

# *The Performer's Voice*

Second Edition

Michael S. Benninger, MD, FACS  
Thomas Murry, PhD  
Michael M. Johns III, MD



---

# Contents

Preface	vii
Contributors	ix
<b>PART I. OVERVIEW</b>	<b>1</b>
1. Introduction <i>Michael S. Benninger and Thomas Murry</i>	3
2. Music and the Brain <i>Iva Fattorini, Neil Cherian, and Lisa M. Gallagher</i>	7
3. History of Professional Voice Care <i>Gayle E. Woodson</i>	23
4. Anatomy of the Vocal Mechanism: Structure of the Voice <i>Nicolas E. Maragos</i>	31
5. Physiology of Voice Production: How Does the Voice Work? <i>Jack Jiang</i>	39
6. Normal Voice Maturation: Hormones and Age <i>Jean Abitbol</i>	53
7. The Pediatric Voice <i>Gillian R. Diercks and Christopher J. Hartnick</i>	73
8. The Aging Voice <i>Chad Whited, Jarrod Keeler, Leda Scarce, and Seth Cohen</i>	89
9. Artistic Vocal Styles and Techniques <i>Sharon L. Radionoff</i>	103
<b>PART II. DIAGNOSTICS</b>	<b>123</b>
10. Case History, Interview, and Voice Handicap Assessment <i>Thomas Murry and Michael S. Benninger</i>	125
11. Examination of the Singer <i>Peak Woo</i>	143
12. Aerodynamic and Acoustic Voice Measurements <i>Philippe H. DeJonckere</i>	165
13. Perceptual Attributes and Assessment of the Singer's Voice <i>Rahul Shrivastav and Judith M. Wingate</i>	179
14. Reflux and the Performer's Voice <i>Albert L. Merati</i>	193
15. Acute Assessment of Professional Singers <i>Josef Schlömicher-Thier and Matthias Weikert</i>	209

<b>PART III. MEDICAL TREATMENTS</b>	<b>223</b>
16. Medications: The Positive and Negative Impact on Voice <i>Kelsey Stammes, Tanya K. Meyer, David M. Alessi, and Audrey Crummey</i>	225
17. Complementary and Alternative Medications and Techniques <i>Michael D. Seidman</i>	237
18. Vocal Emergencies <i>Joseph P. Bradley and Adam M. Klein</i>	255
19. Medical Problems in Performers <i>Laura H. Swibel Rosenthal</i>	265
<b>PART IV. BEHAVIORAL TREATMENTS</b>	<b>277</b>
20. Training and Teaching the Singer <i>William D. Riley and Linda M. Carroll</i>	279
21. Voice Therapy for Benign Vocal Fold Lesions and Scar in Singers and Actors <i>Mara Behlau and Thomas Murry</i>	299
22. The Alexander Technique and Other Strategies for Dealing With Vocal Tension <i>Janet Madelle Feindel</i>	315
23. Treatment of Injured Singers and Professional Speakers: The Singer/Actor, Singer/Dancer, and Singer/Musician <i>Jeannette L. LoVetri</i>	329
24. Performance Anxiety: Identification, Assessment, and Treatment <i>Philip J. Lanzisera</i>	341
<b>PART V. WHEN SURGICAL TREATMENT IS NECESSARY</b>	<b>355</b>
25. Surgical Anatomy, Planning, and Consent <i>Michael S. Benninger</i>	357
26. Microlaryngoscopic Procedures and Operations <i>Seth H. Dailey and Charles N. Ford</i>	367
27. Office-Based Procedures in Performers and Other Vocal Professionals <i>Paul C. Bryson</i>	379
28. Surgery (Nonlaryngeal) for the Professional Vocalist <i>Glendon M. Gardner and William G. Young</i>	385
29. Postoperative Voice Care of the Singer <i>Robert H. Ossoff and Thomas F. Cleveland</i>	397
<b>PART VI. BUILDING A PROFESSIONAL VOICE PRACTICE</b>	<b>407</b>
30. The Professional Voice Practice <i>Robert T. Sataloff and Claudio F. Milstein</i>	409
31. Medical-Legal Implications of Professional Voice Care <i>Robert T. Sataloff and Michael S. Benninger</i>	421
Appendix A. Vocal Hygiene	427
Glossary	429
Index	441

---

---

## Preface

This second edition of *The Performer's Voice* follows the highly successful first edition published 5 years ago. The original editors have added Dr Michael Johns, who brings a new perspective to this edition. *The Performer's Voice, Second Edition* brings together dedicated professionals who treat performers, educate performers, and conduct groundbreaking research on the elite voices of performers. Otolaryngologists, speech-language pathologists, psychologists, singing voice specialists, singing teachers, and performers have contributed their knowledge and offered insights on the newest approaches to the management of the voice professional.

In this book, the focus is primarily on the singer and actor; however, other performers are included—voiceover artists, dancer/singers, and instrumentalist/singers, to name a few. Each type of performer brings specific issues to the treatment team and requires special attention; specific team members have joined this edition to offer unique solutions to all those who perform, regardless of the types of performances. This book identifies these individuals, presents reports on cases with special needs, and offers myriad solutions designed to preserve the voice and prevent further damage.

All of the contributors to this volume have shown a dedication to the care of the performer through their academic training, research interests and experience, and clinical and/or performance backgrounds. Most of the contributors have been on stage as a performer at some point in their lives and bring that performance history to their specialty. The contributors range from current-day performers to choral conductors to past rock and roll musicians. In this edition, we have also added a number of additional chapters to address the expansion of interest in professional voice care.

The book is divided into 6 sections. Part I presents an overview of the world of performance artists—how music influences brain development, a

history of professional voice care, who are performing artists, and why they are important. In addition, this section presents short reviews of the vocal anatomy and physiology, as well as the effects of age and vocal styles.

Identifying and diagnosing singers' voice problems follows in Part II. Problems that require medical care, voice training, or adaptation to the performance world are described.

Part III describes pharmacologic treatments for the performer. The information in this section is particularly important for singers as many medications may have negative side effects that alter the voice temporarily despite their beneficial effects. There is also a discussion of nonlaryngeal medical problems and how they may impact and influence the voice.

Part IV considers behavioral and nonsurgical treatments for the performer. In this section, speech pathologists and singing voice specialists offer a broad range of treatment options for the performer, both for the acute and long-term care of the singer.

Part V describes surgical considerations for the performer. These chapters are specific to the performer's voice. Types of surgery, when to do it, and how to avoid damage to the vocal mechanism are all considered in these chapters. There is a discussion of the evolution of voice surgical care with the growth of office-based procedures.

Part VI addresses the needs and training involved in building a professional voice practice. Professional singers are not the most common patients seen by the speech-language pathologist, the psychologist, or the otolaryngologist. Thus, in this section, important guidelines are provided to direct individual practitioners on how to build and develop their practices to accommodate performers and medical-legal implications of a vibrant performing voice practice.

In summary, *The Performer's Voice, Second Edition* is a comprehensive book for those who treat the

performer and for those who perform. The information brought to this volume by those who have cared for performers during their careers is an invaluable reference for everyone who cares for singers and other performers. The updates and new chapters

expand the breadth of the discussion of performers' voice care and introduce new innovations and technology that are integral to a contemporary performing voice practice.



---

# Chapter 1

## INTRODUCTION

Michael S. Benninger  
Thomas Murry

*Your voice is the mirror of your soul.*

**O**ur voices influence nearly every part of human interaction and culture. Until relatively recently in human history, the voice was the sole method of communication. Early human history and recording of events was exclusively through oral history. It is only in relatively recent history that communication has been both written and oral. Despite the information explosion in written, printed, and digitalized/computerized recordings, most people still use their voices as their primary means of communication. Even when people are alone, they will use their voices, to sing or to “speak to themselves.”

Voice communication begins at birth. The birth cry is the first sign of life. The cry soon becomes the communication link between baby and mother. The voice of the mother soothes the crying voice. As the child develops, his or her voice plays a pivotal role in satisfying the needs of hunger, pain, and play. Some children develop pleasurable sounds whereas others use their voices strenuously and develop hoarseness or harshness. Still others find that humming or singing brings pleasure and reinforcement from family and friends. And that is often how these children go on to bigger and more prominent acting and singing roles in primary school, high school, and beyond. For some adults, singing is an enjoyable hobby, while for others it becomes their passion

and finally their profession. Even for those who did not get the principal part in the high school musical, training and practice under watchful eyes and ears help to develop the voice for later success in a vocally demanding profession. Eventually, these individuals become the voice professionals.

Words mean more than what is set down on paper. It takes the human voice to infuse them with deeper meaning.

—Maya Angelou

Who are professional vocalists? Loosely defined, professional vocalists are individuals who rely on their voices to be the major part of their occupation. This includes teachers, salespeople, coaches, politicians, broadcasters, singers, orators, clergy, and numerous other professionals. The voice demands, the techniques and style of use, and the overall quantity of use may vary considerably among these groups. Similarly, the quality demands and the ability to maintain their professional value may differ. Newscasters must talk rapidly with clear articulation, teachers must talk for long periods of the day, and sports coaches must talk loudly. Ultimately, however,

the need to maintain a strong, effective, and clear voice affects each of these professionals and contributes in some way to their success. Without their voices, these individuals can no longer perform the duties required.

One unique group of professional voice users is professional singers. Of all the voice professionals, singers are perhaps the most affected by problems with their voices, even subtle ones. There is a general expectation that a singer will always perform at his or her best, with a strong, pure, and clear voice with a broad range and unique character. Minor changes in quality are immediately scrutinized, far more so than minor hoarseness in other voice professionals. Because of these voice expectations, singers tend to also spend the most time of any voice professionals developing their voices through practice and training. They demand a higher quality for their own voices than even their audiences do. They are driven to perfection and will work diligently to crystallize their quality and refine their vocal style whether it is opera, gospel, or cabaret. This perfectionistic drive and focus on hard work and repetition are not only what leads to excellence but may increase the risk of injury. Any injury to singers' voices has dramatic implications not only on their voices but also on their psyche and sense of self-worth.

First, I lost my voice, then I lost my figure and then I lost Onassis!  
—Maria Callas

What happens when singers are injured and cannot perform at a level that either they or their audiences expect? That depends on many factors, including the professional level of the singer, the magnitude of the injury, the importance of the performance, the experience of the singer, the type of music to be sung, and the expectations from the audience for the performance. It is a simplification to suggest that the expectations of the performance of an elite opera singer are greater than that of a rock singer. There are too many variables to think like this. The demands of the performance vary for each individual and for each performance. Even for the experienced, elite opera singer, there may be an important difference between a Metropolitan Opera

premiere and a light-hearted recital at a hometown outdoor venue. The audition for entrance into a school of music is usually more critical to a developing young singer than the third performance of the weekend in the school play.

The greatest musical instrument given to a human being is the voice.  
—Dayananda Saraswati

For some singers and for some performances, “the show must go on.” But there is a danger in thinking like that. Singers usually injure their voices when they are sick, fatigued, or under strain. When the experienced singer feels that he or she cannot perform to a known level, he or she will cancel the rehearsal or the show. Canceling at the last minute, however, becomes more difficult for the lead singer at a small college in the Midwest where there is no one else to take over the role. The need to perform must always be balanced against the probability of vocal injury. When the singer cannot use his or her full voice, the decisions must be made with the singer's long-term career in mind. For some, it is simply a matter of rest and hydration; for others, their show cannot go on unless they seek treatment from knowledgeable individuals who understand the ramifications of voice care and vocal injury.

Madonna Cancels NJ Show: A sore throat forced Madonna to cancel the final NY area date of her Drowned World tour last night at the Meadowlands Arena.  
—*New York Times*, August 2001

Google CEO Larry Page has vocal cord paralysis: When Google CEO Larry Page stopped talking at events last summer, some company watchers feared the worst. But Page revealed on Tuesday that he's perfectly healthy, and his raspy voice is due to vocal cord paralysis.  
—*CNN Money*, May 14, 2013

---

To treat singers, one has to be aware not only of the important principles of anatomy, physiology, and pathology of the voice but also the critical interfaces between the voice, the sound produced, and the unique aspects of each individual singer. A comprehensive understanding of the differences in individual voice production, between musical styles and the more complex relationships the singer has with teachers, audiences, agents, and promoters, is necessary to comprehensively address the singer's voice needs. Each singer is different, and each needs to be considered individually. Although there are a number of variables in the assessment and treatment process, the best rule to approach an injured singer is that there are no rules. Knowledge, education, compassion, and a thoughtful, deliberate approach bolstered by appropriate tools and equipment for evaluation and treatment are needed each time a singer comes to the clinic or studio with a voice problem.

One fortunate aspect of the treatment of singers is that the characteristics of hard work and drive that can lead to injury are usually also applied to assessment, treatment, and rehabilitation. Singers sing because they love it. They rehabilitate their injured voices to resume their profession. They respect a knowledgeable voice clinician and will often follow the advice and recommendations without hesitation. In a large sense, singers are vocal athletes. Their bodies are the source of their vocation, and like other athletes, they base their careers on a somewhat fragile machine that is prone to injury. And, like athletes, they will do what is necessary to return to performing. In doing so, they rely on the specialized voice practitioners, primarily otolaryngologists and speech-language pathologists who specialize in voice disorders, and colleagues in the music community to help them return to their careers at the same level as before their injury.

Actors and actresses also require exacting standards for their speaking voice. Projection, articulation, and endurance in the speaking voice range require training and practice. Injuries may occur in actors' voices that restrict use and therefore income. Medical care and rehabilitation of the injured actor's voice also fall to the otolaryngologist, speech-language pathologist, vocal pedagogue, and singing teacher.

The current approach to caring for the performer's voice is to use an interdisciplinary team of cli-

nicians. The performer's voice care team is usually under the direction of an otolaryngologist or laryngologist. Laryngologists are otolaryngologists who specialize in diseases and disorders of the larynx. However, the performer's internist should always be kept apprised of changes in the performer's health status and of the prescribed medications.

Speech-language pathologists are an integral part of the performers' voice care team. Speech pathology encompasses many subspecialties of communication disorders. Relatively few have special training or intimate knowledge of the anatomy and physiology of the vocal mechanism or even an interest in the performing population. Most speech pathologists who routinely treat performers are closely aligned with an otolaryngologist and work together with the injured performer to achieve rapid and safe recovery of vocal injuries.

Phoniatrists, singing voice specialists, and vocal coaches are also involved in the care of the performer. Phoniatrists are specialists in European countries who are trained as physicians but not as surgeons. They may prescribe medicines and offer behavioral treatments. Singing voice specialists are usually singers who go on to study the medically related aspects of voice use. They are usually affiliated with voice care teams and offer special singing-related information to the singer and the members of the voice care team.

There is a wealth of information available to the singer with a voice problem since the advent of modern voice care. Singers should be educated by their voice care team, and team members owe it to the singers to share the most up-to-date practice methods that are available. It is important for the voice care team to communicate with the performer's other health care specialists, voice teachers, and others in the performing industry so that conservative and appropriate care is given when there is a voice injury.

This second edition of *The Performer's Voice* is written to present the most current and comprehensive approach to the care of the singer's voice. The important anatomic, physiologic, and pedagogic principles of voice production for the singer will serve as the foundation for the care of the singer. The authors represent a wide array of people who have dedicated their careers to the prevention of voice injury; the diagnosis, treatment, and rehabilitation of



the injured singer; and the education of others who continue to advance the science and art of voice care through education, research, and clinical practice. The diversity of the authors supports the important principles of the multidisciplinary approach to the care of the vocalist, particularly the singer. All of the chapters have been updated to bring the most up-to-date information related to performing voice care and injury prevention. A number of new chapters have been added to make the book more comprehensive and to address new and challenging areas in performing voices.

This book serves as a concise reference for the otolaryngologist or speech-language (voice) pathol-

ogist who wishes to focus their practice on the evaluation and care of vocalists, particularly the professional singer. It also provides a strong foundation in the understanding of the singer's voice for singers, teachers of singing, pedagogues, and those who contract and produce vocal performances, as well as others who have already developed a foundation in voice and wish to become more familiar with the intricate principles of the performing voice. Ultimately, we hope that this book will continue to strengthen the fundamental foundations of voice care and will expand the multidisciplinary interests in the care and preventive treatment of the singer's voice.



---

## Chapter 2

# MUSIC AND THE BRAIN

Iva Fattorini  
Neil Cherian  
Lisa M. Gallagher

Your brain loves music. Listening to music lights many nooks on the neurological map. Not only the brain areas that control hearing. But the areas that make you walk, dance, smile, and salivate; the areas that make you love and cry; and the areas that allow you to daydream and imagine. Music can engage the highest intellectual faculties, or it can stimulate the most elemental reflexes. We associate it with both spiritual purity and prurient sensuality. Music can make us happy when we're sad, and add sadness to the sunniest mood. All of this happens in the brain. So any study of music and its effect on the body and health has to begin with the brain.

This chapter has an ambitious agenda. We offer a broad overview of music and the brain in the context of healing. The subject is immense, so we move quickly through examples and topics. The goal is to share our excitement for this vast topic and encourage you to take a deeper dive.

So what is music? At the most basic level, it's ordered sound. Music is part of nearly every culture on earth, and wherever you find music, you're likely to find it associated with health and healing. Music and health run hand in hand through many of the world's cultural and religious traditions. Apollo was the Greek god of both music and healing. Perhaps the Muses used melody to soothe Zeus, in much the same way that the Biblical David charmed the melancholy King Saul with his harp. Plato and Aristotle

analyzed the effects of music on the emotions. In many African traditions, music is believed to be connected to spiritual and physical well-being. Johann Sebastian Bach composed his famous *Goldberg Variations* to help a sick count cope with insomnia. As music became more sophisticated, so did its abilities to alter the mind, spirit, and health.

With the advent of scientific medicine, scientists launched formal studies into the effects of music on the mind. Psychiatric hospitals in the 1930s deployed music to soothe patients and prevent destructive behavior.<sup>1</sup> After World War II, Veterans Administration hospitals engaged musicians to play for the recovering wounded to apparent good effect.<sup>2</sup> Today, most hospitals in America offer music at some time or another to patients and visitors. Cleveland Clinic provides live music each weekday and ambient music throughout the day.

Music can affect the mind and emotions in ways that are relevant to healing. The challenge now is to get a fuller understanding of how music and the brain interact, and to shape that knowledge into testable treatments. Music therapy, for instance, is now a formal health care profession. Many medical centers include music therapists on the teams that treat serious conditions. Here's an example:

Bill was a 52-year-old man admitted to the hospital with a left hemispheric stroke. Before his stroke, Bill enjoyed teaching, painting, and playing