

## Preface

The concept of the Institutes for Advanced Optical Technologies developed out of SPIE's desire to foster increased interaction and collaboration among researchers working in emerging optical technologies. The Institutes provide a forum for experts in these areas to analyze and document the state of the art and to point toward future trends and applications. Institute topics are selected for their timeliness as well as for their significance to future progress in the application of optics. Institute organizers invite selected experts to participate as paper contributors and discussion participants. It is intended that the interaction generated by the small-group structure in a retreat-like setting will foster productive discussions that are beyond the scope and possibility of a regular conference format.

Each Institute has two primary objectives: first, that the interactions and dialogue stimulate technical advancement, and second, that the publication of the Institute volume results in an authoritative collection of significant papers covering key topics in the field. While each editor and committee has unique criteria for determining the acceptability of contributions, it is intended that the Institute process itself will establish the worth and appropriateness of the individual contributions. Each contributor is asked to prepare a draft manuscript and circulate it to the other participants in advance of the Institute. The editor/chair organizes an agenda for discussing critical technical issues. The interactions and congenial discussions by the Institute members are the basis for the ensuing Institute volume. The final action of the Institute is to decide the scope of the volume and what material is to be included and what other material is to be added and by whom.

The Institute on photodynamic therapy, held January 19–21, 1990, in San Diego, addressed the future outlook and critical technical issues related to research and clinical development in PDT. The Institute forum gave the participants an opportunity to present and discuss in depth different approaches and expectations for the future development of PDT. It was especially fruitful to have the blend of technical interests represented by the participants—biochemists, clinicians, and engineers, all with a common interest in PDT.

This volume contains papers by the Institute participants and their research colleagues. Topics range from a review of the status of PDT clinical trials, studies into new photosensitizers, requirements in laser and fiber optic technologies for light delivery, to studies of the biological mechanisms behind PDT action.

### **Roy F. Potter**

General Editor, SPIE Institutes for Advanced Optical Technologies

**Other publications in the SPIE Institutes for Advanced Optical Technologies series:**

*Transformations in Optical Signal Processing*, William T. Rhodes, James R. Fienup, Bahaa E. A. Saleh, Editors, 1984, SPIE Volume 373 (Out of print)

*Optical and Hybrid Computing*, Harold H. Szu, Editor, 1987, SPIE Volume 634

*Photonics: High Bandwidth Analog Applications*, James Chang, Editor, 1987, SPIE Volume 648

*Large-Area Chromogenics: Materials and Devices for Transmittance Control*, Carl M. Lampert, Claes G. Granqvist, Editors, 1990, Volume IS 4

*Dosimetry of Laser Radiation in Medicine and Biology*, Gerhard J. Müller, David H. Sliney, Editors, 1989, Volume IS 5

# Future Directions and Applications in Photodynamic Therapy

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# Introduction

Photodynamic therapy (PDT) is the treatment of malignant lesions with visible light following the systemic administration of tumor-localizing photosensitizers. The therapy takes advantage of the unique properties of laser-generated light sources and fiber optic delivery systems. Clinical applications of PDT in the treatment of solid tumors have a 15-year history, and a number of promising anecdotal studies have been reported. However, the first controlled Phase III clinical trials are only now being performed and the true potential of PDT has yet to be realized. Continued efforts to define photochemical and photophysical properties of photosensitizers used in PDT, as well as additional studies focused on identifying targets and mechanisms of action associated with PDT, should provide a solid foundation for understanding and exploiting the applications of this therapy. Likewise, the synthesis of new photosensitizers and the continued development of laser and dosimetry systems should play a significant role in the future refinement of PDT.

The goal of the SPIE Institute on Photodynamic Therapy was to provide an informal forum in which experts in various preclinical and clinical disciplines of PDT could debate current applications and future directions. As a result of this endeavor, the participants have written chapters for this book that provide new information on current research in PDT, as well as suggestions for future studies.

I'd like to thank Tom Dougherty, Barbara Henderson, and Lars Svaasand for their contributions as discussion leaders during the Institute, as well as all the participants for their contributions. I also thank Roy Potter for his support in bringing this Institute together. Finally, the financial assistance and organizational skills of SPIE are gratefully acknowledged. All of the participants express their sincere appreciation to SPIE and its staff for an extremely productive and enjoyable conference.

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