
Preface

The development of microdialysis, a minimally invasive technique, by Ungerstedt about 35 years ago has changed radically the way we study neurochemistry in vivo. Thanks to the substantial modification of a dialysis membrane attached to the end of Delgado's "dialytrode," Ungerstedt and Pycock in the 1970s succeeded in giving the first demonstration of the feasibility of using brain dialysis for measuring neurotransmitter release in vivo, measuring amphetamine-induced release of dopamine in the rat striatum. Interesting details about the development of this innovative technique can be found in the Foreword that Prof. Ungerstedt has provided to this volume, for which we are very grateful. Since its first application, microdialysis has become incredibly popular to study brain function and has been applied with success in different fields from psychopharmacology, neurobiology, and physiology in animals and also humans. The success of such a technique in neuroscience research is principally due to its capability to provide information on basal and stimulated levels of extracellular neurotransmitters offering the opportunity to single out the role of various receptor subtypes in regulation of synaptic and extrasynaptic neurotransmitter release and metabolism in discrete nuclei. Moreover, the development of different analytical methods, first of all high performance liquid chromatography (HPLC), has made this technique versatile, cheap, and easy to use routinely. Other different analytical methods have been coupled to microdialysis. They can be divided in non-separation-based methods, which allow the detection of one analyte at a time, in contrast to separation-based methods that can be used for the detection of multiple analytes in each sample. Due to limited spatial and temporal resolution, conventional microdialysis is best suited for sampling extrasynaptic pools of neurotransmitters and neuromodulators. Nevertheless, advances in probe design, fluid collection and handling, as well as analytical techniques are making way for breakthrough advances in microdialysis moving the membrane closer to the synapse.

This volume, with contributions from leading experts in their fields, follows a tradition set by the *Neuromethods* series by focusing on the practical aspects of microdialysis in animals and humans, highlighting current technical limitations, and providing a vision of what is yet to come for the determination of the most disparate compounds in the brain. The book has been organized to display the research topics to which modern microdialysis methods have been applied. The 16 chapters each contain an introduction that gives a broad overview of a focused topic, followed by an extensive protocol on how the experiments are performed along with invaluable practical advice. We hope that this text will be a valuable reference for students, neuroscientists, and physicians for the use of microdialysis in the study of brain functions and its clinical applications.

I would like to thank my friend and colleague, Vincenzo Di Matteo, for his help in producing this book, and Springer and its publishing editor for this series, Wolfgang Walz, for helping us in driving the book's development and eventual publication.

Finally, I would like to express our sincere appreciation to all the authors who have responded very willingly and contributed their time and expertise in preparing their individual contribution to a consistently high standard.

Msida, Malta

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