Apr 6th, 12:00 AM

Development of the International Stem Cell Registry: Progress and Challenges

Kelly P. Smith
University of Massachusetts Medical School

Follow this and additional works at: https://escholarship.umassmed.edu/escience_symposium

Part of the Library and Information Science Commons, Life Sciences Commons, and the Medicine and Health Sciences Commons

This work is licensed under a Creative Commons Attribution 4.0 License.

Repository Citation

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in University of Massachusetts and New England Area Librarian e-Science Symposium by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.
Development of the International Stem Cell Registry: Progress and Challenges
Importance of Stem Cells

Stem cells provide novel tools for studying development and disease.

Pluripotent stem cells also offer options for the treatment of acquired and inherited diseases that resist traditional strategies for drug design and discovery.
Stem Cells: an evolving field

Biology
  Characteristics
  Differentiation

Technology
  New methods for deriving pluripotent cells such as iPS cells
  New techniques for growth and differentiation

Applications
  Cell replacement therapy
  Drug screening
  Disease models
Embryonic Stem Cells

Human Embryonic Stem Cells: Derivation and Characteristics

Blastocyst Embryo

Inner Cell Mass (ICM)

Cell Culture

Embryonic Stem Cell

Unlimited Growth

Differentiation
Embryonic Stem Cells

Derivation
Isolated from early stage embryos

Characteristics
Competent to form **ALL** specialized cells, tissues, and organs of the adult organism (*pluripotent*)
Indefinite life span in culture

Limitations
Derivation normally results in embryo destruction
Prior to March 9, 2009, only a limited number of lines were available for federally funded research
Risk of tumors (teratomas) from transplanting undifferentiated cells
Reprogrammed cells - *Induced Pluripotent Stem (iPS) cells*
Reprogrammed cells - *Induced Pluripotent Stem (iPS) cells*

**Derivation**

Isolate adult somatic cells (e.g. skin fibroblasts)
Viral introduction of genes expressing factors that control very early development

**Characteristics**

Re-establish pluripotency, and indefinite lifetime in culture.
Cells can be developed that are matched to patients.

**Limitations**

Must establish functional equivalency of IPS and human embryonic stem cells.
Viruses used in derivation may promote tumorigenesis.
The need for a comprehensive registry

There are hundreds of hES and iPS cell lines worldwide, most of which are not published.

Different states and funding agencies have different guidelines regarding hES cell line derivation (provenance), which has created a regulatory maze.

Published research is not searchable by cell line.

Scientists need up to date information for experimental design, grant applications and keeping current with the field.
A publicly accessible, searchable, comprehensive and continuously updated database that includes published and validated unpublished information on all pluripotent stem cell lines.

Dedicated to acquiring, configuring and disseminating, information between providers, researchers and the broader scientific community.

Includes cell lines developed by the international research community. (e.g., United States, Canada, Europe, Japan, Singapore, Australia, China)
## Registry information

<table>
<thead>
<tr>
<th><strong>Practical Information</strong></th>
<th><strong>Scientific Information</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer</td>
<td>Derivation</td>
</tr>
<tr>
<td>Provider(s)</td>
<td>Characterization</td>
</tr>
<tr>
<td>Provenance</td>
<td>Marker expression testing</td>
</tr>
<tr>
<td></td>
<td>HLA and genotyping</td>
</tr>
<tr>
<td></td>
<td>Literature references</td>
</tr>
</tbody>
</table>

*International Stem Cell Registry*
Published literature (derivation, characterization, uses)

Contact with cell line developers (unpublished data)

Websites posting independently derived characterization information (ISCI Stem Cell Forum)

Information derived by stem cell banks (QC data, etc.)
Data Collection - Publications

Tools:

PubMed - only allows search of titles, abstracts and keywords

Crossref - Not all journals represented, difficult to sort by publication date

Publication websites
Many lines are unpublished, making identification, data gathering and validation difficult.

Investigators are often unwilling to post unpublished data Privacy issues impede obtaining provenance information.

Conflicting information from different sources (lack of standards)

Data presentation (creating a user-friendly display of complex information)

Accelerating pace of research (maintaining up to date information)
International Stem Cell Registry  
[www.umassmed.edu/iscr](http://www.umassmed.edu/iscr)

Curators:
- Mai X. Luong, PhD
- Kelly P. Smith, PhD