



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Transplants and Grafts

Development of Synthetic Vascular Grafts

Battlefield wounds often involve vascular tissue damage requiring surgical interventions such as arterial repairs and vein bypass grafts. Synthetic vascular grafts are used routinely. However, challenges remain in the application of these grafts for small diameter vessels, as those currently available may result in complications such as obstruction, clot formation, and arterial wall thickening.

To overcome these obstacles, investigators from the University of Florida (Gainesville, FL) developed biodegradable tissue-engineered vascular grafts that more closely mimic the architecture of the native vessel. To this end, the team has created a bilayer scaffold consisting of a hollow polymeric tube surrounded by a thick layer of microscopic fibers containing essential vessel wall components collagen and elastin (*Goins et al., 2018*). The addition of these proteins to the construct will support the growth of vascular cell types to promote vascular integration and tissue regeneration.

Mechanical testing of the designed scaffold revealed that the scaffold closely matched the mechanical properties of native arteries. The grafts also supported adhesion and growth of blood vessel lining and muscle cells. Additionally, the scaffold could withstand physiologically relevant stresses and pressures.

Taken together, the promising characteristics of these newly developed synthetic vascular grafts have the potential to promote tissue regeneration for the repair and replacement of small diameter blood vessels.

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