Docket #: S23-067

Material Applications and Surgical Designs to Prevent Vascular Graft Failure

This invention describes reinforced grafts made from biocompatible materials that are designed for use in surgical procedures such as coronary bypass graft surgery, vascular surgery, and arteriovenous fistula. These reinforced grafts are fabricated using 3D printing techniques and take into account surgical design considerations such as mechanical strength, flexibility, porosity, and the ability to be tailored to specific anatomical structures. Furthermore, these reinforced grafts are designed to mitigate maladaptation and failure after surgery.

Venous grafts used in coronary artery bypass grafting occlude and fail at a rate of 50% within five to ten years after surgery, leading to repeat revascularization procedures, myocardial infarction, or death in 30% of patients within five years of graft failure. To avoid long-term graft failure, these graft assemblies utilize an external support sheath that provides an adaptive response after surgery.

Stage of Development

- Research - *in vivo*

Related Technology:
Stanford Docket - S19-419 Systems, Devices, and Methods to Prevent Auto and Xeno Graft Failure

Applications

- **Support for vein grafts in clinical applications including:**
  - coronary bypass graft surgery
  - vascular surgery

    - arteriovenous fistula

Advantages

- **Biodegradable, biocompatible, or bioresorbable elastomeric biomaterials**
- **Fast production and customizable -** 3D printed using thiol-ene chemistry
    - **Geometric pattern** to accommodate sheath curvature
    - **Radial and lengthwise compressibility** to accommodate proximal and distal anastomotic sites

Patents

- Published Application: WO2024206506
- Published Application: 20260232426

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