

Preface

This book was written by internationally recognized researchers and scientists from many years of their combined research and instruction work in biology, bioengineering, mathematics and pharmaceutical fields. This book is an essential practical guide to an important and expanding area about cell proliferation. A detailed practical description of cell proliferation mechanism, detection methods, and related biomaterial and drug development is provided in this book. Proliferation of plant cells is also addressed in Chapter 5 to help readers understand cell proliferation in a broad arena. I sincerely hope that this comprehensive book on cell proliferation helps scientists in basic and clinical research in understanding this important biological activity, and helps them utilize this knowledge to help improve the life quality of humans.

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Oligodendrocyte progenitor cells (OPCs), also known as NG2+ glia, polydendrocytes or synaptoblasts, are widespread in the grey and white matter areas of the central nervous system. In every region of the brain, OPCs are found as proliferative cells, and both in development and in the adult brain 50% of them are actively dividing. Signals responsible for regulation of OPC proliferation are currently a work of intense investigation. Studies in culture suggested that different molecules, including the neurotrophins, glial growth factor-1 (GGF1), fibroblast growth factor (FGF), as well as growth factors, may contribute to regulation of OPC proliferation. Recent evidence in vivo indicated that neuronal activity can regulate proliferation and differentiation of OPCs. This chapter summarizes basic information that the neurotrophins may be one of the molecules involved in regulation of OPC proliferation. It also puts forward a hypothesis that glutamate is secreted at neuron glia synapses may inhibit effects of neuronal activity on proliferation of OPCs in vivo.

Keywords: Oligodendrocyte progenitor cells, proliferation, glutamate, synaptic, cell cycle, neuronal and glia.