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(LTI PhD Student)

Isa Santos has a BSc degree in Mechanical Engineering and a MSc degree in Industrial Design by University of Porto. She has worked in different companies and has done scientific research. Her main area of interest is product development of medical devices.

MIT Portugal

Structural analysis and optimization in the design of a smart stent graft

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MIT-Portugal associated research project: New technological solutions for smart cardiovascular medical devices

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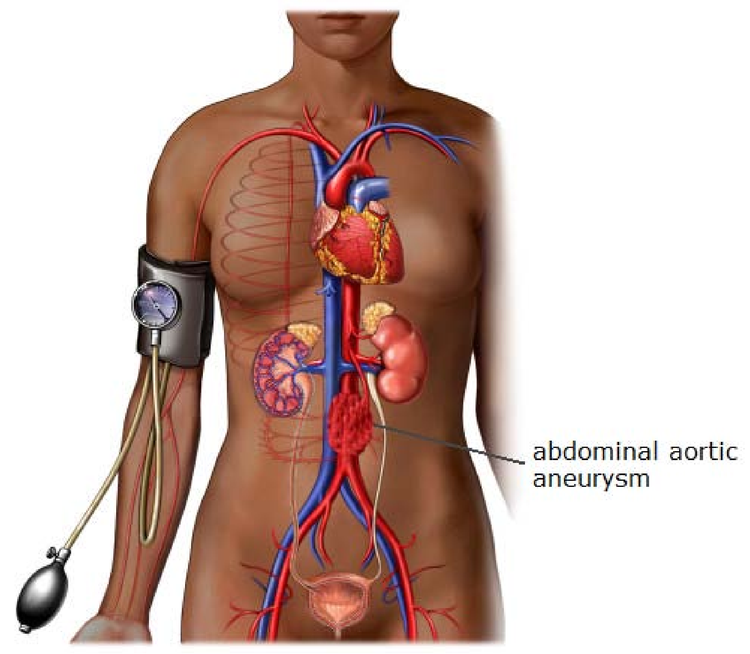
Objectives

Abdominal aortic aneurysm (AAA), see figure, is a cardiovascular disease with over than 90% mortality attached to it. The standard therapy is open surgical repair, but mortality and morbidity rates remain high. The placement of stent grafts via the femoral route, endovascular repair (EVAR), provides an attractive treatment alternative due to its minimal-invasive approach. The results display low mortality and complication rates. However, endoleaks, stent migration or misplacement, aortic perforation, vascular trauma and spinal cord injuries still represent complications. The main goals are the analysis of the existing devices and the development of an improved one that could help to enhance global statistics on surgery time, costs, recovery time, etc.



Abdominal aortic aneurysm (AAA)

Work plan

- Literature review, evaluation of the state-of-the-art on current stent graft solutions, surveys to recognize which features can be improved and / or included;
- Development of a novel stent graft and its validation using finite elements modeling;
- Integration of a sensing element in the stent graft and its evaluation using computational simulations;
- Elaboration of a comprehensive cost model and its sensitivity analysis.

Expected results

An enhanced stent graft with monitoring capabilities, passive telemetry and improved mechanical behavior for the treatment of abdominal aortic aneurysm to be used in endovascular repair.

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