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Vitalize synthetic vascular grafts in vivo

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Purpose: Current arterial tissue engineering research focuses on cell-based approaches. The purpose of this study is to investigate the potential of mammalian host to remodel synthetic polymeric grafts into viable arteries. The idea is to bypass in vitro cell seeding and culturing completely.

Methods: We designed the graft to have two layers, the inner tubular core is made of the elastomeric poly (glycerol sebacate), the outer sheath is made of polycaprolactone fibers. The sterilized grafts are coated with heparin and implanted as interposition grafts in rat abdominal aorta.

Results: The grafts were quickly infiltrated with cells and polymer degradation led to rapid host remodeling. The graft materials were mostly degraded within 3 months. In its place was a neo-artery that mimicked native artery mechanically, biochemically, and anatomically. The neo-arteries were well integrated with the host, remained patent and pulsed synchronously with host arteries.

Conclusions: This study indicates that synthetic vascular grafts made from fast degrading elastomeric materials can be remodeled by rodents into viable arteries. It remains to be seen if this is translatable to small arteries in large animal models and humans.

Biography

Yadong Wang is an Associate Professor of Bioengineering at the University of Pittsburgh. Prior to this, he was an Assistant Professor at Georgia Tech and Emory University. Dr. Wang earned his PhD from Stanford University and finished his Postdoctoral training in Bioengineering from the Massachusetts Institute of Technology. Dr. Wang's interests include bio-inspired materials for cardiovascular tissue engineering, nerve regeneration, and controlled delivery of biomacromolecules. Dr. Wang's team applies biomimetic strategies to biomaterials design and explores means to translate c materials innovations into clinical benefits.

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