Preface

Vasopressin and oxytocin are two octapeptide hormones released from the posterior pituitary. They are identical in structure with the exception of two amino acid residues that allow specific binding of each one to its cognate receptor resulting in completely different actions. A central activity of vasopressin is involved in water regulation. In this case, its action in the distal kidney is to induce the reabsorption of water into the bloodstream. This occurs in the following scenario. Arginine vasopressin (AVP or antidiuretic hormone, ADH) is stored in vasopressinergic nerve endings in the posterior pituitary. In response to signaling of osmoregulators or a decrease in blood volume, AVP is released from this site. AVP also can be released by nicotine (smoking). The gene encoding mRNA for AVP contains responsive elements at its N-terminus: osmolar response element, glucocorticoid response element, estrogen response element, and *fos/jun* response element. The polypeptide precursor liberates AVP, neurophysin II, and copeptin. Neurophysin II is a carrier protein that is complexed with AVP through its transport in the bloodstream presumably to protect AVP from inactivation. At some point before associating with a distal kidney cell, AVP dissociates from the AVP–neurophysin II complex. The liberated AVP binds to its cognate receptor in the distal kidney cell membrane, and the activated receptor complex activates cellular protein kinase C. Protein kinase C then phosphorylates aquaporin 2 subunits, four of which form a water channel in the apical membrane. The increase in aquaporin channels in the apical membrane facilitates the uptake of water that is transported across the cytoplasm in a vesicle from the apical side to the basolateral side of the cell. There, water is expelled into the extracellular space through different aquaporin channels, fixed within the basolateral membrane, and eventually reaches the bloodstream to expand its water volume. This is one aspect of the activities of AVP. In this book, there are reviews of many aspects of this fascinating hormone.

In the opening chapter, S.A. Mayasich and B.L. Clarke report on "Vasotocin and the origins of the vasopressin/oxytocin receptor gene family." "Oxytocin/vasopressin-like neuropeptide signaling in insects" is recounted by E. Muratspahić, E. Monjon, L. Dürrauer, S.M. Rogers, D.A. Cullen, J. Vanden Broeck, and C.W. Gruber. M. Spiess, N. Beuret, C.P. Baschong, and J. Rutishauser describe "Amyloid-like aggregation of provasopressin."

Next, N. Makita, K. Manaka, and T. Iiri review "V2 vasopressin receptor mutations." Opposite to its activity, vasopressin can be inactivated as related in a chapter by D.T. Li, E.N. Habtemichael, and T.S. Bogan entitled "Vasopressin inactivation: Role of insulin-regulated aminopeptidase." Related to AVP action on the distal kidney, S. Li, C. Li, and W. Wang discuss "Molecular aspects of aquaporins." Following this, a review of "The vasotocinergic system and its role in the regulation of stress in birds" is authored by W.J. Kuenzel, S.W. Kang, and A. Jurkevich. In the relationship of vasopressin to kidney disease, A.A. Gonzalez, N. Salinas-Parra, F. Cifuentes-Araneda, and C. Reyes-Martinez offer "Vasopressin actions in the kidney renin angiotensin system and its role in hypertension and renal disease." "Vasopressin receptor subtypes and renal sodium transport" is next owing to the contributions of Y.V. Natochin and D.V. Golosova. Relative to clinical problems, J. Garona, M. Pifano, G. Ripoll, and D.F. Alonso describe "Development and therapeutic potential of vasopressin synthetic analog $[V^4Q^5]$dDAVP as a novel anticancer agent." Following in this vein, a chapter on "Vasopressin and vasopressin receptors in brain edema" by E. Zeynalov, S.M. Jones, and J.P. Elliott completes the presentation.

The illustration on the book cover is taken from two figures in the book. On the left is a ribbon structure in a 3D model of the vasopressin receptor from Fig. 4A of chapter 8 entitled "Vasopressin actions in the kidney renin angiotensin system and its role in hypertension and renal disease" by A.A. Gonzalez, N. Salinas-Parra, F. Cifuentes-Araneda, and C. Reyes-Martinez. On the right is a surface representation of neurophysin II (blue) with bound vasopressin (green) from Fig. 3B of chapter 3 entitled "Amyloid-like aggregation of provasopressin" by M. Spiess, N. Beuret, C.P. Baschong, and J. Rutishauser.

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