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## Preface

Blood-brain barrier (BBB) breakdown leading to cerebral edema occurs in many brain diseases—such as trauma, stroke, inflammation, infection, and tumors—and is an important factor in the mortality arising from these conditions. Despite the importance of the BBB in the pathogenesis of these diseases, the molecular mechanisms occurring at the BBB are not completely understood. In the last decade a number of molecules have been identified not only in endothelial cells, but also in astrocytes, pericytes, and the perivascular cells that interact with endothelium to maintain cerebral homeostasis. However, the precise cellular interactions at a molecular level in steady states and diseases have still to be determined. The introduction of new research techniques during the last decade or so provide an opportunity to study the molecular mechanisms occurring at the BBB in diseases.

*The Blood–Brain Barrier: Biology and Research Protocols* provides the reader with details of selected morphologic, permeability, transport, *in vitro*, and molecular techniques for BBB studies, all written by experts in the field. Each part is preceded by a review that emphasizes the advantages and pitfalls of particular techniques, as well as offering much relevant current information. The techniques provided will be helpful to both beginners in BBB research and those more experienced investigators who wish to add a specific technique to those already available in their laboratories. Although a number of *in vitro* techniques are included, it is suggested that they be complemented with data derived from *in vivo* studies to gain a truer picture of the biological process.

It is hoped that the methods described in *The Blood–Brain Barrier: Biology and Research Protocols* will aid researchers in the isolation of molecules not yet described, and increase our understanding of how they interact at the BBB to maintain cerebral homeostasis as well as of the mechanisms that result in BBB breakdown in diseases. Advances in technology will necessitate collaboration among researchers having expertise in many of these techniques to solve biological questions.

A greater understanding of the molecular mechanisms occurring at the BBB in diseases is also necessary in order to identify substances/molecules that can be targeted for pharmacological manipulation and/or gene therapy and to determine when therapeutic intervention can attenuate the disease process.

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This book is dedicated to Mohit Kumar and Labonya Nag.

*Sukriti Nag*