Indholdsfortegnelse

Preface........................................................................................................................................ 4
About us...................................................................................................................................... 5
  Department of Vascular Surgery ....................................................................................... 5
  The Vascular Research Unit.............................................................................................. 5
Strategic research areas ........................................................................................................ 6
To work as a researcher - selected stories ......................................................................... 7
Twitter Activity ..................................................................................................................... 11
Meet the Researchers.............................................................................................................. 12
Collaborative partners......................................................................................................... 31
Fundraising ........................................................................................................................... 32
Trials ........................................................................................................................................ 33
PhD thesis from the Department of Vascular Surgery......................................................... 34
PhD Examinations ................................................................................................................. 35
Scientific Presentations ......................................................................................................... 36
Scientific production of 2020.............................................................................................. 38
Preface

At the Department of Vascular Surgery, Rigshospitalet, we strive to provide research-based treatment and education. Within the last years, we have been rethinking our research strategy with the aim to strengthen the department’s future research. One of the results is the formation of the Copenhagen Vascular Research Unit, focusing on collaboration, knowledge sharing and consolidation of our research efforts. This annual report is the first of its kind from the Research Unit, and it’s our hope that it will be well received as an attempt to outline the group’s work, our ambitions and the investments made.

We hope you will enjoy reading.

Jonas Eiberg and Henrik Sillesen
About us

DEPARTMENT OF VASCULAR SURGERY

Department of Vascular Surgery at Rigshospitalet, Copenhagen University Hospital, Denmark (@Rigshospitalet), is among the largest vascular clinics in Europe. Our experience and volume of diagnosing and treating vascular disease is considerable, providing a valuable base for the development of new treatments as well as basic and clinical research. Rigshospitalet is Denmark’s leading hospital for patients needing highly specialised treatment, with the ambition to provide internationally outstanding treatment. Department of Vascular Surgery is part of The Heart Centre, a highly specialised unit that diagnoses and treats all kinds of cardiac, vascular, pulmonary and infectious diseases.

THE VASCULAR RESEARCH UNIT

Research is one of the cornerstones of Rigshospitalet, thus it occupies a very special place of importance and priority. Research findings are obtained and disseminated through extensive national and international collaboration.

The day-to-day leadership of The Vascular Research Unit (@VascularCph) at Department of Vascular Surgery is handled by our clinical research associate professor and the department’s professors, and the unit comprises of 4-5 research fellows, app. 10 postdocs and medical students. The clinical research associate professor is also part-time employed at Copenhagen Academy of Medical Education and Simulation (CAMES), a NASCE accredited centre, with a strong research and development profile within medical education and simulation.

During the last ten years, >10 theses and doctoral dissertations and >300 scientific publications have emanated from The Vascular Research Unit. The clinic has for years been well represented in the leadership of the European Society of Vascular Surgery and has been organising several international courses and participates regularly in international clinical trials.

Over the last 5 years, the research unit has experienced progress, both in terms of active researchers, number of publications and the breadth of research. The group meets monthly and updates each other, shares experiences and presents the latest research results.
**Strategic research areas**

Our research focuses mainly on advanced vascular ultrasound for improving imaging and risk prediction of vascular disease in several vascular beds, but also research on arteriosclerosis in general, carotid disease, aortic aneurysms and surgical training.

"Thanks to the close integration of research and clinic, we aim to encourage investigation of clinical questions, innovative thinking and solutions; as well as to breed the next generation of clinical academic leadership.

**Three Dimensional (3D) Vascular Ultrasonography (US)**
- Volume quantification of aneurysms
- Improved atherosclerosis quantification
- Image-guided intervention
- Improved decision making

**Carotid disease**
- Contrast-enhanced ultrasound (CEUS) in carotid disease
- Improved identification of thrombus and echolucent plaques
- 3D for plaque characterisation
- Biomarkers in carotid disease

**Abdominal aortic aneurysms (AAA)**
- AAA US-volume for improved risk prediction
- AAA biomarkers and intraluminal thrombus
- Ultrasonic assessment of AAA biomechanics
- Improved virgin AAA and post-EVAR surveillance programs

**Atherosclerosis**
- Plaque characteristics and thrombotic events
- Plaque changes over time
- Identification and quantification of atherosclerosis in particular high-risk patients
- Non-surgical treatment and care of the atherosclerotic patients

**Vascular surgical educational**
- Learning styles and learning curves in vascular surgery: open and endo
- Simulation-based education in vascular surgery: curriculum and implementation
- Interdisciplinary and cross-curricular simulation-based training
- Evidence-based certification of vascular US

**Endovascular Aortic Repair**
- Evidence-based surveillance following EVAR and FEVAR
- Prediction of EVAR failures
To work as a researcher - selected stories

BRIAN LINDEGAARD PEDERSEN

Brian (44y) and his colleagues started a few years ago to expand the use of ultrasound when diagnosing and treating complicated stenoses in AV-dialysis fistula.

The life of a patient with renal failure and haemodialysis is characterised by several weekly hospital visits for dialysis. The fistula becomes the patient’s “lifeline” and the relatively common fistula stenosis is a serious threat to this fragile group of patients. Previously, fistula stenosis was treated using fluoroscopy and contrast guided balloon angioplasty as an in-patient, meaning a whole day in the hospital, blood samples and bureaucracy.

Brian and colleagues have developed an ultrasound and outpatient-based alternative, allowing four to five patients treated per day, involving only the surgeon and two endovascular assistants (EVA’s). Brian explains: “With the patient awake, the surgeon examines the fistula stenosis with ultrasound and balloons the stenosed vessel in 30-60 mins. In this way, the patient spends approximately two hours instead of a whole day and night, saves contrast infusion and radiation – all thanks to ultrasound-guided percutaneous angioplasty. It’s a no-brainer!”. Currently, Brian is investigating the role of intravascular ultrasound (IVUS) to optimise the treatment further, and at the latest to expand ultrasound guided therapy of vein bypass stenosis on the leg.

“The patient spends approximately two hours instead of a whole day and night.”
In one of Jonathan’s (30y) several projects, he has focused on simulation-based training of nurses in basic endovascular skills, called ‘endovascular assistants’ or ‘EVAs’. Jonathan explains: “The goal of this program is, among other things, to give surgeons and nurses the same pre-understanding and knowledge platform before treating patients. It is good both for the patient and the teamwork in the OR.”

Jonathan is well on his way through his research fellowship where he, among other projects, take EVAs and future vascular surgeons through the Belgian developed course “PROSPECT”. PROSPECT is today a mandatory simulation course for all Danish vascular surgical trainees. Jonathan explains: “The requirements for the trainees are more challenging compared to the EVA’s, as the trainees will be responsible for the treatment and must pass several practical modules and tests. The EVAs are going through all modules with a focus on familiarisation with the procedure and the equipment”.

Both EVAs and surgeons agree that their work together has become more fluent and cooperative, and the EVAs says that the simulation program has increased their job satisfaction.

“...The unexperienced driver next to you just don’t know when the driver is busy with traffic, while the experienced driver on the passenger seat automatically will be quiet when a hectic situation occurs.”
ALEXANDER ZIELINSKI

Alexander (32y) is one of our most senior research fellows, planning to submit his PhD thesis during summer 2021. As the oldie in the PhD-office, we asked him to take a trip down memory lane…

Starting as a research fellow was a big change for Alexander: “As a house officer, you’re getting used to a ‘here and now’ pace around clinical procedures, whereas the expectations of a research fellow are more on the long term. As deadlines, submissions and presentations come nearer, you’re required to plan your time efficiently and well ahead.”

Alexander continues: “Moreover, the role of a research fellow demands three layers of skills or knowledge. Firstly, the professional knowledge that makes you an expert in your field. Secondly, you need to master the more general skills of health science such as statistics and writing. Thirdly, and just as important, you need to train your organisational skills.” Alexander continues: “Throughout the first period of your fellowship, you simply follow your supervisor’s advice and count on it to be right, but sooner or later, some of your own understanding begins to take shape. It’s like the karate kid: you do something for a while without knowing why, and at some point, it makes sense”, Alexander says with a smile.

What’s apparent in the conversation with Alexander is his respect for the craftsmanship of writing articles: “Combining data with analysis, intention, message and effort, the researcher tells a story”. Alexander finds writing scientific articles more human and impressionable than he had first expected.
"There is strong evidence supporting the effect of ‘Supervised Exercise Therapy’ for patients with intermittent claudication, but the knowledge of how to set up an effective rehabilitation program in a community-based setting is poor" says research fellow Maj Siercke (51), who is close to publication of a randomised control trial, as part of her research fellowship.

In this RCT, more than 100 patients with intermittent claudication were included. In the intervention group, patients were introduced to Supervised Exercise Therapy close to that offered in coronary heart disease rehabilitation. "The training consisted of 3 months of team-based playful sports with a continuous focus on team spirit, combined with several other motivational factors", Maj explains. Compared to the control group, the patients' maximal walking distance, quality of life and other factors went up significantly.

In Denmark, all citizens with newly diagnosed coronary heart disease are by law entitled to receive an offer of cardiac rehabilitation. Although realised for many years, Maj's results highlighted that patients with intermittent claudication benefit much from rehabilitation. Like two faces of the same disease, it stands out that only newly diagnosed coronary heart disease patients, and not claudicants, receive an offer of rehabilitation.

With minor adjustments, the Supervised Exercise Therapy for coronary heart disease fit most claudication patients, and with approximately 60,000 Danes living with this condition there would be a need to create claudication-training teams in the whole country. "An estimate of the price", Maj adds, "favors the Supervised Exercise Therapy, as balloon and stent treatment amounts to € 10,000, compared to € 1,000 for supervised training".

"It stands out that newly diagnosed coronary heart disease patients receive an offer of rehabilitation, while claudication patients receive some good advice about exercising more."
Twitter Activity

@VascularCph

Since mid-May 2020, the Vascular Research Unit in Copenhagen has been on Twitter (@VascularCph), and during that time we have produced more than 50 tweets on many aspects of the vascular world.

At the Vascular Research Unit, we pride ourselves with an engagement rate of currently 6.8%, as smaller organisations would suffice themselves with an engagement rate over 4%.
Meet the Researchers
Alexander is a vascular surgical trainee at the Department of Vascular Surgery, University Hospital of Copenhagen. He has a keen interest in advanced vascular ultrasound, especially of the abdominal aorta.

OVERVIEW OF PHD PROJECT

An aneurysm of the abdominal aorta (AAA) is a condition characterised by progressive weakening and dilation of the vessel wall, and eventually rupture and major haemorrhage. Ultrasound is used to track AAA growth, where size is the most important risk factor for rupture. The ultrasound (US) group at the Department of Vascular Surgery has for years investigated the role of 3D-US and AAA volume assessment in the context of AAA surveillance.

Alexander’s PhD project focuses on improving mapping of AAA using advanced 3D-US and magnetic tracking to perform 'extended field of view'-volume estimations. The work of this PhD project is done in close collaboration with US laboratories in Paris and Seattle, where engineers develop new technologies to be tested in the clinical setting in Copenhagen.

STATUS OF PROJECT

Alexander is in the second half of a three-year research fellowship. The project is based on measurement of AAA growth, and at the time of writing, more than 200 AAA patients have been included in the project.

The preliminary results were presented at the annual ESVS conference in Hamburg 2019, one paper is accepted, one is submitted and a third is in manus.

PhD thesis is expected submitted within summer 2021.
Jonathan Lawaetz has a joint fellowship at the Department of Vascular Surgery, Rigshospitalet and the Copenhagen Academy for Medical Education and Simulation (CAMES). He has a keen interest in medical education, particularly in the field of competency-based education of future vascular surgeons.

OVERVIEW OF PHD PROJECT

Jonathan’s project focuses on simulation-based training in open aortic repair (OAR), endovascular aortic repair (EVAR) and endovascular treatment of peripheral arterial disease (PAD). The project runs as two separate training courses; “The Aortic Course” and “PROSPECT”, the last of which is adapted from, and done in collaboration with, the University Hospital in Ghent, Belgium. The participants are residents within the first two years of their vascular surgery training. Both courses are split into two arms, comparing massed (typical boot-camp courses) vs. distributed training (running over a longer time). Jonathan’s thesis will focus on learning strategies (massed vs distributed), learning curves and cost of training, as well as the translational value of the two training strategies.

STATUS OF PROJECT

Jonathan is in the first half of his PhD fellowship and is more than halfway through data-collection. The preliminary results in OAR show that the rate of learning is highly individual and that simulation-based training should be proficiency-based, underlining the need for validated assessment tool and pass/fail scores. The results on EVAR and PAD are pending.

Two abstracts were presented at the ESVS annual meeting in Hamburg in 2019, and the latter as part of the prize sessions. A systematic review (simulation-based training and assessment in open vascular surgery) and an original paper has been published.

Karin Yeung is a vascular surgical trainee with main interest in atherosclerotic carotid disease and advanced vascular ultrasound. Before Karin’s PhD fellowship, she did research in collaboration with the Department of Anesthesiology and the Department of Vascular Surgery at Rigshospitalet, leading to one publication.

OVERVIEW OF PHD PROJECT

Atherosclerosis in the carotid artery leads to accumulation of cholesterol and calcification in the arterial wall, and over the years it forms a plaque. As the plaque increases, the arterial lumen will stenose and may cause a stroke. The presence of carotid plaque is a documented risk factor for future cardiovascular disease. Current criteria for prophylactic carotid endarterectomy in Denmark are based on neurological symptoms and the degree of stenoses determined from CT or US, but do not include plaque morphology. Numbers needed to treat is 3-10 for carotid endarterectomy. Thus, additional risk factors in plaque morphology are needed to optimise the risk stratification of carotid plaques for cardiovascular disease.

Karin’s PhD project is focused on determining carotid plaque morphology and identifying vulnerable plaques using advanced 3D-US and US contrast (CEUS). The project is done in close collaboration with ultrasound engineers in Paris and Seattle, and with the Department of Cardiology at Rigshospitalet.

STATUS OF PROJECT

Karin is in the first year of a three-years research fellowship. The project is based on ultrasound imaging of carotid plaques from three different patient groups in four subprojects and requires at least 405 patients for inclusion. The project started inclusion in May 2020.
Lærke graduated from Aarhus University in 2012 and received her PhD degree from the University of Copenhagen in 2020. Her research focuses on the detection of structural changes in carotid plaques over time using 3D-US.

OVERVIEW OF PHD PROJECT

Plaque instability is essential for developing thromboembolic events, and a systemic vulnerability at the time of the thromboembolic events is suggested. This provides a reason for assessing plaque instability for the specific plaque, and to use this assessment as a general cardiovascular risk-factor.

Ultrasound (US) of carotid plaque size is used as part of a risk assessment, whereas the morphological plaque characteristics are yet not implemented in clinical practice. "Lærke’s work with 3D-US and FDG-PET/CT indicate a stabilization of the vulnerable carotid plaque over time after a stroke and a structural difference in statin-naïve AMI patients compared to patients with chronic peripheral artery disease on statins. The project was performed in close collaboration with ultrasound engineers in Paris and Seattle, and the Department of Cardiology at Rigshospitalet.

STATUS OF PROJECT

Lærke finished her PhD fellowship at the Vascular Research Unit with a successful defense held on February 4th, 2020. Currently, she is a trainee in vascular surgery at the Department of Vascular Surgery.
Maj’s research field is in cardiovascular rehabilitation. Maj has been 12 years (1993-2005) at the Department of Cardiology, Herlev Hospital, where she became the leader and developer of an interdisciplinary rehabilitation program. From 2005, she served for 12 years as a senior lecturer at the School of Nursing at University College Copenhagen. Throughout her work, Maj always focused on care for acute and cardiac patients, and the rehabilitation of these.

OVERVIEW OF PHD PROJECT

The CIPIC Rehab study is a randomised and mixed methods clinical trial with a cross-sectoral rehabilitation intervention for patients with intermittent claudication versus usual care for patients in non-operative management. The objectives of the trial are to investigate the effects of a cross-sectoral exercise and lifestyle intervention based on the established rehabilitation program for patients with ischemic heart disease, versus usual care without rehabilitation in 118 patients with intermittent claudication. The primary hypothesis is that, compared with the control group, a specialised rehabilitation program for the intervention group improves maximal walking distance in the treadmill walking test after the completed intervention. The three secondary hypotheses are that pain-free walking distance, diet and level of physical activity improve in the intervention group compared with the control group after 6 and 12 months. Exploratory analyses will test the hypothesis, that rehabilitation for patients with intermittent claudication improves quality of life, health behavior, physical activity and reduces anxiety and depression after 6 and 12 months. The effects, benefits, and motivational factors of conservative management will be examined. Also patient-experiences of the intervention will be examined, including factors that support or hinder adherence to the intervention explored.

Maj expects to submit her PhD thesis in early 2021.

Magdalena is a vascular surgical trainee at Copenhagen University Hospital. Her research focus is on outpatients-based three-dimensional ultrasound and endovascular aortic repair (EVAR) outcomes. In addition, Magdalena has, together with a team of biomedical engineers in Paris, been piloting a new tool for assessing biomechanical properties of abdominal aortic aneurysms (AAAs). This work is affiliated with the Horizon 2020 initiative: the Medical Digital Twin for Aneurysm Prevention and Treatment (MeDiTaTe-project).

OVERVIEW OF PHD PROJECT

Magdalena’s PhD project is aiming to further nuance the surveillance programme of AAAs with special focus on preoperative imaging. Advanced 2D- and 3D ultrasound acquisitions obtained from our outpatient clinic constitute the framework of the first part of her project. The images are processed through different softwares, in varying stages of development, to obtain information on AAAs. The second part of Magdalena’s PhD project focuses on outcome research of a low profile EVAR graft. The graft has constituted the predominant choice for infrarenal AAA-repair at our centre for many years, providing a unique basis for data extraction. The present study will evaluate the midterm outcome through comprehensive assessment of pre- and postoperative CTAs and medical charts.

STATUS OF PROJECT

Magdalena is one year into a three-year research fellowship. Her first PhD paper, describing a new way of categorising AAA growth, is in manus. Magdalena has presented a poster on the ultrasound based tracking of AAA wall movement at the ESVS Translational Meeting 2020.
Benjamin Sandholt is in the very last part of his vascular surgical training. He is also a PhD graduate from the University of Copenhagen. His research mainly centres on carotid atherosclerosis and the use of advanced 3D ultrasound. Teaching experience includes, among others, being faculty on supraaortical disease course for Danish vascular surgical trainees and an instructor on the ESVS Academy Basic- and Advanced Vascular Ultrasound. Benjamin Sandholt is involved in one PhD as co-supervisor, with another already finished. His research has resulted in 8 peer reviewed articles, 1 chapter in educational material and in Guidelines for Danish Cardiologists and General practitioners.

Brian Pedersen is a vascular consultant with main research interest and experience within muscle perfusion, exercise and metabolism in patients with peripheral vascular disease and type 2 diabetes. Brian Pedersen started his research as a medical student within basic science and in the field of translational medicine – connecting the clinical world with basic science has always been a major inspiration. Other interests involve development and research within ultrasound-guided PTA procedures in patients with AV-fistulas for hemodialysis and patients with peripheral vascular disease. Working together with nephrologists and the radiology department, he participates in different research projects within the field of AV-fistulas for hemodialysis. Brian has also participated in projects on surgical skills training, and taught surgeons in the treatment of peripheral ischemia.
Henrik Sillesen is head of the Department of Vascular Surgery at Rigshospitalet, a senior researcher and professor at the University of Copenhagen. As a leading professor on vascular surgery and ultrasound, Henrik Sillesen has been the official opposition for 12 theses, encompassing doctoral and PhD theses in vascular surgery and medical science, as well as being supervisor of an equal amount of doctoral and PhD academic degrees. He is author or co-author of 230 peer-reviewed publications and has been a member of several steering committees on major research trials (SPARCL, AORTA, High Risk Plaque Study etc.). As a senior researcher in vascular surgery through decades, Henrik Sillesen has served as president in the European Society of Vascular Surgery (2016-2019), in the Danish Heart Foundation (2004-2008) and Danish Society for Vascular Surgery (DKKS, 2003-2005), as well as president of the World Federation for Vascular Specialties in 2009. Henrik Sillesen is an honorary member of the vascular societies of Europe (ESVS), South Africa (VASSA) and Great Britain and Ireland (GBVSI) and has been on the editorial board of several international journals, including the EJVES.

Jonas Eiberg is consultant in vascular surgery and senior researcher with a PhD degree from the University of Copenhagen (2004) and has received formal education in clinical and research management at Copenhagen Business School. His main research areas are simulation-based education of vascular surgeons, as well as risk-prediction of abdominal aortic aneurysms and advanced 3D-ultrasound. For several years, Jonas Eiberg has been managing Europe’s largest outpatient’s clinic in Copenhagen, Denmark. In the period 2016-2019, Jonas Eiberg was chairman of the ESVS Academy under the European Society of Vascular Surgery and responsible for its establishment from concept to its current status, as the world’s fastest growing educational event within vascular surgery, diagnostics and vascular medicine. Jonas Eiberg is the current chairman of the Danish Society of Vascular Surgery and responsible for cardio-vascular simulation at CAMES. As a supervisor, Jonas Eiberg has been involved in eight PhD theses (4 complete, 4 in progress), five completed master theses, author or co-author of approx. 70 peer-reviewed publications, book chapters and several scientific lectures and posters.
Kim Bredahl is a vascular surgeon and experienced researcher at the Department of Vascular Surgery, and he holds a PhD degree from the University of Copenhagen, Denmark. Kim is a trained educator in the diagnostic use of US in vascular surgery, as well as being the ESVS Academy convenor of non-invasive diagnostic methods. He has also been responsible for the ESVS Basic and Advanced Vascular Ultrasound courses in Copenhagen for years. Kim’s main research focus is advanced 3D-US, tailored EVAR surveillance and risk-prediction of AAA. Currently, Kim is involved in two PhD projects as co-supervisor, with a 3rd already finished, as well as master theses and clinical supervision. His research has resulted in 14 peer-reviewed articles, 3 scientific reviews and two chapters in educational material – as well as multiple national and international lectures.

Lasse Fisker is a recently graduated MD from the University of Copenhagen (2020), and has done research at the Department of Vascular Surgery for two years during his medical studies. His scientific interests are vascular US, post-operative surveillance, as well as PAD and CLTI, which have resulted in presentations at the annual ESVS conference in Hamburg 2019 and at the Danish Society of Vascular Surgery DKKS in 2018, the latter awarded with the prize Best Abstract. His scientific work resulted so far in one paper on ultrasound surveillance after in situ bypass due to CLTI (first authorship) and one co-authored paper on the superiority of in situ bypass in the treatment of femoropopliteal lesions in CLTI patients.
Leizl Joy Nayahangan is a full-time researcher at the Copenhagen Academy for Medical Education and Simulation (CAMES) in Copenhagen, Denmark. Leizl Nayahangan is a registered nurse with a master’s degree in healthcare management and is currently enrolled in the Master of Health Professions Education (MHPE) at the University of Illinois at Chicago. Her main research centres on simulation-based education and curriculum design. Leizl has led national and international needs assessment processes to identify content for simulation-based curricula; and is now also focusing on assessment for learning and implementation of simulation-based training programs across different specialties such as vascular surgery. Leizl is the course director of the CAMES Surgical Simulation Masterclass that teaches leaders and medical educators how to develop, implement, and run evidence-based simulation programs for surgical training. She has authored/co-authored more than 20 peer-reviewed publications and has led various scientific workshops and presentations.

Leizl is a member of the AMEE Simulation Committee and the Danish Society of Medical Education.

Lisbet is educated from Rigshospitalet, Copenhagen, and Odense University Hospital. Her expertise is especially the field of carotid surgery, in which she has taught, supervised, and optimised treatment-plans as well as published several articles. Lisbet is responsible for ensuring the quality and safety of patient care at the Department of Vascular Surgery and is a trustee in the board of the Danish Vascular Registry, Karbase.
Louise de la Motte is a vascular surgeon, head of education in the Department of Vascular Surgery, and an experienced researcher with a PhD from the University of Copenhagen (2013). Her main research areas are peri-operative optimisation; aortic aneurysms and mural thrombus; biological and radiological features; and simulation-based surgical and endovascular training. Louise de la Motte is an associate professor at Copenhagen University and an experienced teacher and instructor, having taught different subjects since she finished her medical education. Amongst other teachings, she is an organiser and teacher in vascular surgery at CAMES, a teacher in research training and aneurysm diseases of registrars and an instructor in the ESVS Basic and Advanced Course in Vascular Ultrasound since 2010. With her substantial involvement in the education of younger colleagues, she has been coordinating the education of trainees at the Department of Vascular Surgery since 2015. Louise de la Motte has authored or co-authored 17 articles, is editing several chapters of educational material in surgery and served as board member of the Danish Vascular Registry from 2015-2020.

Majken received her master in medicine from the University of Copenhagen in January 2020, and is now a resident doctor at the Department of Vascular Surgery at Rigshospitalet. Majken’s research experience started already as a medical student, where she did research on rectus diastasis and hernias with 7 articles authored and/or co-authored. She is now researching on peripheral artery disease in the Vascular Surgery Research Unit, alongside her employment as medical doctor. In 2021 Majken will start a research fellowship at the Department.
Martin’s PhD thesis (2010) from the University of Copenhagen “Detection of the vulnerable plaque with PET/CT” has shed several highly cited papers in premium indexed international medical journals and the work have been followed up by another two PhD theses (2019, 2020) which Martin has co-supervised. Research merits span from basic cardiovascular and renal pharmacological in vivo studies in rodents, to advanced imaging of vascular diseases in human. The current research takes offset in his endovascular specialisation with focus on optimisation of procedures. Especially advancements in medical imaging, both CT and US, are endorsed in daily clinical settings to facilitate the transition from x-ray guided procedures to less harmful techniques for the benefit of both patients and staff.

Martin graduated as MD from the University of Copenhagen in 2014. He started his research career during medical school, working on several randomised trials comparing modern treatments of varicose veins and has since played a significant part in the development of these treatments in Denmark. As a vascular surgical trainee, Martin has evolved his focus into arterial disease with research dealing with the treatment of peripheral atherosclerosis, especially comparing the gold standard open surgery with less invasive percutaneous procedures. Furthermore, he has a great interest in the use of diagnostic US, and has lectured on this topic at several international meetings and workshops. He has authored or co-authored > 10 peer-reviewed publications and presented his results at more than 15 scientific conferences around the world.
Nikolaj Eldrup is consultant in vascular surgery and senior researcher with a PhD degree from the University of Copenhagen (2007). Main research areas are registry-based research. The last couple of years, Nikolaj’s collaboration with other medical specialities have intensified his research about: inflammatory disease and incidence of aortic disease, the impact of transfusion strategies on outcome after major vascular surgery, medical treatment awareness in Danish patients having undergone vascular intervention and impact on the need for repeating revascularisation and major cardiovascular adverse events. Nikolaj has supervised one completed PhD thesis and is co-supervisor for 5 ongoing PhD projects. Nikolaj is also member of the Danish Vascular Registry, Vascunet and the International Collaboration of Vascular Registries.

Qasam M. Ghulam is currently finalising his surgical residency at Rigshospitalet, Department of Vascular Surgery and has a PhD degree from the University of Copenhagen (2018).

Qasam’s main research focus on AAA and visceral artery entrapment. The theoretical framework is focused on personalized AAA risk assessment, encompassing: advanced three-dimensional ultrasound, biomarkers, intraluminal thrombus and aneurysm morphology. Together with colleagues from Rigshospitalet, and the Department of Surgical Gastroenterology at Hvidovre Hospital, Qasam has reintroduced the treatment of patients with median arcuate ligament syndrome (MALS) as a viable treatment in Denmark.

Currently, Qasam Ghulam is involved in two PhD theses as co-supervisor and has authored or co-authored 8 peer-reviewed publications, several scientific lectures and posters. He is also involved in the ESVS Academy as co-convener and is likewise convener of the annual ESVS Basic and Advanced Vascular Ultrasound course held in Copenhagen.
Timothy Resch is the Complex Endovascular Aortic Lead at the Department of Vascular Surgery at Rigshospitalet, Denmark and is the national director of vascular surgery training in Sweden. He completed his PhD in 1999 under the guidance of Prof. Krassi Ivancev, and received a Margret A. Smith fellowship with Dr. Roy Greenberg as his senior. Timothy Resch’ main research focus is endovascular aortic repair and advanced imaging techniques with more than 150 peer-reviewed publications and book chapters on vascular surgery. Timothy Resch served as the Chairman of the Vascular Center in Malmö in the period 2013-2019, and he is on the editorial board of several major vascular journals. He was the 2016 Roy K. Greenberg Distinguished Lecturer at the Vascular Annual Meeting of the SVS and is on the organising committee of Critical Issues on Aortic Endografting, the European Vascular Course and Paris Endovascular Aortic Course. As a supervisor, Timothy Resch has seen 4 PhDs through and is supervising 4 more, as well as supervising several national and international research fellows.

Ulver Lorenzen is a resident in training in vascular surgery and a young researcher with his medical degree from the University of Copenhagen. So far, his introduction to research has been through a broad palette of studies consisting of laboratory research, clinical trials, animal studies, and systematic reviews. During these experiences, Ulver has received relevant training in the form of GCP and FELASA B courses. Ulver Lorenzen has worked as a vascular surgery resident for just over a year and is due to start his formal training. Ulver Lorenzen is the author of two peer-reviewed publications, is currently working on publishing three more, is the co-author of two publications due this year, and has presented research on several scientific conferences. Ulver plans to start a research fellowship at the Research Unit around New Year 21/22.
Collaborative partners

We have established research collaborations with several public and private partners including:

- Philips Ultrasound, Boteil, WA, USA
- Medisys Research in Paris, France
- University of Ghent in Belgium
- University of Barcelona in Spain
- Academy of Medical Education and Simulation in Copenhagen
- MeDiTaTe project and the European Union’s Horizon 2020 project
- COOK Medical
- The National Research Centre of Work Environment (NRCWE) in Copenhagen
- University Hospital in Aarhus
- Bayer AG
- Novo Nordisk
Fundraising

- Aase og Ejnar Danielsens Foundation
- Ingrid Munkholms Foundation
- Bayer AG
- Cook Medical
Trials

The department was in 2020 involved in several ongoing larger research projects and trials, outside PhD projects.

**STRIDE**

Global trial testing if Semaglutide will increase walking distance in patients with type 2 diabetes and intermittent claudication. Henrik Sillesen (Global-PI), Jonas Eiberg (I)

**WARD**

Continuous wireless monitoring of vital signs and automated alerts of patient deterioration vs. routine monitoring of high-risk patients after major surgery. A randomised controlled trial. Jonas Eiberg (I)

**VASSIM**

Europe-wide initiative to explore simulation training in vascular surgery, current status of implementation in Europe, and to explore the associated enablers and barriers. Jonathan Lawaetz (PI), Jonas Eiberg (I), Leizl Joy Nayahangan (I).

**VIXIE**

Hyperoxia and antioxidants during major non-cardiac surgery and risk of cardiovascular complications, a blinded 2x2 factorial randomised clinical trial. The VIXIE trial (Vitamin and oXygen Interventions and cardiovascular Events). Jonas Eiberg (I)

**XATOA**


**VESALIS**

Secondary prevention with PCSK9 inhibitor (Evolucomab) in vascular patients where statin treatment has not resulted in satisfactory LDL levels. Henrik Sillesen (PI).

**PROSPECT**

PROficiency Based StePwise Endovascular Curricular Training Improves Performance in the Hybrid Suite. The PROSPECT Training Registry. Jonathan Lawaetz (I), Jonas Eiberg (PI)

**BURNOUT**

A national and cross-sectional population-based survey targeting all Danish vascular surgeons and vascular trainees, investigating burnout and its association with the psychosocial work environment, organisational factors and personal aspects. Jonas Eiberg (National coordinator, PI)

**DEVICE APPROVAL FOR NEW INDICATIONS BASED ON PROSPECTIVE MULTINATIONAL DATACOLLECTION FROM VASCULAR REGISTRIES**

In collaboration with Vascunet ([www.vascunet.org](http://www.vascunet.org)) and the International Consortium for Vascular Registries ([http://www.icvr-initiative.org/](http://www.icvr-initiative.org/)), Rigshospitalet and the Danish Vascular Registry work on new prospective ways of data collection for the gathering of data on medical devices for FDA and EMA approval on new indication. The first project is to have individual endovascular aortic graft for aneurysm repair approved by the FDA for treatment of ruptured aortic aneurysmal repair. Nikolaj Eldrup (PI)
PhD thesis from the Department of Vascular Surgery

Lærke Urbak, defence on 4th of February 2020.

Title:

Time related morphological and inflammatory changes in carotid plaques. Identification of vulnerable carotid plaques with PET/CT and 3D ultrasound.

Supervisors:

Henrik Sillese, MD, DMSc
Martin Traæe MD, PhD
Henning Bundgaard, MD, PhD, DMSc
Andreas Kjær MD, PhD, DMSc
Benjamin Sandholt MD, PhD

Opponents:

Thomas Engstrøm, MD, PhD, DMSc
Dept. of Cardiology, Rigshospitalet, university of Copenhagen
Maarit Venermo, MD, PhD
Dept. of Vascular Disease
Helsinki University Hospital
Göran Bergström, MD, PhD
Professor at Dept. of Molecular and Clinical Medicine
University of Gothenburg
PhD Examinations

The department was in 2020 involved in PhD defences as chairmen, assessment committee or examination board members.

Danish PhDs:

1. **Louise Skovgaard Londero, MD.** Faculty of Health Sciences, SDU: “Fighting amputations of the lower limbs (FALL): From epidemiological risk identification to cost effective direct actions”, 25/08-2020. Jonas Eiberg as member of the assessment committee

International PhDs:

1. **Moritz Lindquist Liljeqvist, MD.** Karolinska University Hospital / Karolinska Institute, Sweden: “Geometric, biomechanical and molecular analyses of abdominal aortic aneurysm”, 11/09-2020. Jonas Eiberg as chairman of the examination committee

2. **Saman Salim, MD.** Faculty of Medicine, Lund University, Sweden: “On Mesenteric Venous Thrombosis”, 30/05-2020. Nikolaj Eldrup as member of the assessment committee.
Scientific Presentations

- **Alexander Zielinski**: “Full volume estimation of abdominal aortic aneurysm by extended field of view 3D ultrasound: towards a radiation-free alternative to CT” @ ESVS Spring Meeting May 2020.

- **Alexander Zielinski**: “Full volume estimation of abdominal aortic aneurysms by Extended Field of View 3D-ultrasound”, @ ESVS Month, 16th of September 2020.

- **Magdalena Broda**: “Quantifying AAAs Biomechanical properties using ultrasound” @ ESVS Spring Meeting May 2020.

- **Maj Siercke**: “Does 3 months community based cardiac rehabilitation improve walking distance in patients with intermittent claudication? A Randomized controlled trial”, @ ESVS Month, 29th of September 2020.

- **Stevo Duvnjak**: “Iliac Aneurysms: Patient selection, planning and outcome of endovascular management”, @ CIRSE 2020 SUMMIT, 12th-15th of September 2020.
Scientific production of 2020


Some of the members of Vascular Research Unit at a board meeting.