

Contents

Part I Systems Biology Approach to β -Cells

- 1 **Systems Biology of the β -Cell – Revisited** 3
Flemming Pociot
- 2 **Established Facts and Open Questions of Regulated Exocytosis in β -Cells – A Background for a Focused Systems Analysis Approach** 25
Erik Renström
- 3 **Mitochondria and Metabolic Signals in β -Cells** 53
Pierre Maechler
- 4 **β -Cell Ontogenesis and the Insulin Production Apparatus** 73
R. Scott Heller and Ole D. Madsen
- 5 **The Role of the Cytoskeleton in Transport and Release of Insulin-Containing Granules by Pancreatic β -Cells** 83
Roger S. Goody and Hans Georg Mannherz
- 6 **The Mathematical Microscope – Making the Inaccessible Accessible** 97
Johnny T. Ottesen

Part II Imaging and Sensors

- 7 **Magnetic Resonance Imaging of Pancreatic β -Cells** 121
Patrick F. Antkowiak, Raghavendra G. Mirmira,
and Frederick H. Epstein
- 8 **Mapping the β -Cell in 3D at the Nanoscale Using Novel Cellular Electron Tomography and Computational Approaches** . . . 147
Andrew B. Noske and Brad J. Marsh

9	In Vivo Applications of Inorganic Nanoparticles	185
	Joseph Bear, Gaëlle Charron, María Teresa Fernández-Argüelles, Salam Massadeh, Paul McNaughtner, and Thomas Nann	
10	Cell Cultivation and Sensor-Based Assays for Dynamic Measurements of Cell Vitality	221
	Angela M. Otto	
11	Bioimpedance Spectroscopy	241
	Beate Klöschen, Christine Rümenapp, and Bernhard Gleich	
Part III Genetics and Proteomics		
12	DNA Variations, Impaired Insulin Secretion and Type 2 Diabetes	275
	Valeriya Lyssenko and Leif Groop	
13	Genetically Programmed Defects in β-Cell Function	299
	Aparna Pal and Anna L. Gloyn	
14	Proteomic Analysis of the Pancreatic Islet β-Cell Secretory Granule: Current Understanding and Future Opportunities . . .	327
	Garth J.S. Cooper	
15	Physiological and Pathophysiological Role of Islet Amyloid Polypeptide (IAPP, Amylin)	363
	Gunilla T. Westermark	
Part IV Physiological, Pharmaceutical and Clinical Applications and Perspectives		
16	Present State of Islet Transplantation for Type 1 Diabetes Patients	389
	Torbjörn Lundgren and Olle Korsgren	
17	Predictive Protein Networks and Identification of Druggable Targets in the β-Cell	407
	Joachim Størling and Regine Bergholdt	
18	Nanotoxicity	419
	Gary R. Hutchison and Eva M. Malone	
Part V Mathematical Modelling and Numerical Simulation		
19	From Silicon Cell to Silicon Human	437
	Hans V. Westerhoff, Malkhey Verma, Frank J. Bruggeman, Alexey Kolodkin, Maciej Swat, Neil Hayes, Maria Nardelli, Barbara M. Bakker, and Jacky L. Snoep	

20 Probing Cellular Dynamics with Mesoscopic Simulations 459
Julian Shillcock

**21 What Drives Calcium Oscillations in β -Cells? New Tasks
for Cyclic Analysis** 475
Leonid E. Fridlyand and Louis H. Philipson

**22 Whole-Body and Cellular Models of Glucose-Stimulated
Insulin Secretion** 489
Gianna Maria Toffolo, Morten Gram Pedersen, and Claudio Cobelli

23 Geometric and Electromagnetic Aspects of Fusion Pore Making 505
Darya Apushkinskaya, Evgeny Apushkinsky,
Bernhelm Booß-Bavnbek, and Martin Koch

Index 539

BetaSys

Systems Biology of Regulated Exocytosis in Pancreatic
β-Cells

Booß-Bavnbek, B.; Kloesgen, B.; Larsen, J.; Pociot, F.;
Renström, E. (Eds.)

2011, XX, 556 p. With online files/update., Hardcover

ISBN: 978-1-4419-6955-2