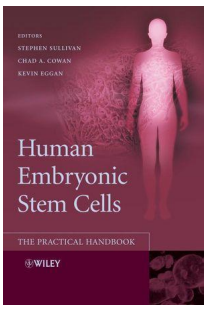
HUMAN EMBRYONIC STEM CELLS, The Practical Handbook



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DESCRIPTION:
With this valuable practical guide, three members of the Harvard Stem Cell Institute have compiled and edited the definite handbook for the exciting new field of human embryonic stem cell research. The editors have gathered protocols from scientists with extensive reputation and expertise, describing and comparing currently used techniques for the culture of human stem cells and discussing the strengths and weaknesses of the different approaches.

Human Embryonic Stem Cells: The Practical Handbook contains the first centralised collection of methods used in human embryonic stem cell biology. The book covers the derivation of human stem cell lines, the obtaining of cells from human stem cell banks, the culturing and characterisation of the cells, and the differentiation of the cells in vitro and in vivo. Lastly, almost all of these protocols can also be used for analyzing and manipulating induced pluripotency iPS stem cells. This allows an even greater number of opportunities for those interested in purusing work in pluripotent stem cells, disease modelling, and other aspects of basic regenerative medicine research.

The novel and useful focus of this book sets it apart from other available books:

- Compares and evaluates the protocols used in leading laboratories working on human embryonic stem cells
- Centred solely on practical protocols for human (not mouse) embryonic stem cell research
- Includes extensive troubleshooting sections
- Addresses the different proclivities and behaviours of individual human embryonic cell lines
- Contains techniques currently known only to a small number of specialised laboratories worldwide

This handbook represents an essential source of up-to-date practical information for all cell and developmental biologists working with human embryonic stem cells or wishing to enter the field. It is also essential reading for clinical researchers in areas such as diabetes, cardiovascular disease, and neurological diseases.

CONTENTS:
Section 1: Obtaining and culturing human embryonic stem cells.
1. Organization and good aseptic technique in the human embryonic stem cell laboratory.
2. Sourcing human embryonic stem cell lines.
3. Human embryo culture for human embryonic stem cell derivation.
4. Derivation of human embryonic stem cell lines.
5. Standard culture of human embryonic stem cells.
6. Culture of human embryonic stem cells in chemically defined conditions.

Section 2: Characterization of undifferentiated embryonic stem cells.
7. Phenotypic analysis of human embryonic stem cells.
8. Genetic and epigenetic analysis of human embryonic stem cells.

Section 3: Manipulation of human embryonic stem cells.
9. In vivo differentiation of human embryonic stem cells.
10. In vitro differentiation of human embryonic stem cells.
11. Differentiation of human embryonic stem cells into extraembryonic cell types.
12. Directed differentiation of human embryonic stem cells into:
(a) Early endoderm cells.
(b) Hepatic cells.
(c) Pancreatic cells.
13. Directed differentiation of human embryonic stem cells into:
(a) Cardiomyocytes.
(b) Endothelial cells.
(c) Osteogenic cells.
(d) Hematopoietic in vivo repopulating cells.
(e) Lymphocytes.
(f) Myeloid cells.
14. Directed differentiation of human embryonic stem cells into:
(a) Forebrain neurons.
(b) Dopaminergic neuron.
(c) Spinal motor neurons.
15. (a) Gene targeting: knock out and knock in by homologous recombination.
(b) RNA interference in human embryonic stem cells.
c) Generation of gene reporters using bacterial artificial chromosome recombineering.