Medical Textiles No Longer for 'External Use Only'

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If you've ever had a broken arm – or a paper cut – you probably appreciated the healing role textiles played in your recovery. New types of materials are now being used to treat internal illnesses and injuries, making surgeries less invasive, for example, and delivering drugs with greater efficiency.

Dr. Martin King, professor of biotextiles and textile technology in North Carolina State University's College of Textiles, is playing a leading role in the growing field of biomedical textiles, or biotextiles.

"Many companies that make medical devices have a lot of experience working with materials like plastics, metals and ceramics," says King, who also holds an appointment at Laval University medical school in Quebec City, Canada. "Many of them don't have a lot of experience working with textiles, so we have a unique role in assisting with the development of new medical textile products."

Such products include artificial arteries, stents, heart valves, blood filters, spinal column cushions that can be inserted between vertebrae to replace degenerative discs, or heart support devices for people who suffer from congestive heart failure.

"The amazing thing about some of these devices is you can deliver them where they're supposed to go in the body by using surgical procedures that are less invasive," King says.

For example, a small incision on the thigh and the insertion of a catheter probe, which can be viewed radiologically, can position a stent in the right place in an artery, rather than having to make long, deep incisions as was common in the past using open surgery.

“If you can do this, the patient can walk out of the hospital the next day with a Band-Aid over the incision, rather than spending several days in the hospital recovering,” King says. “Medical textile devices help reduce trauma, shorten the time of the operation and reduce recovery time for the patient.”

King’s work on biotextile devices involves testing their lifespan and how compatible the materials will be with the body. The next wave of innovations will involve creating devices that will aid in the healing process through materials that foster cell growth.

“In this new paradigm of tissue engineering, we’d like the body to form new tissue around these devices so it’s not relying solely on synthetic foreign implanted material,” King says. “Now that we know more about molecular biology and how cells behave and interact with each other, we are beginning to understand how we can create certain markers that will encourage functional cells to migrate and grow on these surfaces.”

King and other researchers are already seeing progress in cell growth research, through a partnership with Dr. David Gerber’s liver implantation team at the University of North Carolina at Chapel Hill’s School of Medicine. One of King’s graduate students, Jessica Gluck, has demonstrated that viable and functioning liver cells can be grown on textile scaffolds.

“In the future, this approach may allow surgeons like Dr. Gerber to re-establish liver function in patients with liver disease by implanting living and functional liver tissue that has been grown in the laboratory,” King

says. “We are only just beginning to understand how these types of textile scaffolds can support cell growth, and we are just scratching the surface on how textiles may be used in many different internal and external medical applications.”

Source: NC State University