GETTING RID OF THE STENT

Late one night several years ago in a shared office on the top floor of the Robert H. Lurie Medical Research Center on the Chicago campus, Guillermo Ameer and Melina Kibbe came up with a new idea for their research. Kibbe, associate professor of vascular surgery at the Feinberg School of Medicine, had spread out the different kinds of stents she uses in surgery; Ameer, associate professor of biomedical engineering at McCormick and of surgery at Feinberg, wanted to know why certain aspects of one or another are good or bad, what causes devices to fail, and how biomaterials could be more successful. After a long discussion the two came up with a radical idea: What if you got rid of the stent altogether?

That idea came after years of successful collaboration. Kibbe and Ameer began working together five years ago, when one of Ameer’s postdoctoral fellows was searching for a researcher who could provide some much-needed assistance with animal models of vascular grafting and found Kibbe, who was just beginning her research. “My lab was working on citric acid polymer materials and needed a partner to help test these materials in vivo,” says Ameer. “Melina and I share a strong interest in cardiovascular resistance with animal models of vascular grafting and found Kibbe, who was just beginning her research.

Ameer and Kibbe hope to develop nitric oxide–eluting materials for use in a biodegradable stent. Nitric oxide is naturally produced by the thin layer of endothelial cells that line arteries and provides a host of benefits key to cardiovascular health. For example, it inhibits the proliferation of the white blood cells, vascular smooth muscle cells, and platelets that can hinder the artery as it heals. In addition, nitric oxide promotes the survival and growth of more endothelial cells in the region. These all-important endothelial cells and the nitric oxide they produce are put at risk by the trauma of surgery: “Whenever you insert a balloon into an artery for angioplasty, the act of blowing it up and the trauma from surgery kill off the fragile single layer of endothelial cells,” Kibbe says. “When you lose those cells, you lose your normal nitric oxide supply.”

After working on several small projects to make the case for further study, Ameer and Kibbe received a highly competitive challenge grant from the National Institutes of Health. The two-year grant provides them with the resources to develop their idea into a concept that could find its way to clinical trials. “It’s my hope that I can eventually use techniques and devices that we’ve developed in the operating room,” says Kibbe.

Ameer and Kibbe’s partnership also includes a company they formed in 2008 to commercialize some of the work they’ve developed in the operating room, an opportunity to share facilities at the Institute for Bionanotechnology in Medicine (IBNAM) on Northwestern’s Chicago campus. With support from the National Institutes of Health, the two are developing a biodegradable stent that forms inside the body to the contours of an artery. They hope the technology will elute drugs that promote healing during recovery, improving upon current options.

“Some people will shoot down a creative idea because it is so different from current techniques. It’s important to develop some of these ideas enough to see the merit in them.”

GUILLERMO AMEER