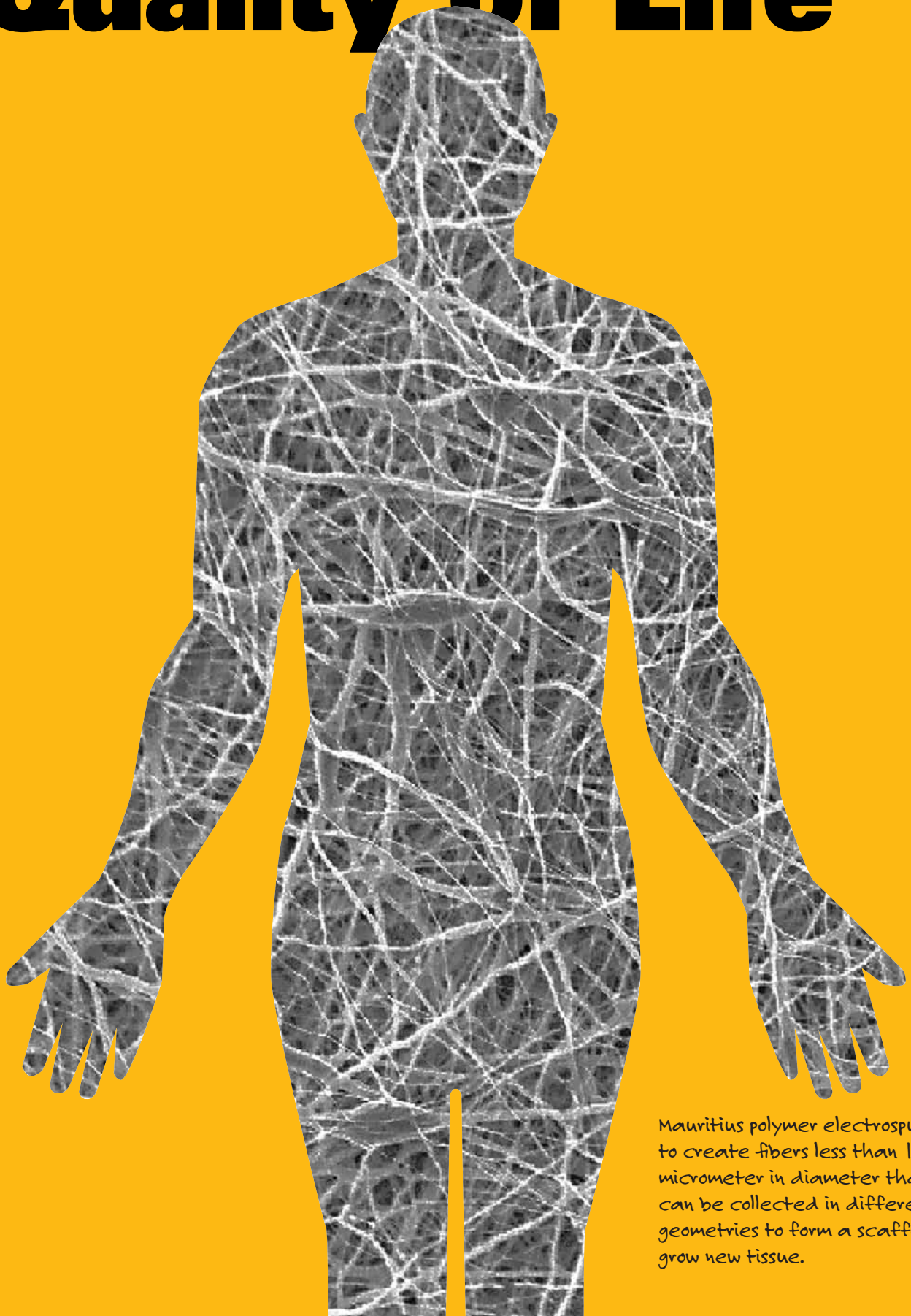
The Future of Tissue Engineering:

Improving the Quality of Life



Mauritius polymer electrospun to create fibers less than 1 micrometer in diameter that can be collected in different geometries to form a scaffold to grow new tissue.

"Tissue engineering applies engineering and biological innovations to design and fabricate new tissues and organs for those who need replacements due to disease or injury."

In April 2009, an exchange of e-mails between VCU Professor Gary L. Bowlin and University of Mauritius Professor Dhanjay Jhurry inspired a collaboration of ideas. After receiving his first e-mail from Jhurry, Bowlin's first move was to find Mauritius—a tropical island nation off the southeast coast of Africa, directly east of Madagascar, in the Indian Ocean—on the world map.

After their first exchange, Bowlin, VCU's Harris Professor of Biomedical Engineering, and Jhurry, a Professor of Chemistry with expertise in Polymer Science, formed a partnership aimed at creating innovations in the tissue engineering field. Tissue engineering applies engineering and biological innovations to design and fabricate new tissues and organs for those who need replacements due to disease or injury. The goal of Bowlin and Jhurry's work is helping patients in need of tissue and organ replacements.

Jhurry sought Bowlin's advice for the electrospinning of novel polydioxanone analogues. Polydioxanone is a base material used in a resorbable suture. Bowlin is a pioneer in using the process of electrospinning to fabricate biomaterial-based nanofibrous fabrics for use as tissue engineering scaffolds, and Jhurry was interested in exploring the potential for applying these materials in designing novel tissue engineering scaffolds. Bowlin explains, "These scaffolds are essential because they are the temporary (resorbable) structural element/form used to initiate the growth of new tissues, such as blood vessels."

Soon after their first email exchange, Bowlin and Jhurry had the chance to work together at the first USA-Mauritius Workshop, entitled "Biomaterials: Possibilities and Perspectives." This workshop was held at the University of Mauritius in December of 2009, and its purpose was to help establish an integrated interdisciplinary research, education and training program with a focus on the engineering of biomaterials for application in the biomedical field in the Indian Ocean region.

Bowlin led the syllabus design for the first course in Biomaterials offered by the University of Mauritius, which was taught by various workshop participants mainly from the US. This course was first offered online in October 2010 with Dr. Bowlin teaching several modules in biomedical textiles, biomaterial infection and complement system, as well as biomaterials testing and vascular and bone tissue engineering applications.

Early on in their research, Jhurry had sent Bowlin some of the novel polymer samples synthesized in his laboratory to begin characterization and optimizing processing conditions. This work was conducted by Patricia Wolfe, a Ph.D. student in Bowlin's laboratory. These efforts resulted in an article, prepared by Wolfe, entitled "Scaffold Characterization of Electrospun Novel Poly(ester-ether) Copolymers: 1,4-Dioxan-2-one and D,L-3-Methyl-1,4-dioxan-2-one," which was recently accepted for publication in the *Journal of Engineered Fibers and Fabrics*.

In November 2010, Bowlin visited Jhurry in Mauritius. The primary emphasis of his visit was to review recent research findings and plan the next phase. Bowlin also agreed to co-supervise a PhD student at the University of Mauritius who was continuing the synthesis of novel polymers for vascular tissue engineering. As part of that co-supervision, Bowlin will host the student for six to eight months, allowing her to conduct extensive characterization of the synthesized polymers in his laboratory.

In an effort to generate support for this work, Bowlin and Jhurry organized several high-profile meetings. One meeting was with Craig White, a Public Affairs Officer, and Peter Chisholm, a Consul at the US Embassy in Mauritius. They reviewed potential funding options to allow Jhurry and researchers/students of his group to visit and conduct research in Bowlin's laboratory, where they could utilize equipment not yet available in Mauritius.

The professors also met with Dr. Rajesh Jeetah, Minister of Tertiary Education, Science, Research and Technology. They briefed Jeetah on their research efforts and its importance, and they requested support from his office as biomaterials research and education continued to expand at the University of Mauritius. Bowlin and Jhurry also explained novel polymer variations that they envision for potential use in bone tissue engineering. This meeting resulted in broadening awareness about the on-going attempts to synthesize novel, functional polymers in order to meet a critical need in developing the next generation of bone tissue engineering scaffolds.

Bowlin and Jhurry have found this collaboration, despite being separated by thousands of miles and nine time zones, to be stimulating and productive. They look forward to the discovery of novel polymers and scaffolds made of polymers that will allow development of products to improve the quality of life for those in need.