

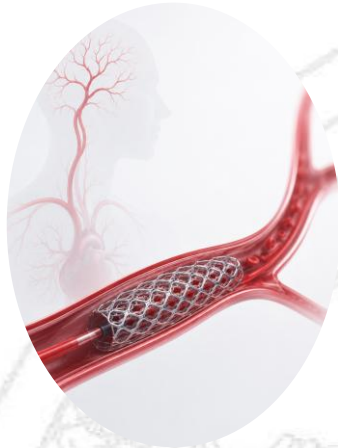
Novel engineering strategies for vascular implants

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Minimally invasive, catheter-based interventions have revolutionized the diagnosis and treatment of cardiovascular pathologies over the last few decades. Technological advances in areas such as lasers and textiles have enabled the development of increasingly smaller implants, both balloon or self-expandable, which allow access to smaller arteries and so into deeper body regions, such as in the neurovasculature. Despite these significant achievements, serious implant-related complications still include thrombus formation as well as inflammatory vessel reactions, both of which are likely to result in a long-term vessel occlusion, such as in the heart or in the brain.

Against this background, a considerable effort has been invested in researching and developing novel materials with the enhanced ability to integrate into their biological environment after implantation. The use of tissue-mimicking polymeric substrates combined with novel design solutions promises the next paradigm change in vascular engineering, shifting the focus from a merely mechanical support into more integrative solutions, with the implant capable of providing both biochemical and physical cues designed to stimulate natural tissue regeneration mechanisms.

