

# Contents

## Part I Introduction

- 1 The Metabolic Syndrome and its Complex Pathophysiology** ..... 3  
Antonio Vidal-Puig
- 2 Systems Biology in Human Health and Disease** ..... 17  
Matej Orešič

## Part II Pathophysiology of Metabolic Syndrome

- 3 The Liver in Metabolic Syndrome** ..... 27  
Simona D'Amore, Giuseppe Palasciano and Antonio Moschetta
- 4 Role of Adipose Tissue in the Pathogenesis and Treatment of Metabolic Syndrome** ..... 63  
David Sanchez-Infantes and Jacqueline M. Stephens
- 5 The Beta Cell in Metabolic Syndrome** ..... 85  
Bader Zarrouki, Ghislaine Fontés, Meriem Semache, Julie Amyot and Vincent Poirat
- 6 The Skeletal Muscle in Metabolic Syndrome** ..... 111  
Antonio Zorzano, David Sebastián and Montserrat Romero
- 7 The Central Nervous System in Metabolic Syndrome** ..... 137  
Luís Martins, Andrew J. Whittle, Rubén Nogueiras, Antonio Vidal-Puig, Carlos Diéguez and Miguel López
- 8 Lipid Metabolism in Metabolic Syndrome** ..... 157  
Jan Borén and Martin Adiels
- 9 Gut Microbiota in Metabolic Syndrome** ..... 171  
Fredrik Bäckhed

### **Part III Key Technologies to Study Metabolic Syndrome**

<b>10 Proteomics in the Systems-Level Study of the Metabolic Syndrome. . .</b>	<b>185</b>
Isabel Rubio-Aliaga, Irma Silva-Zolezzi, Michael Affolter, Loïc Dayon, Alexandre Panchaud and Martin Kussmann	
<b>11 Metabolomics in the Systems-Level Study of the Metabolic Syndrome</b>	<b>213</b>
Tuulia Hyötyläinen	
<b>12 Fluxomics . . . . .</b>	<b>237</b>
Marta Cascante, Adrián Benito, Igor Marín de Mas, Josep J. Centelles, Anibal Miranda and Pedro de Atauri	
<b>13 <i>In vitro</i> Colon Model to Study Metabolic Syndrome . . . . .</b>	<b>251</b>
Anna-Marja Aura	

### **Part IV Modeling Metabolic Syndrome**

<b>14 Genome-Scale Modeling of Tissue and Cancer Metabolism . . . . .</b>	<b>281</b>
Livnat Jerby and Eytan Ruppin	
<b>15 Modeling of Lipid Membranes and Lipoproteins . . . . .</b>	<b>299</b>
Artturi Koivuniemi and Ilpo Vattulainen	
<b>16 Computational Statistics Approaches to Study Metabolic Syndrome</b>	<b>319</b>
Ilkka Huopaniemi and Samuel Kaski	
<b>17 Towards Modeling of Metabolic Syndrome: Tissue Crosstalk in Lipid Spillover . . . . .</b>	<b>341</b>
Sergey Smirnov, Eugeny Metelkin, Nail Gizzatkulov, Oleg Stepanov and Oleg Demin	
<b>Index . . . . .</b>	<b>367</b>

A Systems Biology Approach to Study Metabolic  
Syndrome

Oresic, M.; Vidal-Puig, A. (Eds.)

2014, XIX, 384 p. 47 illus., 23 illus. in color., Hardcover

ISBN: 978-3-319-01007-6