

Preface

A collection of chapters on pancreatic islet cells can easily span many diverse areas in islet cell biology and diabetes, extending into multiple volumes of a bulky book or gigabytes of an e-book. This is a very wide-ranging and highly researched area of biology that impacts on the health of multiple organs in the body—including the eyes, kidneys, arteries, heart, brain, nerves, feet and liver, as well as the psychological, social and economic aspects of an individual and those surrounding this person with diabetes. All of this starts with the dysfunction of insulin-producing β -cells in the pancreatic islets of Langerhans—the sole player in the game and the body's only insulin-producing factory. The diverse effects of the dysfunction of this single (pro-)hormone on multiple organs and in different age groups; starting with monogenic forms of diabetes in babies, type 1 diabetes, which often starts in childhood, and type 2 diabetes, which becomes increasingly common with age, attract many curious minds to invest their lifetime careers into training and specializing in one of the many areas that islet cell research has to offer.

The idea of putting together a book on pancreatic islet biology came to my mind when I realized that most students, whilst being well read in their field of speciality may lack the general understanding of islet cell function in development, health and disease. I thought it would be useful to have a collection of chapters discussing different areas of pancreatic islet biology. Such a book can help a burgeoning researcher by providing them with current knowledge in the field through a “tasting platter” of highly relevant, yet diverse, articles in pancreatic islet biology. This volume starts with an overview chapter from Professor Alicia Jenkins explaining insulin production, secretion and signalling under physiological and pathological conditions. This is followed by a set of very interesting contributions from the groups of Dr. Manami Hara and Dr. Vipul Periwal describing the diversity in architecture of pancreatic islets of Langerhans and a mathematical model to understand this diversity. These studies specifically describe the differences in human and rodent models, which we need to remember whilst addressing questions in human diabetes. Another important aspect of insulin production is the epigenetic regulation of gene expression. Professor Sanjeev Galande's contribution specifically sheds light upon multiple epigenetic mechanisms involved

in efficient insulin production. The next series of contributions are organized to educate the reader in understanding the regenerative potential of endocrine pancreas (Professors Bonner-Weir and Takasawa) and the potential of other cell types to differentiate into insulin-producing cells (Professors Ferber & Simpson and Dr. Joglekar). We then discuss some of the newer aspects in understanding the role of microRNAs and viruses in the development of type 1 diabetes (Dr. Akil) and then close off by learning about islet cell death and current therapy for the treatment of type 1 diabetes (Professors Thomas and Hawthorne).

Overall, this book is aimed to educate young researchers who are starting a career in islet biology, senior researchers in understanding fundamental aspects in different areas of islet biology, and cross-disciplinary scientists and experts interested in multiple aspects of pancreatic islet cell development, lineage commitment, their differentiation, regeneration and function, the pathobiology of diabetes and clinical replacement of islets in diabetes. The contributions in this book are very diverse, yet are unified resources to support the novice, expert or cross-discipline researcher to establish a strong basis in understanding the biology of the pancreatic islets of Langerhans. Each chapter can be read in sequence after the other or in isolation, to serve as a quick reference for any researcher in islet biology.

I am sure that the tremendous contribution of time and effort that I greatly appreciate from around four dozen top-ranked researchers in their fields will also be recognized and valued by every reader of this book. I greatly acknowledge the time and patience in working with me to put this volume together for you. During the time when I was preparing to put together this book, I was hit by a truck in a pedestrian crossing accident (whilst carrying my 11-month-old daughter), and the resultant neck injuries restricted my work capacity. I greatly appreciate the support from my wife—Mugdha, my parents, in-laws and my two daughters during those difficult times. I would also like to thank all of my past and current mentors who prepared me to take up and progress in diabetes research. The key people in my career who have trained me during the past two decades in multiple areas of pancreatic islet biology, obesity and diabetes include Professors Ramesh Bhonde and Ranjan Yajnik (India); Professor Claude Remacle and late Professor Joseph Hoet (Belgium); Professors Doris Stoffers and Marvin Gershengorn (USA); and Professors Bernie Tuch, Alicia Jenkins and Anthony Keech (Australia). This work could not have been possible without the scholarly contributions from all the authors and their willingness to participate in this endeavour. I greatly acknowledge the support from the Australian Research Council (ARC) and the Juvenile Diabetes Research Foundation (JDRF) Australia, Type 1 Diabetes Clinical Research Network (T1DCRN) for their support. Finally, I thank the staff from Springer Publishers, USA, who deserve a special mention for their patience during the time taken in assembling this book to its present stage. I hope that you will find this book to be a great resource for your own laboratory, as well as to pass on to your new students in their welcome pack. This reminds me of a famous quote by Michelangelo “Every block of stone has a beautiful statue inside it and it is the task of the sculptor to discover it by hammering out all of the unwanted part”. I am sure that the clarity of thoughts and ideas presented by each of the

contributing authors to this book will serve as a hammer and a chisel to carve out the ignorance of novice readers, educating them to establish a solid background in understanding pancreatic islet cell biology and putting them on a path to discover a diabetes-free world in the coming years.

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