dealing with anterior segment diseases of the eye. Each reader will be rewarded by learning how to look beyond established diagnostic horizons.

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## Preface

This atlas and textbook summarizes our experience in the rather new field of clinical *in vivo* micromorphology. Stimulated by the work of Maurice, Jester, Bourne, Beuermann, Masters, Mathers, Thaer and others, our long-lasting cooperation is based on the mutual interest to push forward the frontiers of biomicroscopy using and combining recently available technical principles such as laser scanning, fast digital signal capture and processing and techniques for image stabilization. As a prerequisite there was the Heidelberg Retina Tomograph system for optic disc analysis with more than 5000 users worldwide and the engineering skill and dedication of physicists and engineers carefully listened to the wishes and dreams of the clinicians. So we are already on the way to “*in vivo* biopsy,” as postulated by Teruo Nishida.

The content of the book reflects the common efforts of clinicians and physicists from the Ro-

stock University Eye Department and the Centre Hospitalier National d’Ophtalmologie des Quinze-Vingts in Paris. Both groups share the enthusiasm to incorporate *in vivo* microscopy in the clinical decision making process by imaging, measuring and quantifying tissue parameters to achieve a quick and exact diagnosis and to monitor treatment in order to find the optimal path for patient recovery.

In a time when molecular biology, genomics and proteomics are marking the frontier of biomedical research, *in vivo* micro morphology could well be the platform where these metabolic changes are displayed clinically first.

BAUDOIN  
GUTHOFF  
STAVE

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