SHARED RESOURCES LABS

APP #	TITLE	TOTAL BUDGET REQ	GWG SCORE	1	2	3	FWG SCORE	1	2	3	CIRM Recommendation
INFR6.1-15357	Stem Cell-based Disease Modeling Shared Resource Laboratory	**$5,400,000**	**1**	10	5	0	**1**	10	0	0	FUND
INFR6.1-15363	Stem cell-based Partnership Resource for Investigating Human Diseases and Training (SPRINT)	**$5,055,863**	**1**	10	5	0	**2**	0	8	0	REVISE FACILITY
INFR6.1-15366	Shared Research and Training Facility for Bio-Fabrication of Organs for Regenerative Medicine (Bio-FORM) in Underserved Areas	**$5,400,000**	**1**	13	2	0	**2**	0	8	1	REVISE FACILITY
INFR6.1-15413	Resources for Expanding Stem cell-derived Tissues and Organs for Regenerative Engineering (RESTORE)	**$5,366,999**	**2**	4	11	0	**1**	8	0	0	DO NOT FUND
INFR6.1-15478	The Live Cell Biotechnology Discovery Lab	**$5,399,996**	**2**	0	12	3	**1**	5	4	0	DO NOT FUND
INFR6.1-15517	A CIRM Shared Resource Facility for Modeling	**$5,398,227**	**2**	0	15	0	**1**	9	1	0	DO NOT FUND
INFR6.2-15383	A modular automation approach to stem cell modeling to increase throughput, reproducibility and access	**$3,999,999**	**1**	15	0	0	N/A				FUND
INFR6.2-15368	Shared Resources Laboratories to Enhance In Vitro Stem Cell Modeling and Training	**$4,000,000**	**1**	13	1	0	N/A				FUND
INFR6.2-15527	A Center for Stem Cell Disease Modeling and Therapeutics	**$4,000,000**	**1**	13	0	0	N/A				FUND

SHARED RESOURCES LABS

APP #	TITLE	TOTAL BUDGET REQ	GWG SCORE	1	2	3	FWG SCORE	1	2	3	CIRM Recommendation
INFR6.2-15400	CIRM ASCEND Center - Advancing Stem Cell Education and Novel Discoveries	**$3,946,795**	**1**	11	3	0	N/A				FUND
INFR6.2-15440	Shared Resource Laboratory for Stem Cell-Based Modeling: Resources for Exploring the Biological Underpinnings of Aging and Age-Associated Pathologies	**$3,759,999**	**2**	4	9	1	N/A				FUND
INFR6.2-15416	Expanding and enhancing molecular, cell biological and bioengineering resources for stem cell-based models	**$4,000,000**	**2**	1	14	0	N/A				DO NOT FUND
INFR6.2-15475	Shared Resource Laboratory for Advanced Stem Cell-Based Modeling	**$3,991,879**	**2**	1	13	0	N/A				DO NOT FUND
INFR6.2-15403	Enhancing/Expanding Stem Cell-Based Modeling at a Shared Research and Training Facility	**$3,950,775**	**2**	0	15	0	N/A				DO NOT FUND
INFR6.2-15457	Shared Resources Laboratory for Stem Cell-Based Modeling in Stem Cell Biology and Engineering	**$3,999,995**	**2**	0	15	0	N/A				FUND
INFR6.2-15513	A Comprehensive Biorepository of Human Induced Pluripotent Stem Cells and Their Cardiovascular Derivatives	**$3,995,356**	**2**	0	10	5	N/A				DO NOT FUND
INFR6.2-15482	Shared Laboratory of Human Organoids and Complex Multicellular Systems	**$4,000,000**	**3**	1	1	13	N/A				DO NOT FUND
INFR6.2-15521	The Shared Resource Laboratory for Human Stem Cell-Based Embryo Models	**$2,603,500**	**3**	0	5	9	N/A				DO NOT FUND

SHARED RESOURCES LABS

APP #	TITLE	TOTAL BUDGET REQ	GWG SCORE	1	2	3	FWG SCORE	1	2	3	CIRM Recommendation
INFR6.2-15372	A Shared Resource Laboratory for Stem Cell High-Throughput Biology & Comprehensive Techniques Training	**$3,999,999**	**3**	0	3	11	N/A				DO NOT FUND
INFR6.2-15501	A High Throughput Shared Resource Laboratory to Genome Edit hPSC Disease Models for the California Research Community	**$2,697,046**	**3**	0	3	12	N/A				DO NOT FUND

Application #	INFR6.1-15357
Title (as written by the applicant)	Stem Cell-Based Disease Modeling Shared Resource Laboratory
Project Objective (as written by the applicant)	Our Shared Resource Laboratory will expand access to stem cell-derived models to support research and educational programs with two main goals: democratize access to state-of-the-art models and technology among a diverse scientific community and catalyze innovation in regenerative medicine.
Summary (as written by the applicant)	Our proposed Stem Cell-based Disease Modeling Shared Resource Laboratory (SRL) will expand access to world-class stem cell-derived organoids to researchers at the institution and our neighboring institutions that will enable them to pursue impactful scientific questions. In addition, we will offer valuable hands-on training and education in the derivation and application of such models to researchers and trainees of diverse backgrounds. The SRL will provide resources and training for applying the robust models developed by our own institution's investigators (Co-Is) within their own labs for the specialized needs of the users. Our 4 service lines will include: 1) brain organoids generated from human immortalized neural stem cell (NSC) lines or brain tumor cell lines; 2) brain organoids derived from induced pluripotent stem cells (iPSCs); 3) cardiac spheroids derived from iPSCs; and 4) breast spheroids derived from primary normal/cancer pluripotent cells. We will provide anatomical and functional characterization of models in each service line as required, e.g., spatial phenotyping using the Akoya Codex, confocal imaging of 3D structures, 3D confocal imaging of whole-mount organoids, sample processing for genotypic and transcriptomic analyses, as well as more specific characterizations such as synaptic activity of brain organoids and contractility assays for cardiac models. All available assays and procedures are routinely performed in the laboratories of the Co-Is and will be available within the E-SRL. We will also leverage the extensive (30+) SRs within our institution to support operations within the E-SRL as appropriate. By generating and providing brain organoids, cardiac spheroids, and breast spheroids, and performing complete functional assessments of these organoids/3D cultures, we will offer a unique resource in a region that currently lacks access. We are well-placed to establish and sustain this much needed SRL and to join the CIRM SRL network to ultimately broaden access to our valuable expertise and models across California, as well as advance the standards and reproducibility of stem cell-based modeling.
Statement of Benefit to California (as written by the applicant)	This Shared Resource Laboratory will expand access to stem cell-derived models to regions of Southern California with limited access to such models. It will also provide hands-on training in their use to researchers and trainees of diverse backgrounds, contributing to California's regenerative medicine workforce. Long-term, activities supported by this SRL will accelerate research in regenerative medicine, benefiting both the research community, patients, and diverse communities in California.
Funds Requested	$5,400,000
GWG Recommendation	Tier 1: warrants funding
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 1

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	15
Votes for Tier 1	10
Votes for Tier 2	5
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 14	• Impressive list of users and the models proposed; especially the tumoroids are interesting and relatively rare. The program consolidates a strong stem cell community. • Providing access to normal neural and breast adult stem cell-based models, especially the cancer organoid models, is a real strength as these models are not widely available in the SRL network. • This is a strong proposal that will likely enhance access to stem cell and organoid technologies to underserved populations in the region. • This is a strong application that will consolidate labs, increase efficiencies and advance stem cell research. The service offerings are extensive. • This team is committed to knowledge sharing and improving educational access and resources to advance CIRM's mission.
No: 0	• *none*
GWG Votes	**Is the project well planned and designed?**
Yes: 13	• The project plan is clear and detailed. The sustainability plan is well planned and convincing. • The proposed organoid models are robust and appropriate for serving the anticipated users. • An additional benefit is they have onsite manufacturing, which gives them the entire ecosystem from discovery to manufacture. • The SRL will operate in a renovated space that will assemble state-of-the-art instruments and technologies and centralize the development and establishment of organoid/3D culture model generation. • Minor weakness: While access to genetically modified cells for organoid production is discussed, no details for how this will be achieved are provided. Are these existing NPCs/iPSCs? This is important, as implementation of these methods can take up significant resources and time. • They have thousands of control donors and patients. Storage and methods to keep track of it all may be challenging - how will this be achieved?
No: 1	• I am not convinced the 350 sq ft facility will be sufficient to serve the needs of the prospective users. The availability of teaching lab space mitigates that concern for the courses.
GWG Votes	**Is the project feasible?**
Yes: 14	• Strong existing expertise forms the basis for the SRL services and training. Currently, the proposed work is being done in various labs - this will bring these assets together in a single space. The institution has a proven track record of conducting a large array of preclinical experiments and clinical trials with biologics and stem cells. Collaborative interactions among diverse researchers are proven. • Excellent leadership with experience with similar programs. The project has strong institutional support. In the past 15 years the institution has flourished with CIRM support (over 50 awards; ~200M), leading to 23 discovery and translational research projects, 12 clinical trials and the establishment of a stem cell Alpha Clinic. They have excellent institutional commitment in terms of space and money. • The proposal includes an excellent sustainability plan. • While all upper level managers are in place and experienced, activities associated with this project will be in addition to their current duties.

	• Perhaps as additional staff are hired the new activities will not be overwhelming. • The available space is relatively small for the project proposed plus the course.
No: 0	• *none*
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 14	• This is a strong DEI plan, including outstanding plans for outreach to underserved communities. • The applicant plans to offer significant support for travel/lodging to attend the training course. This will enhance opportunities for underserved trainees. • The inclusion of a dedicated outreach coordinator to communicate with institution/high school representatives and coordinate services/courses is a strength. • The applicant has done a excellent job here and the institution has a strong commitment to DEI. • The proposal includes a solid plan for distributing brain organoids, but it's not clear how this activity will impact DEI. The outreach coordinator will be useful.
No: 0	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 12	• The plan to offer tiered training opportunities for trainees of different experience levels is a strength. • Overall, the proposal includes well-designed educational offerings. One concern is whether the broad training offered in the 5-day Techniques Course will offer deep enough hands-on training to enable researchers wishing to transfer these technologies back to their institutions. It appears only 1-2h per day of the course are devoted to hands on training. • The hands-on-training portion of the course is not long enough for the complex culture of organoids. • The course is well planned but the duration seems too short for growing organoids. • The 5-day course may not be enough to teach all techniques. The course could be parsed into several focused courses, one for each tissue type or technique, to allow students more time to achieve results.
No: 2	• The course is not well described. • The course is limited in terms of hands-on activities.

Application #	INFR6.1-15357
Title (as written by the applicant)	Stem Cell-based Disease Modeling Shared Resource Laboratory
Project Objective (as written by the applicant)	Our Shared Resource Laboratory will expand access to stem cell-derived models to support research and educational programs with two main goals: democratize access to state-of-the-art models and technology among a diverse scientific community and catalyze innovation in regenerative medicine.
Summary (as written by the applicant)	Our proposed Stem Cell-based Disease Modeling Shared Resource Laboratory (SRL) will expand access to world-class stem cell-derived organoids to researchers at the institution and our neighboring institutions that will enable them to pursue impactful scientific questions. In addition, we will offer valuable hands-on training and education in the derivation and application of such models to researchers and trainees of diverse backgrounds. The SRL will provide resources and training for applying the robust models developed by our own institution's investigators (Co-Is) within their own labs for the specialized needs of the users. Our 4 service lines will include: 1) brain organoids generated from human immortalized neural stem cell (NSC) lines or brain tumor cell lines; 2) brain organoids derived from induced pluripotent stem cells (iPSCs); 3) cardiac spheroids derived from iPSCs; and 4) breast spheroids derived from primary normal/cancer pluripotent cells. We will provide anatomical and functional characterization of models in each service line as required, e.g., spatial phenotyping using the Akoya Codex, confocal imaging of 3D structures, 3D confocal imaging of whole-mount organoids, sample processing for genotypic and transcriptomic analyses, as well as more specific characterizations such as synaptic activity of brain organoids and contractility assays for cardiac models. All available assays and procedures are routinely performed in the laboratories of the Co-Is and will be available within the E-SRL. We will also leverage the extensive (30+) SRs within our institution to support operations within the E-SRL as appropriate. By generating and providing brain organoids, cardiac spheroids, and breast spheroids, and performing complete functional assessments of these organoids/3D cultures, we will offer a unique resource in a region that currently lacks access. We are well-placed to establish and sustain this much needed SRL and to join the CIRM SRL network to ultimately broaden access to our valuable expertise and models across California, as well as advance the standards and reproducibility of stem cell-based modeling.
Statement of Benefit to California (as written by the applicant)	This Shared Resource Laboratory will expand access to stem cell-derived models to regions of Southern California with limited access to such models. It will also provide hands-on training in their use to researchers and trainees of diverse backgrounds, contributing to California's regenerative medicine workforce. Long-term, activities supported by this SRL will accelerate research in regenerative medicine, benefiting both the research community, patients, and diverse communities in California.
Funds Requested	$5,400,000
FWG Recommendation	Tier 1: warrants funding
Process Vote	All FWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the FWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 1

Up to 11 members of the FWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	1
Count	10
Votes for Tier 1	10

Votes for Tier 2	0
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the FWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

FWG Votes	Does the proposed renovation/facilities improvement project support the applicant's proposed SRL core research and educational activities?
Yes: 4 **No:** 0	• The applicant will re-purpose existing underutilized spaces to achieve a functional SRL. The applicant provided sufficient plans. • The project includes converting underutilized dry laboratory space in an existing building into the SRL. • The facility has a good location with easy access. • While clearly expensive for the size, the overall project seems highly coordinated and well-conceived. The dollars being spent are very focused on small areas (mostly Mechanical, Electrical, and Plumbing (MEP)-based), and thus have an outsized look on the totality of the project.
FWG Votes	**Are the SRL renovations/facility improvements feasible as proposed?**
Yes: 4 **No:** 0	• Assets include the use of existing teaching space and improvements to under-utilized dry space. • The SRL team has secured the use of space for the planned classroom/teaching laboratory-based educational activities. No funds are requested for renovation, as these activities will be accommodated in existing space within the Graduate School of Biological Sciences located at the institution. Educational activities will comprise lecture-based instruction in a modern AV-equipped classroom as well as hands-on, laboratory-based activities on the fundamentals of cell manufacturing. • Yes. The facility seems feasible to achieve in the proposed SRL project.
FWG Votes	**Does the proposed SRL facility include the appropriate research equipment and laboratory configuration in support of the proposed SRL activities?**
Yes: 4 **No:** 0	• Proposal is adding capability to a well-established campus and working facility. • The site that has been identified for the Stem Cell-based Disease Modeling Shared Resource Laboratory is currently under-utilized and there are no significant barriers to making the space readily available to start construction as outlined in the Renovation/Facility Improvements Project Schedule. It is close to main entrance to facilitate access to internal and external user community. • Yes, it appears that the equipment and configuration of space is conducive to the project. • There should be some clarification of the code/occupancy and security of placing the cylinders in the corridor. The 2'-8" clear between Biosafety Cabinets and casework appears very tight.
FWG Votes	**Are the renovation/facility improvement costs appropriate?**
Yes: 4 **No:** 0	• The cost per square foot is >$2,000, which is high, but appear reasonable as the applicant is doing an MEP rework and will be placing lots of equipment into a small space. Biohazard cabinets alone can be $50K each. • Overall, yes, though the costs seem disproportionately high, including the demolition and MEP costs. • The cost per square foot of >$2000/sf was surprising, even for the small space.
FWG Votes	**Does the applicant ensure diversity, equity and inclusion goals for design and construction?**
Yes: 4 **No:** 0	• Yes. The DEI narrative seems comprehensive and strategic in achieving DEI goals. • The institution has a Supplier Diversity policy that reinforces equal opportunity. They invite requests for proposals from suppliers that support small and diverse vendors in their local and regional communities.

	• The applicant is reaching out to a variety of development councils and chambers of commerce to make the project known. • The institution has a new program that is encouraging diversity. There aren't specific targets for the design and construction team. The builder has stated they cannot find subcontractors to do this work, which is difficult to accept.

Application #	INFR6.1-15363
Title (as written by the applicant)	Stem cell-based Partnership Resource for Investigating Human Diseases and Training (SPRINT)
Project Objective (as written by the applicant)	Use of stem cells in human disease modeling has reached a broader scientific audience of underserved, marginalized communities. Researchers/scholars have comprehensive training in iPSC generation, genetic modification, and differentiation techniques to model human diseases successfully.
Summary (as written by the applicant)	The centralized facility is designed to advance the use of human pluripotent stem cells (hPSC) for human disease modeling among researchers from partner institutions with limited access to stem cell laboratory resources, expertise, training, and services. Structurally, it consists of two arms: -A research arm will: 1) provide shared stem cell laboratory to researchers and scholars from minority, underserved, and diverse community services; and 2) partner with research institutions that engage in health disparities and minority health research. -An educational arm will focus on comprehensive training in: 1) generating patient-derived iPSC lines, 2) generating genetically modified ESC/iPSC lines, and 3) differentiation into neural cell types. The core has three objectives: 1. Provide users access to equipment and expertise for the generation, reprogramming, and genetic modification of hPSCs, to address human diseases, especially those suffered by minority and marginalized communities. 2. Provide directed differentiation of hPSCs into organ and lineage-specific cell types allowing the modeling of human diseases in 2D and/or 3D (e.g., organoids) cultures for comprehensive disease research. 3. Provide comprehensive online and hands-on training in iPSC generation, genetic modification, and differentiation techniques to model human diseases successfully.
Statement of Benefit to California (as written by the applicant)	The core fills a gap for the scientific community, particularly those studying underserved populations where access to resources, training, expertise, and services for hPSCs is limited and distance and transportation costs are deterrents to stem cell research participation. The patient population, particularly those who lack equitable medical services, will benefit from the support of regenerative or modeling tools of human diseases that may have delayed diagnosis and that often lack treatments.
Funds Requested	$5,055,863
GWG Recommendation	Tier 1: warrants funding
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 1

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	15
Votes for Tier 1	10
Votes for Tier 2	5
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 14	• The objective of this application is to create a "hPSCs core facility" which has 3 main goals: (1) on demand derivation and genetic modification of hPSCs, especially from ethnic minorities relevant for California, (2) produce differentiated cells from hPSCs for modeling disease, and (3) provide training on hPSCs. This is very high value in the context of this institution and the surrounding environment. • This platform will cover a gap between equivalent resources based at nearby institutions. This includes location, time of commute, and also population diversity. This institution seems located in an under-resourced area with direct contact to ethnic minority individuals. • This proposal seeks to establish a stem cell core facility that will serve the institute's own researchers as well as that of neighboring institutions. The proposal fills a gap in an area that does not have a stem cell core. • The proposal offers significant value; it aims to serve researchers at institutions with a high percentage of minority populations and create stem-cell models of diseases prevalent in underserved populations. • The proposal is addressing an underserved population. • For research, yes. However, the proposed stem cell course will serve only 24 students over the life of the award. This diminishes the value of the potential award. Additional efforts are needed to warrant support for course development. • Twenty-four students over the course of the award seems too small.
No: 0	• *none*
GWG Votes	**Is the project well planned and designed?**
Yes: 14	• Most of the services are well planned and designed. • The proposal has a clear focus on specific stem cell models and provides a list of expected users that align with the proposal's scientific goals. • The third proposed offering is a little broad in scope with generation of several differentiated cell lineages. This may require extensive training of personnel on each of these differentiation protocols with no guarantee that all cell lineages will be requested. It may be wise to make available only two or three differentiated cell products to start with, and expand to more lineages upon request. • The project includes all the details necessary in terms of planning. The size of the core facility looks appropriate even if the space dedicated for cell culture room seems relatively small. • The space is small, which may limit the accessibility and potential impact of the SRL. • The space is rather small.
No: 0	• *none*
GWG Votes	**Is the project feasible?**
Yes: 14	• The proposal includes a detailed plan that appears achievable. The PIs are leaders in the proposed stem cell research areas. The institution will provide significant resources for planning and building the facility. • The project is well planned and the plan is convincing. The team has the right expertise. The application includes a plan for self-sustainability which is convincing. • Most services offered are standard (iPSC generation, gene editing, hands-on training) and have been successful at numerous other cores. These will also be feasible at the applicant institution. • The timeline proposed is feasible.

	• There are some concerns about the long-term sustainability of the SRL, although the institution is seeking external support.
No: 0	• *none*
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 14	• The DEI plan is extremely strong and a core focus of the proposal. The core facility aims to engage directly with researchers and scholars from minority and underserved communities. For that, the core has forged strategic partnerships with local universities that engage with these communities. • The lead applicant has a strong record on these aspects. There is a clear understanding on the importance of gender and ethnicity on disease. This is clearly a central aspect to justify the core facility. • The SRL is likely to serve a highly diverse group of researchers at institutions that serve under-resourced populations. • The proposal includes a well described embrace of DEI values and initiatives. • The DEI statement and plan are strong for this proposal.
No: 0	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 10	• The goal of the course is to provide training for a broad population of researchers who might find difficult to receive training from other institutions. So, yes it does fit a clear need and will support the next generation of researchers. The curriculum of the e-course is very broad and covers all the different aspect of hiPSC technology including derivation, genome editing, and differentiation (into neuronal cells). • The curriculum is well designed in general and covers both virtual and hands-on-training. The Introduction to Stem Cell Laboratory Techniques is especially well designed to serve the target users of the core. As pointed out in the proposal, the anticipated users are from under-resourced communities and may not have had exposure to basic stem cell culture techniques. • It is a strength that the course can be offered based on the needs of its users instead of having fixed schedules. • The iPSC generation unit may need longer than 7 days as reprogramming is a complex procedure and many steps are involved in generating fully reprogrammed cells. An expansion of this course may be helpful to fully grasp the technology. • The course is not well developed and should be adjusted appropriately. For example, online learning does not use the newest and best described practices. Other online courses already exist and it is thus not clear what new aspects the core will offer.
No: 4	• The core needs to be able to train more students - it currently seems to only be able to train 24 students over the course of the funding cycle. • As the course only serves 8 student per year, the impact seems low for the amount of money requested. • The online course needs more thought to be a good option for learning. It is a great idea to reach more students, but watching lectures online is not ideal. There are a lot of existing online stem cell courses. How will this one differentiate itself? • While the topics covered are appropriate, the YouTube videos of online lectures are not adequate. • The syllabus outlines a self-paced online course expected to take about 8 hours to complete. Students will not have any hands on experiences. This course is not worth funding, since similar opportunities already exist - and even if they didn't, it is not clear that this course would require $1M to produce.

Application #	INFR6.1-15363
Title (as written by the applicant)	Stem cell-based Parternship Resource for Investigating Human Diseases and Training (SPRINT)
Project Objective (as written by the applicant)	Use of stem cells in human disease modeling has reached a broader scientific audience of underserved, marginalized communities. Researchers/scholars have comprehensive training in iPSC generation, genetic modification, and differentiation techniques to model human diseases successfully.
Summary (as written by the applicant)	The centralized facility is designed to advance the use of human pluripotent stem cells (hPSC) for human disease modeling among researchers from partner institutions with limited access to stem cell laboratory resources, expertise, training, and services. Structurally, it consists of two arms: -A research arm will: 1) provide shared stem cell laboratory to researchers and scholars from minority, underserved, and diverse community services; and 2) partner with research institutions that engage in health disparities and minority health research. -An educational arm will focus on comprehensive training in: 1) generating patient-derived iPSC lines, 2) generating genetically modified ESC/iPSC lines, and 3) differentiation into neural cell types. The core has three objectives: 1.Provide users access to equipment and expertise for the generation, reprogramming, and genetic modification of hPSCs, to address human diseases, especially those suffered by minority and marginalized communities. 2.Provide directed differentiation of hPSCs into organ and lineage-specific cell types allowing the modeling of human diseases in 2D and/or 3D (e.g., organoids) cultures for comprehensive disease research. 3.Provide comprehensive online and hands-on training in iPSC generation, genetic modification, and differentiation techniques to model human diseases successfully.
Statement of Benefit to California (as written by the applicant)	The core fills a gap for the scientific community, particularly those studying underserved populations where access to resources, training, expertise, and services for hPSCs is limited and distance and transportation costs are deterrents to stem cell research participation. The patient population, particularly those who lack equitable medical services, will benefit from the support of regenerative or modeling tools of human diseases that may have delayed diagnosis and that often lack treatments.
Funds Requested	$5,055,863
FWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All FWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the FWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 2

Up to 11 members of the FWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	2
Count	8
Votes for Tier 1	0
Votes for Tier 2	8
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the FWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

FWG Votes	Does the proposed renovation/facilities improvement project support the applicant's proposed SRL core research and educational activities?
Yes: 2 **No:** 1	• The host institute is a good location for a project of this nature, but the proposal needs far more detail on the construction budgets and overall scope. • With regards to the equipment requested and functional processes/stations described, the proposal appears adequate to support the services outlined. • The equipment list does not comport with the drawings and allocated space. Some equipment poorly positioned. Some other important items are lacking. • Information on existing conditions, scope (preliminary plans), and a budget that is reflective of the preliminary plans in coordination with existing conditions is needed to validate expenses. • No. There are multiple questions related to the feasibility.
FWG Votes	**Are the SRL renovations/facility improvements feasible as proposed?**
Yes: 0 **No:** 3	• It is difficult to determine if the proposed renovations are feasible based on the information provided. There are conflicting scope of work details between the facility drawings, the narrative, and the general contractor's rough order of magnitude cost estimate. • The feasibility assessment would benefit from revised drawings and aligned narrative and cost estimates. • Without as-builts or a preliminary plan developed by an architect and consultants, it is unclear if this is a feasible project or if the budget proposed will support the scope. • Feasibility is hard to extrapolate with such incomplete data. • No. The space and usage including access to a fume hood does not seem to be properly determined. • Not without significant attention paid to revising drawings. The drawings need to take into consideration ADA regulations and how those regulations might impact their proposed design, even at the preliminary concept drawing level.
FWG Votes	**Does the proposed SRL facility include the appropriate research equipment and laboratory configuration in support of the proposed SRL activities?**
Yes: 1 **No:** 2	• The equipment requested and referenced fully aligns with the processes and activities of the SRL as described. • Laboratory equipment seems comprehensive, although the space and configuration does not seem to allow for the amount of equipment proposed. • Yes, but it is not clear if equipment can fit. • The proposal does not reference any mechanical or plumbing scope and has very limited electrical scope, so this is hard to extrapolate. • A revised proposal would benefit from verification of capacity with the existing building utility infrastructure and details on existing and proposed life safety measures and resources. • The concerns related to the lab configuration were about the feasibility of equipment fitting as depicted, the placement of equipment requested but not illustrated on the plans, and the aisle clearances required by Building Code. • There is a severe disconnect between the equipment list and the figures showing the location and disposition of this equipment.
FWG Votes	**Are the renovation/facility improvement costs appropriate?**
Yes: 0 **No:** 3	• Both the initial and revised contractor estimates had numerous notations deferring scope and pricing to the subcontractors at a later date, as well as numerous exclusions of which prohibited an assessment of the appropriateness of the requested renovation budget. • A revised budget that includes the line items requested in the budget worksheet as well as a copy of detailed costs from the general contractor inclusive of allowances for subcontractors would allow for an assessment of the adequacy of the budget for the renovation. • There is no defined scope to validate the budget proposed.
FWG Votes	**Does the applicant ensure diversity, equity and inclusion goals for design and construction?**
Yes: 1	• The applicant institution system typically does well in this regard. • The application itself does not describe how this project serves the diverse community in the surrounding area. • In the original proposal the applicant did not correctly respond to the question asking for the

No: 2	applicant to ensure DEI goals are established and maintained related to design and construction contractor selections. ● In a follow up submittal response to the DEI requirement, the General Contractor responded on behalf of the applicant taking responsibility for ensuring compliance which was not what was requested of the applicant. ● This was lacking and not detailed.

Application #	INFR6.1-15366
Title (as written by the applicant)	Shared Research and Training Facility for Bio-Fabrication of Organs for Regenerative Medicine (Bio-FORM) in Underserved Areas
Project Objective (as written by the applicant)	The shared Bio-FORM Core will introduce organoid models to the research community in underserved areas and provide a knowledge-sharing platform and ecosystem for hands-on training and developing advanced organoid technologies and 3D organs toward regenerative medicine applications.
Summary (as written by the applicant)	This proposal aims to develop a "Shared Research and Training Facility for Bio-Fabrication of Organs for Regenerative Medicine (Bio-FORM) in Underserved Areas." A diverse group of researchers, students, and start-up companies in the Inland Empire have voiced strong interest in working with organoids and have identified a critical need for essential training and facilities. The Bio-FORM Core will establish a critical platform for researchers in underserved areas to enter organoid work and create advanced 3D organs with cutting-edge engineering technologies. The Bio-FORM Core aims to support both research and educational programs and create vital linkages between them for diverse students and researchers. This Core will support a rich ecosystem of interdisciplinary regenerative medicine research, grounded in organoid culture methodologies and advanced engineering technologies in 3D printing. The shared Bio-FORM Core will enable researchers, educators, trainees, and medical professionals in the Inland Empire to gain direct access to a state-of-art research and training facility. The Bio-FORM Core will offer nine hands-on training courses for key techniques. Videos of course materials will be published and be accessible online by anyone in California. The Core will provide easy and low-cost access for making cutting-edge scientific discoveries in Stem Cells and Regenerative Medicine, share research and training opportunities, disseminate knowledge, raise awareness among under-resourced communities, and break the infrastructural and technical barriers for adoption of new technologies and therapies in underserved areas. Such facilities and the attendant training would be unique in the Inland Empire. Inland Empire is a geographically, socioeconomically, medically, and educationally underserved region with a diverse population. By providing a critical entry point for training and access to major instruments, the shared Bio-FORM Core will enable researchers to: (1) work with organoid models, (2) create stem cell-based 3D models of organoids, tissues and organs to be more like those in vivo, and (3) produce complex, 3D tissue structures and organs for regenerative therapies. This Core will transform regenerative medicine research beyond current organoid culture by providing training and access to state-of-the-art 3D to 4D printing technologies and other major analytical instruments. The Bio-FORM core will enhance the efficiency, accuracy, and creativity in stem cell and regenerative medicine research, enabling groundbreaking discoveries and fostering collaborations beyond Inland Empire. The users of Bio-FORM Core will be diverse, including students and researchers in the Inland Empire, from startup companies, from California State University (CSU) partners, and institutions of Inland Empire and greater Los Angeles Regenerative Medicine Consortium.
Statement of Benefit to California (as written by the applicant)	Located in the Inland Empire, the Bio-FORM Core will provide researchers, educators, trainees, and regional medical professionals with access to a state-of-the-art research & training facility. Bio-FORM will support fundamental science and translational research. For California and the Inland region (a medically underserved area), this Core will raise stem cell awareness, reduce infrastructural barriers to scholarship, and enable clinical translation of new therapies for underserved populations.
Funds Requested	$5,400,000
GWG Recommendation	Tier 1: warrants funding
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 1

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	15
Votes for Tier 1	13
Votes for Tier 2	2
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 13	• The proposed Bio-FORM program will extend stem cell expertise to (1) work with organoid models, (2) create stem cell-based 3D models of organoids, tissues and organs, and (3) produce complex, 3D tissue structures and organs for regenerative therapies. These approaches represent the forefront of stem cell research and a nice blend of basic stem cell biology and bioengineering. • The course offerings will provide training in organoid culture and development of advanced 3D organoids using bioprinting and biofabrication. The facility will share resources with the Inland Empire Stem Cell Consortium and continue to work with companies. • Combining organoids and biofabrication techniques should enable the development of novel culture systems to more closely model in vivo function. This activity grew organically from user needs at the institution's existing Stem Cell core. • A strength is that this proposal is an expansion of an existing core, because the infrastructure is in place to manage the facility and maintain/service equipment. The new shared resource will engage academic and industry researchers to develop more sophisticated and accurate models. • This project will expand an existing, successful stem cell research center to include techniques in organoid, tissue, and organ production. • The project will be located in a geographic region of California with underserved healthcare and health care research.
No: 1	• The applicant institution is already well equipped and well resourced.
GWG Votes	**Is the project well planned and designed?**
Yes: 14	• The plan is very well designed and all the information needed to assess the program is provided. • The proposal is driven by interest in the current faculty in furthering organoid research and gaining access to bioprinting techniques instrumentation. • The project will significantly increase space and add new technologies in organoid, tissue, and organ production, which builds on an existing stem cell facility that has been highly effective. • The applicants have a strong leadership and management background with an excellent track record of managing the current stem cell facility. • There is a robust group of users that will benefit from the equipment and course offerings. • The design of the spaces enables multiple users at a time. Planned equipment purchases will enable researchers to achieve the goals of the core. • The course offerings and core services are closely linked, enabling researchers to obtain the necessary training for organoid culture and biofabrication. The proximity of the core facilities

	to the stem cell core will enable easy transfer of activities. • Yes. The new SRL for organoid/tissue research will be added to the existing stem cell research center, expanding the impact of previous CIRM funding, while building new capabilities. • The new SRL will benefit from the extensive user protocols and support structures (scheduling, SOPs, etc) that are already in place at the stem cell research center.
No: 0	• *none*
GWG Votes	**Is the project feasible?**
Yes: 13	• Yes. The team has identified 3,718 sq feet for the lab. This included 1,468 sq feet of the original CIRM-funded stem cell lab. A letter of support from the institution's Dean was provided to confirm availability of this space. • The institution's administration has committed access to space. • Yes, the applicant institution can accomplish the proposed project. • The close collaboration between PIs and the institution's Office of Research and Economic Development should facilitate addressing any challenges that arise. A co-PI has experience with renovation of space for core facilities. • Contingency funds are committed in the event of any unexpected costs. • The leadership team consists of the director, co-director, and associate director of the Stem Cell core. They have considerable experience collaborating together on large grants. Joint leadership of the stem cell core and this new facility should facilitate communication and collaboration • The institution has demonstrable success at managing a stem cell facility. There is every reason to expect that the new SRL will enjoy a similar outcome.
No: 1	• The focus on biofabrication/bioprinting is a limitation. This type of technology is not incredibly successful with hiPSCs or stem cell in general. So, it seems difficult to focus a training program or core facility on this aspect.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 14	• The applicant institution has been designated an accredited Hispanic-Serving Institution and an Asian American Native American Pacific Islander-Serving Institution. • The institution serves a Hispanic and Asian-American population. They have several CIRM funded training programs to promote a diverse group of graduate students. The applicant institution and partner institutions have a diverse group of faculty using the current Stem Cell Core. • The institution serves many first-generation students and has networking with places that have BRIDGES, McNair Scholars, and MARC scholars. • The PIs have an extensive network to recruit a diverse group of researchers. The PDs will work closely with the Wellness Office and Office and Diversity and Inclusion to incorporate the best approaches to support the students and researchers who wish to access the research and educational resources of the core. • The university serves a highly diverse student population. Note that criteria for admission to the SRL courses should be clearly articulated in advance of receiving applications. Leaving the selection to the discretion of the instructor raises the potential for unconscious bias. The selection criteria should be available to applicants, as well. • The PDs have successful track records of incorporating diverse perspectives in their research and in the operation of the core. • The resource will provide access to resources that enable the study of stem cells that reflect ancestral and sex diversity. • Diversity is well addressed at the level of the institution but the scientific aspect could be more developed. • The application does not make clear the diversity in the stem cells that will be used in the new facility.
No: 0	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 13	• Some components of the course already exist. The course should be expanded to new areas. • New courses will be 9 mini-laboratory certificate courses using the new Bio-FORM Core. • Yes, students will be qualified to perform stem cell-based modeling research upon completion of the course. • Yes. The training plan is comprehensive and appropriate. Specific learning outcomes/assessments are included.

	• Detailed topics and learning objectives are provided for the proposed 9 courses. Courses cover a range of topics from stem cell culture, to organoids, to biofabrication and imaging. The course builds upon an existing academic year course, but will include additional lab exercises. • Courses range in duration from 1 to 5 days, with most 4-5 days long. Intensive, hands-on experience will be provided. There is a clear statement of cost to students. • Instructors have the necessary expertise to deliver course materials. They have taught this content as part of their regular teaching responsibilities. Guest lectures and videos complement the main content. • Some of the course offerings are basic, but the hands on classes are important.
No: 1	• It seems that part of the course already exists, so funding the course material described in this application might not bring a lot of added value.

Application #	INFR6.1-15366
Title (as written by the applicant)	Shared Research and Training Facility for Bio-Fabrication of Organs for Regenerative Medicine (Bio-FORM) in Underserved Areas
Project Objective (as written by the applicant)	The shared Bio-FORM Core will introduce organoid models to the research community in underserved areas and provide a knowledge-sharing platform and ecosystem for hands-on training and developing advanced organoid technologies and 3D organs toward regenerative medicine applications.
Summary (as written by the applicant)	This proposal aims to develop a "Shared Research and Training Facility for Bio-Fabrication of Organs for Regenerative Medicine (Bio-FORM) in Underserved Areas." A diverse group of researchers, students, and start-up companies in the Inland Empire have voiced strong interest in working with organoids and have identified a critical need for essential training and facilities. The Bio-FORM Core will establish a critical platform for researchers in underserved areas to enter organoid work and create advanced 3D organs with cutting-edge engineering technologies. The Bio-FORM Core aims to support both research and educational programs and create vital linkages between them for diverse students and researchers. This Core will support a rich ecosystem of interdisciplinary regenerative medicine research, grounded in organoid culture methodologies and advanced engineering technologies in 3D printing. The shared Bio-FORM Core will enable researchers, educators, trainees, and medical professionals in the Inland Empire to gain direct access to a state-of-art research and training facility. The Bio-FORM Core will offer nine hands-on training courses for key techniques. Videos of course materials will be published and be accessible online by anyone in California. The Core will provide easy and low-cost access for making cutting-edge scientific discoveries in Stem Cells and Regenerative Medicine, share research and training opportunities, disseminate knowledge, raise awareness among under-resourced communities, and break the infrastructural and technical barriers for adoption of new technologies and therapies in underserved areas. Such facilities and the attendant training would be unique in the Inland Empire. Inland Empire is a geographically, socioeconomically, medically, and educationally underserved region with a diverse population. By providing a critical entry point for training and access to major instruments, the shared Bio-FORM Core will enable researchers to: (1) work with organoid models, (2) create stem cell-based 3D models of organoids, tissues and organs to be more like those in vivo, and (3) produce complex, 3D tissue structures and organs for regenerative therapies. This Core will transform regenerative medicine research beyond current organoid culture by providing training and access to state-of-the-art 3D to 4D printing technologies and other major analytical instruments. The Bio-FORM core will enhance the efficiency, accuracy, and creativity in stem cell and regenerative medicine research, enabling groundbreaking discoveries and fostering collaborations beyond Inland Empire. The users of Bio-FORM Core will be diverse, including students and researchers in the Inland Empire, from startup companies, from California State University (CSU) partners, and institutions of Inland Empire and greater Los Angeles Regenerative Medicine Consortium.
Statement of Benefit to California (as written by the applicant)	Located in the Inland Empire, the Bio-FORM Core will provide researchers, educators, trainees, and regional medical professionals with access to a state-of-the-art research & training facility. Bio-FORM will support fundamental science and translational research. For California and the Inland region (a medically underserved area), this Core will raise stem cell awareness, reduce infrastructural barriers to scholarship, and enable clinical translation of new therapies for underserved populations.
Funds Requested	$5,400,000
FWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All FWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the FWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 2

Up to 11 members of the FWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	3
Count	9
Votes for Tier 1	0
Votes for Tier 2	8
Votes for Tier 3	1

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the FWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

FWG Votes	Does the proposed renovation/facilities improvement project support the applicant's proposed SRL core research and educational activities?
Yes: 3 **No:** 1	• Yes, it is renovating space adjacent to existing programs, and this is augmenting them with needed equipment space. • The proposed facility appears disjointed and non-contiguous, with poor planning on equipment placement and utilization. • The scope of work defines the piecemeal renovation of an existing facility on the campus, combining supply closets, conference rooms, and offices that could eventually meet minimal levels of acceptable functionality for the science. The cost, thusly, is exaggerated past the typical renovation cost for such an undertaking, even on a newly constructed facility and does not create a wholly coherent laboratory. • It should be noted that a large percentage of the money being requested is specifically for renovating, updating, and improving the building/facility--an institutional building and program building. It is not made clear why alternative, non-governmentally controlled and owned facilities were not contemplated and instead a university is indirectly asking for a capital expense budget grant via this project. • The space is not guaranteed to the project in the future, should the university deem it eventually unjustified--thus a significant amount of funds could be applied for the university's benefit with no certainty of longevity or "payoff." Quoting the letter of support: "As with all campus space, use of the space will be periodically evaluated and may be reassigned based on actual need and campus priorities." • Concern exists over a lack of guarantee that this facility would not be repurposed at an early date. • It is a team of institution-based people and scientific progress that is directly tied to the campus, so the location is potentially appropriate. Alternative sites do exist within a short to medium distance (and elsewhere on/near campus) and would be free of the university encumbrance. • Building fundamentals like backup power and loading/unloading are unaddressed in the scope and will be necessary functions for the program use.
FWG Votes	**Are the SRL renovations/facility improvements feasible as proposed?**
Yes: 0 **No:** 4	• The people noted seem to be highly qualified. They also seem to be fully integrated into the system through previous work. • The proposal does address the current state of the building, it's age, and the disjointed nature of the spaces that are attempting to be fused into a functional "whole." Historical significance

	of the building (constructed in 2009) is not addressed, but unlikely to be a factor. Surrounding uses seem to be in-line with the proposed use. ● The time (5 months) allocated to construction is shorter than the time given to design process (7 months). ● The general timeline for construction seems overly optimistic (5 months total) and commissioning of the space for appropriate use is completely unaddressed (especially for a BSL-2 level sterile environment). Structural, MEP, and building systems will all have to be touched, and no plan for after hours or sterile control is noted in the current uses or adjacent uses. ● Proposed timelines are of concern. ● There are concerns with the plans as they are very diagrammatic and are either out of scale or will not work - as an example there is equipment in front of doors, and benches that appear to not have access to them. ● The project does address air flow, biosafety cabinet installation and use, and fume hood requirements (all needing to be purchased and installed). Chemical storage issues are completely unaddressed, and overall use seems to lean heavily on the re-use of one room with similar current purpose. It is assumed the re-use of viable space is a mitigated risk. Building vibration, hazardous material/waste, and other discharge procedures are not mentioned/addressed. ● The bid system for how these professionals were selected, and from a pool of whomever else was asked to participate is unaddressed. ● Substantial questions remain.
FWG Votes	**Does the proposed SRL facility include the appropriate research equipment and laboratory configuration in support of the proposed SRL activities?**
Yes: 1 **No:** 3	● The exact configuration of the MEP systems is not disclosed, especially how much is existing versus new. That said, the layout and configuration of the spaces does appear to take into account all equipment and benching into account, suggesting that through the process the support systems are being addressed. ● Barely, but it does seem in-line with the campus mission and evolving use. Because of the incremental approach to the design, inclusion, and renovation of the space(s), shared access (for equipment and personal), exiting, and workflow are potentially tolerable but certainly not ideal. ● Anticipate problems of accessing the facility and adjacent areas during construction. Concern over three non-contiguous rooms in a 50-year-old building. ● Overlapping placement of equipment is a concern.
FWG Votes	**Are the renovation/facility improvement costs appropriate?**
Yes: 0 **No:** 4	● This area needs more explanation, as the cost for design and the cost for university management are roughly equal to the cost of the work. Normally I would expect to see soft costs at 20%-30% of the budget, including furnishings and equipment. Here the design and management fees are roughly 40% - clarification is needed. ● Concern over lack of guarantee that the space we fund could be repurposed at any time. ● Too much unknown at the moment. ● Substantial questions remain.
FWG Votes	**Does the applicant ensure diversity, equity and inclusion goals for design and construction?**
Yes: 4 **No:** 0	● Strong in this category. Serving the underserved community. ● They are used to working with small minority and women business contractors. ● Well done. The institution has well-founded policies regarding DEI and numerous resources dedicated to it. Both in policy and in resources, this seems to be one of the better addressed points of the work.

Application #	INFR6.1-15413
Title (as written by the applicant)	Resources for Expanding Stem cell-derived Tissues and Organs for Regenerative Engineering (RESTORE)
Project Objective (as written by the applicant)	The areas of focus for our SRL were chosen based on expertise of cardiovascular stem cell fates, cardiovascular tissue development, and stem cell characterization at our center and includes Endothelial Cell and Cardiomyocyte Cell Differentiation, MPM Networks, and Fabrication of Cardiac Tissue.
Summary (as written by the applicant)	This SRL aims to broadly support research and educational needs in human stem cell culture, stem cell differentiation, cell and tissue characterization, transplantation, small-animal imaging, and cardiovascular modeling. The specific stem cell models, chosen based on expertise of the faculty, will focus on using human embryonic stem cells (ESCs) and human induced pluripotent stem cells (iPSCs) to direct cardiovascular stem cell fates and cardiovascular tissue development. The SRL will also generate and offer new human stem cell products: genetically diverse iPSC lines, differentiated vascular progenitor cells (VPCs) and differentiated endothelial cells (ECs). We will also offer a three-week intensive summer Stem Cells Techniques Workshops with lessons in Human Stem Cell Culture, Stem Cell Differentiation, Cell and Tissue Characterization, Microfluidic Device Design and Fabrication, Cell-Material Hydrogel Assemblies, Image Analysis, Animal Handling, Human Stem Cell Transplantation, Tracking and Quantifying Stem Cell Transplantation using a Variety of Imaging Scanners.
Statement of Benefit to California (as written by the applicant)	Contribution to stem cell-based modeling ecosystem in California: its offerings will enable access to stem cell-based models in geographic areas of California where access to models is limited. Knowledge Sharing Plan: describe the plans and processes intended to capture and disseminate information about core offerings, sharing stem cell-based models, best practices, knowledge, resources for researcher training and student educational programs, and other resources.
Funds Requested	$5,366,999
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	15
Votes for Tier 1	4
Votes for Tier 2	11
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in

the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 12	• The Institutional Resources for Expanding Stem cell-derived Tissues and Organs for Regenerative Engineering (RESTORE) project is proposed in the central valley of California, in a new and developing university located in a chronically underserved area with a predominantly minority population. This project holds significant value in such a context. • The proposal targets a broad user base and does not specifically aim at stem cell researchers. A significant portion of the requested budget is allocated to cover the costs of imaging and flow cytometry equipment. • The SRL aims to comprehensively support research and educational needs in human stem cell culture, stem cell differentiation, cell and tissue characterization, transplantation, small-animal imaging, and cardiovascular modeling. These vertically integrated procedures allow for experimentation from cell to therapy, which is critically important for this institution. • While the proposed SRL is a combination of a research and educational facility, the description places more emphasis on education. One of the major strengths of the proposal is the potential to obtain a more diverse population of donors for iPSCs. Additionally, the introduction of in vivo and in vitro techniques to assess the function of the cells derived from iPSCs is another notable strength. • Major strengths of the proposal include its wide-ranging applications, which support research in human stem cell culture, stem cell differentiation, cell and tissue characterization, transplantation, small-animal imaging, and cardiovascular modeling. The Stem Cell Transplantation Techniques training offered by the proposed SRL is especially valuable, as very few stem cell cores currently provide this service. However, there are concerns that the general services and users are primarily interested in imaging, with less emphasis on stem cell-based modeling and components. • Letters of support indicate that the facility will be used for both research and education. However, the nine investigators who provided letters offer limited detail regarding their research projects or funding, making it difficult to gain a comprehensive understanding of the true need for all of these facilities. Furthermore, research interests by investigators at other institutions in the region were not provided. • The proposal lacks sufficient justification for the overall interest it aims to serve, resulting in a modest value proposition. While a few individuals, particularly the PIs, stand to benefit significantly, there is no clear evidence that enough investigators will utilize the facility at rates that are sufficient and reasonable. • This is a very ambitious proposal and would benefit from scaling back with reasonable expectations. Focusing on in vitro applications of stem cells might lead to more viable cores.
No: 2	• *none*
GWG Votes	**Is the project well planned and designed?**
Yes: 10	• The applicant plans to offer a diverse range of training options, including comprehensive courses in Human Stem Cell Culture, Flow Cytometry, Histology, Fluorescence Microscopy, and Small Animal Imaging for Stem Cell Tracking. They also offer specialized training in EC Differentiation and CM Differentiation, as well as the fabrication of Microfluidic Chips for generating Cardiovascular Models. This comprehensive approach is particularly valuable for this underserved area, and will fulfill unmet needs.
No: 4	• The goal is to acquire a substantial amount of equipment, but the plan for maintaining and utilizing this equipment is unclear. It's essential to provide information on the number of users this facility will serve. • The project seems a bit overly ambitious as it spans from stem cell culture to in vivo experiments. • The proposed stem cell-based models primarily focus on endothelial and cardiovascular cell differentiation and modeling. However, it appears that most anticipated users require technical support for imaging purposes. Users may mainly benefit from technical training for the imaging instruments rather than the stem cell-based models. • The stem cell core offers a range of services that would be of interest to those conducting both in vitro and in vivo studies. The imaging capability is versatile and can cater to a wide range of needs. The availability of different rooms dedicated to specific activities enables multiple investigators to work simultaneously on various projects. • Notably, there is no information provided about the number of users beyond the Principal Investigators (PIs) and the eight other investigators. This population may be too small to sustain the facility in the long term, especially considering that almost all of the investigators

	are from the same institution.
GWG Votes	**Is the project feasible?**
Yes: 12	• The proposed plan is feasible. Adequate lab space is available, and instruments and training programs can be established based on the experience of the personnel. However, it may be necessary to hire a specialized stem cell biologist for daily management of stem cell-based modeling in the proposed SRL. • The project has an excellent plan for efficient operations, including software tracking, a well-structured management team, and support from institutional resources, such as the Office of Research and Economic Development (ORED). Staff is already in place to initiate the project. • The institution has a centralized management structure for core facilities, which will oversee and manage the operations of the SRL, with the Office of Research and Economic Development (ORED) providing guidance. The leadership team is highly capable and has a successful history of collaborations. • Institutional commitment is evident in terms of providing space, administrative oversight, budgeting, accounting, and shared computing services. Recharge fees will cover 100% of the costs at the end of the funding period, potentially causing access issues. Exploring alternative funding mechanisms, such as NIH or NSF grants or institutional support, should be considered if recharge rates fall short. • The project appears to be overly ambitious, and there is uncertainty about the successful completion of all its components. • The leadership team lacks qualifications in stem cell expertise but possesses extensive experience in administration. • It's not clear if they have access to various radiotracers, which could be crucial for certain aspects of the research. • Having a staff pathologist or at least a histology expert would be valuable for the project's success.
No: 2	• The Shared Resource Laboratory (SRL) aims to develop new iPSC lines as well as cardiac and endothelial cells derived from iPSCs. While these are common cell types used in various research, they represent only a small fraction of the potential cell types that can be obtained. Since differentiation protocols can be carried out in individual labs, the SRL should focus on providing iPSCs and a range of protocols. • The proposed equipment would cover a broad spectrum, from cell culture to animal studies. To be self-sustaining, a sufficient user base is required, but the applicants have not provided enough information to demonstrate that the service facility can maintain itself. Furthermore, the demand for in vivo studies has not been presented. • Although the differentiated cell types (cardiac and endothelial cells) are limited, they are well characterized. The supporting letters did not strongly emphasize the need for these specific cell types, and there has been no effort to poll potential users. • The described plan for the facility is reasonable. One of the Co-PIs will oversee and manage the shared resource laboratory, and they have significant expertise in setting up and running core facilities. • Investigator 1, the overall PI, has been at the institution since 2005 and is trained as a bioengineer. They are actively engaged in critical research and educational efforts at the institution and have substantial experience in stem cell engineering. They have developed protocols for human cardiac cell and endothelial cell differentiation from iPSCs and have led major grants that implemented new resources and programs at the institution. • Investigator 2 researches communication between bone and hematopoietic stem cells on immune cell fate decisions. They have trained over 40 undergraduates, one master's student, and six Ph.D. students, providing valuable expertise in cell and stem cell biology. • Investigator 3 is a professor of Bioengineering developing new applications of biomedical instrumentation. They also established the Bioengineering graduate program and are active in obtaining grants for major equipment. • Investigator 4, in addition to their role in core facilities, has published with Investigator 2. Investigator 5 has expertise in facilities and project management, having worked at several private firms. • There is no discussion of staff requirements for this new core. It is likely that separate staff will be needed for stem cell activities and in vivo imaging. • The project's scope is too broad and may not be sustainable.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 13	• The core facility will support an underserved community. The DEI (Diversity, Equity, and Inclusion) statement and plan are strong. • Yes, the Stem Cell Research Laboratory (SRL) aims to provide access to shared research facilities and equipment to support stem cell biology and regenerative medicine research in

	the California Central Valley. The SRL also proposes to develop its own diverse induced pluripotent stem cell (iPSC) lines. However, the concern is that the plan and budget for generating diverse iPSC lines lack detail. • The plan is to synergize with the institution's core values to promote diversity, equity, and inclusion. The institution's student body is ethnically diverse, with 55% Hispanic, 20% Asian/Pacific Islander, 4.5% African American/Black, less than 1% Native American, 10% White, and 3% Multiracial representation. It is a Hispanic Serving Institution (HSI) and an Asian American Native American Pacific Islander Serving Institution (AANAPSI), and over 73% of students are first-generation college students. Thus, serving their own student body will be crucial. • The researchers are part of interdisciplinary teams and have developed interdisciplinary educational programs during their long history at the institution. Two of the investigators have extensive experience working with the diverse student population and diverse perspectives. • The goal to obtain iPSCs from a diverse group of donors demonstrates how the full breadth of human diversity can be incorporated into research. However, while meritorious, the applicants provide few details about the approach they will use to recruit such cell donors.
No: 1	• Incorporation of DEI into the project is not adequately addressed.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 10	• The course is well designed as a three-week intensive summer Stem Cells Techniques Workshops with lessons supporting stem cell researcher with different needs, especially the training for Stem Cell Transplantation Techniques which currently very few stem cell core provide. • It may be helpful to have some one-day or other introductory courses to introduce stem cell research to a wider audience in order to generate grassroots interest and excitement. These types of courses might help to break down barriers and introduce participants to the language and what is possible in terms of cell culture and experimentation for novice users. • They do offer outreach courses in the local high school via the COMPASS program. • This course is a large commitment and may hamper research facilities during the course.
No: 4	• The course is well designed, but it lacks certain aspects, such as the characterization of human induced pluripotent stem cells (hiPSCs). • The stem cell course is a massive three-week intensive program that aims to cover a wide range of topics. However, it includes too many components, making it challenging to comprehensively address all the necessary aspects. • The curriculum covers standard topics related to stem cell culture and differentiation, cell sorting, and stem cell transplantation. Some fundamental topics, such as growth rates, cell counting, morphological analysis, passaging of cells, and freezing, appear elementary and should be considered background knowledge for individuals with experience in cell culture. Notably, it does not address the critical area of stem cell characterization. • In addition to the core topics, the course offers advanced content, including emerging bioengineering subjects such as microfluidic devices, cell-material hydrogel assemblies, and in vivo imaging of stem cells. • The time commitment is very demanding, with classes running from 8:30 AM to 5:00 PM five days a week for three weeks, which may be more suitable for graduate students. Unfortunately, there is no option to select subunits for individuals with expertise in a specific topical area. • The course description lacks clarity regarding the division between lecture and lab hours per week. Furthermore, it does not discuss karyotyping or other hiPSC characterization methods or spontaneous differentiation of hiPSCs. • The syllabus is missing specific learning objectives; it primarily consists of a list of topics and activities. A suggestion for improvement would be to incorporate course credits and/or provide a certificate upon completion of the three-week course. Additionally, offering a freely accessible online learning experience before the course could benefit both enrolled students and others interested in the subject.

Application #	INFR6.1-15413
Title (as written by the applicant)	Resources for Expanding Stem cell-derived Tissues and Organs for Regenerative Engineering (RESTORE)
Project Objective (as written by the applicant)	The areas of focus for our SRL were chosen based on expertise of cardiovascular stem cell fates, cardiovascular tissue development, and stem cell characterization at our institution, and includes Endothelial Cell and Cardiomyocyte Cell Differentiation, MPM Networks, and Fabrication of Cardiac Tissue.
Summary (as written by the applicant)	This SRL aims to broadly support research and educational needs in human stem cell culture, stem cell differentiation, cell and tissue characterization, transplantation, small-animal imaging, and cardiovascular modeling. The specific stem cell models, chosen based on expertise of the faculty, will focus on using human embryonic stem cells (ESCs) and human induced pluripotent stem cells (iPSCs) to direct cardiovascular stem cell fates and cardiovascular tissue development. The SRL will also generate and offer new human stem cell products: genetically diverse iPSC lines, differentiated vascular progenitor cells (VPCs) and differentiated endothelial cells (ECs). We will also offer a three-week intensive summer Stem Cells Techniques Workshops with lessons in Human Stem Cell Culture, Stem Cell Differentiation, Cell and Tissue Characterization, Microfluidic Device Design and Fabrication, Cell-Material Hydrogel Assemblies, Image Analysis, Animal Handling, Human Stem Cell Transplantation, Tracking and Quantifying Stem Cell Transplantation using a Variety of Imaging Scanners.
Statement of Benefit to California (as written by the applicant)	Contribution to stem cell-based modeling ecosystem in California: its offerings will enable access to stem cell-based models in geographic areas of California where access to models is limited. Knowledge Sharing Plan: describe the plans and processes intended to capture and disseminate information about core offerings, sharing stem cell-based models, best practices, knowledge, resources for researcher training and student educational programs, and other resources.
Funds Requested	$5,366,999
FWG Recommendation	Tier 1: warrants funding
Process Vote	All FWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the FWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 1

Up to 11 members of the FWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	1
Count	8
Votes for Tier 1	8
Votes for Tier 2	0
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the FWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in

the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

FWG Votes	Does the proposed renovation/facilities improvement project support the applicant's proposed SRL core research and educational activities?
Yes: 3 **No:** 0	• This appears to be an appropriate use of a deserving facility. The applicant is re-using current infrastructure in a purpose-built building from 2020. • The proposal was indicative of a well planned and comprehensive assessment of equipment and space requirements to support the proposed programs of their SRL. • This SRL will attract diverse student interest (DEI) and is a good investment.
FWG Votes	**Are the SRL renovations/facility improvements feasible as proposed?**
Yes: 3 **No:** 0	• Given the minor scope of work, the timeline seems reasonable and well thought out. I particularly appreciate the longer commissioning period given the use. • The proposal leverages research space that was constructed only a few years ago and takes advantage of the current technology infrastructure and flexibility of the rooms as constructed. This allows the applicant to create a highly efficient and ideally configured SRL facility. • The proposal includes a good commissioning schedule that integrates important dependencies (i.e., things that must be fully in place before next steps). Need-to-haves are well identified and accounted for. • This is a well thought out plan with detailed drawings and an equipment list. The plan uses a purpose-built building.
FWG Votes	**Does the proposed SRL facility include the appropriate research equipment and laboratory configuration in support of the proposed SRL activities?**
Yes: 3 **No:** 0	• While the architectural plans provided are not Mechanical, Electrical and Plumbing (MEP)-specific, it does appear that the utility connections and equipment placement has been well thought in terms of placement and supply. The notations on the plan provided are well conceived. Page 4 (of 7) on the plans indicates that adequate systems are in place and shows logical additions. • The proposed SRL facility functional areas include the appropriate equipment to efficiently perform the proposed services. The applicant consulted closely with their facilities group to ensure capacity of mechanical, electrical, and plumbed utilities. • The equipment list has a high price tag, but may contain the costs of installation as well as purchase.
FWG Votes	**Are the renovation/facility improvement costs appropriate?**
Yes: 3 **No:** 0	• The cost for "construction" of the fume hood and lab sink appears to include the purchase of these items as well (equipment plus installation). A breakout of equipment and installation costs would be clearer. • The renovation costs are well within the range of costs for similar projects and included appropriate contingency allowances for unforeseen changes in design requirements. • The applicant's budget was comprehensive and indicative of preparation by experienced facilities and project delivery personnel. • The project seems economical.
FWG Votes	**Does the applicant ensure diversity, equity and inclusion goals for design and construction?**
Yes: 3 **No:** 0	• Yes, this proposal represents another success for this institution's DEI policy and well-established methodology. • The applicant provides detailed information about their institutional policies and processes for meeting DEI goals within design and construction projects. • The applicant states that they are following the guidelines established by their institution. • The scope of the outreach appears reasonable and within institutional guidelines. • The location of this campus in Central Valley supports outreach to diverse communities.

Application #	INFR6.1-15478
Title (as written by the applicant)	The Live Cell Biotechnology Discovery Lab
Project Objective (as written by the applicant)	We aim to bring stem cell-derived neuronal models to underserved classrooms by taking advantage of cloud-enabled microscopes, electrophysiology and fluidics devices. These cloud technologies will allow students anywhere in the state to access, monitor and manipulate experiments in real time.
Summary (as written by the applicant)	We will build and establish a Shared Resources Laboratory (SRL) that will use novel cloud-enabled technologies to facilitate project-based educational curricula for stem cell and neuroscience training in schools without access to stem cell facilities. Throughout the state of California, there is a great disparity in access to stem cell facilities for education and research. Compared to coastal CA educational centers, regions with Latinx-majority populations, such as the Central Valley and the Salinas Valley, have few programs to effectively introduce students to stem cell modeling and techniques. This reality translates into an underrepresentation of racial minorities in the stem cell workforce. Building new resources for stem cell education faces at least 3 important barriers: 1) High infrastructural and equipment costs, 2) Specialized training for teachers and mentors, and 3) Potential exposure to hazardous materials, including viruses, human cell lines and other biosafety-level 2 materials. It is therefore difficult to build stem cell teaching capacity at every location. Cloud technologies have the potential to eliminate these disparities by enabling real-time stem cell-based experiments through remote monitoring and manipulation of a centrally located core of stem cell incubators. Moreover, the use of cloud technologies is economically scalable as hundreds, or even thousands of users could access the experiments simultaneously. We will take advantage of cloud-connected in-incubator technologies, such as microscopes, electrophysiology and fluidics devices in order to enable remotely-controlled live experiments of pluripotent stem cell-derived 2D and 3D neuronal models. We will work with faculty and students at community colleges, small 4-year universities and high schools to generate community-driven projects that will be used to transmit complex concepts in stem cell topics, such as neuronal differentiation, characterization of complex phenotypes, and drug screenings. In addition, we will create a publicly available repository of education materials, including raw and processed data, educational slides and worksheets, that can be used by additional educators, students or self-learners. Our SRL will host frequent training sessions for instructors and students, as well as community sessions that bring together members of academia, patient advocates and the general public in order to generate new educational modules. Altogether, our SRL will enable underserved communities to receive state of the art training and education in stem cell biology, while integrating the voices, concerns and aspirations of the California community.
Statement of Benefit to California (as written by the applicant)	Currently there is a large disparity in access to stem cell technology throughout the state. The establishment of this shared laboratory core will enable live experiments for education and training in stem cell and neuroscience to undergraduate students in schools who otherwise would not have access to this technology. This in return will generate a more diverse workforce of highly trained individuals dedicated to stem cell research and treatments.
Funds Requested	$5,399,996
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	3
Count	15
Votes for Tier 1	0
Votes for Tier 2	12
Votes for Tier 3	3

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 10	• The applicant proposes to create a unique lab in which students perform live experiments through the use of instrumentation controlled via the cloud. Since students do not need to be on site, the lab can be used by students anywhere. • The applicant does an excellent job detailing how the proposed core will contribute to the SRL Network and increase access to stem cell learning in under-represented regions across California. This will be achieved through the creation of educational materials and modules, the sharing of new technology and the incorporation of new schools as the project period progresses. • The plan to include community based feedback in developing new educational resources is also key. This will increase students' interest and allow individual communities to help tailor the core's services to issues affecting them. • The investigators have already garnered a large amount of interest from communities in California with a high percentage of Latinx and other underserved students. • The outcome criteria proposed cover all aspects of the core and its services and will adequately measure impact. • The cloud-based work is very interesting and will certainly help access. The applications and the educational benefits have the potential to be very strong. • By using cloud-based technology to provide research experience, this project has the potential to engage any student, anywhere in stem cell research. • The proposal adds value in view of the service area. However, overall coordination of the program within the institution is not adequately described. • How the project goals will be accomplished is not fully described. Many details are lacking.
No: 4	• Recharge is an issue. Relying on small community colleges and high schools to pay $1,200/month does not seem feasible. • Generated revenue from YouTube and Google video views may not be reliable. • The applicant states that 25 students are in the class per year. There is no clear plan to fund this course after CIRM funding ends.
GWG Votes	**Is the project well planned and designed?**
Yes: 4	• This is a well-constructed program. It is well thought-out with a strong diversity plan. The sustainability plan could be improved. The data sharing plan needs revision.
No: 10	• The proposed SRL core is well-suited to offer creation of new in vitro stem cell models for neuronal differentiation and utilization of these models for remote project-based education for both students and educators. • The proposed SRL will have access to an hPSC collection that have been genetically modified to contain the 250 most important mutations in neuropsychiatric disorders. • The investigators have both a proven track record in stem cell biology and access to additional resources in the neuronal differentiation area. • The proposed Cloud-based research experience and (year-long) hands-on stem cell biology laboratories are well planned, with a strong syllabus for the hands-on lab.

	• There are concerns around the cloud-based offerings for community colleges and high schools. The application did not clearly detail who would be the local leads class for these students. If high school teachers will lead the classes, there is additional concern that those teachers will need a lot of prior education before they could make the best use of the cloud-based lab. • The applicant needs to develop a comprehensive plan for training high school teachers to effectively deliver the proposed Stem Cell Research Learning (SRL) program. This should include details on the curriculum, resources, and support mechanisms to ensure successful teacher training. • The proposal notes that the applicant has been successful in training faculty (in person) to incorporate remote aspects to their teaching. This is not necessarily transferable to high schools. • The plan for community college students to receive credit for the SRL course is unclear. Will the community college students pay additional tuition fees to participate in the program? • Based on the current application the university participants and community college participants will have disparate outcomes - jobs for the university participants but mentorship roles for community college participants. Is this accurate? If so, an equitable plan should be developed. • The proposal does not do a good job of describing how all the parts of the project will work together. This lack of clarity makes it challenging to evaluate the potential of the project to succeed. For example, the location of the proposed activities on the host campus and the relationships among related efforts (the new neuroscience facility, the Genome Center, and the Stem Cell Institute) are not described. • Will the educational experience be modified for different audiences (i.e., high school versus college students)?
GWG Votes	**Is the project feasible?**
Yes: 8	• The program is feasible. • Users will be trained in cloud-enabled technologies for the long-term culture of 2D and 3D stem cell-derived models. • The proposal appears to be scalable to the number of users since it is cloud-based.
No: 6	• The previously demonstrated ability to use cloud based systems to control live stem cell experiments from any geographical location is the strongest advantage of this application. As there are no geographical limitations, any student in the state has the potential to benefit. By targeting a few small universities and community colleges, the investigators will be able to build a core group of teachers that will in turn facilitate knowledge transfer. • The plans to include community based feedback in developing new educational resources is also key. This allows individual communities to help tailor the education to issues effecting their community and increase the interest of the students and benefit the people around them. • There was some concern on how the SRL could sustain itself. Relying on social media partnering and high schools and community colleges to contribute substantial money in return for custom course content seemed risky. • The PD is very qualified and has the strong support and commitment of the institution, which has an excellent track record in supporting similar commitments to extending their educational outreach. • Recharge rates are not likely to cover costs in the long run. • Strength: The PIs have successfully completed pilot projects, showing that proposed cloud-based research experiences are viable and effective. As a result, it is likely that the proposed research experiences will be similarly successful. • Weakness: The plan to include community college and other students in the cloud-based research experiences is notable. However, the project's plan to do so is significantly flawed (and/or incompletely described.) Along these lines, the sustainability plan is highly unlikely to succeed.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 14	• The proposal is likely to increase the participation of diverse and/or underserved populations in multiple ways - by using the cloud based experimental system to reach students in targeted geographic areas, by creating educational materials in English and Spanish, and by targeting community issues. • The team has a good track record of promoting DEI by providing educational opportunities to underserved communities and by devoting research to help underserved populations. The PD in particular has been very active in promoting STEM education in Latin America. • This is a clear focus on benefiting underserved populations. However, the proposal is unclear how they will reach this population.

	• Cell lines of different sexes and different genetic backgrounds will be used. • The proposal emphasizes inclusivity throughout. A major strength of the proposal is the plan for an annual meeting with community stakeholders to probe interests and needs relevant to stem cell research. • However, the plans do not currently serve community college students equitably, calling into question the expertise of the PI and senior personnel in upholding inclusivity in action.
No: 0	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 5	• The goal to provide a year-long experience for students is a notable strength. The syllabus for this series of courses is well structured. • The project doesn't "complete the loop" in training. After completion of the course, there should be attempts to connect interested students to mentored research experiences. • Faculty from the partnering community colleges and high schools should be more integrated into the leadership of the project. Planning for the research experience needs to include the targets of the experience.
No: 9	• The inclusion of a 3-quarter course that includes both lecture time and lab time will help educate future researchers. • They propose an in-depth course that is adapted to location, well-detailed and organised. However, there is no clear plan to implement the courses. This a major problem. • There is no description of how community college students will be selected. There is no description of how community college students will be linked to students at the host institution. • The applicant notes that the course will be “embedded” into the institution and community college curricula so no one pays extra (students will pay normal tuition). The host institution can make this choice for its own students (they note this course will meet both lab and disciplinary communication degree requirements), but there does not appear to be an agreement with any community colleges to proceed in this way. • The PD is working with admissions to better link the host institution with the participating community college students, potentially for future transfer. It would be helpful to know the progress of this potential arrangement.

Application #	INFR6.1-15478
Title (as written by the applicant)	The Live Cell Biotechnology Discovery Lab
Project Objective (as written by the applicant)	We aim to bring stem cell-derived neuronal models to underserved classrooms by taking advantage of cloud-enabled microscopes, electrophysiology and fluidics devices. These cloud technologies will allow students anywhere in the state to access, monitor and manipulate experiments in real time.
Summary (as written by the applicant)	We will build and establish a Shared Resources Laboratory (SRL) that will use novel cloud-enabled technologies to facilitate project-based educational curricula for stem cell and neuroscience training in schools without access to stem cell facilities. Throughout the state of California, there is a great disparity in access to stem cell facilities for education and research. Compared to coastal CA educational centers, regions with Latinx-majority populations, such as the Central Valley and the Salinas Valley, have few programs to effectively introduce students to stem cell modeling and techniques. This reality translates into an underrepresentation of racial minorities in the stem cell workforce. Building new resources for stem cell education faces at least 3 important barriers: 1) High infrastructural and equipment costs, 2) Specialized training for teachers and mentors, and 3) Potential exposure to hazardous materials, including viruses, human cell lines and other biosafety-level 2 materials. It is therefore difficult to build stem cell teaching capacity at every location. Cloud technologies have the potential to eliminate these disparities by enabling real-time stem cell-based experiments through remote monitoring and manipulation of a centrally located core of stem cell incubators. Moreover, the use of cloud technologies is economically scalable as hundreds, or even thousands of users could access the experiments simultaneously. We will take advantage of cloud-connected in-incubator technologies, such as microscopes, electrophysiology and fluidics devices in order to enable remotely-controlled live experiments of pluripotent stem cell-derived 2D and 3D neuronal models. We will work with faculty and students at community colleges, small 4-year universities and high schools to generate community-driven projects that will be used to transmit complex concepts in stem cell topics, such as neuronal differentiation, characterization of complex phenotypes, and drug screenings. In addition, we will create a publicly available repository of education materials, including raw and processed data, educational slides and worksheets, that can be used by additional educators, students or self-learners. Our SRL will host frequent training sessions for instructors and students, as well as community sessions that bring together members of academia, patient advocates and the general public in order to generate new educational modules. Altogether, our SRL will enable underserved communities to receive state of the art training and education in stem cell biology, while integrating the voices, concerns and aspirations of the California community.
Statement of Benefit to California (as written by the applicant)	Currently there is a large disparity in access to stem cell technology throughout the state. The establishment of this shared laboratory core will enable live experiments for education and training in stem cell and neuroscience to undergraduate students in schools who otherwise would not have access to this technology. This in return will generate a more diverse workforce of highly trained individuals dedicated to stem cell research and treatments.
Funds Requested	$5,399,996
FWG Recommendation	Tier 1: warrants funding
Process Vote	All FWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the FWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 1

Up to 11 members of the FWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	9
Votes for Tier 1	5
Votes for Tier 2	4
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the FWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

FWG Votes	Does the proposed renovation/facilities improvement project support the applicant's proposed SRL core research and educational activities?
Yes: 3 **No:** 1	• Yes. Plans for the re-purposing of the 5500 SF appears to be a good utilization of underutilized campus space. • 5500 SF of space is dedicated to project. Applicant has prior CIRM grants. • Potentially yes, but the current lack of building infrastructure is concerning without much more detailed mechanical/electrical/plumbing (MEP) information and how to address it. The facility is currently in "warm shell" condition with only power supplied as a resource. No specific information on air handling, waste management, backup power, loading/unloading is provided - all of which will be necessary components.
FWG Votes	**Are the SRL renovations/facility improvements feasible as proposed?**
Yes: 4 **No:** 0	• The plans appeared to be well thought out to optimize the existing space and break it into multiple lab spaces. • Somewhat, the plans and location are detailed well, but little information about the building MEP and substructure is provided, nor additional/adjoining uses. While noted renovations have occurred in the building, it's age and therefore useful life is concerning. • Construction cost estimates not complete, especially in mechanical, electrical, etc. areas. As-built drawings not available. • Insufficient clarity.
FWG Votes	**Does the proposed SRL facility include the appropriate research equipment and laboratory configuration in support of the proposed SRL activities?**
Yes: 3 **No:** 1	• Yes, there appears to be a comprehensive plan in regard to research equipment and configuration. • Missing are as-built drawings to better inform new construction/renovation. Also missing are plans for MEP component. • Not addressed in this proposal, this is one of the major concerns that hopefully can be easily addressed.
FWG Votes	**Are the renovation/facility improvement costs appropriate?**
Yes: 3 **No:** 1	• Yes. The costs appear to be appropriate however there was not any backup from a general contractor to validate the costs provided. • Needs a more detailed break out of cost of MEP and other items. • No. Other than ROM pricing for phasing the design/build, price breakdown is not provided nor explained. The institutional bid processes require a three-bid process at minimum, so hopefully that it is implemented here per SOP. • Insufficient clarity.
FWG Votes	**Does the applicant ensure diversity, equity and inclusion goals for design and construction?**
Yes: 4 **No:** 0	• The applicant provided detailed information about the institutional policies and processes for ensuring DEI goals for design and construction services. • Laudable goal of 25% funds going to small, minority, and disabled veteran businesses. • Yes, DEI standards for the institution are established and enumerated well.

	• The DEI narrative seemed comprehensive in achieving its stated goals.

Application #	INFR6.1-15517
Title (as written by the applicant)	A CIRM Shared Resource Facility for Modeling
Project Objective (as written by the applicant)	This CIRM-funded Shared Resources Lab is in a rural, geographically isolated and medically underserved county of California. By partnering with major medical research institutions with existing SRL laboratories it will provide access to state of the art research and training opportunities.
Summary (as written by the applicant)	This Shared Resource Laboratory for Human Stem Cell-Based Modeling (SRL-hSC) will offer education, training and access to stem cell-based techniques and models of human disease in one of the most remote, medically underserved regions of the state. The project goals are to 1.) diversify the cohort of stem cell researchers in the state; 2.) accelerate discoveries in regenerative medicine; 3.) support reproducibility of stem cell-based modeling experiments within and across laboratories; and 4.) increase awareness and access to cellular based therapies to the diverse rural communities of our region. It will achieve these goals by providing: • Hands-on training in the routine subculture and characterization of human pluripotent cell lines and the creation and use of stem cell-based models • Cell culture facilities to conduct stem cell-based modeling experiments • Facilities for researchers interested in reproducing experiments performed in their home laboratories • Professional development opportunities for clinicians interested in addressing health inequities by creating access to cellular based therapies and clinical trials • Educational workshops for local high school and college students interested in understanding the applications of stem cell biology and career opportunities. • High-cost and highly specialized technologies needed for stem cell-based modeling • Well characterized, unmodified and modified hPSC collections, locally and by shipment • Partially or fully differentiated stem cell-based models, locally and by shipment As part of the statewide CIRM network, it will also contribute to the advancement of standards and reproducibility of stem cell-based models.
Statement of Benefit to California (as written by the applicant)	The facility will support educational programs designed to increase the regenerative medicine workforce, provide an advanced cellular techniques course to investigators throughout the state, and bring education and awareness about the power of regenerative medicine and the potential of cellular therapies to meet unmet medical needs to community members, 8-12th grade student in the public schools, physicians, and clinical researchers.
Funds Requested	$5,398,227
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	2
Count	15
Votes for Tier 1	0
Votes for Tier 2	15
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 10	• The program's location fits the call of this funding opportunity and will provide added value to the local population. • There is enthusiasm for the location and community served. • The major benefit is better serving a region for which there is limited stem cell research. • This project is situated in an underserved area of California. It has the potential to broaden participation in stem cell research. • A large number of classes already present will be expanded as a result of the SRL. • The institution's capital campaign, which is ahead of schedule, will add the proposed core to its ask from donors. • Feedback from the donor community contributing to the institution's capital campaign is stated to be positive. • The institution serves a unique population who has limited access to stem cell research activities. The offering will extend already existing training opportunities and will provide hands-on instructions. • A strong point is the interest from key supporters, including a local Medical Society President and a Clinical Laboratory Manager from the United Indian Health Services, to offer this stem cell training to local clinicians, clinical laboratory specialists, and local physician residents. However, defining the needs of these potential users in more detail would have strengthened the application. • The target populations for use and training are not clear. Are these students, undergraduates, or clinicians?
No: 4	• If the application was more focused on the educational component it would be very strong.
GWG Votes	**Is the project well planned and designed?**
Yes: 3	• The project will result in creating a 2000 square foot stem cell resource lab with capacity for advanced stem cell-based techniques. This effort is well connected to the institution's existing CIRM Bridges program. • It is concerning that the proposal lacks many important details. What is the projected use of the new SRL? How many students will it serve? What kinds of students (high school, college, residents)? What is the schedule of offerings? Who will use the facility for research? When will research use start?
No: 11	• The project is focusing on very complex models. There is a gap between the complexity of the biology that will be offered and the population that it is supposed to serve. • The planned stem cell offerings are very complicated. • The proposal is overly ambitious and would be more successful if it focused on ensuring access to basic stem cell resources. • It is suggested that the applicants consider a more basic use of stem cells for the core. • It is not clear how the space will be used, but the large amount of space allotted is a strength. • The offerings are focused on highly specialized themes with nine users being identified from two other named institutions. It should have been highlighted whether the offerings are or are not not already accessible at the home institutions of the identified users. • It appears that very little stem-cell research is being conducted on campus, suggesting that research users would be from other institutions. Will they work only in the summer? It was challenging to find firm commitments from active stem cell researchers to use the space, making it difficult to evaluate the value of the facility for kick-starting research projects. • It is not clear whether the target population is specialized researchers or students who need basic stem cell training.

	• How the participants will pay for the course is not well described. In similar educational efforts, the participants' costs are fully covered and they receive a stipend, as well as materials to use in their own courses. Such a situation is not described in this proposal. It may not be possible for the targeted population to pay for a summer course, room and board, etc. for the (up to 5 weeks) they spend developing their course materials. ○ Suggestion: A modification of the workshop would be to have faculty teams (2 – 3 people) attend, thus reinforcing the likelihood of impact at the participants' school or laboratory. There are numerous successful models on which the proposal could draw, including that of the Scientific Teaching workshops initially supported by the HHMI. • "Giving access to well characterized, unmodified and modified hPSC collections, locally and by shipment as well as partially or fully differentiated stem cell-based models, locally and by shipment" does not require a core.
GWG Votes	**Is the project feasible?**
Yes: 3	• The leadership team is experienced and the institution is appropriately supportive. It is likely that the project can be accomplished as described. • The sustainability plan is insufficient. It does not create confidence in the potential for the SRL to be supported after CIRM funding is concluded. They appear to expect that future tuition and lab fees will be a major source of funding. There is a notion that facility use charges can pay for running the SRL, but you need a large base of active researchers to make that idea work, and it's a challenge even at very well-funded research universities. It will be an even bigger challenge at an institution that is just building its research program and external funding.
No: 11	• The availability and track record of the leadership are questionable. • The complexity of the scientific objectives seems difficult to achieve. • While the educational aspects are great, it is concerning that the leads will need to be trained themselves in research techniques proposed to be offered and and it's not clear the leads will have the bandwidth to do everything required. Additionally, they still need to identify key technical staff. • It is not clear if the PI has enough time to run the project. • The PI may be overcommitted. • It may be hard to recruit the experts to come in to help teach the course. • Appropriate staff have not been identified. • Feasibility is not clear at this stage. Three researchers (only one from the host institution) pledged to share stem cell resources but it is not clear what will be done with these tools. • The applicants state that "new models" will be added, but it is not clear what this means.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 12	• This proposal will support an under resourced area and bring important value to the local community. • The stem cells used will represent rare diseases. • This proposal would serve a very under-resourced and diverse area. • The PI states they will "provide stem cells with ancestral and sex diversity in three ways." They then state the three ways, none of which appear to ensure that they come from diverse populations. • In respect to outreach, yes; in respect to offerings of stem cells, no.
No: 2	• The proposal relies on its location to achieve its goals of inclusivity. It does not provide a comprehensive description of its DEI goals or expected outcomes. It also misses the opportunity to engage leaders in diverse communities in planning the SRL and stem cell biology courses - those communities instead appear to be targets of outreach.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 5	• The course seems appropriate. • It is doubtful that the Advanced Stem Cell courses will support themselves via fees (maybe locally but not throughout the state). • The courses will teach core techniques.
No: 8	• This should be a strength of the program and so it would be beneficial to see more detail on the course syllabus. • Course selection and overall goals are not clear. The target population is not well defined: are the courses targeting clinical participants to provide "kick-start" to projects, or students to extend courses (which are already covered by BRIDGES)? • The curriculum is not very specific, and instructors need to be recruited. • The syllabus for the Stem Cell Techniques course is a generic list of topics. Learning objectives and assessments are not included. It is unclear what students who complete the

	course will know or be able to do upon completion. • The proposal misses the opportunity to create classroom-based research experiences and online learning resources. These components would enhance the potential impact of the project. • The proposed course will not be sufficient to enable students to gain skills. They will be exposed to the techniques and equipment, but not carry out a mentored, sustained experience. There seems to be hopes that the course will launch the institution's faculty into stem cell research, but additional thought would be needed to help make this possibility more likely.

Application #	INFR6.1-15517
Title (as written by the applicant)	A CIRM Shared Resource Facility for Modeling
Project Objective (as written by the applicant)	This CIRM-funded Shared Resources Lab is in a rural, geographically isolated and medically underserved county of California. By partnering with major medical research institutions with existing SRL laboratories it will provide access to state of the art research and training opportunities.
Summary (as written by the applicant)	This Shared Resource Laboratory for Human Stem Cell-Based Modeling (SRL-hSC) will offer education, training and access to stem cell-based techniques and models of human disease in one of the most remote, medically underserved regions of the state. The project goals are to 1.) diversify the cohort of stem cell researchers in the state; 2.) accelerating discoveries in regenerative medicine; 3.) support reproducibility of stem cell-based modeling experiments within and across laboratories; and 4.) increase awareness and access to cellular based therapies to the diverse rural communities of our region. It will achieve these goals by providing: - Hands-on training in the routine subculture and characterization of human pluripotent cell lines and the creation and use of stem cell-based models - Cell culture facilities to conduct stem cell-based modeling experiments - Facilities for researchers interested in reproducing experiments performed in their home laboratories - Professional development opportunities for clinicians interested in addressing health inequities by creating access to cellular based therapies and clinical trials - Educational workshops for local high school and college students interested in understanding the applications of stem cell biology and career opportunities. - High-cost and highly specialized technologies needed for stem cell-based modeling - Well characterized, unmodified and modified hPSC collections, locally and by shipment - Partially or fully differentiated stem cell-based models, locally and by shipment As part of the statewide CIRM network, it will also contribute to the advancement of standards and reproducibility of stem cell-based models.
Statement of Benefit to California (as written by the applicant)	The facility will support educational programs designed to increase the regenerative medicine workforce, provide an advanced cellular techniques course to investigators throughout the state, and bring education and awareness about the power of regenerative medicine and the potential of cellular therapies to meet unmet medical needs to community members, 8-12 student in the public schools, physicians and clinical researchers.
Funds Requested	$5,398,227
FWG Recommendation	Tier 1: warrants funding
Process Vote	All FWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the FWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 1

Up to 11 members of the FWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	10
Votes for Tier 1	9
Votes for Tier 2	1
Votes for Tier 3	0

- A score of “1” means that the application has exceptional merit and warrants funding.
- A score of “2” means that the application needs improvement and does not warrant funding but, at the applicant’s option, may be resubmitted to address areas for improvement if the Application Review

Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.

- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the FWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

FWG Votes	Does the proposed renovation/facilities improvement project support the applicant's proposed SRL core research and educational activities?
Yes: 3 **No:** 1	• The general descriptions and illustrations provided as part of this application do adequately depict the appropriate functions and resources that would be required to support the SRL as described in the program overview narrative. • It is part of a larger project, but yes, the scope of this grant is defined in the narratives. • Yes. The primary focus is related to educational programs and development of students and others to advance stem cell knowledge and techniques. • There are too many unknowns on the current status of the building, its capacity and infrastructure, and the longevity of the systems in place.
FWG Votes	**Are the SRL renovations/facility improvements feasible as proposed?**
Yes: 3 **No:** 1	• The original application, in addition to the supplemental information and responses provided by the applicant in response to preliminary review questions, fully demonstrates that the applicant and their facilities group did a comprehensive assessment of the surrounding uses and building conditions. • Yes. The overall facility improvements are feasible. There appear to be some unknowns around modifications related to developing positive pressure that need to be worked out but that should be able to be accommodated. • It seems so; the design team is practiced at this site. Given the information provided, the scope of construction appears feasible. However, there are concerns about aspects of the required work that were not addressed and thus not solved for to our knowledge. • Given that this project is part of a larger and somewhat unrelated innovation, it may be outside the control of the applicant group to insure completion within 18 months. • In looking at the plans, it appears that there might be challenges with adhering to ADA regulations or even function as it relates to the Cleanroom Entry and Cell Banking lab space.
FWG Votes	**Does the proposed SRL facility include the appropriate research equipment and laboratory configuration in support of the proposed SRL activities?**
Yes: 3 **No:** 1	• The proposal demonstrated the applicant's attention to detail and knowledge of the specific equipment required, appropriate placement of equipment, and appropriate physical and mechanical • There is separation to reduce the potential, or even prevent, cross contamination while supporting the active research of other investigators using the SRL. • Yes. The scope of the activities are relatively modest related to educational component. The fluorescence microscopy and cell culture work are enabled with the lab modifications. • Based on the drawings it does appear to include appropriate equipment, but there isn't sufficient room in the preliminary plans for researchers to get around in the space. • Unclear, based on the information in this submission. It appears to be part of a much larger project, which certainly could address the equipment concerns.
FWG Votes	**Are the renovation/facility improvement costs appropriate?**
Yes: 4 **No:** 0	• While the segmentation from the larger project is hard to understand at this stage, the overall number and timeline appear reasonable. • Although the budget was indicated as a lump sum amount, preventing the assessment on division by division basis, the total budget amount is within the range anticipated for a project of similar scope and size. • The overall cost is in alignment with what is expected, and a reasonable contingency is included. It is unclear how much of the soft costs will be born out of the larger project. • Yes. From the information provided the costs appear to be in line with the note that there are still some unknowns. • There is no breakdown of costs by construction specialty.
FWG Votes	**Does the applicant ensure diversity, equity and inclusion goals for design and construction?**

Yes: 4 **No:** 0	• The host institution's system has good policy on this front, this project is no different. • The applicant did a great job of explaining their policy and procedures related to DEI for contracting services with design and construction firms as mandated by the institution's system. • Based on their location, the applicants believe they will need to utilized small business/minority businesses and have not identified specific criteria.

Application #	INFR6.2-15383
Title (as written by the applicant)	A modular automation approach to stem cell modeling to increase throughput, reproducibility and access
Project Objective (as written by the applicant)	This project enhances stem cell access, scalability, and collaboration. It offers characterized hPSC lines, CRISPR editing, and differentiation on automated platforms accelerating progress in biology, disease research, and regenerative medicine.
Summary (as written by the applicant)	The proposed SRL aims to enhance access to stem cell-based models by providing well-characterized human pluripotent stem cell (hPSC) lines and CRISPR-based genome-editing services. The project focuses on addressing challenges in access, robustness, and throughput for hPSC models, collaborating with experts across California. Key Goals and Objectives: 1) Access to Well-Characterized hPSC Lines: We will offer researchers access to diverse hPSC lines, including human embryonic stem cells (hESCs) and human induced pluripotent stem cells (hiPSCs). This includes lines from various genetic backgrounds to improve the robustness and reliability of studies. This project aims to provide a repository of well-characterized hPSC lines, overcoming challenges like genetic and epigenetic abnormalities. 2) CRISPR-Based Genome Editing Services: To overcome limitations in available modified hPSC lines, we will provide CRISPR-based genome-editing services. CRISPR-based editing will enable precise modification of genomic sequences for robust research. These services will come with rigorous quality control measures to ensure accuracy and reproducibility. 3) 2D Differentiation Models: Addressing the challenge of scalability and comparability in hPSC-based modeling, we will support multiple 2D differentiation models. This includes creating skeletal muscle and excitatory neurons from hPSCs. These models hold promise in studying muscle diseases and neurodevelopmental disorders. Automation will optimize differentiation protocols and enhance reproducibility. 4) Automation and Throughput: hPSC-based research faces significant time and labor constraints. To address this, we aim to implement automation in hPSC maintenance, differentiation, and genome engineering using robotic liquid handling and imaging. Automation will significantly increase throughput and accelerate research progress. 5) Collaborations and Training: We will collaborate with leading experts and offer training to researchers at various levels. Our objectives are to facilitate access to stem cell-based models, overcome challenges in robustness and scalability, and promote collaboration and training. By providing well-characterized hPSC lines, CRISPR-based editing services, and automated differentiation, we aim to accelerate progress in basic biology, disease studies, and regenerative medicine.
Statement of Benefit to California (as written by the applicant)	The project benefits California by advancing regenerative medicine through diverse hPSC lines, potentially leading to novel treatments and addressing health disparities. It offers educational opportunities in stem cell research and genetics, promising improved health outcomes and economic opportunities for Californian citizens.
Funds Requested	$3,999,999
GWG Recommendation	Tier 1: warrants funding
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 1

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	1
Count	15
Votes for Tier 1	15
Votes for Tier 2	0
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 15	• The applicants propose a center for disease modeling that will provide well-characterized stem cell lines from diverse genetic backgrounds, generation of high quality genome-modified stem cell lines, and differentiated muscle and neural stem cell-based models. This is a very comprehensive program. The automation aspect is definitely novel. • Automation will facilitate the SRL's stem cell services including maintenance, genetic modification and differentiation of hPSCs. The automation will dramatically increase throughput and reproducibility. • This proposal will no doubt address the needs of CA researchers for access to these models. In my opinion, this will also expand the user base and attract researchers that are currently not using stem cell-based models. • The applicants will also establish several well-characterized hPSC lines representing diverse genetic backgrounds, and make these available to California researchers. Such a collection is not yet readily available. • The applicant presents a comprehensive and realistic plan to run a SRL. All five areas (see below) that will be covered are supported by thoughtful descriptions and expertise. • Access to well-characterized hPSC lines; 2. Genome editing services; 3. Differentiation models; 4. Automation for enhanced throughput and robustness; 5. Collaboration, training and formal course work. • Yes, the proposed stem cell-based models, services, specialized technologies, and educational offerings appear to address critical needs of California researchers and educators. The center's objectives include providing access to well-characterized human pluripotent stem cell (hPSC) lines, offering genome editing services, supporting differentiation models, and providing automation and training opportunities. • These services cater to researchers and educators in the field of stem cell research, which is likely to be of significant value, especially in areas where access to such resources may be limited. • Their success criteria include automation of stem cell culture and CRISPR gene editing and stem cell differentiation, and achieve the accurate assessment of client demands. These outcome criteria are adequate to measure the impact of their SRL core and services. • The proposed Knowledge Sharing Plan and PD commitment demonstrate a comprehensive and thoughtful approach to knowledge sharing within the SRL Network. They are likely to advance the network's success by promoting effective sharing of knowledge, supporting education, and facilitating the dissemination of resources across the state. • This approach aligns with the network's objectives and promotes collaboration and transparency, which are essential for achieving success in the field of stem cell research. • The proposal is well written and the services matches well with the applicant team's expertise. This will add value.
No: 0	• *none*
GWG Votes	**Is the project well planned and designed?**

Yes: 15	• The plan is clear and comprehensive. The proposal is very well written and the timeline is realistic. The number of potential users is impressive. • The anticipated user base includes 71 laboratories from 14 institutions based on letters of support. Most users expressed interest for generating gene modified hPSCs as well as differentiation of muscle and neural lineages. • The stem cell community will benefit from using this SRL core to generate more gene edited stem cell models for a variety of diseases. • The core's offerings properly reflect the scientific needs of the anticipated users based on solicitations from potential users. • The automation is a key part of the core and is critically needed to continue to move the field forward. This will help to drive down costs. • The design will be effective in implementing automation into the workflow of the core and ensure effective operations. • The program also proposes training and automation equipment access to clients. These appear to be major needs of the anticipated users. This module is well designed because the core will work with each client to establish efficient workflow for their protocols so that they can drive their own project using equipment in the core facility. The will enhance client driven stem-cell based modeling. • For automation training, they plan to have a class size of 8 participants, which is appropriate. • The SRL team is strong. Their team consists of highly accomplished investigators and experts that bring complementary expertise in areas needed for successfully achieving the goals of the SRL with leadership from the PD. • Overall, yes, though there is some outdated technology in the proposal.
No: 0	• *none*
GWG Votes	**Is the project feasible?**
Yes: 15	• All the expertise seems available to support the project. There is no doubt that the applicant can deliver this core facility. • This project is feasible and the timeline proposed is reasonable. • Yes. The institution has the track record, commitment and co-funding to support this SRL core. • Yes, the leadership team is strong and consists of experts in stem cell research. They are qualified to execute this project. • This was an easy to follow application from an excellent team with all the necessary expertise. • Overall, yes, though (i) the proposed targets for throughput seem unrealistic, and (ii) space may be limiting. • There is no doubt that automation will increase efficiency. However, the increase from 100 editing projects per year to 1000 may be a bit too ambitious. • The proposed project is feasible and should be implemented with the proposed timeline because iPSC generation, iPSC gene editing (KO) and differentiation can be done by the team. The only concern is the knock-in (KI) of stem cells. • For now, the efficiency for gene KI in stem cells can be very low. It is unclear how this team can achieve this goal when they have multiple KI tasks requested from the clients.
No: 0	• *none*
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 15	• The proposed SRL offerings are designed to support researchers and educators with diverse goals, approaches, perspectives, and backgrounds. They mention specific efforts to encourage applications from researchers typically underrepresented in stem cell sciences. • The center aims to remove roadblocks to adoption of stem cell models and increase access to a wide group of researchers, suggesting inclusivity and support for diverse backgrounds and perspectives. • The proposed SRL intends to offer stem cell lines with ancestral and sex diversity. These stem cell lines are sourced from a genetically diverse collection, including individuals representing various diseases and healthy controls from different ethnic backgrounds, including African American, Hispanic, Asian, and European ancestries. • The proposed training and educational offerings are likely to increase participation by diverse and underserved populations in California. They highlight various programs that involve individuals from a wide range of socioeconomic backgrounds and underrepresented minorities. • The proposal also mentions a hybrid course format that can reach a diverse audience by eliminating the cost of travel for underserved populations. These efforts are designed to

	enable success and retention in the stem cell and gene therapy fields. • The applicant mentions that a significant portion of the team are individuals who are the first in their family to graduate from college. • Their institutional DEI resources include numerous activities aimed at bringing diverse and inclusive perspectives and experiences to the project. • The applicants demonstrate a strong commitment to promote and to support diversity. The DEI section is convincing. • Realistic goals and ongoing efforts show commitment to DEI.
No: 0	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 15	• The training course is well designed. It is quite focused on automation - with a general introduction to stem cells followed by a module in basic automation. • The course will provide knowledge for iPSC culture and gene editing of iPSCs, and automated culture for iPSCs. • The advanced training module is particularly attractive for those serious in working with automated equipment to develop models themselves. • Course cost is also reasonable at $500 for the general course and $100 per task for the advanced training module. • The syllabus contains specific learning outcomes and assessments (questions students will be able to answer.) They point to where their course intersects with others at other centers in the region. • The breadth of the course is very good. The synergy with other regional courses is also very good. • The project will develop courses in laboratory automation, an important topic with few existing learning opportunities. • The instructors are well qualified for teaching the course. • The target students are not well described.
No: 0	• *none*

Application #	INFR6.2-15368
Title (as written by the applicant)	Shared Resources Laboratories to Enhance In Vitro Stem Cell Modeling and Training
Project Objective (as written by the applicant)	Our broad objective is to expand access to equipment, services, and training within our areas of excellence. Through knowledge sharing and collaboration, we aim to add value to the CIRM SRL network. We seek to build on our historical success and foster excellence in California stem cell research.
Summary (as written by the applicant)	We propose to expand our existing Shared Resources Laboratory to offer essential technologies and training for the development of novel in vitro stem cell-based modeling, serving researchers within our institution and across California. The SRL will offer access to instrumentation and services in four key areas: foundational technologies, bioengineering and organoids, gene editing, and high dimensional and spatial data analysis. Each core area will also provide training programs to enable stem cell researchers across the state to develop core competency and expertise so they may continue using these innovative technologies and approaches at their home institution. Our team includes 8 key faculty members with deep expertise in the core areas, along with 4 highly experienced core facility managers who will maintain consistency and quality across our services and training programs, and 2 key administrative personnel to ensure operational excellence. The overall objective is to contribute our unique expertise and innovative excellence to the CIRM SRL network in order to expand the regenerative medicine knowledge base across the state and accelerate development of stem cell therapies for patients with unmet medical needs.
Statement of Benefit to California (as written by the applicant)	The SRL will provide access to specialized instruments and innovative stem cell models not currently available to researchers in all areas of California. We have embedded workforce development efforts into each of our SRL offerings to deliver new expertise across the state. Our participation in the CIRM SRL network will support basic and translational research to accelerate development of regenerative medicine scientific discoveries into solutions for unmet medical needs of Californians.
Funds Requested	$4,000,000
GWG Recommendation	Tier 1: warrants funding
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 1

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	14
Votes for Tier 1	13
Votes for Tier 2	1
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in

the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 14	• There is enthusiasm for four focus areas: i) Bioengineering/bioprinting/organoid development; ii) CRISPR modification of stem cells and iPSC generation; iii) High-dimensional analyses, including mass cytometry, imaging mass cytometry, and spatial transcriptomics; and iv) foundational technology, including flow cytometry, flow sorting, magnetic sorting, multi-photon microscopy and imaging. In particular, the mass cytometry and imaging mass cytometry are unique areas where this SRL can benefit the network. • The proposal aims to create a SRL which will extend the activity of the institution's current platform. These activities include bioprinting, organoid models, genome editing, mass spectrometry, spatial transcriptomics, and cell sorting. This is extremely broad and could have been better connected. However, those activities are new and will bring new expertise supporting stem cell work. • This Shared Resource Laboratory will provide key technologies for stem cell research by enhancing four cores for Bioengineering and Organoids, iPSCs/CRISPR to develop activating and inactivating variants, a high dimensionality core, and a technology core. Enhancements involve new equipment and services and greater integration with the Stem Cell Research Core. For education, they will supplement the Stem Cell Technologies course with additional training related to new core activities. • The four cores arose from a survey of needs of the current users of the Stem Cell Research Center. Letters of support indicate interest at other CA institutions. Evidence indicates that the enhancements are of interest and address an unmet need. • The imaging and higher dimensional analysis will be a critical addition, strengthening single cell analysis. The equipment and technologies that will be integrated are a unique resource for stem cell research. Letters of support indicate wide interest. • The outcome criteria will provide information on the use of the stem cell resources from the institution's own researchers and by external users. Usage of the core facilities will be a key indicator. Placed within historical context, these should demonstrate if interest in the resources is growing. • The program director has forged links with other institutions in the local region that should enable this to be a resources for many institutions. Strong letters of support were provided. Resources will be available to startups which should enable them to advance their technologies. • This SRL will be available to researchers at the host institution and at a good number of other local institutions as well as cell therapy focused start-up companies. • One concern is that the facility will not provide stem cell based models.
No: 0	• *none*
GWG Votes	**Is the project well planned and designed?**
Yes: 14	• The program will build off of existing operations and is overall well designed to deliver the services described. The facilities and layout are excellent. • The physical space occupied by the core and proposed additional should be able to serve existing users and new users due to faculty hiring and by access provided to other California institutions and start-ups. • The facility will increase diversity of iPSCs with a focus on using CRSPR-a and CRISPR-i. • The offer is very broad and several aspects are not stem cell specific. The bioprinting/bioengineering, while useful for specific projects, remains a very immature technology which can be used in very focused areas and will only benefits a limited number of users. The spatial transcriptomic, mass spec, and other technologies could be used for a broad number of projects.
No: 0	• *none*
GWG Votes	**Is the project feasible?**
Yes: 14	• The diverse platforms included in this applications appear to already exist and their size/organization seems adequate to support local users and projects. The different practical aspect seems to be ready to be implemented. The timeline looks reasonable and feasible. • The lead PD is well qualified with extensive experience in running similar centers and educational programs. • All of the cores already exist, and the proposal enhances the features of some of the cores. Only a small amount of additional space is required, and no renovation costs are requested. Thus, the only delay would be the equipment delivery. So, the timeline should be met.

	• The institution has steadily expanded and developed its stem cell research core, adding new capabilities. The management team overseeing the stem cell research core will also oversee this project. Thus, the institution has an excellent track record of managing these facilities and the proposed plan will utilize this structure.
No: 0	• *none*
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 14	• This core will develop and share new CRISPRa and CRISPRi iPSC lines derived from individuals of Hispanic origin to add to the diversity of samples already in the library at the institution. A modest number of new iPSC lines (eight) will be developed. • The DEI seems appropriate even if the diversity aspect could be expended beyond Hispanic ethnicity. • There is strong support by program and staff for DEI programs. • The CRISPR-a/i cell line development from Hispanic/Latino background is particularly exciting and an opportunity for expanding ancestry diversity for this technology. This offering has the potential to add value to the SRL network. • The facility is providing access to other UC schools with diverse populations.
No: 0	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 14	• The course covers the new activities and provide hands on experiences. The syllabus seems appropriate. • The proposal will support an existing and successful Stem Cell Techniques Course and will add a CRISPR training course. The course already seems to be working well to serve the community with a relatively large number of users to date. ○ The facility will also offer two more advanced courses, including a Bioengineering/Bioprinting/Organoids Boot Camp and a Training Suite for High Dimensional Analysis to offer training in mass cytometry and imaging mass cytometry that will complement these unique services offered by the core. • The Stem Cell techniques course has been offered multiple times per year for 15 years. This will continue but will be supplemented by the advanced training courses which will enable individuals to benefit from new resources. The course provides a nice introduction to stem cell culture. Student feedback is very positive. • The stem cell techniques course provides a nice introduction to stem cell culture and the syllabus is very clear. The hands-on experience is very helpful. For the advanced course, the applicant nicely lays out each of the courses, participating faculty, syllabi, interest from the institution's departments and researchers at other institutions, expected enrollment and frequency of offering, and the tuition for UC system students and those outside the system. The only missing information is the duration of these advanced courses. • The lead course instructor has taught the course for a number of years and student feedback is very positive. Instructors for the training modules have direct experience with the equipment and techniques. • The course offerings are strong and extensive. • The institution will continue to offer an advanced stem cell course. The proposal includes a comprehensive syllabus with many details, basic protocols, and student evaluations. This course is a long-established one, having trained more than 400 students. This begs the question of why funding is being requested to support this course, and how the additional funding will change/improve the course. It is also not clear how the course fits into students' educational curriculum. • The syllabi for the new courses are not provided, nor is a description of the students who will take the courses, how often they will be offered, etc.
No: 0	• *none*

Application #	INFR6.2-15527
Title (as written by the applicant)	A Center for Stem Cell Disease Modeling and Therapeutics
Project Objective (as written by the applicant)	The goal of this project is to support the discovery and evaluation of novel therapeutics using stem cell-based models and drug and CRISPR screening. The facility will provide California researchers access to tools, technologies, and resources for regenerative medicine research.
Summary (as written by the applicant)	Stem cell-based modeling combined with drug and CRISPR screening has proven to be a powerful tool for understanding disease mechanisms, identifying novel therapeutic targets for drug development, and engineering cellular therapies. However, many labs struggle to reap the full benefit of these technologies because of a lack of expertise, funds, or access to specialized equipment. To remove these roadblocks, we seek to establish a centralized stem cell disease modeling and therapeutics core facility dedicated to the development and design of streamlined platforms. The goal of the facility will be to support research at the home institution and across the state of California for discovery and evaluation of novel therapeutics using stem cell-based models leveraging drug and CRISPR screening platforms. Our aims are: 1. Develop disease modeling platforms for stem cell-derived neurons, cardiomyocytes, and immune cells. Lab automation equipment and advanced analysis methods will increase production while improving reproducibility. We will deploy open-source software for genetic and image analysis to complement commercial analysis packages. Cell models and software will empower disease modeling and screening efforts at our institution and the broader research community across California. 2. Establish drug and CRISPR screening platforms for discovering and evaluating novel therapeutics. Powerful high-throughput screens of stem cell models provide a path to discovering novel targets and therapeutics, yet they are nearly impossible for an individual lab to carry out. We will provide state-of-the-art drug and CRISPR libraries, equipment, and expertise to discover new targets and therapeutics. 3. Disseminate methods and research materials to a diverse population of students and researchers in California. Dissemination and education are a major focus of the program. We will provide a series of training opportunities to students and researchers with hands-on stem cell and bioinformatics courses, workshops, and tutorials. Research reagents will be widely available. With the completion of these aims, we will provide accessibility and advanced standards and reproducibility of stem cell-based disease modeling and screening that will greatly accelerate stem cell research at our institution and the broader research community across California.
Statement of Benefit to California (as written by the applicant)	This project benefits California by helping accelerate research to find cures for major diseases of the nervous system, heart, and immune system. This project also provides training for Californians who want to enter the biotechnology workforce. Finally, the shared laboratory strengthens the California research community by providing advanced tools and technologies to a wide variety of regenerative medicine researchers.
Funds Requested	$4,000,000
GWG Recommendation	Tier 1: warrants funding
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 1

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	1
Count	13
Votes for Tier 1	13
Votes for Tier 2	0

Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 14	• This is an outstanding very strong proposal for a new core that will build out three existing and successful cores to add new patient-derived and gene-edited iPSCs, iPSC-derived cardiac models, iPSC-derived neural models, iPSC-derived hematopoietic cells, and gene-edited primary human T cells. The later two focus areas represent relatively novel areas of expertise and could attract new researchers to the field and enhance the overall SRL network. • The proposal is broad but impactful. The facility will give access to differentiate cells from hIPSCs, and will perform drug/CRISPR screens. It combines three distinct existing cores in a unified approach. The services they will provide will offer a breadth of support. This will be high value for their institution. • Overall, the proposal is expected to effectively funnel the expertise of the institution's research group to the SRL network. • There is significant interest in the proposed stem cell models, with researchers showing enthusiasm for optimizing robust protocols that could ultimately save them time. • This proposal is broad enough to be impactful, but specific enough to be feasible. It is well thought out. • The proposal democratizes established protocols from individual labs at the host institution for the benefit of the broader community.
No: 0	• *none*
GWG Votes	**Is the project well planned and designed?**
Yes: 13	• The cardiac models available from the expertise of three participating labs are well established. The neuronal models are routine in additional participating labs. For the iPSC-derived hematopoietic progenitor cell (HPC) models, they will establish collaborations to generate primitive and definitive HPCs, microglia, and T cell progenitors - all of which are relatively new protocols and under active development. • The proposed SRL will provide a wide range of services and all are appropriate. They have three aims, including develop disease modeling platforms for stem cell-derived neurons, cardiomyocytes, and immune cells; establish drug and CRISPR screening platforms; and disseminate methods and research materials to a diverse population of students and researchers in California. • The space and facilities available to house the core will build off of space from the existing cores and are well described in the proposal. • The proposal includes very specific and measurable criteria for success. • The proposal is well thought out and enjoyable to read. • The project is well written and presented. The organization is very clear.
No: 1	• *none*
GWG Votes	**Is the project feasible?**
Yes: 14	• Absolutely, the director is a clear expert in iPSC disease modeling and has a history of being generous with iPSC lines. • The program director has extensive experience with iPSCs for disease modeling, as well as CRISPR engineering. The other team members are already in place in the other cores. Additional existing staff will support the educational activities

	• The proposed plan is feasible. The SRL is an extension of three existing cores, with existing space, and part of the existing equipment that will become part of the major equipment of SRL. The SRL will be co-managed by experienced core facility directors. Management and recharge system has been established. • The proposal will benefit from great leadership. • The advisory committee is superb. • All the necessary expertise is available and the track record is reassuring. • The startup plan seems a bit ambitious given the range of equipment and activities proposed. However, given the program director's track record, this is less of a concern. They will make use of experience with the existing infrastructure.
No: 0	• *none*
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 13	• The SRL team has a successful track record for promoting and valuing diversity, equity and inclusion (DEI).The program director's lab uses iPSCs from a diverse range of patients (>50 iPSC lines). This includes male and female patients from Asia, Africa, Europe, and South America. They provide diverse iPSCs to laboratories all over the world. One particular iPSC line was developed in the program director's lab from an Asian donor and is consider the most widely used iPSC line in the world. • The team has a strong commitment to DEI and plans to attract researchers not currently using stem cell-based models into the field through public listing with other institute cores and monthly seminars and workshops open to the research community. They have a special focus on diversity by working closely with California State colleges and community colleges. • DEI was very strong and benefited from involvement with several community and state colleges. • The institute plans to participate in CIRM-funded EDUC programs. • Diverse iPSC lines are available. • The proposal makes good use of online options, including the institute's YouTube Channel, Wikipathways, and an online seminar series to allow broader access to diverse populations. • They have a strong plan to address diversity, equity, and access supported by the right level of expertise.
No: 1	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 14	• The course curricula are well designed and covers all aspects of hands-on training needed for pursuing stem cell research. The courses proposed provide short term and long term hands on training as well as bioinformatics training. • Three major courses will be provided, including 1) Hands-on training in stem cell techniques. 2) Workshop on bioinformatics. 3) Stem cell and bioinformatics seminar series. The educational component is already integrated into the range of services offered by the institute's cores. However, the frequency of training sessions and whether they are scheduled on demand or according to a specific timetable is not clearly outlined. • The collection of courses is impressive and appropriate. However, the provided "syllabi" is just a list of topics that will be covered, with no learning objectives. The narrative in the proposal provides additional information, but still lacks learning objectives about what the students will be able to do after the course(s). It's also unclear how the courses will fit into the students' educational programs. (Are the courses for credit? Do they provide a certificate?) • The institution has a strong track record of training over the last 10-15 years. • The planned roll out of courses will provide access to a diverse range of students. • The course is well designed with the right level of support.
No: 0	• *none*

Application #	INFR6.2-15400
Title (as written by the applicant)	ASCEND Center - Advancing Stem Cell Education and Novel Discoveries
Project Objective (as written by the applicant)	The proposed ASCEND Center provides cutting-edge organoid-based services, offering consultation, optimized protocols, and genomic analysis. We also offer comprehensive training, workshops, and access to data, empowering researchers across California to excel in stem cell and organoid research.
Summary (as written by the applicant)	The planned ASCEND Center is a transformative effort aimed at accelerating regenerative medicine, research, and education as part of the Shared Resource Lab (SRL) Expansion Program of the California Institute for Regenerative Medicine (CIRM). With the goal of sharing expert knowledge across California, our Center will serve as a leading resource for generating and analyzing organoids, miniature 3D models that replicate human organs and tissues. This will be realized through a consortium of renowned reseachers sharing their expertise in human pluripotent stem cell-derived organoid models, provision of state-of-the-art facilities, and a commitment to diversity and inclusivity. This Center will be a powerful platform for studying disease mechanisms, testing potential treatments, and understanding complex biological processes. The proposed Center is designed to take advantage of the strengths of our scientists, who have developed reproducible methods to generate organoids and have deep expertise in assessing their differentiation using defined gene markers and multiomic approaches. As such, the Center will offer cutting-edge services in organoid production, data analysis, and single-cell omics, enabling researchers to harness the potential of these advanced technologies. The Center will drive high-quality, reproducible results across different labs through meticulous protocols and expertise. By utilizing genetically diverse and male and female stem cell lines, the Center aims to ensure that its research and therapies apply to the plurality of California's populations. This approach aligns with the goals of CIRM to address healthcare disparities and promote equity. Complementing this expertise, we will offer a Stem Cell Techniques Course, which will include comprehensive training for researchers, from novices to experts, in stem cell culture, organoid differentiation, and advanced omics techniques. This training equips the next generation of scientists with skills crucial for pushing the boundaries of regenerative medicine. To sustain the initiative long-term, a fee structure will be implemented for the Center's Shared Research Lab (SRL) services and training courses, while providing broad access to resources. This self-sustaining model enables continued research advancement and educational excellence. Our project's impact extends beyond the Center. Through collaborations with other CIRM-funded cores, California research labs, hospitals and companies, the ASCEND Center will ensure that the broader research community benefits from our resources and expertise. Regular communication, data sharing, and feedback provide constant refinement and improvement of our services. In summary, by pushing the boundaries of regenerative medicine, training researchers, and embracing diversity, the project promises to significantly advance knowledge, improve patient care, and bolster California's leadership in regenerative medicine.
Statement of Benefit to California (as written by the applicant)	Our ASCEND Center benefits Californians by advancing regenerative medicine and healthcare. The Center's services and training will foster innovative research, leading to new therapies and treatments. By embracing genetic diversity in cell lines, the Center ensures relevance to the plurality of California's populations. Our educational focus will equip researchers, with advanced skills, contributing to the state's workforce and leadership in scientific progress and improved patient care.
Funds Requested	$3,946,795
GWG Recommendation	Tier 1: warrants funding
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 1

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	14
Votes for Tier 1	11
Votes for Tier 2	3
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 14	• The ASCEND Center addresses the growing demand for reproducible stem cell models and expertise in their use in a variety of research fields. • The facility provides a wide range of services, from project planning and collaboration to cell resources and specialized training, to both novices and experts in stem cell research. • Relatively simple but broad added value especially around complex organoids. This answers a clear need. • Enthusiasm is based on the co-PDs' significant expertise with complicated kidney and brain organoid models and for the proposed consultation services tailored for both new and experienced users, targeting ~50 research labs at the host institution and aims to extend services to the broader California research community. • Also like the proposal facilitating single cell multiome and spatial analysis taking advantage of being able to handle fixed and frozen tissue samples for single cell and spatial assays. • Enthusiastic for the service to provide access to and develop optimized protocols for differentiation of diverse ancestry CIRM Fujifilm Repository lines and provide benchmarking data for relevant differentiation steps for the brain and kidney protocols. • Strong, well designed stem cell modeling services to support generation of kidney and neural organoids and end-point analysis of functional properties, capacity for -omics studies, and high-content imaging. • The proposed benchmarking of 10 lines from the CIRM iPSC repository reflecting genetic diversity is a significant strength. • Well done proposal and I believe the only one using kidney cells.
No: 0	• *none*
GWG Votes	**Is the project well planned and designed?**
Yes: 14	• The proposal is well organized and proposes interesting services. • Strong points include that the center will aim to address line-to-line variability by optimizing the kidney and brain organoid protocols for nine individual iPSC lines from genetically diverse backgrounds (from the CIRM Fujifilm repository) and subsequently provide standardized reproducible protocol conditions and reference data for each line. They also intend to provide the organoids as a service and will share access to internal lines that have been previously optimized. • Combining the models with the proposed multiomic profiling service is appropriate for the

	chosen focus on complex organoid models. Both PDs have a lot of experience with the proposed multiomic single cell/nucleus/spatial technologies and should be able to manage implementation of these technologies across user projects, for both experienced and inexperienced users. • Superb team and stem cell research environment. The proposed SRL offerings is a strength, with significant expertise in both the kidney and neural organoid types. • The SRL lab space is large and well designed. The separate training lab is a big plus, avoiding disruption of core activities during training sessions. • The ASCEND Center is strategically positioned to support a large number of users both within and outside of the host institution. • The institution already has a molecular genomics core that offers access to much of the same -omics expertise and equipment that is proposed for the multi-omics center in this proposal. A justification for why the existing core infrastructure at the institution is unable to provide the necessary services to the SRL would have been helpful. • The rationale for a multiomics core is not entirely clear (it may be redundant to existing infrastructure). • The application would benefit from greater clarity on resources that currently exist for this user base. • Minor concerns that the startup timeline will be longer than anticipated to find and train staff in these techniques. • The budget could be too limited. The cost recovery could have been better defined.
No: 0	• *none*
GWG Votes	**Is the project feasible?**
Yes: 13	• Overall, the plan to establish the SRL and begin operations is well done. The completion of the project is feasible within the proposed timeline. • The application conveys a sense of a strong existing network of investigators within and outside the host institution who would be users of the SRL. • The plan makes use of existing infrastructure and expertise, offering a feasible approach to the center's prompt construction and operationalization. • The team has very high expertise that will support the platform. This looks achievable. • Proposed staffing might be an issue. Two full-time technicians will provide the organoid services – this seems appropriate. Will the same two personnel also provide services for the multi-omics center? If so, the lack of specific staff with appropriate experience allocated to this is unrealistic.
No: 1	• The proposal for multi-omic services makes up a large portion of the budget (for proposed equipment) and lacks designated staffing. It would be better to use the budget for supply costs for differentiation and characterization and focus on the data analysis aspects.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 14	• The DEI plan is strong and seems appropriate. • The DEI plan builds from existing educational pathways at the institution, including an undergraduate stem cell minor, a CIRM COMPASS program, programs to introduce research to high school students, and a CIRM Bridges program. • A primary aim is to work collaboratively with a neighboring institution to benchmark a series of hPSC lines from the CIRM FujiFilm iPSC repository that reflects genetic diversity. If successful, having well-validated models from genetically and sex diverse backgrounds will be a key contribution of the network. • Institutional commitment to DEI is clear and the SRL will undoubtedly have access to internal users and trainees with diverse goals, approaches, perspectives, and backgrounds. • The proposal includes plans to provide services and education to underserved populations through existing programs (e.g., CIRM BRIDGES) and foster relationships that will provide a pipeline of trainees from underserved communities. • Overall, yes, but the courses don't appear affordable for many students.
No: 0	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 13	• They will provide a combination of interactive workshops, laboratory demonstrations, and hands-on experiments. Students and researchers will have the opportunity to work with state-of-the-art equipment and analytical tools (e.g., single cell technology) and gain practical skills in stem cell isolation, culture, differentiation techniques, and analytical tools relevant to stem cell research in the field of regenerative medicine. • The stem cell techniques course provides a comprehensive educational and hands-on training experience in organoid generation and characterization.

	• The techniques course syllabus has clear learning objectives and will provide trainees with a solid practical foundation in stem cell culture, differentiation into neural organoids, and quality control considerations. • The creation of an online educational repository, including videos and protocols, that is accessible without registration in the techniques course will promote wide access to these technologies. • Given the ASCEND Center's leadership and scientists, the team members are expected to have sufficient qualification. • The instructors are well-qualified to teach the course. • This has an excellent syllabus with clear learning objectives. How will the courses fit into students' academic programs? For credit? Certificate? • While they propose combinations of extended 4-8 week advanced courses and/or individual modules that cover a good range of both basic and advanced techniques, the necessary length of the courses may limit the users to only local institutions. • Minor weakness: The 6-week duration of the 'full' Advanced Stem Cell Techniques course, and even the shorter options consisting of 3-4 modules, seem impractical for external trainees. • While the 6-week course is comprehensive, it may be difficult for students (with the exception of those on campus) to access the course. • The proposal does not include plans to facilitate inclusion of underserved communities. The proposed course tuition fees are unrealistic for high-school level and perhaps miss an opportunity to contribute to sustainability on the for-profit higher end. • Ideally, this (and other) proposals would cover student costs for the initial duration of the award. A fee of $1000 for high school students will exclude many (most?) interested students who would benefit from the course. If courses are for credit, students may be able to use financial aid to cover the costs. • The proposal would benefit from better description on how students will be selected.
No: 1	• *none*

Application #	INFR6.2-15440
Title (as written by the applicant)	Shared Resource Laboratory for Stem Cell-Based Modeling: Resources for Exploring the Biological Underpinnings of Aging and Age-Associated Pathologies
Project Objective (as written by the applicant)	We seek to engage more Californians in stem cell research by providing access to cell models (including those for model the aging brain) derived from a uniquely characterize human cohort, thereby progressing toward better treatment options for age-associated neurological disorders.
Summary (as written by the applicant)	Cell resources. We have created a bank of human fibroblasts and associated induced pluripotent stem cells (iPSCs) derived from an extensively phenotyped cohort that spans the full range of adult human chronological age. To enable targeted research into mechanism of neurodegeneration, specifically Alzheimer's disease (AD), we have also banked fibroblasts and iPSCs from a well-studied cohort of individuals with AD, suspected AD, and age-matched healthy controls. We seek to enable the California stem cell community to take advantage of these resources through the expansion, extensive quality control, characterization, and distribution of these cell lines, as well as by providing additional cell resources relevant to the aging brain. Focus on the aging brain. We have expertise in generating brain cell types from human iPSCs or directly from donor fibroblasts. iPSC-derived cell types exhibit a rejuvenated phenotype, as hallmarks of aging are reset to embryonic benchmarks, whereas directly reprogrammed cells retain aging signatures of donor cells and thus are ideally suited for studying the aging brain. We propose to create and distribute extensively characterized fibroblast cell lines that contain molecular cassettes for their direct reprogramming into neurons and other brain cell types. This will facilitate the use of these cell resources by the California research community to better understand age-associated brain pathologies. We will establish protocols and reagent packages to promote consistency in both direct conversion and iPSC maturation efforts. We will provide iPSC-derived and directly induced brain cell types upon request and perform extensive quality control analyses to ensure between-experiment consistency. We will offer sophisticated phenotyping services to characterize induced cell types. We plan to expand the existing cohort to include those with additional neurodegenerative conditions and diseases of the brain. Experimental reproducibility and training. To promote rigor and reproducibility of stem cell-based efforts across California, we will perform rigorous quality control analyses of all fibroblasts, iPSCs, and induced cell types generated and distributed by our SRL. We will establish, optimize, and distribute standardized protocols for generating brain cell types from donor fibroblasts and iPSCs. We will provide hands-on training in general stem cell techniques and in more specialized techniques for generating and analyzing iPSC-derived and directly reprogrammed brain cell types. Synergy with other local SRLs. Although our proposed SRL is a stand-alone entity capable of delivering valuable stem cell-based resources for studying aging and neurodegeneration, SRLs proposed by our regional neighbors will provide complementary services and training to allow cross-institute validation of stem cell resources and to create a regional hub for stem cell biology that will be a truly transformative resource for California.
Statement of Benefit to California (as written by the applicant)	The distribution of quality-controlled stem cell resources will provide numerous avenues for California researchers to make important strides toward understanding aging and neurodegeneration, potentially leading to breakthroughs in diagnostics and therapeutics. Emphasis on training and the standardization cell resources and protocols will foster reproducible research, bring new Californians into the stem cell field, and ensure that the state remains at the forefront of stem cell biology.
Funds Requested	$3,759,999
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	3
Count	14
Votes for Tier 1	4
Votes for Tier 2	9
Votes for Tier 3	1

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 11	• There is a great interest in understanding the biological aging process. It's critical to have improved human cell models that enable research directly relevant to human aging. The proposed SRL will provide cell resources, services, and education for investigators across California that can perform studies of the aging process. • This initiative provides unique human cell models that focus on the study of aging, which is a major risk factor for many diseases. The thorough characterization of fibroblasts and iPSCs, together with the rich aging-related data from a long-standing study with local participants, distinguishes it as a unique resource. • The focus of providing highly characterized stem cells for specific age related questions is interesting and novel and leverages the large existing cell bank that was funded in collaboration with the NIH. The Core will select specific cells for direct reprogramming and will also provide direct reprogrammed and analyzed cells for research. This is potentially interesting. • The core could have a significant impact on aging research. • Using stem cells to study aging is exciting and an important understudied area that will impactful. It is not clear if this core will be widely used and widely available to all investigators interested and if it will will attract new users. • A total of seven researchers (in addition to the PI) are listed who are interested in using the core although these individuals already work in the stem cell aging field. • The need is clear on aging and this proposal is addressing a key gap. However, it will only target local users and thus will have a limited impact. • The core will provide stem cells and related services for stem cells to better understand human aging and disease. The science is compelling and this would create a valuable resource. However, it's unclear that this lab will have the capacity to truly serve researchers outside of the current users. The proposal reads more like a lab that will support the PIs and their collaborators, but not a shared resource. • The users are mostly collaborators specializing in aging and neuron research. However, it's unclear how the core will reach a more diverse audience and maximize the resource's broader impact. • No new users are identified and a specific plan to attract scientists outside the aging field is not provided. • The banked cells should already be available to research on demand due to the NIH

	mandate of sharing resources. This overlap is not addressed in the proposal. • The access plan is quite "exclusive" favoring in house researchers. The review process for granting access is not clear. For example, why is "innovation" a criteria for core use? The review committee should have no potential conflict of interest in the review of research proposed by users.
No: 2	• The core is very limited to specific users. • It seems that it will be hard to get access to core. • The core won't attract new users since it seems very hard to met the criteria to get access.
GWG Votes	**Is the project well planned and designed?**
Yes: 10	• It's appropriately designed. Starting with an existing cohort, they will perform intensive fibroblasts characterizations for aging, quality control, provide cell line distribution, iPSCs and induced neuron services, aging phenotype analysis, and share detailed protocols and reagent packages. Trainings are related to iPSC, induced neurons, and gene editing. They also plan to expand the existing cell/donor cohort to include additional neurodegenerative diseases. • The comprehensive nature of the proposal, which includes rigorous quality control, standardization, hands-on training, and expansion of cohorts, underlines the SRL's commitment to operational effectiveness and wide accessibility. • Providing a DNA methylation profile is a strength. Providing on-demand generation of isogenic fibroblasts and iPSC lines is interesting. • The core will offer to characterize the energetic and metabolic states of derived cells, which is unique. • The core proposes extensive quality controls of offerings, in particular bulk RNA-sequencing analysis on fibroblast cell lines at the time of banking (to reduce variation and culture-derived artifacts). However it is not clear that this is valuable- no data are provided whether bulk sequencing is necessary or reduces variability. • The science is very interesting and strong. • The core is too focused on a specific group of scientists. • There are some concerns about access.
No: 3	• The applicants will limit access to the core facility based on scientific excellence but how this is defined is unclear. There are so many restrictions to access the core that the impact of the program could be limited.
GWG Votes	**Is the project feasible?**
Yes: 13	• The application comes from an excellent researcher with a lot of experience. There is no doubt that they could deliver the proposal. • The proposed plan is feasible. Lab space is available, major equipment for cell culture and analysis is existing. The application is requesting equipment for rigorous analyses of generated brain cell, such as imaging, mitochondrial, and electrophysiological analyses. Leadership and management of the proposed SRL are well-versed in experiments, operations, and proposed services. • The proposed SRL team is appropriately staffed and qualified. The PD pioneered the use of stem cells to model human disease. They have developed methods for the direct transformation of fibroblasts into neural cell types that retain aging signatures. The co-Directors are leaders stem cell and astrocyte biology. Day-to-day operations of the proposed SRL and for onboarding expertise and models will be managed by the Director of the institute's Stem Cell Core. • The broad plans for cell line creation, characterization, distribution, and associated services in the proposal show a strong infrastructure and expertise. The institute is well-positioned to host and support the SRL, given its biomedical research. • The depth of the proposal indicates strong leadership and a qualified team. • The overall approach to fulfill the offering is feasible and many aspects are already in place. • Some aspects of the "core" seem to represent actual research projects; i.e. the 3Brain system will do analyses on in vivo spiking statistics and compare organoids. • It is not clear whether the SRL will be fully self-sustained beyond the project period from the proposal. The proposal is highly focused on aging and neuron diseases. The breadth of the anticipated users are unclear. The SRL may continue to apply for grant support and or to get support from their institute to sustain. • Sustainability plan is not clear (new users not described).
No: 0	• *none*
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 11	• The DEI is strong and seems appropriate.

	• The SRL can provide services and collaboration for projects with diverse goals, such as neuron diseases using donor cell models, stem cell models, brain cells models, gene editing and aging phenotype analysis. They will also put efforts to reaching Latino communities to diversify the aging cohort and the AD cohort from other connections and collaborations. • On the flip side, the resource's primary focus on aging and neurons may limit its appeal to a more specialized user base. • Housing costs and transportation to facilitate underrepresented students to attend is not addressed. • Funds allocated to help underfunded students/researcher are too low (only 3% of overall anticipated income). • The scientific diversity of the offering is outstanding.
No: 2	• Plan does not enable other users to access the core in a reasonable way. • There are high costs to take courses, rendering them not accessible to many prospective users.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 5	• The three courses topics are well designed, including Basic Stem Cell Techniques Course, Trans-differentiation of Somatic Cells to Neurons, and Genome Editing of Stem Cells and Primary Fibroblasts. • The three courses are targeting to researcher with different skill levels by starting with Basic Stem Cell Techniques Course, to Trans-differentiation Course, and moving to the advanced gene editing course. The courses will be open to applicants ranging from high school to college and graduate programs, as well as PIs, technicians, and everyone in between. • The instructors are appropriately qualified and experienced. • The proposal's emphasis on hands-on instruction in general stem cell techniques, as well as specialized techniques for growing and studying cell types, establishes a solid foundation for a comprehensive curriculum. • The course is highly integrated, and an organizational hub will be responsible for all course related issues. • The knowledge base is not addressed- i.e., how diverse will the background knowledge be among the proposed attendees, and how will this affect the teaching outcomes?
No: 8	• The course description is just a list of topics and activities. It is unclear what parts are hands-on and what is demo and/or lecture. The applicants only estimate the length of time required. Two of the courses are 10 days long - what will happen in that amount of time? How will they manage 50 students/year? Is the demand there? • A more detailed syllabus is needed, in addition to a list of topics. • The course looks good but again the exclusive access is a drawback. The course could be better detailed and the resources necessary might not have been planned properly. • There is limited access and budget for outside students. • The courses may be hard to pull off with the personnel listed, leading to a low student/teacher ratio. • Tuition is pretty high and more could be done to give breaks to underserved students.

Application #	INFR6.2-15416
Title (as written by the applicant)	Expanding and Enhancing Molecular, Cell Biological and Bioengineering Resources for Stem Cell-Based Models
Project Objective (as written by the applicant)	The primary objective is to expand accessibility to stem cell-based models and to cutting-edge technologies essential for their comprehensive characterization and phenotyping as well as to train future stem cell scientists through the technique's course.
Summary (as written by the applicant)	The core mission at the proposed Shared Resource Lab (SRL) is to establish a world-renowned laboratory outfitted with the latest technologies to conduct in-depth analyses of human pluripotent stem cells (hPSCs) and their differentiated derivatives. In addition to the commitment to scientific excellence, the SRL is dedicated to sharing knowledge and technical expertise with the broader stem cell research community through training and techniques courses that will be available to researchers across the state of California. The SRL staff and affiliated faculty at this and collaborating institutes will establish and disseminate robust differentiation protocols that model a spectrum of mature cell and tissue types, including neurons, cardiomyocytes, pancreatic cells, lung cells, and blood cells. To support these endeavors, the SRL will develop cutting-edge bioengineering technologies for the characterization of stem cell models (flow cytometry and confocal microscopy) and the manipulation and modification of hPSCs (AAV-mediated gene delivery & genome editing; lipid nanoparticle (LNP) delivery of nucleic acids; and micro-contact printing). The vision extends beyond just advancing research and aspires to create thriving scientific environments that serve as hubs for comprehensive training and techniques courses. Collaboration and knowledge exchange will accelerate fundamental discoveries in stem cell research, propelling the field toward the ultimate goal of clinical development.
Statement of Benefit to California (as written by the applicant)	Support for this project will enable our shared resource facility to expand our capabilities to better provide stem cell-based models to scientists within our community and within the state of California. Additionally, we will be in a better position to work with California academic groups and biotechnology companies to translate their discoveries into potential therapies that will benefit patients with unmet medical needs.
Funds Requested	$4,000,000
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	15
Votes for Tier 1	1
Votes for Tier 2	14
Votes for Tier 3	0

- A score of “1” means that the application has exceptional merit and warrants funding.
- A score of “2” means that the application needs improvement and does not warrant funding but, at the applicant’s option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group’s review.
- A score of “3” means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 7	• This is a rich proposal with resources to enhance use and experimentation with cells. It can add value to the overall infrastructure. • This proposal is based partly on coordination of nearby institutions and if all are funded it may add value as each separate institution can work to their core strengths.
No: 7	• This is a scientifically sound proposal from a group of researchers with a strong history in PSC biology, however they do not specifically address how they will use the proposed SRL to meet existing critical needs or how they will attract new researchers. They propose enhancing the capabilities of two existing cores - a human embryonic stem cell core facility and a cell engineering research core. • This SRL aims to extend/support the activity of two cores at the institution. This proposal focuses on developing a service activity for hPSCs differentiation (neuronal, HSCs and cardiac cells) and genome editing using AAV and/or LNP technology. The main limitation is that this application is mainly for funding the purchase of cell sorting equipment and the stem cell focus is limited. • They discuss providing access to a wide range of hPSC, differentiated cell types and differentiation protocols but with very few details about the process for how others will gain access to these resources. They do propose to create videos demonstrating the differentiation protocols and made available on their website, but again no details as to how new researchers will be made aware of these resources. • There are reasonable outcome criteria proposed. • Cell sorting seems a major focus of the facility but there is little link with the proposed work on differentiation or genome editing. • It would have been useful to describe more in detail how the equipment will be used for stem cell based research. • The main concern is that, while the expertise on offer is valuable, there are very few details in the proposal about the process for how others will gain access to these resources.
GWG Votes	**Is the project well planned and designed?**
Yes: 10	• *none*
No: 4	• This proposal seems to have deviated from the stem cell modeling focus, as the core will become a flow cytometry core to be self-sustaining. • More detail is needed to justify the purchase of two additional flow cytometers. How are these going to meet stem cell research needs specifically? Why the S8? This is very expensive and very early in release. The justification seems mostly to be that users have to wait to get sorting appointments. Is this sorting need stem cell research driven? • A table is provided that lists researchers that would take advantage of the new technologies, but they are mostly resident faculty, who have previously benefitted from services provided by the cores. It would be good to highlight potential new users. • The hPSC banks described and available to users are robust and sufficiently QC'd. • The SRL will likely operate effectively but again, there is little explanation as to how outreach to new researchers will occur or how it will benefit scientists outside of the local area. • The proposal is well described. However, some aspects could be better explained. The choice of differentiated cells seems to be based on local expertise and not really on clearly established need. The scientific rationale for AAV or LNP could have been better justified. The rationale between the equipments requested and the new activities to be developed is unclear.
GWG Votes	**Is the project feasible?**
Yes: 13	• The proposal includes good collaboration with other institutes. This is a nice addition. • Team leadership has necessary background and expertise, and the project has good institutional support. • The proposal is definitely feasible based on current activity and past experience at the cores. The differentiation aspect is likely to be the most challenging. The existing protocol will need refinement and might not work with all the hPSC lines. From past experience, very few core facilities have been able to provide such a service. This just too technically challenging.

	• The head of the core facility has a lot of experience and has demonstrated their capacity to deliver a successful service activity. There is no doubt that this proposal will achieve most of its objectives especially around the use of equipment.
No: 1	• The project is feasible. The expertise is clearly available and there is strong multi-institutional support. • The two cores have a track record of being revenue neutral. The course tuition should be sufficient to support the training courses. There is also an institutional commitment for some funding for new instrumentation. • The proposed leadership team is strong and has past CIRM funding. They have a strong foundation in hPSC biology and experience running the core. • The justification behind the AAV and LNP technologies being introduced should be stronger. • There was also concern about current staff taking on all the new activities.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 13	• The institution is partnering with local universities to develop an outreach program with the local campuses with high proportions of underserved/under-represented communities. However, the lack of metrics is an issue. • The SRL will provide access to the hPSC resource which includes over 200 fully characterized hPSCs. While this cohort includes gender and ethnicity diversity, some populations remain underrepresented. This aspect could be improved. • Yes, based on location and access to over 200 hPSC lines. • DEI plan takes advantage of local diversity.
No: 1	• This proposal could be stronger in this area. The investigators may be committed to these ideals, but other than stating that they have trained students from diverse backgrounds they are short on details.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 6	• Five courses are proposed covering basic stem cell culture, genetic manipulation of hPSC, brain organoid generation, bioengineering with hPSC and bioinformatics. These are all excellent topics very relevant to the field. • The goal is to have ~45 students (3 times per year x 15 students) in the basic culture course and roughly 10 students in each of the others offered once per year. Though the proposed costs are reasonable, it is hard to know what the demand would be. It would be helpful to know what they have taught in the past and what the demand was.
No: 8	• The main instructor seems to be at another institution based on their biosketch. The application states that they will move to the applicant institution, but it seems a bit risky to have most of the training to rely so heavily on one instructor, who is not currently local. • The syllabus needs more detail. • The curriculum of the course is limited and seems more like justification for buying the new equipment (especially the cell sorter). • The course seems to be more of an afterthought. • The course plan is just a list of modules - no real syllabi are provided. All the coursework will be taught by one person. Shouldn't students hear from researchers who are using the methods? The lectures will be recorded - why will they be offered in person once a year? Why not develop a true online course?

Application #	INFR6.2-15475
Title (as written by the applicant)	Shared Resource Laboratory for Advanced Stem Cell-Based Modeling
Project Objective (as written by the applicant)	This proposal will create a laboratory that will provide training in advanced stem cell modeling technology, particularly organ chip technology. This laboratory aims to train stem cell researchers in using these 2D and 3D stem cell systems and make the expertise available across California.
Summary (as written by the applicant)	The Shared Resource Laboratory for advanced stem cell modeling will lean into our strength in human iPSC production and differentiation and expand our organ chip core collaborations to enable researchers throughout California access to this exciting and powerful new technology. Several of our faculty are highly experienced in this area of research and have history of training CIRM students through CIRM educational programs. We will provide outstanding training in the growth and differentiation of iPSCs from patients with many different diseases available from our world-renowned human iPSC core, using 2 Dimensional (2D) and 3D organoid models. However, the unique aspect of this SRL is the training of stem cell researchers in organ chip technology. These microfluidic devices enhance tissue interactions and support both flow of various biological fluids (e.g., blood, cerebrospinal fluid) and mechanistic forces (stretch) to optimize the disease model and provide a more physiologically-relevant system. Highlights of the SRL include: •Cutting-edge iPSC core facility with the latest equipment and highly trained faculty and staff •Generated over 1000 patient iPSC lines that are ready for use in disease models •Deep knowledge of iPSC differentiation into many different human tissues •Long history of developing novel 2D and 3D organoid/organ chip iPSC-based model systems •Commitment from a leading organ chip company to provide training and support •Several leading CA institutions have already expressed interest in using the proposed SRL •Provided to trainees from diverse backgrounds and under-represented groups in CA who may not normally have access to these systems
Statement of Benefit to California (as written by the applicant)	The proposed project will benefit the State of California and its citizens by granting educational and didactic training in stem cell biology to academic trainees, industry partners, and underserved communities not traditionally represented in stem cell research. We will address the needs of underserved communities by providing education and training opportunities and collaborating with community-based organizations to ensure that our resources and services are reaching those who need them most.
Funds Requested	$3,991,879
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	2
Count	14
Votes for Tier 1	1
Votes for Tier 2	13
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.

- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 12	• The proposed SRL aims to develop a new service providing advice and training on hIPSC differentiation in 2D/3D and to create a pipeline to develop customized organs-on-a-chip in collaboration with a company. Interestingly, this SRL will target the entire state of California and will not focus only on the local area. The focus on organ-on-a-chip is definitely a new concept and it will target a field which is currently not supported elsewhere. • The SRL will provide access to a broad range of differentiation protocols and stem cell-based models using patient-specific iPSC lines available through the institution's Biomanufacturing Center. They will offer basic training modules on general iPSC techniques along with 2D culture techniques and differentiation into stem cell-derived tissues – neuro, heart, bone, blood, gut, lung, and liver. This will add significant value to researchers and education. • A focus on the organ-on-a-chip technology, which provides very good models for several organ systems, makes sense in supporting research activities at the institution, which already has an agreement with the company. However, as a wider training mechanism, this system is very expensive and may not be adoptable by all researchers. • There is a clear interest from other institutions for the service provided and this SRL will target the entire state. • The institution has offered an introductory stem cell course and has the necessary scientific expertise and should be able to expand to these new sources. The training program on latest stem cell technologies will enable trainees to perform research using these technologies in their own lab. • Locally, information will be shared through the Stem Cell Techniques course, the Training Modules and an area Regenerative Medicine Consortium. This section could be stronger with dissemination through websites and newsletters. This will be helpful for other California schools that have faculty and students who could benefit from the program.
No: 2	• This facility and its services may be limited to too few users.
GWG Votes	**Is the project well planned and designed?**
Yes: 10	• The project will collect knowledge from local groups working on differentiation (brain, gut, liver, heart, etc.) and then will train customers to these protocols for developing disease models. The practical aspects will be managed by the existing stem cell core facility, which seems excellent. • The SRL is supported by a group with a solid expertise in differentiation protocols. This is very reassuring. Their interest to share their expertise is also very positive. The involvement of the named company for the organ on a chip component is also positive. • The proposal is relatively complex and could have been better structured. However, the SRL seems to be organized to deliver its objectives even if some aspects of the training are very complex. The support of the existing core facility is reassuring. • The main focus of this proposal is on multi-lineage model systems including multiple hiPSC-derived cell types in 2D culture, organoid/spheroid 3D co-culture and organ chip culture aboard microfluidic organ chips. Assays include functional measures (contractility), electrophysiology, viability, transcriptomics, proteomics, metabolomics, epigenomics, and imaging. They will offer patient-specific modeling of human disease, as well as patient-specific drug response and toxicity screening for personalized medicine. Given this complete suite of services and the level of demand already on campus, they may have trouble servicing all current and potential users.
No: 4	• The training modules for organoids and organ-on-a-chip systems in Figure 11 covers an impressive array of organ systems. • The core should be able to handle the number of trainees for the online portion of the techniques course and the lab module portion since the lab module appears to be demonstration, with limited direct hands-on activity related to organoids and the organ-on-a-chip system. • The frequency of the organ system training modules appears to be quite extensive and could

	limit availability of the system for research. The research needs within the institution may be quite high. No information is provided about how many hours/week are allocated for training versus research. These concerns can be addressed by specifically describing how the training for the organ systems in Figure 11 (right) will actually occur, the throughput of the various systems and expected number of users, and the balance of research and educational usage.
GWG Votes	**Is the project feasible?**
Yes: 11	• The combination of local expertise and the solid track records of the different groups is very positive. The hands on experience and the strong institutional support will be essential. Overall the proposal seems feasible. • The leadership track record is impressive. However, the lead applicant is relatively junior in terms of experience running such a complex operation. • The Program Director is a junior faculty member with experience with iPSC production, gene editing, differentiation into heart tissues, and cardiac disease modeling. The PD is an expert in cardiovascular disease modeling with iPSCs, and has a good funding record for their career stage. However, the PD does not have experience running a large resource core or multi-investigator award. • Another key person's research involves disease modeling and treatment in the nervous system using patient-derived iPSCs. This person has used all of the systems described in the proposal and has experience running large programmatic research awards, and can therefore support the PD's development. • The core project manager provides 100% effort. The project manager has the expertise to oversee operations and support core procedures. The core is additionally supported by a co-lab manager (20%-100%) and two part-time Research Associates (10% and 12% effort). The support seems suboptimal for the effort that will be needed to support training and research roles. • No information is provided on the throughput for the proposed system and organoid development. Without this, it is difficult to judge the number of investigators that can be accommodated and whether the core can become self-sufficient. • Insufficient information was provided about training modules to understand enrollments and how this will interface with existing research. • In spite of the lack of clarity of the ability to support research and training needs, there is a commitment to sustain the core operations.
No: 3	• The current 8 different tissue-focused groups at the institution using iPSC organoid and organ chip systems for disease modeling have been working in their own laboratories and a small organ chip core supported currently through one of the institution's labs. These operations will be transferred to the new SRL allowing more efficient use of lab space and access to a wider range of modeling core support. • There are over 350 PIs at the institution doing a range of cutting-edge biomedical studies. Over 50 of these are already doing projects that would utilize the new core. Although this is a good problem to have, it may be too much work for the space and staff. • The core plans to use booking sheets for use of the hoods. It is hard to assess the efficiency of this method. Online booking or calendar systems may be more effective. Very little details were provided regarding running of the core. This is a complex core with many offerings and the day to day details need to be outlined better.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 12	• The DEI plan seems appropriate. The host institution has a strong focus on this aspect. There is an institutional agreement to work with underserved community especially through state colleges. There is a commitment regarding diversity. • The team will work to recruit trainees from underserved or economically disadvantaged groups. It is difficult to judge the effectiveness of their approach without more data on numbers of underserved students in the labs most likely to be part of the SRL. At the least, the institution has an active effort to increase numbers of underserved students in their graduate programs. The partnership with another state institution network should help. • The institution has multiple outreach programs to recruit a more diverse student population for the labs and these courses. Information on the demographics of labs and courses associated with this program would provide a basis for judging the success of these activities.
No: 2	• They plan to add more diverse iPSC lines, but don't give specifics in terms of ancestral or sex diversity. More concrete goals should be pursued here.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 14	• The stem cell course is well designed and includes a lot of different modules which will support the development of projects. This training is embedded in existing programs and will be coordinated with other institutions. It will specifically support groups who want to use stem

	cells to model diseases. • The program is comprehensive and includes a diversity of topics from differentiation to organ on a chip model. This is novel and will complement existing course while the track record of the instructors is impressive and appropriate for this course. • The course is well outlined and thorough, consisting of both online and hands on portions. • They plan to limit the number of students to create a favorable student:teacher ratio. • It is a comprehensive program that will provide an excellent resource and skills to train the next generation of researchers. • The techniques course provides an introduction to the more sophisticated organoid and organ-on-a-chip systems. For more complex systems, researchers will need take the training modules to become competent with the systems. • A number of instructors are involved in the course and all have considerable expertise in the topic which they will teach. The collaborative company will provide some training that could be used for the portion of the course using their system, but it is unclear if the training is a one-time activity or will be a regular part of the curriculum. • The course is well suited for the institution's faculty and students since they already have a core group using organoids and the organ on a chip system.
No: 0	• *none*

Application #	INFR6.2-15403
Title (as written by the applicant)	Enhancing/Expanding Stem Cell-Based Modeling at a Shared Research and Training Facility
Project Objective (as written by the applicant)	The primary objectives are to prepare a diverse California workforce for careers in regenerative medicine while maintaining fiscal stability and contributing to the CIRM SRL Network that will ensure the highest quality research and training standards across California.
Summary (as written by the applicant)	This application proposes to expand and enhance an existing self-sustaining shared stem cell research and training facility that supports dedicated laboratory space for the culture of human pluripotent stem cells, and training for all career stages in CIRM supported and other training programs. The resources and infrastructure currently in place meet the intended mission by providing access to key services and equipment; teaching and training users in the high-quality standards required for culture and analysis of human stem and progenitor cells; and standardized methods and protocols such as those to ensure sterility, assessments of pluripotency and lineage commitment, and well-characterized model systems. Progress in the regenerative medicine field is dependent on resources where high standards are maintained and rigor and reproducibility in research and training is emphasized. The current infrastructure proposes to build on these strengths and capabilities by enhancing and expanding specialized and advanced services and training that include both hands-on and distanced learning in gene transfer, somatic cell genome editing, stem cell labeling for imaging, and 3D model systems. Faculty and staff have extensive expertise in techniques, tools, and technologies that will be offered as educational and training opportunities, and include applications for pluripotent and lineage committed or adult stem cells in two-dimensional or three-dimensional cultures. Enhancing trainee skillsets and core competencies, as well as emphasis on the importance of data management and sharing within the California regenerative medicine research community, is a high priority. Preparing a diverse workforce for careers in regenerative medicine is strongly supported in the facility and through CIRM training programs and California partners. Key goals are to increase users across California, and ensure the facility remains self-sustainable and at the cutting edge of regenerative medicine and gene therapy research and training now and in the future. The program will integrate with the CIRM SRL Network and Steering Committee and contribute substantially to establishing common standard operating procedures and methods to ensure rigor and reproducibility, and an effective data management and sharing plan.
Statement of Benefit to California (as written by the applicant)	The proposed enhancements will provide benefits to California and its citizens by contributing to scientific advancements by providing users with high quality services and training within an established infrastructure that supports human stem cell research, and tools and technologies for gene transfer and editing. The educational opportunities will ensure core competencies and contribute to the diversity of California's workforce that will benefit patients and communities.
Funds Requested	$3,950,775
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	2
Count	15
Votes for Tier 1	0
Votes for Tier 2	15
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 12	• The proposed services are a strength and will attract users as these techniques (e.g. prime/base editing, organ-on-chip) may not be widely available in the SRL network. • The proposal includes expansion to include gene transfer techniques (viral and non-viral); PET and bioluminescence imaging techniques and tools, 3D and organ-on-a chip culture systems. • While some of these proposed services are new and include 3D and organ-on-a-chip culture, other technologies (flow cytometry, imaging, analysis of consequence of gene transfer) are more general. This latter group is often covered by other core facilities, and is not necessarily specific to stem cell models. • While the proposed services are useful and add value, the applicant may also consider expanding services to include generation of stem cell based models such as iPSC generation, gene editing of PSCs and production of PSC-derived cell lineages to support their users. • Very strong leadership team and excellent support from the institution. Builds on a fantastic, self-sustaining core lab. • The proposed resource would be part of a larger facility and extend the resources. The project is well supported by the institution.
No: 2	• The goal is to expand an existing core, which is very large and offer a diversity of services. This core and seems to cover many cell types. Part of the budget is dedicated to equipment which is not specific to use with stem cell models. • There is another Stem Cell Core at the institution. More information should be provided on how these resources will interact and avoid overlap in services and training. • More focus should be paid to new stem cell specific services. Details are lacking in this regard. The applicant's response to reviewers on this issue also lacked specifics. • Reviewers need more information on who would be the new users (i.e., beyond the current users). • There is no information about the costs of services.
GWG Votes	**Is the project well planned and designed?**
Yes: 5	• The applicants plan to offer a wide range of services. Histology services are a strength. • It would be important to understand how this core integrates with and/or enhances other cores on campus.
No: 9	• More detail is needed about what new services will be provided to users (i.e., deliverables, numbers of users expected for each service, etc.). • The applicant requests a FACSAria instrument, but it is not clear how this will be used to provide new services. • The services to be provided are unclear and lack details. Equipment to be funded by CIRM seems inadequately related to stem cell services. • The primary concern is that the facility will be spread too thin by offering too many different types of services. • The SRL core already has infrastructure in place - a large space of 2500 square feet as well as personnel to ensure effective operations. • The training course is clearly presented. The proposal is vague in specifying stem cell modeling services to be offered. The additional information provided (upon request) by the applicant did not provide adequate further clarification. • The applicant includes a solid plan to provide consultation services and training in each of the three new focus areas.

	• The proposal includes hands-on-training on new equipment to be purchased; it's unclear what services the core will be offer beyond these equipment use training modules. • The description of services not related to consultation/training is not well developed. Exactly what services are proposed and how will they be delivered?
GWG Votes	**Is the project feasible?**
Yes: 11	• Project leadership has great track record. • Great space and great institutional support. • The project is feasible as all the expertise is available. However, an operational plan would have been useful. • The proposed timeline is feasible. The team already has all price quotes in place and operations will highly depend on acquisition and installation of new equipment. • The institution has an international track record for research excellence and excellent resources for establishing core facilities. The institution implemented a Research Core Facilities Program that assists in developing competitive recharge rates and provides support in implementation and strategic plans for campus cores. • Both the PD and the Associate PD are well qualified to lead the core. • The core will implement a recharge fee structure to sustain long term financial independence. It already has a proven record of self-sustainability after the end of the last round of CIRM funding (2007-2012). • Due to the applicant's good track record, the project is likely to be successful. • Potential weakness: There may be some potential overlap with another institutional Stem Cell Core (gene editing, organoids and organ-on-a-chip). • No appropriate budgetary plan.
No: 3	• Primary concern that the core services were varied and not explained in much detail to enable a feasibility assessment. • Weakness: The lack of a detailed operational plan to provide the services makes it difficult to assess feasibility. In particular, how the SRL will be staffed is not well described. How many technical staff will provide SRL services? • Weakness: Few details are provided about new users who are interested in using the proposed new services. • Lack of details in the operational plan and services offered make it difficult to fully assess this proposal. • The sustainability plan is good.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 11	• One planned partnership with a sister institution will provide additional diverse iPSCs. • Another planned partnership with a sister institution's umbilical cord blood bank will allow access to blood samples that could be reprogrammed into iPSC better representing the diverse population. Although, it is again unclear if the core provides reprogramming as a service. • The DEI statement and plan are strong. • The institutional commitment to DEI is strong and a number of programs are described in the application. The SRL will undoubtedly benefit from these programs. • Cells from diverse genetic backgrounds are available to SRL users through the CIRM iPSC repository and sister institution's cord blood bank.
No: 3	• Not clear how DEI is addressed in the proposal.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 13	• New advanced courses build appropriately on the basic classes and their expertise. • The curriculum is well designed and the content is appropriate to cover the new technology being offered by the core. It contains four modules including stem cell culture, gene transfer and editing, stem cell labeling and imaging, and organoid platforms. The course has both lecture and hands-on components. • The course is offered 2-4 times per year which provides ample opportunity for interested researchers. • Instructors are well qualified to teach the course. • One weakness of the course is that the gene editing module only covers somatic cells. A module on editing of PSCs using CRISPR/Cas technology would be more relevant. • This proposal includes a well-designed stem cell techniques course, consisting of a curriculum of both virtual lectures and hands-on training experiences separated into discrete training modules. • Inclusion of continuing education services to support implementation of methods in trainee labs is a strength.

	• Excellent syllabi.
No: 1	• The course is too limited and should be broadened to cell culture, differentiation etc., and focus less on characterization. It's not clear whether the course is part of the core's overall services or if the main core service is the course.

Application #	INFR6.2-15457
Title (as written by the applicant)	Shared Resources Laboratory for Stem Cell-Based Modeling in Stem Cell Biology and Engineering
Project Objective (as written by the applicant)	We propose to expand and enhance our stem cell core, a key resource for the local area. This project will accelerate new therapies and train stem cell scientists.
Summary (as written by the applicant)	We propose to expand and enhance an essential stem cell core facility on campus. This successful facility, established in 2005, serves as a key resource for the local area. Its clients include not only campus investigators, but also researchers and students from nearby colleges, universities, research institutes, and biotechnology companies. The major goals of our program are: • Enhancement of the Core Laboratory via the addition of new, modern equipment to support stem cell culture and analysis. • Expansion of access for diverse investigators and students to state-of-the-art technology for research in stem cell biology and engineering. • Sharing of unique stem cell-based models related to Neural Development and Disease. • Novel patient-derived hiPSC and CRSPR-engineered hPSC lines for modeling neural disease • Integrated Embryo Models for modeling early neural development • Brain and Retinal Organoid Models for modeling the development of neural connectivity, neural disease, and ocular maladies • Access to advanced imaging, single cell RNAseq, omics and multi-electrode array analysis of cells and cell assemblies • Access to the BioFoundry for culture optimization, genetic and pharmacological screening • Access to the Materials Research Lab for investigation of novel materials for encapsulation and scaffolding to support cell therapies • Establishment of two hands-on laboratory training courses: Advanced Stem Cell Techniques and Quantitative Stem Cell-Based Modeling.
Statement of Benefit to California (as written by the applicant)	We propose to expand and enhance our stem cell core, a key resource for the local area. Its clients include campus investigators, students from local colleges, universities, and biotechnology companies. We will establish two new courses. This project will accelerate new therapies and train a diverse future generation of stem cell scientists and wlll be of great benefit to the state of California as we develop new therapies and train stem cell scientists.
Funds Requested	$3,999,995
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	2
Count	15
Votes for Tier 1	0
Votes for Tier 2	15
Votes for Tier 3	0

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 13	• This proposal will bring together a number of new technologies that will be available to the institution and the surrounding areas. In particular, the usage of the core by the existing CIRM scholar and trainee programs will help attract and train new researchers in the field. • The project would provide good support for the institution's local area and greater central coast area. The proposed Advanced Stem Cell Techniques and Quantitative Stem Cell-Based Modeling will be made available to CIRM Scholars, CIRM Bridges trainees, students at other central coast universities and community colleges, and industry scientists. It will also support the training and research activities of two CIRM Bridges programs at nearby institutions. • There is strong support for novel brain and retinal organoid models to support a biotechnology company which will help support a new CIRM CLIN2 grant to carry out a phase 2b clinical trial for age-related macular degeneration. The core also features novel integrated embryo models for modeling early neural development. • The proposal covers the addition of several novel technologies, most importantly, integrated embryo models. • Access to the institution's Biofoundry and Materials Research Lab add additional layers of technology that are critical to advancing the field but not commonly available. • The strength of this proposal is the novel research platforms that can be brought to the table. A large number of edited lines will be available which will help researchers interested in those diseases incorporate stem cell models into their research. • Access to extensive imaging and transcriptomics is a strength. Access to the MERSCOPE (for use in spatial transcriptomics) is an exciting complimentary tool to the offered cellular components. • The leadership team is experienced and has already begun to disseminate knowledge through area stem cell meetings. • There was enthusiasm for the program's track record of expertise in retinal stem cell models and ability to provide expertise in developing stem cell-based therapies, for example for age-related macular degeneration. This facility could enhance the SRL network. • The focus on neural development and diseases is aligned with many user and the development (and sharing) of optogenetic and Alzheimer's disease-related lines is interesting and important. • The objective is important. The gastruloid focus is interesting. The collaboration with other cores will increase impact. The proposal is good without being exceptional. • A major weakness driving reduced scores is that the services planned seem to only be relevant to a limited scope of users and it's not clear how these services will serve the users they note in the application. • The offering of "gastruloids" is unique but its use might be limited to a select group of already involved users.
No: 1	• The proposal is from a successful core wishing to expand, but it is not clear how many users or potential users will use these expanded services, so the value proposition is hard to assess. Nevertheless, this is the only core proposing to provide retinal stem cell models relevant to diseases of the eye.
GWG Votes	**Is the project well planned and designed?**
Yes: 10	• The existing core and directors have ample experience in retinal stem cell models relevant to disease of the eye. But they will also provide other neural models and iPSC lines (e.g. Alzheimer's disease-related lines). Also included are novel integrated embryo models for modeling early neural development. They will also support these models with relevant

	services in imaging and spatial transcriptomics. • There are no concerns with the facility planned. The equipment requests are appropriate. • The core will play an important role in two newly awarded CIRM Training Grants – The EDUC4 program for Grads and Postdocs and the EDUC5 program. • Another strong point is providing supporting services via a BioFoundry to support screening assays, and a Materials Research Lab for investigation of novel materials for encapsulation and scaffolding to support cell therapies. • There are a number of potentially new users listed who do not work in the neuro space. The needs of these new users is not specifically addressed (for example, bone marrow derived stem cells, kidney organoids, cardiomyocytes).
No: 4	• The strength of this proposal are the novel research platforms that can be brought to the table. A large number of edited lines will be available which will help researchers interested in those diseases incorporate stem cell models into their research. • While the outcome criteria were generally well described, the outcome criteria for the dissemination about the lines and service offered by the SRL as well as the current and future usage could be more carefully outlined. • This proposal is low risk with strong expertise. However, the sustainability is weak. Staff seems appropriate but the resources requested could be too limited.
GWG Votes	**Is the project feasible?**
Yes: 14	• The leadership team is very experienced and has a good track record in all proposed areas. • The Program Director has ample expertise in the models and in running cores and building the center. A large number of faculty will provide stem cell lines and expertise. • The team will be able to deliver the objectives of the project. • The long-term sustainability of this project is based upon recharge rates and the facility will set recharge rates depending on other obtained funding. Importantly, the institution has shown willingness to allow for-profit companies to use the core and to recharge at higher rates. • The sustainability plan is reasonable. They have a plan to seek line-item positions that will be supported by the Neuroscience Research Institute, in addition to seeking further grant and gift funding. They also have a recharge plan. • The core had previous CIRM support and continued operations with funding from foundations and other grants and gifts. A modest recharge was instituted to recover some costs. The center is quite active with about 60 current users from 18 different laboratories. • The facility is appropriately staffed with sufficient efforts allocated to the tasks. A suitable billing system and oversight is in place.
No: 0	• *none*
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 4	• While there is a general statement of the core being open to everybody in California and being in line with educating California's diverse population, as described in its Strategic Academic Plan, no specific efforts to attract diverse students are described. • There is no discussion about ancestral and sex diversity in offered stem cell-based models.
No: 10	• The proposal is light on details regarding DEI. It highlights the range of diverse student groups on campus that will have access to the courses and service offerings, but does not provide any details. • While overall DEI plans seem good, unfortunately there was no consideration found for use of diverse cell lines in the models offered. • The diversity of stem cell models is completely missing. The applicants don't describe how they will promote inclusion, and provide only a value statement regarding diversity. • There was no mention about the diversity of the cell lines. • There was no mention of how to reach underserved populations. • DEI plans were not clear. • The DEI section is weak.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 11	• This proposal includes plans to offer two courses and up to four workshops. The courses will be run in conjunction with the nonprofit "Pathways to Stem Cell Science". • The plan to establish the Advanced Techniques course is good. They have entered into a partnership with a nonprofit organization that has already been providing this course to CIRM Bridges students in a nearby area. The course seems well designed for the aims and all staff are well qualified. • The curriculum seems well designed for developing hands-on stem cell culture skills and is based off one originally developed in 2009 at another institution, for instruction in culturing,

	freezing and manipulating hPSCs. • The course seems appropriate without being exceptional. • Courses are described to target CIRM Bridges trainees, students at other central coast universities and community colleges, and industry scientists. • Courses will cover "Advanced Stem Cell Techniques" and "Quantitative Stem Cell-Based Modeling", however, it is not clear how these courses fit with the background knowledge of Bridges and EDUC4 and EDUC5 students. • The selection of students that would benefit is not described. • The plan is to offer these workshops and courses for free for the first three years and eventually institute a tuition. This seems like a lost opportunity to build a financial reserve.
No: 3	• For the Advanced Stem Cell biology course, the applicant provides a syllabus with an appropriate list of topics and schedule for advanced cell biology techniques. However, no learning objectives or description of what students will be prepared to do upon completion (e.g., start work in a stem cell lab?) are provided. No syllabus for the quantitative course was uploaded, but it plans to enable students to do hypothesis-driven research. • There is no description of how they will recruit students to the courses or how the courses will fit into students' education (certificate? credit?). Are they just planning to serve Bridges students?

Application #	INFR6.2-15513
Title (as written by the applicant)	A Comprehensive Biorepository of Human Induced Pluripotent Stem Cells and Their Cardiovascular Derivatives
Project Objective (as written by the applicant)	Harness the potential of iPSCs to revolutionize cardiovascular research, enabling precise disease modeling, novel therapeutic insights, and improved patient outcomes. Simultaneously, empower researchers and students through comprehensive training, driving advancements regenerative medicine.
Summary (as written by the applicant)	This project addresses the global challenge of cardiovascular diseases (CVDs), which contribute significantly to morbidity and mortality. CVDs manifest with diverse disease profiles and varying drug responses among patients, particularly evident in conditions such as peripartum cardiomyopathy (PPCM) and congenital heart disease (CHD). To address these challenges, induced pluripotent stem cells (iPSCs) have emerged as a transformative tool in cardiovascular research and medicine. iPSCs possess the unique ability to self-renew indefinitely and differentiate into various human cell types, thereby opening new avenues for advancing cardiovascular disease modeling and developmental disorder research. Despite notable progress in iPSC research, significant obstacles remain that hinder their full potential for cardiovascular studies. The existing biobank has made commendable strides in overcoming challenges by amassing a diverse iPSC collection and enabling external distribution. However, certain gaps persist, especially in enlisting both genetic and non-genetic disease cohorts and addressing early developmental diseases. To bridge these gaps, the innovative Shared Resource Laboratory (SRL) core has set forth ambitious objectives: (i) To expand the iPSC collection by recruiting diverse genetic and non-genetic cohorts, with a special focus on PPCM and CHD donors; (ii) To enhance resources through the generation of naïve stem cells from existing and prospective primed iPSC donors; (iii) To provide primed and naïve iPSC-derived cardiac cells to facilitate precise cardiac tissue modeling, disease investigation, and drug evaluation; and (iv) To foster extensive collaboration with researchers by offering training and support in iPSC reprogramming, naïve iPSC culture, embryo modeling, and 2D and 3D cardiac cell culture techniques. This collaborative approach empowers the scientific community to fully harness the potential of iPSCs and iPSC-derived cardiac cells for comprehensive cardiovascular studies. The SRL core is led by a distinguished team of experts, with combined expertise ensuring the seamless execution of the project's objectives, heralding a new era in cardiovascular research and shaping the trajectory of personalized medicine in the field. In unity with the shared mission, the SRL Core is poised to offer pioneering techniques, abundant resources, and strategic collaborations that hold the promise of catalyzing advancements in cardiovascular research.
Statement of Benefit to California (as written by the applicant)	The SRL Core's pioneering cardiovascular research using iPSCs will position California as a leader in scientific innovation. Collaboration among experts and institutions will drive knowledge sharing, while training initiatives will cultivate a skilled workforce for future breakthroughs. Enhanced cardiovascular health and personalized medicine outcomes will establish California as a frontrunner in biomedical research.
Funds Requested	$3,995,356
GWG Recommendation	Tier 2: needs improvement, could be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 2

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	3
Count	15
Votes for Tier 1	0
Votes for Tier 2	10
Votes for Tier 3	5

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 6	• The proposed SRL will add to the available technologies across California by creating cardiac disease iPSC models across diverse populations. • Cell offerings will include diseased and healthy subjects as well as cardiac differentiated derivatives and naïve stem cells. • The outcome criteria are very specific and measurable which increase the ability to accurately measure impact. • The team has a proven track record of data and biomaterials sharing. • Would create an important resource; using a multiplex approach is a strength. • Very ambitious proposal; could be scaled down.

No: 9	• The proposed project aims to generate 500 iPSC lines from CHD and PPCM donors and to differentiate them into a variety of cardiac lineages for banking and distribution to researchers.
	• The scientific merit of this proposal is sound, and it will undoubtedly advance the field of cardiovascular disease.
	• The naive cell lines proposed by the applicants provide good value and will be very useful for modeling developmental disorders.
	• Strengths include:
	  ○ Proven track record of sharing 1000's of iPSC vials to researchers.
	  ○ They maintain a public website to access the biobank.
	  ○ They also submit genomic data from their various lines to reputable repositories, reinforcing data integrity and accessibility within the scientific community.
	• They also intend to share comprehensive documentation, protocols, and standardization procedures with researchers, fostering a collaborative and innovative research environment. The Program Director is an important asset.
	• They do add to the body of work and access to additional genetically diverse lines in addition to addressing early developmental diseases will enhance resources by generating naïve stem cells from current and prospective primed iPSC donors. Subsequently creating stem cell embryo models such as blastoids for developmental disease research, although not critical, offers benefit to the stem cell community.
	• Main goal is to extend collection of iPSCs to increase diversity to model cardiac disease. If successful, this project would be very impressive, but the scale is just too big.
	• While expertise and cell models proposed are top-notch, the feasibility of deriving 500 new iPSC or naïve iPSC and differentiating them given the resources proposed seems unrealistic. However, the overall plan could be attractive if they scaled down expectations and reallocated the budget. This is one I'd like to see come back in reapplication if possible.
	• The proposal sounds unrealistic and extremely costly and with unknown significance as part of a SRL network.
	• I'm not sure if this would attract additional researchers but adds to the resources available to them.

	• I would like to see a better analysis of the value proposition. For example, how many researchers will use the new resources? • For such a large-scale project, it is unclear that the money spent will justify the relatively small number of anticipated users (<15 in California) that it will benefit. • More explanation is needed for how new California researchers will be brought in to use the new services proposed. • Limited number of users.
GWG Votes	**Is the project well planned and designed?**
Yes: 9	• The SRL core proposes service offerings in three areas - generation of diverse cardiac disorder specific iPSC, generation of naïve iPSC from some of these cell lines and differentiation of cardiac derivatives from both of the above cell types. • The project is well described and planned. The core will derive 500 primed iPSC lines and 200 naive iPSC lines. These lines will be differentiated into multiple cardiac lineages in 2D. 3D tissue differentiation will be offered on demand. The core will also offer iPSC cell villages. • The proposal provides excellent detail on how they will recruit diverse subjects and how the related data will be gathered and curated. • The patient recruitment and clinical data collection and curation are well designed and have suitable personnel in place. • The SRL is well planned with complete services from cell production to comprehensive analysis tools. • Additional clarity on how this may fit with other campus resources would be a plus. • The proposal did not provide details on how iPSC reprogramming will be carried out. No characterization or QC criteria are listed to ensure that the derived iPSCs are of high quality. • It is hard to get a grasp of the total amount of space dedicated to the proposal and if it will be enough to serve both the needs of the researchers and educational classes. • The proposal did not provide information on core personnel (either existing or to be recruited) who will be carrying out these activities. • More detail needs to be added about how the current staff will support these activities. • The budget is confusing and contains discrepancies. Also, it is curious that the proposal requested over $1,400,000 for maintenance of equipment. This is a very large sum without justification.
No: 6	• Details are needed about how the large number of iPSC lines and differentiated cells will be practically achieved. • Not sure how they will be able to do this many lines. More details about staffing and ability to do this work is needed. • The cell village concept is interesting but is not likely to work and are unlikely to erase the variability in differentiation. Naive stem cells may not be useful for disease modeling.
GWG Votes	**Is the project feasible?**
Yes: 1	• The center has excellent facilities and resources for the team to execute the project plan, so the project in principle is feasible. • The PD is well qualified and has led prior efforts in generating iPSC banks for other cardiomyopathies. • The proposal does not have a budget for the personnel who will be doing all the cell work, which presumably will be the largest portion of the cost of the work. Without a budget for personnel, this project will not be feasible.
No: 14	• The team is already in place and has demonstrated an ability to operate this enterprise. However, it is not clear if there are enough personnel and the budget to accommodate this ambitious number of additional cell lines. • From the details in the proposal, it is not clear how they can do this many lines. QC measures need more detail. How will comparisons be carried out with this large number of cell lines? • How much characterization and QC will be performed on the new lines? • There was concern about the feasibility of generating all the listed lines and cell types. • Too many lines seem to be generated, so the feasibility is not clear. • The proposal and scale of cell lines to be generated and banked is very ambitious. This would be extremely challenging for the budget included and this timeline. They also want to differentiate all these cell lines into cells. This is simply not feasible. • There are not enough people to do the work. • There was also concern about whether the budget could support this work. • Not feasible based on available resources and the timeline. • The proposal would benefit form more detail about why the particular diseases to focus on were chosen and how the particular mutations were chosen. • There appears to be a large part of the budget devoted to equipment maintenance.

	• Space is limited.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 14	• This proposal has an excellent plan to support DEI. Highlights include recruitment of underrepresented populations for deriving new iPSC lines and hosting minority students from other CA institutions. • The DEI statement and plan are strong. • They will follow the institution's inclusion, diversity, equity, and access initiative and other institution wide DEI principles. • There are some ideas presented that appear acceptable. • Although tuition will be free, they don't list any other strategies to help overcome barriers to participation from underserved populations. • They do plan to include diversity into the cell acquisition, but without active recruitment. It is based on who walks into the clinic, so this may limit ancestral diversity.
No: 1	• Lacks details for the derivation of diverse hiPSCs or how they will reach underserved students.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 14	• The Stem Cell Techniques Course is well designed. It covers a wide variety of topics all taught by experts in the field. It has both lectures and hands-on components. • The course is one of the largest ones available and will be offered quarterly and aims to serve up to 70 students annually. This is a big plus. • The course includes a variety of topics from basic culture methods including reprogramming, gene editing, generating cardiac lineages and ethics. It covers all the necessary skills needed for stem-cell based modeling research. • This is an excellent proposal with a combination of online and in person instruction. The content covers a wide range of topics that will enable a student to gain independence in stem cell culture and experimentation. • Appropriate topics & great syllabi with learning objectives. • The course topics are relevant and useful. • The instructors for the course are extremely well qualified the topics covered and most have dedicated significant time to training the next generation of stem cell scientists. • The course is designed for high school, college, and graduate students along with researchers. The program will host up to 70 trainees per year with at least 40-60% of trainees from underrepresented backgrounds, but the plan lacks specific details about recruitment or how students will be chosen. • The course looks well designed for a range of students, but again, the focus could be too advanced. • This a commendable effort and impressive numbers of students assuming demand is there. Given space, hoods, and equipment limits, can this be accomplished without impacting ongoing research?
No: 0	• *none*

Application #	INFR6.2-15482
Title (as written by the applicant)	Shared Laboratory of Human Organoids and Complex Multicellular Systems
Project Objective (as written by the applicant)	The Shared Lab aims to offer access to diverse organoid models, cutting-edge equipment and pioneering expertise. We will foster studies of tissue dynamics and disease while emphasizing education. Our innovation in stem cell models and data processing ensures sustained advances in organoid research.
Summary (as written by the applicant)	We are establishing the Shared Lab of Human Organoids and Complex Multicellular Systems with a primary goal of standardizing organoid production and enhancing academic and industry collaborations. Organoids, derived from stem cells, have become instrumental in understanding tissue organization, development, disease, and personalized medicine. The Shared Lab will provide open access to these organoid models and provide state-of-the-art collaborative environment, equipment, uniform protocols, and comprehensive training. Our emphasis on large-scale, standardized organoid production from diverse genetic backgrounds underscores our commitment to diversity in both fundamental and translational research. Education initiatives, especially for underserved communities, will be central to our mission. By innovating in bioengineering and data processing, the Shared Lab aims to advance organoid research, establish enduring partnerships, and ensure sustained success.
Statement of Benefit to California (as written by the applicant)	The proposed Shared Lab offers California and its citizens a forefront position in medical advancement through stem cell research, particularly in organoids. As stem cell innovations reshape medicine, it's essential to address organoid research challenges for translating fundamental insights into clinical applications. Our commitment is to navigate these obstacles, guaranteeing Californians have broad and equitable access to these transformative biomedical technologies.
Funds Requested	$4,000,000
GWG Recommendation	Tier 3: sufficiently flawed, cannot be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 3

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	1
Lowest	3
Count	15
Votes for Tier 1	1
Votes for Tier 2	1
Votes for Tier 3	13

- A score of “1” means that the application has exceptional merit and warrants funding.
- A score of “2” means that the application needs improvement and does not warrant funding but, at the applicant’s option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group’s review.
- A score of “3” means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel’s discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 10	• The application has a clearly defined goal of generating a shared lab that is focused on (i) reproducible organoid production from diverse donors that will be made available on demand, and (ii) providing training to researchers. Organoids will span multiple organ systems, increasing the value of the offerings. The laboratory will be built on the already established CIRM hiPSC repository to maintain organoids of a vast variety. The entity will also help in coordinating access to core services that enable hiPSC reprogramming, gene editing, and clonal edited line derivation. The Shared Lab will collaborate with other CIRM-funded entities. • There is a superb stem cell research environment at the institution, and the broad range of proposed neural organoid types is supported by faculty with strong expertise in their generation and application. • There is a strong focus on robust organoid phenotyping (including high-throughput imaging). The importance of standards and quality assessment (including in the educational offerings), is a significant strength of this application. • The focus on organoids has a strong value proposition. • This has the potential to be of great value as a very ambitious proposal. • Education is a vital part of the application and is focused to increase access of underrepresented scientists, but how such "users" will be attracted is not clear. • The anticipated needs that this facility will address are not discussed. There is a risk of the facility mainly catering to the scientific needs of an already established team. How is the facility advertised and what is the target population that would subscribe to the monthly fee? What are the costs of "buying" organoids? • The project seems like a research project on its own, rather than a shared resource facility. • Expertise is good, but a main concern is with feasibility of delivering on the proposed plan.
No: 4	• The SRL outcome criteria, particularly repeatability and the availability of top-tier organoids, appear to indicate success. However, more specific success measures and user feedback channels would improve the application.
GWG Votes	**Is the project well planned and designed?**
Yes: 2	• The approach is using state of the art techniques to generate and validate offered organoids. • The project is well planned, but the scale and the breadth could be too ambitious. • The "holistic" approach to organoid research includes everything for generating, analyzing, screening, and characterizing organoids. The services provided seems to take over the goals of a normal research grant, making this proposal seem more like a research project. • The protocol (and the associated products) might be biased by being exclusively driven by a single lab's protocol. Other approaches are known, and inclusion of other approaches would strengthen the offerings.
No: 12	• The subscription plan seems unlikely to succeed. How will the priority of users' projects be set using this model? • The percent effort for the program directors and SRL director are appropriate for the project, but beyond these individuals, only two technical staff are proposed at 20% effort each. This seems entirely insufficient to provide the breadth of proposed services. • Several experts in the different brain organoid models offered by the SRL will contribute their expertise and protocols to the SRL. Some will provide consultation services. However, no percent effort is provided for these faculty. • Organoids are difficult to produce and not a routine technique. Unless the core has already made significant progress generating the breadth of models proposed, the time needed to produce and standardized production might be too much given the staff proposed. • The proposed space is too small and distributed across multiple campuses/labs to be effective as an SRL. The proposal is unfocused, decreasing the likelihood that the investment will have significant outcomes. • Too many approaches are pursued at once.
GWG Votes	**Is the project feasible?**
Yes: 1	• The expertise is available and thus the project appears feasible.
No: 13	• It doesn't seem that there are enough staff to support users with the proposed scope of services. • Feasibility is a serious concern with limited staff for serving a subscription service. • Depending on the number of users, they may have difficultly servicing the need as these are complex models and will need significant help to pull this off. • The number or proposed services is extensive and this is a weakness of the proposal. Despite having technical expertise within the institution, the plan for the SRL to support applications ranging from iPSC culture, disease modeling, organogenesis, screening

	platforms, pharmacogenomics, automation, through cell therapy seems entirely too ambitious. • Organoid generation and culture in the SRL appear as if they will be performed in two labs on separate campuses. Effectively operating the SRL across these two locations seems like it would be very challenging. • The timeline is not realistic. • The executive committee is not named, and the size is not clear although three members are required to validate decisions (3 out of how many?). One individual is named to received salary (5%) but their role on the leadership team is not clear or discussed. They also seem to provide access to a multi-electrode array to aid in organoid generation, but it is not clear how this would work. Will their lab space be open to users and/or course participants? • The monthly recharge fee of $1,300/user has been calculated to be is sufficient to maintain operations and while a subscription based model is interesting, it is not clear how access of subscribers will be prioritized and how many users at any give time can be accommodated. • As the core proposes to provide the generation of complete data sets that might uncover novel insights, it is not clear how intellectual property or authorship questions will be handled. • Feasibility is at risk, since the models have not yet been developed. The model of funding via subscription is not tenable (funding agencies would not allow it). • The individual contributors are already generating organoids and are thus able to begin operation immediately after installation of equipment. • The applicants' track record is excellent. • The proposed SRL is embedded in an institution that is a world leader in developing innovative stem cell and organoid technologies. There are superb institutional technical resources. • There is a strong sense of existing interactions and collaborations with investigators within and outside the institution. • There is an impressive list of faculty and other institutions interested in utilizing the services of the SRL.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 13	• The ultimate goal to provide access to 40 iPSC lines from individuals from diverse ancestries is very good. • A core mission is to provide highly diverse organoids for research. • Yes, DEI is addressed well. • The DEI could be better developed. There is a plan to derive organoids from diverse backgrounds, but the outreach approach could have been better planned. • A commitment to a culture of DEI is included but a weakness is that there is no discussion of institutional programs related to DEI. • The recruitment of users who have otherwise limited access to such a service is not well addressed.
No: 1	• *none*
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 12	• The syllabus is clear and the courses are well organized. • The proposal describes a well-designed stem cell techniques course, consisting of a comprehensive curriculum of both lecture based and hands-on organoid training experiences. The syllabus has clear objectives that will provide trainees with a solid foundation in stem cell culture, differentiation into neural organoids, and quality control considerations. • The plan to provide consultation for troubleshooting technical issues for SRL users after completion of the training module is a strength. • The course design is excellent. • Students enrolled in the CIRM Bridges program might benefit from the course but how these students integrate with other, perhaps more advanced, course participants is not clear. • Knowledge-based criteria are not addressed to ensure the course is beneficial for all.
No: 2	• The course is poorly planned: there is no consideration of the different knowledge levels of students who would take this course.

Application #	INFR6.2-15521
Title (as written by the applicant)	The Shared Resource Laboratory for Human Stem Cell-Based Embryo Models
Project Objective (as written by the applicant)	To provide: i) Comprehensive assistance in using stem cell-based human embryo models for research; ii) Hands-on training and education for scientists aiming to establish these models in their laboratories; iii) Tissue-specific organoids from stem cell-based human embryo models.
Summary (as written by the applicant)	We aim to establish a Shared Resources Laboratories (SRL) for Human Stem Cell-derived Embryo-Like Models. The SRL will provide access to expertise and resources pertaining to stem cell-based human embryo models, foster collaborations throughout California and beyond, improve standards and reproducibility of these models, and create educational opportunities to learn these techniques. Human embryonic stem cells (hESCs), human pluripotent stem cells (hPSCs) or induced pluripotent stem cells (hiPSCs) will be combined to form models that recapitulate the epiblast (future organism) and the extra-embryonic hypoblast (future yolk sac). Comparable models for mouse embryos have already advanced to the onset of organogenesis, and we expect to achieve similar milestones with these human embryo models. Although these models can form the bilaminar disc, undergo gastrulation and establish tissues within an embryo-like structure, they cannot generate a fetus because they lack trophectoderm-derived lineages. The SRL will collaborate with various experts to create new embryo models that form specific organs. As a core facility, the SRL will accelerate discoveries in regenerative medicine and enhance our understanding of human biology and disease mechanisms. The proposed Services within the SRL include: 1) Comprehensive assistance in using stem cell-derived human embryo models for research. 2) Hands-on training and education for scientists aiming to establish these models in their laboratories. 3) Generation of tissue-specific organoids from stem cell-based human embryo models. The SRL will provide essential technologies for analyzing and manipulating the human embryo models, including imaging and cell sorting, confocal microscopy, gene delivery and editing, and single-cell RNA sequencing. The SRL will support a variety of investigations, such as: 1. Engineering stem cell-derived human embryo models that progress to initiate organogenesis. 2. Identifying Signaling Pathways in Development. 3. Creating robust models of distinct cell types and tissues. Creating stem-cell based human embryo models requires specialized resources and knowledge, currently available from only a few labs worldwide. Our SRL core will meet the growing demand for these models by providing unique resources and training. The SRL is expected to increase the impact of these new human embryo models, improve their accuracy and reproducibility, and uncover their utility for elucidating human biology and disease. Ultimately, the proposed SRL core would position California as a leader in this emerging field and technology.
Statement of Benefit to California (as written by the applicant)	Creating stem-cell based human embryo models requires specialized resources and knowledge, currently available in a handful of labs worldwide. This SRL will meet the growing demand for these models by providing unique resources and training. It will increase the impact of human embryo models, improve their accuracy and reproducibility, and uncover their utility in understanding and treating human disease. Thus, the SRL would position California as a leader in this emerging field and technology.
Funds Requested	$2,603,500
GWG Recommendation	Tier 3: sufficiently flawed, cannot be resubmitted
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 3

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	3
Count	14
Votes for Tier 1	0
Votes for Tier 2	5
Votes for Tier 3	9

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 6	• The proposed SRL for Human Stem Cell-derived Embryo-Like Models provides a significant value proposition in the field of stem cell research and embryo development. The focus on sharing expertise, fostering collaborations, and generating new human embryo-like models addresses the critical needs of researchers across California, particularly those looking to better understand human biology and disease mechanisms. • The proposed stem cell-based models are of significant value. However, ethical issues associated with creation and use of these models are not sufficiently addressed. • The science itself is exciting and this effort would increase these experimental approaches to California. However, the proposal will not create not a shared resource lab.
No: 8	• The science is very exciting and needed. It would likely drive new innovation both in basic stem cell research as well as human health, but such a limited number of trainees and likely the number of researchers restricts the value. • There is enthusiasm for the science proposed here, but this is a research proposal rather than a SRL. • While this is a unique and potentially valuable line of study, it is not clear how this will be a service to the SRL network. As proposed, this resource is not really a core. Limited training will be provided. • The proposal sounds more like a startup package for recruitment and not a core. • The user base is very small, so the core does not offer significant value for the funds provided. • The budget requested to train one person at a time (for two-week periods) does not seem appropriate. It is unclear how many people will be trained. • There is no plan to sustain the SRL beyond performing a detailed cost analysis and comparison to other cores at a future date.
GWG Votes	**Is the project well planned and designed?**
Yes: 4	• The general approach sounds reasonable, but differentiating human hPSCs is more complicated than mouse PSCs, which is the applicant's primary area of expertise. In addition, cell line variability could pose additional challenges. • This proposal is not structured as a core facility, making this a high-risk approach.
No: 10	• It is not clear if this core will be sustainable because it is so niche. Will there be enough users to support independent operation? • One goal is to "to diversify the cohort of stem cell researchers." However, it is unclear how this will be accomplished since outreach is lacking. • Only one person will be able to visit at a time, and the plan is for a person to stay for two weeks. • The proposal is more science orientated, versus focused on a stable core.

	• It is not well articulated on how this will operate as a core. Some institutional support is lacking. Details of the space are lacking.
GWG Votes	**Is the project feasible?**
Yes: 8	• The stem cell-based models proposed, including those that replicate epiblast and extra-embryonic tissues, are robust and in line with the latest advancements in the field. The establishment of such models in the program director's lab further supports their viability. • The project is feasible but the technology proposed also has significant risks and therefore might be too premature to offer as an SRL service. It is very likely that lots of exploratory work would need to be performed to establish standardization and reproducibility. • The institution's Center for Science, Society, and Public Policy will be involved in ethical issues surrounding embryo models. • The proposal should further address long-term feasibility given the evolving practices and oversight of embryo models.
No: 6	• The proposal did not convincingly demonstrate feasibility in light of the fact that policies, standards, and oversight for embryo culture in California are not yet established.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 1	• *none*
No: 13	• The CIRM Bridges program is mentioned but it is not clear that the program director understands what this program is, as the people to be trained in the SRL, as proposed in the text, are not Bridges students. • The DEI plans consist of vague language that appears to have been pulled from other sources. • This section only provided a list of potential resources or existing programs, which are not really connected to the resource centers. Ethical issues regarding embryo models are not adequately discussed. • The plan reads as boilerplate institution information. • The DEI plan is insufficient, and more details are needed • This is not well-developed and needs improvement. • This needs to be developed fully.

Application #	INFR6.2-15372
Title (as written by the applicant)	A Shared Resource Laboratory for Stem Cell High-Throughput Biology & Comprehensive Techniques Training
Project Objective (as written by the applicant)	•California's 1st SRL providing services/training in High-Throughput Biology, a newly-emerging area of stem cell biology & disease modeling •Comprehensive series of techniques training modules serving stem cell investigators from novice to expert with individualized curricula •Benefit the underserved
Summary (as written by the applicant)	In our SRL renewal, we offer services & training in a highly-sophisticated, newly-emerging area in stem cell biology & disease modeling – High-Throughput (HT) Biology. Briefly, HT Biology-based research relies on the use of automated, HT assays with cellular & functional readouts & systematic & unbiased experimentation, to accelerate the pace of discovery & expand the exploratory space of research. Thus, in addition to improving productivity, the great value of this methodology is to increase reproducibility & thus the impact of SRL users' research. The SRL will offer state-of-the-art stem cell-based disease biology phenotyping, functional genomics (siRNA & arrayed CRISPR guides libraries) & focused small molecule screening services. Moreover, it will offer user training & access to highly specialized & cutting-edge technologies & equipment, increasing the ability of investigators to pursue these types of studies. As a result, we expect that the SRL will contribute to advancing our understanding of human disease biology, facilitate the implementation of early drug discovery programs, promote intellectual property creation, and, more generally, stimulate innovation in California. The SRL, will also provide a portal in which less experienced stem cell biologists, or even non-stem cell biologists (e.g., clinicians) can ultimately gain access to this technology, through training & offered services, for example, generating high-quality hiPSCs from patient samples. Training will be directed to engaging the spectrum of stem cell investigators – from the novice needing our Basic Techniques Course to the experienced user wishing to learn cutting-edge models (e.g., our Organoid Module) & new ways of interrogating them (e.g., our HT Module & Single Cell/Spatial Proteomic Module). Our SRL will contribute to outreach & to the education of the CIRM trainees we host – BRIDGES, EDUC4, SPARK, & COMPASS programs which benefit under-represented communities. While we will be self-sustaining through recharges/tuition, sponsorships, donations, royalties, & sponsored research, we will use any revenue>costs for scholarships. While our SRL & Courses alone are high-value, their impact is amplified by being one of the "nodes" in a Network formed with other Institutions in our neighborhood with complementary specializations that leverages synergy, avoids redundancy, optimizes quality, yet provides sufficient overlap to ensure rigor in cross-validation & reproducibility, particularly of protocols and data that will be publicly-accessible. A Steering Committee will direct users to the most appropriate SRL for a given project. That same collaborative culture led to emergence of a Stem Cell Techniques "Institute", a "hub-&-spokes" arrangement wherein the "spokes" are modules for a particular technique conducted in the Institute where that skill is performed most commonly, & the coordinating "hub" ensures that trainees pursue a curriculum tailored to their individual needs.
Statement of Benefit to California (as written by the applicant)	Our SRL represents the State's 1st capable of providing services/training in High-Throughput Biology, a newly-emerging area of stem cell biology, disease modeling, & drug discovery. It also provides a portal in which less experienced stem cell biologist (e.g., clinicians) can ultimately gain access to this technology, e.g., when hiPSCs are generated from patient samples. We offer the State's 1st comprehensive series of training modules with curricula individualized for the novice through expert.
Funds Requested	$3,999,999
GWG Recommendation	Tier 3: sufficiently flawed, cannot be resubmitted
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 3

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	3
Count	14
Votes for Tier 1	0
Votes for Tier 2	3
Votes for Tier 3	11

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 6	• The proposed SRL will offer services and training in High-Throughput (HT) stem cell Biology, with a focus on cardiac and brain diseases. The SRL core will enable researchers to delineate disease-associated phenotypes in hPSC-derived cells (particularly, cardiac and neural lineages) and perform focused screening of small molecules, siRNA, and arrayed CRISPR to identify actionable targets, using state-of-the-art high-content imaging and multielectrode array (MEAs) platforms. • The proposed SRL will focus on iPSC derived cardiac and neural lineage. It's unclear why cardiac and neural lineage differentiations are not planned for training courses. CRISPR editing or the CRIPSR screening workflow can be also provided as training courses. Full self-sustaining ability after the CIRM funding is unclear. • The proposed services, training, and educational offerings of the proposed Stem Cell Resource and Training Network appear to address critical needs of California researchers and educators, especially in areas with limited access to stem cell models and technologies. • They offer: High-Throughput Biology; State-of-the-Art Platforms; Training and Education; Outreach to Underserved Areas; Synergy with Other SRLs; Reproducibility and Quality Control. • Benefit to California: The proposal's expected contributions to advancing disease biology understanding, drug discovery, intellectual property creation, and innovation all have the potential to stimulate growth and innovation in California. • The offerings are well-aligned with the needs of California's stem cell researchers and educators, promising to bridge the accessibility gap and enhance the quality and impact of stem cell research across the state. • One of the success criteria is serving at least four projects per month using at least two different disease models. These numbers should depend on the difficulty of the project. For example, a knock-in project to restore function of a silenced gene in iPSCs would not fit into this timeframe. • The proposal does not include a detailed knowledge (data) sharing plan.
No: 8	• This is a strong institute with a lot of expertise in stem cells. However, the core offering is too broad and has overlap with what the institute is already doing. • The proposal offers an unusually broad range of cell culture models (2D & 3D), services, platform technologies, formats, genetic and chemical screening, machine learning, AI-based imaging, functional analysis of different cell types, high-resolution proteomics, automation and many others. This approach is described as "high-throughput biology." The focus will be on cardiac and neural diseases but lung organoids, pancreas, and skeletal muscle are also mentioned as areas of expertise. • Considering the enormous scientific and technical complexities of each of these costly models and platform technologies (e.g., genetic and chemical screens), the proposal

	underestimates the challenges, while focusing on overselling the availability of these resources for external users. • Increasing throughput is important, but it's not really clear from the application if the applicant can achieve this (particularly the necessary follow-up). • The proposal does not make a convincing case that the applicant will be able to serve the identified unmet needs. Lack of clarity and focus decrease the potential of this project to provide value.
GWG Votes	**Is the project well planned and designed?**
Yes: 5	• The proposed SRL will be led and managed by a team of internationally recognized stem cell and HT Biology specialists and offer state-of-the-art stem cell-based disease biology phenotyping, functional genomics (siRNA and arrayed CRISPR guides libraries) and focused small molecule screening services. • Yes, the expected number of users is appropriate, but its effectiveness depends on the complexity of the projects proposed by the users. Some challenging knockin projects may exceed the capabilities of the SRL core. • The proposed SRL core plans to focused on cardiac and neural lineages. These two lineages have been robustly characterized as compared other lineages. • The operation team is strong. This SRL program proposed lectures for stem cells and could include more courses on the advanced skills in stem cell research. • Potential overlap, communication, and synergies with other cores at the institute are not well described. • The project plan is insufficiently focused.
No: 9	• Such a broad range of techniques and services could only be offered by a contract research organization (CRO) with several full-time scientists fully dedicated to those technologies and services. The outcome criteria are extremely ambitious and not sustainable in a non-profit environment considering cost, timelines and quality of services. • The knowledge-sharing plan is more of an advertisement plan - without adequate consideration of the types of data/information/practices that would be generated and shared. • There are concerns about whether the proposed personnel will be able to complete all of the proposed techniques. • The proposal is too broad. The project management aspect is too vague and will be very challenging. • Unclear how this facility will connect to existing resources on campus and elsewhere.
GWG Votes	**Is the project feasible?**
Yes: 3	• The SRL will offer several levels of services: 1) Provide control hPSC lines and cardiac and neural progenitors to users; 2) training on HT equipment; 3) perform phenotypic analyses and screening; 4) developing workflows for lentiviral arrayed CRISPR screen prior to making it available to users. A new faculty hire at the institute will serve as an advisor to the SRL regarding use of CRISPRa and -i on hPSC-derived cells. • The applicant identifies anticipated users across different institutes plus potential pharma/biotech clients. • The applicant has the available space for the proposed SRL. However, the list of services they plan to provide may be too ambitious (including differentiation to many different lineages). • The applicant institution has the necessary facilities and resources for supporting this SRL. • This team is strong and has the expertise. The team members have complementary skills. • Yes. The applicant team will use multiple strategies to sustain the proposed SRL, such as fee-for-service; grants; and partnerships with philanthropic organizations.
No: 11	• It's not clear that the applicant team can do the work proposed. The proposal would need more evidence (e.g., publications) that the applicant team has the experience to run this as a core. • It is not clear that all of these services are possible at one institution, or that the expertise for all of the services is available at this one institution. • There are concerns about the availability of necessary expertise on the leadership team and the institution as a whole. • The lack of focus renders the application not realistic. The track record is limited and suggest that some of the proposed technology is not yet available. Feasibility is a major issue. • There is no clear timeline for any of these complex and costly services. Therefore, the project appears risky and not feasible and lacks the credibility that users would expect from a CIRM-funded SRL. • It remains unclear how the access to high-throughput capabilities and special instruments will be managed as many of the proposed services will not be directly performed by the SRL core. It's also unclear how incoming requests will be prioritized and coordinated with the

	various teams across the institute that perform the actual high-throughput experiments. How busy are these teams? How many new users can be accepted and how long is the waiting list? • The way the proposal is written suggests that the SRL team is not routinely using high-throughput technologies for stem cells and appears to misjudge the enormous amount of work. The SRL team is understaffed for this proposal, which appears unrealistic and of unknown significance for users that expect quality service.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 12	• The DEI plan seems appropriate. • The applicant institution has a impressive track record in promoting diversity with regard to (1) the groups it engages and (2) patients from which the research center & core facility obtain cells for hiPSCs. • Yes, the proposed SRL offerings are designed to support researchers and educators with diverse goals, approaches, perspectives, and backgrounds. The text highlights the applicant institution's commitment to promoting diversity, equity, and inclusion (DEI) through its Education & Training Diversity, Equity, & Inclusion Committee. • This committee, composed of various individuals representing a wide range of scientific and cultural diversity, actively works to create an inclusive and equitable training culture that values diversity. The applicant institution's commitment to recruiting individuals from underrepresented backgrounds, including women, is evident in its various programs and activities, fostering a diverse community of researchers and educators. • Yes, the proposed training and educational offerings are likely to increase participation by diverse and underserved populations in California in the stem cell and gene therapy fields. • The text describes how the institution is actively working to engage students and trainees from underrepresented and underserved communities, including first-generation college students and those from underrepresented minority (URM) backgrounds. Initiatives such as the SPARK program and the CIRM-funded EDUC4 program provide opportunities for individuals from diverse backgrounds to access stem cell education and research opportunities. • These programs are designed not only to engage students but also to help them succeed and retain their interest in stem cell research. • Yes, the SRL team demonstrates a commitment to diverse and inclusive perspectives and experiences. The text provides evidence of a successful track record for promoting and valuing DEI through efforts such as the Education & Training Diversity, Equity, & Inclusion Committee, which comprises members representing a wide range of scientific and cultural diversity. Additionally, the text highlights one co-investigator's active role in promoting women in STEM and the institution's efforts to increase diversity. • The proposed SRL places a strong emphasis on ancestral and sex diversity in offered stem cell-based models. The SRL actively generates and incorporates hiPSCs from individuals of different racial and ethnic backgrounds, ages, and genders in their research, particularly in studies involving lung organoids. This approach aligns with the scientific need for diverse cellular models to understand differences in susceptibility to diseases and responses to treatments across diverse populations. • Therefore, the SRL's emphasis on ancestral and sex diversity in its stem cell models is scientifically well-supported and promotes the applicability of research and educational outcomes to diverse populations.
No: 2	• There could be more clarity around the specific efforts on how they plan to increase participation by diverse and underserved populations in California. • There is a paragraph listing the percentages of applicants for the CIRM-funded EDUC4 program with regard to gender and ethnicity. Similarly, percentages are provided for the SPARK program. More information on efforts for outreach and promotion of DEI could be provided. • The authors make a high-level statement that hiPSC lines are available from men and women from a broad range of ethnic and racial backgrounds and ages. However, exact numbers and more details are not provided and it is not clear from the description what the scientific criteria and coordinated long-term efforts are around ancestral and sex diversity. • The plan does not clearly describe successes in this area, nor how it will achieve the goals it proposes. For example, it appears that by just including CIRM EDUC students, it will achieve its DEI goals. In fact, the DEI goals are not articulated.
GWG Votes	**IF PROPOSED, is the Stem Cell Techniques Course well designed?**
Yes: 7	• The course materials are more like a general introduction course for stem cell research. They lack the details for stem cell researchers who want to perform stem cell modelling research. • It is unclear why the proposed course did not provide lectures related to cardiac and neural

	differentiation, as the SRL plans to focus on these two for research. • The course seems disconnected to the core offerings. Relatedly, it's not clear where training will be conducted. • The instructors are qualified.
No: 6	• The core provides basic training but this looks non-specific and not related to the rest of the proposal. • The course is too diverse and lacks focus. It covers many subjects, though not the services the core actually proposes to provide including cardiac and neuronal differentiation and gene editing. • The proposed SRL will focus on iPSC derived cardiac and neural lineage. It's unclear why cardiac and neural lineage differentiations are not planned for training courses. CRISPR editing or the CRIPSR screening workflow can be also provided as training courses. • The stem cell techniques course has a long tradition at the institute. However, it is unclear from the description how the course has evolved and incorporates the latest knowledge and advances. For instance, how did the Stem Cell Techniques Course address and implement standardization and reproducibility. This is particularly important as standardization and reproducibility are important objectives of this SRL funding opportunity. • The course appears appropriate for novice users with little to no stem cell background. Based on the information provided, the course doesn't appear to be of great value for researchers that want to perform stem cell-based modeling research. • It sounds like the stem cell techniques course will be taught by scientists who are no longer affiliated with the institute. Clarification is needed to better understand the level of commitment for the next 5 years by the instructors. • In addition, to avoid redundancy and increase standardization, the Stem Cell Techniques Course should be coordinated with other nearby institutions. • The applicant proposes courses but provide no syllabi.

Application #	INFR6.2-15501
Title (as written by the applicant)	A High Throughput Shared Resource Laboratory to Genome Edit hPSC Disease Models for the California Research Community
Project Objective (as written by the applicant)	The objective of this proposal is to establish a state of the art genome editing laboratory that will create human pluripotent stem cell-based disease models on demand and make them widely available to the research community.
Summary (as written by the applicant)	This proposal seeks to make human pluripotent stem cell genome editing readily available to the research community by providing an end-to-end hPSC editing pipeline. The system will employ a high throughput automated tissue culture system coupled with state of the art genome editing and sequencing approaches. Phenotyping of edited hPSC lines will be accomplished using a high content live cell imaging system. Assistance will be available at each step, including experimental design and project management, creation and characterization of disease-related genome edited cell lines, and quality control and distribution of those lines. Basic instruction in tissue culture techniques will be available on an on-demand basis to new investigators as needed. This CIRM Shared Resource Laboratory will relieve the technical, workforce and affordability barriers preventing research groups from fully benefiting from this transformational technology.
Statement of Benefit to California (as written by the applicant)	This project will make human pluripotent stem cell genome editing technology broadly available to California researchers, regardless of the infrastructure available at their institution, greatly expanding the number and diversity of investigators involved, diseases modeled, approaches taken, mechanisms revealed and ultimately cures developed for the citizens of California.
Funds Requested	$2,697,046
GWG Recommendation	Tier 3: sufficiently flawed, cannot be resubmitted
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 3

Up to 15 scientific members of the GWG score each application. The final score for an application is the majority score of all of the individual member scores. Additional parameters related to the score are shown below.

Highest	2
Lowest	3
Count	15
Votes for Tier 1	0
Votes for Tier 2	3
Votes for Tier 3	12

- A score of "1" means that the application has exceptional merit and warrants funding.
- A score of "2" means that the application needs improvement and does not warrant funding but, at the applicant's option, may be resubmitted to address areas for improvement if the Application Review Subcommittee has not approved an application for funding following the Grants and Facilities Working Group's review.
- A score of "3" means that the application is sufficiently flawed that it does not warrant funding.

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA/RFA. Following the panel's discussion and scoring of the application, the members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

GWG Votes	Does the proposed SRL offer a significant value proposition?
Yes: 9	• The proposed SRL would provide genome editing services in iPSCs and high-content, high throughput arrayed CRISPR screening. Both of these techniques are labor- and funds-intensive and a major bottleneck for researchers. • The proposed stem cell-based models, services, and specialized technologies do address critical needs of California researchers and educators. They aim to remove limitations in the genetic engineering of pluripotent stem cells to create disease-relevant models, which has been a significant bottleneck for many researchers. • By providing an end-to-end human pluripotent stem cell editing pipeline with automated processes, high-throughput genome sequencing, and phenotyping capabilities, the proposal addresses unmet needs. Moreover, the availability of experienced SRL staff members for assistance and on-demand instruction in tissue culture techniques suggests that it is designed to support a wide range of users, including those in geographic areas with limited access to such resources. • The proposed success criteria for the SRL appear adequate to measure the impact of the SRL core and its services. The success criteria are specific and measurable, encompassing the delivery of essential equipment, successful performance of genome editing projects, financial sustainability, and user satisfaction. These criteria provide a clear framework for evaluating the effectiveness and success of the SRL and its ability to deliver its intended services. • The program director has experience with iPSCs and gene editing and is committed to the steering committee. • The PD is clearly an expert in genome editing and iPSCs. • The program has a potential to be impactful, but seems to be under-resourced. • There is a need in the research community for the proposed gene editing services - the SRL could have significant value • but would need more resources to reach the potential impact.
No: 6	• This is a very broad proposal, and genome editing has become more mainstream. Thus there is limited clear high impact for users. How will this platform benefit researchers outside the applicant institution? • There is insufficient detail on how this would be a service. The proposal seems more like a PI-driven, open-ended research program than a core service. • Standardizing and performing gene editing in a high-throughput fashion and performing biologically meaningful screens to identify disease phenotypes remain important challenges in the field. This proposal does not convincingly demonstrate how this could be achieved as part of a SRL. It appears that this team has not much experience with automation and therefore largely underestimates the difficulties and the cost associated with establishing and providing such a service to the broader community. • One major goal is generation and isolation of researcher-specified gene-edited hPSC lines. Considering that gene editing is now widely practiced across California, it remains unclear how these efforts would bring additional value. For instance, single cell cloning is a critical step for fast and efficient establishment of clonal gene-edited cell lines. The proposal does not provide any information on how efficient single cell cloning will be performed.
GWG Votes	**Is the project well planned and designed?**
Yes: 1	• *none*
No: 14	• The team is strong with expertise in gene editing of iPSCs. They may need to include someone with high throughput expertise into the team to make their proposed SRL stronger. • While expertise of the lab for the CRISPR approaches proposed is good, the high-content imaging expertise needed seems limited or not well described. • The goals of this proposal are very ambitious, risky, and not well-developed. The simple fact that automation will be used does not guarantee a successful outcome of generation and isolation of high-quality gene-edited hPSC lines. Similarly, using automation does not ensure successful screens without extensive preceding work around quality control. • It remains unclear how exactly forward and reverse genetic screens will be performed. At what developmental stage will screens be performed? Please note that disease phenotypes are typically not obvious at the pluripotent state. How will multiple cell lines be differentiated in parallel to identify disease phenotypes rather than picking up cell culture artifacts or cell-line-to-cell-line variability? • The team lacks someone with high-content, high-throughput experience (siRNA or drug) experience. Limitations of arrayed screening (i.e., plate effects, assay development, Z' values, etc) are a concern. • The proposal lacks a clear workflow and the budget is not realistic. They also underestimate

	the complexity of the automation necessary to achieved their project. • The details surrounding the types of screens are lacking. • Currently, the efficiency of knockin of iPSCs remains low especially for these silenced genes in iPSCs. The proposed SRL core may be understaffed to process their estimated number of projects. • The proposed SRL can handle a limited number of projects for gene KO and KI. However, they may need more people joining them to meet their requirements for all the clients. • Not clear if the personnel is experienced enough and if there is enough staff to do the screens and editing. • Details about the number of projects and number of investigators/institutions served is lacking. It is unclear how this SRL will ensure access and awareness of the SRL to groups outside of the applicant institution by a SRL website only with a project application portal. • Demand for the services is not described.
GWG Votes	**Is the project feasible?**
Yes: 2	• *none*
No: 13	• This team is strong and has a track record for iPSC culture and gene editing. • The applicant institution has world-class expertise in gene editing. However, applying gene editing to hPSCs poses different technical and scientific problems. This is particularly challenging if gene editing is combined with automation, scale-up, screening, and identification of disease phenotypes that may or may not manifest in pluripotent or differentiated cell types. • Establishing robust gene-phenotype relationships is extremely difficult, particularly in high-throughput format with multiple cells lines representing different disease models. Therefore the goal of finding rare disease phenotypes as well as novel and complex phenotypes sounds extremely ambitious. • It is unclear how this could be provided as a SRL service considering timelines, cost, and quality. • It is not specified how many cell lines could be processed at a given time and how many users would be able to receive the service. Also, it is assumed that researcher-specified cell lines could be widely distributed but this could create many additional challenges, including legal considerations. • The proposal is definitely feasible based on the expertise available except for the automation part which will much more challenging than initially planned. • There is not sufficient staffing to accommodate the services that are proposed. The proposal is for 3 FTEs (genome editing lead, automation lead, and a SRAII). Even with automation, this SRL will be greatly understaffed to be able to handle the proposed services. There are many aspects of the pipeline that are not automated including genome editing reagent design, transfection, expansion of final clones, cryopreservation, library creation/curation, etc. • Arrayed screening based on phenotype will require differentiation of cells prior to screening. It is not clear what expertise/protocols are in place for differentiation. What cell types will they screen? • Unclear. There are questions about staffing and whether the expertise needed for the high-content imaging/phenotyping is sufficient or available. • The proposed project may not be feasible because this team may need expertise for high throughput screening and automation culture techniques. • Not clear that the personnel/expertise are in place to complete the proposed services. • Not clear that they would have time/capacity to do genetic screening services. • It will be essential to have a high volume of editing project to become sustainable. The plan for doing this is not well detailed. • Sustainability plan is insufficient. • Space may be an issue.
GWG Votes	**Does the project effectively uphold the principles of diversity, equity and inclusion?**
Yes: 8	• The application process for access to genome editing services emphasizes prioritizing projects involving hPSCs from diverse populations and addressing medical conditions prevalent in minority communities. • The SRL is focused on enabling robust genetic studies and ensuring that stem cell-based disease models reflect the genetic diversity of the California population. By offering flexibility in the use of researchers' specified cell lines and commonly used hPSCs, the SRL promotes the creation of disease models in multiple and diverse genetic backgrounds. • Specific examples, such as modeling genetic risk factors for non-alcoholic fatty liver disease and severe autoimmune deficiency, demonstrate the commitment to creating diverse disease models. Therefore, the SRL's approach promotes the applicability of research and

	educational outcomes to diverse populations. • Additionally, the laboratory offers guidance and support to users, particularly those who are relatively inexperienced, to promote diversity in users' backgrounds and experiences. • The educational activities provided by the SRL, including instruction in hPSC culture and genome editing, are offered to diverse populations. These activities are provided to students from non-traditional backgrounds through programs like the CIRM Compass program, a local CIRM Bridges program, and a nearby summer student research program. There is emphasis on introducing students from non-traditional backgrounds to stem cell and regenerative medicine. • The SRL team works closely with programs like the CIRM Compass program, which focuses on mentor training to create an equitable and supportive laboratory environment. Additionally, the institution is in the process of hiring a DEI officer to promote equity and diversity throughout the scientific ecosystem. These efforts suggest a commitment to diverse and inclusive perspectives and experiences.
No: 7	• The applicant institution is in the process of hiring a DEI officer. The applicant mentions the CIRM Compass and CIRM Bridges Program. • It is also mentioned that a project seeks to model and cure severe autoimmune deficiency caused by mutations in the Artemis gene more common in people of Native American Navajo/Apache descent. • DEI is included but could be better developed.