

Proposition 14: Californians for Stem Cell Research, Treatments and Cures Developing Vaccines and Treatments for COVID-19

Across the globe, the best and brightest physicians and medical researchers are working around the clock to develop treatments and cures for COVID-19, including right here in California. Nearly two decades ago, California made a critical investment in stem cell research that propelled our state to the forefront of regenerative medicine and set the stage for current research opportunities – such as finding treatments and cures to mitigate many chronic diseases. One such example is Coronavirus, which has impacted the life of every Californian.

In 2004, voters overwhelmingly approved Proposition 71, establishing the California Institute of Regenerative Medicine (CIRM) and authorizing a \$3 billion investment in stem cell research to advance therapies and treatments for diseases and injuries including cancer, heart disease, Alzheimer's, Parkinson's, diabetes and now, COVID-19. But this vital source for funding research and therapy development will soon end, unless California voters pass [Proposition 14](#), on this November's ballot.

Accelerating COVID-19 Vaccine & Treatment Development with Stem Cell Research

Earlier this year, CIRM allocated \$5 million to support projects dedicated to combatting COVID-19 because of at least two viable paths afforded by stem cells to possibly prevent and treat the virus:

1. Developing Vaccines Using Stem Cells

Historically, there is a demonstrated success of developing vaccines using cell-based approaches. Vaccines for many devastating illnesses and conditions – including Polio, Hepatitis A, Rubella, Mumps, Rabies and Measles – were developed in this way. The use of stem cells in vaccine development serves multiple benefits, including greater speed and stability of vaccine production, which is especially critical in combatting the virus.

2. Using Stem Cells to Test Existing Medications Or Identify New Treatments

Using stem cells, scientists can grow clumps of cells specific to an organ or tissue in a dish (in this case, the lungs), allowing them to test large numbers of candidate drugs at a high speed and with great accuracy. Recent research indicates there are currently more than [3,000 potential drugs/molecules](#) to treat/immunize against COVID-19. Stem cell models can provide an efficient and effective method to screen large numbers of potential candidates and to identify those that have the greatest chance of success.

A Demonstrated History of Success in Combating Infectious Diseases - Zika Virus

- Several years ago, a Zika virus epidemic terrorized countries across the globe. After receiving funding from CIRM, a UC San Diego scientist used stem cells to grow a clump of brain cells to test existing medications for potential Zika treatments.
- The research led to the discovery that an already FDA-approved drug can [block the virus from dividing](#). It is predicted that once applied to the clinical population, this drug will prevent transmission between mother and child.

CIRM Grants Awarded to Help Fight COVID-19

Current CIRM funding to combat COVID-19 (both prevention and treatment) includes the following grant recipients to date:

Clinical Trials

- **\$750,000 to Dr. John Zaia at City of Hope** to conduct a clinical trial administering blood plasma from recovered COVID-19 patients to treat those with the virus.
- **\$750,000 to Dr. Michael Matthay at University of California, San Francisco** to conduct a clinical trial using mesenchymal stromal cells for treatment of Acute Respiratory Distress Syndrome (ARDS), a life-threatening consequence of COVID-19 that leads to ICU admission and ventilator dependence.

- **\$750,000 to Dr. Xiaokui Zhang at Celularity** to conduct a clinical trial that will use blood stem cells obtained from the placenta to generate natural killer (NK) cells, a type of white blood cell that is a vital part of the immune system, and administer them to patients with COVID-19.

Early-Stage Research Programs

- **\$350,000 to Dr. Vaithilingaraja Arumugaswami at UCLA** to test the ability of a drug candidate to prevent COVID-19 viral replication in the lungs, thereby reducing lung injury and inflammation.
- **\$150,000 to Dr. Song Li at UCLA** to use biomaterials as a way to “activate” the immune system and boost vaccine response in elderly patients.
- **\$150,000 to Dr. Stuart Lipton at Scripps Research Institute** to re-purpose a class of drugs that fights the virus while protecting the brain against coronavirus-related damage.
- **\$150,000 to Dr. Justin Ichida at the University of Southern California** to determine whether a suitable drug can be derived from a specific class of proteins referred to as ‘*kinase inhibitors*’ to prevent infection by COVID-19.
- **\$300,000 to scientists at UCLA for two projects** – one utilizes stem cell models to develop a vaccine and the other uses lung stem cells to screen for and identify an effective drug against the virus.
- **\$150,000 to Dr. Jianhua Yu at City of Hope** to use umbilical cord blood cells to derive a population of immune cells (known as NK cells), and to test the ability of these newly generated NK cells to prevent and treat the virus.
- **\$150,000 to Dr. Helen Blau at Stanford University** to re-purpose 2 FDA-approved drugs as a way to stimulate muscle stem cells of the diaphragm in COVID-19 patients with extended ventilator use and augment their lung regeneration.
- **\$150,000 to Dr. Albert Wong at Stanford University** to facilitate vaccine development.
- **An additional \$100,000 to Dr. Albert Wong** to expand on the initial approach for vaccine development by assessing its impact on the Latinx and African American populations — two ethnicities disproportionately impacted by the virus in California.
- **\$250,000 to Dr. Preet Chaudhary at the University of Southern California** to use induced pluripotent stem cells (iPSCs) to generate natural killer cells (NK). The goal is for these iPSC-NK-CAR cells to be used as a treatment for COVID-19.
- **\$228,229 to Dr. Evan Snyder** at the Sanford Burnham Prebys Medical Discovery Institute to use induced pluripotent stem cells (iPSCs) to generate clumps of cells that resemble the actual lung (lung organoid). These lung organoids will then be infected with Sars-Cov-2 and two potential drugs will be tested on them. This model could expedite FDA authorization for clinical testing.
- **\$150,000 to Dr. Steve Dowdy** at UC San Diego to use a technique for effective delivery of anti-COVID siRNAs to lung cells. Small interfering RNA (siRNA) are usually used to “silence” genes. Thus, using this method, the COVID virus could be “silenced”.
- **\$250,000 to Dr. Karen Christman at UC San Diego** to develop a treatment for Acute Respiratory Distress Syndrome (ARDS), a life-threatening lung injury that occurs when fluid leaks into the lungs and is prevalent in COVID-19 patients.
- **\$250,000 to Dr. Lili Yang at UCLA** to develop a treatment for COVID-19 using blood stem cells to create invariant natural killer T (iNKT) cells, a powerful kind of immune cell with the potential to clear virus infection and mitigate harmful inflammation.

To learn more about the grants and progress of critical COVID-19 research through the California stem cell program, visit www.cirm.ca.gov.

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