

Contents

Introduction	1
Discovery of the Aquaporins and Development of the Field	3
Jennifer M. Carbrey and Peter Agre	
Part I Aquaporin Protein Structure and Selectivity Mechanisms	
The AQP Structure and Functional Implications	31
Thomas Walz, Yoshinori Fujiyoshi, and Andreas Engel	
Dynamics and Energetics of Permeation Through Aquaporins. What do we Learn from Molecular Dynamics Simulations?	57
Jochen S. Hub, Helmut Grubmüller, and Bert L. de Groot	
In Vitro Analysis and Modification of Aquaporin Pore Selectivity	77
Eric Beitz, Dana Becker, Julia von Bülow, Christina Conrad, Nadine Fricke, Amornrat Geadkaew, Dawid Krenc, Jie Song, Dorothea Wree, and Binghua Wu	
Part II Aquaporin Function in Mammalian Water Homeostasis	
Aquaporins in the Kidney	95
Tae-Hwan Kwon, Jakob Nielsen, Hanne B. Møller, Robert A. Fenton, Søren Nielsen, and Jørgen Frøkiær	
Regulation of Aquaporin-2 Trafficking	133
Pavel I. Nedvetsky, Grazia Tamma, Sven Beulshausen, Giovanna Valenti, Walter Rosenthal, and Enno Klussmann	
Role of Aquaporin-4 in Cerebral Edema and Stroke	159
Zsolt Zador, Shirley Stiver, Vincent Wang, and Geoffrey T. Manley	

Aquaporins as Potential Drug Targets for Meniere's Disease and its Related Diseases	171
Taizo Takeda and Daizo Taguchi	
Aquaporins in Secretory Glands and their Role in Sjögren's Syndrome ..	185
Christine Delporte	
Part III Aquaporin Glycerol Permeability in Mammalian Physiology	
Skin Aquaporins: Function in Hydration, Wound Healing, and Skin Epidermis Homeostasis	205
Mathieu Boury-Jamot, Jean Daraspe, Frédéric Bonté, Eric Perrier, Sylvianne Schnebert, Marc Dumas, and Jean-Marc Verbavatz	
Function of Aquaporin-7 in the Kidney and the Male Reproductive System	219
Eisei Sohara, Shinichi Uchida, and Sei Sasaki	
Role of Aquaporin-7 and Aquaporin-9 in Glycerol Metabolism; Involvement in Obesity	233
Norikazu Maeda, Toshiyuki Hibuse, and Tohru Funahashi	
New Members of Mammalian Aquaporins: AQP10–AQP12	251
Kenichi Ishibashi	
Part IV Aquaporin Functions Apart from Water and Glycerol Transport	
Structural Function of MIP/Aquaporin 0 in the Eye Lens; Genetic Defects Lead to Congenital Inherited Cataracts	265
Ana B. Chepelinsky	
pH Regulated Anion Permeability of Aquaporin-6	299
Masato Yasui	
Aquaglyceroporins and Metalloid Transport: Implications in Human Diseases	309
Hiranmoy Bhattacharjee, Barry P. Rosen, and Rita Mukhopadhyay	
Ammonia and Urea Permeability of Mammalian Aquaporins	327
Thomas Litman, Rikke Sjøgaard, and Thomas Zeuthen	
Knock-Out Models Reveal New Aquaporin Functions	359
Alan S. Verkman	
Part V Towards Therapeutic Use of Aquaporins	
Design, Synthesis and Assaying of Potential Aquaporin Inhibitors	385
Rose Haddoub, Michael Rützler, Aélig Robin, and Sabine L. Flitsch	

Aquaporin-1 Gene Transfer to Correct Radiation-Induced Salivary Hypofunction 403
Bruce J. Baum, Changyu Zheng, Ana P. Cotrim, Linda McCullagh,
Corinne M. Goldsmith, Jaime S. Brahim, Jane C. Atkinson, R. James Turner,
Shuying Liu, Nikolay Nikolov, and Gabor G. Illei

Index 419