

B. Breakdown of Stem Cell Research by Cell Type

Research supply companies preparing to launch a new stem cell product line, or expand an existing one, must consider a variety of stem cell types for use in product development. Logically, it makes sense to launch products for which there is significant current research demand. Thus, this section considers the degree to which various types of stem cells contribute to total global research activity. The figures below are based on Trailing Twelve Month (TTM) data for November 1, 2010 – November 1, 2011.

The stem cell types included in analysis were:

- Embryonic Stem Cells (ESCs)
- Fetal Stem Cells
- Cord Blood Stem Cells
- Dental Stem Cells
- Hematopoietic Stem Cells (HSCs)
- Mesenchymal Stem Cells (MSCs)
- Neural Stem & Progenitor Cells (NSCs)
- Cancer Stem Cells
- Induced Pluripotent Stem Cells (iPSCs)
- Novel Stem Cell Types
 - Neural Rosette Cells (R-NSCs)
 - Very Small Embryonic Like (VSEL) Stem Cells
 - Other Stem Cell Types (not included above)

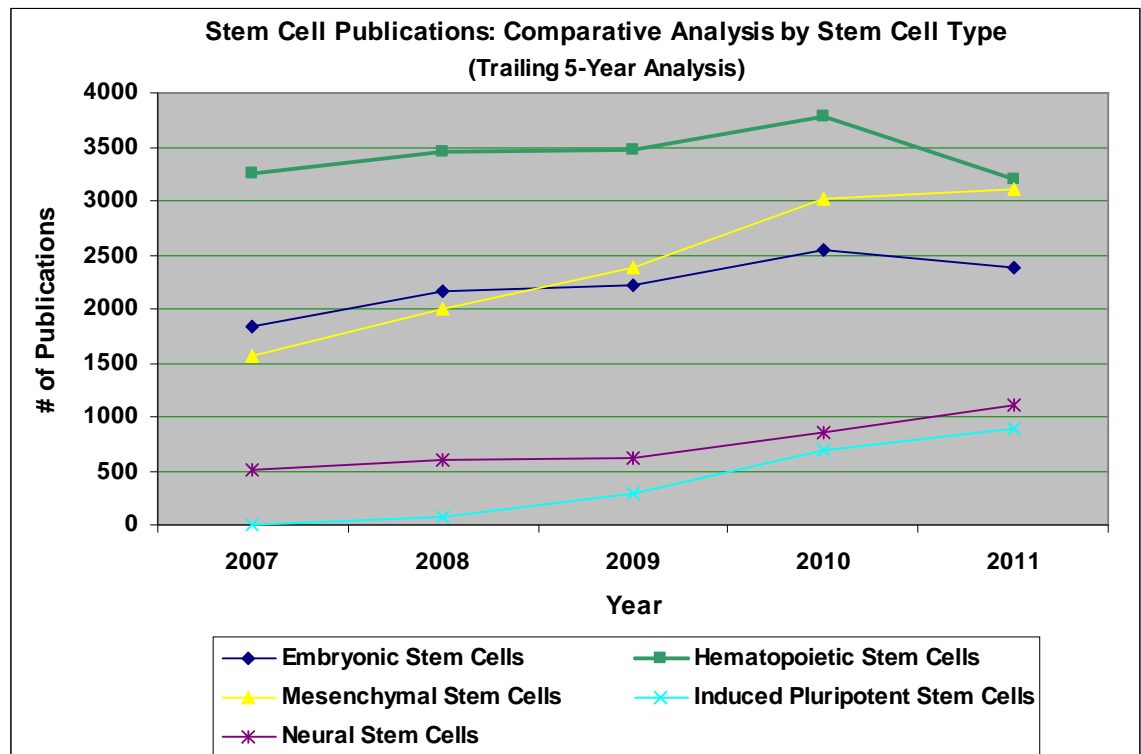
The table on the following page was generated using aggregated publication rate data from Google Scholar, PubMed, Highwire Press and the EuroNF Web Portal.¹

¹ Sources: 1) Pubmed (<http://www.ncbi.nlm.nih.gov/pubmed/>), 2) Google Scholar (<http://scholar.google.com>), 3) Highwire Press, a service of Stanford University (<http://highwire.stanford.edu/>), 4) the EuroNF Web Portal (http://euronf.enst.fr/en_accueil.html). Aggregated Publication Data, Date Range: Nov 1, 2010 – Nov 1, 2011. Data Accessed Nov 10, 2011.

STEM CELL TYPE	% of Stem Cell Research	# of Trailing 12-Month Publications
Hematopoietic Stem Cells	35.2	3429
Mesenchymal Stem Cells	24.8	2416
Embryonic Stem Cells	22.9	2229
Neural Stem & Progenitor Cells	7.5	735
Induced Pluripotent Stem Cells	4.0	390
Cancer Stem Cells	3.2	312
Cord Blood Stem Cells	1.5	151
Other Stem Cells	0.3	34
Dental Stem Cells	0.3	26
Fetal Stem Cells	0.2	21
TOTAL	100.0	9743

As seen above, hematopoietic stem cells (35.2%) and mesenchymal stem cells (24.8%) together accounted for more than half (60.0%) of all stem cell research over a trailing twelve-month period. While human embryonic stem cells research remains ethically controversial, embryonic stem cell research with other species (especially mouse and rat) is prevalent, causing embryonic stem cell research to be the third most common (22.9%). It is also not surprising that hematopoietic stem cell research was the most common type of stem cell research, as hematopoietic stem cell transplantation (HSCT) is the only widely practiced form of stem cell therapy that is done clinically. In addition to being readily available and easy to expand, research with this stem cell type is necessary to facilitate future research advances.

As determined above, the top five most commonly studied stem cell types are hematopoietic, mesenchymal, embryonic, neural, and induced pluripotent stem cells, in that order. Thus, the analysis below considers trends in research rates for these five stem cell types, over a trailing five-year history. Aggregated publication rate data is again used, due to its comprehensive nature.²



As observed in the graph above, although hematopoietic stem cell research was the most frequent type of stem cell research conducted over the trailing five-year period, its frequency dropped significantly during 2011, making the frequency of hematopoietic stem cell research approximately equivalent to that of mesenchymal stem cell research in 2011.³ The volume of embryonic stem cell research also declined significantly over the past year. However, rates of both neural stem cell and induced pluripotent stem cell research have increased substantially year-over-year for the full five-year period, with particularly strong annual growth rates observed from 2009 to present.

² Sources: 1) Pubmed (<http://www.ncbi.nlm.nih.gov/pubmed/>), 2) Google Scholar (<http://scholar.google.com>), 3) Highwire Press, a service of Stanford University (<http://highwire.stanford.edu/>), 4) the EuroNF Web Portal (http://euronf.enst.fr/en_accueil.html). Aggregated Publication Data, Date Range: Nov 1, 2006 – Nov 1, 2011. Data Accessed Nov 10, 2011.

³ 2011 values are projected full-year values, based on publication rates from Jan 1 – Nov 1, 2011.