



## Embryonic Stem Cells: Methods and Protocols

Methods In Molecular Biology, Vol. 185, edited by Kursad Turksen, Humana

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Embryonic stem (ES) cells are totipotent cells that have the ability to proliferate *in vitro*, to self-renew and, upon differentiation, to develop into virtually all types of tissue. These cells are currently one of the hottest topics in academic science and the biotech industry: they hold the promise of an incredible versatility, which could have implications for the treatment of a broad variety of diseases. In addition to their incredible potential, ES cells are a useful model for the study of gene expression or drug effects. At present, research is rapidly developing in this field, as are methodological protocols.

A book that summarizes the current state of methods in this field is needed, and is certainly a challenge. *Embryonic Stem Cells: Methods and Protocols*, edited by Kursad Turksen, contains 35 chapters on a wide variety of methods used in murine ES cell research. The chapters of the first part cover the following:

- isolation procedures for murine ES cells;
- maintenance cultures;
- specific lineage differentiation protocols to study the differentiation of ES cells into diverse cell types, such as hematopoietic and endothelial cells, osteoclasts, adipose cells, different types of muscle cells, neural precursors, cells of the epidermal and hair follicle lineage and melanocyte development;
- a lineage selection protocol using the example of neural precursors; and

- protocols on the analysis of the cell cycle, as well as the expression of different genes induced during differentiation or, for example, by hypoxia.

The second part of the book reflects more molecular approaches using ES cells as a tool, such as:

- gene chip approaches to study genetic pathways;
- conditional transgenesis;
- site-specific recombination techniques;
- gene trap approach;
- phage-displayed antibodies; and
- gene transfer techniques using targeted filamentous bacteriophages.

The book is a collection of detailed protocols, each written by a well-established group in the respective field. It is easy to read and well illustrated, although there are clear differences in quality between the chapters. Each chapter starts with a brief introduction, followed by a detailed list of materials (as detailed as including catalogue numbers) and a methods section. *Embryonic Stem Cells* can be used like a manual and, as such, provides excellent information for those who are trying to set up new methods or who wish to compare their own protocols with other techniques.

It must be noted that the book solely provides culture methods for mouse ES cells; methods for human ES cells are not covered. However, these protocols undergo constant modifications and are subject to continuing research; also, different laboratories use different approaches. At present, there is no ultimate protocol, for example, for any of the lineage differentiation techniques, which makes it difficult to edit a book on this subject.

This book is not a textbook. Unfortunately, most chapters lack a comparison with other existing protocols in the field. To compare the efficiency of, for example, lineage specific differentiation protocols, the yield of cells would have been useful to

know for the respective protocols, which is missing in some chapters. Furthermore, insulin-secreting cells and oligodendrocytes are some of the major targets in ES cell differentiation; chapters on such protocols are missing.

The book reads easily and chapters are comprehensive for newcomers to the field. However, the reader should not expect background information on ES cells in general. The introduction of the book is repetitive and it seems that the links between chapters are missing, and no references to other chapters are given if parts are redundant or where it applies. This would have added value to the book, making it more than a selection of protocols.

In summary, this book is a manual and gives insight into detailed protocols, which can not be obtained from published articles. It is aimed at newcomers as well as established researchers in the field and is a useful guide to setting up new techniques. Furthermore, it is certainly a motivation to apply new methods to ES cell models, and for that purpose it provides a useful resource and adds value to the field of stem cell research.

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