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Santa Cruz, CA
January 17, 2024

To the CIRM Application Review Subcommittee,

We would like to submit this letter in complement to our application INFR6.1--15478 The Live Cell Biotechnology Discovery Lab.

A preeminent goal of the 2020 Proposition 14 was to create equity in access to stem cell resources throughout California and to promote the training of a diverse workforce of stem cell professionals to reinforce California's position as a world leader in the development of stem cell treatments and cures for patients. Among the different regenerative medicine areas, neuronal models and treatments have been prioritized. The request for proposals INFR6.1 specifically, aimed to create stem cell / regenerative medicine- focused educational programs for diverse and/or underserved student populations. *Applicants proposing remote, cloud-based approaches to serve researchers and/or educational programs in geographic areas with limited access to stem cell-based models were encouraged to apply*.

The Live Cell Biotechnology Discovery Lab provides essential infrastructure to accomplish mandates of Proposition 14 and INFR6.1. Employing cloud technologies developed in California, our group proposes remotely operated cell culture platforms to teach underserved communities throughout the state the intricacies of 2D and 3D pluripotent stem cell derived-neuronal models. ***Our SRL aims to target some of the least-resourced student groups: high school and community college students in rural Latinx communities.*** Our SRL builds on our expertise in stem cell-derived neuronal models and cloud technologies, and leverages our extensive experience in training Latinx groups through project-based learning. We propose to expand our inexpensive and scalable approach to train thousands of students and teachers in stem cell culture, neuronal manipulation, and analysis of big data. Our team further proposes to work with community colleges and high schools and build relationships that will pique students' interest in pursuing stem cell-centered biology, promote their enrollment in 4-year colleges, and ultimately create a diverse workforce in stem cell research. Our SRL has the potential of creating a long lasting impact on the stem cell workforce in our state. Not surprisingly, our program has received extensive support from high school teachers and community college professors in underserved regions of the state (Central Valley, Salinas Valley and Northern California), and generous financial commitment from our university. ***Of note, supporters of our program include Bakersfield College, the largest community college in an underserved and Latinx-majority region (21 faculty committed to using our SRL), as well as some of the smallest and underfunded colleges in the state.***

The proposal of the Live Cell Biotechnology Discovery Lab received a Tier 1 recommendation by the Facilities Review Group, showcasing its well thought out design and the feasibility of the SRL. Furthermore, contingent on this grant, our university has committed to building a 5,500 square feet facility dedicated to the research of stem cell-derived neuronal models that includes academic research laboratories and core equipment (microscopy, washing stations). This effort represents a >$10M investment from our university, demonstrating the institutional support for our application and the excitement toward these new avenues, which will bolster other CIRM priorities such as the study of neuropsychiatric disorders.

The Scientific Review Group gave a Tier 2 recommendation. While the reviewers expressed their excitement for the SRL and evaluated the proposal as being unique, well structured, and with a strong potential to create an impact in stem cell education throughout the state, reviewers raised two primary concerns, which we believe can be addressed:

1) The reviewers were concerned about the sustainability of the SRL past the duration of CIRM funding. Because our SRL targets underserved communities in California, our fundraising plan cannot rely solely on recharges. After CIRM funding ends, in addition to charges to schools, we plan to fund the SRL with a) additional funding opportunities from other agencies, b) new gifts, c) recharge to research faculty who aim to expand their teaching reach (see letters of support), d) partnerships with industry catalyzed by the UCSC Innovation & Business Engagement Hub, including recharging companies for the creation of education modules and offering opportunities to recruit trained students. In case of a funding gap, temporary relief funds are available from the Genomics Institute, QB3, the SOE division and the UCSC Vice chancellor for Research. To strengthen our solicitations for external funding, we will measure the impact of our work on the target audience. Specifically, we will collect extensive data from the students in several categories: development of STEM identity by the students, knowledge gained in stem cell, regenerative medicine and neuroscience concepts, transfer to 4 year-colleges. These will be complemented with measurements of impact on teachers (such as increase in science teaching efficacy belief). Notably, we already have 3 quantitative publications in education journals measuring the impact of our pilot work with high school and college students. Moreover, while PD Mostajo-Radji already has substantial experience in evaluating teaching technology, our team also includes members of the UCSC Teaching and Learning Center who are experts on measuring outcomes of education interventions. The analyses will be used to optimize our approach and to strengthen our applications for additional grants and gift funds from external agencies. Of note, in his previous role as CEO of the nonprofit organization Clubes de Ciencia Bolivia, PD Mostajo-Radji secured over $1.5M in funding for project-based education programs through grants (5 grants from the US Department of State and 2 grants from the International Brain Research Organization), private donations and partnerships with leading companies including Genentech, Facebook, Twilio and Salesforce. PD Haussler, has secured over $95M in funding in the past 10 years, which includes awards with large education and outreach

components. Furthermore, we envision that our work will inspire the faculty and staff at the community colleges and high school districts to take advantage of the existing grant application infrastructure at UCSC to lead applications that will expand the use of our remote technologies in their curricula. Our team structure includes an Academic and Community Coordinator position whose role will be to spearhead these applications and work closely with the community colleges, high schools, and our Genomics Institute grant support team. Currently, PD Mostajo-Radji is preparing an application to the Racial Equity in STEM Education solicitation for the National Science Foundation (NSF) in collaboration with the faculty at Hartnell College and Alisal High School in Salinas ($5.5M). Our SRL will enable our team and the faculty at community colleges and high schools to be uniquely positioned to secure grants such as the NSF Research Coordination Networks in Undergraduate Biology Education ($0.5M), NSF Research on Innovative Technologies for Enhanced Learning ($0.9M), NSF Improving Undergraduate STEM Education: Hispanic-Serving Institutions ($3M), NIH Initiative to Maximize Research Education in Genomics ($1.6M). Furthermore, the UCSC Genomics Institute, of which both PDs are core members, has close relationships with philanthropic organizations and private donors who fund our work. We are therefore well positioned to leverage and greatly expand the initial investment by CIRM.

2) The reviewers expressed reservations in regards to our ability to expand to additional community colleges. We have been continuously expanding our network of community colleagues and there is every reason to expect that our success will accelerate this. For example, Dr. Bordignon, joining our team, was a community college faculty member in California before joining UCSC (Skyline and Foothill-De Anza Community Colleges) and a student from Berkeley City College who has trained with our cloud technologies is currently an intern in PD Mostajo-Radji's lab through the CIRM Bridges program. These team members have good contacts that we are pursuing. PD Mostajo-Radji is already working collaboratively with several community colleges that have submitted support letters for this grant and are networked to additional schools. Alumni of our SRL are also dedicated to expansion of the program. A former Alisal high school student is now a UCSC student who performs research with PD Mostajo-Radji. Several more alumni of our remote training are applying to UCSC. Also, UCSC has a dedicated office (the services for transfer and re-entry students - STARS) that has several partnerships with community colleges, including Cabrillo College, Hartnell College, San Jose College and Mission College. Indeed, UCSC often partners with community colleges in biotechnology education, such as creating mixed teams for programs like iGEM. Finally, we envision working closely with the program officers at CIRM to expand our programs to new colleges to enable new courses, as well as stem cell research opportunities through the cloud. Of note, we do not foresee that this increase in work will increase our funding requirements.

In summary, we believe that our group is well prepared to advance this proposal and address any concern brought forward by the review panel. By combining our expertise in

education of underserved students, and our custom-build technologies for remote stem cell research and education, we are, to our knowledge, the only group prepared to fulfill the mandate of using cloud technology to provide stem cell training opportunities to students in California's underserved regions. As our Tier 1 facilities evaluation demonstrates, the infrastructure proposed is ready to accomplish these goals. We therefore respectfully request the ARS to strongly consider approving the funding for our SRL.

Kindly,

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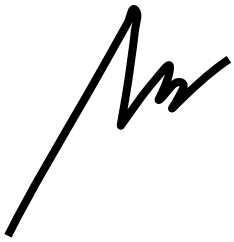

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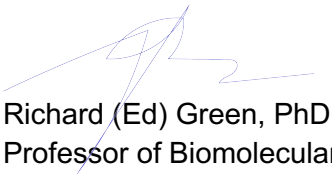

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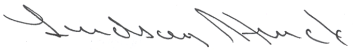

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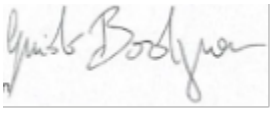

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