



Università degli Studi di Genova

**DISC**

Dipartimento di Scienze Chirurgiche e Diagnostiche Integrate

<b>Title: Impact of peripheral endovascular repair on femoral-popliteal artery kinematic: from clinical experience to in vivo biomechanical modeling (PERFEKT study)</b>	<b>Area of interest:</b> MED/22 – Vascular Surgery	<b>Principal Investigator: Bianca Pane</b>
<b>Funding</b> (NO PROFIT - Company)	<b>RICERCA FINALIZZATA 2018 – MINISTRY OF HEALTH</b>	
<b>Summary</b>	<p>Femoro-popliteal arterial (FPA) segment is commonly affected by two types of vascular diseases: peripheral artery disease and popliteal aneurysms. Although endovascular treatment is recommended specially in high-risk patients to treat aneurysms or occlusive lesions, its outcomes could be impaired by the hostile biomechanical conditions due to the hip/joint kinematics, inducing mechanical failure of the implanted device which can lead to limb amputation, strongly affecting the quality of patient life. Most of the current literature deals either with cadaver models or healthy subjects but lacks of in vivo data, that will help relate loading conditions, device design, and clinical outcomes.</p> <p>PERFEKT study aims to fill this gap combining clinical data, in-vivo medical images and biomechanical simulations of leg bending and vessel deformation. Our results are expected to provide valuable insights into FPA biomechanics before and after stenting, and ultimately improve post-operative outcomes.</p> <p><b>Specific aims:</b></p> <ul style="list-style-type: none"><li>- To evaluate the performance of the popliteal stent.</li><li>- To define a protocol for CTA images with flexed and extended knee acquisitions.</li><li>- To show the stent capability to avoid kinks or local mechanical failure by means of structural FEA and CFD analysis and to understand how to improve the new generations of stents for FPA segments.</li></ul> <p><b>Publications:</b></p> <ol style="list-style-type: none"><li>1. Spinella G, Finotello A, Pane B, et al. In Vivo Morphological Changes of the Femoropopliteal Arteries due to Knee Flexion After Endovascular Treatment of Popliteal Aneurysm. <i>Journal of Endovascular Therapy</i>. 2019;26(4):496-504. doi:10.1177/1526602819855441</li></ol>	

2. Ferrarini, A., Finotello, A., Salsano, G. et al. Impact of leg bending in the patient-specific computational fluid dynamics of popliteal stenting. *Acta Mech. Sin.* 37, 279–291 (2021). <https://doi.org/10.1007/s10409-021-01066-2>
3. Conti, M., Ferrarini, A., Finotello, A., Salsano, G., Auricchio, F., Palombo, D., ... & Pane, B. (2020). Patient-specific computational fluid dynamics of femoro-popliteal stent-graft thrombosis. *Medical Engineering & Physics*, 86, 57-64.

**Partner:**

- Ospedale Policlinico San Martino – UOC Chirurgia Vascolare ed Endovascolare (Dr. Giovanni Spinella, PI)
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**Link to protocol**

<https://compmech.unipv.it/projects/ongoing-projects/perfekt-project/>