

**RFA 08-02 Concept Proposal:
CIRM Tools and Technology Awards**

Because of the unique ability of stem cells to differentiate into multiple cell types of the adult body, these cells have the potential to be utilized both as diagnostic and drug discovery tools, and to treat or cure chronic disease and injury. Significant technical hurdles exist, however, which need to be overcome before stem cell research can be effectively translated to the clinic. Development and availability of specialized tools and technologies will facilitate rapid progress in this field. CIRM proposes a new program to address these needs through tools and technology grants.

While efforts to differentiate stem cells into various cell types are making considerable progress, yield of the final functional cell product still remains a challenge. Tools are needed to achieve efficient differentiation and maturation, such as standardized reagents (e.g., animal free extracellular matrix for cell culture); and biomarkers for identification, selection, purification, trafficking and functional analyses of stem cells and their derivatives. It is therefore critical to develop monoclonal antibodies to defined cell surface markers and to engineer human embryonic stem cells with reporter sequences in key genes of development. In addition, there is a need to develop and validate pluripotency assays and assays for functional analyses of stem cell derivatives and to develop homologous recombination technologies and novel vectors for gene delivery.

Similarly, new technologies and tools are needed for translational research, including process and product development, and for clinical research. One of the toughest tasks will be generating the large quantities of clinical grade cell required to develop cell-based therapies for patient populations. It will demand the development of new scale-up technologies and new cell separation technologies that allow rapid separation of a given cell population with high purity and full retention of function. Also needed are sensitive imaging and molecular technologies that allow tracking of cell delivery, trafficking and activity, not only in small animal models but also in large animals and importantly in humans. Other examples of technologies of practical importance include delivery devices (e.g., catheter/needle injection systems) for reliable and reproducible delivery of viable cells to target tissues, and encapsulation scaffolds that prevent immunological rejection while permitting release of bioactive material (e.g., insulin release from beta cells for diabetes).

RFA 08-02 will support the inception, early stage development and evaluation for stem cell research applications of innovative tools and technologies that will overcome current road blocks in basic, translational and/or clinical stem cell research. Specifically, this RFA will support two areas of technology development: (1) creation and design of novel tools and technologies; and (2) optimization, improvement, standardization or scale up of an existing tool or technology for stem cell research for which proof of concept has been achieved. Particular consideration will be given to research applications that address the use of pluripotent stem cells and that are not eligible for federal funding. Possible goals include but are not limited to:

- Discovery of novel biomarkers (including monoclonal antibodies) for identification, selection, purification, trafficking and functional analysis of stem cells and their derivatives
- Development, optimization and testing of efficient homologous recombination techniques for gene targeting in human stem cells
- Development of safer and more effective viral and non-viral vectors for gene transduction
- Development and testing of human embryonic stem cell lines with reporter sequences in key genes of development
- Development and testing of stem cell scale up technologies
- Development and optimization of new cell separation, purification and cryopreservation technologies
- Development of sensitive imaging and molecular techniques for tracking delivered cells in animal models and in humans
- Development of cell delivery devices and procedures

The CIRM Tools and Technologies Award program will be open to investigators with a Ph.D., M.D. or equivalent degree who are full time employees at academic, non-profit or for-profit organizations in California. Each principal investigator may submit no more than one application.

Academic and non-profit applicant institutions will be eligible to submit up to four applications. For-profit applicant institutions will be eligible to submit up to two applications. CIRM proposes to fund up to 20 two--year awards with project costs up to \$300,000 per year for a total cost of up to \$20 million for program.

Provisional Timetable

RFA Release	April 2008
Review of Applications:	September 2008
ICOC Approval for Funding:	December 2008