New drug-delivery system will improve lives of patients with chronic eye diseases

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(Medical Xpress)—Patients suffering from eye diseases such as glaucoma and macular degeneration benefit from the availability of highly effective medicines.

However, the methods for delivering these drugs to the eye keep patients trapped in a cycle of constant maintenance with monthly injections or cumbersome eye drops multiple times a day.

Robert Bhisitkul, MD, PhD, a professor of clinical opthamology at UC San Francisco, is all too familiar with this challenge and is working with Tejal Desai, PhD, professor of bioengineering and therapeutic sciences, on a solution to help improve the lives of patients.

"It's a problem that has had only limited progress for decades and with Tejal's technology we see a way to completely change this field," says Bhisitkul. Desai works on the design, fabrication and use of advanced micro/nano biosystems, and has been developing a tiny, flexible, implantable film that is able to deliver conventional medicines and also complex antibody-based drugs used in retinal disease therapies.

Bhisitkul, an internationally renowned vitreo-retinal surgeon, maintains that current drug delivery approaches place a significant burden on patients and their families, with frequent trips to the doctor's office and almost monthly eye injections that are painful and carry risks such as infection. "Not only will this new technology reduce the burden of the treatment for patients and their families, but we think it's also going to

maximize the therapeutic effect," Bhisitkul said.

Increased potential through collaboration

"This project actually completely changed the way I thought about treating clinical disease," says Desai, a recognized leader in advanced drug delivery and tissue engineering systems. She has been working on developing micro and nanostructured materials for tissue engineering and drug delivery for more than 15 years, but as a bioengineer lacked the clinical perspective afforded by the collaboration with Bhisitkul.

"We realized that it's not enough to just develop a technology that works, but also to make that technology something that clinicians could easily implement, that could be fairly low-cost, be able to keep drugs stable and to have a long shelf life," she said.

Bhisitkul and Desai share a vision of offering patients a product that allows them to control their chronic eye disease with just one or two visits to the clinic per year. Understanding the desired features of a potential product, or 'Target Product Profile,' is a key element to successful translational science, and the reason that this research is featured on LaunchPad, a new online resource for investigators managed by UCSF's Clinical and Translational Science Institute (CTSI).

LaunchPad provides resources and peer insights for investigators thinking about moving their work out of the lab and into the marketplace, and in a series of LaunchPad videos, Bhisitkul and Desai discuss their work and share experiences in translational research.

Acknowledging that they needed help navigating regulatory pathways and investor perspectives, Bhisitkul and Desai received assistance from CTSI's Catalyst Awards Program, and in particular Catalyst Awards advisors Charlie Semba, MD, and Quinton Oswald, who provided

consultation that helped shape their research project.

"Researchers need to understand what the steps will be from the regulatory standpoint and develop a framework for their projects that speaks to the concerns of regulatory agencies and investors," said June Lee, MD, director of the Early Translational Research program at CTSI, which manages Launchpad and the Catalyst Awards Program

"In the course of our talks with the experts and the advisors that we had in the Catalyst program, one issue came up over and over again: safety." Bhisitkul goes on to describe how this perspective helped Desai in her selection of the appropriate materials for the prototype and "really accelerated the development pathway."

Proximity also accelerated the project. Desai and Bhisitkul are both based at UCSF, which has made it very easy for the project teams to go back and forth on several iterations of experimentation. Bhisitkul remarks, "we've seen a lot of collaborative projects where the principals are geographically separated, and we think that it's really been an advantage for us that we're able to do this at UCSF and that it has an environment where these collaborations are not only possible, but they're really supported and encouraged."

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