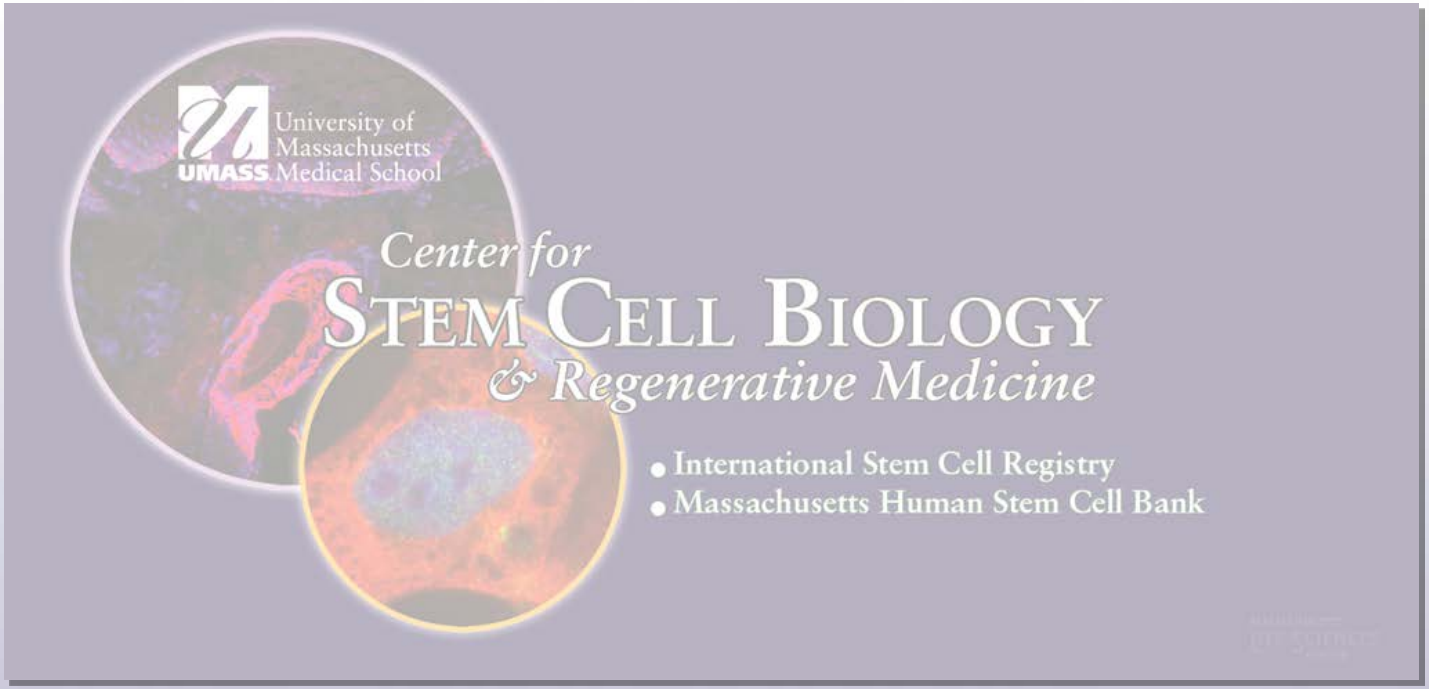
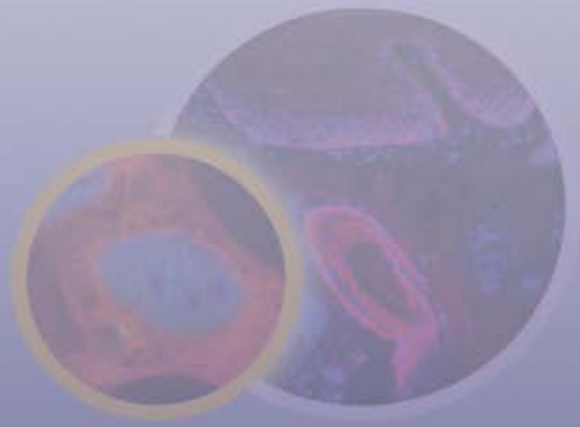


Development of the International Stem Cell Registry: Progress and Challenges

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

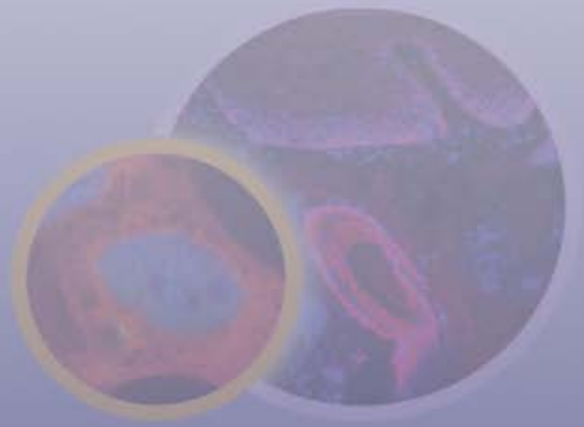
- Characteristics
- Differentiation

Technology

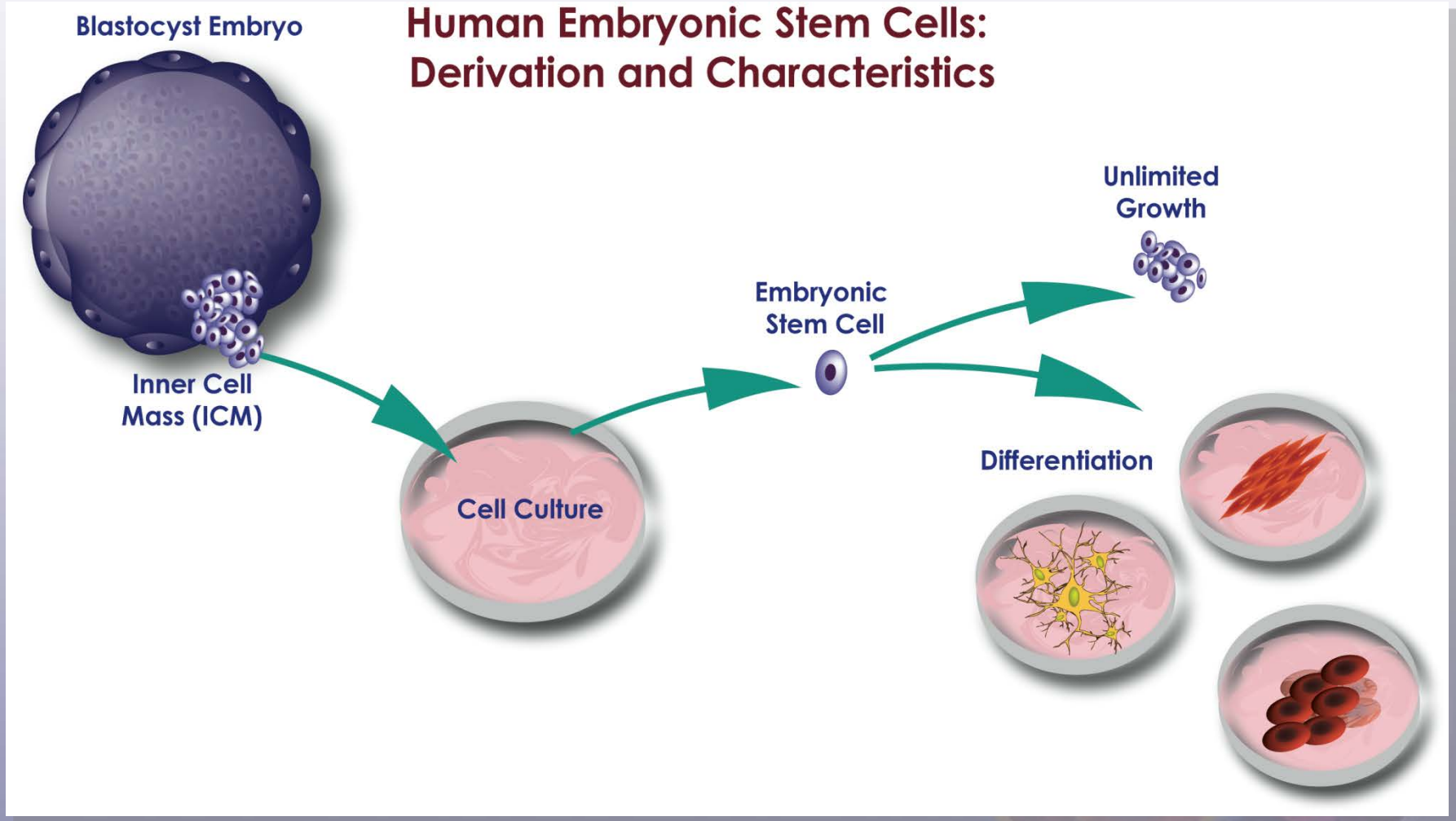
- New methods for deriving pluripotent cells such as iPS cells
- New techniques for growth and differentiation

Applications

- Cell replacement therapy
- Drug screening
- Disease models



Embryonic Stem Cells



Embryonic Stem Cells

Derivation

Isolated from early stage embryos

Characteristics

Competent to form **ALL** specialized cells, tissues, and organs of the adult organism *(pluripotent)*

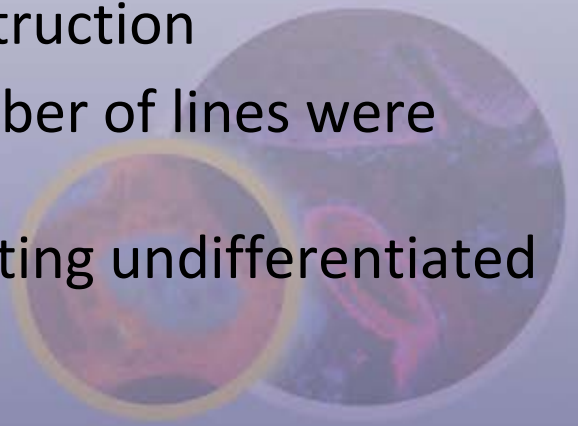
Indefinite life span in culture

Limitations

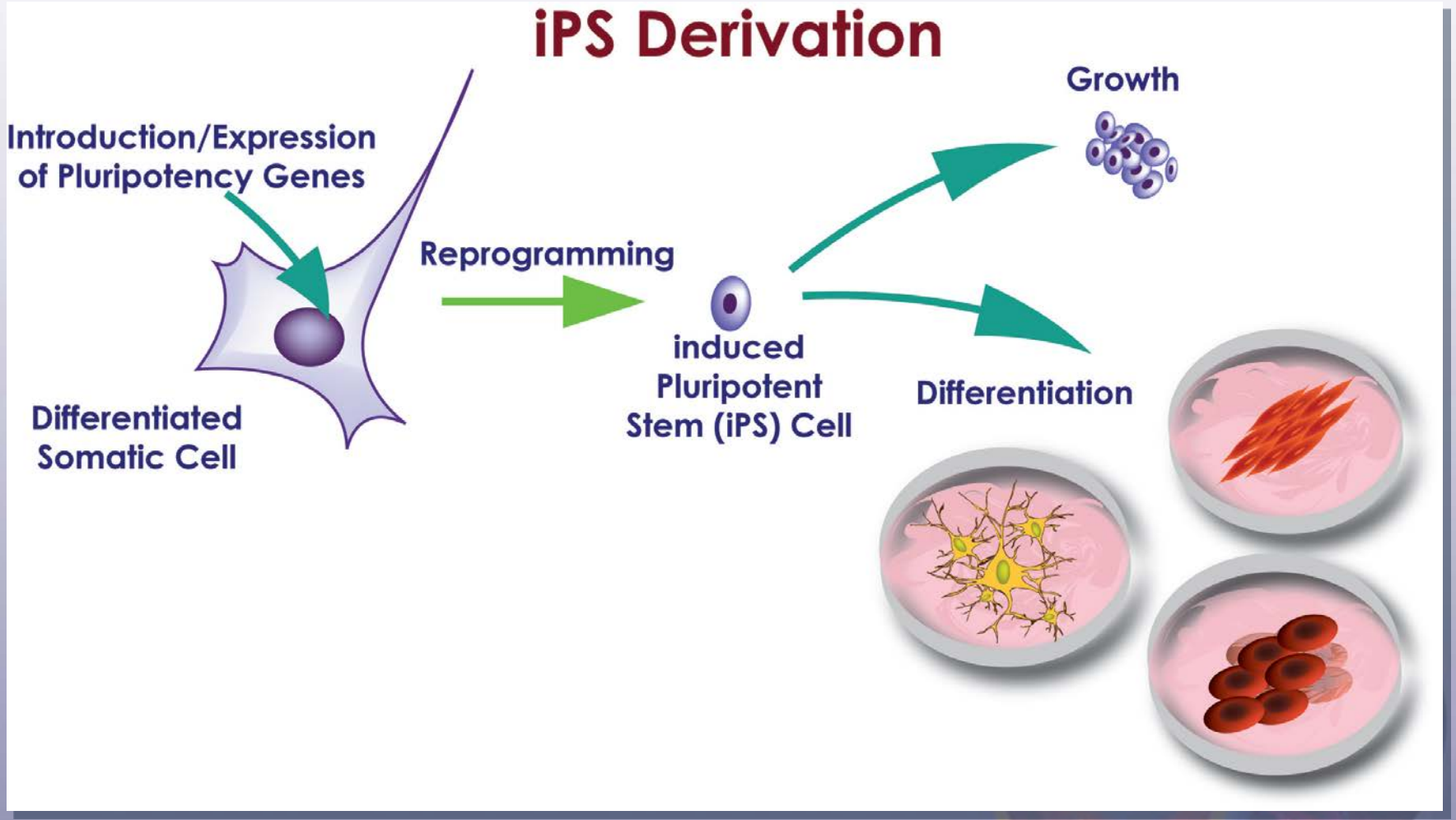
Derivation normally results in embryo destruction

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.

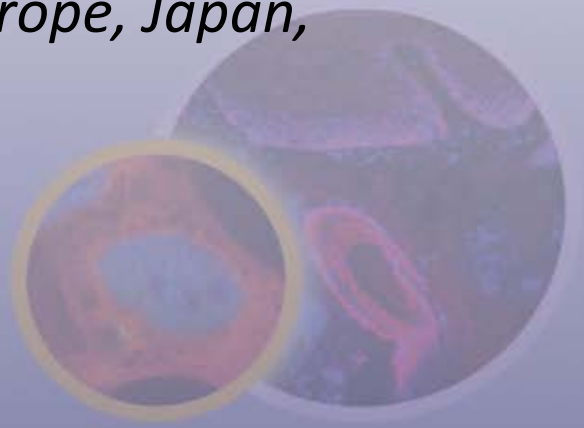
Scientists need up to date information for experimental design, grant applications and keeping current with the field.

International Stem Cell Registry

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.

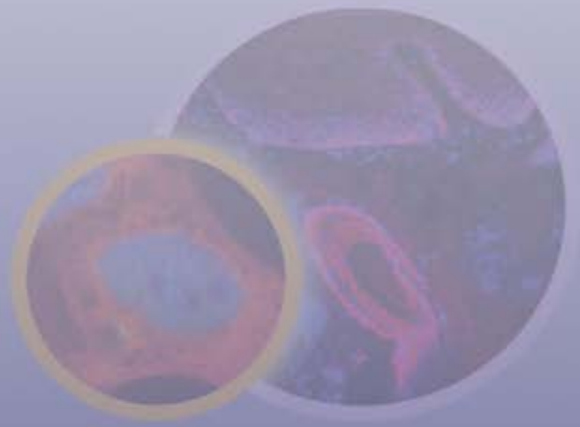
Includes cell lines developed by the international research community. (*e.g., United States, Canada, Europe, Japan, Singapore, Australia, China)*



Registry information

Practical Information	Developer Provider(s) Provenance
Scientific Information	Derivation Characterization Marker expression testing HLA and genotyping Literature references

International Stem Cell Registry



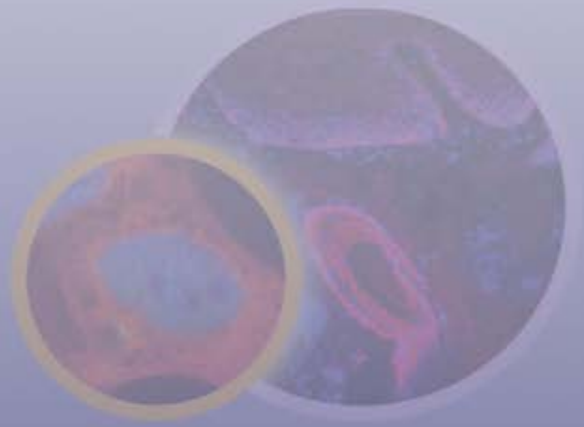
Data Collection

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.)



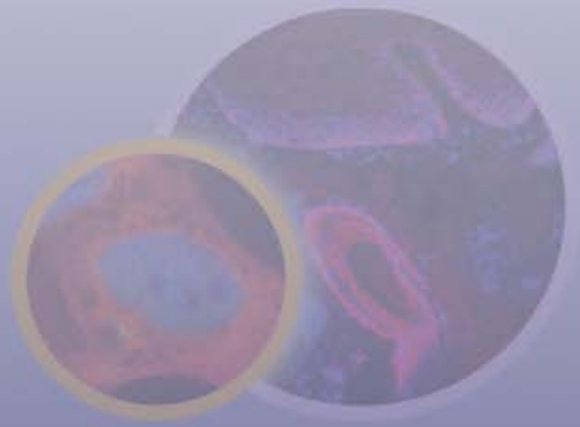
Data Collection - Publications

Tools:

PubMed - only allows search of titles, abstracts an keywords

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

Publication websites



Challenges

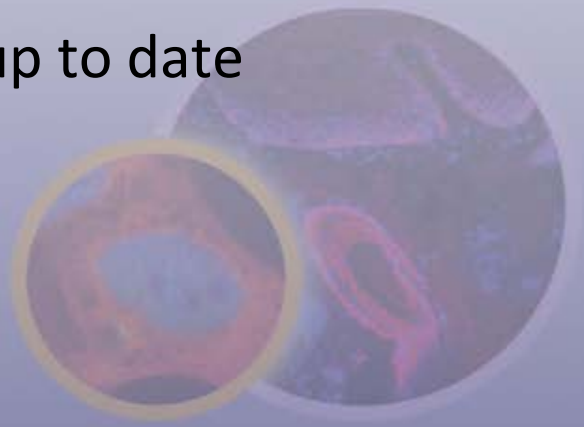
Many lines are unpublished, making identification, data gathering and validation difficult.

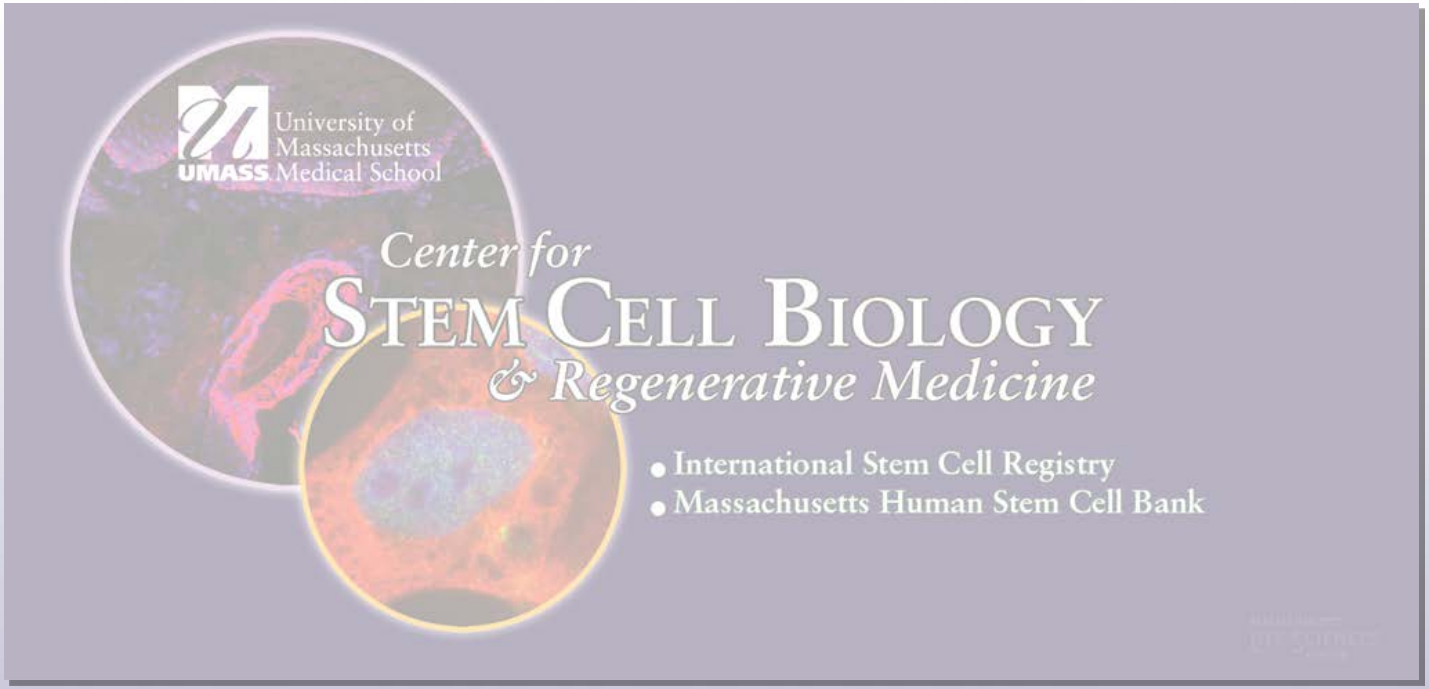
Investigators are often unwilling to post unpublished data Privacy issues impede obtaining provenance information.

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

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