LITTLE HOOVER COMMISSION
November 20, 2008

Written Testimony of Susan V. Bryant

9:00 am, November 20, 2008
Room 4203

Introduction

Susan V. Bryant: Professor, University of California Irvine (1969- present)
Degrees: BSc and PhD, University of London, UK.
Research Expertise: Regeneration and developmental biology(over 100 publications).
Administrative experience:

Program Director, Developmental Biology Program, National Science Foundation, (1980-81)
Chair, Dept of Developmental and Cell Biology, UC Irvine (1995-97)
Dean, School of Biological Sciences, UC Irvine (2000-2006)
Vice Chancellor for Research, UC Irvine (2006- present).

Memberships:

California Council on Science and Technology (2006- present)
Advisory Committee for the Directorate of Biological Sciences of the National Science Foundation (2005-present)
Independent Citizen's Oversight Committee: California Institute for Regenerative Medicine, appointed by Chancellor Ralph Cicerone (2004-present)

Honors:

Elected Fellow, American Association for the Advancement of Science
Elected Fellow, Association for Women in Science

ICOC and the process for awarding Grants

a. Development of the Strategic Plan

CIRM funding initiatives are based on the CIRM Scientific Strategic Plan that was approved by the ICOC in 2006. The plan was developed by the President and scientific staff of CIRM, with broad input from the CIRM Working Groups, the scientific community, the public, and ICOC. It identifies long-term objectives for CIRM over the next 10 years, and includes proposed funding initiatives for pre-clinical research and development, clinical trials and related research, as well for the renovation and construction of new laboratories and research facilities. Using the Strategic Plan as a guide, the President and scientific staff of CIRM prepare draft RFAs (Requests for applications) and present them for discussion, revision and final approval to ICOC. Public comment is invited at ICOC meetings when RFA concept plans are considered.

b. Issuance of Requests for Applications (RFAs).
When an RFA is finally issued, a full description of it is posted on the CIRM website. In common with other research institutions, UCI advertises the availability of research funding from ALL sources, including CIRM, to its research community. When there are no limits on the number of applications from an institution, individuals or groups of faculty prepare proposals for submission, which are reviewed by several levels within the institution for budget accuracy, and compliance with a number of relevant research regulations. Although I am often the institutional official signing off on grant submissions to various agencies, in the case of any conflict of interest (e.g., the proposal is written by a near relative; the proposal is being reviewed by a board on which I serve) I recuse myself from involvement in the submission process, and with any communication of any kind with the agency.

c. Limited competitions within institutions.
In some cases, CIRM RFAs, in common with those from other granting agencies and foundations, limit the number of applications from a given institution. UCI has a process in place that predates the establishment of CIRM, for reviewing and selecting proposals for submission from among the possible applicants. A standing committee of the Irvine Academic Senate (Council on Research Computing and Libraries), recommends one or more individuals to serve on an ad hoc committee for a particular RFA for which submissions are limited. For the screening of CIRM applications, committee members are added from a list of faculty with expertise related to regenerative medicine, drawn from several academic units (Biological Sciences, Engineering, Medicine and other Health Sciences). For each round of applications, the list of available reviewers is checked for potential conflicts of interest to eliminate, for example, any co-investigators or collaborators with the Principal Investigator (PI) of a pre-proposal under review. The ad hoc committee reviews pre-proposals to determine those most likely to succeed, based on relevant research-related criteria (responsiveness to CIRM guidelines and to the RFA, research record and experience of the PI and other members of the research team in the relevant area, etc.), and successful applicants are informed that they have been approved to submit an application in response ton the relevant RFA. At UCI, this selection process is administered by the Director of Administration and Research Policy, who attends the ad hoc review meetings.

d. Proposal submission by institutions, with UCI as an example
The submission of proposals to most funding agencies is handled through the Office of Research at UCI. However, in all cases where I have a conflict of interest (e.g., the proposal is written by a near relative; the proposal is being reviewed by a board on which I serve), I do not serve as the submitting official for UCI. Therefore, because of my role on the ICOC, proposals made to CIRM for funding by UCI researchers do not carry my signature, but rather are submitted from the campus by the Chancellor or the Executive Vice Chancellor. I do not correspond with CIRM or ICOC in any way concerning these submissions and when a proposal from UCI comes before the ICOC, I recuse myself from participating.

e. Review and ranking by CIRM Scientific and Medical Research Funding Working Group.

The charge of the Scientific and Medical Research Funding Working Group is to make recommendations to the Institute's 29-member governing body, the Independent Citizens Oversight Committee (ICOC), with respect to research grants funded by the Institute, including consideration of the scientific merit of research facilities grants. In order to eliminate conflict of interest in the scientific review of applications for CIRM funding, from the outset it was decided that no Californian researchers could be members of the Scientific and Medical Research Funding Working Group, or participate in any way in the review and ranking of proposals. Hence the review of proposals is carried out by researchers who have no opportunity to benefit from CIRM funding because they do not work at a California institution.

f. Review and final decision by ICOC.

The University of California(UC) consists of 10 separate universities, each of which is viewed by all funding agencies in the USA and abroad as 10 independent grantee institutions. Hence, a faculty member from UCI would need to recuse themselves from review of proposals from UCI to major federal granting agencies (NIH, NSF, USDA, DOD, DOE etc.), but not from the review of a proposal from a different UC campus. In addition, under Proposition 71, the various campuses of the University of California are similarly treated as separate and individual grantee institutions. (Health & Saf. Code, § 125292.10(j).) As a result, UC campuses apply independently to CIRM for grants and the ICOC considers the applications from UC campuses independently from one another. UC Irvine therefore submits applications to CIRM independently from other UC campuses. As an employee of UC Irvine, I refrain from participating in the ICOC's consideration of applications submitted by UC Irvine. However, because Proposition 71 treats the campuses of UC as separate institutions for purposes of grant awards, I am permitted to participate in the ICOC's consideration of applications from other UC campuses, just as I am as a reviewer for NIH or other similar federal agencies. (*See California Family Bioethics Council v. California Institute for Regenerative Medicine* (2007) 147 Cal.App.4th 1319, 1370, fn. 36 [rejecting plaintiffs' argument that ICOC members affiliated with a UC campus were required to recuse themselves from voting on applications involving any UC campus].)

The ICOC has established detailed procedures to avoid conflicts of interest. As a member of the ICOC, I receive a list of all applicant institutions, principal investigators, and collaborating organizations and investigators that would receive funding pursuant to the application. This list is accompanied by a memorandum from counsel describing the ICOC's conflict of interest rules and state conflict of interest laws, and asking members to identify those institutions and investigators in which the member has a financial interest. Like all ICOC members, I review the list carefully to identify institutions and individuals in whom I have a financial interest. I then submit a certified list identifying my conflicts prior to the scheduled meeting. Staff also reviews the members' Form 700s to indentify any additional conflicts. At the meeting, staff provides me and other

members with individualized lists identifying our conflicts by application number so that we know to recuse ourselves when the applications included on our lists are discussed.

At the ICOC meeting, we consider the Grants Working Group's recommendations to: (1) fund (Tier 1); (2) fund if funds are available (Tier 2); and (3) not to fund (Tier 3). Scientific staff presents the proposals by title and application number, and without applicants' names or institutions. Usually, we first consider motions to move individual applications from one tier to another (e.g., from Tier 3 to Tier 1), but before any discussion occurs concerning a particular application, the Chair asks staff to remind the board of those members who are ineligible to participate in the discussion. Staff reads the members' names into the record. Those members who are indentified do not participate in the discussion or the vote.

We also have the ability to consider confidential and proprietary material before making a decision. When we meet in closed session to consider this information, we are again advised by staff regarding our conflicts. After we identify the applications we would like to discuss, staff identifies the members who have conflicts. Those members are then excluded from any discussion of the confidential and proprietary information in the application. Small teams of members who do not have conflicts gather with a scientific officer in order to ask questions about the proprietary information. Each team reports back to the ICOC regarding the information it has gathered, but before the discussion begins, members with conflicts leave the room and remain outside of the room while that application is being discussed.

When we return to open session, we consider motions to approve the three tiers, as modified by any prior motions. We then vote en bloc on the recommendations regarding applications in each tier by roll call vote. Staff instructs is to indicate that we are not voting on those applications in which we have an interest. Staff then calculates the votes of members who do not have conflicts to determine the final vote on each application. After the voting is complete, each member of the ICOC signs a certification that he or she has not participated in the vote or discussion of applications in which they have a conflict of interest.

The importance and impact of CIRM funding on the University of California

a. <u>Stem Cells</u>.

Our bodies consist of dozens of genetically identical cells that have developed into scores of different types of specialized cells (neurons, skin, bone etc), and these cells cooperate with one another to form our tissues and organs. Unfortunately, humans have very limited powers of regeneration, so when an organ is diseased or damaged, it cannot be replaced, and wounds do not heal without scaring. This is despite the fact that most tissues contain a supply of specialized stem cells, adult stem cells, that are specific for replacing cells a particular tissue (for example, stem cells exist in muscle and respond to exercise by changing into mature muscle cells). However, these stem cells exist in small numbers, they are very difficult to isolate, do not grow well in culture and are limited in

the types of cells they can produce. The promise of human embryonic stem cells on the other hand, is that for the first time, it will be possible to culture large quantities of cells that can be influenced to become one of a large number of different specialized cells by changing the culture conditions. Having quantities of specialized cells enables many avenues of research of great benefit to human health. In addition to transplantation of specialized cells to replace damaged cells such as neurons in neurodegenerative diseases or glial cells in spinal cord injury, they can also be used to deliver important chemicals such as growth factors and molecules important in cell-cell communication to specific locations in the body. They also provide an abundant source of cells that can be used to screen for potential drugs of interest, and if cell lines were available for specific disease conditions, targeted therapeutic agents could be developed.

b. Stem Cell Research in California prior to Proposition 71

Prior to the passage of Prop 71 and the establishment of CIRM, the level of stem cell research in California was similar to that in other states, and less than that in other countries. The production of the first-ever human embryonic stem cell lines was reported in the Fall of 1998. Three years later, in August, 2001, President Bush announced that stem cell research supported by federal funds could only be carried out on cell lines that already existed at that time. Unfortunately, although a number of labs had generated stem cell lines, only a few were suitable for research, and most had been cultured alongside animal cells and were therefore unsuitable for clinical uses in the future. In 2004, the level of NIH funding for stem cell research nationally was on the order of $20+million, and has risen to $40+million three or four years ago and has remained flat since then. Funding for stem cell research at UC Irvine prior to the passage of Proposition 71 was about $1.5million per year, counting support from NIH, foundations and private individuals. At that time, the number of active stem cell investigators at UC Irvine was less than 10, and the number working on human embryonic stem cells was one. All research institutions in the state, including all UC campuses, were similarly hindered by the availability of stem cell funding, and most had similar levels of research support for their efforts.

c. Stem Cell Research in California after Proposition 71

The first few years after the establishment of CIRM and ICOC in late 2004, were dominated by the development of policies to guide and enable the development of the new agency, as well as to defending the agency from legal challenges from groups opposed to stem cell research. Since then, grants totaling more than $600 million--for training the next generation of stem cell scientists, for research, and for building appropriate facilities for stem cell research--- have been awarded to 27 different research institutions throughout California (Table 1).

d. Impact of CIRM funding

California was the first state to decide to fund stem cell research to allow full exploration of this new field in the absence of federal support. Since then, several other states have

also made funding for stem cell research available. So far, none have matched the level of support provided by California.

CIRM funding is supporting a wide range of stem cell research and activities throughout the UC system. All ten UC campuses have received Proposition 71 funding, with a total of 104 research and training grants and 17 facilities grants being awarded to the Berkeley, Davis, Irvine, Los Angeles, Merced, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz campuses. CIRM awards to UC campuses have totaled approximately $320 million as of August, 2008 (Table 2).

Given the level of NIH funding for stem cell research nationally before and after the formation of CIRM, it is likely **that between 25 and 50 times** as much funding is now being expended in California to further the promise of stem cell research than would have been available without Proposition 71. This increase in funding has stimulated an increase in the number of researchers in the stem cell field. Using UC Irvine and an indication of the change in the UC system, the number of faculty lines in this area has doubled or tripled since the passage of Proposition 71. Unlike the situation that may pertain at private institutions, this tripling is brought about by state funded faculty lines, permanently assigned to stem cell researchers.

UC campuses have received CIRM support in the following broad areas:

RESEARCH AND TRAINING

- **Training Grants:** 8 UC campuses and 8 other California institutions received training grants for the purpose of training pre-doctoral, post-doctoral and clinical fellows. These grants were the first to be awarded. Since 2001, federal funding has been, and continues to be, scarce for stem cell research, causing graduate students, postdoctoral clinical fellows to be discouraged from entering this major new research area as a career. In almost all areas of the life sciences, the ability to build a successful career and to carry out research in a chosen area has depended on federal research funding. To address this issue, CIRM provided an opportunity for aspiring California scientists to be trained in the new area of stem cell biology, despite the lack of emphasis on stem cell research at the national level. The first awards made by CIRM were training grants to develop the scientific workforce, and these are providing training for at least 170 pre-doctoral, post-doctoral and clinical fellows, with half of these being trained at UC campuses. At UCI we have trained 12 graduate students and 7 postdoctoral fellows on the CIRM training grant. In addition, UC Irvine faculty have been providing a practical stem cell techniques course 3-4 times per year, to provide hands-on experience in the foundational techniques used to culture, differentiate and genetically manipulate human embryonic stem cells. This course is available to established as well as new investigators, and has served 66 investigators--52 from UC Irvine, 10 from UC Riverside, and 4 from other local universities and companies. An additional 16 UC Irvine students in the Biotechnology Masters Program, with an emphasis in Stem Cell biology, have taken this practical training. None of these 84 people would have entered the field of stem

cell research if not for CIRM funding to UC Irvine, and similar stories can be told throughout the state

- **Leon J. Thal SEED Grants:** 9 UC campuses received SEED Grants that enabled them to bring new ideas and new investigators into the field of human embryonic stem cell (hESC) research. A total of 73 SEED grants were awarded, with 38, or about half going to UC campuses. These awards followed training grants as CIRM established its funding program, and again, the aim was to encourage scientists with relevant backgrounds (developmental and cell biology, genetics, molecular biology, bioengineering and more) to get experience in stem cell research.

- **Comprehensive Research Grants:** Investigators at 5 UC campuses received comprehensive research grants, which were awarded to support mature, ongoing studies on hESCs by scientists with an established record of accomplishment in the field. A total of 28 were awarded, reflecting the smaller number of established stem cell researchers in California at that time, and again, UC received about half of the awards. UC Irvine received 3 Comprehensive awards.

- **New Faculty Awards:** 9 UC campuses received a total of 26 New Faculty awards to encourage and support the next generation of clinical and scientific research faculty in stem cell research at a critical stage in their careers. UC campuses were awarded 26 of the total of 55.

- **New Cell Line Awards:** 4 UC campuses received 7 of the 17 awards to fund the derivation of new lines of pluripotent human stem cells. These cell lines are critical tools for the future of research in stem cell biology.

- **Disease Team Planning awards**: 4 UC campuses received 8 of a total of 22 awards. Disease team planning awards are to allow the development of teams to compete for Disease Team Research funding at a future time. The teams that are being built cross disciplines and institutions and are characterized by their focus is on a particular disease, and on taking bench research to the clinic. UC Irvine was awarded funds to plan disease teams in Huntington's Disease and in retinal degeneration.

FACILITIES

- **Shared Research Laboratory Grants**: 9 UC campuses and 8 non-UC institutions received awards to support the design and renovation of laboratory space and acquisition of equipment for the new research facilities. This includes funding for courses in stem cell techniques, to be developed to train scientists from both UC and non-UC institutions, using CIRM-supported shared lab space. UC Irvine received funds to renovate lab and vivarium space.

- **Major Facilities Grants**: 8 UC campuses and 4 non-UC institutions received awards for construction of stem cell research facilities (and one other campus participated in a regional consortium that was awarded a Major Facilities grant). Both facilities

grants and lab grants were designed to facilitate the conduct of stem cell research in light of federal restrictions limiting the kind of stem cell work that can be done in federally-financed facilities. In all cases, CIRM funding was supplemented by major donations, and where necessary, campus debt, thereby leveraging the CIRM funding. As an example, at UC Irvine, a CIRM award of $27.2 million to build a CIRM Institute: Sue and Bill Gross Hall, was the cornerstone of a building that is estimated to cost $66.5 million, where the balance is provided by major donations and debt financing.

Partnerships between individual institutions, CIRM and the public have developed throughout the state. The stimulus of CIRM funding has enabled the development of major research facilities that will serve the research mission of California universities, including UC campuses in this area for the next 30 years. Using UC Irvine as an example, research on the campus has been enormously impacted by CIRM. We have competed successfully for research grants in all categories: 7 Seed Grants, 3 Comprehensive grants, 2 New Faculty awards, 2 Disease Team planning grants,1 New Cell Lines grant, and 1Shared Research Lab awards. These awards total $24million, and they are supporting innovative stem cell research in fields such as Alzheimer's Disease, Diabetes/Metabolic Disorder, Spinal Cord Injury, Cancer, Vascularization, Retinitis Pigmentosa, Huntington's Disease, and the biology of stem cells. More than 30 faculty are involved in stem cell research at UCI, compared to a handful before 2004. Seventeen labs have CIRM supported individuals working in them, and there are more than 50 research professionals in these labs. The environment for interaction and synergy provided by CIRM is palpable. In Table 3, are some highlights of research results to date from UC campuses.

PROPOSITION 71 FUNDING SUPPORTS:

- **Innovation and Creativity** – Proposition 71 funding has stimulated significant scientific innovation and creativity, notably in areas where federal support has not been available due to restrictions on use of federal funding for human embryonic stem cell research. Whenever a new field opens up, there is an explosion of new ideas and research directions. This natural response to the findings in1998 that human embryonic stem cell lines could be established and maintained in the lab, was muted if not inhibited by federal Presidential order, and inadequate research funding. The formation of CIRM has allowed the flowering of the new field of stem cell research to take place in California. CIRM grants have enabled new activities around the UC system, including not only innovative research projects designed to enhance understanding of biological processes and disease (and hopefully lead to treatments and cures), but also training of graduate students and postdoctoral and clinical fellows in the field of stem cell research, attracting faculty to work in the area of stem cells, and creating new facilities and renovating existing facilities so that research can be conducted in compliance with federal restrictions regarding use of federally-funded facilities. All of this contributes to creating momentum and critical mass in this important field.

- **Multiple Scientific Disciplines** – Research is being conducted in myriad disciplines, including molecular and cell biology, bioengineering, chemical engineering, chemistry, bioinformatics, applied mathematics, biostatistics, experimental genomics & proteomics, biotechnology, health & environmental science, biochemistry, computer engineering, bioethics, human embryology, and biophysics.\

- **Ethics Studies** - In addition to scientific research, UC scholars are studying ethical issues related to stem cell research through humanities fellowships and consortia among institutions and disciplines that examine the ethical, legal and social aspects of stem cell research. Ethical issues related to stem cell research are a part of all CIRM educational endeavors, and on all campuses, a new Hescro compliance committee has been established to review proposed research activities for adherence to strict ethical guidelines laid down by the National Academies of Science and by CIRM concerning the derivation and use of human embryonic stem cells.

- **Training the Next Generation of California Stem Cell Scientists** – CIRM Training grants, SEED Grants, and New Faculty Awards are helping UC campuses build a cadre of talented professionals trained in and dedicated to working in the field of stem cells. Since the magnitude of this activity is unique to California, the state is developing the stem cell workforce of the future for stem cell research.

- **Disease Specific and translational Research** – The integration of disease advocates into the California stem cell program, through their involvement in getting Proposition 71 passed, their involvement on ICOC as patient advocates, and their constant reminder to all involved that there are several major degenerative diseases for which stem cell cures hold great hope, has had a profound and no doubt transformative effect on how biomedical research will move forward in the future. Instead of seeing the basic discovery phases and clinical application as two distinct and non-overlapping aspects of the work to develop cures, CIRM, has found a way to both focus on the basic science, and at the same time, encourage the development, through its RFAs of translational and disease focused teams of researchers. In addition to conducting research that increases our understanding of the biological processes that lead to disease, investigators at UC campuses and elsewhere in the state are doing important work related to specific diseases, including leukemia, Parkinson's disease, spinal cord injury, HIV/AIDS, metabolic disorders, lung cancer, Alzheimer's disease, Huntington's Disease, brain cancer, muscular dystrophy, diabetes, stroke, and ALS (amyotrophic lateral sclerosis or Lou Gehrig's disease), with the ultimate goal of finding treatments.

- **New Technologies and Tools** – In recognition that this is the opening years of stem cell research as a discipline, CIRM has offered funding for the development of new technologies important for stem cell research, e.g., biomarkers, assays and vectors for the study of stem cells, and are building instrumentation foundries for the fabrication of customized nano-devices for analysis of cells.

HIGHLIGHTS OF RESEARCH RESULTS:

Highlight of research from UC labs will be presented at the hearing.

Table 1: CIRM Funding

Approved CIRM Grants as of August 2008

Institution	Research Grants	Facilities Grants	Total Grants	Funds (Requested and Awarded)
Stanford University	30	2	32	$93,896,310
UC San Francisco	27	2	29	$62,376,058
UCLA	19	2	21	$51,315,992
UC Irvine	16	2	18	$51,228,810
USC	12	2	14	$48,467,604
San Diego Consortium	0	1	1	$43,000,000
UC Davis	7	2	9	$35,766,586
UC San Diego	18	1	19	$32,853,328
UC Berkeley	5	2	7	$29,454,489
Buck Institute	2	2	4	$25,429,364
Gladstone Institutes	10	1	11	$18,787,142
The Burnham Institute	12	1	13	$18,180,796
UC Santa Cruz	5	2	7	$16,573,636
The Salk Institute	9	1	10	$16,036,730
CHLA	5	1	6	$11,701,083
Scripps	4	1	5	$9,317,989
UC Merced	3	1	4	$8,010,498
UC Santa Barbara	1	2	3	$6,687,931
UC Riverside	3	1	4	$6,055,762
Ludwig	3	0	3	$2,473,053
CalTech	1	0	1	$2,071,823
City of Hope	3	0	3	$2,036,042
San Diego State	1	0	1	$1,725,830
HBMRI	1	0	1	$714,654
CHORI	1		1	$55,000
Novocell, Inc.	1		1	$48,950
Cedars-Sinai	1		1	$46,886
Totals	200	29	229	$614,314,346

Table 2: CIRM funding by UC campus

Campus	Res. Grants	Facilit Grants	Total Grants	Total Award
UC Berkeley	5	2	7	$29,454,489
UC Davis	7	2	9	$35,766,586
UC Irvine	16	2	18	$51,228,810
UCLA	19	2	21	$51,315,992
UC Merced	3	1	4	$8,010,498
UC Riverside	3	1	4	$6,055,762
UC San Diego	18	1	19	$32,853,328
UC San Francisco	27	2	29	$82,378,058
UC Santa Barbara	1	2	3	$6,687,931
UC Santa Cruz	5	2	7	$16,573,636
TOTAL	**104**	**17**	**121**	**$320,325,090**

Table 3: **Highlights of stem cell progress at UC campuses**

UC Berkeley:

-- Researchers identified two key regulatory pathways that control how well adult stem cells repair and replace damaged tissue. They tweaked how stem cells reacted to biochemical signals to revive the ability of muscle tissue in old mice to repair itself nearly as well as the muscle in the mice's much younger counterparts

-- Scientists discovered an important alteration in the control of gene expression during maturation of muscle progenitors to adult muscle cells. These findings help to explain how activation of muscle-specific genes is limited to differentiated muscle cells.

-- Bioengineers developed a method for creating customized adeno-associated viruses for use in gene therapy. This method allows selection of viruses with improved target cell specificity, and is being used to improve the efficiency of inserting genes into human embryonic stem cells.

-- Nanofibrous scaffolds seeded with bone marrow stem cells have been developed for use in coronary artery bypass procedures. After successful proof of principle in animal models, these findings are being further developed in the start-up biotechnology company, Nanovasc.

UC Davis:

-- Researchers have identified the potential stem cells that become the bladder, adding to the body of research that already has identified stem cells for many other organs

-- The safety of embryonic stem cells and iPS cells is the focus of new research

-- Methods involving human bone marrow-derived stem cells to deliver gene therapy to cure diseases of the blood, bone marrow and certain types of cancer do not cause the development of tumors or leukemia.

-- Cancer cells can be recognized by an innovative method to identify the molecules that are specific to cancer stem cells from which they arose

UC Irvine:

--Human neural stem cells were used to successfully repair damaged spinal cord tissue and improve walking ability in rodents

--The first high purity human cell line (oligodendrocytes) able to be scaled up to generate large quantities of identical cells has been generated from human embryonic stem cells

-- Researchers are generating new stem cell lines that are clinically-compliant and that are being made available to researchers at UC Irvine and elsewhere in the state

-- Murine neural stem cells transplanted into aged Alzheimer's-model mouse brains were able to rescue cognitive impairment

-- It is expected that the first clinical trial in the nation using hESCs will be based on stem cell research from UC Irvine

UC Los Angeles:

-- UCLA faculty were the first in California to create human induced pluripotent stem cells (iPSC). Human skin cells can be treated so as to create cells that are nearly identical to human embryonic stem cells. These cells, iPS cells have the ability to become every cell type found in the human body.

-- Researchers have identified a transcriptional signature associated with malignant cancer stem cell emergence in testicular cancer

--The molecular and genetic mechanisms that cause a normal blood stem cells to become cancerous have been identified

-- Functioning cardiac cells have been developed using mouse skin cells that had been reprogrammed into cells with the same unlimited properties as embryonic stem cells

-- Blood stem cells, the cells that later differentiate into all the cells in the blood supply, originate and are nurtured during gestation in the placenta.

UC Merced:

-- Researchers are investigating how bone marrow stem cells derived from the same embryonic stem cells as a tissue intended for transplant, can prepare the body to receive tissues and organs derived from unmatched embryonic stem cells.

-- The Stem Cell Instrumentation Foundry (SCIF) will provide stem cell researchers at UC Merced and throughout California access to advanced instruments, techniques and collaborators for single cell analysis. The SCIF will be housed in a 5420asf facility which includes Class 1000 and 100 clean rooms for micro/nano fabrication, facilities for human and mouse stem cell culture, quantitative cell imaging, and workstations.

UC Riverside:

-- Developed a method for in vitro culturing of hESC without use of Matrigel or animal protein substrates. This takes us closer to development of a defined medium for hESC culture.

-- Developed a method for in vitro monitoring of environmental toxicants using embryonic stem cells to model pre-implanation development. Using this system they have shown that environmental tobacco smoke from harm reduction cigarettes is more toxic than smoke from traditional brands.

-- Developed methods for scaling up production of osteoblasts in bioreactors for potential use in treating bone disease.

-- Contributed to development of a toxicological assay using embryoid bodies to monitor embryotoxicity of environmental chemicals.

UC San Diego:

-- Researchers have for the first time been able to reprogram skin cells from patients with Alzheimer's disease and to induce the resulting pluripotent stem cells to form neurons carrying the same genetic constitution as known Alzheimer's Disease patients

-- Researchers are investigating ways of destroying cancer stem cells as a new approach to treating cancer of the heart, blood, brain, breast, colon, head and neck, and others, by using a drug that specifically targets cancer stem cells for destruction

-- Unique partnership between industry and academia leads to human clinical trials of a new drug for a rare class of blood diseases called myeloproliferative disorders (MPD), which are all driven by the same genetic mutation and can evolve into leukemia.

-- Scientists may be able to develop a stem cell based therapy, based on findings that have shown that targeting neuronal support cells called astrocytes sharply slows disease progression of amyotrophic lateral sclerosis (ALS), or Lou Gehrig’s disease, in mice

-- Grafts of human spinal stem cells can return rats paralyzed due to loss of blood flow to the spine, to near normal ambulatory function six weeks after grafting

UC San Francisco:

-- UCSF researchers collaborated on research reprogrammed human adult cells to function like pluripotent embryonic stem (ES) cells.

-- Understanding neuronal migration in the brain is important for cell therapy, as replacement cells need to be directed to appropriate sites. Membrane proteins that connection cells play an important role in controlling how neurons migrate in the brain

-- Researchers have identified genes that are active in embryonic stem cells but not in more differentiated cells, and techniques to find DNA regions that could be important for activating these genes

-- Researchers have found that proteins involved in the generation of neurons early in development also help neural stem cells produce neurons after birth. They also identified a self-repair mechanism in the brain that relies on these neural stem cells.

-- Researchers have found nearly a thousand genes that are expressed differently in different parts of the colon. The colon is constantly renewed via its own stem cells and understanding how these genes are expressed differently as the cells specialize will help understand what happens when this goes wrong as in colon cancer

UC Santa Barbara:

-- Scientists are studying how stem cells turn into eye cells. They have succeeded in coaxing stem cells to differentiate into retinal pigment epithelial cells, which nourish and support the eye's vital photoreceptors, which respond to light. It is these retinal pigment epithelial cells that are casualties of age-related macular degeneration. Researchers expect this might be the first work from UCSB to result in a clinical application.

--'Father of Stem Cell Research' James Thompson will be operating a research lab at UCSB as an adjunct professor.

UC Santa Cruz:

-- New faculty member studies how stem cells make the decision to become a particular type of mature blood cell, and how this process can go wrong to cause disease, and aims to provide a comprehensive understanding of stem cell fate decisions and how to manipulate those decisions after transplantation of stem cells into the body

-- Scientists focus on the development of corticospinal motor neurons, which control voluntary muscle movements and are affected in neurodegenerative diseases and spinal cord injuries, and the potential of stem cells to replace damaged or diseased neural tissues affected by neurodegenerative disorders