

Tobacco Smoking Addiction: Epidemiology, Genetics, Mechanisms, and Treatment

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 Springer

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Preface

This book, *Tobacco Smoking Addiction: Epidemiology, Genetics, Mechanisms, and Treatment*, is my attempt to provide updated knowledge and views of what we have learned about nicotine addiction from multiple disciplines. According to a recent World Health Organization report, more than 1 billion men and 250 million women currently smoke and the number of deaths caused by smoking is estimated to be over 6 million annually. Tobacco smoking is one of the most preventable causes of various cancers, especially lung cancer. How to prevent and treat tobacco addiction has become one of the most important tasks for researchers, physicians, and governments throughout the world. To reveal the susceptibility genes for nicotine addiction and successful smoking cessation, thousands of clinical and basic scientists throughout the world have been engaging in research on this behavior. Through these investigations, we have learned much about the genetics, mechanisms, pathology, and, yes, treatment of this complex disorder. Most of these accomplishments are covered in this book.

The primary reason for smokers to continue smoking is the addictive properties of nicotine, which is present in tobacco smoke. In order for nicotine to exert its pharmacologic effects, it must bind to nicotinic acetylcholine receptors (nAChRs), which are broadly distributed in almost every brain area and certain peripheral systems as well. Because of this property, research on nicotine and nAChRs has been the primary focus in the tobacco field, thus one of the primary focuses of this book.

The major mission of this book is to provide an updated knowledge, not only of the properties and biological function of nicotine and various types of nAChRs but also of the clinical aspects of tobacco smoking such as its epidemiology and treatment. To accomplish this mission, this book has been organized into 21 chapters, which can be classified into four broad sections: epidemiology, genetics, pharmacologic effects, and treatment. Briefly, Chap. 1 describes the epidemiology of tobacco smoking and its associated diseases; Chap. 2 describes the basic concepts and the techniques used to study the genetics of smoking addiction; Chap. 3 makes it clear that smoking is a heritable disease; Chap. 4 summarizes all genome-wide linkage analysis findings of various smoking behaviors; Chaps. 5, 6, 7, 8, and 9 provide updated summaries of the best-investigated candidate genes for smoking addiction, including *CHANA5/A3/B4*, *CHRN3/A6*, GABAergic, *ANKK1/DRD2*, and the sero-

tonin system; Chap. 10 covers the converging findings from linkage and association approaches; Chap. 11 describes representative examples of the epistatic effect on smoking addiction; Chaps. 12 and 13 summarize the genes and pathways that to date have been found to be involved in addictions based on pathway and gene enrichment analyses at both the RNA and protein levels; Chap. 14 illustrates how microRNAs are involved in smoking addiction; Chaps. 15, 16 and 17 discuss how nicotine affects food intake and body weight, inflammation, the immune system, and cancer development; Chap. 18 shows how genes encoding different nAChR subunits evolved in both vertebrate and invertebrate species; Chap. 19 discusses the treatment of nicotine addiction from the psychological and genetic points of view; Chap. 20 describes the status of E-cigarettes and its developmental trend; and Chap. 21 discusses the challenges and opportunities we are facing today concerning the basic and clinical aspects of smoking addiction and other psychiatric disorders as well.

This book represents a collection of major studies that were conducted and reported since 1998 by my research team at the University of Tennessee Health Science Center, the University of Texas Health Science Center at San Antonio, the University of Virginia, and Zhejiang University with financial support primarily from the National Institute on Drug Abuse of the National Institutes of Health through various grants. During these years, numerous scientists have participated in our research projects, and I am grateful for their valuable contributions to our accomplishments in the past, especially for those who contributed to the chapters included in this book, which include Drs. Rong Cheng, Wenyan Cui, Bhagirathi Dash, Tongyuan Hu, Justin Kane, Ozlen Konu, George Lou, Yunlong Ma, Chamindi Seneviratne, Andrew van der Vaart, Ju Wang, Li Wen, Jackie Yang, and Zhongli Yang, to name a few. I thank Drs. Sulie L Chang (Seton Hall University), Robert Elston (Case Western Reserve University), Joel Gelernter (Yale University), Harold Gordon (NIDA, NIH), David Goldman (NIAAA, NIH), Bankole Johnson (University of Maryland), Caryn Lerman (University of Pennsylvania), Lanjuan Li (Zhejiang University School of Medicine), Joni Rutter (NIDA, NIH), Thomas Payne (University of Mississippi Medical Center), and Jonathan Pollock (NIDA, NIH) for their collaboration and support during these years. Furthermore, I want to thank Dr. David Bronson and Ms. Judith Gunn Bronson for their excellent editing of almost all the works published by my team and almost 30 years of friendship since my graduate school days at the University of Minnesota. Especially, I am the most grateful to my wife and colleague Professor Jennie Ma of University of Virginia and my three daughters, Maria, Sophia, and Andria, for their love and continuous support during all these years. Without their participation, collaboration, and support, it would have been impossible for me to accomplish all the tasks I have set myself. Last but not at least, I am most grateful for all these people who have taught and inspire me through their contributions and for the knowledge they will convey to all who read this book.

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