

# STEM CELLS: NUCLEAR REPROGRAMMING AND THERAPEUTIC APPLICATIONS

Chair: **John Gearhart**

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Stem cells are specialized cells with unique potential for self-renewal and specific cell-type commitment. They remain uncommitted until a particular physiological signal prompts them to differentiate and become lineage-specific cells with characteristic physiological functions.

In 1998 investigators isolated embryonic stem cells from human embryos for the first time and were able to culture these *in vitro*. Since then, stem cell-based technologies have received enormous scientific attention because of their promise for developing novel therapeutic applications. Potential clinical applications covered in the book include the production of cardiomyocytes to replace damaged heart tissue, the production of insulin-producing cells for patients with diabetes, and the generation of neurons for the treatment of patients with Parkinson's disease or spinal cord injury.

Particular attention is paid to the factors that maintain stem cells in a pluripotent state or which drive them to create differentiated and lineage-committed cells *in vitro* and *in vivo*. Understanding stem cells at the molecular level is essential to understanding their behaviour in a physiological context. Nuclear reprogramming, the process by which a nucleus acquires developmental potential, is currently a focus of great interest in the scientific community and is covered here. It is relevant to stem cell research generally, and also to research on the cloning of animals by nuclear transfer.

The book features animated discussion from the world's experts in this topic on the important ethical issues raised by stem cell research. They review the various regulatory regimes which apply in different countries—a key factor in determining where future stem cell research is carried out. This book is an essential purchase for all those engaged in stem cell research, whether in the laboratory or the clinic.

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