

# Department of Angiology

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PD Dr. Marc Schindewolf  
Consultant Physician



PD Dr. Sebastian Sixt  
Consultant Physician, until Oct 2018



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Consultant Physician



Hana Ramadani  
Member of Scientific Staff

## Research Partners

- ARTORG Center for Biomedical Engineering Research, University of Bern, Bern, Switzerland
- Clinical Trials Unit Bern, Department of Clinical Research, University of Bern, Bern, Switzerland
- Vorarlberg Institute for Vascular Investigation and Treatment (VIVIT), Feldkirch, Austria
- University Hospital Bern, Department of Visceral Surgery and Medicine, Bern, Switzerland
- University Hospital Bern, Department of Vascular Surgery, Bern, Switzerland
- University Hospital Bern, Department of General Internal Medicine, Bern, Switzerland
- University Hospital Basel, Department of Angiology, Basel, Switzerland
- University Hospital Zürich, Department of Angiology, Zürich, Switzerland
- University Hospital Frankfurt, Department of Hemostaseology, Frankfurt, Germany
- University Hospital Lübeck, Department of Dermatology, Lübeck, Germany
- University Hospital Mainz, Department of Cardiology/Angiology, Mainz, Germany

## Research Profile

The Division of Angiology is dedicated to a multitude of research projects to advance the field of vascular medicine. The spectrum of research ranges from fundamental research to clinical trials that comprise analysis, classification and computational hemodynamic modeling of congenital vascular malformations, stereotactic MRI-based imaging guidance techniques, risk factor analysis and risk factor modulating therapies in peripheral artery disease, endovascular treatment of peripheral artery disease, drug therapy and endovascular management of venous thromboembolism, and contrast-enhanced ultrasound imaging techniques for outcome prediction in atherosclerotic disease.

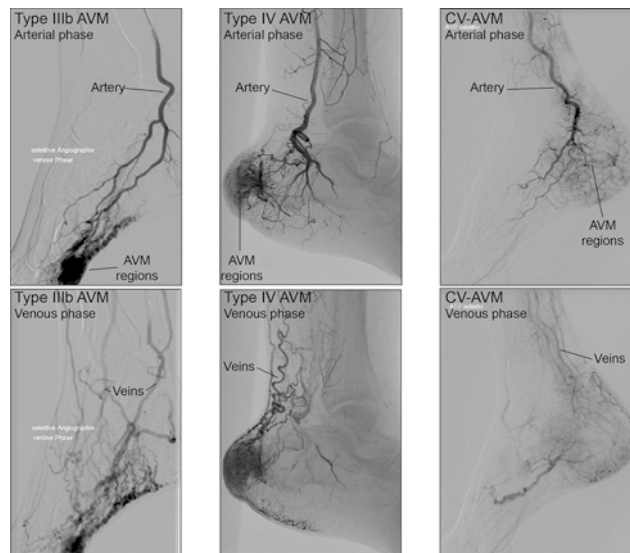
## Teaching Profile

The Division of Angiology participates in University teaching programs for students of medicine and sports-/ physiotherapists. Further activities are regular student lectures and courses (clinical skills), weekly DHGE lectures, and weekly internal education in the field of vascular medicine.

## Highlights 2018

### *Angioarchitecture and hemodynamics of microvascular arterio-venous malformations*

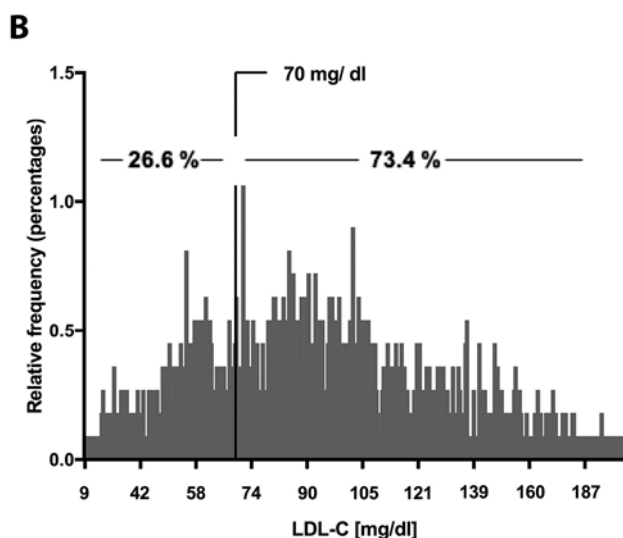
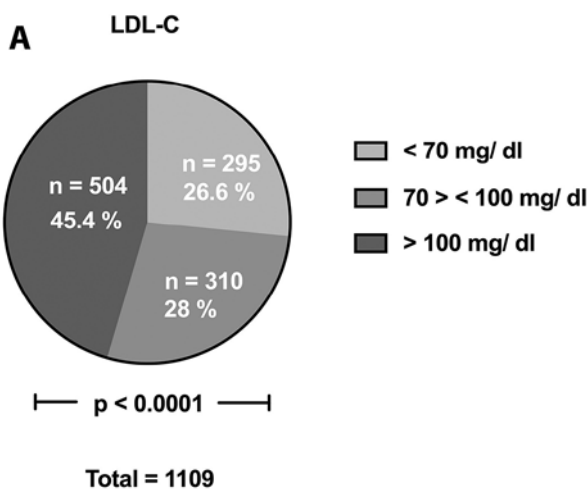
In collaboration with ARTORG Center for Biomedical Engineering Research, University of Bern, Switzerland, we developed a computational model to study the effects of microvascular anomalies on local hemodynamics and their impact on angiographic contrast propagation. Since some microfistular arteriovenous malformations (AVM) do not match the characteristics described in current AVM classification systems, we proposed a new subgroup of microfistular AVMs, composed of enlarged, fistulous paths on the venous half of capillaries and/or dilated draining venules



(hyperdynamic, capillary-venulose malformation [CV-AVM]). The computational model predicts increased arterio-venous contrast agent transit times, highly dispersive transport characteristics and high flow type II and III AVMs for the proposed CV-AVM angioarchitecture. These findings relate to the time-contrast intensity curves sampled from our clinical angiographies.

*Poor attainment of lipid targets in patients with symptomatic peripheral artery disease*

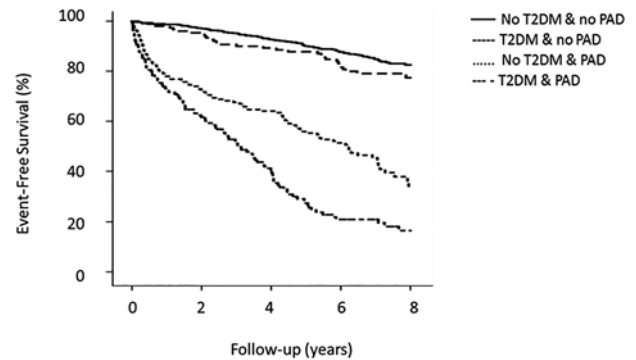
Since patients with peripheral artery disease (PAD) are at very high cardiovascular risk, strict lipid-lowering therapy is recommended. Our single-center observational study aimed at investigating the guideline equitable lipid lowering in 1109 patients with symptomatic PAD. The results show a remarkable undertreatment of LDL-C and non-HDL-C in patients with symptomatic PAD. As statin treatment was associated with a reduced CV mortality rate, our findings call for an increased awareness in clinical lipidology.



*Single and combined effects of peripheral artery disease (PAD) and of type 2 diabetes mellitus (T2DM) on the risk of cardiovascular events*

In collaboration with the Vorarlberg Institute for Vascular Investigation and Treatment (VIVIT), Feldkirch, Austria, we prospectively recorded cardiovascular events in 1049 subjects (w/o PAD and w/o T2DM) and aimed at investigating the individual and combined effect of T2DM and PAD on future events.

The cardiovascular event rate was lowest in patients with neither PAD nor T2DM (16.7%). Compared to this group the event rate was not significantly increased in T2DM patients without PAD (22.2%,  $p = 0.077$ ) but higher in non-diabetic patients with PAD (52.6%;  $p < 0.001$ ) and further increased in patients with both PAD and T2DM (71.2%;  $p < 0.001$ ). In conclusion, PAD is a stronger risk factor for future cardiovascular events than T2DM, but T2DM in PAD patients strongly increases the incidence of cardiovascular events.



**Awards**

- PD Dr. Marc Schindewolf: Schweizer Preis für Angiologie 2018

**Selected Competitive Grants**

- Dr. Jörn F. Dopheide: Schweizerische Herzstiftung

**Selected Publications**

- Frey S, Cantieni T, Vuillemin N, Haine A, Kammer R, von Tengg-Kobligk H, Obrist D, Baumgartner I. Angioarchitecture and hemodynamics of microvascular arterio-venous malformations. *PLoS. One.* 2018 Sep 7;13(9):e0203368. doi: 10.1371/journal.pone.0203368. eCollection 2018
- Dopheide JF, Papac L, Schindewolf M, Baumgartner I, Drexel H. Poor attainment of lipid targets in patients with symptomatic peripheral artery disease. *Journal of Clinical Lipidology.* 2018 May - Jun;12(3):711-717. doi: 10.1016/j.jacl.2018.02.013
- Saely CH, Schindewolf M, Zanolin D, Heinzle CF, Vonbank A, Silbernagel G, Leiberer A, Drexel H, Baumgartner I. Single and combined effects of peripheral artery disease and of type 2 diabetes mellitus on the risk of cardiovascular events: A prospective cohort study. *Atherosclerosis.* 2018 Oct 6;279:32-37. doi: 10.1016/j.atherosclerosis.2018.09.031
- Baumgartner I, Norgren L, Fowkes FGR, Mulder H, Patel MR, Berger JS, Jones WS, Rockhold FW, Katona BG, Mahaffey K, Hiatt WR. Cardiovascular outcomes after lower extremity endovascular or surgical revascularization: The EUCLID trial. *J Am Coll Cardiol.* 2018 Oct 2;72(14):1563-1572. doi: 10.1016/j.jacc.2018.07.046
- Schindewolf M, Banik N, Lindhoff-Last E. Reply: Fondaparinux and direct oral anticoagulants: Promising anti-coagulant for management of heparin-induced thrombocytopenia. *J Am Coll Cardiol.* 2018 Apr 17;71(15):1710-1712. doi: 10.1016/j.jacc.2018.02.026
- Hügel U, Baumgartner I. Implementation of new endovenous treatments of varicosis in the therapy of lateral embryonic veins in Klippel-Trenaunay syndrome. *Journal of Vascular Surgery* (accepted Dec 2018)