
Preface

Ross G. Harrison's founding experiments with nerve cell cultures between 1907 and 1910 were motivated by the same concerns of Santiago Ramón y Cajal centered on the "Neuron Doctrine." Cajal used impressive silver impregnations in chick spinal cord to illustrate axonal growth in vivo. Harrison, using pieces of frog neural tube nourished in lymph within a depression slide, solved the problems of his predecessors and devised a reproducible method of tissue culture experimentation. For the first time, the outgrowth rates of individual fibers and their growth cones were observed in real time under the microscope. In essence, Harrison established a direct in vitro test to prove Cajal's axon outgrowth theory. Harrison overcame basic tissue culture problems and created a culture technique others could follow. Since the beginning of nervous system tissue culture with Ross Harrison's vision, now just over 100 years ago, the scientific community has established numerous protocols to generate the current wide variety of cell and tissue culture technology.

The rapid growth of neuroscience during the 1980s and a highly acclaimed, intensive tissue culture course held in Saskatoon, Saskatchewan, for several years formed the concept for this protocol series in neural tissue culture. In 1992, Dr. Sergey Fedoroff (University of Saskatchewan) founded this series with the publication of the first edition. The textbook continued to grow in popularity with subsequent editions, and the book is now established as a popular neuroscience protocol reference in numerous laboratories throughout the world.

The fourth edition of *Protocols for Neural Cell Culture* represents a turning point in this series from editorial and content perspectives. Since the publication of the third edition in 2001, neuroscience has continued to expand with discoveries that utilize tissue culture methodologies. The refinement of existing protocols and the emergence of new techniques and culture media formulations are linked with advances in neuroscience. This edition includes three chapters from leading companies who specialize in neural tissue culture biotechnology and contribute significantly to the products used by many scientists.

Updates on the experimental procedures for many of the classical tissue culture preparations in neuroscience are highlighted. In view of the implications for regenerative medicine, methods to grow and expand embryonic and adult neural stem cells are included in this edition. This volume covers the isolation, expansion, and cryopreservation of neural tissue from mouse, rat, and human sources. Immunocytochemistry is a subcomponent of many chapters as it continues to be a solid method to identify cells at developmental points within specific lineages. The basic techniques for establishing specified neuronal and glial preps are complimented by many new chapters including methods to assess aspects of cell function (calcium imaging) and cell death.

I am privileged to have the support from Dr. Fedoroff (a great neuroscience mentor) to continue the Editorship of this collection. I am very grateful to all the authors for their commitment and time. Their dedication has produced a text with exceptional quality and

coverage in tissue culture protocols for today's neuroscience. A special thanks to Sharon Ralph for countless hours of editorial assistance, management, and organization in the production of this book.

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