

**SINCERE APPRECIATION TO THE 2016
SPONSORS OF THE TEEN BIOTECH CHALLENGE!**



Bayer CropScience



**AND, THANKS TO OUR PAST SPONSORS/MEMBERS OF BIOTECH
SYSTEM & ON-GOING SUPPORTERS OF K-14 STEM EDUCATION:**



2016 Teen Biotech Challenge Awards Reception



***University of California, Davis
Conference Center
May 20, 2016
7:00 – 9:30 pm***

2016 Teen Biotech Challenge Awards Reception Program

Registration & Root Beer Float Social: 7:00 - 7:30pm

Welcome & Keynote: 7:30 – 8:00pm

TBC Awards & First Place Winner Presentations: 8:00 – 9:25pm

TBC Awards: 8:00 – 9:25pm

SPARK Research Scholar Awards

Presenter: Gerhard Bauer, UCDMC Institute for Regenerative Cures

Regenerative Medicine

Presenter: Gerhard Bauer, UCDMC Institute for Regenerative Cures

Personal Genomics & Human Health

Presenter: Dr. Judy Kjelstrom, UC Davis Biotechnology Program

Drug Discovery & Biomanufacturing

Presenter: Dr. Judy Kjelstrom, UC Davis Biotechnology Program

Agricultural Biotechnology

Presenter: Caroline Coatney, Monsanto - Seminis, Woodland, CA

Environmental Biotechnology

Presenter: Dr. Feng Xu - Novozymes, Inc., Davis, CA

Computational & Systems Biology

Presenter: Dr. Jamison-McClung, UC Davis Biotechnology Program

Nanobiotechnology

Presenter: Dr. Jamison-McClung, UC Davis Biotechnology Program

Teacher Appreciation & Grand Prize Winner

Presenter: Dr. Jamison-McClung, UC Davis Biotechnology Program

Closing Remarks: 9:25 – 9:30pm

Photos & Congratulations (optional): 9:30-9:45pm

Which items in the supermarket contain GMOs?

There are only 10 GMO foods currently on the market (or coming soon* to a grocery store aisle near you). You may see other items labeled “non-GMO”, which is a common marketing ploy:

Soybeans/Soybean oil (herbicide tolerant)

Field corn and Sweet Corn (Bt – insect resistant)

Canola oil (derived from GM Canola this oil is chemically identical to oil derived from conventional canola plants)

Sugar (derived from GM Sugar Beets, this sugar is chemically identical to sugar derived from other plant sources)

Papaya (virus resistant)

Squash (virus resistant yellow squash & zucchini)

Arctic Apples (PPO gene for browning when sliced “turned off”)*

Innate Potatoes (less browning/bruising and lower acrylamide formation when fried – PPO gene “turned off”)*

AquAdvantage Salmon (have a gene from another type of salmon that helps the fish reach adult size more quickly, using less food/energy = sustainable aquaculture)*

Two additional biotech crops are herbicide tolerant alfalfa and Bt cotton. The Bt gene allows crops to resist “hungry, hungry caterpillars” (herbivory). Research studies have confirmed that Bt crops improve insect biodiversity through reduction in field applications of insecticide. The first biotech crop, the Flavr’Savr tomato, was invented right here in Davis, CA, at the Monsanto Calgene Campus in the early 1990’s. The Flavr’Savr was a biotech tomato with delayed ripening and sold well in town. But, due to price competition and market forces, this particular biotech crop is not currently on the market.

What’s in the works? Scientists are developing useful crops that grow well in drought conditions and saline soils, crops that need much less fertilizer, and biofortified crops that have been engineered to provide essential nutrients and minerals (like Golden Rice, which produces beta carotene).



Myth-Busting Agriculture!

Consumers are exposed to a ton of misinformation about genetically engineered (GE) crops, agricultural production systems and nutrition in the popular press. Here are two of the most common myths:

Myth: *Organic farming is pesticide-free.*

Facts: *Like all farmers, those using organic systems must use pesticides to overcome pests. Organic farmers choose both natural and synthetic pesticides from a USDA approved list.*

Myth: *GE crops are untested, unregulated and/or pose additional risks to health and the environment, compared to conventional crops.*

Facts: *GE crops are the most carefully studied and analyzed plants in the history of mankind, with regulatory oversight by the USDA, EPA and FDA. They have the same nutritional value and safety as similar conventional crop plants and are safe for humans and animals.*

****An independent report on GE crops was released by the US National Academies of Sciences, Engineering and Medicine on May 17, 2016, after a two year study group with a panel of 20 expert reviewers analyzing ~900 research studies. The report reaffirms food and feed safety, as well as environmental safety.** #GECropStudy**
<http://nas-sites.org/ge-crops/2016/04/27/report-release/>

For additional science-based answers to general questions on genetic engineering for crop and animal improvement, see:

- UCBiotech.org – <http://ucbiotech.org>
- Best Food Facts – <http://www.bestfoodfacts.org>
- Biology Fortified – <http://www.biofortified.org>
- GMOAnswers – <http://gmoanswers.com>

For info on humanitarian ag projects for the developing world, see:

- Golden Rice - <http://www.goldenrice.org/>
- Water Efficient Maize for Africa (WEMA) - <http://wema.aatf-africa.org/about-wema-project>

WELCOME TO TBC2016!

Thank you for joining us at the Teen Biotech Challenge Symposium and Awards Reception as we honor the academic excellence and dedication of your winning students. In 2016, **427 Northern California students** participated in building a TBC website. Of those forwarded after a preliminary round of school site judging, **90 websites from 7 California high schools** were entered in the final judging round, so your students faced tough competition and all should be proud of their efforts. We appreciate the support that teachers, parents and family members have shown to these exceptional young people and hope that we share a wonderful evening together, learning a little about biotechnology along the way.

The Biotech Community Makes TBC Possible

We would like to offer warm thanks to our 2016 Industry Sponsors, Bayer CropScience, Novozymes and Element Realty, as well as acknowledging Genentech and Monsanto for on-going support and encouragement. Together with the UC Davis Biotechnology Program's PhD students, staff and faculty, we make the Teen Biotech Challenge possible through fundraising activity and volunteer service. Please share your personal thanks with the sponsors joining us this evening.

Sincere Congratulations,

Dr. Denneal Jamison-McClung
Director, BioTech SYSTEM
Associate Director, UC Davis Biotechnology Program
Program Coordinator, UC Davis ADVANCE

Teen Biotech Challenge is the primary outreach activity of the BioTech SYSTEM, a regional Northern California consortium for promoting education in science, technology, engineering and mathematics (STEM). The BioTech SYSTEM is administered by the UC Davis Biotechnology Program.

STEM CAREERS (Cont.)

TBC2016 is 100% sponsor supported, including student prizes and the awards event. TBC2016 has been made possible by the following generous sponsors:

Event Partners: \$3,000-\$10,000

- UC Davis Biotechnology Program

Platinum Sponsors: \$1,000 - \$2,999

- Bayer CropScience
- Novozymes, Inc.

Bronze Sponsors: \$50 - \$250

- Element Realty

We appreciate all TBC Sponsors' steadfast support of science education over the past ten years. Special thanks to Novozymes and Bayer CropScience for funding TBC2016. We would also like to acknowledge Bio-Rad, Chevron, Genentech (Event Partner 2011-2014), HDR Architecture, Monsanto, Rotary Club of Sacramento and SARTA for significant past support.

For a list of recent contributors, please see our website:
<http://teenbiotechchallenge.ucdavis.edu/Sponsors.html>

Thank you TBC Sponsors!!!

The majority of biotechnology jobs require a **Bachelor of Science (BS) college degree**. In addition to positions requiring a BS degree, there are a significant number of entry-level life science technician jobs in California with a minimum requirement of the **Associate of Science (AS) degree or Program Certificate**.

We have several excellent community college biotechnology programs in our region, some of whom are here this evening. Please visit the information booths for more information on 2-year and 4-year academic programs in biotechnology, related life sciences and engineering. Across the nation, the average salary for researchers or technical employees in biotechnology, whether working in healthcare, agriculture or the environment, is about \$65,000 per year.

Online Resources

For a list of useful resources to find detailed information on careers and training in biotechnology, please see the **BioTech SYSTEM - Biotech Careers & Training** page at:

http://biotechsystem.ucdavis.edu/biotech_training.html



STEM CAREERS

Careers in Science, Technology, Engineering and Math (STEM) will be thriving for years to come and educating students in these fields will allow us to tackle global challenges in healthcare, agriculture and the environment. In addition to helping humanity solve major problems, students choosing STEM career paths are entering a healthy job market. Science and technology are strong drivers of economic growth and we want your students to share in this region's prosperity. **Northern California is the birthplace of biotechnology, also called the life sciences**, and we have a special opportunity to participate in the biotechnology community centered in the San Francisco Bay Area. Look around at the informational booths here this evening and ask booth participants about their career journeys in biotechnology.

When people think of **biotechnology jobs**, most envision a scientist in a laboratory. However, specific jobs requiring biotechnology training may include teaching, sales, government policy analysis, project management, clinical work and practice of law.



Research



Administration



Teaching



Sales & Marketing



Patent Law



Government
Regulatory Affairs



Technical Writing



Health Care

See the State of California Employment Development Department on Biotechnology jobs for the latest job market projections:

http://www.labormarketinfo.edd.ca.gov/Biotechnology_in_California.html#OccData

TBC 2016 WINNERS

Focus Area 1: Agricultural Biotechnology

1st – Tahea Hossain, “Saving Lives With Crops” (Sheldon HS)

2nd – Nicolette Le & Connor Randolph, “Yellow Biotechnology: Insects in Biotech” (Sheldon HS)

3rd TIE – Kelly Hongkham & Jane Miller, “Let’s Grow A Little GMO” (Antelope HS)

3rd TIE – Shaylyn Saelee, “Genetically Modified Crops: The Future of Farming” (Sheldon HS)

Honorable Mention – Albert Duong, “Sustaining the Future: Why the World Will Depend on GMOs” (Sheldon HS)

Honorable Mention – Victor Lu, “Biotechnology: The Future of Food Production” (Sheldon HS)

Honorable Mention – Makayla Anderson & Ashley Poole, “Plant and Animal Breeding Methods” (El Camino HS)

Focus Area 2: Computational & Systems Biology

1st – Jacob Miller, “3D Modeling in Biology.” (Davis HS)

2nd – Vincent Truong, “Brain Computer Interface” (Sheldon HS)

3rd – Faith Chalk, “The Human Microbiome” (Sheldon HS)

Honorable Mention – Sara Abbas, Dylan Farrell & Emily Wade, “Tree of Life – Genomics and Evolution” (El Camino HS)

Honorable Mention – Anthony Chan, “Bacterial Evolution: Antibiotic Resistance” (Sheldon HS)

Honorable Mention – Anthony Oliver & Clarissa Perseveranda, “Bioterrorism in Modern Warfare: Biological Warfare” (Rodriguez HS)

Honorable Mention – Mikayla Nonog, “Breast Milk Influence On Infant Gut Flora” (Sheldon HS)

TBC 2016 WINNERS (Continued)

Focus Area 3: Drug Discovery & Biomanufacturing

1st TIE– Daisy Bacatan, “Drug Discovery: HIV/AIDS” (Sheldon HS)

1st TIE – Buddhika Ratnasiri, “HIV to AIDS: the Ultimate Evolver” (Davis HS)

2nd – Maristela Abria “Vaccines: Helping Us Fight One Battle at a Time” (Sheldon HS)

3rd – Galilea Manriquez & Kelly Nguyen, “Biologics: Medicine Made of Living Matter” (Sheldon HS)

Honorable Mention – Isabella Chiaravalloti & Sehyun Hwang, “Antibiotics: They're Different from Probiotics” (Davis HS)

Honorable Mention – Melanie Alcantara, Alexander Duarte, & Austin Garrido, “got vaccines?” (Vallejo HS)

Honorable Mention – Devayani Varma, “HIV & AIDS Drug Discovery” (Davis HS)



Biotechnology to Meet Global Challenges



Biotechnology is an applied field of science that uses our knowledge of living systems and engineering principles to create solutions for complex local and global challenges in agriculture, health care and the environment. What are the biggest challenges for most global communities today? In 2015, the United Nations set 17 Sustainable Development Goals (SDGs) to improve the everyday lives of millions of people in developing countries, including:

- Zero Hunger (#2)
- Good Health & Well-Being (#3)
- Clean Water & Sanitation (#6)
- Affordable & Clean Energy (#7)
- Industry, Innovation & Infrastructure (#9)
- Sustainable Cities & Communities (#11)
- Responsible Consumption & Production (#12)
- Climate Action (#13)
- Life Below Water (#14)
- Life on Land (#15)

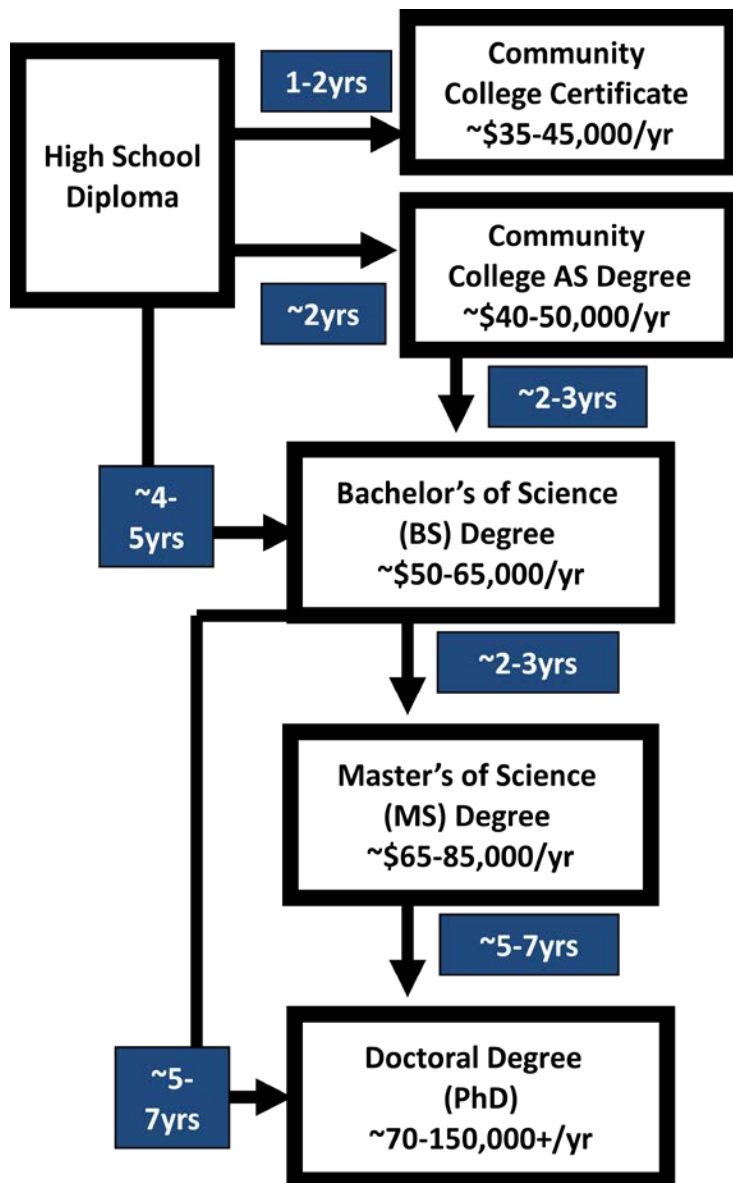
Biotechnology has a key role to play in meeting many of the UN Sustainable Development Goals, especially those related to human health and food security.

The winning TBC websites are a great educational resource for learning about specific biotechnology research approaches that will help address the SDG's, such as the development of cost-effective vaccines and drug treatments, the use of biotech crops to increase food security and emerging technologies to convert plant biomass into renewable liquid biofuels.

We hope that the Teen Biotech Challenge has opened your eyes to some of the amazing advances we are making through science and engineering!

<http://www.un.org/sustainabledevelopment/>

Academic Paths & Salary Ranges for Biotechnology Careers



TBC 2016 WINNERS (Continued)

Focus Area 4: Environmental Biotechnology

1st – Dean Vo & Peng Xiao, “Bioremediation: The Treatment of the Future” (Sheldon HS)

2nd – Kaylin Moua, “Bioremediation: Sustaining Earth's Soils and Waters” (Sheldon HS)

3rd TIE – Kelly Ngo, “Bioremediation: Paving the Way to a Greener Earth” (Sheldon HS)

3rd TIE – Hillary Hernandez & Hyojin Lee, “Bioplastics: Creating a Cleaner Earth” (Rodriguez HS)

Honorable Mention – Lyn Doan, “Algae Biofuels, Refining the World” (Sheldon HS)

Honorable Mention – Joel Alcaraz, Hannah Box & Bienvenido Sapida III, “Bioplastics & Green Chemistry” (Vallejo HS)

Honorable Mention – Ashley Hernandez & Illoisa Lambojon, “Biofuels: The Future of Energy” (Rodriguez HS)

Focus Area 5: Nanobiotechnology

1st – Ranya Odeh, “Synthetic Biology: Engineering Reborn...” (Sheldon HS)

2nd – Shaniya Singh, “Nanomedicine- Unraveling Novel Pathways” (Sheldon HS)

3rd – Diana Ly, “DNA Origami: The Future of Nanofabrication” (Sheldon HS)

Honorable Mention – Raymond Dale Matias, “Medicinal Nanotech: Health Redefined” (Sheldon HS)

Honorable Mention – Kenny Santiago, David Reboin & Michael Donoghue, “Synthetic Biology - The Creation of Organisms” (El Camino HS)

Honorable Mention – Luong Lu, “Nanotechnology” (Sheldon HS)

Honorable Mention Melina Nasser, “Nanotechnology: The Future is Here!” (Sheldon HS)

TBC 2016 WINNERS (Continued)

Focus Area 6: Personal Genomics & Human Health

1st – Kyla Leacox & Annika Streeb, “Genes with The Perfect Fit” (Davis HS)

2nd – Sharon Lau, “Epigenetics: Where Nature Meets Nurture” (Sheldon HS)

3rd TIE – Thomas Abbott & Chubi Yambao, “Genetic Engineering” (Sheldon HS)

3rd TIE – Aaron Nguyen, “Personalized Medicine” (Sheldon HS)

Honorable Mention – Jean Miriam Yasis, “Medical Genetics: Predictive Medicine” (Sheldon HS)

Honorable Mention – Kirsten Londeree, McKenzie King & Samantha Stanley, “Less Than Perfect: Designer Babies” (El Camino HS)

Honorable Mention – Gabriella Agar, “Hematology” (Sheldon HS)



TBC2014 Personal Genomics & Human Health Winners

Science and Social Media



Have you ever been curious about the latest discoveries in biotechnology? What’s new with stem cells? Biofuels? GMOs? The human microbiome? What do the experts think about the latest controversies in biotech?

An excellent way to keep up is by using Twitter as a science newsfeed, taking care to “follow” only reputable sources of scientific information. Some of our winning TBC websites have incorporated a Twitter feed and it is quite a handy tool. One of the best things about Twitter, and other social media platforms, is the ability to connect with like-minded people from around the world.

On Twitter, one can follow posts by governmental bodies (@CIRMnews, @NSF, @CDCgov, @theNASEM), science-based philanthropists (@gatesfoundation, @RockefellerFdn), well known scientific journals (@PLOS, @PNASnews, @NatureNews, @sciencemagazine), popular science magazines and communicators (@neiltyson, @BillNye, @SciAm @NatGeo, @PopSci), and many other recognized experts in science and engineering.

Check out Twitter, if you haven’t already...The reward will be a treasure trove of great science information streaming to your mobile device!



-Dr. Jamison-McClung
@yggdrasil13751

Awesome TBC Sponsor Teachers!

Each year, a few intrepid students enter the TBC as individual contestants, but the majority of our entries are facilitated by the extraordinary dedication and encouragement of TBC Sponsor Teachers through incorporation of TBC as a class project. We applaud the following California educators for their commitment to science education and for striving to keep their classrooms on the “cutting edge”, through activities like the TBC, and on-going professional development through BioTech SYSTEM membership:

- American Canyon High School - Elizabeth Hawkins
- Antelope High School – Angela Anderson
- Christian Brothers High School – Nicole Brousseau
- Colusa High School – Craig Richards
- Davis Sr. High School - Ann Moriarty
- Davis Sr. High School - David Osborn
- Davis Sr. High School - Scott Richardson
- Davis Sr. High School - David Van Muyden
- Dougherty Valley High School – Minu Basu
- El Camino High School - Louis Dias
- El Camino High School – Steve Markley
- El Segundo High School – Erica Zug
- Rodriguez High School - Kevin Scully
- Sheldon High School - Jason Brennan
- Sheldon High School - Justin Cecil
- Sheldon High School - Bob Fendall
- Sheldon High School - Kelli Kosney
- Sheldon High School – Leeann O’Bear
- Sheldon High School - Laura Ziegenhirt
- Vallejo High School – Diosa Bande
- Vallejo High School – Twila Jackson

TBC 2016 WINNERS (Continued)

Focus Area 7: Regenerative Medicine

1st – Lauren Duan, Daniel Jiang & Andrea Zheng, “Tissue Engineering: From Petri Dish to Patient” (Davis Senior HS)

2nd – Seth McCann, “Stem Cells Then, Now and Later” (Antelope HS)

3rd TIE – Kiana Wooten & Shelly Schwarzbart, “Stem Cells” (El Camino HS)

3rd TIE – Kelly Le, “Bioreactors & Stem Cells in Regenerative Medicine” (Sheldon HS)

Honorable Mention – Jamey Guzman, “Tissue Engineering: The Next Breakthrough” (Sheldon HS)

Honorable Mention – Andrea Morales & Stephania Valdez, “Synthetic Organs” (Rodriguez HS)

Honorable Mention – Jasleen Kaur, “Stem Cells: Present and Future of Regenerative Medicine” (Sheldon HS)



SPARK Research Scholar Awards

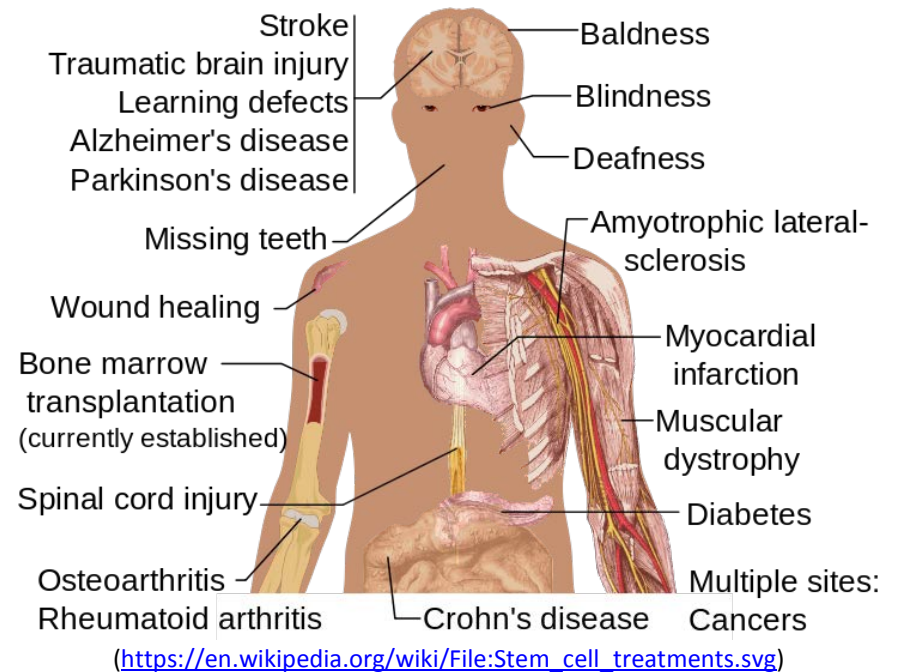
TBC Winners meeting minimum eligibility requirements for the UCDCM Volunteer Services program were invited to apply for a Research Scholar Award. Based on a competitive application process, the following students have been invited to participate as SPARK Research Scholars under the tutelage of leading stem cell scientist, Gerhard Bauer, Director of the GMP Laboratory. Students will conduct research in laboratories affiliated with the UC Davis Institute for Regenerative Cures (Director, Dr. Jan Nolte).

- Sharon Burk, St. Francis HS
- Lauren Duan, Davis HS
- Fatima Flores, McClatchy HS
- Jamey Guzman, Sheldon HS
- Kelly Hongkham, Antelope HS
- Diana Ly, Sheldon HS
- Aaron Nguyen, Sheldon HS
- Ranya Odeh, Sheldon HS
- Vincent Truong, Sheldon HS
- Jean Miriam Yasis, Sheldon HS

This summer research experience has been made possible by a SPARK Award (PI-Gerhard Bauer) from the California Institute for Regenerative Cures (CIRM). Research Scholars will present their research posters to members of CIRM at the Creativity Award Poster Symposium in early August 2016.



Potential uses of Stem cells



California Institute for Regenerative Medicine (CIRM)

<https://www.cirm.ca.gov/>

“California's Stem Cell Agency was created in 2004 when 59% of California voters approved Proposition 71: the California Stem Cell Research and Cures Initiative.”

