

Preface

When Elsevier offered me an opportunity to write a book on tight junction and claudins, I started battling against myself to decide what would be the best title for the new book. My colleagues Dr. James Anderson and Dr. Alan Yu have edited two books entitled "Tight Junction" and "Claudins" respectively. Tight junctions are essential cellular barriers that separate extracellular compartments and allow passive transport of ions, solutes, and water in a regulated manner. Claudins are vital components of the regulatory machinery for paracellular transport. By comparison, tight junction behaves like an ion channel. Claudins may well form the channel pore. I reckon, the term "Paracellular Channel" will best describe what tight junction is and what claudins do.

I have maintained a historical flavor in the book and would like to emphasize that many of today's discoveries have roots in strong biochemical work of the past. Among the forerunners in the field, Dr. Shoichiro Tsukita has made the most important contribution—the discovery of claudin in 1998. We now know, claudins play pivotal roles in almost every aspect of paracellular channel's life. This book is intended to comprehensively review the current state of knowledge on paracellular channels, and inspire an influx of new minds and approaches for future exploration. This book is conceptually organized into three areas—biology, physiology, and disease of paracellular channel. The structure and function are the most important question in paracellular channel biology. Because paracellular channels reside in tight junction, how they become assembled into an ordered molecular architecture will present additional complexity to paracellular channel biology. Similar to transcellular membrane channels, paracellular channels can permeate cations, anions, and water. The charge and size selectivities define paracellular channel physiology. We have now gained a great deal of knowledge on paracellular channel's role in organ function. Such knowledge has proven vital to our understanding of how dysfunction in paracellular channels may cause diseases. Next-generation medicine will exploit genetic or pharmacologic manipulation of paracellular channel function.

Finally, I must say paracellular channel biology is a young field. Exciting discoveries are being made at a phenomenal rate. I hope this book will enthrall graduate students, research trainees, and scientists from both academia and industry to enter the field, grow with the field, and pioneer the field into a new frontier.