Preface

Intrinsically photosensitive retinal ganglion cells (ipRGCs) are a special type of ganglion cells in mammalian retina. They express a novel light sensitive pigment, melanopsin, which drives imaging and non-imaging visual functions. In this brochure, a comprehensive updated summary on history and discovery, biological characteristics, and physiological functions of ipRGCs is provided with integration of recent advances in neurobiology and visual neuroscience. Moreover, the roles of ipRGCs are discussed under the pathological milieu generated by optic neuropathies, glaucoma, diabetic retinopathy, and the systemic neurodegenerative diseases with retinal lesions. Finally, the interaction is described between the ipRGCs and melatonin under retinal physiology and the pathology of the above-mentioned neurodegenerative diseases, in the hope that the ipRGCs' resistance to oxidative, mechanic, and metabolic stresses and the melatonin's regulation on the ipRGCs under the stressful conditions could provide hints for identifying novel neuroprotectants, and the degenerative behavior of these cells might subserve biomarkers for surveillance of neurodegeneration in the neuropathies such as Alzheimer's, Parkinson's, and Huntington's diseases.