Preface

The event of cell-cell fusion is involved in a variety of physiological, but importantly also of pathophysiological processes. As a prominent example, the formation of skeletal muscle fibers depends on the fusion of myoblast cells to form giant syncytia. This book addresses this fascinating process that takes place during muscle development and regeneration with several chapters highlighting methods to analyze cell fusion in skeletal muscle.

Critically, cell fusion represents an indispensable mechanism in various processes of development and regeneration. Furthermore, the process of cell fusion may rejuvenate aging or damaged cells upon their fusion with certain stem or progenitor cells. These aspects are covered by a selection of protocols that address the fusion process in a variety of cell types beyond skeletal muscle tissue. High definition methods are presented to detect fusion events in vitro and in vivo and supposed to help scientists in order to gain deeper insights into the underlying mechanisms of these cell biologically highly important and relevant processes.

This volume intends to support the reader specifically with a collection of state-of-the-art protocols that allow for the detection and analysis of fusion events in various cell types in vitro and in vivo. In addition, the provided selection of protocols aims to facilitate the future highly relevant process of engineering cells for specific purposes, such as generation of transgenic embryos and development of hybrid cells, in order to tackle specific tasks in cell biology and medicine. The book closes with a chapter on mitochondrial fusion as a prominent process of subcellular fusion processes with a dominant importance for mitochondrial function in health and disease—highlighting that not solely cell fuse, but also cell organelles possess this central biological function in order to fulfill their properties within a healthy organism.

This book would not have been possible without the contribution of many outstanding experts in the field of cell fusion that agreed to share their knowledge and laboratory protocols with the readers of this edition. Therefore, I would like to express my honest thankfulness to all contributing authors who spend a lot of time and effort to record their protocols and support me with the project. I am also thankful to John Walker for giving me the chance to edit this volume of Methods in Molecular Biology.

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