San Antonio to Honor Regenerative Medicine Pioneer Stephen Badylak

Xconomy Texas — San Antonio — Ah, to be able to regrow a missing limb like a slimy salamander—a trick long dreamed of by youngsters and scientists alike.

Research into such regenerative abilities has increasingly excited the scientific community during the past 30 years as it has gained further insight into the potential of the extracellular matrix, a part of all biological tissue that acts like the scaffolding for cells. In particular, researchers are interested in the potential that extracellular matrices (ECM) may have in signaling and regulating stem cells, something that someday could be used to repair and regenerate human tissues. Science is nowhere near anything like limb regrowth, but numerous advances have been made since the first discoveries, made in the 1980s, revealed the potential applications of extracellular matrices.

"As we learn more about organ-specific matrix composition and functionality, we may be able to rationally modify matrices to drive desired regenerative outcomes in vitro and in vivo," wrote Laura Niklason, a professor of anesthesiology and biomedical engineering at Yale University, in the scientific journal Cell Stem Cell in 2018. "Eventually, we may even generate completely synthetic matrices that can act as agents for directing tissue restoration in humans."

One of the pioneers of ECM research, Stephen Badylak, is slated to receive an award in September from San Antonio biomedical advocacy group BioMed SA for his work, which includes founding two companies, gaining more than 70 patents, and publishing hundreds of scientific articles on the topic. Badylak is the deputy director of the McGowan Institute for Regenerative Medicine at the University of Pittsburgh, which announced July 12 he is slated to receive the award. In addition to his academic work, Badylak is involved with several startups developing ECM-related products.

He is the co-founder of Pittsburgh-based ECM Therapeutics, which makes diagnostic and therapeutic products from ECMs, including a hydrogel the company believes can mobilize and differentiate stem cells to stimulate healing. It has raised about $2.4 million of $5 million in planned funding as of June, according to a securities filing.

StemBioSys, a San Antonio-based company founded in 2010 that makes an extracellular matrix technology used for replicating stem cells, has collaborated with Badylak for two years on new applications of the company's ECMs, which are derived from a type of stem cell in human bone marrow. What Badylak discovered surprised StemBioSys: The company's matrices had small packets of RNA, the molecular messengers that carry the genetic instructions for proteins, which could direct cell behavior, according to Chief Operating Officer Sy Griffey.

StemBioSys was excited by the discovery, Griffey writes in an email, because it may mean that the company can expand its technology, and because the packets, or vesicles, of RNA that Badylak discovered appear to be distinct from other RNA-carrying biological bubbles, known as exosomes. Exosomes, once thought to be cellular garbage bins, now are popular in scientific research. They first spurred diagnostic companies, such as Cambridge, MA-based Exosome Diagnostics, which Bio-Techne bought for $250 million last year. Now, Codiak Biosciences, another Cambridge startup that cancelled its plans for an IPO this month, is seeking to make therapeutics using exosomes as delivery devices.

For StemBioSys, working with Badylak has meant developing customized forms of its matrix, which Badylak uses to make comparisons depending on the cell type used to make the matrix, says StemBioSys CEO Bob Hutchens. The lab work is being done at the University of Pittsburgh and the two organizations have an agreement in place that deals with ownership, Hutchens says in an interview.

“It’s very exciting work, and these matrix-bound vesicles in the long term could have some really interesting applications, including in therapy,” he says.

Badylak also previously served on the scientific advisory board for BioBridge Global, a San Antonio life sciences nonprofit that operates multiple subsidiaries focused on regenerative medicine, according to a spokesperson for BioMed SA, which said Wednesday it had selected Badylak as the recipient of its annual award for innovation in healthcare and science. Previous winners include vaccine researcher and Army surgeon George Peoples and prolific biotech founder Robert Langer.

Badylak’s history with ECMs dates to the late 1980s, when he was working at Purdue University and began exploring surgically removing the aorta of dogs, replacing it with a piece of the dog’s small intestine, according to a profile in Discovery Magazine from 2011. (One surgical resident who worked with Badylak “called the operation ‘cruel’ and ‘ridiculous’ and refused to participate,” the article says.) The results Badylak reported appeared astounding: The animals responded well and, in one dog that he operated on again to examine the results of the surgery, he discovered that the aorta had regrown. Badylak published findings in 1989.

Applications of the process have been used to varying degrees over the past 30 years, including in attempting to aid people dealing with horrific accidents and for injuries sustained by military members, such as wounded soldiers treated as part of various Department of Defense-funded studies at the University of Pittsburgh. The patients, who had severe muscle injuries and received ECM implants derived from pig tissue, showed improvement in strength and range of motion, according to research publications and news reports. The procedure has been used on soldiers in San Antonio, where there is a large military presence, by organizations such as the US Army Institute of Surgical Research.

“I am honored to receive this recognition, especially coming from BioMed SA and San Antonio where much of our early research into ECM was successfully applied to help wounded warriors,” Badylak said in a news release.

Source: *https://xconomy.com/texas/2019/07/17/san-antonio-to-honor-regenerative-medicine-pioneer-stephen-badylak/*

July 17th 2019