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*Dr. Hirano and Dr. Sato (left to right)*
*This book is dedicated to my teacher, mentor and outstanding role model, Emeritus Professor Minoru Hirano, the consummate academic surgeon. He has had the greatest impact not only on my medical knowledge but also on my approach to learning, teaching and academic life as a physician. He continues to serve as a source of inspiration to me.*
*Sincerely and with the deepest gratitude I dedicated this book to him.*
*Kiminori Sato, M.D., Ph.D.*
*Kurume-shi, Fukuoka*
*May 2017*

# Preface

The basic functions of the human larynx are to act as a protective sphincter, to act as a passageway for air, and to produce sound. The human larynx has a complex structural organization with a framework characterized by an external cartilaginous skeleton and internal connective tissues in a variety of arrangements in the different regions of the larynx. This framework composed of cartilage, ligaments and muscles contributes to the physiologic functions of the human larynx.

Histology and histoanatomy reflect the organ's functions very well. Functional histoanatomy (physiological histoanatomy, morphophysiology) is a histoanatomy studied in its relation to functions.

Among mammals, only humans can speak and only the human adult vocal fold has a vocal ligament, Reinke's space, and a layered structure. Why do only human adults have such a characteristic vocal fold structure? Why and how does the newborn vocal fold mucosa grow, develop and mature? What are the factors for initiating and continuing the growth and development of the human vocal fold mucosa? Why does the voice change with age?

Vocal folds are comparable to the strings of a musical instrument. The strings must be changed from time to time, because they become old and do not vibrate well. However, human vocal folds maintain their viscoelasticity and produce good vibration for many decades. The renewal of extracellular matrices in the vocal folds is believed to occur continuously to maintain viscoelasticity.

Recent advances in molecular biology shed light on the metabolism of extracellular matrices that are essential for the viscoelastic properties of the human vocal fold mucosa. The manipulation, not only of cells but also their microenvironment, is one of the strategies in regenerative medicine. Artificial manipulation of these cells could lead to advanced development in vocal fold regeneration. Understanding the mechanisms responsible for microenvironmental regulation of the cells in the maculae flavae of the human vocal fold will provide the tools needed to manipulate cells through their microenvironment for the development of therapeutic approaches to diseases and tissue injuries of the human vocal fold. Translational medicine focused on how to regulate cells and extracellular matrices (microenvironments) contained in the maculae flavae of the human vocal folds will contribute to our ability to restore and regenerate human vocal fold tissue.

Phonosurgery is a surgery performed on the human larynx to treat phonatory functions and to improve quality of voice. It is very important to be able to visualize the internal laryngeal structures by looking at the laryngeal cartilage when performing phonosurgery via an extralaryngeal approach. It is also important to be able to visualize the internal laryngeal structures including histoanatomy by observing the mucosa of the lumen when performing phonosurgery via an intralaryngeal approach. Knowledge of the three-dimensional structure, histology and histoanatomy of the larynx is indispensable to performing phonosurgery.

This book provides essential "functional histoanatomy of the human larynx" information of which the laryngeal surgeon must have mastery. I feel strongly that a true surgeon is not only a physician but also a scientist who always approaches each patient with a deep understanding

of the basic medicine, such as essential histoanatomy and pathophysiology of voice disorders. Understanding of the histologic structures related to laryngeal functions and the histopathology of the vocal fold and larynx are vital for understanding the concepts behind phonosurgery.

Kurume-shi, Japan Kiminori Sato, M.D., Ph.D.

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Kiminori Sato, M.D., Ph.D.

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