

Preface

Since its discovery by Paul Ehrlich in the late nineteenth century, the blood–brain barrier has been the object of intensive research. It is formed by brain capillary endothelial cells and represents a dynamic interface that separates the brain, the most critical organ in our body, from the blood circulation. It protects the central nervous system (CNS) from potentially harmful xenobiotics and metabolites, while simultaneously regulating transport of essential molecules and maintaining a stable environment within the brain. Together with pericytes, astrocytes and neurons, the capillary endothelial cells form the so-called neurovascular unit, which is regulated by extremely complex signaling cascades. Unfortunately, the blood–brain barrier also prevents most therapeutic agents from reaching their target in the brain, which is why effective treatment of CNS diseases such as Alzheimer’s disease, Parkinson’s Disease, Depression, Epilepsy or brain tumors, including brain metastases from peripheral tumors, remains to be one of the big challenges in modern medicine.

This volume of “Topics in Medicinal Chemistry” is a compilation of the latest research concerning new developments in the blood–brain barrier field. Seven internationally acknowledged research groups have contributed chapters, detailing their findings in this exciting and challenging area of biomedical research. Their works cover a broad range of topics including general structure and function of the blood–brain barrier, modes to study the blood–brain barrier in vivo, active transport systems, drug delivery across the barrier by colloidal carriers or ultrasound as well as alterations of the barrier at various disease states. From these chapters the complexity of the blood–brain barrier becomes apparent and they also illustrate which enormous efforts still lie ahead of us before we obtain a complete understanding of this fascinating area.

It has been a great pleasure for us to act as editors for this volume and we thank all authors who contributed. In addition, we hope that the volume might stimulate others to enter this research area and help to clarify the manifold unresolved questions.

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