CARIM + HVC ANNUAL REPORT 2024

CARDIOVASCULAR RESEARCH INSTITUTE MAASTRICHT
HEART+VASCULAR CENTER

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CONTENTS

PREFACE

NO BRIDGE TOO FAR...

History has a way of repeating itself. We grow up learning about cruelty, injustice, and war as if they were lessons confined to history books, yet when horror unfolds before our very eyes, we often choose silence. We know the suffering, but we look away. We hope that indifference will shield us, but it never does. Silence is not neutral; it allows tragedy to grow.

It is tempting to believe these events are far away, beyond our reach. Can there be an alternative? Perhaps it lies in the simple, profound act of building bridges. Not the literal concrete structures across rivers, but bridges of respect, dialogue, and connection. Pope Francis has reminded us that only by reaching out across social, cultural, or ideological divides, can we hope to secure our shared survival. Where others build walls, we must build connections. Where rhetoric promotes division, we must insist on dialogue. Building bridges is not an act of weakness, but of courage.

This year at CARIM, we have chosen 'building bridges' as our theme, not only because it reflects a moral duty in the current global challenges, but because it perfectly captures our mission as basic and clinical scientists. At our core, we are bridge builders. We stand with one foot in the world of basic science and the other in the clinic. We explore the mysteries of blood, vessels, and heart, yet we never lose sight of the patient who depends on us. To cross that gap, from molecular discovery to bedside care requires courage, but in addition persistence, and collaboration.

The unique strength at CARIM is the proximity to the clinic. Unlike institutes where ideas remain theoretical, our research is constantly tested against real clinical needs. Clinicians voice their challenges, and our researchers translate them into scientific questions. Conversely, discoveries at the bench can be directly applied into patient care. This dynamic and constant crossing of the bridge is the heartbeat of CARIM. It is why we have become a leader in translational cardiovascular research.

In recent years, the Board of the Maastricht University Medical Center+ completed its 'Strategic portfolio management', selecting spearheads not based on politics or trends, but on academic excellence. For CARIM, that meant a sharpened focus on translational aspects of thrombosis, metabolic disorders, arrhythmia, aneurysms, and heart failure. Each of these domains is a bridge: from molecular insight to clinical application, from today's suffering to tomorrow's solutions.

This is bridge building in its purest form: recognising where our combined scientific and clinical strengths lie and investing in them. For CARIM, it means a sharpened focus on complex challenges in the fields of thrombosis, metabolic and vascular disorders, arrhythmia, and heart failure. Each of these fields represents not only a scientific challenge but also a bridge: from mechanistic understanding to practical prevention and intervention, ultimately to the benefit of a healthier and longer life for tomorrow.

The dice have now been cast. At our annual end-of-year celebration, together with our clinical counterpart Heart+Vascular Center (HVC), we announced that as of 2024 CARIM and HVC will enter into matrimony, with all the vows that bind us in good times and in bad.

The merger of CARIM with HVC is more than a structural change; it is the laying of a cornerstone. Research and clinical care, once separate entities, are becoming one body, one way of life. This fusion is not the end, but the beginning: a launchpad for a future CARIM Clinical Care Centre. Our vision is bold: a fully integrated clinical center where cutting-edge research and patient care are inseparable, where every patient is a source of learning, and where every discovery immediately is streamlined into practice.

In times of global fragmentation, it is tempting to believe that isolation provides security. But isolation, whether geopolitical or academic, leads only to stagnation. True progress arises not from building walls but from building bridges, bridges between disciplines, between institutions, between people.

When we walk through our labs and clinics, we see researchers hunched over microscopes, astonished as patients stem cell-derived cardiomyocytes suddenly awaken to their fate, and realising they are heart cells, begin to beat with a slow, steady rhythm. We see clinicians at the bedside and in operating theatres, intervening in cases of arrhythmias or aneurysms, while PhD candidates collect samples of both diseased and healthy tissue directly from surgery for research. And most importantly, we see them talking to each other, crossing the bridge that unites them. There is an energy here, a sense that what we do matters, not only in publications or grants, but in lives saved and futures restored.

So let this be our guiding principle for the coming year: build bridges. Build them in your research, in your collaborations, in your mentorship. Build them in your conversations with students, patients, colleagues, and society. Build them where others hesitate and strengthen them where they are fragile. For in the end, the bridges we build will outlast the walls that divide us.

As a result of our unification, we present to you the first edition of the integrated CARIM+HVC annual report, a milestone that marks the beginning of many more to come, featuring interviews and highlights from both labs and wards, brought together by our thriving cardiovascular community. The report includes our new grants and contracts, as well as the awards and prizes proudly presented to our colleagues during this remarkable CARIM+HVC year, and we invite you to take a moment to browse through and celebrate our collective achievements.

This is CARIM+HVC 2024.

We hope you enjoy your reading.

Professor Tilman M. Hackeng, Scientific Director
Professor Kevin Vernooy, Medical Director
CARIM+HVC

WHO ARE WE

01

CARIM+HVC

Founded in 1988, the Cardiovascular Research Institute Maastricht (CARIM) has established itself over the last decades as a leading research institute in the field of cardiovascular disease in Europe. At CARIM, more than 500 employees investigate basic mechanisms as well as early diagnosis and individual risk stratification of cardiovascular disease, allowing faster translation of new research concepts to clinical practice. New findings, products and techniques applied in healthcare are evaluated, often in collaboration with private partners, and the results of scientific research are published in high-ranking international journals. CARIM offers a dynamic training ground for master students in basic and clinical sciences, guides PhD candidates towards becoming independent researchers, and supports postdoctoral fellows to become leading scientists in the field of cardiovascular disease, with a strong focus on translational excellence.

CARIM is organised into three divisions – Blood, Vessels, and Heart – each comprising two interdisciplinary programmes: **1.** Blood coagulation, venous thrombosis & bleeding; **2.** Atherosclerosis, arterial thrombosis & stroke; **3.** Vascular complications of diabetes & hypertension; **4.** Regenerative & reconstructive cardiovascular medicine; **5.** Structural heart failure and **6**. Complex arrhythmias. These six programmes host 21 Principal Investigator (PI) groups, which serve as independent scientific, infrastructural, and financial units within the institute.

CARIM embraces a collaborative, team science approach that strategically combines the strengths of its programmes, researchers, and infrastructure. All divisions integrate both basic and clinical research and operate under a shared governance model. Each division is co-led by basic and clinical scientists, enabling collective responsibility for scientific progress, cross-programme collaboration, and talent development. PIs manage their own teams and finances, fostering both autonomy and accountability. International researchers are drawn to CARIM for its open communication culture, interdisciplinary collaboration, high scientific standards, advanced technological platforms, and intellectually stimulating environment.

CARIM is one of eight thematic research institutes within the Faculty of Health, Medicine and Life Sciences (FHML) at Maastricht University and is embedded in the Maastricht University Medical Center+ (Maastricht UMC+).

KEY FIGURES CARIM 2024

ANNUAL BUDGET: M€ **22.8**

NEW CONTRACTS AND GRANTS: M€ **11.0**

RESEARCHERS: **153.6** FTE

TECHNICAL AND SUPPORTING STAFF: **52.5** FTE

DEPARTMENTS/DISCIPLINES: **17**

INTERNATIONAL PEER-REVIEWED JOURNAL ARTICLES (SCI): **1,036**

PHD THESES: **58**

CARIM+HVC

The Heart+Vascular Centre (HVC) is part of Maastricht UMC+, with more than 600 staff members and provides the highest quality cardiovascular care 24 hours a day. HVC stands for inventive and innovative top-referral cardiovascular care. Based on this foundation, HVC proactively and confidently positions and profiles itself clinically as a progressive and internationally oriented academic cardiovascular clinic. Highly specialised expertise is employed for a broad spectrum of cardiovascular conditions. HVC primarily treats patients from the Southeast Netherlands with complex conditions (tertiary care) and is an international reference centre for several treatments (quaternary care). HVC combines state-of-the-art care facilities, such as catheterisation labs, with optimal deployment of digital care and networked care.

HVC plays a prominent role in several nationally recognised centres of expertise, contributing significantly to top-referral care for rare and complex cardiovascular and thoracic conditions. Within Maastricht UMC+ Centre for Cardiogenetics and Rare Heart Diseases, HVC provides highly specialised care for inherited and uncommon cardiac disorders, including dilated and hypertrophic cardiomyopathy, arrhythmogenic right ventricular cardiomyopathy, long QT syndrome, idiopathic ventricular fibrillation, and Brugada syndrome. In addition, HVC is active within Maastricht UMC+ Centre for Rare Respiratory Tumours, which holds national referral status for robotic thymectomies in the treatment of mediastinal tumours. Together with Radboud UMC, HVC also leads the Center for Marfan and Related Disorders, offering expert care for conditions such as Marfan syndrome, Loeys-Dietz syndrome, vascular Ehlers-Danlos syndrome, idiopathic spontaneous coronary artery dissection, and familial thoracic aortic aneurysms and dissections.

HVC collaborates with private partners to develop and test innovative solutions for cardiovascular diseases. Due to the intensive nature of some of these collaborations, strategic partnerships have been established. Health Foundation Limburg (HFL) and Maastricht UMC+ are working together in the fight against cardiovascular diseases. Under the name *Hart en vaat onderzoekfonds Limburg*, the two organisations raise awareness of cardiovascular diseases and highlight the need for increased funding for research. The *Hart en vaat onderzoekfonds Limburg* supports top-level clinical research at HVC, focusing on new treatments, faster diagnoses, improved care, and the prevention of cardiovascular diseases through prevention.

KEY FIGURES HVC 2024

REVENUE: M€ **109**

STAFF MEMBERS: **390** FTE

NUMBER OF BEDS: **105**

OUTPATIENT VISITS: **42,000**

CLINICAL PROCEDURES: **5,500**

CARIM+HVC

In 2024, CARIM and HVC formally joined forces as CARIM+HVC, building on decades of collaboration and a shared vision for excellence in cardiovascular medicine. This strategic integration represents a major step towards establishing a comprehensive CARIM Clinical Care Centre, where research and clinical practice are seamlessly aligned.

The synergy between the two entities combines academic excellence and clinical expertise, creating a dynamic platform for innovation in diagnostics, treatment, and prevention. The unification was further formalised through the installation of a joined CARIM+HVC board, ensuring cohesive leadership across cardiovascular research, education, clinical residency training, and clinical care. This joint governance structure provides strategic direction and facilitates integrated decision-making, further accelerating the translation of innovation into daily cardiovascular care.

CARIM+HVC has participated in more than 20 European projects, including three Doctoral Network programmes (formerly known as ITNs). CARIM+HVC has a long-standing tradition of collaborating with industry, sharing its expertise while maintaining its independence as reflected by the right to independently publish. Past and ongoing collaborations with industry include, among others, Medtronic, Baxter, Bayer, Roche, Abbott, Siemens and Philips. Furthermore, CARIM+HVC researchers are involved in other public private collaborations in (inter)national networks such as CVON, Horizon 2020, Horizon Europe, ERA-CVD, Interreg and Leducq Transatlantic Networks. International training is provided by all three divisions, leading to three excellent and much acclaimed courses (see page 94-95): the Certificate of Advanced Studies in Antithrombotic Management (CAS-AM: Division Blood); The European Vascular Course (EVC: Division Vessels), and the Diploma of Advanced Studies in Cardiac Arrhythmia Management (DAS-CAM: Division Heart).


BEGIN-PIONEER

INTERVIEW

BEN HERMANS LUUK DEBIE AND JOHN NAKKEN

Behind the scenes at the Cardiology workshop

The cardiac catheterisation laboratories are the workshops of the clinical Department of Cardiology; this is where most of the treatments for arrhythmias, coronary heart disease and valvular heart disease take place. It is all about innovation here. The two managers, Luuk Debie and John Nakken, jointly stand at the helm of this ship, which recently changed its name to Cardiac Intervention Center (CIC), with cardiologist Justin Luermans as its medical manager. Ben Hermans is a clinical technologist and researcher, thus forming the human bridge between clinic and university.

A ship with two captains is often the proverbial bad idea, but if you take a look at CIC's organisation, you will understand why this is necessary. It is due to the complexity of the department, which may appear straightforward with its 50 staff members, but is actually situated at different locations across the hospital. At level 1, where HVC is situated, you will find the pacemaker and ICD outpatients clinic, while the treatment rooms are at level 3, and then there is the planning office in the Cardiology staff corridor. "We hope to have a compact CIC within five years", says Luuk, "at one location in the hospital, including a 'heart lounge'. We're aiming for a more homely atmosphere for our day patients, where they mainly wear their own clothes and have one contact person during their entire stay. Of course, we'll need to coordinate with other hospital departments to find a place to fit in our compact department."

FIFTH ROOM

Furthermore, the CIC is a department with a lot of expensive equipment, where innovation is what it is all about. John: "The equipment in the four catheterisation rooms has been completely renewed in recent years. That was necessary to keep up, now and in the future, with the latest developments, such as 3D mapping support in cardiac ablations, but also to use the latest techniques for minimally invasive valvular interventions. We want to expand the number of catheterisation laboratories from four to five, as waiting times for some interventions are becoming too long with our current capacity. And this also requires enough staff." In short: it is the operational and tactical management, ranging from planning, quality assurance, safety, staffing and organisation to finances, as well as the supervision of product and process innovations, which make it a complex department to lead.

HUMAN BRIDGE

At one time, these tasks were carried out as two team leaders under one manager: John for the interventional cardiology and Luuk for the arrhythmias. These two focus areas were retained when the previous manager moved on to another job, and since then they have been sharing the work. In addition to their management tasks, they are also involved in patient care. One of their colleagues is Ben Hermans, who acts as a bridge between clinic and university. "I'm a clinical technologist at the cardiology department and I'm doing research on behalf of CARIM. After my PhD project at the Department of Biomedical Engineering I did a postdoc at the Physiology department, both within CARIM. For the last 18 months I have been combining my job as an allied professional in cardiac devices and electrophysiology with scientific research, collaborating with Professor Dominik Linz." Ben thus has inside knowledge of both worlds. "For CARIM, CIC is the department that has access to human hearts without the need for full open-heart surgery. For example, we can take blood samples and biopsies straight from the heart but can also do physiological measurements, like measuring the pressures within the heart and measuring the heart's electrical conduction. Many CARIM PhD theses have been written using data derived from this department."

PRACTICAL APPROACH

Ben's research focuses on ablation as a treatment for atrial fibrillation. "For instance, one question is: which patients will benefit from a second ablation? We're investigating whether we can predict that from an MRI-scan or an ECG." This research requires data from the outpatient clinic as well as the CIC. "The idea behind my dual job is that it works both ways: I can do clinical measurements as well as measurements for scientific research in patients who undergo an ablation. That way, science and the clinic are

physically linked. I like to take a practical approach. Science is always exploring new distant horizons, while work at the inpatient and outpatient clinics produces results much faster. If after a day's work at the outpatient clinic I have seen fifteen patients, that gives me a sense of immediate satisfaction. And at the same time the clinical work feeds into new research questions."

INVOLVEMENT

In recent years, the cardiac catheterisation rooms at Maastricht UMC+ have undergone an impressive development. Not only has the complexity of the procedures increased, but the role and involvement of the intervention nurses has considerably changed – and increased. Nowadays, nurses stand at the table during their shift at the catheterisation laboratories, in fully sterilised outfits, unlike what used to be the case. John: "Whereas intervention nurses mostly used to have a supporting role outside the sterilised zone, they're now standing, fully qualified and sterilised, at the table during the interventions." This change has ensured not only a greater direct contribution to the intervention process, but also a greater sense of responsibility, ownership and involvement in patient care. The technological progress at the catheterisation lab has also played a major part in this evolution. Procedures have become more complex, using ever more sophisticated equipment like 3D-mapping systems, ultrasound and specialised imaging techniques, which are essential for things like minimally invasive valvular interventions. The successful use of this technology requires a close-knit team that works well together, in which each professional is a vital link – from cardiologist to intervention nurse.

FOR DUTCH

ARTIFICIAL INTELLIGENCE

What are their expectations for the coming years? Luuk: "On average once a month, a new request to cooperate in data collection comes in from CARIM researchers, so of course we'll keep on doing that." Ben and his colleagues are very much looking into artificial intelligence: how can it be used to improve remote care, for instance for patients with a pacemaker? But the team also expects that AI within 3-D mapping systems will in the future enable them to better define an ablation point on a heart. John: "In all of these developments, staffing is a key point for the coming years. You have to be able to keep people committed and interested, while at the same time try to attract new staff. That requires creativity. Think of a nurse consultant who is also working at the short stay ward and at the outpatient clinic. That also works both ways: it can be a fascinating job, plus it offers the advantage of getting to know a hospital patient's trajectory in all its aspects."

HOW WE WORK

02

CARIM+HVC

The Scientific Director has the overall responsibility for the research institute, including the organisation and management of its research programme, the scientific output, the training of bachelor and master students, PhD candidates and postdocs, the financial management and the public relations of the institute. The Scientific Director is assisted by the Managing Director, who handles the financial, legal and human resource issues, and by the Strategic Programme Coordinator, who together represent the Management Team (MT).

The MT meets weekly to discuss daily matters. Together with the three leaders of the Divisions Blood, Vessels, and Heart, a representative from the Strategic Board, the CARIM Priori board members, and the Medical Director of HVC, the MT constitutes the Executive Board (EB) of the institute. The EB meets monthly to discuss and decide on issues at strategic and operational level. The EB is advised by the SB, Education Programme Committee (EPC), the Research Council and the working group on Diversity, Inclusivity & Social Safety.

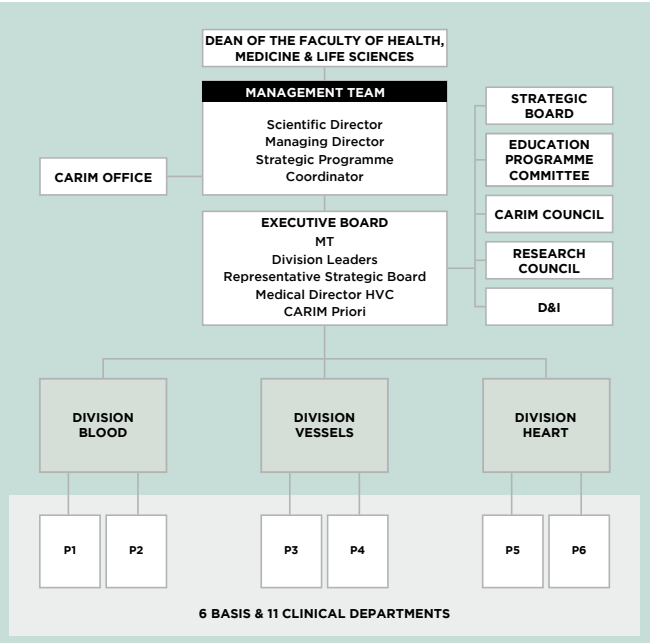
The Strategic Board (SB) is in place to advise and support the Executive Board in developing long-term policy. The SB serves as a discussion forum and generates written visions of the future of CARIM and its sustainability in an increasingly competitive international scientific environment. The SB meets monthly to discuss issues such as grant programmes, national and international collaboration networks, trends, interdisciplinary communication and CARIM's visibility in the national and international cardiovascular fields.

The EPC coordinates both the PhD and master training programmes and advises the EB on all issues regarding these educational programmes. The chair of the EPC is also CARIM's PhD Coordinator and advises the EB about all issues regarding the PhD programme. Within CARIM, the PhD Coordinator works closely with the CARIM Office and Scientific Director.

The Research Council advises the PIs, researchers and EB on the quality of research proposals and meets regularly to discuss and guide grant applications. The Research Council trains applicants for their personal interviews with funding bodies and evaluates applications for CARIM's HS-BAFTA Talented future postdocs grant.

The Grants & Incentives Team has been established to boost grant acquisition by activating researchers and research teams, discussing calls and funding opportunities, and keeping track of submitted, granted and rejected applications. The team is also responsible for a monthly circular on cardiovascular grant applications and deadlines, as well as providing personalised advice on funding opportunities.

The CARIM Council consists of all PIs and Department Heads and meets four times a year. The CARIM Council is informed by the EB about ongoing matters and advises the Scientific Director on research within the institute and the related education programmes.



EXECUTIVE BOARD

- Prof. Tilman Hackeng, Scientific Director
- Prof. Hugo ten Cate, Division Leader Blood (until 1 March 2025)
- Prof. Judith Sluimer, Leader Blood (since 1 March 2025)
- Prof. Casper Schalkwijk, Division Leader Vessels (until 1 March 2025)
- Prof. Martijn Brouwers, Division Leader Vessels (since 1 March 2025)
- Prof. Kevin Vernooy, Division Leader Heart (until 1 October 2024)
- Prof. Kevin Vernooy, Medical Director Heart+Vascular Center (since 1 October 2024)
- Prof. Joost Lumens, Division Leader Heart (since 1 October 2024
- Prof. Uli Schotten, Representative Strategic Board
- Danny Luciana, Managing Director
- Tara de Koster, Strategic Programme Coordinator
- Dr Nynke van den Akker, CARIM Priori board member
- Dr Job Verdonschot, CARIM Priori board member

BOARD DIVISION BLOOD

- Prof. Hugo ten Cate
- Prof. Leon Schurgers
- Prof. Judith Sluimer
- Prof. Julie Staals

BOARD DIVISION VESSELS

- Prof. Casper Schalkwijk
- Dr Nynke van den Akker
- Dr Vanessa van Empel
- Dr Marleen van Greevenbroek
- Prof. Barend Mees
- Dr Koen Reesink

BOARD DIVISION HEART
- Prof. Kevin Vernooy
- Dr Vanessa van Empel
- Prof. Joost Lumens
- Dr Miranda Nabben
- Dr Sander Verheule

STRATEGIC BOARD
- Prof. Uli Schotten, chair
- Deepak Balamurali (until May 2024)
- Prof. Martijn Brouwers
- Giulia Cordella (since June 2024)
- Prof. Judith Cosemans
- Dr Boy Houben
- Dr Aaron Isaacs
- Sandrine Seyen
- Prof. Paul Volders
- Danny Luciana
- Tara de Koster (until October 2024)
- Esther Wishaupt (since October 2024)

PRINCIPAL INVESTIGATORS
- Prof. Erik Biessen, Dept of Pathology
- Dr Matthijs Blankesteijn, Dept of Pharmacology & Toxicology
- Prof. Martijn Brouwers, Dept of Internal Medicine
- Prof. Hugo ten Cate, Dept of Internal Medicine
- Prof. Judith Cosemans, Dept of Biochemistry
- Prof. Tammo Delhaas, Dept of Biomedical Engineering
- Prof. Tilman Hackeng, Dept of Biochemistry
- Prof. Stephane Heymans, Dept of Cardiology
- Prof. Iwan van der Horst, Dept of Intensive Care
- Prof. Bram Kroon, Dept of Internal Medicine
- Prof. Jos Maessen, Dept of Cardiothoracic Surgery
- Prof. Robert van Oostenbrugge, Dept of Neurology
- Prof. Mark Post, Dept of Physiology (until July 2024)
- Prof. Uli Schotten, Dept of Physiology
- Prof. Leon Schurgers, Dept of Biochemistry
- Prof. Monika Stoll, Dept of Biochemistry
- Prof. Kevin Vernooy, Dept of Cardiology
- Prof. Paul Volders, Dept of Cardiology
- Prof. Christian Weber, Dept of Biochemistry
- Prof. Joachim Wildberger, Dept of Radiology
- Prof. Leon de Windt, Dept of Cardiology

GRANTS AND INCENTIVES TEAM
- Prof. Judith Sluimer, chair
- Dr Stijn Agten
- Dr Constance Baaten
- Dr Matthijs Blankesteijn
- Dr Marleen van Greevenbroek
- Dr Gwynned de Looijer
- Dr Daniel Molin
- Danny Luciana

RESEARCH COUNCIL
- Dr Kristiaan Wouters, chair
- Dr Constance Baaten, secretary
- Dr Matthijs Blankesteijn
- Prof. Ingrid Dijkgraaf
- Dr Marjo Donners
- Dr Ed Eringa
- Dr Pieter Goossens

EDUCATION PROGRAMME COMMITTEE

- Prof. Eline Kooi, chair, PhD Coordinator
- Dr Matthijs Blankesteijn, Coordinator Biomedical Sciences master
- Dr Boy Houben
- Dr Marleen van Greevenbroek
- Minke Rijpkema
- Elias Wieland (until September 2024)
- Laura Kempen (until November 2024)
- Lisa den Brok
- Eline Berends (until September 2024)
- Stan Muitjens (since May 2024)
- Giulia Cordella (from September 2024 until December 2024)
- Margarita Pencheva (since September 2024)
- Rita Chamoun (since December 2024)
- Sophie van de Walle (since December 2024)
- Edoardo Zancanaro (since December 2024)
- Esther Willigers

6

BASIC DEPARTMENTS

- Biochemistry
- Biomedical Engineering
- Epidemiology
- Genetics & Cell Biology
- Pharmacology & Toxicology
- Physiology

11

CLINICAL DEPARTMENTS

- Anesthesiology
- Cardiology
- Cardiothoracic Surgery
- Clinical Chemistry
- Clinical Pharmacy
- Internal Medicine
- Intensive Care
- Neurology
- Pathology
- Radiology & Nuclear Medicine
- Vascular Surgery

CARIM OFFICE

The CARIM Office consists of specialists who support the institute and its researchers with administrative, financial and legal issues, including people and development, and funding. Esther Willigers, Barbara Przybylski and Esther Wishaupt are responsible for administrative issues, including supporting the EB. Tara de Koster is the Strategic Programme Coordinator, contributing to the strategic and operational development of CARIM. The controller of CARIM is Lynn Lemeer, assisted by Hans Slenter.
The Finance Department of Maastricht University provides support for accounting related to CARIM research projects with Henny Kerckhoffs, Johan Noordijk and Jacqueline Roufs-Scheepers involved. Petra Suurmond and Anke Neekmann of the Department of People and Development of Maastricht University are dedicated to CARIM. In legal affairs, Paul Bohnen and Suzanne ten Hoeve provide support to CARIM. Dr Gwynned de Looijer offers Faculty support for funding acquisition. Managing Director Danny Luciana is the head of the CARIM Office. Prof. Frits Rosendaal (LUMC, the Netherlands) is CARIM's external scientific advisor and provides guidance on an annual basis or as needed. The research within CARIM's divisions involves the research activities of employees working in 17 departments of Maastricht UMC+ (six basic and eleven clinical).

CARIM+HVC

The clinical care within HVC is organised into three departments – Cardiology, Cardiothoracic Surgery, Vascular Surgery – and the Thrombosis Expertise Center. The Department of Cardiology includes the Cardiac Intervention Center (CIC), the Cardiac Emergency Unit & Cardiac Care Unit, an Inpatient Ward, a Short Stay Ward, and Cardio-research activities. The CIC is a unique and advanced clinical care and research facility dedicated to ablations, device implantations, transcatheter heart valve interventions, and PCI procedures. It is equipped with state-of-the-art interventional technology. The Department of Cardiothoracic Surgery oversees inpatient surgical care and specialised services including Extracorporeal Life Support (ECLS). The Department of Vascular Surgery provides care for patients with vascular conditions and includes an inpatient ward and a unit focused on organ preservation. The Thrombosis Expertise Center specialises in the management of thrombosis and anticoagulation therapy, and includes the Anticoagulation Clinic.

The HVC outpatient clinic organises (including scheduling) the outpatient activities for Cardiology, Cardiothoracic Surgery, and Vascular Surgery. It also facilitates outpatient services for the sub-specialisms of Vascular Dermatology, Vascular Internal Medicine, and Vascular Neurology.

Cardio-research organises the execution of contract research within HVC. The eight research coordinators support 40 to 50 clinical-scientific studies annually, mainly in the fields of cardiology and/or cardiac surgery. Cardio-research supports researchers with study initiation, guidance, and closure, including research administration, patient screening, study visits, and data management. The department is managed and supervised by cardiologist Dr Twan van Stipdonk.

HVC is led by the Medical Director, the Managing Director and the Vice Managing Director. Together, they form the Management Team and the core of the HVC Executive Board, which further includes the chairs of the medical departments, the clinical co-chair of the Thrombosis Expertise Center, the Scientific Director of CARIM, and the Chief Strategy Officer HVC.

The management team is supported in its work by a staff unit encompassing expertise in Finance & Control, Personnel & Organisation, Quality, Safety & Operations, and Marketing & Communications. Integral management of HVC activities is ensured through the Operations Management Team, which consists of all operational managers, business staff, directors, and members of the Executive Board.

Patient involvement in their treatment and the overall care process is of great importance within CARIM+HVC. The perspectives, knowledge, and experiences of patients and their loved ones are highly valued. Patients have already been involved in the development of new care pathways and the evaluation of existing care. To ensure this involvement is embedded in a structural way, a patient panel was established in September 2019. The panel actively contributes ideas on how care can better align with the needs and expectations of patients. Drawing from their own experiences, members provide valuable insight into what works well, and what could

be improved. These perspectives are of great value to healthcare professionals, researchers, and leadership teams alike. The panel offers both solicited and unsolicited advice and meets six times per year. In scientific research, the patient voice is also becoming increasingly important. Many research funding applications now require patient participation, and the panel plays an active role in this area as well.

MANAGEMENT TEAM

- Prof. Kevin Vernooy, Medical Director
- Freek van Daal, Managing Director
- Daphne Sleijpen, Vice Managing Director

EXECUTIVE BOARD

- Prof. Elham Bidar, Chair Department of Cardiothoracic Surgery
- Freek van Daal, Managing Director
- Dr Vanessa van Empel, Vice Chair Department of Cardiology
- Prof. Tilman Hackeng, Scientific Director CARIM
- Henk Hoogervorst, Chief Strategy Officer
- Prof. Geert Willem Schurink, Chair Department of Vascular Surgery
- Daphne Sleijpen, Vice Managing Director
- Prof. Kevin Vernooy, Chair Department of Cardiology & Medical Director HVC
- Dr Kristien Winckers, Co-chair Thrombosis Expertise Center

DEPARTMENT OF CARDIOLOGY
- Prof. Kevin Vernooy, Chair
- Prof. Hans-Peter Brunner-La Rocca, Vice Chair
- Dr Vanessa van Empel, Vice Chair

DEPARTMENT OF CARDIOTHORACIC SURGERY
- Prof. Elham Bidar, Chair
- Prof. Roberto Lorusso, Vice Chair

DEPARTMENT OF VASCULAR SURGERY
- Prof. Geert Willem Schurink, Chair
- Prof. Barend Mees, Vice Chair

THROMBOSIS EXPERTISE CENTER
- Prof. Henri Spronk, Co-chair
- Dr Kristien Winckers, Co-chair

OPERATIONS MANAGEMENT TEAM
- Dr Arina ten Cate-Hoek, Anticoagulation Clinic
- Luuk Debie, Cardiac Intervention Center
- Petra Dodemont-op het Veld, Business Finance
- Marie-José Dols, Cardiac Emergency Unit & Cardiac Care Unit
- Monique van Heusden, Business Finance
- Tom Joordens, Finance & Accounting
- Willemijn Jussen, Personnel & Organisation
- Wencke Korn, Outpatient Clinic
- Erik Körver, Extracorporeal Life Support
- Marion Lahaije-Mares, Marketing & Communications
- Kathleen Lousberg-Thenaerts, Inpatient Ward Cardiology
- John Nakken, Cardiac Intervention Center
- Angelique Plusquin, Inpatient Ward Vascular Surgery
- Mirte Soons, Quality, Safety & Operations
- Gwen Vliegen, Quality, Safety & Operations
- John Wijenbergh, Business Development & Control
- Rens Wekenborg, Inpatient Ward Cardiothoracic Surgery/ Short Stay Ward Cardiology

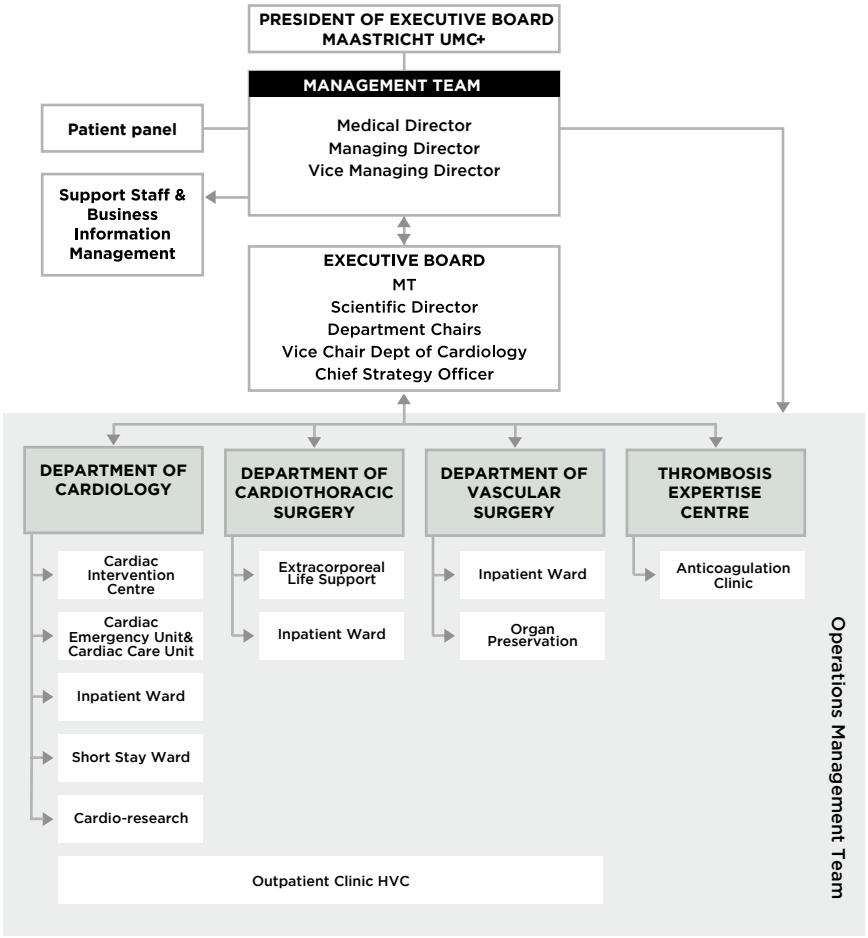
PATIENT PANEL
- Francien Heijs, Chair
- Maud Clercx, Quality, Safety & Operations CAKZ
- Martin Deguelle, panel member
- Valéry Hawinkels-Hellwig, Quality, Innovation & Research
- Henk Hoven, panel member
- Marion Lahaije-Mares, Marketing & Communications
- Tom Lemmens, panel member
- Claire Priem, panel member
- Ron Rosell, panel member (since November)
- Dr Jan Willem Sels, cardiologist/intensivist
- Daphne Sleijpen, Vice Managing Director HVC
- Mirte Soons, staff advisor Quality, Safety & Operations
- Anja Thehu, panel member (until June)
- René Vanderreijden, panel member
- Sjoerd Vogelzand, panel member (since September)
- Dyon de Vreede, panel member

SUPPORT STAFF & BUSINESS INFORMATION MANAGEMENT
The staff of the HVC Office supports HVC and its professionals in administrative, strategic, financial, personnel and organisation, communication, and quality-related matters. The MT is supported by Anja Lanckohr, who serves as the MT's management assistant.

Finance and control matters are managed by Petra Dodemond (controller), Joël Straat (assistant controller) and John Wijenbergh, who is responsible for business development and control. Tom Joordens provides expertise in finance and accounting.

Mirte Soons and Gwen Vliegen are responsible for quality, safety, and operations within the centre. Marketing and communications are coordinated by Marion Lahaije-Mares.

The personnel and organisation department is supported by Willemijn Jussen (staff advisor) and Nathalie Hofman (consultant).



INTERVIEW

RICK VAN LEEUWEN, SERVÉ OLIESLAGERS AND ROEL SPÄTJENS

A new start

PhD candidates come and go at the laboratories of Maastricht University's Department of Cardiology. Professors too occasionally switch to other universities, but the constant factor are the three lab coordinators: Rick van Leeuwen, Roel Spätjens and Servé Olieslagers. Together, they have clocked up 75 years of work experience at Maastricht. "We offer continuity, and that's something that's appreciated."

It still smells a bit new; the renovation of Maastricht University's Department of Cardiology was only recently completed. From the start, the three lab coordinators together were allowed to decide how the new offices and laboratories were to be set up. "On the whole, we're satisfied and very pleased with the ease with which the renovation and relocation went", says Roel. Having worked at Maastricht University for almost thirty years, he has been there the longest of the three, but both Rick and Servé are close behind him. They still love their job, even after all those years. It is the challenges, like the new location, which keep it diverse. And the same goes for the cooperation between the various research groups.

ISLANDS

This trend towards closer collaboration between the PI groups started around 2008. Rick: "Since then, the labs have slowly converged. Before, they were predominantly separate islands, for instance each buying their own lab materials; nowadays we do that using a joint budget." Roel: "Each group has its own research niche, but the techniques largely overlap or complement one another. Researchers visit each other's labs to learn or refine techniques, which drives the potential for new scientific developments." Servé: "Also consider aspects like education, biosafety, equipment maintenance and IT management; there's so much involved in running a lab. The department-wide assurance of these kinds of tasks are divided across the three of us, allowing us to combine our strengths more efficiently." Roel: "That makes us one large cardio-lab."

KNOWLEDGE PRESERVATION

Although Servé is the youngest of the three, he too notices that the researchers who come and go at the lab on average remain of more or less the same young age, while they themselves are getting older. "That changes the dynamics a bit, and you have to have a feel for that. The core aspect of our task is mostly support and knowledge preservation. And the longer you work here, the more substantial this becomes." Roel: "PhD candidates, postdocs and thesis interns come and go. Within this relatively short period, we teach them the various lab techniques, but also the norms and values prevailing in the lab. Good laboratory practices are very important. And after working here for such a long time,

WE MEET IN THE KITCHEN AND BRIDGES ARE BUILT BASED ON EXPERTISE, INTERESTS OR SOCIAL INTERACTIONS

you know how things at the university that are not written down work. You've built up a huge network by now." Rick: "In addition to preserving knowledge, part of our job is innovation regarding new technologies. So it's important for us to keep up with the literature and seeking knowledge in our specialist field, within and beyond our own network."

NICE AND LIVELY

Four years ago, when talks started about the set-up of the new department, they had a staff of 35 fte, but since then, the department has boomed. Rick: "Recently, another seven UM staff members were added to our department. Plus a dozen clinical PhD candidates coming over, and some other additions, so by now we have approximately 60 people working here." Roel: "That means it's now nice and lively at the offices. But no-one's complaining, so it's genuinely pleasant." Servé: "We've built up something nice and that encourages coherence. It feels a bit like a new start." Roel: "I don't think many of the PhD candidates see this department as consisting of separate teams. We meet in the kitchen and bridges are built based on expertise, interests or social interactions. It's more and more becoming one entity."

OPTING FOR STABILITY

All three have had the opportunity to gain experience with scientific research. Roel: "I see it as a token of confidence on the part of your PI when you are asked to co-author a paper on a particular piece of research. That's one of the factors that makes the job of lab coordinator so varied." Rick: "Our scientific input is appreciated to such an extent that we are given creative freedom when it comes to new developments at the lab." There was a time when some lab coordinators might go for a PhD, as they had participated in so many publications, but nowadays a Bachelor's degree alone no longer allows that. Servé: "All three of us have at some time been asked if we'd like to write a PhD thesis ourselves, but we've opted for stability, for instance in the form of a permanent appointment and more room for personal activities. If I'd entered on a PhD project, I wouldn't have been able to play in a band all those years."

FIRST LOVE

For 27 years, he played the guitar in various bands, with which he toured all over the world or for instance played at the major Dutch festival called Pinkpop. "I used to spend every free hour I had on music. I've recently stopped, opening up the time to return to my first love: collecting relief and intaglio prints from the northern Renaissance. I fell in love with them during my first drawing lessons as a high school freshman, followed by chemistry and guitars." Roel is the sportsman of the three. "I spend every available moment on my racing bike, especially now that the kids are a bit older. It's a great way to clear my head and push myself to the limit." "I used to do a lot of sports too when I was younger", laughs Rick, "but nowadays I'm mostly into good food and fine wines. I like cooking and organise wine tastings as well." Servé: "It all has to do with passion. You need that at work too, and that's what all three of us share." Roel: "There's more to life than work, and such a hobby is a nice part of that." Servé: "When I see how much time, effort and dedication our researchers invest in their work: that's admirable, but at the same time that's just where we differ. They have a great career, while we have a great job."

FOR DUTCH

INTERVIEW

KRISTIEN WINCKERS AND HENRI SPRONK

Filling Hugo's big shoes together

If you're in a position to continue the brainchild of a heavyweight like Professor Hugo ten Cate, you realise that you have got some big shoes to fill. Might it help if you then divide up the tasks among two people? Since April 2025, the Thrombosis Expertise Center (TEC), founded by Hugo in 2014, has been led by biochemist Henri Spronk and vascular internist Kristien Winckers. "Our ambition is to raise the profile of thrombosis even further, by creating a community in which anyone involved in it feels welcome."

Thrombosis is one of the priority areas at Maastricht UMC+. For many years, a great deal of research has been done into it, and it was one of Hugo ten Cate's missions to bridge the gap between clinic and university on this topic. And not without success. Henri: "When I started my job as a biochemist here at Maastricht, researchers regarded thrombosis as something which existed purely in test tubes. An absurd example of this was when the idea arose that the contraceptive pill increased the risk of thrombosis, and at the lab here they started grinding up those pills and adding the powder to plasma. The research often completely ignored human beings. It was Hugo who very successfully managed to bridge this gap."

EXPANSION

Now, in 2025, 'Maastricht' is known for its research into the mechanisms of thrombosis, target finding for new medication to treat or prevent thrombosis, and predicting and improving antithrombotic therapy. Kristien: "TEC covers all outpatient clinics providing thrombosis care at the hospital, as well as regional care, a thrombosis committee, a thrombosis vigilance officer and the thrombosis service, and it also includes translational research and teaching. So Hugo had already accomplished quite a lot. It's now up to us to further expand it."

OUR AMBITION IS TO RAISE THE PROFILE OF THROMBOSIS EVEN FURTHER, BY CREATING A COMMUNITY IN WHICH ANYONE INVOLVED IN IT FEELS WELCOME

ROOM FOR EVERYBODY

At the time of this interview, at the end of April, they had not yet had a lot of time to come up with strategies for this. Henri: "The idea still has to grow on us too, but we're getting there, and the main thing is to tackle it together, involving both clinic and university. There's room for everybody." Kristien: "First of all we have to make it clear that anyone who is contributing to the expertise on thrombosis is in fact already participating in TEC. We want to render this more concrete, for instance by means of joint meetings, a website and more."

COMMUNITY

Henri and Kristien aim to build up a 'thrombosis community', which in fact already exists in terms of content, though not everyone is as yet equally aware of it. Henri: "A community in which people feel welcome to jointly improve care, carry out and share research, as well as offering a place where students can be taught about thrombosis." That is quite a challenge, as thrombosis transcends the boundaries between medical disciplines. Kristien: "And we don't want to detract from what Hugo has so expertly built up. We've been asked to expand something, but we two are very different types of builders from our predecessor. That can be a little unnerving sometimes." Henri: "In a way it secretly still feels as if we have to fill Hugo's big shoes. What helps is that there's two of us and we have an interdisciplinary team around us. That increases the chances of success."

FOR DUTCH

SCIENCE THAT MOVES HEARTS

03

In 2024, the successful work of our researchers was reflected in 1,036 international peer-reviewed journal articles (SCI). In total, 58 PhD candidates successfully defended their theses, and 10.2 million Euros were received in competition from national science foundations and from third money parties, charities, EU framework programmes and industry.

SCHOLARLY IMPACT

22.5% of CARIM+HVC's publications belong to the top 10% and 3.4% to the top 1% of publications in its field, meaning that CARIM+HVC performs significantly above average when compared to others in the same scientific field. With an overall CNCI (Category Normalized Citation Impact) of 2.3, CARIM+HVC's publications are cited 2.3 times more often, on average, than the expected average for comparable publications in their specific fields. All research lines are above the global average in their contribution to the top 1% and top 10% of publications. 78% of CARIM+HVC's 2024 publications are available as open access.

	NUMBER OF DOCUMENTS	AVERAGE CNCI	PAPERS IN TOP 1%		PAPERS IN TOP 10%	
			#	%	#	%
TOTAL	**4,384**	**2.3**	**159**	**3.6%**	**993**	**22.7%**
BLOOD	1,331	2.0	52	3.9%	332	25.0%
VESSELS	1,181	2.1	38	3.2%	209	17.7%
HEART	1,030	3.3	48	4.7%	258	25.0%

*The number of documents and citation impact for separate divisions (2017-2022) and the research institute (2019-2022).

RESEARCH GRANTS AWARDED TO INDIVIDUALS

NHS DR E. DEKKER PROGRAMME

Within the framework of the Dr E. Dekker programme of the Dutch Heart Foundation, Dr **Matthijs Cluitmans** (Dept of Cardiology) has been awarded a Senior Scientist grant. The k€ 553 grant will enable him to conduct research on cardiovascular diseases in the coming years. In the Netherlands, each day more than 90 people are admitted to the hospital with a heart attack. This damages their heart muscle, increasing their risk of a life-threatening cardiac arrest. Matthijs wants to investigate whether he can predict the actual risk for each patient using a very detailed heart scan. People with a high risk of cardiac arrest can then receive a life-saving ICD.

Dr **Uyên Châu Nguyên** (Dept of Cardiology) and Dr Roel Meiburg (Biomedical Engineering, TU Eindhoven) have been awarded a k€ 649 Dr E. Dekker Team Science grant. If electrical signals fail to travel properly through the heart, it can lead to heart failure. Due to these faulty signals, the heart does not contract properly and pumps insufficient blood. Uyen and Roel will use 'digital twins of the heart' to investigate, for each patient, the best way to help the heart pump effectively again. When placing a pacemaker, the cardiologist can connect the leads to both heart chambers. Recently, it has also become possible to place a single lead between the two chambers. This approach seems to resemble the natural functioning of the heart more closely and may potentially yield better results than the traditional method. However, it is not yet clear which method is better.

It may even vary from patient to patient. The two scientists are now collaborating to investigate which treatment works best for whom. Under the leadership of Uyên, 28 patients will receive such a special pacemaker. With her team, she will conduct precise measurements of their hearts. This information will be sent to TU Eindhoven, where Roel and his team will create computational models.

NWO TALENT PROGRAMME

NWO has awarded a Veni grant worth k€ 320 to Dr **Job Verdonschot** (Dept of Cardiology). He receives the grant for his project 'Visualizing the invisible in genetic cardiomyopathies'. Job's research involves hereditary heart muscle disease. He conducts this research not only for the benefit of patients but also for their family members, who may be at risk of developing the same disease. By monitoring these family members with the appropriate tests, the heart muscle disease can be detected and treated at an early stage. This approach helps to prevent the serious consequences of such a disease. Job uses the Veni grant in his research on the hereditary heart disease dilated cardiomyopathy, also known as dilated heart muscle.

Currently, family members of patients are advised to have an echocardiogram performed by a cardiologist every one to three years. However, new European guidelines recommend that these individuals should also regularly and more readily receive an MRI, as scars can form in the heart that are not visible on an echocardiogram but can be seen on an MRI. This is not easy, however: conducting an MRI is expensive, and there is insufficient capacity to regularly screen the thousands of family members. Together with TU Eindhoven, Job is therefore using a new ultrasound technique that, with a higher frequency, can visualise scar tissue. With support from the Veni grant, he will investigate whether this ultrasound technique can visualise scarring as well as or even better than an MRI scan.

DUTCH DIABETES RESEARCH FOUNDATION

Dr **Amée Buziau** (Dept of Internal Medicine) has received a Junior Fellowship of k€ 230 from the Dutch Diabetes Research Foundation. Her three-year project focuses on the role of the pentose-phosphate pathway in the pathogenesis of intrahepatic lipid accumulation and, subsequently, type 2 diabetes. Amée will employ multiple research methodologies including an in vitro model using human induced pluripotent stem cells-derived hepatocyte-like cells, traditional epidemiology, and genetic epidemiology, highlighting the translational nature of her research. See pages 76-83 for more information about Amée's research.

DUTCH DIGESTIVE FOUNDATION

Dr **Sabine Daemen** (Dept of Internal Medicine) has received a Career Development Grant of k€ 160 from the Dutch Digestive Foundation (MLDS). In this two-year project, Sabine will investigate the potential of targeting hepatic macrophages to combat liver fibrosis. To investigate this, she will use innovative techniques including spatial transcriptomics and spectral flow cytometry in liver biopsies of patients. Each year, MLDS invests in research to enhance the diagnosis and treatment of gastrointestinal diseases. See pages 50-54 for a full interview with Sabine.

NWO OFF ROAD

Dr **Roel Wierts** (Dept of Radiology & Nuclear Medicine) has received a k€ 100 Off Road grant from ZonMw for his project 'Improving oncologic PET imaging using a new method to quantify arterial radiotracer levels'. This grant offers Roel the opportunity to further develop his out-of-the-box idea or hypothesis over a period of one to one and a half years. Currently, positron emission tomography (PET) plays a key-role in many oncologic applications. Quantification of PET radiotracer uptake has been shown to improve PET image interpretation. However, current clinical methods of PET quantification have notable limitations, resulting in inter-patient and therapy-induced variations in tumour radiotracer uptake. This reduces diagnostic accuracy and may even lead to erroneous interpretation regarding the efficacy of oncologic treatment. This project aims to eliminate these variations, and therefore enhance PET quantification, by correcting for the total amount of radiotracer available to the tumours using a highly innovative, non-invasive technique to measure radiotracer levels in the arterial blood, compatible to the current clinical workflow. This will result in improved personalised patient management from which patients will directly benefit.

KOLFF+ DUTCH KIDNEY FOUNDATION

Dr **Sjoerd Timmermans** (Dept of Internal Medicine) has been awarded a k€ 239 Kolff+ Junior Talent Grant from the Dutch Kidney Foundation for his project 'COMplement Prospective Evaluation of TMA on Endothelium and downstream effects'. The COMPETEd project focuses on uncovering the pathways that lead to thrombotic microangiopathy (TMA), including the disease atypical haemolytic uremic syndrome (aHUS). The project also aims to develop tests to determine which pathway is causing TMA in individual patients, particularly in cases of aHUS. It further seeks to identify compounds that could serve as candidates for targeted therapies. Since all TMA pathways converge on the same clotting process, COMPETEd ultimately aims to identify a unifying therapeutic target.

YUFE4POSTDOC

Dr **Cédric Neutel** (Dept of Biomedical Engineering) has received a k€ 129 YUFE4Postdocs postdoctoral fellowship. YUFE (Young Universities for the Future of Europe) is an alliance of ten young, research-oriented universities, including Maastricht University, and two non-academic partners working to reshape European higher education. YUFE4Postdocs is a postdoctoral training programme within the YUFE alliance, co-funded by Horizon Europe's Marie Skłodowska-Curie Actions. The programme aims to train 'future-proof' researchers who bridge academia and society, focusing on urban challenges in sustainability, digital societies, European identity, and citizens' well-being. As a YUFE4Postdocs fellow, Cédric will investigate the impact of per- and polyfluoroalkyl substances (PFAS)-persistent industrial chemicals found widely in the environment-on public health, with a particular emphasis on cardiovascular disease.

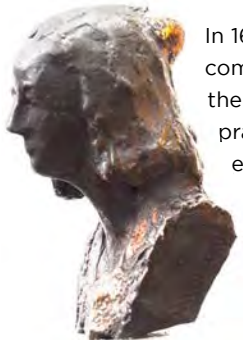
Dr **Miranda Nabben** (Dept of Cardiology) has received a k€ 50 Crazy Idea grant from the PLN Foundation and

Netherlands Heart Institute for the project 'Exploring Metabolic Dysregulation and Triggers in PLN Cardiomyopathy'.

ANNA MARIA VAN SCHURMAN STIPENDIUM

The first Anna Maria van Schurman Stipendium has been awarded to Dr **Uyên Châu Nguyên** (Dept of Cardiology).

In 2024, CARIM introduced the Anna Maria van Schurman Stipendium that will be awarded annually to a female researcher within CARIM, aimed at encouraging and supporting female researchers. The award is named after Anna Maria van Schurman, widely recognised as the first female student enrolled in a Dutch University in 1636. The stipendium amounts k€ 100 and includes a bronze statue of Anna Maria van Schurman, created by the renowned artist Wil van der Laan. With this scholarship, CARIM aims to help counteract the stagnation in the advancement of women to senior scientific positions in the Netherlands, as highlighted in the 2023 Monitor of Female Professors.



In 1634, Anna Maria van Schurman composed a *laudatio* at the occasion of the opening of Utrecht University, praising the city's resilience and envisioning the university as a beacon of intellectual renewal. Boldly, she used the platform to challenge the exclusion of women from academic life. Her eloquent appeal led to her historic admission, albeit behind a screen, to Utrecht University. This act was more than symbolic; it cracked open the rigid barriers of academic patriarchy. Van Schurman's presence and scholarship legitimised women's intellectual capabilities in a male-dominated world. Through her writings, polyglot mastery, and correspondence with leading European intellectuals, she inspired a network of learned women across the continent. Her influence was instrumental in shifting societal perceptions of women's education and laid a foundation for future generations of female scholars to claim their place in the university and beyond.

15. "Hinc bibet indigena, & sitientes Nectara Belgae,
"Hinc bibet & geminus qua patet usque Polus.
Hinc quoque Mystarum facunda per ora Minervae
Traiicies placidas (munera mentis) opes.
Ast quae (forte rogas) agitant tua pectora curae?
Non haec Virgineis pervia Sacra choris."

15. "From this [UU], the Dutch inhabitants
who thirst for native nectar will drink,
from this, everyone who resides between the two poles will drink,
from this, you too, Utrecht, will draw the products
of the wells of the mind,
through the mouth of Minerva, eloquent in the mysteries.
But, you might ask, what is troubling you?
Well, these sanctuaries are inaccessible to women."

fragment from
'Inclytae et antiquae urbi Traiectinae Nova Academia nuperrime donatae gratulatur'

by Anna Maria van Schurman.

With the support of the Anna Maria van Schurman Stipendium, Uyên will investigate and further develop innovative ECG techniques that strike the right balance between novelty and added diagnostic value compared to the conventional cornerstone of clinical cardiology, the 12-lead ECG. These techniques are designed to remain practical and patient-friendly, making them suitable for widespread clinical implementation. Uyên aims to use these tools to personalise invasive and electrical treatment of patients with heart failure and arrhythmias, for example, by guiding the implantation of cardiac implantable electronic devices and optimising device programming during follow-up. Her dual background as a cardiologist in training, actively involved in patient care, and her technical expertise in clinical technology and computational medicine uniquely positions her to translate novel innovations into clinical practice seamlessly. The first Anna Maria van Schurman Stipendium enables her to balance clinical duties with dedicated research time, strengthening her profile for future academic positions and grant applications.

HARRY CRIJNS RESEARCH GRANT

Yesim Kaya (Dept of Cardiology) received the 2024 Harry Crijns Research Grant of k€ 25 for the project '3D-precision radioablation for ventricular tachycardia', a collaboration between the Departments of Cardiology, Radiology and Radiotherapy. The Harry Crijns Research Grant was first awarded in 2021 by the *Hart en vaat onderzoekfonds Limburg* (this year sponsored by Bayer and Amgen) to a promising young researcher in the field of cardiovascular disease. The grant was instituted as a tribute to Prof. Harry Crijns, who chaired the Department of Cardiology of Maastricht UMC+ until December 2020 and served as a board member of CARIM.

EUROPEAN RESEARCH COUNCIL GRANTS

Dr **Bart Spronck** (Dept of Biomedical Engineering) is one of the partners in the international consortium VITAL (VIrtual Twins as tools for personalised clinicAL care which has been awarded M€ 10.9 by the European Commission. VITAL involves 14 partners and led by Prof. Patrick Segers (Ghent University, Belgium). The project aims to deliver a comprehensive, clinically validated, multi-scale, multi-organ modelling platform that is driven by and can represent

individual patient data acquired both in the clinic and from wearable technology. The platform will generate a virtual human twin to enable individualised and sex-specific optimisation of medical (pharmacological) or surgical (interventional) therapy for complex, multifactorial cardiovascular disorders. These include conditions with systemic impact and high risk of comorbidities of, amongst others, the kidney and brain: systemic hypertension, heart failure (with/without preserved ejection fraction) and hemodynamically complicated atrial septal defects. Within the VITAL project, Bart and his team will contribute to the development of arterial and venous wall models and the embedding of these into the virtual twin platform.

Prof. **Erik Biessen** and Dr **Pieter Goossens** (Dept of Pathology) are partners in the international consortium ABCardionostics (Human Antibody-enabled Cardiovascular Personalized Theranosis), which has been awarded M€ 3.6 in funding by the European Commission under the EIC Pathfinder program. The project brings together eight partners from France, Spain, and the Netherlands to develop (bi)functional antibody-based diagnostics and personalised therapies for atherosclerotic vascular disease (ASVD), a leading cause of heart attacks and strokes. By integrating novel biotechnology, such as phage display, *in silico* affinity optimisation and target identification, with advanced imaging techniques, ABCardionostics aims to improve early detection and risk stratification, ultimately supporting more targeted treatment approaches for cardiovascular disease.

CONTRACT RESEARCH

Dr **Frans van Nieuwenhoven** (Dept of Physiology) has received k€ 399 in funding from Novo Nordisk's NovoSTAR programme and the Innovation Fund Denmark (IFD) for the project 'Deciphering CILP: Investigating Fibrosis Mechanisms in Heart Failure'. This collaborative project focuses on the regulation, function, and mechanism of action of Cartilage Intermediate Layer Protein (CILP) in cardiac fibrosis and diabetic heart failure. Using human engineered heart tissue models (EHT), the team will examine how CILP expression in cardiac fibroblasts is influenced by mechanical strain, TGFβ signalling, diabetic conditions and fibroblast phenotype. CILP function and mechanism of action will be studied in fibrotic and diabetic EHT and cardiac organoid models. The project is driven by PhD candidates Minerva Corrales Terrón (Maastricht University) and Chiara Rossi (Novo Nordisk), combining academic and industry expertise. Early findings suggest that CILP may contribute differently to fibrosis depending on the disease environment and fibroblast state, offering insight into its potential as a therapeutic target in myocardial remodelling.

OTHER GRANTS, AWARDS AND PRIZES

Dr **Casper Mihl** (Dept of Radiology & Nuclear Medicine) and Dr **Chahinda Ghossein-Doha** (Dept of Cardiology), together with their colleagues from the University of Bristol received a k€ 499 grant from the Dutch Heart Foundation together with the British Heart Foundation (BHF) and the DZHK Deutsches Zentrum für Herz-Kreislauf-Forschung e. V. for their project 'Bi-national investigation of placental pathology and maternal cardiovascular health (BI-PATH)'. BI-PATH builds on the earlier PEARLS study and is a collaboration between researchers from Maastricht UMC+, Erasmus MC and Radboud MC. Women who experience complications during pregnancy, such as significantly high blood pressure, are at increased risk of heart and vascular diseases. Issues with placental blood flow further elevate this risk. The researchers are studying how they can identify, through the placenta, which women are at high risk of heart and vascular diseases. They also aim to generate ideas for new treatments through this approach.

Three CARIM+HVC researchers have been awarded prestigious grants from the Leducq Foundation through the 2024 International Networks of Excellence Program. Dr **Rogier Veltrop** and Prof. **Leon Schurgers** (Dept of Biochemistry) are involved in the project 'PRIORITY: cardio-laminoPathy: fRom pathomechanIsms tO peRsonalIzed TherapY' (k€ 565). The PRIORITY transatlantic network aims to unravel the genotype-phenotype correlations in LMNA-related dilated cardiomyopathy (DCM) and uncover the underlying pathophysiological mechanisms. By doing so, they seek to develop new treatments tailored to individuals and broadly applicable therapies to address the severe symptoms and high mortality associated with LMNA-DCM, which currently do not respond well to conventional therapies for DCM. In addition, Prof. **Uli Schotten** (Dept of Physiology) is involved in the project 'Immune targets for the treatment of atrial fibrillation' (M€ 1,1). This project aims to address the inefficacy of current anti-arrhythmic drugs for atrial fibrillation by targeting macrophages, which play pivotal roles in atrial tissue remodelling observed in AFib patients and animal models. Through studying changes in macrophage dynamics and interactions within the atria, they seek to uncover new immune pathways that could lead to novel therapies for AFib.

The project 'Complex thrombo-inflammation in Long-COVID: mechanism, biomarkers and therapeutic strategies', coordinated by Prof. **Henri Spronk** (Dept of Biochemistry) and Dr Michiel Warlé (Vascular Surgery, Radboud UMC), has been granted by ZonMw. This two year grant of k€ 332 will support a multidisciplinary team including three post-doctoral research positions. Post-COVID (or Long COVID), with its persistent symptoms post-COVID-19, poses significant challenges, requiring a multidisciplinary approach for management. Investigating its pathophysiology, particularly thrombo-inflammation involving platelets, monocytes, and coagulation, is crucial. Sex differences and hormonal influences impact thrombo-inflammation, possibly contributing to higher symptom persistence in women. The grant proposes a case-control study to unravel these mechanisms, aiming to identify biomarkers and improve (antithrombotic) treatment strategies. This research is crucial for mitigating the impact of Post-COVID and bolstering public health resilience in the post-pandemic era.

The project 'Impact of COVID-19 protective measures and shielding in vulnerable patients with kidney failure', coordinated by Prof. **Marc Hemmelder** and **Pim Bouwmans** (Dept of Internal Medicine), has been granted k€ 283 by

ZonMw. This grant includes funding for a two-year postdoctoral research position. Dialysis patients and kidney transplant recipients were the most vulnerable patients during the COVID-19 pandemic. Many of these patients adhered strictly to personal protective measures and governmental measures. This project will investigate the effects of these measures on the physical and mental health of these patients , using data from RECOVAC surveys on personal protective and governmental measures in approximately 1,000 dialysis patients and 3,500 kidney transplant recipients. This data collection is enriched with national patient registries, the RIVM and CBS. Additionally, health inequalities in patients will be investigated according to periods with and without governmental measures, and according to patient characteristics such as age, sex, household composition, educational level and occupational status. This project provides in-depth knowledge on the effects of personal protective and governmental measures on vulnerable patients. Such knowledge can be used during future pandemics. The project will be conducted in cooperation with *Nierpatiënten Vereniging Nederland, Nefrovisie*, and RECOVAC collaborators from all university medical centres in the Netherlands.

Prof. **Hans-Peter Brunner-La Rocca** (Dept of Cardiology) is participating in the groundbreaking 'PRE-DETECT-HF' project, supported by a M€ 1.5 grant from EIT Health. The two-year initiative aims to advance heart failure monitoring through voice-based detection of acute decompensated heart failure (ADHF). The study will be conducted in Spain (Barcelona) and the Netherlands (Maastricht, in collaboration with Zuyderland) and will involve approximately 100 patients. The project will evaluate the usability of voice recordings and the feasibility of voice analysis in identifying early warning signs and predicting ADHF exacerbations. This pioneering approach has the potential to revolutionise the management of ADHF by providing a non-invasive and cost-effective means of early detection, leading to improved patient outcomes and reduced hospitalisations.

The project 'I-HARP development for patients with peripheral arterial disease (I-AVP)' led by **Marie-José Vleugels** and Prof. **Barend Mees** (Dept of Vascular Surgery) has been awarded funding of k€ 272 through ZonMw's Palliantie II programme. Patients with chronic limb-threatening ischemia (CLTI) experience limitations in physical function, daily activities and social life, which leads to a poor quality of life. Early palliative care can be beneficial for improving quality of life and reducing potentially inappropriate care. To enable this, insight into palliative care needs in patients with CLTI must first be gained. The I-HARP tool will be further developed for application in CLTI (referred to as I-AVP) through a participatory action research approach, and its effect on quality of life and potentially inappropriate care at the end of life will be evaluated.

Dr **Marleen van Greevenbroek** (Dept of Internal Medicine) received a grant of k€ 325 from NWO as work package leader in the ERA4Health NutriBrain consortium 'BOOMERANG'. This ERA4Health European partnership within the Horizon Europe programme supports transnational research projects that focus on modulation of brain ageing through nutrition and healthy lifestyle. In this consortium she will, together with the coordinator from Norway (Prof. Stine Ulven, University of Oslo) and collaborators from Northern Ireland and Germany, use human cohorts and interventions as well as *in vitro* and *in vivo* models to study how B-vitamins and ω-3 fatty acids can modulate brain ageing. In Maastricht, she will collaborate with Prof. Seb Köhler (MHeNs) and Dr Simone Eussen (CARIM, CAPHRI) and use dietary, biomarker, and genetic data from

multiple pre-existing observational cohorts (including The Maastricht Study) to study the interaction of dietary B-vitamins and ω-3 fatty acids on cognitive function, cognitive decline and brain atrophy.

Dr **Ed Eringa** (Dept of Physiology) and Prof. **Casper Schalkwijk** (Dept of Internal Medicine) have received a grant within the ZonMW open competition programme of k€ 750 for the project 'It takes three to tango: fat vessel crosstalk in muscle at the origin of diabetes'. The aim of this research is to elucidate the role of fat around microvessels in muscle in type 2 diabetes and muscle weakness. The research team will investigate the role of fat around arteries in controlling contraction and glucose uptake of muscles, and how its functions can be normalised in type 2 diabetes by locally treating it with precision medicine. To achieve this, PET/CT imaging of this fat and sugar uptake in muscles of healthy people and people with early diabetes, and cell-specific analysis of gene expression in this vascular fat tissue will be made. The effect of fat tissue on sugar uptake and strength in human 'muscles in a dish' built from muscle cells, human microvessels and human muscle fat will be studied. Finally, muscle fat in obese mice will be removed or treated with nanomedicine containing an anti-inflammatory drug. Together, this research can lead to new therapies to reverse type 2 diabetes. The project is a collaboration between Amsterdam UMC, Maastricht UMC+ and Maastricht University.

With a k€ 720 grant from NWO, Prof. **Rory Koenen** (Dept of Biochemistry) and Dr Victor Thijssen (Amsterdam UMC) will continue their successful collaboration on the functional interactions of galectins and chemokines, and their roles in immune defense and inflammation. The immune system helps the body to defend itself against pathogens and malignant cells. This requires immune cells to function properly. A previously discovered mechanism that controls the function of immune cells will be further investigated. The mechanism involves proteins that bind to sugars on the surface of immune cells, and their activity is modulated by interactions with chemokines, small signal molecules in the immune system. The current project will provide more insight in this unique mechanism and will help to better understand the development of diseases that are caused by an inadequate immune response. In addition, this project will contribute to the development of novel drugs that improve the function of the immune system.

In April 2024, Dr **Nynke van den Akker** and Dr **Daniel Molin** (Dept of Physiology) received funding of k€ 604 and launched B-SMARTT!, an Interreg VI Flanders-Netherlands project focused on additive manufacturing for life science applications. B-SMARTT! brings together high-tech manufacturing and green, circular biotechnology in the border region, creating an open innovation platform for researchers and SMEs. This platform offers access to advanced materials, technology, and validation tools, helping to turn circular and market-driven ideas into real-life solutions. For CARIM+HVC, B-SMARTT! is especially relevant to vascular tissue engineering, where new biomaterials and biofabrication techniques are crucial for next-generation vascular grafts and tissues. Building on a strong track record in interregional collaboration and life science-based solutions for high societal needs (CellAg), B-SMARTT! supports scientific progress and practical impact in both the lab and the region's economy and society.

In late 2024, it was confirmed that **The Maastricht Study** will receive M€ 5 in funding to continue for another five years starting in 2025. This large-scale epidemiological study of the South Limburg population explores the prevalence, causes,

and treatment of type 2 diabetes, cardiovascular disease, and other chronic conditions. The funding allows for follow-up measurements of over 2,000 participants, contributing to both current medical science and future healthcare. Over the past 15 years, the study has produced a unique dataset that underpins the scientific ambitions of Maastricht UMC+. With a strong focus on prevention and vitality, it collects comprehensive data on lifestyle, health, and social factors. New data on lung function, joint health, and heart rhythm further expand the study's research potential. The funding was made possible through contributions from the Executive Boards of Maastricht UMC+ and Maastricht University, along with CARIM, HVC and the centres for Acute and Critical Care and Chronic Care. These contributions ensure the study's continuation for the next five years. The dataset remains accessible to all researchers within Maastricht UMC+ and external partners, strengthening multidisciplinary collaboration and innovation.

Two research projects received a Public-Private Partnership (PPP) Allowance in 2024: PREVENT, involving Prof. **Andy Baker**, Prof. **Judith Sluimer** (Dept of Pathology), Dr **Maarten Snoeijs** (Dept of Vascular Surgery) and colleagues at the University of Glasgow and Batavia Biosciences BV and 2ILLUMINATE, involving Dr **Martijn Smulders** (Dept of Cardiology, Dept of Radiology & Nuclear Medicine) and Dr **Casper Mihl** (Dept of Radiology & Nuclear Medicine).

Arteriovenous fistulas (AVF) and grafts (AVG) often fail due to intimal hyperplasia, where vascular smooth muscle cells (VSMCs) proliferate and migrate, narrowing the vessel lumen. While balloon angioplasty temporarily restores flow, stenosis frequently recurs. Prior studies showed that overexpressing tissue inhibitor of metalloproteinase-3 (TIMP-3) via adenovirus blocks this process. **PREVENT** (k€ 103) will explore using adeno-associated virus (AAV6) delivery of TIMP-3 for longer-lasting gene therapy. TIMP-3 expression in human AVF/AVG tissues will be assessed and AAV- and adenovirus-mediated effects on VSMCs will be compared. Findings will guide future in vivo studies and could lead to improved, durable therapies for dialysis access failure.

Cardiac MRI (CMR) remains the gold standard for detecting myocardial fibrosis. However, it has several limitations: it cannot visualise coronary plaques, offers relatively low spatial resolution, is time-intensive, and is not widely accessible. To address these challenges, photon-counting computed tomography (PCCT) is being explored, a next-generation imaging technology that delivers high-resolution images and enables multi-energy acquisitions for detailed tissue characterisation. PCCT can assess myocardial fibrosis, coronary artery disease, and other cardiac conditions in under 15 minutes. This efficient 'one-stop-shop' approach has the potential to streamline diagnostics, lower healthcare costs, and reduce patient waiting times. **2ILLUMINATE** (k€ 175) will compare PCCT with CMR across three areas: MINOCA (WP1), pulmonary vein isolation follow-up (WP2), and acute myocarditis (WP3), evaluating PCCT's accuracy and clinical utility.

Dr **Frank van der Heide** and Prof. **Martijn Brouwers** (Dept of Internal Medicine) have been awarded a k€ 67 Cross Boarder grant from the Dutch Alzheimer Foundation. The funded project, a collaboration between Maastricht UMC+ and Inserm Paris, aims to study a combination of measurements of nerves and small blood vessels in the retina and their associations with the risk of Alzheimer's disease and other related disorders. The eye is often described a window to the brain. Previous studies have shown that degeneration of neurons and blood vessels in the retina is involved in the processes

underlying cognitive disorders. This research will draw on data from 1,100 patients from the cognitive neurology centre at the Lariboisière-Fernand Widal hospital and 3,000 cognitively healthy participants from The Maastricht Study. Ultimately, retinal measurements could be an essential tool for improving the early diagnosis of neurocognitive diseases such as Alzheimer's disease.

The COHESION consortium, in which Dr **Fatma Karapinar** (Dept of Clinical Pharmacy) is a partner, has received a grant of M€ 1.4 from the *Koninklijke Nederlandse Maatschappij ter bevordering der Pharmacie* (KNMP). This consortium, together with patients and other healthcare providers, will develop pharmacist-coordinated, multidisciplinary interventions. These interventions aim to improve the effectiveness and safety of medication use for people with heart failure, while also reducing healthcare costs. There is specific attention to treatment outcomes that are important to the patient. Subsequently, not only will the effectiveness of these personalised interventions be investigated, but also how these interventions can be best implemented. COHESION stands for a collaboration of pharmacists in community pharmacy and the hospital, cardiologists representing the Dutch Society of Cardiology, cardiac nurses, general practitioners, practice nurses, and researchers from five universities in the Netherlands (Amsterdam, Groningen, Leiden, Maastricht, and Utrecht).

The NLHI *Hartenbank* has received k€ 700 in follow-up funding from the Dutch Heart Foundation. Since its launch in 2020, *Hartenbank* has been collecting and managing heart tissue samples, supported by a robust and well-structured infrastructure. The *Hartenbank* is coordinated by Dr **Michiel Henkens** (Head of NLHI-HTB; pathology resident at the Department of Pathology) and Dr **Rogier Veltrop** (Scientific Coordinator), both postdoctoral researchers at CARIM+HVC.

OTHER HIGHLIGHTS

The paper of Van Kuijk et al. (DOI: 10.1093/cvr/cvad016) was awarded the John Shillingford prize for the most impactful publication in the journal Cardiovascular research in 2023, presented at the European society of Cardiology 2024 conference in London. This paper is the result of work from an international team of scientists from Maastricht University, Edinburgh University, RWTH Aachen University, and the Texas Heart Institute, and was led by Prof. **Judith Sluimer** (Dept of Pathology). Key findings include the identification and validation of new cell type markers for arterial fibroblasts, fibroblast subsets and their regulation by cardiovascular risk factors, like ageing and hypercholesterolemia. The paper was selected based on its scientific quality, level of innovation, number of downloads, citation count and Altmetric score.

Dr **Stef Zeemering**, Dr **Aaron Isaacs**, Dr **Joris Winters** and Prof **Uli Schotten** (Dept of Physiology) received the Joan and Douglas Zipes Publication of the Year Award 2024 in Heart Rhythm at the Heart Rhythm Society Meeting in Boston. The award was granted for their article 'Atrial fibrillation in the presence and absence of heart failure enhances expression of genes involved in cardiomyocyte structure, conduction properties, fibrosis, inflammation, and endothelial dysfunction'. The article describes gene expression alterations in atrial tissue from patients with AF and how gene expression changes are modulated by heart failure. This atrial tissue bank from the Horizon 2020 CATCH-ME consortium also provides first insights into disease-specific exon usage and clusters of co-expressed genes and thereby paves the way for multiple mechanistic validation studies to be undertaken in the context of 'EmbRACE', a national network on atrial fibrillation funded by the Dutch Heart Foundation (DOI: 10.1016/j.hrthm.2022.08.019).

Dr **Stijn Agten** (Dept of Biochemistry) has been awarded the ISTH Fundamental Research Career Development Award by the International Society on Thrombosis and Haemostasis for the project titled 'Coagulation meets calcification: Gla-diators as protectors of vascular integrity'. This is a great stepping stone for uncovering the role of γ-carboxy glutamic acid and vitamin K-dependent proteins in vascular calcification. The awards are specifically aimed at early career investigators who have demonstrated excellence in research. The aim is to strengthen fundamental research by supporting innovative ideas of the next generation of scientists in the field by recognising a high potential to develop independent research careers, and by fostering active commitment of early career investigators to the ISTH. The award winners each receive an award of up to k$ 50 for research in their respective category. Funds are used by applicants to support research, training and/or collaborations.

Dr **Rob Holtackers** (Dept of Radiology & Nuclear Medicine) received the Certificate of Merit Award at the Annual Meeting of the European Society of Cardiovascular Radiology (ESCR) for his presentation titled 'How low can we go? The effect of acquisition duration on cardiac volumes and function in free-running cardiac and respiratory motion-resolved 5D whole-heart cine MRI'. Rob's work delves into the fascinating challenge of balancing acquisition speed and efficiency with image quality and diagnostic value in cardiac MRI. By exploring how acquisition duration impacts the accuracy of cardiac volume and function measurements, it is aimed to pave the way for more efficient and patient-friendly imaging solutions.

As of 1 May 2024, Dr **Fatma Karapinar** has been appointed as the Chair of Department of Clinical Pharmacy at Maastricht UMC+. .

The **HeArt Ma'at** crowdfunding initiative has successfully reached its fundraising goal of k€ 25. To reach this milestone, various initiatives have been developed. The HeArt Ma'at team has attended several sport events such as the *Alfa Laval Stevensloop* in Nijmegen and *Maastricht's Mooiste*. Artistic activities, including painting sessions with patients at HVC and an art workshop for cardiologists, researchers and patients have been organised. In addition, presentations at several organisations, such as tonight at the Rotary Club, were given. By reaching its target, the project became eligible for the **CARIM Crijns Crowdfunding Doubler**. The CARIM Crijns Crowdfunding Doubler offers enthusiastic researchers financial support in reaching their crowdfunding goals by doubling one CARIM crowdfunding initiative to k€ 50 once it has raised k€ 25 through public contributions. The crowdfunding activity is organised within the University Fund Limburg (SWOL), serving as a 'bridge' between Maastricht University and society by providing grants to (scientific) staff and students, managing funds, raising donations, and establishing financial partnerships with individuals (including alumni), foundations and businesses.

As of 1 October 2024, Prof. **Casper Schalkwijk** and Prof. **Joost Lumens** have been appointed as Division Leaders Vessels and Heart. Casper aims to advance translational research in vascular biology by integrating experimental, imaging, and epidemiological approaches. Division Vessels focuses on micro- and macrovascular dysfunction in diseases such as diabetes, hypertension, and chronic kidney disease. By combining expertise in vascular function, immunotyping, and access to well-phenotyped cohorts and patient-derived iPSCs, he seeks to reduce the vascular health burden of an ageing population through high-level academic care. Joost will lead the Division Heart, which combines the programmes 'Structural Heart Failure' and 'Complex Arrhythmias'. His vision is to deepen integration between these subthemes and promote collaboration across clinical, experimental, and computational domains. By fostering translational partnerships and supporting young

researchers, he aims to drive innovation in diagnostics and therapies for cardiac disease.

Dr **Magdi Nagy** (Dept of Biochemistry) and Prof. **Peter de Leeuw** (Dept of Internal Medicine) have been appointed as CARIM Confidential Contact Persons. They serve as an accessible and trusted first point of contact for staff members and PhD candidates who seek confidential and approachable support. While FHML provides a formally trained confidential advisor, Maria Jansen, for more complex matters, the CARIM Confidential Contact Person can provide support for initial conversations and, if necessary, refer individuals to the faculty advisor when needed. Their responsibilities include:

- Listening to CARIM staff and PhD candidates seeking confidential advice or support;
- Advising or referring them to the faculty confidential advisor for further consultation;
- Ensuring confidentiality and providing a safe environment for open conversations.

PROFESSORSHIPS

- 1 January 2024: Dominik Linz (Dept of Cardiology) – Professor of Comprehensive Atrial Fibrillation Management
- 1 January 2024: Barend Mees (Dept of Vascular Surgery) – Professor of Vascular Repair and Regeneration
- 1 April 2024: Julie Staals (Dept of Neurology) – Professor of Neurovascular Disorders
- 1 May 2024: Henri Spronk (Dept of Biochemistry) – Professor of Biochemistry of Atherothrombosis
- 1 December 2024: Judith Cosemans (Dept of Biochemistry) – Professor of blood platelets biology and pathophysiology

INTERVIEW

SABINE DAEMEN

The lucky go-getter

So far, Sabine Daemen's scientific career seems straight out of a storybook. Even complete with the proverbial knight in shining armour, as she has known her husband since primary school and they spent three years together as postdocs in the US. Nevertheless, she sometimes wonders whether her future actually lies in science. "Doing research is what I want to do and what I'm good at, but the research climate is a bit of a challenge. The next two years will be crucial." In 2024 she was awarded a Career Development Grant by the Dutch Digestive Foundation.

Sabine Daemen is a go-getter, as is necessary if you want to stick to doing scientific research in the long run. “I love solving scientific puzzles and I don’t mind if it takes a long time before you can add another piece to the jigsaw.” In addition, she has already had many things going for her in her career. Sabine is currently engaged in research at the Department of Internal Medicine of Maastricht University. After graduating in Biomedical Sciences at the same university, a grant from the fellow institute NUTRIM enabled her to write her own PhD proposal. At NUTRIM, she examined lipid storage in muscle tissue and its association with developing type 2 diabetes. “When I chose the Biomedical Sciences programme, I had no idea what a career in research would be like, but when I gained some taste of it during my research internships, I knew it was for me. I get very excited about new data which can explain more about what’s happening in our body at the cellular level. Although my work is very much fundamental, I’m also driven by the hope that in 10 or 20 years’ time it will help improve patient treatment.”

COVID POSTDOC

During her PhD years, her husband to be was also doing a PhD, partly in Bordeaux. When after obtaining his PhD he was offered a postdoc position at Washington University in St. Louis, the couple decided they didn’t want to have a long-distance relationship again. “I wrote to various labs in St. Louis, and I also found a postdoc position, with Dr Joel Schilling.” They left for the US together in 2019. “In hindsight, we are grateful that we left together, as the COVID pandemic started a year later. Our plans to visit or receive visits from our families had to be abandoned; in the end, two of the three years we spent there were during the pandemic. But we were fortunate to be there together.” For a while, the couple considered extending their stay in the US. “We learned so much there, met so many nice people, my lab was great. Previously, I had sometimes been sceptical about the pressure on researchers to gain experience abroad. Although it’s difficult to put a finger on it, I do have to say that that period was very rewarding for me as an independent researcher.”

PROTECTIVE MACROPHAGES

At the same time, the couple were also keen to start a family. “We both strongly felt, especially after COVID, that we wanted to start our family close to where our families lived. I’m very ambitious, but other things are also important in life.” When they returned to the Netherlands at the end of 2021, she was six months pregnant. At the time, she and Dr Kristiaan Wouters jointly wrote an application for a Marie Curie Postdoc Fellowship, which she got. “In St. Louis I studied the fatty liver that can result from obesity, more specifically the role of macrophages and the way these inflammatory cells contribute to the fatty and inflamed liver, also known as MASH. Our hypothesis was that the macrophages in MASH exacerbated the inflammation and fibrosis, but we found that some macrophages actually had an inhibitory, protective role in mice. We now want to measure these macrophages in human biopsies.”

RESEARCH DESIGN

Sabine uses the grant from the Dutch Digestive Foundation to study the macrophages in livers of patients with MASH, with or without fibrosis, for two years. Her research is primarily based on spatial transcriptomics, with ‘spatial’ meaning that the gene expression is examined at the site where, in this case, the macrophages are located. “We know that the function of macrophages is largely determined by signals from their environment, so that’s why this technique really offers added value. Since this is a very expensive technique, we work with a small number of human biopsies.”

I LOVE SOLVING SCIENTIFIC PUZZLES AND I DON'T MIND IF IT TAKES A LONG TIME BEFORE YOU CAN ADD ANOTHER PIECE TO THE JIGSAW

She will then use spectral flow cytometry to determine at what stage of MASH the macrophages are present, and in what quantities. Finally, she wants to use a cell model to test what signals the macrophages receive that determine their protective properties. "We can hopefully later further study this a mouse model, but we'll need another grant for that."

UNCERTAINTY

A follow-up grant... Yes (of course) she's already writing an application for that next grant, even though it is currently not the best time to obtain research funding. "I can usually put the uncertainty from my mind during the everyday hustle and bustle; I now have two children, aged 1 and 3 years. After our stay in the US, my husband gave up science and now works in industry. I considered that too for a while at that time, but research is where my real passion lies. When considering other jobs, I always think: 'This would also be a great option', but research is what I'm really good at and what I want to do." Her job and her children do not currently leave much time for other things, but she is fine with that. "When I think back to the US, I'm very happy with the employee benefits we have here. It's a mystery to me how anybody there can combine a career in research with having small children."

WHY CARIM?

Finally, why is a researcher who is studying liver diseases in obesity working in a cardiovascular research institute? "I've often had that question. We know that fatty liver and MASH are closely associated with the development of cardiovascular diseases. We don't know exactly why, but epidemiological studies have shown that an early stage of MASH results in a 60% higher risk of cardiovascular diseases, and fibrosis even doubles or triples it. I would really like to investigate what determines what happens in the liver, and what effect that has on your blood vessels." The expertise and resources available at CARIM, like the spectral flow cytometer, make it is a fertile environment for her. The same is true for its Research Council, which she always asks to review her grant applications before submitting them. "People who are not specifically working in your field, but do know about research and grant applications, look at it from a different perspective, which can be helpful. But at the same time I also know that many great careers in science are based on 'luck'." The future will show whether she also has luck on her side.

FOR DUTCH

HIGHLIGHT
DIVISION BLOOD

WIM VAN ZWAM, ILSE HUIJBERTS, AND ROBERT VAN OOSTENBRUGGE

A decade of MR CLEAN: Transforming ischaemic stroke care

In the decade since the MR CLEAN trial, the management of ischaemic stroke due to large vessel occlusion (LVO) in the anterior circulation has changed significantly. The MR CLEAN trial [1], published in The New England Journal of Medicine on 1 January 2015, was the first to show that endovascular treatment (EVT) improves functional outcomes in LVO patients. In 2024 alone, 244 patients underwent EVT at Maastricht UMC+ [2], reflecting the wide adoption of this treatment in clinical practice. This highlight reviews the origins of MR CLEAN, its impact, and the research and academic developments that followed, with a special emphasis on the most recent high-impact paper, whose first author was a medical student, to circumstantiate the scientific training opportunities.

THE MR CLEAN TRIAL

The MR CLEAN trial was initiated in 2010 by the Dutch Heart Foundation. During the period when patients were being enrolled in the trial, three EVT trials were published. These studies could not show a clear benefit of EVT, likely due to limitations in patient selection, outdated thrombectomy devices, and variable workflow protocols. MR CLEAN had addressed these issues by enrolling patients with radiologically confirmed LVO in the anterior circulation (distal carotid artery, middle cerebral artery M1 and M2 segments, or anterior cerebral artery M1 and M2 segments) who could be treated within 6 hours of stroke onset. [1]

Patients were randomly assigned to receive EVT plus the best medical treatment (including intravenous thrombolysis if eligible) or the best medical treatment alone. The primary outcome was the functional outcome at 90 days, measured using the modified Rankin Scale (mRS), a 7-point scale ranging from 0 (no symptoms) to 6 (death). MR CLEAN demonstrated that 33% of patients in the EVT group achieved functional independence (mRS 0–2) compared with 19% in the control group, representing a 13.5% absolute increase. The adjusted common odds ratio for a shift to a better outcome on the mRS was 1.67 (95% CI, 1.21–2.30, figure 1). The groups did not differ significantly in mortality or symptomatic intracerebral haemorrhage. [1]

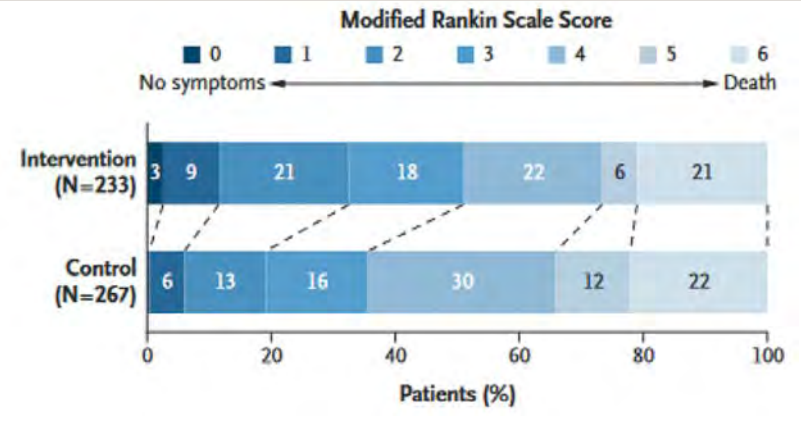


FIGURE 1 Shift towards better functional outcome on the Modified Rankin Scale in patients who received endovascular treatment versus best medical treatment (control group). [1]

IMMEDIATE IMPACT: CHANGING GUIDELINES AND CLINICAL PRACTICE

The findings of MR CLEAN, reinforced by similar positive outcomes in subsequent trials, led to a revision of clinical guidelines. By early 2015, the American Heart Association (AHA), European Stroke Organisation (ESO) and other bodies recommended EVT for eligible LVO patients. As the infrastructure of stroke care in the Netherlands was already centralised, the Netherlands was uniquely positioned to implement EVT rapidly and effectively. The introduction of EVT also prompted worldwide changes, including the expansion of neurointerventional services and the adaptation of prehospital triage protocols to enable faster identification and transfer to EVT centres of patients with suspected LVO.

MR CLEAN-LATE: EXTENDING THE TIME WINDOW

While the original MR CLEAN trial showed that EVT improves outcomes in patients with LVO if performed within 6 hours of stroke onset, many patients arrive at the hospital beyond this time window.

In 2018, the DAWN and DEFUSE 3 trials proved that EVT could still be beneficial in highly selected patients between 6 and 24 hours after stroke. [3,4] These trials used advanced imaging, such as CT perfusion (CTP) and MRI, to measure the infarct core (the irreversibly damaged brain tissue) and the penumbra (at-risk but salvageable tissue). Treatment was only offered if there was a favourable mismatch: a small core and a large penumbra. These studies changed the national guidelines for EVT in the late window, but only for a highly selected group of patients.

The MR CLEAN-LATE trial, coordinated at Maastricht UMC+ and published in The Lancet in 2023, took a pragmatic approach and aimed to identify an additional patient population eligible for late-window EVT. [5] Instead of perfusion imaging, patients were selected on the presence of collateral flow on CT angiography (CTA) (Figure 2). Patients with collateral flow were randomised to EVT plus best medical treatment or best medical treatment alone between 6 and 24 hours after symptom onset or last seen well.

The results confirmed that EVT remained beneficial in the late window. Patients treated with EVT had significantly better functional outcomes at 90 days than those receiving best medical treatment alone (adjusted common odds ratio

1.67 (95% CI, 1.20 to 2.32). [5] Importantly, mortality and rates of symptomatic intracerebral haemorrhage were similar in both groups, supporting the safety of the treatment in the late window.

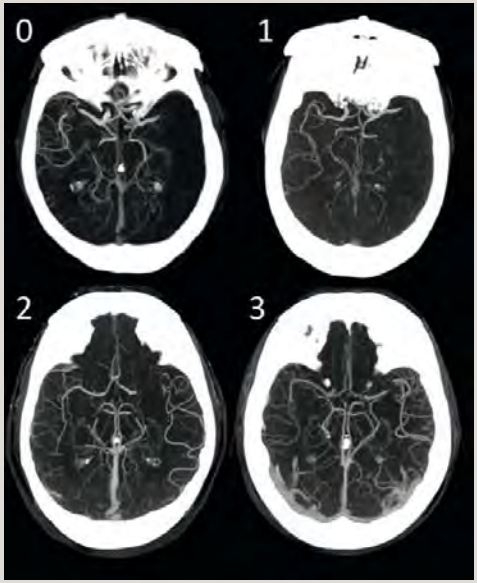


FIGURE 2 Collateral flow grades on CTA. Grade 0 = no collateral filling; grade 1 = 1-50% collateral filling; grade 2 = 51-99% collateral filling; grade 3 = 100% collateral filling. [6]

WHY COLLATERAL-BASED SELECTION MATTERS

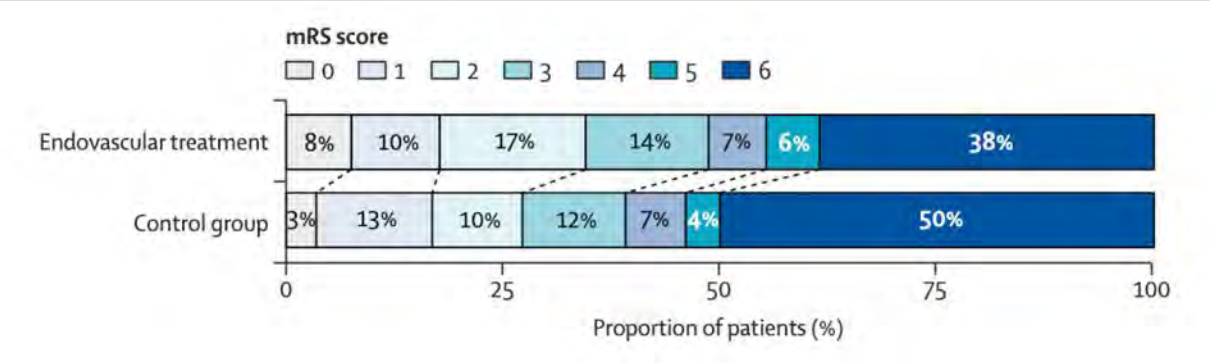
Collateral-based selection for late-window EVT offers significant advantages, as it relies on standard imaging (CTA) instead of advanced perfusion software. This makes patient selection for late-window EVT more practical and accessible, and it is increasingly used to select eligible patients for EVT in the late window. By validating the use of CTA-based collateral grading, MR CLEAN-LATE helped lower the threshold for treatment and expanded access for a broader range of stroke patients.

Although the global number of EVT procedures has increased sharply in recent years, access remains limited in many low- and middle-income countries, due to infrastructure and funding gaps. In such settings, CTA-based selection could play a key role in expanding access and reducing disparities in stroke care.

LONG-TERM BENEFITS OF LATE-WINDOW EVT AND DEVELOPING FUTURE RESEARCHERS

The MR CLEAN-LATE trial has advanced both clinical insights and academic growth within the research team. In 2021, Ilse Huijberts joined the MR CLEAN-LATE research group as a second-year medical student, initially supporting data collection and gradually taking on more responsibility through close supervision, structured involvement and training.

During her Master's, she began a PhD project focusing on long-term outcomes after late-window EVT. This led to a two-year follow-up study of MR CLEAN-LATE, published in The Lancet Neurology in June 2024. The study showed that early functional benefits of late-window EVT were sustained up to two years after randomisation [7]. Patients treated with EVT had better outcomes on the mRS (adjusted common odds ratio 1.41 [95% CI 1.00–1.99]; p=0.049) at two years post-stroke. In addition, two-year all-cause mortality was lower in the EVT group, though this difference did not reach statistical significance. These findings support the safety and durability of collateral-based selection for EVT in the late treatment window, and encourage further evaluation of its cost-effectiveness and the broader implementation of



this pragmatic approach in stroke care.
As first author of the two-year follow-up to MR CLEAN-LATE, Ilse had early opportunities for academic and professional growth during her medical training. Conducting research alongside her studies taught her to work efficiently under pressure and strengthened her skills in data analysis, scientific writing, and project coordination. Presenting the findings at international stroke conferences yielded valuable experience in academic communication. Together, these activities deepened her understanding of evidence-based care and helped her develop into a more analytical and reflective future clinician. Her development reflects both personal motivation and the strength of the supportive mentorship within the MR CLEAN-LATE team.

LOOKING AHEAD: THE FUTURE OF THE MR CLEAN-LATE TRIAL

The success of MR CLEAN (-LATE) and related EVT trials has laid a solid foundation for continued efforts to refine stroke care and expand treatment eligibility. The next step involves improving individualised patient selection to maximise benefit and minimise risk.

FIGURE 3 Shift towards better functional outcome on the Modified Rankin Scale in patients who received late-window endovascular treatment versus best medical treatment (control group) is sustained at 2 years after randomisation. [7]

To this end, the MR PREDICT project was developed to improve individualised decision-making in acute stroke care by creating a model that estimates treatment effects using combined trial data and clinical and imaging factors [8]. An updated version including late-window data is currently being developed.

In parallel, longitudinal analyses from MR CLEAN-LATE will explore detailed long-term patient outcomes as well as healthcare and societal costs, helping to inform policy makers, guide resource allocation, and promote sustainable implementation of advanced stroke therapies.

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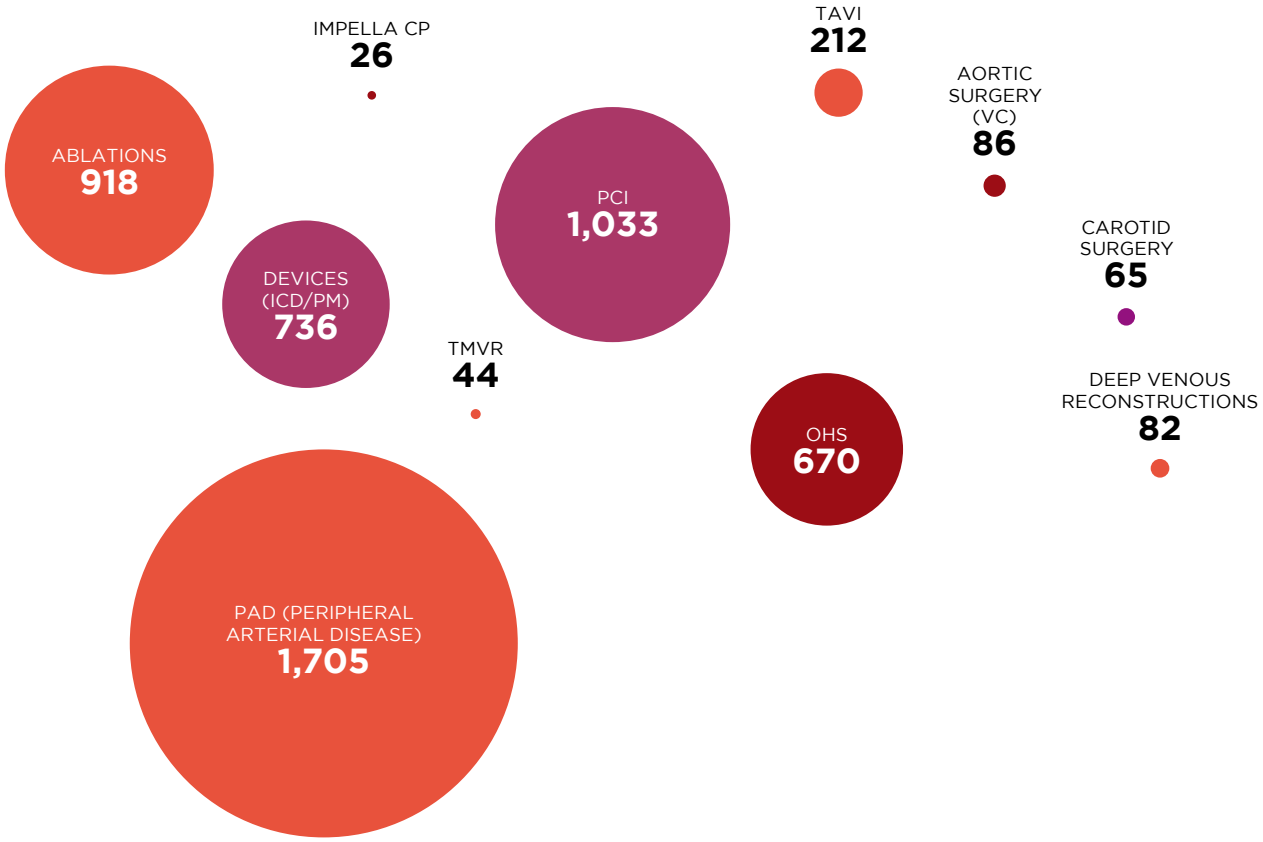
NEXT LEVEL CARE

04

NEXT LEVEL CARE

In 2024, the Heart+Vascular Center (HVC) at Maastricht UMC+ continued to provide high-quality, patient-centred cardiovascular care on a large scale. With over 42,000 outpatient visits and more than 5,500 procedures performed, the centre operated at full capacity across its 105 beds. Supported by a dedicated team of nearly 390 fte, HVC generated a total revenue of 109 million Euros, reflecting both its clinical scope and strategic significance within Maastricht UMC+. These figures highlight HVC's position as a national leader in complex cardiovascular care.



ADVANCES IN TREATMENT

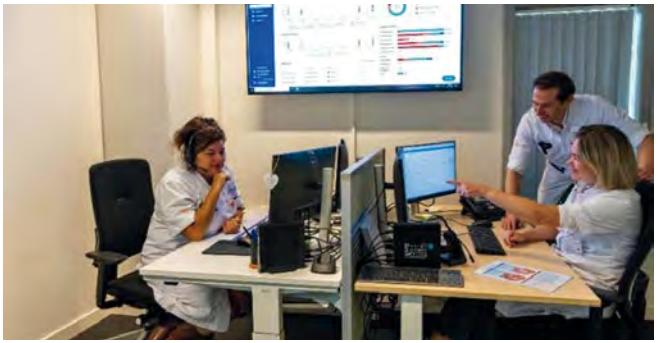
A team led by Prof. **Vanessa van Empel** (Dept of Cardiology), Prof. **Kevin Vernooy** (Dept of Cardiology) and Prof. **Joost Lumens** (Dept of Biomedical Engineering) have discovered a promising new approach to treating diastolic heart failure, a condition affecting approximately 120,000 people in the Netherlands. Using virtual heart models, they found that increasing the heart rate, rather than slowing it, can improve the heart's ability to pump blood effectively. In a study with 75 patients, pacemakers were used to raise heart rates by 20-30 beats per minute, producing results consistent with simulations: improved heart function and reduced symptoms like fatigue and breathlessness. The team is now exploring the use of dual-chamber pacemakers to further enhance outcomes. Published in the European Heart Journal, the findings suggest faster research through virtual models could bring this treatment to patients sooner. See pages 114-119 for a full article.

A study led by **Dr Peyman Sardari Nia** (Dept of Cardiothoracic Surgery) has shown that remote prehabilitation before heart surgery significantly reduces the risk of serious complications. The 'Digital Cardiac Counseling (DCC)' study involved 394 patients and compared standard care to a personalised six-week online programme including teleconsultations, physical training, and mental health support. Patients in the prehabilitation group experienced a 35% decrease in major complications and showed improvements in lung function, reduced anxiety, and higher rates of smoking cessation. The results, published in JACC and presented at the EACTS Congress, support integrating prehabilitation into routine cardiac surgical care.

INNOVATIVE TECHNOLOGIES

The Department of Vascular Surgery is involved in the clinical evaluation of **Philips Lumiguide**, a breakthrough optical technology offering real-time, high-resolution 3D catheter navigation during complex endovascular procedures. Selected as one of nine centres worldwide for this initiative, HVC led efforts to assess Lumiguide's clinical value In a cohort of 210 patients, including approximately 100 with complex aortic aneurysms, an analysis by Prof. **Geert Willem Schurink**, Prof. **Barend Mees**, **Anna Prent**, and **Jorinde van Laanen** showed that Lumiguide significantly reduced both radiation exposure and cannulation time, particularly during key phases of the procedures. Notably, HVC was the first centre globally to implement the 3D Hub, enabling system-agnostic catheter use and gaining international recognition. Collaborative research confirmed that Lumiguide improves technical success and reduces radiation during complex EVAR, even in anatomically challenging cases and across various vascular access points. These findings position Lumiguide as a transformative tool in vascular care, with the potential to support radiation-free procedures, including future applications in heart valve interventions.

HVC made significant progress toward establishing a fully integrated remote atrial fibrillation (AF) clinic led by Prof. **Dominik Linz** and Dr **Astrid Hermans** (Dept of Cardiology), with 2024 marking several key milestones. Highlights included the implementation of nurse-led AF care, the



launch of a centralised AF control room, progress toward a personalised mHealth rhythm monitoring continuum, and the development of the **MetAFib** digital platform. Nurse-led care, now fully embedded, enhances patient outcomes through structured, multidisciplinary coordination. The AF control room enables real-time remote monitoring, efficient triage, and team-based decision-making. A range of rhythm monitoring tools, including Holter, FibriCheck, KardiaMobile, and Philips ePatch, are being integrated to tailor care to individual patient needs. All data and care processes will be

unified within MetAFib, a digital platform designed to support personalised, secure, and seamless remote AF care. Together, these innovations lay the groundwork for a scalable, future-ready model that improves quality of life and outcomes for AF patients while generating valuable data for ongoing research.

For the first time in the Netherlands, a patient has been treated by Prof. **Dominik Linz** and Dr **Justin Luermans** (Dept of Cardiology) in the Cardiac Intervention Center (CIC) using **Pulsed Field Ablation (PFA)** in combination with the new Omnypulse Catheter. This cutting-edge ablation technique uses high-frequency electrical pulses to selectively disrupt heart muscle cells, effectively 'discharging' them, without heating the surrounding tissue. The procedure was performed as part of a clinical study in collaboration with Biosense Webster. This innovative catheter technology is expected to further simplify and enhance the safety of treatments for atrial fibrillation and other cardiac arrhythmias. See pages 14-17 for a full interview about the CIC.

The mitral valve team has successfully performed a new, minimally invasive procedure on a patient with recurrent mitral valve regurgitation. In this condition, the leaflets of the mitral valve no longer close properly, causing blood to leak backward into the heart. Despite the previous placement of MitraClips, a new leak had developed between the existing clips. Placement of a third clip was not considered feasible. Rather than opting for conventional open-heart surgery, the team took a novel approach: using a vascular plug, inserted through the groin, to seal the gap between the clips and reduce the leakage. The procedure, performed by Dr **Pieter Vriesendorp**, **Ralph Theunissen** and Dr **Bas Streukens** (Dept of Cardiology), was successful, and the patient was discharged in good condition. This innovative technique enables new treatment possibilities for mitral valve regurgitation in selected patients with limited conventional options.

PATIENT SATISFACTION AND QUALITY INDICATORS

All university hospitals in the Netherlands use the Patient Experience Monitor (PEM) to assess patient satisfaction and gather feedback. These results are actively applied by individual departments to improve healthcare services. As highlighted in both overview reports, HVC achieved an exceptionally high level of performance. These results reflect a high standard of care, with ongoing efforts aimed at further improvement.

From September to December 2024, the PEM functioned as a national benchmark across all university hospitals. The initiative was designed to facilitate shared learning by exchanging best practices.

Cardiothoracic Surgery departments across university hospitals received consistently high patient ratings. Topics such as knowledge of the medical file, trust in physicians and nurses, explanation of treatment benefits and risks, respectful communication, and a sense of safety all scored highly. The Cardiothoracic Surgery department at Maastricht UMC+ achieved the highest national average score: 8.8 out of 10. This outstanding result is largely attributed to the strong trust patients have in the nursing staff, as well as the high quality of discharge care.

These achievements are a source of pride within the department. At the same time, several areas for improvement have been identified to further strengthen the quality of care provided.

OTHER HIGHLIGHTS

As of 1 May 2024, Prof. **Kevin Vernooy** (Dept. of Cardiology) has been appointed Medical Director of HVC, succeeding Prof. Michael Jacobs. Kevin looks forward to stepping into this role alongside his current position as Head of the Department of Cardiology. As a cardiologist, he specialises in the invasive treatment of heart rhythm disorders in patients with heart failure.

After three successful online editions, the **Maastricht Mitral Masters** was held in person for the first time at the MECC Maastricht, from 2 to 4 September. The organising team proudly welcomed 150 participants from 27 countries for this inaugural on-site event. The Maastricht Mitral Masters is an international masterclass that brings together multidisciplinary heart teams, including surgeons, interventional cardiologists, echocardiographers, and other specialists, to advance the treatment of mitral and other atrioventricular valve diseases.

On 15 October 2024, the **cardiology outpatient clinic** in the **Annadal Clinic** in Maastricht officially opened. This initiative is a collaboration between Annadal Clinic and Maastricht UMC+, with cardiologists from the Maastricht UMC+ working on site at Annadal. The aim is to reduce waiting times for patients with cardiac symptoms and to improve communication and feedback to referring physicians. See pages 72-75 for a full interview with Ella Poels and Kevin Hendriks about our new cardiology outpatient clinic.

The project ‘Prediction model for a favourable outcome (including quality of life) after TAVI procedures’, led by **Kim van der Velden** (Dept. of Cardiology), received the NHR Quality Award 2024 at the NHR Symposium 2024 held on 28

June. The project stands out for its impact on the further development and both internal and external validation of a prediction model designed for future integration into clinical decision support systems. The model aims to identify patients most likely to achieve a favourable outcome, defined as one-year survival with improved quality of life, measured using the SF-36 questionnaire. Its primary purpose is to support the heart team in shared decision-making by identifying patients at increased risk of an unfavourable outcome before treatment decisions are made. An important next step is to better understand why quality of life does not improve in certain patients, despite procedural success. Gaining insight into these cases may help optimise perioperative counselling and patient preparation for interventions such as TAVI. The NHR Quality Award is presented by the Netherlands Heart Registration (NHR) and recognises quality improvement projects that make effective use of NHR data. The NHR is a service-oriented organisation that facilitates the nationwide, high-quality collection of data on all cardiac interventions and surgeries in the Netherlands. It also supports the registration of several common cardiovascular conditions. Data from these registries provide valuable insights into care outcomes, both within and across hospitals. These insights are actively used to inform quality dialogues and drive targeted improvement efforts in clinical practice.

HVC has received special recognition from the Chinese Society of Extracorporeal Life Support (CSELS) as the most productive centre in the field of extracorporeal life support (ECLS). The recognition was presented to Prof. **Roberto Lorusso** (Dept of Cardiothoracic Surgery) during the opening ceremony of the 8th Annual Congress of the CSELS. The recognition was based on the centre's achievement of the highest impact factor in 2023 for the scientific production of high-impact manuscripts (e.g. NEJM, Lancet) in the field of ECLS. Additional praise was given for the promotion of international cooperation, notably for uniting numerous centres worldwide in clinical research, and for Roberto's recent appointment as Chairman of the Extracorporeal Life Support Organization Research Committee. The CSELS is a professional organisation dedicated to the advancement of extracorporeal life support in China. ECLS refers to medical treatments that provide prolonged cardiac and respiratory support to patients whose heart and lungs are unable to sustain life on their own.

On 14 November, a **Regional Echocardiography Day** focusing on cardiomyopathies was held in Roermond, The Netherlands organised in collaboration with Radboudumc Nijmegen, The Netherlands. The event served as a regional training day for echocardiographers from across our region, and beyond. Attendees benefited from a series of informative, practical, and engaging presentations delivered by leading experts in the field.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INTERVIEW

KATHLEEN LOUSBERG-THENAERTS

A day at Ward B3

What does a day on the cardiology ward (B3) of Maastricht UMC+ look like? On the one hand, an impossible question to answer, as it is especially these patients that require extreme flexibility of the staff. On the other hand, a ward like this obviously could not function without a clear structure and protocols. Head of ward Kathleen Lousberg-Thenaerts has been working here for many years (and working very hard), having started out as a nurse.
She accompanies us on a tour of ward B3 for a day.

Day shift starts at **7 am**, with five nurses, two to six trainees, one or two nursing assistants and one nurse-coordinator. "That last one is a position we've introduced somewhat over a year ago, being one of the first units in the hospital to do so", says Kathleen. "Nurse-coordinators play a coaching and coordinating role during the shift. They have greater authority within the systems and have had additional training for this. The team leader is actively present on the ward, with me, as head of the ward, working somewhat more at a distance. I coach the team leader, take care of financial matters and staffing matters, but I also take part in pilot programmes introduced throughout the hospital, like that of the nurse-coordinators."

After the dayshift staff has read the patient reports, they briefly discuss them with each other at **7:20 am**, after which the morning nursing round starts at **7:30 am**. Each nurse has about six patients to take care of, including performing checks and providing medication. Patients who require a lot of assistance with washing and getting dressed will also be helped by nursing assistants and trainees. Soon after that, breakfast is brought in by the catering department.

At **9:15 am**, the team briefly meets again at the office to discuss how far everyone has got with the care required, and whether someone needs extra assistance. "This is also one of the moments when we quickly check if our staff are doing okay personally." Then, at **9:30 am**, the ward round gets underway, with three or four doctors visiting the patients together with the nurses. The nurse-coordinator keeps track of the time, as the ward round needs to be completed by **11:30 am**. "That can sometimes be a bit of a challenge, for instance if a doctor or a nurse reports sick in the morning, but nevertheless we usually manage to finish in time."

24/7

After the ward round, the nurses can put in another medication round, after which the first half of the staff have their lunch break from **11:45 am to 12:30 pm**. The other half have their lunch break from **12:45 pm to 1:30 pm**, and of course the patients also get their lunch around this time. "Sometimes we may have to admit a new patient during lunch break, as that goes on 24/7. We are an acute care department and there's no telling when peaks will occur. A few days ago, 35 of our beds were occupied, whereas we normally use 32 at most. And then again, this morning we had eight empty beds."

Around **1:30 pm**, the doctors and nurses discuss patients' new lab results, and possible changes to be made to their medication, and communicate these to patients and their relatives, for instance. Then the nurses' afternoon round starts, which involves taking patients to examinations, discharging them etc.

At **3 pm**, it is the start of visiting hours, as well as the evening shift, with three nurses and two assistants. These might be two trainees or one trainee and a care assistant. Patients are handed over to the evening shift by the day shift staff. At **4 pm** there is another medication round, and both patients and staff have their evening meal from **5 to 5:30 pm**. The nurses update the patient files, doctors sometimes look in before they head home, and then from **6:30 to 7 pm** there is another nursing round, similar to the morning round at **7:30 am**.

TELEMETRY FOR DISTANCE MONITORING

The night shift starts at **10:45 pm**, with three nurses. All patients are handed over to them at the team station, after which they are responsible for all patient care until **7:15 am** the next morning. "We try to enable people to sleep as much as possible through the night; the nurses can monitor patients' telemetry from the station. They also prepare medications for

next day and update discharge data. From the time a patient is admitted, we have to indicate when we expect them to be discharged, and if this prognosis changes, it has to be updated in the system. This ensures that hospital management remains informed about the number of beds available, but it also makes it possible over time to develop a prognosis for the hospital stay for each medical condition."

While all these regular activities are taking place, staff at ward B3 are confronted on a regular basis with a case of reanimation. The hospital's reanimation team is then alerted and will be on site within 1 to 3 minutes. Meanwhile, the ward staff will also start reanimation themselves, and they have usually already administered the first AED shock. "That puts extra pressure on the team. In addition, the ward has seen quite a lot of technological innovations in recent years, and staff have to be able and willing to work with them", says Kathleen. "We now have a young and dynamic team, who opt for this. At the same time, we're a kind of breeding ground for intensive care and emergency department nurses. People often move on to those positions after they have been with us for two or three years and have mastered everything, and that's something we actually appreciate."

Patients at B3 not only require complex nursing interventions, but also need the staff to be very patient. "Patients with heart failure retain too much fluid. They ought to reduce their fluid intake, but they're also extremely thirsty. As a nurse, you have to have a lot of understanding and patience with them." Kathleen herself does not mind occasionally having to take over some care tasks if staff members are ill. "I don't mind doing that for a day, and I'm happy to be able to help out the team. But in terms of my normal tasks, I nowadays get my work satisfaction mostly from managing the department.
I get energy from my team members when I see them concluding their shift with a sense of satisfaction."

FOR DUTCH

B3 FACTS & FIGURES

30	NURSES
17	TRAINEE NURSES (INTERNAL AND EXTERNAL)
4	NURSING ASSISTANTS
2	CARE ASSISTANTS
1	TEAM LEADER
1	HEAD OF DEPARTMENT
40	BEDS IN THEORY, 32 IN PRACTICE
16	TELEMETRY BEDS

COLLABORATION WITH **NURSING DEPARTMENT D4** (CARDIAC SURGERY), WHICH TAKES OVER PATIENTS IF IT GETS TOO BUSY.

STAY RANGES FROM TWO DAYS TO SOME MONTHS.

PATIENTS ARE MOSTLY REFERRED FROM THE CARDIAC EMERGENCY UNIT.

MOST COMMON DISORDER IS HEART FAILURE, FOLLOWED BY CARDIAC INFARCTION.

B3 IS A PART OF HVC, AS ARE **D4** (CARDIAC SURGERY), **B4** (VASCULAR SURGERY), **C3** (CARDIAC EMERGENCY UNIT) AND THE INTENSIVE CARE UNIT.

INTERVIEW

KEVIN HENDRIKS AND ELLA POELS

Cardiology outpatient clinic at Annadal operational

Since October 2024, patients who are referred to the hospital by their general practitioner (GP) for cardiological complaints can visit an outpatient clinic outside the Maastricht UMC+. The Annadal Clinic hosts several specialties, and the cardiologists from Maastricht UMC+ work there on a secondment basis. The aim is to reduce waiting times and to improve communications with primary care physicians. This also gives HVC more room for complex academic care.

When they started working as cardiologists at Maastricht UMC+, Ella Poels and Kevin Hendriks both knew that part of their work would be done at Annadal Clinic. The two had been trained at Maastricht. Ella had worked in Belgium for a few years, but in 2024 she decided to return to the familiar team. Kevin was appointed in 2022 as a cardiologist who would be spending half of his working hours at the outpatient clinic (also at Annadal) and half at the hospital clinic. “By now, I’ve also started to focus more on congenital heart diseases, and I’ve taken on a number of management tasks, so that some of the other cardiologists now also occasionally work at Annadal for a day." Ella: “Reactions have been favourable. It’s a much more intimate setting, and that’s how it feels too.” Kevin: “At the hospital, we have 38 cardiologists, whereas at Annadal you can count them on one hand, and there are four assistants and one ultrasound technician.”

ROUTINE

At first, the cardiologists themselves did all the ultrasounds at Annadal, but nowadays an ultrasound technician is present on some of the days to carry them out. “In theory, any cardiologist can do them, but in practice, not everyone does them equally often. For us two it’s routine, which was one of the reasons why we were asked to work at this outpatient clinic”, says Kevin. The aim at the start was to see forty patients a week, with a maximum waiting time of three working days. In practice, it’s five working days, which is still better than the waiting time at HVC. The capacity is gradually being expanded. Patients usually attend the Annadal outpatient clinic only once after they have been referred by their GP. At their visit there, they get all the necessary examinations one after the other. Ella: “That means they only have to undress once for an ECG and an ultrasound, which is also comfortable for our target group, who are mostly older people.”

SCREENING AND REFERRING

At the end of the visit, which on average takes one hour, the patient will have received a diagnosis and a treatment plan, or else additional examinations have been requested at the hospital. The patient’s GP will receive a letter about the

THE ATMOSPHERE AT ANNADAL IS ALMOST COMPARABLE TO THAT OF A GP’S OFFICE, AND WE NOTICE THAT PEOPLE APPRECIATE THAT WE HAVE A BIT MORE TIME FOR THEM

consultation the same day. Sometimes additional examinations, like an MRI or a CT-scan, will be requested. Kevin: “We screen and refer to a specialised colleague at the hospital if we suspect a particular cardiac problem. That’s the case for about one in four or five patients we see at Annadal.” The rest of the patients can return to primary care. The fact that this influx of patients does not need to go to Maastricht UMC+ makes things easier for both patients and HVC. Kevin: “The atmosphere at Annadal is almost comparable to that of a GP’s office, and we notice that people appreciate that we have a bit more time for them. And also, they’re often reassured by having an ultrasound made right away.” Ella: “It creates more room at the hospital for tertiary care.”

The number of referrals from GPs is increasing. Ella and Kevin expect that the volume of care offered at Annadal Clinic will only rise over the coming years. Kevin: “We see patients with all kinds of symptoms, but we limit ourselves to triage. Annadal is not intended to do outpatient checkups as well. It’s good that we alternate between working here and at Maastricht UMC+. It’s the variety that makes it interesting for us.”

FOR DUTCH

HIGHLIGHT
DIVISION VESSELS

AIMÉE BUZIAU

Fructose is causal in the pathogenesis of intrahepatic lipid accumulation, type 2 diabetes, hypertension and myocardial infarction

FRUCTOSE AND CARDIOMETABOLIC DISEASE

There is compelling evidence that added sugars play an important role in the current epidemic of non-communicable diseases, including obesity, metabolic dysfunction-associated fatty liver disease (MAFLD), dyslipidaemia, type 2 diabetes (T2DM), cardiovascular disease (CVD), and colorectal cancer (CRC) [1-5]. Simple sugars, like glucose and fructose, can be converted into new fatty acids via hepatic *de novo* lipogenesis (DNL) (Figure 1A) [6-7]. Based on textbook biochemistry, one would expect that impairment of enzymes involved in the breakdown of fructose (i.e., fructolysis) would reduce DNL and, consequently, intrahepatic lipid (IHL) accumulation. However, our group has previously demonstrated that patients with an impaired fructose metabolism (due to mutations in the gene encoding aldolase B [ALDOB]) are characterised by a higher IHL content [8].These paradoxical observations suggest that fructose also has indirect effects on DNL (Figure 1B). Therefore, the two research questions of my postdoctoral research were:

1. What is the causal relationship between fructose intake and the risk of non-communicable disease at the population level?
2. Which are the key molecular mechanisms by which fructose participates as a signalling molecule in the pathogenesis of IHL accumulation, and what is the role of fructose 1-phosphate (F1P) therein?

We used a variety of research methodologies (each with their own strengths and limitations), including experimental studies using both mice and humans, as well as nutritional and genetic epidemiology, highlighting the translational nature of our research.

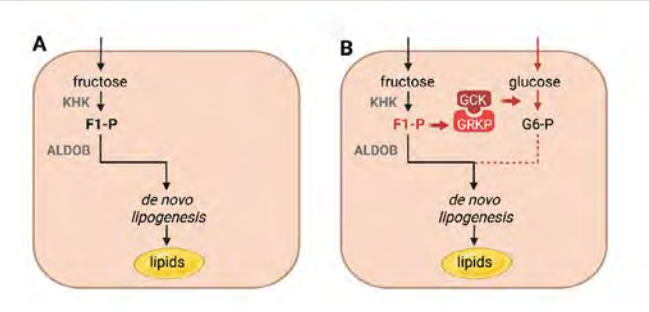


FIGURE 1 Fructose metabolism in the hepatocyte.
(A) Fructose can be phosphorylated by ketohexokinase (KHK) and cleaved by aldolase B (ALDOB) and, eventually, directly converted into new fatty acids via DNL.
(B) We hypothesised that fructose – mediated by GKRP – can also be indirectly converted into new fatty acids via DNL.

FRUCTOSE IS CAUSAL IN THE PATHOGENESIS OF CARDIOMETABOLIC DISEASE

We first performed an epidemiological study to assess the cross-sectional association between fructose from fruit, fruit juice and sugar-sweetened beverages (SSB) and the IHL content, as part of The Maastricht Study (n~7,000), in which IHL content was quantified by magnetic resonance imaging. We found that fructose from fruit juice and SSB, but not from fruit, was associated with a higher IHL content (Figure 2) [9].

Next, we performed a genetic study to assess the causal nature of the relationship between fructose and non-communicable disease at the population level. We performed a Mendelian randomisation (MR) analysis by studying the association between a common variant in the gene encoding ketohexokinase (KHK) (which catalyses the formation of F1P, the first committed step in fructose metabolism; Figure 1A) and the risk of non-communicable disease. Since genetic variants are randomly distributed among future haploid cells during meiosis, they can be used as instruments in MR to examine a potential causal relationship, akin to conducting a randomised controlled trial [10].

We first assessed the functionality of rs2304681, a common missense variant in KHK resulting in amino acid substitution Val49Ile (minor allele frequency: 0.37). In line with our hypothesis, we found that the minor A allele is associated with fructosuria (Figure 3A; p=0.001) [11-12]. Since

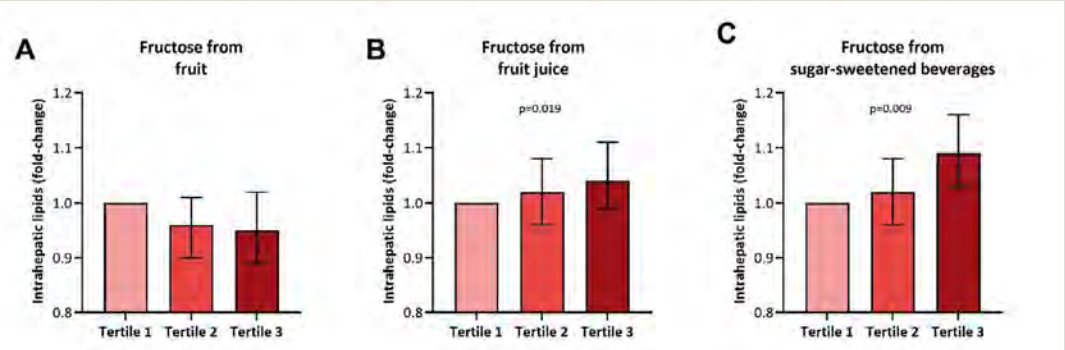


FIGURE 2 Fructose from fruit juice and SSB is associated with higher IHL content in The Maastricht Study (n=3,981).

fructosuria reflects impaired KHK function, the association is consistent with rs2304681, or a highly correlated variant, being functional. Next, we performed a two-sample MR analysis to examine the potential causal association between genetically proxied impaired KHK function (reflected by urinary fructose levels derived from the Maastricht Study, as determinant) and IHL content and the risk of T2DM, hypertension, myocardial infarction and CRC. We found that genetically proxied impaired fructose metabolism protects against IHL accumulation (Figure 3B, p< 0.001), T2DM (Figure 3C, p=0.002), hypertension (Figure 3D, p=0.040), myocardial infarction (Figure 3E, p=0.003) and CRC (Figure 3F, p=0.007) [12-13].

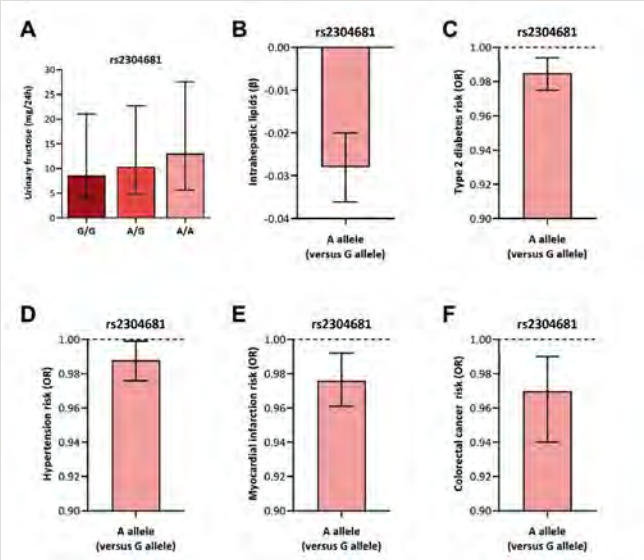


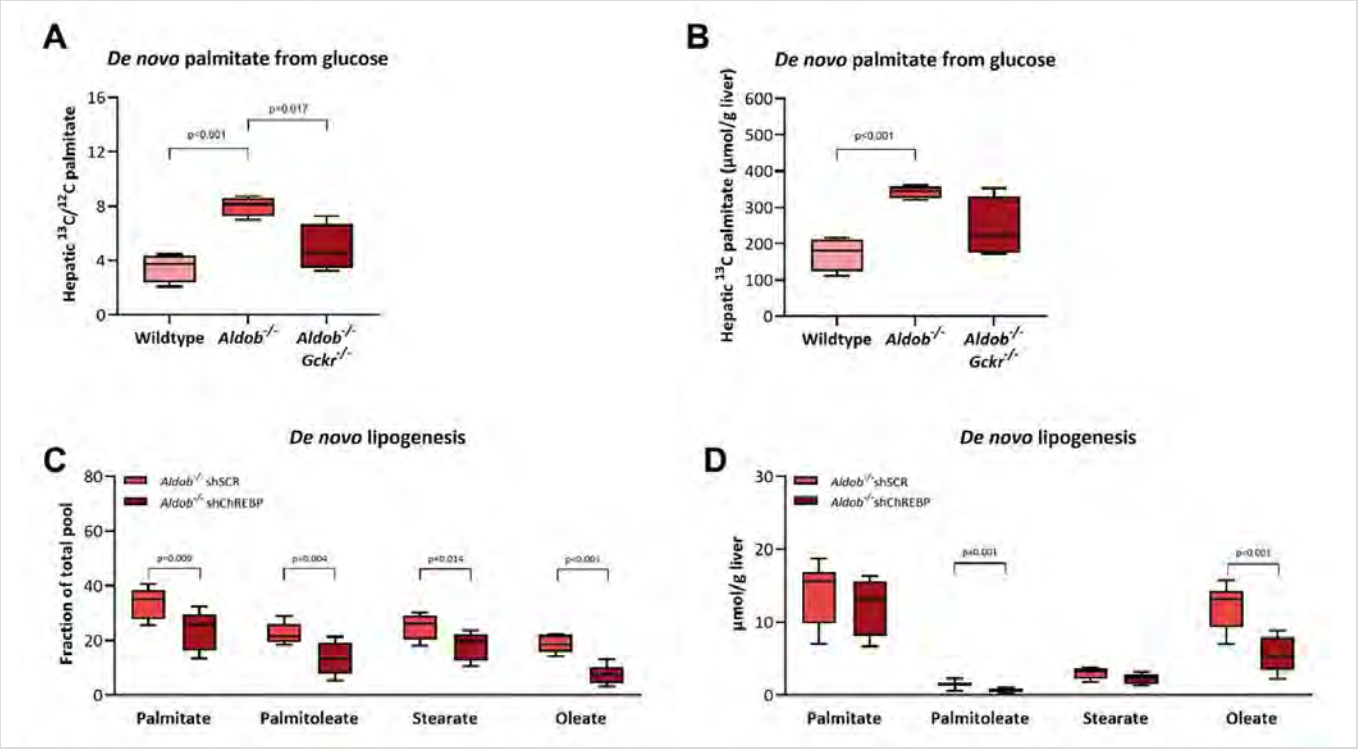
FIGURE 3 Genetically proxied impaired fructose metabolism protects against cardiometabolic disease. The rs2306481 A allele is associated with greater 24-hour urinary fructose excretion in participants of the Maastricht Study (A). The rs2306481 A allele is associated with a lower IHL content (B), and lower risk of T2DM (C), hypertension (D), myocardial infarction (E) and CRC (F).

In conclusion, based on combined nutritional and genetic epidemiology, we conclude that fructose plays a causal role in the pathogenesis of IHL accumulation, T2DM, hypertension, myocardial infarction and CRC. Furthermore, our findings imply that fructose from fruit juice and SSB may be more prone to cause IHL accumulation than fructose from fruit.

FRUCTOSE HAS INDIRECT EFFECTS ON *DE NOVO* LIPOGENESIS

We performed numerous experiments in mice and humans to investigate molecular mechanisms by which fructose participates as a signalling molecule in the pathogenesis of IHL accumulation (14-16) (manuscript in preparation). In one experiment, we focused on two regulatory proteins that have previously been implicated in both fructose and glucose metabolism, i.e., glucokinase regulatory protein (GKRP; Figure 1B) and carbohydrate response element binding protein (ChREBP). For this, we performed experiments with Aldob−/− mice, which are characterised by high hepatocellular F1-P.

Since F1P is a potent disruptor of the GKRP-glucokinase (GCK) complex, thereby enhancing glycolysis, we generated Aldob−/−/Gckr−/− mice to investigate the role of GKRP in F1P-mediated DNL. We first assessed de novo palmitate synthesis from intraperitoneally injected U-$^{13}C_6$-glucose. Aldob−/− mice showed increased hepatic ^{13}C-palmitate/^{12}C-palmitate ratios and a higher total ^{13}Cpalmitate content when compared to wildtype mice (Figure 4A-B, p<0.001) [14], indicating increased de novo palmitate synthesis rates from



glucose. Gckr knockout in turn reduced hepatic ^{13}C-palmitate/^{12}C-palmitate ratios and ^{13}C palmitate content in Aldob−/− mice (Figure 4A-B, p=0.017 and p=0.096, respectively) [14].

We next studied the role of hepatic ChREBP in F1P-mediated DNL by administering a shRNA against ChREBPα/β (or a shSCR) to Aldob−/− mice by means of AAV delivery. Using 1-^{13}C-acetate supplementation via the drinking water, we found that hepatic ChREBP knockdown reduced fractional hepatic palmitate, palmitoleate, stearate, and oleate synthesis from DNL in Aldob−/− mice (Figure 4C, p=0.009,

FIGURE 4 Indirect effect of fructose on de novo lipogenesis. Box-and-whiskers plot (minimum and maximum) presenting fractional hepatic de novo palmitate synthesis from glucose (A) and total hepatic ^{13}C palmitate content (B) in male wildtype, Aldob−/− mice, and Aldob−/−/Gckr−/− mice. Fractional (C) and absolute (D) hepatic fatty acid synthesis rates from DNL in female shSCR-treated Aldob−/− and shChREBP-treated Aldob−/− mice.

p=0.004, p=0.014, and p<0.001, respectively) (14). Furthermore, a similar pattern was observed for absolute palmitoleate and oleate synthesis via DNL (Figure 4D, p=0.001 and p<0.001, respectively) [14].

In conclusion, our mice experiments found that fructose also has indirect effects on DNL, mediated by GKRP and ChREBP.

A NEW *IN VITRO* MODEL TO STUDY IHL ACCUMULATION

After my PhD project, I received the HS-BAFTA Talented future postdoc grant, which enabled me to perform my postdoctoral research at the Stem Cell Institute (SCIL) at KU Leuven. I learned the techniques required for human-induced pluripotent stem cells (hiPSCs) research. Considering both its strengths and limitations, I believe hiPSC-2D hepatocyte-like cells (HLCs) may provide an *in vitro* model to study other possible mechanisms of IHL accumulation, without using animal models. I validated this in vitro model by exposing the iPSC-HLCs with oleic acid and, subsequently, measuring the lipid deposition (by Bodipy stain; Figure 5; manuscript in preparation).

THE ROLE OF THE PENTOSE-PHOSPHATE PATHWAY IN THE PATHOGENESIS OF FRUCTOSE-INDUCED IHL ACCUMULATION

Next, I received the Dutch Diabetes Junior Fellowship to continue my postdoctoral research. During this project, I will investigate the underlying mechanisms by which fructose causes IHL accumulation and its sequelae. I hypothesise a role for the pentose-phosphate pathway (PPP) in fructose-mediated IHL accumulation. The PPP parallels glycolysis and provides both substrate (acetyl-CoA) and NADPH for *DNL* (Figure 6) [17]. Furthermore, PPP activity produces erythritol as a byproduct. Erythritol is a validated biomarker of the PPP [18]. We will perform an observational and genetic study (MR analysis), as well as experiments to study the role of the PPP in IHL accumulation.

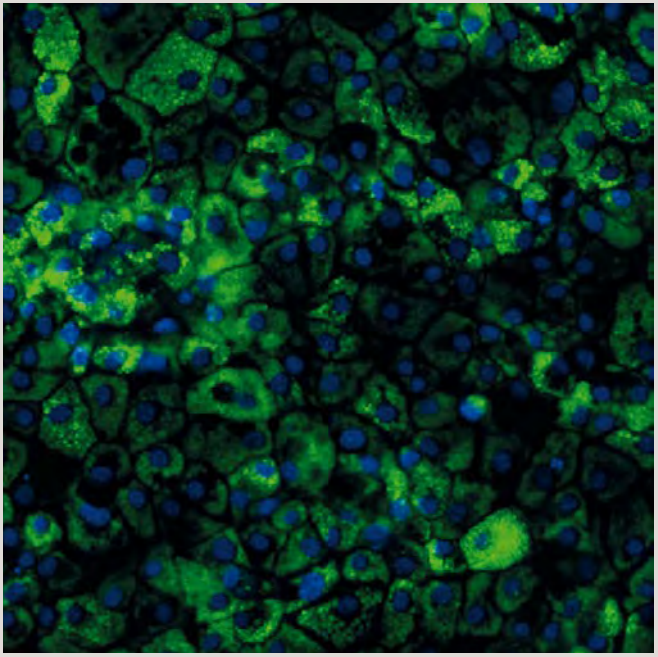


FIGURE 5 Oleic acid-induced lipid deposition in iPSC-derived hepatocyte-like cells.

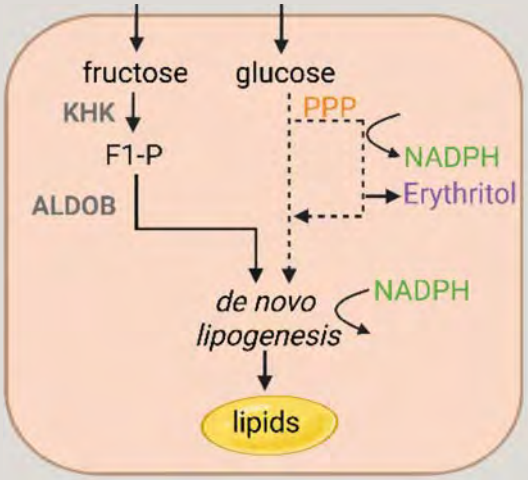


FIGURE 6 Working hypothesis: The PPP serves as an additional/ parallel pathway to provide substrate and NADPH in the pathogenesis of IHL accumulation.

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HIGHLIGHT DIVISION VESSELS

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SHAPING THE FUTURE: EDUCATION & TALENT

05

CARIM+HVC offers a flexible and integrated education and training programme tailored to the individual ambitions of its students and PhD candidates. The clinical and preclinical staff of CARIM+HVC is intricately involved in the development and implementation of the education programmes of the FHML Bachelor and Master studies of Biomedical Sciences, Medicine, and the Physician-Clinical Investigator Programme (MSc/MD). CARIM+HVC also contributes to the education programme of the Faculty of Science and Engineering. In addition, CARIM+HVC's staff is involved in the design of a contiguous and state-of-the-art PhD (doctoral) training programme. The content of the PhD education programme has been developed by our leading researchers, while its framework has been created by senior educators at Maastricht University, internationally recognised for their didactic approach based on problem-based learning.

RESEARCH MASTER

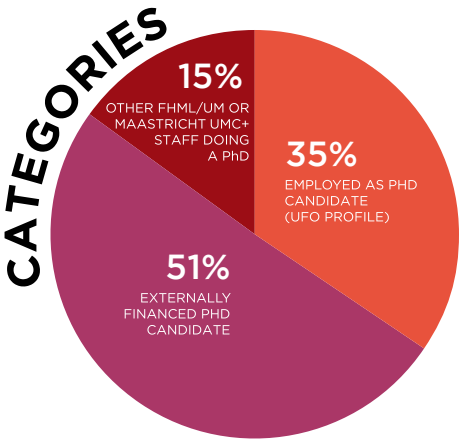
In the master programmes offered at FHML, students are introduced to CARIM and the programmes of the other FHML research institutes during the start of the master phase. CARIM+HVC staff members actively participate in the design and implementation of teaching within the Master programmes. Students can attend institute specific lectures and parallel programmes organised by researchers. In the second year, students who are attracted to cardiovascular research can do their senior research internship and master thesis at CARIM+HVC. These internships are also accessible for students from other master programmes, provided that they have a suitable academic background. Talented master students can subsequently pursue their scientific career as PhD candidates within CARIM+HVC.

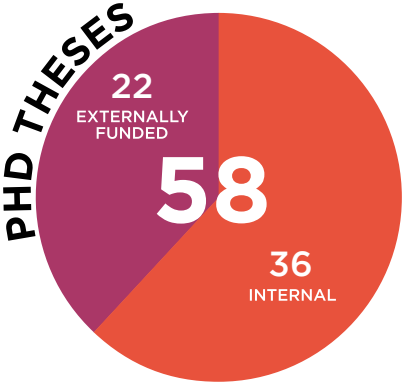
PHD PROGRAMME

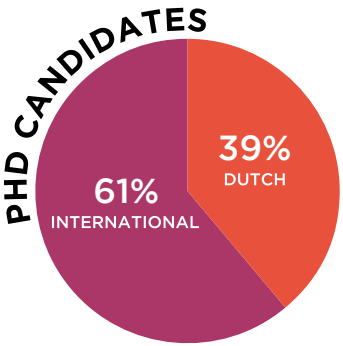
Our PhD programme is accessible for talented and motivated graduates from national and international Medical and Basic Sciences Masters. At the beginning of 2024, a total of 382 PhD candidates (both internal and external) were enrolled in our PhD programme. In 2024, more than 60% of our PhD candidates came from abroad, contributing to an exciting multicultural and international atmosphere. To advance cardiovascular knowledge and the treatment of cardiovascular disease, CARIM+HVC considers both basic and clinical research equally important, and thrives on research at their interface. The translational nature of CARIM+HVC's research is exemplified by the mix of PhD candidates with a background in medicine or in the basic sciences. The primary goal of the PhD training programme is to support PhD candidates

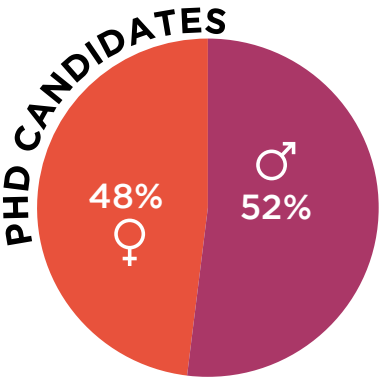
in developing into independent and mature researchers in the cardiovascular field. To ensure high-quality PhD training, CARIM+HVC offers frequent interaction between PhD candidates with skilled and experienced supervisory teams, thereby providing a stimulating and critical environment to further develop research skills. We also offer our PhD candidates a broad range of possibilities to attend general and institute specific courses, to attend seminars and master classes, and provide support from a buddy (a senior PhD candidates) and a coach (an independent senior faculty member). PhD candidates are encouraged to visit symposia to present their own research on national and international conferences.

In 2024, 68 new PhD candidates began their trajectory at CARIM+HVC. During the same year, 36 internally funded and 22 externally funded PhD candidates successfully defended their theses at our institute. At the start of 2024, the male-to-female ratio among CARIM+HVC appointed PhD candidates is nearly 50/50. More than 60% of our PhD candidates come from abroad.









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Supervisors: Prof. J.E. Wildberger, Dr A.J. ten Cate-Hoek, Prof. C.H.A. Wittens
12 January

Karolien Baldewijns
Title: From guideline to practise: The organisation of multidisciplinary heart failure care in three European regions
Supervisor: Prof. HP Brunner-La Rocca
Co-supervisors: Dr J.J.J. Boyne, Dr A. Devillé (Thomas More University of Applied Sciences)
25 January

Tim van Loon
Title: Fail to Fill: An in silico investigation of complex cardiac filling dynamics
Supervisors: Prof. J. Lumens, Prof. T. Delhaas
1 February

Renée Tillie
Title: Plaque stabilizing and destabilizing effects in atherosclerosis: The role of microvessels, macrophage metabolism and fibroblasts
Supervisors: Prof. J.C. Sluimer, Prof. E.A.L. Biessen
2 February

Claudia van der Heijden
Title: Exploring the essential aspects of the hybrid approach for atrial fibrillation
Supervisor: Prof. J.G. Maessen
Co-supervisor: Dr B. Maesen
2 February

Martine Bol
Title: Methodological and clinical aspects of glycocalyx measurements in critical illness
Supervisor: Prof. T. Delhaas
Co-supervisors: Dr M.C.G. van de Poll, Dr J.W.E.M. Sels
19 February

Job Stoks
Title: Multimodal image integration to better explain human ventricular tachyarrhythmias
Supervisors: Prof. P.G.A. Volders, Prof. R.L.M. Peters, Prof. P. Dendale (Hasselt University)
Co-supervisor: Dr M.J.M. Cluitmans
22 February

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Supervisors: Dr W.M. Blankesteijn, Prof. Z. Ahmed (University of Birmingham)
Co-supervisors: Dr S. Foulquier, Dr D. Fulton (University of Birmingham)
5 March

Chukiat Tantiwong
Title: Modelling of collagen receptor clustering and signalling
Supervisors: Prof. J.W.M. Heemskerk, Prof. J.M. Gibbins (University of Reading)
Co-supervisors: Dr R. Cavill, Dr J.L. Dunster (University of Reading)
11 March

Rik Hendrix
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Co-supervisors: Dr P.W. Weerwind (Medanex Clinic/NAMSA Diest), Dr Y.M. Ganushchak (Erasmus University Rotterdam)
12 March

Astrid Hermans
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Supervisors: Prof. D.K. Linz, Prof. U. Schotten, Prof. K. Vernooy
14 March

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19 March

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Supervisors: Prof. R.J. van Oostenbrugge, Prof. E.A.L. Biessen
Co-supervisors: Prof. J.E.A. Staals, Dr S. Foulquier
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Co-supervisors: Dr S.M. Chaldoupi, Dr C. Mihl
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Co-supervisors: Dr A.J. ten Cate-Hoek, Dr V. ten Cate (Johannes Gutenberg University Mainz)
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Supervisors: Prof. R. Lorusso, Prof. J.G. Maessen
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Co-supervisors: Dr H.M.H. Spronk, Dr K. Jurk (Johannes Gutenberg University Mainz)
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Co-supervisor: Em.Prof. T. Arts
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Co-supervisors: Dr B. Martens, Prof. M. Das (Helios Hospital Duisburg)
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Co-supervisor: B.A.B. Essers
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Co-supervisors: Prof. L.M.G. Curfs, Dr L.M.T. Eijssen
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Supervisor: Prof. HP Brunner-La Rocca
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Co-supervisor: Dr M.C.G. van de Poll
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Supervisor: Prof. J.M. ten Berg
Co-supervisors: Dr P.G. Noordzij (St. Antonius Ziekenhuis), Dr C.M. Hackeng (St. Antonius Ziekenhuis)
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8 November

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Title: Challenges of Diabetes Mellitus and Percutaneous Treatment in Modern Interventional Cardiology
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Co-supervisor: Dr R.S. Hermanides (Isala Zwolle)
12 November

Giulia Spanò
Title: m6A mosaics, transcriptional regulation of developing cardiomyocytes
Supervisors: Prof. L.J. de Windt, Prof. M. Stoll
13 November

Koen van der Laan
Title: An ex vivo experimental approach for connecting the multiple facets of arterial stiffening
Supervisor: Prof. T. Delhaas
Co-supervisors: Dr K.D. Reesink, Dr B. Spronck
21 November

Rudolf Tolsma
Title: Prehospital management of patients suspected for non ST-elevation acute coronary syndrome
Supervisor: Prof. A.W.J. van 't Hof
Co-supervisors: Dr J.P. Ottervanger (Isala Zwolle), Dr R.J. Slingerland, (Isala Zwolle)
22 November

Mueez Aizaz
Title: Advanced non-invasive atherosclerotic plaque imaging strategies: Harnessing the power of MRI, PET-MRI and dual energy CT
Supervisors: Prof. M. E. Kooi, Prof. R. M. Botnar (King's College London), Prof. F. M. Mottaghy (RWTH Aachen University)
Co-supervisor: Dr R. P. M. Moonen
26 November

David Barnett
Title: Perturbing and protecting the infant gut: exploring the impacts of antibiotics and oligosaccharides on gut microbiota and child health
Supervisors: Prof I. Arts, Prof. J. Penders
5 December

CARIM + HVC THESES 2024

Shengshi Huang
Title: The molecular linkage of von Willebrand Factor (VWF) and pathological coagulation in disease
Supervisor: Prof. H. ten Cate
Co-supervisors: Dr B. de Laat (Synapse Institute), Dr M. Ninivaggi (Synapse Institute)
12 December

Borek Foldyna
Title: Artificial Intelligence in Cardiac Imaging: Assessment, Prediction, and Management of Cardiovascular Risk
Supervisor: Prof H. Aerts
Co-supervisor: Dr M. Lu (Harvard Medical School)
12 December

Deepak Balamurali
Title: The dark side of the Genome: A story in three-peats
Supervisor: Prof. M. Stoll
Co-supervisor: Dr A. Isaacs
13 December

Fang Wang
Title: Targeting CD36 and v-ATPase for diabetic cardiomyopathy treatment
Supervisor: Prof. J.F.C. Glatz
Co-supervisors: Dr J.J.F.P. Luiken, Dr M. Nabben, Dr D. Neumann
18 December

Rawan Alnazer
Title: The factors influencing renin, aldosterone, and the aldosterone-to-renin ratio
Supervisors: Prof. A.A. Kroon, Prof. P.W. de Leeuw
19 December

Gregory Veldhuizen
Title: The factors influencing renin, aldosterone, and the aldosterone-to-renin ratio
Supervisors: Prof. A.A. Kroon, Prof. P.W. de Leeuw
19 December

MEDICAL SPECIALIST TRAINING

HVC provides a dynamic and academically rigorous environment for medical specialist training in cardiology, cardiothoracic surgery, and vascular surgery. This is supported by the expertise of the Academy for Medical Specialist Training, ensuring high-quality education and continuous curriculum development.

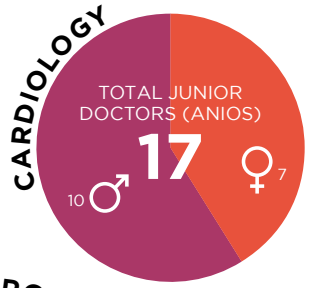
Cardiology training spans six years and combines internal medicine with dedicated cardiology instruction. Maastricht UMC+ holds indefinite accreditation for the final three years, including the subspecialisation year. Advanced clinical subspecialties offered include electrophysiology and devices, heart failure, interventional cardiology, intensive care cardiology, and advanced imaging. As lead institution in the South training cluster, Maastricht UMC+ collaborates closely with Zuyderland and VieCuri Medical Centres. In 2024, the core training team included Drs Trang Dinh (Programme Director), Dr Dennis den Uijl (Deputy), Eliane van Caldenborgh (Secretary), and two resident representatives. There is a strong and constructive collaboration with the local and national training committees.

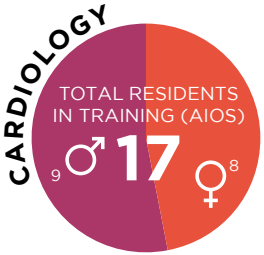
Cardiothoracic surgery training is a 5.5-year programme centred on mastering complex surgical skills through progressive, supervised practice. The curriculum includes rotations in pulmonology, intensive care, cardiology, congenital heart surgery, and academic profiling. Training is delivered regionally, with each partner centre contributing niche expertise. In 2024, the core team consisted of Dr Patrique Segers (Programme Director), Dr Bart Maesen (Deputy), and Winnie Heijnens (Secretary), in collaboration with Prof. Jos Maessen (Head of Department). The implementation and continued development of the programme take place in close collaboration with all relevant stakeholders, including accredited training institutions, the College of Medical Specialties, the Registration Committee for Medical Specialists, the Federation of Medical Specialists, De Jonge Specialist, involved educators and training groups, the Capacity Body, the Healthcare and Youth Inspectorate, and other parties directly or indirectly contributing to the quality and delivery of cardiothoracic surgery training.

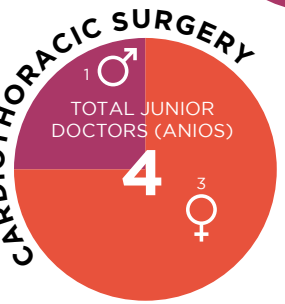
Vascular surgery training is offered in the final two years of the national General Surgery programme and focuses on both open and endovascular techniques. At Maastricht UMC+, this subspecialty phase takes place in the Department of Vascular Surgery and is supervised by Prof. Geert Willem Schurink. The programme includes internships in several other vascular surgical departments, with a focus on open and endovascular procedures, vascular diagnostics, and multidisciplinary collaboration. Upon completion and successful examination, trainees qualify for registration as vascular surgeons. The programme aligns with the national surgical curriculum (SCHERP) and is accredited by the RGS in partnership with the Dutch Association for Surgery (NVvH).

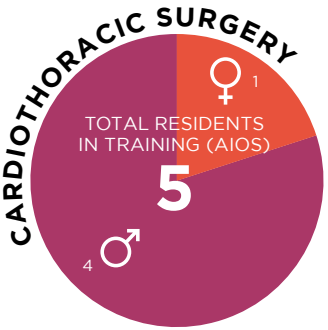
In 2024, the Cardiology, Cardiothoracic Surgery, and Vascular Surgery departments hosted a total of 69 physicians in training. Cardiology had the largest group, with 34 trainees and a near-even gender split. Vascular surgery maintained a balanced team of nine, equally divided between junior doctors and residents. Cardiothoracic surgery counted nine trainees, with more women among junior doctors and more men among residents. Overall, the

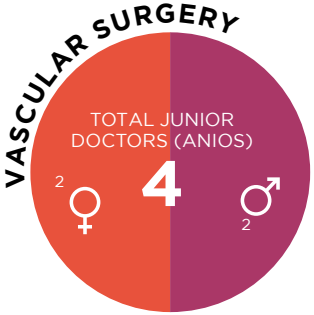
training programmes reflect strong participation and a healthy gender mix.











POSTGRADUATE PROGRAMMES

The expertise of the three divisions is transferred to international colleagues through three clinical postgraduate programmes: CAS-AM (Blood), EVC (Vessels) and DAS-CAM (Heart). CAS-AM (Certificate of Advanced Studies in Antithrombotic Management) is specifically designed for physicians who are active in the management of patients with thromboembolic diseases and have the ambition to improve their knowledge and skills in order to become leading professionals in antithrombotic management. The EVC (European Vascular Course) aims to provide outstanding training and education for specialists in arterial, venous, vascular access and cardiovascular fields. DAS-CAM (Diploma of Advanced Studies in Cardiac Arrhythmia Management) trains future leaders in cardiac electrophysiology by integrating state-of-the-art cardiac arrhythmia management with leadership skills, biostatistics and health technology assessment. All three professional development courses are endorsed by prominent international societies: CAS-AM by the International Society on Thrombosis and Haemostasis (ISTH) and the European Congress on Thrombosis and Haemostasis (ECTH); EVC by the Aortic Association and Vascular International; and DAS-CAM by the European Heart Rhythm Association (EHRA) and the European Society of Cardiology (ESC).

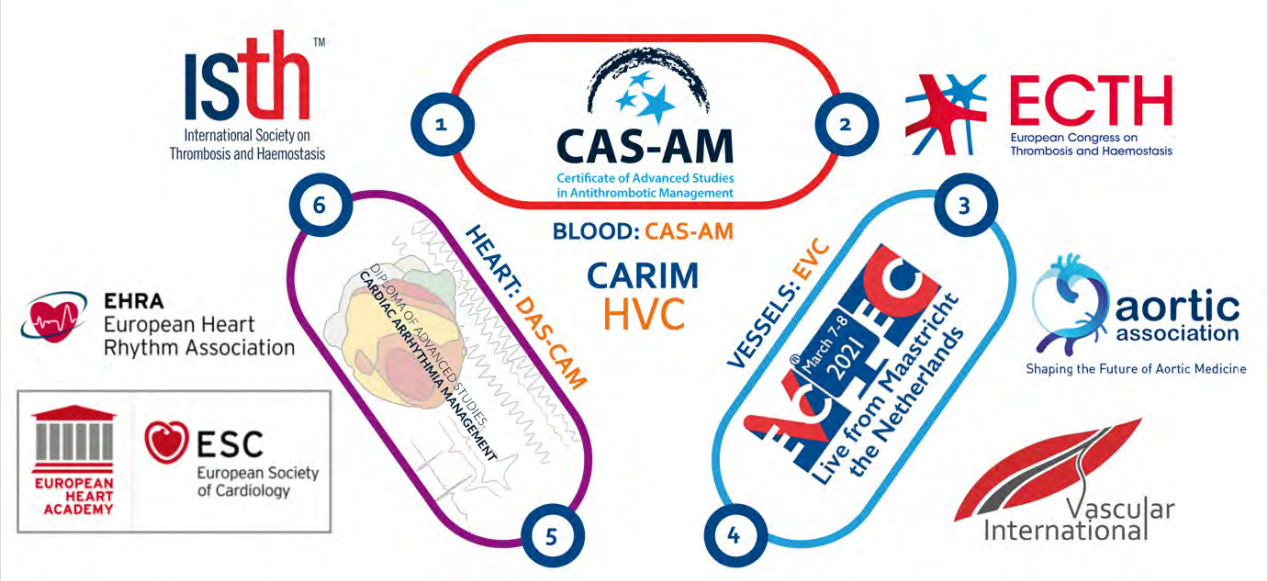


FIGURE CARIM divison structure with professional education.

DISSERTATION PRIZE 2023

The CARIM Dissertation Prize 2023 has been awarded to Dr **Uyên Châu Nguyên** for the thesis 'Multi-modality imaging in Cardiac Resynchronization Therapy: In silico and in vivo analyses'.

Uyên received a double PhD degree, from Maastricht University and from Università della Svizzera Italiana in Lugano, Switzerland. Prior to her PhD she also obtained two Master's degrees, in Technical Medicine at Twente University, Enschede, and in Medicine at Maastricht University. Currently, she is specialising in Cardiology at Maastricht UMC+.

For her PhD studies, Uyen reassessed the value of the electrocardiogram to improve the selection of heart-failure patients who will benefit from cardiac resynchronisation therapy. She also developed a strategy for better positioning of the left-ventricular pacing lead for resynchronisation therapy, based on multimodality imaging. Finally, she investigated the influence of dyssynchrony and subsequent cardiac resynchronisation therapy on local repolarisation patterns and proarrhythmia in the ventricles of the heart. This latter work was the foundation for a project proposal awarded with a Dekker Clinical Scientist grant from the Dutch Heart Foundation.

KNOWLEDGE TRANSFER

CARIM COURSES

From 3 to 7 June, CARIM hosted its annual Course Week, featuring a diverse range of parallel courses covering key aspects of CARIM's research. Alongside the academic programme, a social programme was organised by I'MCARIM, the association for CARIM's PhD candidates.

In 2024, CARIM researchers led two specialised courses: 'Vascular Inflammation and Thrombosis' and 'Drug Discovery and Development'. Approximately 40 PhD candidates participated in these sessions. Additionally, the 'Advanced Microscopy and Vital Imaging' course, open to CARIM+HVC PhD candidates, was organised by the Department of Molecular Cell Biology.

The 'Vascular Inflammation and Thrombosis' course, coordinated by Dr Constance Baaten (Dept of Biochemistry) and Dr Pieter Goossens (Dept of Pathology), aimed to deepen participants' understanding of basic and clinical concepts in vascular biology and thrombosis. The course introduced key (in vitro and in vivo) techniques used in the field, including flow cytometry, animal models, lesion analysis, transcriptomics, and microscopy. Participants also gained hands-on experience with the state-of-the-art facilities of the atherothrombosis cluster, learning how to integrate these technologies into their own research.

The 'Drug Discovery and Development' course, led by Dr Matthijs Blankesteijn and Dr Sébastien Foulquier (Dept of Pharmacology and Toxicology), provided insights into the multidisciplinary field of drug development. Participants

explored the full process of drug discovery, from identifying and validating therapeutic targets to navigating regulatory approval.

In addition to the scientific sessions, CARIM PhD candidates also participated in a workshop on creating an inclusive work environment. The week concluded with a social activity organised by I'M CARIM, fostering connections among researchers in an informal setting.

CARDIOVASCULAR GRAND ROUNDS MAASTRICHT

The Cardiovascular Grand Rounds is a lecture series, organised by CARIM researchers since 2010. In recent years, the scientific organisation has been managed by a broad committee representing the CARIM divisions and the full spectrum from clinical to basic research. Additionally, I'MCARIM plays a vital role in involving younger researchers by promoting lectures and organising workshops with invited speakers. We continue to be excited about offering engaging lectures and featuring excellent speakers.

In 2024, we hosted a total of 21 speakers, including excellent lectures by CARIM researchers and several distinguished guests from international institutions. We are grateful for the financial support provided by the *Stichting ter Bevordering van Cardiovasculair Onderzoek en Onderwijs*.

CARIM SYMPOSIUM 2024

The CARIM annual scientific symposium took place on Wednesday 27 November. The event featured outstanding scientific lectures from our recent laureates, an engaging CARIM+HVC clinical care session, an inspiring keynote by Prof. Hans Bruyninckx on Human Health in Times of Climate Change, and the announcement of the winner of the Harry Crijns Research Grant; Yesim Kaya. As in previous years, a significant portion of the programme was dedicated to a poster session, where CARIM scientists showcased their latest research findings.

This year's traditional Robert Reneman Lecture, held in

honour of the Institute's founding Director, was delivered by Prof. Kalyanam Shivkumar. Prof. Shivkumar received his medical degree from the University of Madras, India in 1991 and his PhD from UCLA in 2000. He completed his cardiology fellowship training at the University of California, after which he joined the University of Iowa, where he also served as the Associate Director of Cardiac Electrophysiology. In 2002, he was recruited back to UCLA to direct the newly created UCLA Cardiac Arrhythmia Centre at the David Geffen School of Medicine. His field of specialisation is interventional cardiac electrophysiology, and he heads a group at UCLA focused on developing innovative techniques for the nonpharmacological management of cardiac arrhythmias. He is currently Professor of Medicine with a joint appointment in the Department of Radiology at UCLA. He is certified by the American Board of Internal Medicine in the subspecialties of Cardiovascular Disease and

Clinical Cardiac Electrophysiology. He is an active member of several professional organisations, including the American Heart Association, American College of Cardiology, and the Heart Rhythm Society.

Finally, the CARIM prizes have been awarded and the CARIM Priori have been drawn by lot. As of January 2025, Lilian Skiba and Bart Spronck have joined the CARIM Executive Board for a one-year term. The following poster presentations have received awards:

- Division Blood: Eda Aydeniz and colleagues - The influence of incremental PEEP trials during electrical impedance tomography (EIT) on right ventricular function in mechanical ventilated patients;
- Division Vessels: Michelle van Oeteren - The influence of incremental PEEP trials during electrical impedance tomography (EIT) on right ventricular function in mechanical ventilated patients;
- Division Heart: Tom Konings - Hemodynamics-driven mathematical model of murmur generation.

OTHER CARIM LECTURES, SEMINARS AND SYMPOSIA 2024

Complementing the Cardiovascular Grand Rounds Maastricht and the CARIM annual scientific symposium, several additional lectures, seminars and conferences were organised by our staff in 2024. Some of them are highlighted below.

The **Cardiorenal Seminars** is a joint lecture series of CARIM and the Institute of Cardiovascular Research (IMCAR) of the University Hospital RWTH Aachen (headed by Prof. Joachim Jankowski) and provides a platform for international top scientists in the fields of vascular biology and nephrology to present their recent work. The lecture series alternates between Aachen and Maastricht. In 2024, four keynote lectures were given by Peter Grant (University of Leeds, 30 January), Conny Gysemans (KU Leuven, 20 June), Yvonne Döring (University Hospital Bern, 28 August) and Nikolaus Marx (University Hospital Aachen, 19 September). In addition, a lecture by Prof. Inge Depoortere from the Gut Peptide Research Lab at the Translational Research Center for Gastrointestinal Disorders (Targid) at the Catholic University Leuven was organised on 2 October in collaboration with the Liver and Friends seminar series.

The **Maastricht Immunology Seminar Series** brings together researchers from Maastricht who are interested in immunology and inflammation. These informal meetings are ideal for expanding local networks, and to share research techniques and experiences. Each seminar features an external speaker and two PhD candidates or postdocs from Maastricht present their research. The meetings are organised by Dr Kristiaan Wouters (Dept of Internal Medicine) and Dr Lotte Wieten (Dept of Transplantation Immunology). The organising committee also includes young researchers from different research institutes: Dr Sabine Daemen (Dept of Internal Medicine), Dr Denise Habets (Dept of Transplantation Immunology), and Dr Marina Mané-Damas (Dept of Psychiatry and Neuropsychology). In 2024, three meetings were held. Invited speakers included Dr Femke van Wijk (UMC Utrecht, Regulatory T-cells), Dr Bieke Broux (Hasselt University (BE), blood brain barrier) and Michal Eikmans (LUMC, reproductive immunology). Local speakers were Ezgi Sengun (Pediatrics), Sarah Chenine (Psychiatry & Neuropsychology), Sébastien Foulquier (Pharmacology & Toxicology), Xiaodi Zhang (Internal Medicine), Sanne Claasen (Pediatrics), Amber Lombardi (Transplantation Immunology), Renée Ysermans (Clinical Immunology), and Elias Wieland (Pathology).

The **Vascular Rounds** is a regional lecture and discussion series organised by the Department of Internal Medicine , offering a platform for clinicians, researchers, and healthcare professionals to engage with current topics in vascular medicine. In 2024, the series addressed diverse and clinically relevant themes, including monoclonal antibodies in cardiovascular care, the vascular relevance of liver disease, challenges in obesity and lifestyle interventions, and disorders of blood pressure regulation during four sessions. The year concluded with the prestigious Peter de Leeuw Lecture, delivered by Prof. Hugo ten Cate on advances in anticoagulation therapy. The sessions also facilitated valuable peer exchange and interdisciplinary networking. The scientific committee of the lecture series include Prof. Bram Kroon, Prof. Roger Rennenberg and Dr Renske Olie.

With a symposium in the St. Janskerk and a farewell lecture in the university's auditorium, Prof. **Michael Jacobs** (Dept of Vascular Surgery), officially bid farewell on 16 April 2024. In recognition of his exceptional contributions to Maastricht UMC+ and its patients, he was honoured with the Maastricht UMC+ Award, the institution's highest distinction, presented by board chair Helen Mertens. The symposium, titled 'Important Perspectives in Healthcare', featured insightful contributions from Prof. Tilman Hackeng, Prof. Barend Mees, and Prof. Geert Willem Schurink. Representatives from The van Grinsven Hospitality Group and Medtronic also offered their perspectives on the evolving landscape of healthcare and the impact of Michael's work.

As part of National Heart Failure Week (22–28 April), HVC once again hosted its annual **Heart Failure Symposium**. The event took place on 22 April and attracted over 100 participants, including colleagues from Maastricht UMC+, regional hospitals, general practitioners, and other healthcare professionals. Heart failure remains a common yet often misunderstood condition. With ongoing advancements in heart failure care, keeping healthcare providers informed about the latest developments is essential. The symposium featured a strong and diverse speaker lineup, covering a range of relevant topics such as the treatment of atrial fibrillation in heart failure patients, updates on TAVI and implementing palliative care pathways in clinical practice.

From 6-8 June 2024, the **Atrial Signals Conference** took place at Hotel Van der Valk in Maastricht. The local hosts, Prof. Kevin Vernooy, Prof. Uli Schotten, Prof. Dominik Linz, Dr Stef Zeemering and Jolanda Gulpen were honoured to organise this conference together with the Karlsruhe team (KIT) and welcome more than 150 guests from all over the world and sponsored by renowned names in the industry. Key-experts shared the newest insights in pathophysiology of atrial tachyarrhythmias and new technology for AF/AT characterisation. Keynote lectures were given by top scientists in their field, Prof. John Camm and Prof. Helmut Pürerfellner. Our young researchers presented their posters during the poster sessions; the competition was so strong that the judges selected four winners instead of three due to the high scores. An evening highlight was a walking dinner in St. Jans church in the heart of Maastricht.

On 1 October, the CARIM workshop '**First Aid with EU Funding'** was hosted by the Grants & Incentives Team in

collaboration with the FHML Research Office. The session provided an overview of the Horizon Europe funding scheme, explored potential funding opportunities, and offered guidance on how to interpret a call text. Participants were also presented with key dos and don'ts for successful funding applications.

In 2024, several newly professors delivered their inaugural lectures, showcasing groundbreaking research in their respective fields. On 1 March, Prof. **Miranda Schram** (Dept of Internal Medicine) presented the lecture *'Zoete inzichten'*. On 15 March, Prof. **Jur ten Berg** (Dept of Cardiology) delivered his inaugural lecture *'Met alleen een hartinterventie ben u er nog niet'*. Finally, on 22 March, Prof. **Ingrid Dijkgraaf** gave her inaugural lecture *'Chemische innovatie door biologische inspiratie'*.


Governance implications (1)


WEDNESDAY 27
Minderbroedersberg 4-6
CARIM SYMPOSIUM 2024
NOVEMBER

CARIM'S DEVELOPMENT PROGRAMME

Early recognition of talent is one of the key strategies of CARIM to coach and prepare gifted young academics for their future academic career. CARIM stimulates and supports talented students and staff by offering grants for research fellowships at each step of their career, be it at Bachelor, Master, postgraduate, PhD or postdoc level. These grants will be enabled through our 'Harry Struijker-Boudier Award for Talented Academics' (HS-BAFTA). The HS-BAFTA programme is intended for three groups of young scientific researchers.

1. HS-BAFTA TALENTED FUTURE PHD CANDIDATES

The fellowship is intended for:

a. Talented Bachelor students in Health, Medicine or Life Sciences, who have demonstrated to be able to combine their studies with an active involvement in scientific research. It can be used to interrupt their study and to perform a research project within CARIM for 6 to 12 months during their Bachelor phase.

b. Talented Master students in Health, Medicine or Life Sciences, who have demonstrated to be able to combine their studies with an active involvement in scientific research. It can be used to interrupt their study and to perform a research project for 6-12 months within CARIM during their Master phase.

c. Talented future PhD candidates in Health, Medicine or Life Sciences, Postgraduates to bridge the time between graduation and the start of an official contract as a PhD candidate within CARIM. The fellowship must start within the first year after graduation and is open to students not yet contracted by or enrolled in a PhD programme.

The fellowship covers the candidate's full salary for 6 to 12 months including bench fee. For Ba/Ma students the regular curriculum should be interrupted to perform the research project within CARIM.

2017 William van Doorn

2018 Jasper Demandt

2019 Mohamed Kassem

2020 Anne-Marije Hulshof, Yentl Brandt

2021 Daniek Meijs

2022 Peter Deissler

2023 Daria Majcher, Yesim Kaya

2. HS-BAFTA TALENTED PHD CANDIDATES

The fellowship is meant to support PhD candidates who want to spend time abroad during their PhD in order to gain experience and improve their chances in receiving a personal grant (i.e. Rubicon; Veni; Dr E. Dekker) after their PhD. The fellowship amounts up to 6 months supplemental living allowance per month and travel costs.

2018 Mueez Aizaz, Jens Posma

2019 Federica de Majo, Cengiz Akbulut, Walid Chayoua, Rogier Veltrop, Valeria Lo Coco, Rob Holtackers

2020 Stefan Reinhold, Anouk Geraets, Job Verdonschot, Raquel Videira, Jorik Simons, Anne Willers

2021 Kim Maasen, Job Stoks, Jordi Kocken, Renée Tillie, Rachel van der Velden

2022 Jerremy Weerts, Shaiv Parikh, Mitch Ramaekers, Deepak Balamurali, Vanessa Bröker, Bob Knapen, Maurits Sikking

2023 Aaron Iding, Eline Berends, Ellen Denessen

2024 Femke de Vries, Pim Bouwmans, Floor Pinckaers, Elias Wieland, Anouk Achten, Guiliana Lezzoche, Juul Bierens

3. HS-BAFTA TALENTED POSTDOCS

The fellowship is intended for recently graduated CARIM PhD candidates. The fellowship is meant to keep top CARIM talents connected to our institute by giving the opportunity to go abroad, thereby establishing international cultural and scientific exchange and gaining the experience required for acquiring personal grants. Therefore, a main requirement for this fellowship is that approximately 9 months (max. 12) shall be spent at a partner institute outside the Netherlands to acquire (further) foreign experience and strengthen the international network of the candidate and PI(s) involved. The fellowship covers the candidate's full salary for 12 months including bench fee. The candidate should use this year for setting up international collaborations and writing a proposal for a postdoc position (i.e. Rubicon; Veni; Dr E. Dekker) and will be judged on his intentions of performing research of this grant from within CARIM. The ultimate goals are either to acquire or increase international research experience, to broaden the laureate's professional network, and to enhance chances of obtaining prestigious grants in order to strengthen the personal and professional ties to Maastricht University and specifically CARIM.

2016 Stijn Agten

2017 Robin Verjans

2018 Mitchel Bijnen

2020 Federica de Majo

2021 Jens Posma

2022 Mohamed Kassem

2023 Amée Buziau

2024 Victor Gonçalves Marques

HS-BAFTA winners 2024.

ROBERT RENEMAN LECTURE

The Robert Reneman Lecture takes place during the annual CARIM Scientific Symposium, and is named in honour of the founding Scientific Director of CARIM. The Robert Reneman Lecture is given by a renowned scientist in the field of cardiovascular diseases and is awarded with a bronze sculpture of Caius Spronken.

1993	M. Verstraete	Leuven, Belgium
1994	J. Sixma	Utrecht, NL
1995	P. Vanhoutte	Courbevoie, France
1996	W. Schaper	Bad Neuheum, Germany
1997	P. Davies	Philadelphia, USA
1998	M. Pfeffer	Boston, USA
1999	Y. Nemerson	New York, USA
2000	V. Fuster	New York, USA
2001	M. Schneider	Houston, USA
2002	F. Rosendaal	Leiden, NL
2003	A. Zeiher	Frankfurt, Germany
2004	P. Poole-Wilson	London, UK
2005	D. Wagner	Boston, USA
2006	S. Wickline	St. Louis, USA
2007	J. Molkentin	Cincinnati, USA
2008	B. Furie	Boston, USA
2009	K. Walsh	Boston, USA
2010	J. Lusis	Los Angeles, USA
2011	W. Ouwehand	Cambridge, UK
2012	D. Kass	Baltimore, USA
2013	J. Yudkin	London, UK
2014	P. Reitsma	Leiden, NL
2015	S. Hatem	Paris, France
2016	S. Laurent	Paris, France
2017	J. Griffin	San Diego, USA
2018	M. Giacca	Trieste, Italy
2019	V. Ramachandran	Boston, USA
2020	H. Büller	Amsterdam, NL
2021	B. Casadei	Oxford, UK
2022	P. Stenvinkel	Stockholm, Sweden
2023	M. Cushman	Vermont, USA
2024	K. Shivkumar	Los Angeles, USA

PROFESSORSHIPS

HEIN WELLENS VISITING PROFESSORSHIP

The Hein Wellens Visiting Professorship is endowed by the St. Annadal foundation to stimulate clinical research in the field of cardiovascular disease. The purpose of this chair is to give renowned scientists the opportunity to teach and apply their knowledge at CARIM.

The chair is named after Prof. Hein Wellens (1935-2020), a Dutch cardiologist who is considered to be one of the founding fathers of the cardiology subspecialty of clinical cardiac electrophysiology. From 1978 until 2002, Prof. Wellens held a chair at Maastricht University as Professor and Head of the Department of Cardiology.

2004 - 2005	J. Narula	Irvine, USA
2007 - 2008	M. Krucoff	Durham, USA
2008 - 2010	Y. Rudy	St. Louis, USA
2010 - 2011	R. Kim	Durham, USA
2011 - 2013	K. Mayo	Minneapolis, USA
2013 - 2014	M. Stoll	Münster, Germany
2016 - 2017	A. Zaza	Milano, Italy
2020 - 2023	Th. Münzel	Mainz, Germany

CARIM+HVC CHAIR

The programme is founded and funded by the CARIM together with the HVC and aims at strengthening the translational cardiovascular axis.

2020 - 2025	C. Hughes	University of California at Irvine

STICHTING TER BEVORDERING VAN CARDIOVASCULAR ONDERZOEK EN ONDERWIJS

2020	P. Kirchhof	University Heart and Vascular Center UKE Hamburg
2022 - 2023	P. Stenvinkel	Karolinska Institute Stockholm, Sweden

SINT ANNADAL FOUNDATION

2014 - 2019	J. Hoorntje

CARIM COMMITMENT AWARD

In 2015, the CARIM Executive Board introduced the CARIM Commitment Award. This Commitment Award is intended for any CARIM member who has devoted his or her heart and soul to CARIM in an exceptional way, be it on an academic, managerial, service or community level. The award consists of a bronze coin by the sculptor Marina van der Kooi (www.marinavanderkooi.nl) and an exclusive restaurant dinner voucher for two. In 2024, the CARIM Commitment award was presented to Prof. Marc Hemmelder for his unwavering commitment to the continuation of The Maastricht Study, and for restoring and accelerating cardiovascular research within the Dept of Internal Medicine and the Centre for Chronic Disease. He was recognised for his exceptional ability to bring people together in calm perseverance.

CARIM COMMITMENT AWARD LAUREATES

2015	Rob van der Zander
2016	Frits Prinzen
2017	Peter Leenders, Agnieszka Brouns-Strzelecka, Nicole Bitsch, Helma van Essen, Jacques Debets (Muroidean Facility)
2018	Koen Reesink
2019	Kristiaan Wouters; Tara de Koster
2020	Carla van der Kallen; Harry Crijns
2021	Stella Thomassen
2022	Myrthe van der Bruggen, Renée Tillie, Valeria Saar-Kovrov, Kim Maasen, Adele Ruder (I'MCARIM); Marc van Bilsen
2023	Sandrine Seyen
2024	Marc Hemmelder

I'MCARIM 2024

I'MCARIM 2024

I'MCARIM is a committee formed by a group of enthusiastic PhD candidates who represent all PhD candidates at CARIM. We organise social and networking activities and provide input to improve the PhD programme, while advising the CARIM Executive Board and Faculty Board on PhD-related issues.

During the last year, I'MCARIM continued to work to reinforce the social cohesion within the CARIM PhD community. Even though the COVID pandemic and restrictions already lie three years behind us, we still feel that social life within the university has not been completely restored.

Therefore, the goal of every event we organise is to facilitate the connections between PhD candidates of different departments, research fields and nationalities. Furthermore, we have recognised that we could provide more input to the committees we are part of, with the aim of improving the wellbeing of CARIM PhDs. To this end, we have assigned clear roles to all I'MCARIM members, making sure that all aspects of our initiative are suitably covered.

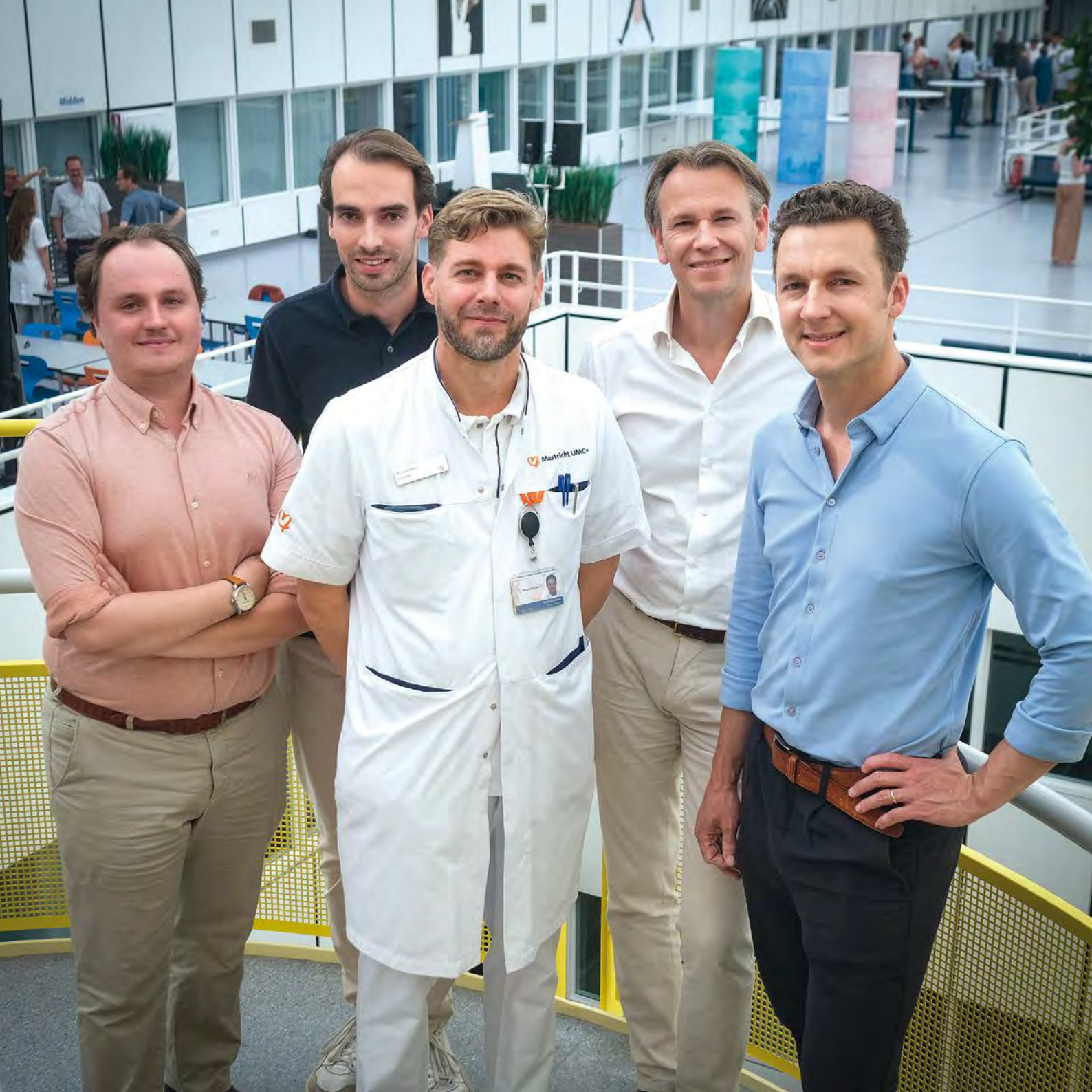
In 2024 we started a new adventure during the CARIM Course Week. We organised an escape room-type activity, where we had to try and escape from a prison island, split up into teams made up of all the PhD candidates who participated in the CARIM Course Week. We organised many workshops and started our first (certainly not last) pub quiz in collaboration with the monthly CARIM café. We organised printing workshops and assigned two confidential advisors specifically for CARIM, in the hope that this will enable CARIM PhDs to talk about some issues in the safest way possible.

To help CARIM PhD candidates find their career path post-PhD, we have again organised our yearly Career Event in collaboration with the NUTRIM PhD council. This time, in organising the Career Event, we took the liberty to showcase even more career options outside academia. We also collaborated with the D&I (Diversity and Inclusivity) committee to organise the first Diversity and Inclusivity Workshop during the CARIM Course Week, which aimed to shed light on the daily struggles faced by all PhDs. Continuing our initiative from 2023, we once again assembled a CARIM running team, which took part in several running events in 2024, such as *Maastricht's Mooiste* and the Campus Run.

In addition to all the fun, we also identified multiple issues and had to intervene to bring them up, first with the CARIM Education programme committee and later with the faculty-wide programme committee. Some of the issues we identified included the lack of access by external PhDs and CSC scholarship PhDs to the Microsoft software and the lack of access to mental health support provided by the university. Furthermore, we also drew attention to important UM-wide gaps such as the lack of clarity about the *cum laude* awarding procedure.

We are excited to keep moving forward and further improve our initiatives to improve PhD candidates' wellbeing.

I'MCARIM 2024
Margarita Pencheva
Minke Rijpkema
Lisa den Brok
Stan Muitjens
Rita Chamoun
Sophie van de Walle
Eduardo Zancanaro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Mastricht UMC+

HIGHLIGHT
DIVISION HEART

TIM VAN LOON AND JOHAN VAN KOLL

Accelerating the translational pathway to improve clinical care: The code-to-clinic collaboration

Heart failure with preserved ejection fraction (HFpEF) is increasingly prevalent, particularly in older adults with multiple comorbidities. It is expected to become the dominant phenotype of heart failure in the near future [1,2]. Despite this growing burden, available therapies provide only modest clinical benefit. While pharmacological developments, such as the SGLT2 inhibitors, have shown promise [3–5], their impact on quality of life and hospitalisation rates remains limited. This underscores the need for targeted treatment options to improve clinical care.

One emerging strategy is cardiac pacing. Traditionally indicated for bradycardia and conduction disorders, pacing is now being investigated as a potential therapy in HFpEF. The myPACE trial [6] demonstrated that heart rate acceleration in HFpEF patients with an existing pacemaker system reduced atrial fibrillation burden, improved quality of life, favorable changes in biomarkers, and increased physical activity, compared to standard lower rate programming. These findings suggest that pacing could play a therapeutic role in HFpEF, but also raise key questions: Which patients benefit most? What are the optimal pacing strategies?

At Maastricht, we aim to address this challenge by means of a close collaboration between HVC and the Division Heart of CARIM. This collaboration builds on a long-standing shared philosophy of 'innovative translation of cell-to-bedside knowledge on arrhythmia and heart failure mechanisms,' and extends it using computational modelling. In this collaboration, simulations are iteratively improved using clinical data, while clinical protocols are guided by model-based mechanistic predictions, forming a continuous and iterative code-to-clinic and clinic-to-code loop.

HEART RATE ACCELERATION IN HFPEF

Recent research at Maastricht UMC+ investigated the physiological mechanisms underlying the previously reported clinical benefits in HFpEF of heart rate acceleration. In particular, we hypothesised that heart rate acceleration might reduce left atrial pressure (LAP) and/or atrial fibrillation in patients with HFpEF, potentially contributing to symptom relief.

We explored this using the CircAdapt computational model [7], developed at the Department of Biomedical Engineering.

Grounded in well-established physics and cardiovascular physiology, simulations of virtual HFpEF patients predicted that moderate heart rate increases could lower LAP by reducing the stroke volume needed to maintain systemic flow. This, in turn, decreased left ventricular end-diastolic pressure, a key contributor to elevated filling pressures in HFpEF. At higher heart rates, however, the benefit diminished due to reduced diastolic filling time, leading to incomplete ventricular relaxation and a rise in filling pressures to maintain flow (Figure 1, right).

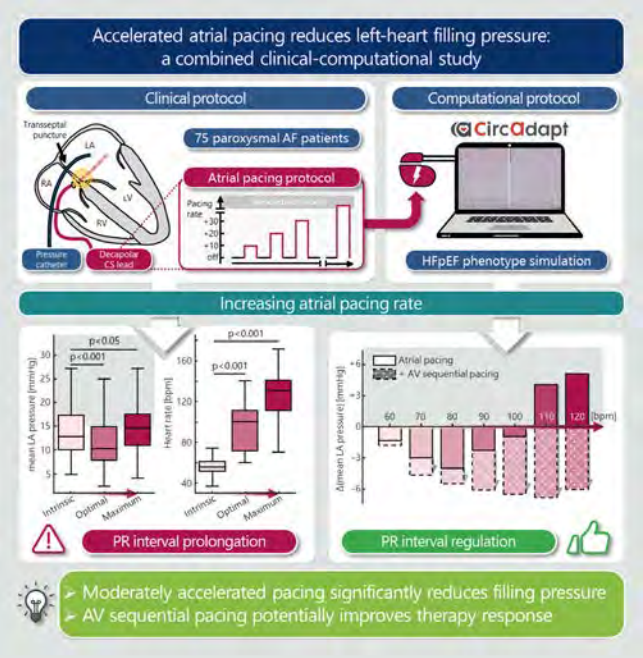

FIGURE 1 Schematic overview of the combined clinical and computational protocol. Left atrial pressure was measured during stepwise atrial pacing via a CS lead near the septum, with pacing increased in 10 bpm increments up to Wenckebach. The optimal rate was defined as the step with the lowest mean LAP. Complementary CircAdapt simulations representing a HFpEF phenotype reproduced the observed haemodynamic pattern and demonstrated that rate-adaptive AV-sequential pacing could further reduce LAP by preserving atrial contribution to ventricular filling at higher rates.

To test these model predictions, we initiated an invasive haemodynamic study conducted during accelerated atrial pacing, in patients undergoing pulmonary vein isolation at Maastricht UMC+. The first cases showed results as hypothesised, and the trend remained consistent across the cohort. In total, we evaluated 75 patients, many with HFpEF characteristics. Moderate rate acceleration significantly reduced LAP by −2.3 ± 1.4 mmHg ($p<0.001$), from a baseline value of 12.8 [10.0–17.4] mmHg. However, at higher pacing rates (130 [110–140] bpm), LAP increased again, often exceeding baseline values (14.7 [11.0–17.6] mmHg, $p<0.05$) (Figure 1, left). These changes were accompanied by progressive atrioventricular delay prolongation (PR interval from 153 ± 20 ms at baseline to 228 ± 34 ms at moderate pacing, and 280 ± 45 ms at higher rates, both $p<0.001$). At these elevated rates, a sharp atrial pressure peak was also observed (Figure 2).

ATRIOVENTRICULAR TIMING IS KEY

The unexpected rise in LAP at higher pacing rates, coupled with PR prolongation, prompted a further mechanistic study using CircAdapt. Simulations of AV-sequential pacing showed that PR prolongation caused atrial contraction to occur during early ventricular relaxation, leading to reduced ventricular filling. In contrast, rate-adaptive AV-delays preserved the contribution of atrial contraction to ventricular filling and sustained LAP reduction even at higher rates. The

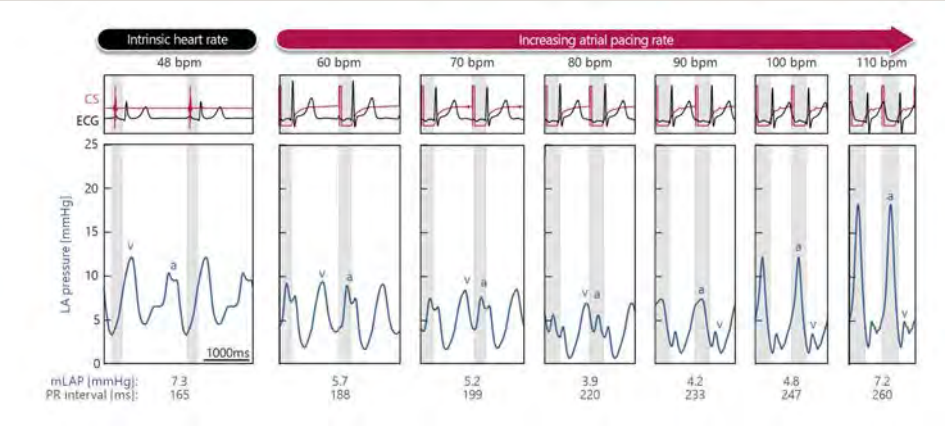

FIGURE 2 Patient example of the acute haemodynamic effects of accelerated atrial pacing. (Top row) Coronary sinus and electrocardiogram, and (second row) left atrial pressure recordings from a representative patient, with the shaded areas indicating PR interval. A-wave annotation indicates left atrial systole, as guided by the pacing spike detected on the coronary sinus catheter.

model also predicted that AV-delay should shorten, not lengthen, with increasing heart rates, highlighting a potential target for therapy optimisation (Figure 1, dashed bars).

This joint computational and clinical effort, recently published in the European Heart Journal [8], exemplifies how interdisciplinary CARIM+HVC collaboration can uncover underlying mechanisms and guide innovation in cardiovascular care.

A SHARED PACE FOR PROGRESS

Based on these findings, we are launching, in collaboration with Medtronic, a prospective clinical trial: RAPID-HFpEF (NL-009754). This is the first in-human trial investigating whether personalised AV-sequential pacing can improve haemodynamics and symptoms in HFpEF patients without a traditional pacemaker indication. Designed around model-guided hypotheses and validated in invasive clinical studies, RAPID-HFpEF will test whether rate-adaptive AV sequential conduction system pacing can reduce pulmonary capillary wedge pressure in HFpEF, more than atrial pacing alone.

What sets this study apart is its combination of mechanistic insights from multiple perspectives and close inter-disciplinary collaboration. The protocol brings together insights from computational modelling, clinical physiology and translational research by Division Heart researchers. Acute haemodynamic responses and long-term outcomes, such as quality of life, biomarkers, echocardiography, and physical activity, will form the key clinical endpoints. In turn, these data will feed into subsequent simulations, enabling continued improvements.

We believe that this is a clear example of how the CARIM+HVC collaboration brings together clinical and preclinical research. By going back and forth between code and clinic, we aim to better understand cardiovascular diseases and find novel ways to improve patient care.

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HIGHLIGHT DIVISION HEART

INTERVIEW

PAUL MENDEZ

Turning back time

With the current trend towards globalisation, postdoc Paul Mendez did not think that working abroad would make a great difference. “But it does”, he says after his first six months of working in the Netherlands. Despite what his surname suggests, he did not come from the other side of the world. Having been granted a CARIM Postdoctoral Fellowship, he came from Berlin to work for four years in Maastricht, studying vascular rejuvenation in Judith Sluimer’s group.

Although Paul Mendez bears his mother's surname, he was born and raised in Berlin, Germany. He studied biotechnology there and did a PhD project at Freie Universität Berlin on the impact of physical forces on cells; mechanobiology. He delved deep into the DNA, to find out, for example, if certain transcription factors are activated during the development of atherosclerosis. "At the end of my PhD project, Leif Ludwig gave a lecture at the university about a newly developed protocol which used single-cell sequencing to track cells, by profiling mitochondrial DNA, which has quite a high mutation rate. It's particularly in complex tissues, where all types of cells are located close together, that you want to unmix this 'soup', and that's what the protocol does. The lab I was working at had no experience with this sophisticated technique, so I approached Leif Ludwig." Just as Judith Sluimer did around the same time.

MUTATION RATE

Paul was especially interested in applying Leif Ludwig's technique to complex atherosclerotic tissue. "With this technique, you can track cells; it's like building a family tree of cells, called cellular lineage tracing. This is a huge topic in research at the moment, and it's also interesting to link this to atherosclerosis. This disease is also known for its frequent cell type switches. Endothelial cells become similar to muscle cells, for example, and that contributes to the disease in the end." Paul had a limited understanding of atherosclerosis and processing human plaques for research purposes, but he found a great helper in Judith while he was working as a guest scientist at Ludwig's lab near the end of his PhD project. "We thought it would be a nice opportunity as a next career step for me to do a postdoc with her in Maastricht, and now I'm here."

INDEPENDENCE

The CARIM Postdoctoral Fellowship he was awarded is a four-year grant that covers his salary plus a bench fee. "That's very nice, because it gives me the independence to set up my own experiments but also to visit international conferences for example." Although he did not think working abroad would be so different from doing science in Germany, especially since he crossed only one border, he has to admit he was wrong about that. "You need to adapt on a personal level, but the labs also have different ways of thinking, publishing a paper and so on. And for me, the hospital environment here in Maastricht is amazing. We get a phone call from the clinic when they're doing surgery, inviting us to collect atherosclerotic plaques. We go one floor down with a bucket of ice, get it and process it one floor up. Plus the cooperation between medical surgeons and researchers is extremely good and efficient."

FIBROBLASTS

At Maastricht, in Judith's lab, he focuses on fibroblasts which are located in the outermost layer of the blood vessel wall and on their contribution to atherosclerosis and vascular ageing. They produce molecules that give structure to a blood vessel. "Recent data suggest that there might be a lot of communication from the outer to the inner part of the vessel wall, and the hypothesis is that fibroblasts dictate disease emergence in this way. Fibroblasts have been detected in atherosclerotic plaques, which is unexpected since they reside in the outer layer of the blood vessel wall. We know they have the potential to change into a different type of cell, and that's where my experience with lineage tracing might provide added value."

DISTANT HORIZON

So the question is: how do cells evolve? If they turn into a different type of cell, is this beneficial or detrimental for the disease outcome? If it is detrimental, can we block it? “On the very distant horizon, we envision that it will be possible to block the factors that contribute to vascular ageing. If you age, your vessels change their mechanical properties, and these properties still interest me a lot. We know the environment around cells makes a huge difference in how they evolve. On glass, stem cells become bone cells, but on a softer plate, they become muscle cells, and on a very soft underground even neuronal cells. At the MERLN institute in Maastricht, they have a lot of experience with manufacturing gels of different degrees of stiffness.” Paul wants to try out if aged cells can develop into younger versions by putting them on a softer substrate. “I also want to do this with fibroblasts.”

RECENT DATA SUGGEST THAT THERE MIGHT BE A LOT OF COMMUNICATION FROM THE OUTER TO THE INNER PART OF THE VESSEL WALL

FUTURE

He did not come to Maastricht alone: his wife and three-months-old daughter came with him. “It was more difficult than I had expected to find a place to live, but we managed to find a house with a garden at fifteen minutes’ cycling from the university. In Berlin, I commuted for one hour, even though we lived in the city centre.” The four-year grant also gives him some freedom for the obligatory grant writing that is so dominant in many scientific careers. Of course, he will have to find new funding in the end. Regarding this uncertain future, he is realistic: “You need to have at least part of your mind accepting that there is another path outside of science. I don’t think I will be without work if funding stops; I can be passionate about a lot of things. But I’m most inspired by progress. When I read a paper about elegantly designed science and nice research questions, I’m fascinated by how smart people are. Being part of this scientific community really fuels my passion.”

BEYOND LAB & CLINIC: SOCIETAL OUTREACH

06

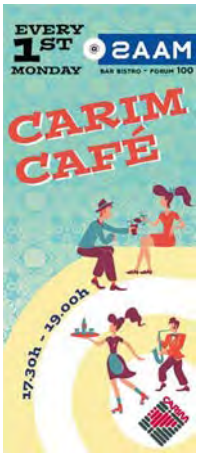
CARIM+HVC actively engage in a variety of public outreach activities aimed at promoting health and advancing cardiovascular research. A key highlight is the **annual 'Walk, Cycle, and Swim with Your Doctor'** series, organised by HFL. These events bring together patients, healthcare professionals, and the general public to participate in physical activities while fostering informal, meaningful conversations with doctors. Proceeds from these events directly support cardiovascular research at Maastricht UMC+ and its partner hospitals.

The year 2024 saw several successful editions of these events:

- On 9 March, the inaugural **'Zwem met je Dokter'** (Swim with Your Doctor) took place, where heart and vascular patients swam alongside vascular surgeons, general practitioners, and other healthcare professionals to raise funds for cardiovascular research.
- On 13 June, the second edition of **'Fiets met je Dokter'** (Cycle with Your Doctor) was held, promoting a healthy and active lifestyle through a community cycling event. The ride brought together doctors, patients, and cycling enthusiasts in a fun and inspiring atmosphere.
- On 29 September, the 16th edition of **'Loop met je Dokter'** (Walk with Your Doctor) took place, organised in partnership with Zuyderland, and regional general practitioners. This walking event offers patients a unique, informal setting where doctors lead by example, emphasising the importance of a healthy lifestyle. Several CARIM+HVC members served as team captains during the event.

Together, these initiatives raised a total of more than k€ 65 in 2024, which will fund cutting-edge cardiovascular research and contribute to improving patient outcomes. In close collaboration with HFL, CARIM+HVC researchers also contribute to **RESCAR**, an initiative dedicated to funding innovative cardiovascular studies at Maastricht UMC+. RESCAR plays a vital role in advancing scientific knowledge and hosts an annual patient congress to share research progress, effectively bridging the gap between science and patient care.

On 9 June, a group of CARIM+HVC researchers participated in the running event **Maastricht's Mooiste**. The CARIM team competed in either the 5 km, 10 km or 10 EM race.



Every first Monday of the month, CARIM organises the social event **'CARIM Café'** in SAAM. All CARIM employees are warmly invited to this speakeasy-style gathering, to enjoy gossip and the gentle disruption of scientific innovation, all accompanied by the pleasant comforts of drinks and snacks.

On 19 June, **Yesim Kaya** and Dr **Matthijs Cluitmans**, appeared on the television programme ***Jekels Jacht***. In this episode, presenter Diederik Jekel explored the Dutch invention of the electrocardiogram (ECG), commonly known as a 'heart film', developed by Willem Einthoven. Yesim and Matthijs provided insights into the innovative ECGI method, which is based on this original invention.

On 13 October, CARIM+HVC celebrated **World Thrombosis Day** for the 11th time, in collaboration with Vitala+. This edition focused on inspiring lectures and discussions on recognition and risk factors of thrombosis. Prof. Tilman Hackeng gave an engaging presentation, followed by Dr Kristien Winckers, vascular internist, and Annisa Aarts, physician-researcher at the Thrombosis Expertise Center. Their contributions made this edition a great success, with scientific insights and new developments in the field of thrombosis taking centre stage.

On 22 September, a CARIM+HVC team consisting of **Boy Houben, Eline Berends, Lisa den Brok, Paul Kruithof, Betsie Limmen, Michelle van Oeteren, Koen Reesink** and **Philippe Vangrieken,** participated in the '**Prominentenroeien**', organised by MWC Maastricht (*Maastrichtsche Watersportclub*). The CARIM+HVC crew competed in a traditional lifeboat race, where precise rhythm and coordination among team members were essential to maintaining pace and direction.

Rowing in perfect synchrony, the team advanced steadily toward a common objective, and achieved a remarkable victory. Beyond the success of the race, the event also had a charitable dimension: a significant amount was raised in support of Maas Cleanup, an initiative dedicated to protecting and restoring the Maas River by removing waste and raising environmental awareness.

On 12 November 2024, CARIM+HVC offered free **CPR training sessions** as part of World Restart a Heart Day. A total of 180 participants from Maastricht and the surrounding region took part in the initiative, learning how to recognise cardiac arrest, use an automated external defibrillator (AED), and perform CPR which are crucial skills that can help save lives. Civilian responders play a vital role in increasing survival rates after cardiac arrest by starting resuscitation before emergency services arrive. By doing so, they directly contribute to saving lives in their community. The event was initiated by Dr **Jerremy Weerts** and Dr **Ankie Hamaekers** and was made possible through a strong collaboration between Maastricht UMC+, HVC, Keep the Heartbeat Going, Taskforce QRS Maastricht, *Hart en vaat onderzoekfonds Limburg*, the Reanimation Relay Limburg, *Stichting Kloppend Hart voor Limburg*, and *Stichting Boeken voor Mensen*.

To close out 2024 on a joyful note, CARIM+HVC invited all colleagues to a festive **end-of-year celebration** on 12 December, at the historic Sint-Janskerk in Maastricht. This gathering was our way of thanking everyone for their hard work and dedication throughout the year. It was wonderful to raise a glass together in celebration of our shared accomplishments in 2024, and to look forward with optimism to what 2025 will bring.

INTERVIEW

TARA DE KOSTER

Tara is running (ITNs)

She started twelve years ago as secretary to CARIM's Scientific Director, and has since developed into an all-rounder. "I couldn't possibly think of one job description that would cover everything I do now", says Tara de Koster. She is one of the longest-serving members of CARIM's office staff, and her colleagues thought that was sufficient reason to have her interviewed for the annual report. "It wasn't my idea", she sighs, though with a smile. She'd rather just be doing her work. And going for runs of course, lots of runs.

"Goodness, we've actually talked for three quarters of an hour, I wasn't expecting that", says Tara at the end of the interview. "Beforehand, I didn't think I had much of interest to tell." Earlier during the interview, she had told me that at one stage she had thought about becoming a journalist herself. That is why she chose to study Arts & Culture at Maastricht University and did a work placement at the regional newspaper. "But I felt I lacked the practical skills to go out there as a journalist; it would involve too much stress for me. Nowadays I'm far more interested in nature than in culture; in hindsight, I'm the worst cultural scientist ever", she laughs. "To me, that illustrates mostly how little you know about yourself when at a young age you have to pick a subject to study."

COORDINATOR

After graduating, she found a temporary secretarial job at the office of the university's Executive Board. "First I was filling in for someone on maternity leave, and then had a similar job at one of the faculties. One thing led to another, and so I ended up at CARIM in 2013." If she had continued to perform the same secretarial job for all those years, she would probably have looked for something else at some stage, but her job became ever more captivating. "And I was given lots of space to develop myself in fields that interested me." One major challenge came up for her after just four years: for the first time, CARIM was asked to coordinate an "Innovative Training Network" (ITN) of the European Commission. The aim of these projects is to train young researchers and promote European collaboration between universities and businesses. "At that time, we didn't know exactly what being the coordinator entailed, and the initial idea was to appoint a postdoc to manage the project. But we were soon faced with a reality check; almost from the start we had to do all kinds of things and that's how I got involved."

FOR DUTCH

RED TAPE

During this first project (called INTRICARE) Tara often felt she was playing catch-up as a project manager. "There are so many rules you have to stick to, you really have to familiarise yourself with them." By now, the second and third ITNs (now called Doctoral Network or DN) under her management are up and running, entitled MINDSHIFT and PRAETORIAN. She feels she has developed a smooth routine for this task. "I organise and support meetings, draw up the estimate and all kinds of agreements, arrange the communication and generally take care of all the bureaucratic red tape to go by all the rules." And the trips to participating universities abroad are the icing on the cake for her. "I love having lots of variety in how I spend my working days, even though this makes it harder to explain to an outsider what exactly my job entails."

DIVERSITY

For example, she is also a member of the working group on Diversity, Inclusivity & Social Safety which CARIM set up some years ago. "We're aiming for greater awareness of this topic, followed by a culture shift, in small steps." The aim is for the working group to be representative of CARIM, but it currently consists of two women: Tara and Judith Cosemans. She herself can see the humour in that. "Of course we're hoping to get at least one man to join, but it's not an easy topic and it means additional work on days that are already packed to the brim. But I find it important, so I'm happy to use this occasion to draw everyone's attention to it."

RUNNING

Since she became a mother almost four years ago, she has been working four days a week. She goes for runs four times a week, usually on her own. “It clears my mind and helps me to focus on the here and now, on this particular stretch of road. It gives me energy and I love spending time outdoors.” She sometimes joins events and then uses an app to train herself to achieve a particular distance. “I will shortly be doing a trail run, which means running off-road, in the nearby village of Gulpen. That’s 30 kilometres on pretty hilly terrain; I’m hoping to do it in 3.5 hours max, but you never can tell.” In 2024 she did a marathon again, in Monschau. “I was well-trained, but after 25 kilometres my hip started playing up. There was still a long way to go to the finish line. Fortunately, my brother-in-law was running along with me, and my sisters were there to encourage me. And the surrounding landscape was beautiful. All that helps you to keep going.” After the summer, her daughter will be entering primary school, so Tara will have some more time to herself. “Maybe I’ll then start to run longer distances again more often.”

FACTS AND FIGURES

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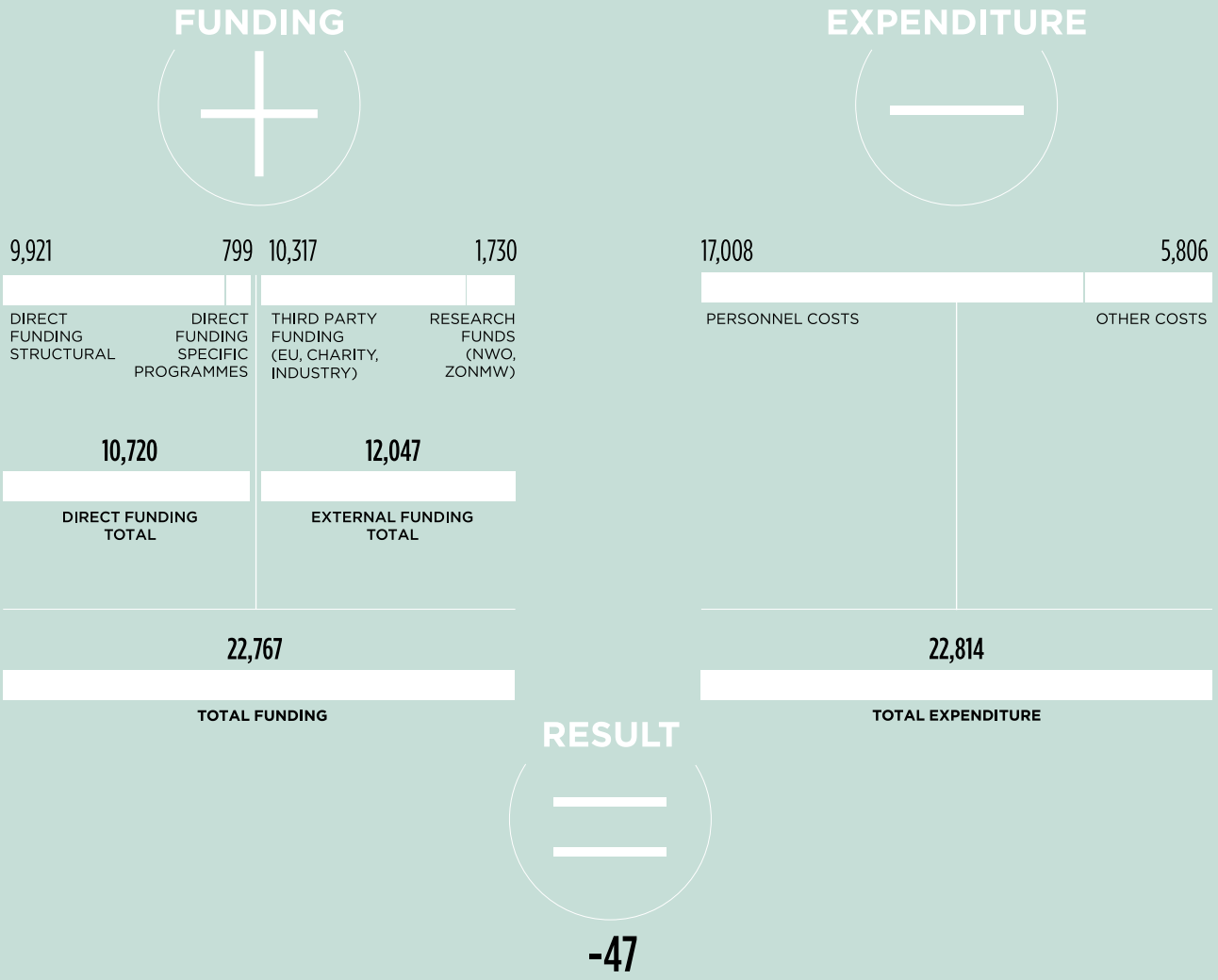
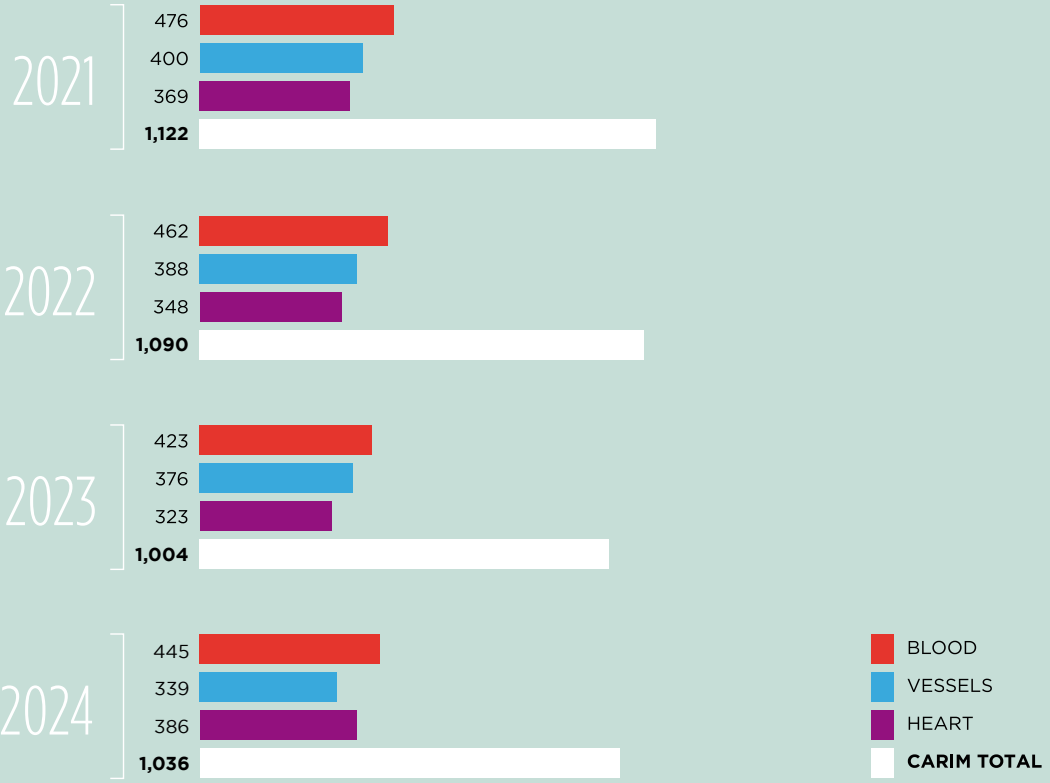
FUNDING AND EXPENDITURE (K€) AT INSTITUTE LEVEL 2024



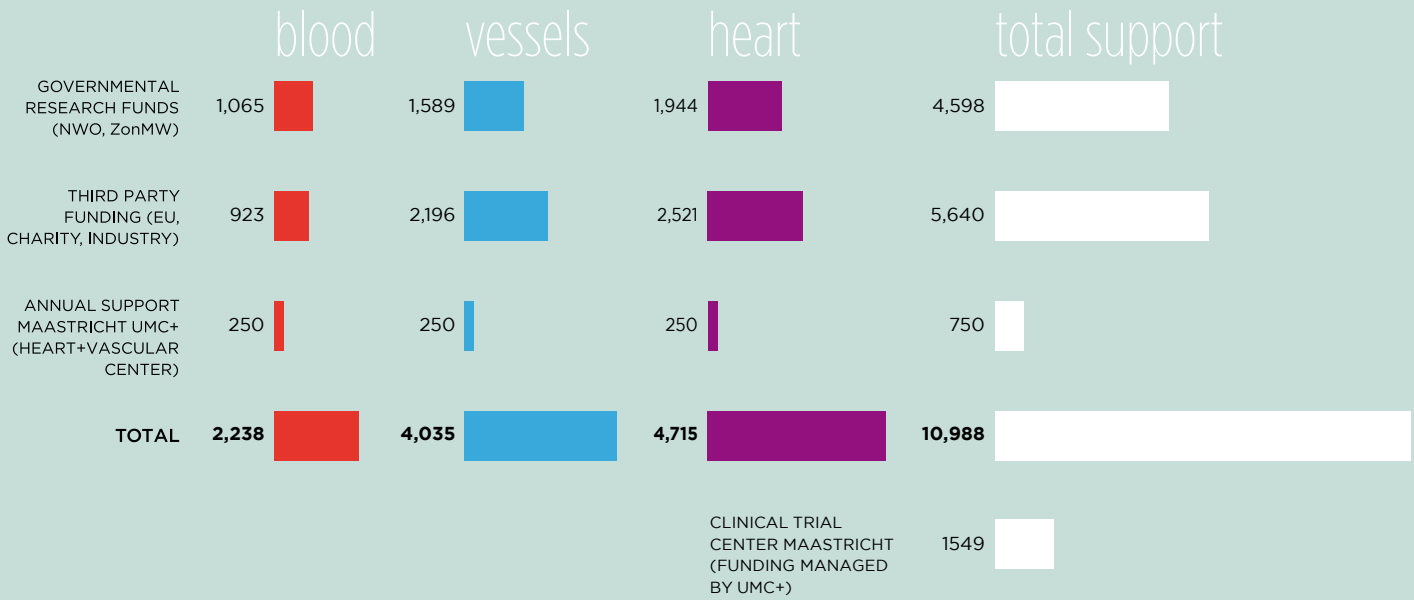
RESEARCH OUTPUT IN 2024

SCI JOURNAL ARTICLES

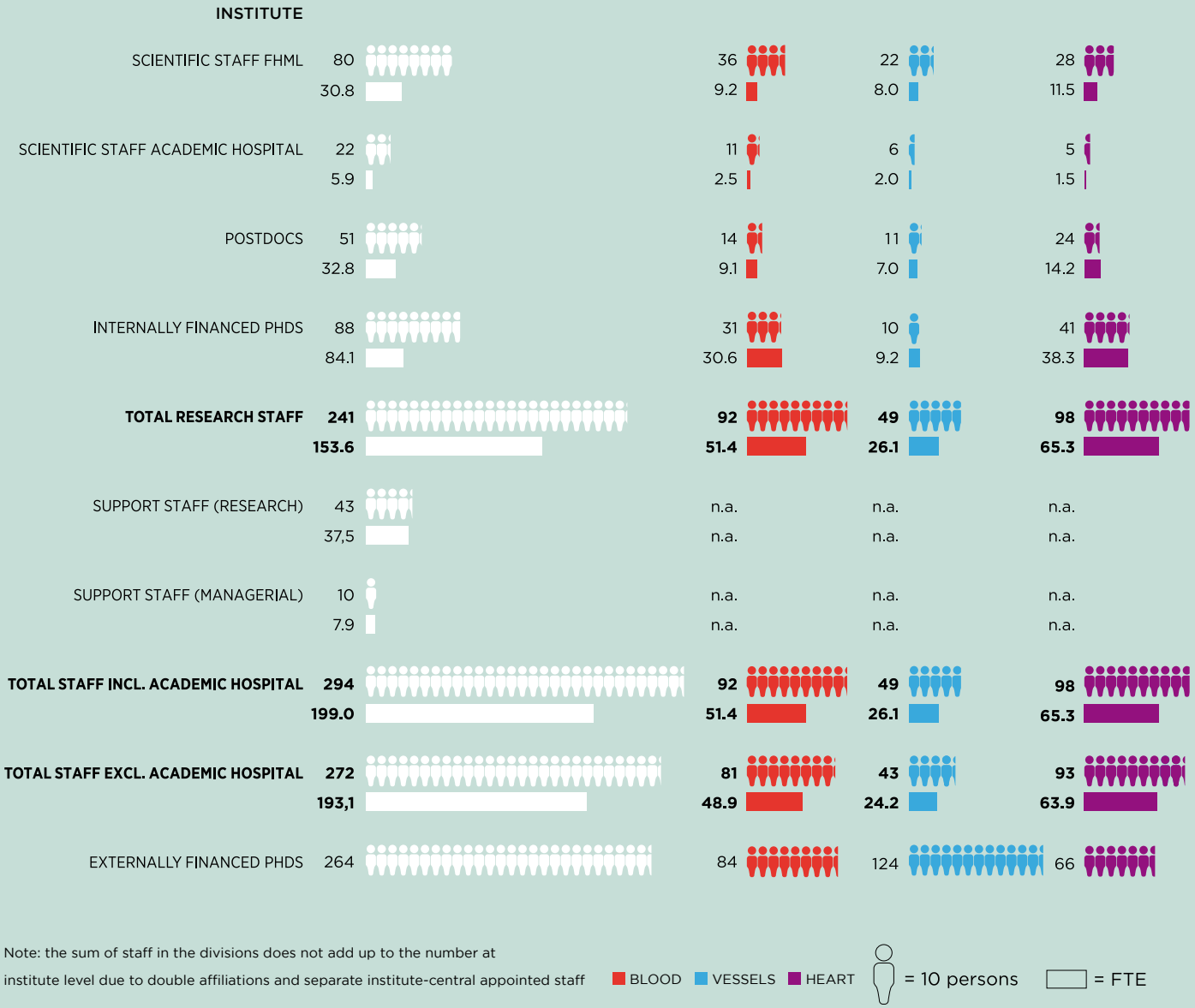


Note: the sum of publications in the divisions exceeds the total number of publications at Institutional level due to double counting of publications with authors from different divisions.

NEW CONTRACTS AND GRANTS (K€) CONCLUDED IN 2024



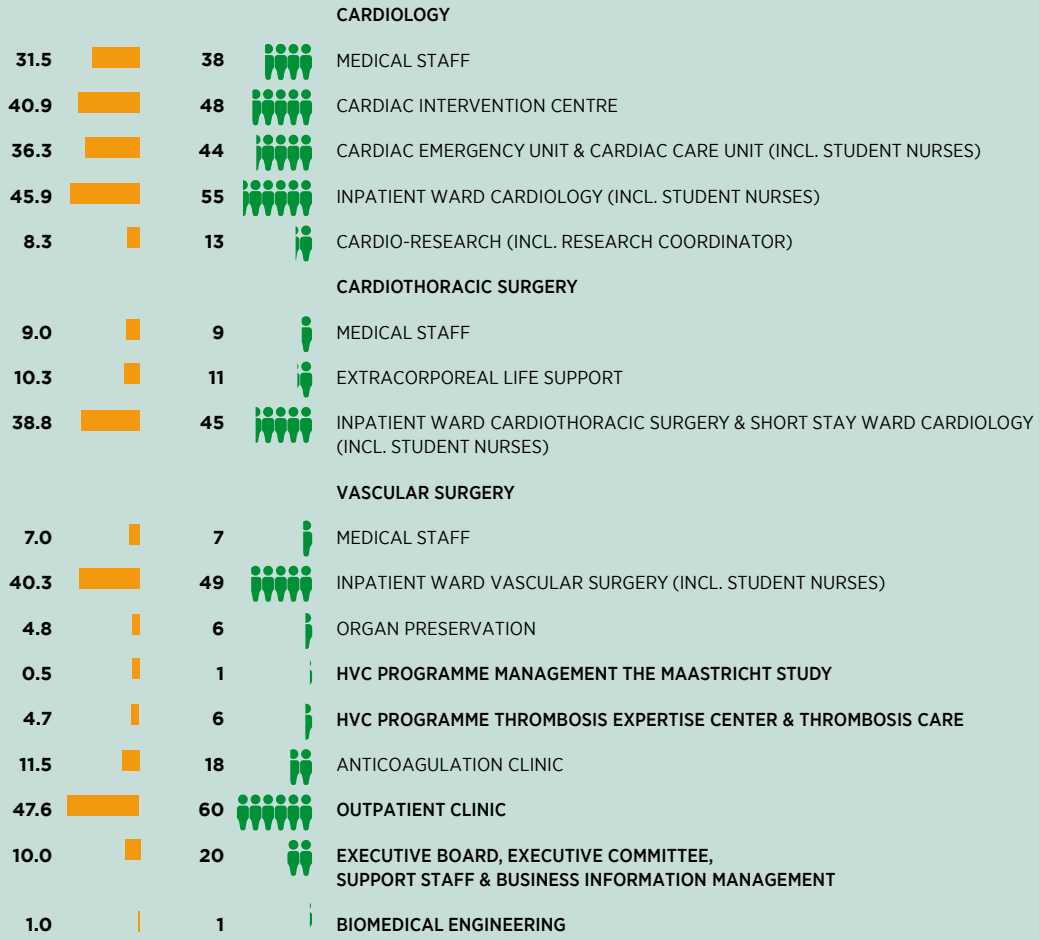
CARIM STAFF 2024



Note: the sum of staff in the divisions does not add up to the number at institute level due to double affiliations and separate institute-central appointed staff

BLOOD VESSELS HEART = 10 persons = FTE

HVC STAFF 2024



Note: This overview excludes AIOSs, ANIOSs, and staff not employed directly by Maastricht UMC+

= 10 persons = FTE

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K3

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