Multiphase Transitioning Peptride Hydrogel for Use in Vascular Anastamosis

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Technology description

Unmet Need

The formation of vascular anastomosis, the joining of two blood vessels, is a fairly common procedure utilized by many surgeons. All vascular bypass operations and solid organ transplants require anastomoses. However, as the vessels being anastomosed become smaller or less firm, surgeons have exponentially increasing rates of failure. In general, these failures often arise from the technical difficulty of suturing small vessels, as this process requires very precise surgical techniques under magnification. Severed vessels tend to contract and have collapsed ends, making their suturing difficult. There are some devices and strategies available today to facilitate the anastomosis, such as expandable stents and stapling tools, but these devices are generally made of metal, contain vessel-damaging ?spikes?, and cannot be removed after surgery. There are also degradable stents, which can be eliminated from the vessel after surgery, but their utility is diminished by the requirement for careful control of temperature, or long dissolution times required for removal. There is a need for a way to aid anastomosis of shorter vessels that is easy to remove after surgery and does not pose a threat to the human body.

Technology Overview

Inventors have designed a peptide-based hydrogel system, called APC1 Peptide Hydrogel, capable of undergoing multiple consecutive phase transitions enabling its use as a temporary stent during anastomosis procedures. The centerpiece of the hydrogel system is a 20-residue peptide, APC1, which is designed to undergo a phase transition under physiological conditions to form a rigid, self-supporting gel directly in a syringe. This solid-like gel also have shear-thin properties, converting the gel into a viscous gel capable of flow. This property allows the gel to be delivered by the syringe directly to the collapsed vessels, where it re-establishes vessel shape, greatly aiding the suturing of a vessel. The peptide gel allows anastomosis procedures to be performed quickly and easily, representing a promising alternative to currently available non-injectable stents.

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