

Jorge Perdigão  
*Editor*

# Tooth Whitening

An abstract graphic featuring wavy, fluid patterns in shades of blue, teal, and yellow, resembling a stylized representation of a tooth or a cross-section of a dental procedure. The patterns are layered and semi-transparent, creating a sense of depth and movement.

An Evidence-Based  
Perspective

**EXTRAS ONLINE**



Springer

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## Tooth Whitening



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Editor

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An Evidence-Based Perspective

*Editor*  
Jorge Perdigão  
University of Minnesota  
Minneapolis  
USA

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## Preface

Our team started working on this project immediately after I finished editing and writing the book *Restoration of Root Canal-Treated Teeth: An Adhesive Dentistry Perspective* (Springer, 2016). As with the previous book, this new book project made me feel truly blessed to have known so many talented colleagues from different parts of the world. The countries represented in this book include Brazil, Germany, Portugal, Spain, and the United States of America.

More interestingly, the coauthors of this book represent different generations of dental professionals. We will not mention here how old the oldest authors are, but the two youngest authors were born in 1987 and 1989. Dentistry is indeed an outstanding global and beautiful vocation.

The driving force behind the current book was the need for a compilation of independent evidence-based information on dental whitening. We have all fielded questions from patients inquiring about different whitening methods, including over-the-counter bleaching, *as-seen-on-TV* laser bleaching, shopping-mall bleaching, and jump-start bleaching, just to mention a few. As a dental professional, I have been asked about bleaching techniques that I had never heard before, mostly anecdotal, yet the patients had read all the details about these supposedly *cutting-edge* methods online.

My ultimate goal is to contribute to a better understanding of dental whitening and how we can improve its outcome based on the available evidence.

Thank you for reading.

Minneapolis, MN, USA

Jorge Perdigão



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## Acknowledgments

My gratitude extends to *all* my current and former students, mentors, and teachers. I am also fortunate to have worked in clinical and research projects with so many gifted coworkers in so many countries. And I am extremely appreciative of my family for their patience and support. We never quit.

Jorge Perdigão





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## Contributors

**Edson Araújo** Department of Dentistry, Federal University of Santa Catarina, Campus Universitário, Florianópolis, SC, Brazil

**Andressa Ballarin** Private Practice, Florianópolis, SC, Brazil

**André Luiz Fraga Briso** Department of Restorative Dentistry, Araçatuba School of Dentistry, Univ. Estadual Paulista (UNESP), Araçatuba, SP, Brazil

**Theodore P. Croll** Department of Developmental Dentistry, University of Texas Health Science Center at San Antonio (School of Dentistry), San Antonio, TX, USA

Private Practice, Pediatric Dentistry, Doylestown, PA, USA

Department of Pediatric Dentistry, University of Washington School of Dentistry, Seattle, WA, USA

**Luciana M. da Silva** Department of Restorative Dentistry, Federal University of Amazonas, Manaus, AM, Brazil

**Carlos A. de Souza Costa** Department of Physiology and Pathology, Araraquara School of Dentistry, Univ. Estadual Paulista (UNESP), Araraquara, SP, Brazil

**Kevin J. Donly** Department of Developmental Dentistry, The University of Texas Health Science Center at San Antonio (School of Dentistry), San Antonio, TX, USA

**Marjorie Oliveira Gallinari** Department of Restorative Dentistry, Araçatuba School of Dentistry, Univ. Estadual Paulista (UNESP), Araçatuba, SP, Brazil

**António Ginjeira** Department of Endodontics, University of Lisbon School of Dentistry, Cidade Universitária, Lisbon, Portugal

**George Gomes** Post-Graduate Program in Esthetic Dentistry, Rey Juan Carlos University, Madrid, Spain

**Josimeri Hebling** Department of Orthodontics and Pediatric Dentistry, Araraquara School of Dentistry, Univ. Estadual Paulista (UNESP), Araraquara, SP, Brazil

**Jennifer M. Homer** Private Practice, Menomonee Falls, WI, USA

**So Ran Kwon** Center for Dental Research, Loma Linda University School of Dentistry, Loma Linda, CA, USA

**Yiming Li** Center for Dental Research, Microbiology and Molecular Genetics, Loma Linda University School of Dentistry, Loma Linda, CA, USA

Microbiology and Molecular Genetics, Loma Linda University School of Dentistry, Loma Linda, CA, USA

**Alessandro D. Loguércio** Department of Dental Materials, State University of Ponta Grossa, Ponta Grossa, PR, Brazil

**Guilherme C. Lopes** Department of Dentistry, Federal University of Santa Catarina, Campus Universitário, Florianópolis, SC, Brazil

**Leandro M. Martins** Department of Restorative Dentistry, Federal University of Amazonas, Manaus, AM, Brazil

**Hendrik Meyer-Lueckel** Department of Operative Dentistry, Periodontology and Preventive Dentistry, RWTH Aachen University, Aachen, Germany

**Filipa Oliveira** Private Practice, Lisbon, Portugal

**Sebastian Paris** Department of Operative Dentistry and Preventive Dentistry, Center of Dentistry, Oral Medicine and Maxillofacial Surgery, Charité-Universitätsmedizin Berlin, Berlin, Germany

**Jorge Perdigão** Division of Operative Dentistry, Department of Restorative Sciences, University of Minnesota, Minneapolis, MN, USA

**Vanessa Rahal** Department of Restorative Dentistry, Araçatuba School of Dentistry, Univ. Estadual Paulista (UNESP), Araçatuba, SP, Brazil

**Carmen Real** Division of Comprehensive Care, Department of Primary Dental Care, University of Minnesota, Minneapolis, MN, USA

**Alessandra Reis** Department of Dental Materials, State University of Ponta Grossa, Ponta Grossa, PR, Brazil

**Diana Gabriela Soares** Department of Physiology and Pathology, Araraquara School of Dentistry, Univ. Estadual Paulista (UNESP), Araraquara, SP, Brazil

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## Part I

# Tooth Whitening with Peroxides

So Ran Kwon

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## Abstract

Few dental treatments have been more successful and conservative in nature than tooth whitening. Therefore, it is noteworthy to mention the efforts of pioneers in our dental profession who continuously attempted to search for the most effective and safest whitening agent. This quest has extended to determine the best whitening technique to meet our patients' desires and expectations about the aesthetic outcome. Here, a short history of tooth whitening agents developed and employed based on the type of discoloration is summarized, as is our current knowledge on the relative efficacy and safety of various types of tooth whitening regimens available. The information on proper diagnosis and treatment planning will guide the clinician in establishing a step-by-step protocol for determining the etiology of the discoloration, selecting the best whitening technique, and monitoring tooth color until the desired outcome has been achieved.

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## 1.1 History of Tooth Whitening

Tooth whitening is a conservative and effective method to lighten discolored teeth and has been practiced in dentistry for many centuries. During the course of development, careful observation and research on various materials and techniques enabled the dental profession to introduce effective, safe, and predictable methods of whitening.

In the mid-1800s, crowns were commonly used for the treatment of discolored teeth (Kirk 1906). However, early pioneers were concerned with the aggressive

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S.R. Kwon, DDS, MS, PhD, MS  
Center for Dental Research, Loma Linda University School of Dentistry,  
11175 Campus Street CSP A1010, Loma Linda, CA 92354, USA  
e-mail: [sorankwon@llu.edu](mailto:sorankwon@llu.edu)