In situ generated polymeric systems for Arterial Aneurysms (AAA) (Yissum)

code: 27-2006-374

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Minimizes the risk of a life-threatening hemorrhage

Categories	Biomedical polymers, Aneurysm, Intravenous solutions, Therapeutic devices
Patent Status	US patent pending
Target Market	The annual market of aortic abdominal aneurysms is estimated in 1 billion dollars.

The Field

- An aortic abdominal aneurysm (AAA) is a localized dilatation of the abdominal aorta resulting from weakening and thinning of the aortic wall. The condition occurs in more than 2% of the adult population, and may result in immediate death following rupture of the aneurismal sac.
- The two major treatments for AAA are replacing the dilated artery by an artificial vascular graft, which is performed by a tortuous open abdominal surgery, and Endovascular Aortic Repair (EVAR), in which a stent-mounted vascular prosthesis is deployed in the intra-luminal cavity.
- Though EVAR presents substantial advantages, it is applicable in only 60% of AAAs. Moreover, renewed leakages into EVAR-treated aneurysms are frequent, and no changes in the aneurismal sac are observed in as much as 40% of EVAR procedures.

Innovation Highligts

- The present invention consists of an isolating polymeric tubular structure that is deployed intra-luminally at the aneurismal site and then expanded, so that it tightly attaches to the vessel and isolates the weak aneurismal arterial wall from the blood stream. Thus, the device minimizes the risk of a life-threatening hemorrhage and rapidly restores the luminal geometry of the healthy artery.
- Differently from rigid EVAR systems, our device consists of a polymer that is deployed in its flexible state and stiffens as required, by different methods (e.g. thermal regulation) after being correctly placed.
- The fixation of the device is tighter and more secure than that of stent/graft systems currently in clinical use due to its increased contact area and continuous interface with the artery tissue.
- The mechanical properties of the device can be tailored to be isocompliant with the pulsating vessel.
- The properties of both the surface facing the arterial tissue and the blood-contacting surface can be tailored independently.
- The device can also release bioactive molecules, as required.
- The device does not comprise a textile graft and, therefore, there are no metal-polymer interfaces, which are known causes of blood leaks and instability.

Development Milestones

- Different polymers were synthesized and characterized, the necessary structures were engineered and their behavior was studied both in vitro and in vivo. The expandability and anchoring of the isolating conduit was demonstrated in acute animals studies.

The Opportunity

- The incidence of AAA is 2-4% of the total population. Rupture of the AAA occurs in 1-3% of the population, entailing death in up to 90% of the cases. Currently available treatments for AAA are difficult, expensive, and prone to failures and complications. Our device presents an innovative solution for major EVAR disadvantages.

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