SPARKING TISSUE GROWTH, ONE CELL AT A TIME

INDIANA'S FLAGSHIP UNIVERSITY is developing regenerative medicine treatments that could transform how doctors repair human tissue—and perhaps even organs

For those with failing organs or damaged tissue, treatment options can be limited, but they could quickly broaden. Researchers at the Center for Regenerative Medicine and Engineering, at the Indiana University School of Medicine, are paving the way to regrow human tissue.

Under the leadership of Chandan Sen, Ph.D., IU is developing technologies and therapies to help heal burns, address diabetic complications, and treat injured soldiers.

"We may soon have the ability to re-program the cells in the human body," says Sen, whose team is also laying the groundwork for the nation's first Ph.D. program in regenerative medicine and engineering. "We can make a skin cell make functional blood vessels or other tissue required for therapeutics. Ultimately, this technology could help us rescue organ function lost to aging or trauma."

Sen and his team have developed a nanochip device that uses tissue nanotransfection (TNT) to reprogram one type of tissue into another using nothing more than a simple touch and a harmless electric spark. With TNT, researchers have converted skin tissue in mice into functional blood vessels that fostered the healing of a badly injured leg. Related experiments show promise in other animal models.

Sen and his team are part of the Indiana University Grand Challenge Precision Health Initiative, which aims to prevent and cure diseases through a more precise understanding of the genetic, behavioral and environmental factors that influence a person's health.

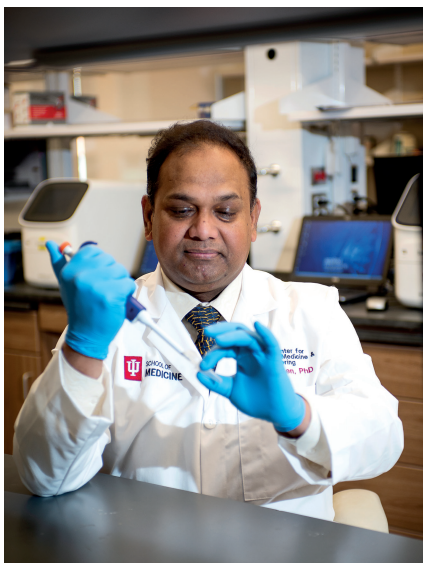
"THE STAKES FOR PATIENTS ARE ENORMOUS."

"The stakes for patients are enormous," Sen says. "We're building a technological platform that will make it possible to take tissue reprogramming to the bedside. Our approach does not require sophisticated laboratory or hospital infrastructure. It may even allow scientists to develop and grow replacement organs using a patient's own cells."

The Indiana University Center for Regenerative Medicine and Engineering employs more than 40 scientists and staff. Center scientists support four central research pillars, with teams focused on cell-based therapies; tissue engineering; wound, burn and inflammation; and military health.

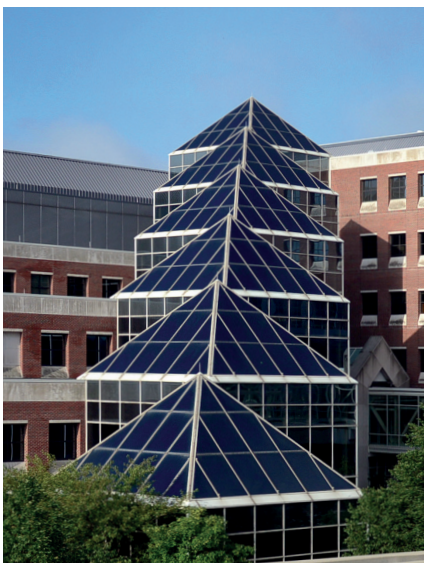
"Regenerative medicine is a complete new platform in healthcare, agnostic of disease," Sen says. "It has implications across the entire spectrum of medicine and this is just the beginning." ■

INDIANA UNIVERSITY
GRAND CHALLENGES



Dr. Chandan Sen

Regenerative medicine has great potential



Indiana University School of Medicine

COURTESY OF INDIANA UNIVERSITY SCHOOL OF MEDICINE