Stem Cell Research Products - Opportunities, Tools, & Technologies

Description: This global strategic report evaluates strategies across the entire stem cell product spectrum, with emphasis on opportunities for stem cell research product development. It explores unique market opportunities by stem cell type, including mesenchymal stem cells (MSCs), hematopoietic stem cells (HSCs), induced pluripotent stem cells (iPSCs), embryonic stem cells (ESCs), neural stem cells (NSCs), and more.

The possibilities arising from stem cells have resulted in great commercial interest, with potential applications ranging from their use in the reversal of disease, to targeted cell therapy, tissue regeneration, pharmacological testing on cell-specific tissues, toxicology assessment, and more.

Several broad categories of stem cells exist, including:

- Embryonic stem cells, derived from blastocysts
- Perinatal stem cells, obtained during the period immediately before and after birth
- Adult stem cells, found in adult tissues
- Induced pluripotent stem cells, produced by genetically reprogramming adults cells
- Cancer stem cells, which give rise to clonal populations of cells that form tumors or disperse in the body

Traditionally, scientists have worked with both embryonic and adult stem cells as research tools. While the appeal of embryonic cells has been their ability to differentiate into any type of cell, there has been significant ethical, moral and spiritual controversy surrounding their use. Although some adult stem cells do have differentiation capacity, it is often limited, which results in fewer options for use.

Thus, when induced pluripotent stem cells (iPSCs) were produced from mouse cells in 2006 by Shinya Yamanaka of Kyoto University in Japan, they represented a promising combination of adult and embryonic stem cell characteristics. By 2007, a series of follow-up experiments were done at Kyoto University in which human adult cells were transformed into iPSC cells. Nearly simultaneously, a research group led by James Thomson at the University of Wisconsin-Madison accomplished the same feat of deriving iPSC lines from human somatic cells.

At this time, the following account for the majority of stem cell research:

- Basic Research - Understanding stem cell mechanisms and behavior
- Regenerative Medicine - Use of stem cells for the reversal of injury or disease
- Drug Target Validation and Drug Delivery - Validation of the predicted target using living cells
- Toxicology Screening - Use of stem cells to evaluate effects of drugs on biological systems

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