
Advances in Experimental Medicine
and Biology

Volume 880

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2014 Impact Factor: 1.958

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Jean-Michel Escoffre • Ayache Bouakaz
Editors

Therapeutic Ultrasound

Volume 880

 Springer

Editors

Jean-Michel Escoffre
Inserm U930 “Imagerie et Cerveau”
Université François Rabelais
de Tours - Faculté de Médecine
Tours Cedex 1
France

Ayache Bouakaz
Inserm U930 “Imagerie et Cerveau”
Université François Rabelais
de Tours - Faculté de Médecine
Tours Cedex 1
France

ISSN 0065-2598 ISSN 2214-8019 (electronic)
Advances in Experimental Medicine and Biology
ISBN 978-3-319-22535-7 ISBN 978-3-319-22536-4 (eBook)
DOI 10.1007/978-3-319-22536-4

Library of Congress Control Number: 2015953337

Springer Cham Heidelberg New York Dordrecht London
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Printed on acid-free paper

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Preface

Besides the well-known and wide use of ultrasound in diagnostics, the therapeutic use of ultrasound has recently emerged. The understanding of the action of ultrasound waves at the cellular level has prompted an increased use of these waves alone or in combination with local activators in several domains. A book on therapeutic ultrasound needs to cover a broad spectrum of techniques and indications, which is quite a challenge. In addition, it should provide an up-to-date review and evidence of treatment efficacy.

All this is presented in three different parts within this book. The first part describes the use of high intensity ultrasound (HIFU) waves to perform tissue ablation: Following a thorough review of the underlying concepts, seven chapters provide detailed reports on different organs of interest. In addition, this part also mentions the synergy between ultrasound and other techniques, such as MRI, for certain indications while others might be achieved with ultrasound techniques exclusively. This underlines the high adaptability of ultrasound to different constraints with respect to the desired objectives. Last but not least, while bone typically represents a barrier for the propagation of ultrasound waves, results obtained in brain applications are absolutely amazing and pave the way for a new method of treating brain diseases.

The second part is based on the existing synergy between ultrasound waves, microbubbles and nanodroplets to exhibit a new therapeutic approach. Here again, after a detailed explanation of underlying mechanisms, even those that are not totally clarified, the following chapters report on the use of this synergy in several domains with a demonstration of efficacy. Conversely to the first part, where clinical trials have clearly demonstrated the high potential of HIFU in several indications, there is less clinical evidence for “sonoporation” to be an invaluable therapeutic improvement, with the exception of sonothrombolysis. However, more and more evidence is now emerging, and no doubt this will be the main challenge for the years to come and might eventually result in a second edition of this book.

The last part of the book deals with further therapeutic applications of ultrasound which do not rely on high intensity focused ultrasound or synergy with microbubbles and nanodroplets. This part illustrates the flexibility of ultrasound which can be used for bone repair or as a new approach for cancer treatment named “sonodynamic therapy”.

Altogether, the three parts provide a near-complete overview of the therapeutic potential of ultrasound and offer researchers and clinicians an extensive review on the topic. There is clear evidence of the value of therapeutic

ultrasound in several domains but, this will surely be further substantiated in the coming years based on the clinical evidence of sonoporation and the increased number of clinical results demonstrating a highly positive therapeutic index.

Many thanks to the Editors Jean-Michel Escoffre and Ayache Bouakaz for accepting the challenge of putting together a reference book on this subject, to Jacqueline Butterworth for the English proofreading of the book and to all the authors for their voluntary contribution.

Plan-Les-Ouates, Switzerland

François Tranquart, PhD, MD

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