

Amsterdam
Movement
Sciences



Amsterdam Movement Sciences

Annual Report 2019

Amsterdam Movement Sciences

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A bird's-eye view of 2019 and a bit beyond



Director
Dr Richard Jaspers



Director
Professor Mario Maas

How can we conquer osteoarthritis? What therapies are the best to cure former IC patients? What kind of movement can contribute to healthy ageing? These issues of great societal impact are some of the research questions researchers of Amsterdam Movement Sciences grapple with, and which you can read more about in this Annual Report. .

A lot happened within Amsterdam Movement Sciences in 2019, and we would especially like to highlight the re-accreditation as an IOC accredited research centre of excellence, and as a NOC*NSF preferred research partner. This is a very exclusive club as there are only 11 of these in the whole world, and we are proud to have these outstanding researchers in our midst.

Another highlight of 2019 was the AMS annual meeting, which again drew a good crowd of enthusiastic researchers, in the field of movement research. This is an excellent event to expand the network on movement research and to find new collaboration partners. As we look back to the start in 2017, we have come a long way with our institute. Our final main happening in 2019 was the reorganization of the research programs, as you can read about further on in the annual report. The reason for the new structure was that the initial three programs had some overlap and were seen as too broad, and together with the underlying research themes, the organization was too complex. We used 2019 to rethink the organization and are happy to announce that the five new research programs

Sports, Musculoskeletal Health, Tissue Function & Regeneration, Ageing & Vitality and Rehabilitation & Development, not only give AMS a distinct flavor, but also easily embed the existing expert- and knowledge centers that allied with the institute. The new research programs were presented during the well visited AMS Summer Meeting in June 2019. You can read more about the research programs further up in the report and meet the new program directors and deputy directors.

As this is written, it is medio 2020 and the first director (and key mover and shaker) of AMS, professor Frans Nollet has stepped down. He led the institute from its first beginnings in the Movement Sciences Working Group in 2016 through to the first unofficial self-assessment in 2019. During that time, and much to his credit, the institute has become a powerful entity in the field of movement research in the Amsterdam area and far beyond. As Richard Jaspers PhD. takes over the baton, both current directors are grateful to professor Nollet for his immense contribution over the first period, and vow to carry the torch further and light the way in the field of movement research.

We are proud to share with you our highlights of 2019 with you. Should you have any comments or suggestions, please feel free to get in touch. Keep on Moving!

Research Programs

As initially mentioned in the introduction, the AMS research programs were restructured in 2019. The restructuring was done after a round of meetings with senior members, which laid bare that the initial programs were seen as too broad, and not fully encompassing the existing expert- and knowledge centers that are allied with the institute. The new programs each has their own director and program board, which sets out the priorities and deliverables of the five research programs. Together with the two directors, the program directors make up the AMS Management Team.

We are proud to announce the five new programs and their directors below.

Sports

Sufficient physical activity, through sports participation is necessary to reduce the burden of non-communicable diseases and to maintain economic viability, and as such is a fundament for public health. In addition, optimization of performance is key for recreational and elite sports, as well as talent development. Unfortunately, participation in physical activities and sports entails a risk for adverse health effects (injury and/or illness) that threaten sustainability. The research program deals with a variety of research questions, starting at a fundamental level, through to the optimization of performance, development of multidisciplinary clinical treatment and training guidelines, through to the short and long term behavioural and objective effects of interventions.



Director: **professor Evert Verhagen**, Amsterdam UMC, location AMC, and deputy-director **professor Geert Savelsbergh**, Faculty of Behavioural and Movement Sciences, VU Amsterdam.

Musculoskeletal Health

Musculoskeletal conditions affect people across the life-course in all regions of the world. The prevalence of musculoskeletal conditions increases with age, but also affect younger people. In the 2016. the 'Global Burden of Disease' (GBD) study showed that musculoskeletal conditions were the second highest contributor to global disability, and lower back pain remained the single leading cause of disability since it was first measured in 1990. While the prevalence of musculoskeletal conditions



of methods to accurately diagnose and track the progression of the disorders, diagnosis and prognosis of declines in physical performance, and finally the efficacy, (cost-)effectiveness of existing and novel interventions.

Director: **professor Raymond Ostelo** Faculty of Science, VU Amsterdam, and deputy-director **dr Idsart Kingma**, Faculty of Behavioural and Movement Sciences, VU Amsterdam.

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Tissue Function & Regeneration

The increased life expectancy in western society results in an increasing population suffering from chronic diseases, concomitant with reduced physical activity. This is associated with injury, wounds, and loss of bone and muscle tissue and strength. In addition, (traumatic) injuries in sports and after accidents are increasingly common. Detrimental effects of injury, chronic disease, and ageing on musculoskeletal tissues result from an impaired ability of muscle, bone, and skin cells to proliferate and differentiate. Successful regeneration and/or adaptation of muscle, tendon, bone, cartilage and skin requires optimal cellular conditions, both systemically by biochemical changes in the circulation that alter the niche of the cells, as well as locally at the cellular level. Cellular functioning is critically determined by the niche stiffness and architecture, availability of nutrients, oxygen concentration, as well as the presence or absence of signaling molecules such as growth factors, cytokines, and/or steroids. This research program integrates various approaches to decipher physicochemical conditions to modulate cellular



varies by age and diagnosis, 20% to 33% of people across the globe live with a painful musculoskeletal condition. The research in this program addresses the various mechanisms underlying the development of musculoskeletal disorders, the development

signaling and promote vital musculature and bone. The aim is to develop and combine (new) techniques to investigate musculoskeletal and skin tissue regeneration at different biological length scales, either isolated or integrated in a two-dimensional (2D) or 3D environment. The members of the program encompass a wide range of researchers, from clinicians to physiotherapists, basic scientists, and private partners.

Director: The initial director was dr Richard Jaspers, but as he was appointed director of AMS, he was succeeded by **dr Nathalie Bravenboer**, Amsterdam UMC, location Vumc, and deputy-director **dr Marco Helder**, both Amsterdam UMC, location VUmc.

Ageing & Vitality

This research program centers on how physiological and pathological ageing is accompanied by a decline on structural, functional and activity levels. Muscle mass, strength and power, bone density, joint flexibility, physical endurance, cardiovascular and respiratory function, sensory acuity, as well as balance performance deteriorate with ageing and age-related diseases. In addition, age-related cognitive changes that affect mobility comprise decline of attention, central information processing and executive function. These effects can increase the risk of mobility problems and lead to loss in physical functioning, such as for example gait function and activities of daily living. The program aims to unravel the mechanisms of ageing and pathology on mobility and physical functioning, to obtain insight into mechanistic, predictive and limiting factors for mobility and possibly into targets for intervention.



Director: **Professor Mirjam Pijnappels**, Faculty of Behavioural and Movement Sciences, VU and deputy-director **dr Carel Meskers**, Amsterdam UMC, location VUmc.

Rehabilitation & Development

This research program includes all translational research addressing optimization of mobility and physical performance of disabling disorders affecting the locomotor functions and brain, for both children and adults. These are the typical rehabilitation target populations, including intensive care unit and diabetic foot disease populations. The research addresses the biological mechanisms underlying declines in physical performance and the effect of interventions preventing/reducing these declines; diagnosis and prediction of declines in physical performance and the underlying impairments and finally the efficacy and (cost-) effectiveness of interventions to prevent/reduce declines in physical performance.



Director: **Dr Sicco Bus**, Amsterdam UMC, location AMC, and deputy-director **dr Erwin van Wegen**, Amsterdam UMC, location VUmc.

- **Professor Mirjam Pijnappels**, VU Amsterdam,
- **Dr Sicco Bus**, Amsterdam UMC, location AMC,
- **Dr Erwin van Wegen**, Amsterdam UMC, location VUmc,
- **Dr Lynn Bar-On**, Amsterdam UMC, location VUmc, / **dr Eric Voorn**, Amsterdam UMC, location AMC,
- **Wouter Schallig**, Amsterdam UMC, location VUmc.

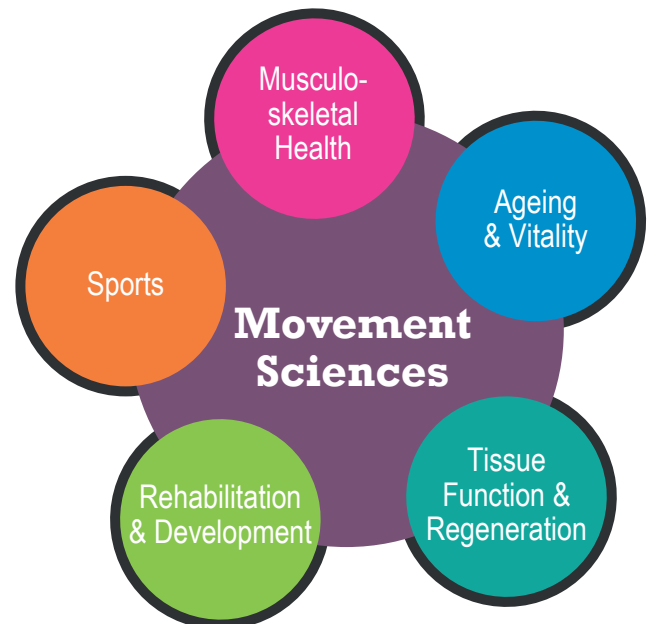
AMS Office

In support of the directors and the MT, there is a small office, including a communications and social media expert, that ensures the smooth running of the day-to-day activities of the research institute.

AMS Management Team (MT)

After the reorganization of the research programs, the MT was made up of the two AMS directors, the research program directors, an ECR and a PhD representative.

- **Professor Frans Nollet** (director AMS), Amsterdam UMC, location AMC,
- **Professor Mario Maas** (director AMS), Amsterdam UMC, location AMC,
- **Professor Evert Verhagen**, Amsterdam UMC, location VUmc,
- **Professor Raymond Ostelo**, Amsterdam UMC, location VUmc / VU Amsterdam,
- **Dr Nathalie Bravenboer**, Amsterdam UMC, location VUmc, / **dr Richard Jaspers**, VU Amsterdam







Interviews

***“Within
30-40 years,
Osteoarthritis
will be
history”***



Gino Kerkhoffs, Professor and Head of Department
of Orthopedics, Amsterdam UMC

Together with a team of sports physicians, radiologists, movement scientists and physiotherapists, Professor Kerkhoffs has set up a center of expertise for the continuous improvement of care for injured (top) athletes. The Academic Center of Evidence based Sports medicine (ACES) stands for a combination of integrated diagnostics, tailor-made treatment and high quality rehabilitation protocols with a longitudinal monitoring of all results to optimize the outcome. The research focusses on primary (surgical) preventive interventions for the treatment of joint disorders of the lower extremity (i.e. the legs), with a focus on ankle cartilage injuries and sports injuries.

Does movement matter?

'Keeping people in motion brings health gains in all areas. The importance of sports and exercise within society is growing, as sports is becoming an increasingly important aspect of life.

The understanding that exercise contributes to the prevention and treatment of numerous diseases is becoming more and more evident.

At our department we have a major role in keeping the athletes and the people of the Netherlands healthy, starting from primary prevention of injuries, to mental health, and further on to the prevention of osteoarthritis. Sports can also cause damage to the musculoskeletal system, such as joint wear and tear. If you can eliminate this and are able to position the muscles optimally and prevent cartilage damage, you can create optimal conditions to benefit movement. With better cushioning of a joint, you can prevent cartilage damage or osteoarthritis, even before it really starts. In this way, movement is healthy, without any side effects.

Preventing the overload and inflammation of the joint, that's what it's all about.'

How can you prevent osteoarthritis?

'Cartilage research is what we are good at, as is seen in a nice cross-pollination collaboration between Theo Smit (professor of Translational Regenerative Medicine, Amsterdam UMC, location AMC) and a company that deals with body materials, including cartilage substitutes. We hope that cartilage damage can be prevented in the future. This prevention was primarily thought off for top athletes, as well as for people with excess weight, or with such low muscle function that they put too much strain on the joints at an early stage. However, the preventive intervention seems interesting for the whole population in motion. In people who already have some osteoarthritis, we aim to slow down the process so that eventually hip or knee replacements become superfluous. Our aim is that osteoarthritis will be eradicated in 30 to 40 years time. It is therefore a primary, preventative task of great societal impact. After all, osteoarthritis is considered one of the most common diseases of our time. The cartilage of the ankle expands to cartilage of all the other joints. We see a lot of patients with ankle disorders, and the model can easily be transposed. The same goes for the muscles, there are a lot of muscle injuries that limit movement abilities, albeit often to a lesser extent than with disorders of the cartilage.'

How important is the mental aspect in the healing process?

'I think it is important to consider the whole person in the healing process, certainly also the

mental aspects. While longitudinal evidence about any causal relationship is lacking, the suggested relationship between sports career-related concussion and mental health symptoms in former elite athletes warrants the development of support measures for elite athletes transitioning out of sports. Especially for those with a history of concussion. What effect did it have on Dutch international Van Basten when he had to stop playing soccer? If you can't do what you like best anymore, in all the roles you have, you are limited. He is the former best player of the world. The Drake Football Study will measure a range of variables across cardiovascular, musculoskeletal, cognitive and mental health, but will also track players over at least 10 years, thus hopefully filling the gaps in knowledge around the onset and progression of several health conditions associated with a career in football'.

Does research collaboration make a difference?

'We joined forces even before the official merger between AMC and VUmc back in 2015. The collaboration gives synergy: $1 + 1 = 3$. The bundling of research on prevention and treatment of sports injuries from the partners at VUmc and AMC is a highlight in recent times in the Netherlands. This spontaneous collaboration led to an official accreditation as one of ten International Olympic Committee Research Centers for the protection of the Athlete's health, chaired by professor Evert Verhagen from VUmc and myself. Our team also hosts a number of Team NL's clinical preferred partner positions with professor of Radiology Mario Maas, cardiologist Harald Jørstad, Simon Goedegebuure and Niels Wijne from Sports

medicine and myself in Orthopedics. The Sports medicine research in our center is in great hands with Hans Tol, who was recently appointed as the first professor of Sports Medicine at Amsterdam UMC and leads a talented team of sports medicine researchers. This bundling of expertise provides many more starting points, in addition to what was always there as part of AMS. We are able to work together with several disciplines to address the matter. I'm very keen on this multidisciplinary approach, because it provides the cross links that strengthen the foundation of our research and very important it is more valuable, powerful and above all more fun to work as a team'.

***“We aim
for a holistic
approach”***



Evert Verhagen, professor of Epidemiology of sport,
physical activity and health



‘The research we do are studies that touch on current issues that play a role in sport. Teun van Erpen, for example, has obtained a PhD on cycling and cyclists’ load. Many more people ride bicycle than in the past, for the sake of public health cycling is a healthy way to move. But what cycling does to you and how your body reacts to it is important. These are important lessons on the health side.

The dissertation of Nici Prien, a German PhD candidate, on the long-term effects of injuries in women’s football, was also innovative. A lot of research has been done on men’s soccer but little on women’s soccer, which is completely different. What does heading a ball do in the long term? It was assumed that this would be bad for the brain, but it turns out not to be so. Osteoarthritis of the hip, on the other hand, is a big problem, from which long-term complaints can remain. We try to support researchers from abroad because we are very much looking for the connection, we are stronger together than alone. It helps us to look at problems in other ways. Fifteen of our researchers now come from abroad, which is very insightful. They go back with much more baggage. They have worked with a number of well-known names, which gives them credibility and in the long term they will benefit a lot because they have been given new ideas and methods of working.

Injuries in disabled athletes: an urgent matter

Another important development in 2019 was obtaining a grant from ZonMw for research into injuries in disabled athletes, the TIPAS study. In that

study we are going to combine a number of things. A stimulating collaboration between VUmc, VU, InHolland, CASA, and AISS, from fundamental to clinicians. Disabled athletes may have an even greater need to exercise and almost nothing is known about the injuries these people sustain and what we can do about them. It is difficult for athletes to determine their resilience. This project provides insight into the physical and mental resilience of athletes for both the athlete and the coach. In this way they can, for example, adjust training sessions to prevent injuries. An important target group, we also encourage these people to exercise more and more.

Sports participation, injury prevention and performance improvement

The research proposal **Citius Altius Sanius** (Faster, Higher, Healthier) with an amount of 4 million euros, was granted by NWO Applied and Technical Sciences. The project is a collaboration of eight universities and academic hospitals and six Universities of Applied Sciences which will collaborate in the project with NOC*NSF, more than twenty companies, multiple sports associations, sports teams, sports physicians and sports physiotherapy practices. It is about promoting sports participation, injury prevention and performance improvement, at both amateur and elite sports levels. This is done by feedback of information to the athlete through sensor and data science technology and smart feedback equipment based on psychological knowledge to influence behaviour. Think, for example, of a 24/7 monitoring system that gives runners insight into the optimal load of their training and the best sports moment on a day or during the week, so that injuries can be

prevented. PhD candidate Ton Leenen focuses on overhead sports, baseball and tennis, *Breaking the High Load*, and how we can provide insight into how the shoulder moves, so we can give more targeted advice to the individual athlete. After all, the leitmotif is broad-based sports and public health.

We also work intensively with **AISS**, the Amsterdam Institute of Sport Science. This offers unique opportunities to investigate the added value of sport and exercise in all its facets and to give the results back to society. A network in which practice is represented, so that knowledge is embedded in practice and vice versa. In this way we want the research facilities of AMS to be more in line with the practice-oriented side of AISS. We will then have everything combined under one roof and will be able to include this in our projects and studies. We do not look at a stamp but at the whole picture.

Bring research results to the field

We are working on interesting projects with smart people. We raise a lot of grant money but those results should not only appear in renowned journals but also be brought to the field: the individual and recreational athlete or the soccer player. There is already a good push towards implementation but there is still a way to go. We need to create a context in which we give people the tools to use our evidence. Also, in elite sport we can learn a lot from each other. I don't see much change in terms of research content in the near future, but we do need to get much closer to sports practice, which we are going to involve much more in what we do and why we do it. We will also involve machine learning, artificial intelligence, among other things; we will

have to look at sports related issues much more holistically.

The athlete and his knee

I sometimes let people look at an anatomical picture of a knee and then I ask, what are you missing? People then look: cruciate ligaments are still attached etc... but the most important thing is the athlete, who is connected to the knee, who has thoughts, feelings, pain, a busy life. It turns out that the holistic approach we try to pursue is appreciated. For example, we have an IOC accreditation as Research Centre of excellence, we are only 11 in the world. We are NOC*NSF preferred research partner. Organisations like our holistic approach and see the benefit. That makes our approach unique!

“Multi-disciplinary research has great potential in improving care for patients”



Raymond Ostelo, Professor of Evidence-Based Physiotherapy, Amsterdam UMC, location VUmc & VU. Director of the Musculoskeletal Health Research Program



‘Because of AMS it’s easier to get in touch with other researchers as you learn about each other’s research topics and methodologies. Therefore, you are more aware of what everybody is involved in. For

example, in 2019 we organized a seminar with a large turnout on various methods of measuring physical functioning in musculoskeletal health. Limitations in physical functioning are important to consider, both in healthy as well as in diseased populations. It is related to decreased quality of life, increased risk of disability, falls and fractures, depression and health care costs. In this meeting various modes of assessment of physical functioning were presented and discussed in the context of ageing and different patient populations. It was interesting to see how laboratory-based researchers look differently at the measurement methods used in large-scale population-based, epidemiological studies. Although some lab-based measurements may be more accurate, they are not necessarily more valid in patients, or it may simply be impossible to use those measurement methods in large population-based studies where patients are recruited across the country. Nevertheless, this discussion made some people aware that it may be worthwhile to think about those methods and on how they could be

applied in, for example, a selection of patients who participate in large scale studies. The main message was that these different methods used to measure physical functioning are complementary. One method is not better than the other.

Interdisciplinary coaching intervention

Another great example of collaborative research is a project by **Marika van der Leeden** (Rehabilitation Medicine, Amsterdam UMC, location VUmc) for which she received a wonderful grant. In her project, entitled: '**Optimizing Physical Recovery During and After Hospitalization**' technology-based methods for measuring physical functioning are applied in patient-based research. The aim is to integrate personalized advices and coaching on movement and nutrition in order to optimally support functional recovery of patients after lung or gastrointestinal cancer surgery. This project was not only funded because of its scientific quality but also for its highly interdisciplinary character. This is a good example of a collaborative project within AMS. It also illustrates how AMS can stimulate early and mid-career researchers through these grants.

Overall screening patients

In the future, I would like to see that our research will move towards true multidisciplinary research, integrating both basic sciences and clinical sciences. This, for example, will enable us to screen patients with musculoskeletal injuries from a real bio-psychosocial perspective. Until now, one could argue, psychologists look at psychological variables, the biomechanics at biochemical variables, etc. If we start to truly integrate these different perspectives,

we might, at the end of the day, be able to better match the right therapy to the right patient. So far this has not been too successful. Aiming for a true bio-psycho-social model, in which you try to map all kinds of biological and psychological variables plus all kinds of disease characteristics, but also all kinds of variables that we haven't thought of so far, such as for example heart rhythm. This has the potential to identify variables that could be used to match the right therapy to the right patient. So, in my opinion, multidisciplinary research has great potential in improving care for patients. As a consequence, care might become true multidisciplinary care, as different skills should be combined to optimally treat patients. In this type of care, a physiotherapist, for example, can or should collaborate more closely with other health care providers such as the general practitioner, the occupational therapist or the primary care-based psychologist. As a result, physiotherapeutic care goes beyond (simple) exercise advice'.

Societal Impact



Sicco Bus

Dr Sicco Bus (Amsterdam UMC, location AMC), was nominated for the Amsterdam UMC Societal Impact Award 2019. A total of six (Amsterdam UMC, location AMC and VUmc) candidates were nominated for this prestigious prize that is given annually by fellow Amsterdam UMC employees. He was nominated for his work on lower extremity biomechanics and injury prevention in diabetes and neuromuscular populations. Sicco Bus and colleague dr Jaap van Netten are members of the Prevention and Offloading working group of the International Working Group Diabetic Foot, which in 2019 published several new and updated clinical guidelines on the Prevention of Foot ulcers in Diabetes and well as new international guidelines on the offloading of diabetic foot ulcers. Finally, in a year full of Diabetic Foot activities, Dr Bus was on the organizing committee of the International Symposium Diabetic Foot, 22-25 May 2019, in the Hague, the Netherlands.



Netflix Research Documentary about GaitLab

The Netflix documentary series *Babies* (series part 1, sixth episode *First Steps*) feature the research led by dr Nadia Dominici at the BabyGaitLab housed at VU Amsterdam. The series present the research on the emergence of walking in children by measuring muscle activity, brain activity (not shown in the series) and limb position in space. During the episode, Nadia explains the context of the research and a snapshot is shown of how the children are being recorded in the lab. The documentary was recorded in 2019 and shows both neonates and toddlers walking. The main aim of the research in the BabyGaitLab is to explain the emergence of walking in children from the initial steps by neonates to independent walking.

Universiteit van Nederland

In 2019 dr Richard Jaspers gave a lecture for the 'Universiteit van Nederland', on how the muscles of each and every individual are adapted to their own background, and why someone with a bundle of muscles may not be the best person to complete a marathon. The lectures are available on You Tube (11,000 views), and as podcasts on iTunes and Spotify.

Klokhuis Wetenschapsprijs

Professor Sue Gibbs was nominated for the Klokhuis (a Dutch public broadcasting children's television programme) wetenschapsprijs 2019. Professor Gibbs was nominated together with early career researcher Maaïke Waasdorp, for their research project *Does saliva help with burn injuries?* The project was nominated for being one of the most interesting and relevant scientific studies for children aged 9 – 12.

Nederlands CP register goes live

After thorough preparation, the Netherlands Cerebral Palsy register went live in February 2019, with the registration of the first patient. The initial inclusion of patients started in Amsterdam UMC, location VUmc, and soon the other four participating centres followed. With this register the available expertise on CP will increase and more children will benefit from the tailored care that is available. Professor Annemieke Buizer, Amsterdam UMC, location VUmc is the coordinator of the Netherlands CP Expertise Center.

Science Museum Amsterdam

Dr Katinka van der Kooij (VU Amsterdam and member of Amsterdam Young Academy) as part of the Science Live programme at NEMO Science Museum, used VR to look into the efficacy of praise on children and how it affects their motor behaviour, a short summary of the experiment can be found on YouTube.

CASA (Centrum voor Aangepast Sporten Amsterdam)

This center for para-sports / disability sports is a collaboration between READE Amsterdam and the Faculty of Behaviour and Movement Sciences, VU Amsterdam. Professor Thomas Janssen (VU Amsterdam) is one of the key AMS researchers associated with the center. The centre bundles scientific expertise on movement and disability sports with up to date know-how and technology on disability elite and grassroots sports. Athletes on all levels use the center and the expertise it offers to optimize their training and thus their personal best.

Children in the VR Movement Lab

At the Virtual Reality (VR) movement lab in Amsterdam UMC, location VUmc, children with cerebral palsy have since fall 2019 been tested on their walking capacity and oxygen intake whilst walking. Children with CP are often exhausted during a walk, and in the VR lab their walking pattern as well as their oxygen intake is monitored on the VR catwalk to register any changes in movement, muscle use and oxygen intake.



"Lieve mensen, het is 4 november en nacht. Zojuist heb ik alweer het eerste #vuurwerk #slachtoffer geopereerd", zo begint de tweet van plastisch chirurg Paul van Zuijlen. Binnen korte tijd kreeg de tweet veel aandacht van voor- én tegenstanders van een verbod op vuurwerk.

Van Zuijlen pleit ervoor dat we op een realistische manier tegen het probleem aankijken. "Wat je met name ziet: er gebeurt weer iets en de maatschappij valt er weer overheen. Het geeft het zeer van de maatschappij aan."

Fireworks Celebrations

Professor Paul van Zuijlen, (Amsterdam UMC location VUmc, and Dutch Burns Centre, Red Cross Hospital, Beverwijk), is a fervent opponent of fireworks both at End-of-Year celebrations as well as for use during, and around soccer matches. As a burns specialist he knows the damage burn wounds can cause to patients, and campaigns in both national and international press to have it stopped. However, professor Van Zuijlen is also eager that supporters of fireworks are heard in the discussion. <https://nos.nl/nieuwsuur/artikel/2258084-arts-schudt-vuurwerkdiscussie-weer-wakker.html>

Exercise Therapy for knee/hip osteoarthritis

Dr Jesper Knoop (VU Amsterdam) conducted a randomized controlled trial (STABILO-study; Knoop et al; 2013) on the effects of exercise therapy during his PhD. The outcomes of this study were used as a basis for the prescribed content of exercise therapy for patients with knee/hip osteoarthritis in the KNGF (Koninklijke Nederlands Genootschap voor Fysiotherapie) Guideline in 2018, which was implemented in a number of physiotherapy trainings during 2019.

Dutch Guideline

Dr Han Houdijk (VU Amsterdam) was involved in writing the Dutch guideline for 'Amputation and prothesiology of the lower extremity', an initiative of the Nederlandse Vereniging van Revalidatieartsen and supported by the Kennisinstituut van de Federatie Medische Specialisten.

Osteoporosis Care

Professor Willem F. Lems (Amsterdam UMC, location VUmc) was a member of the stakeholder group for the report 'Zinnige Zorg in Osteoprosis', which aims to implement nationwide improvements in the gaps in the diagnosis and treatment of osteoporosis care.



Climate Questions

Professor Hein Daanen (VU Amsterdam) is an often-consulted expert on the changing climate and how to deal with extreme heat during the summer and cold during the winter. He is an expert consultant on the Dutch 'Nationale Hitteplan' which comes into force during heatwaves, such as the record heat in the summer of 2019. In 2019 professor Daanen co-organized the ICEE 2019 (the International Conference on Environmental Ergonomics) in Amsterdam with international visitors and expert

speakers on all hot and cold related subjects, such as sports, drowning, thermal modeling and soldier load, and heat acclimation for special populations. Professor Daanen and his team of researchers were in 2019 preparing athletes for how to perform under pressure in the sweltering heat that is expected during the Olympic Games in Tokyo in 2020.

Fitsurance project

PhD candidate and entrepreneur Sauvik Das Gupta (VU Amsterdam) was given a second grant for his project Fitsurance, an application with the aim to improve the health and well-being of the working part of the population. The grant was given to finance a feasibility study on the further development of the Fitsurance app for iOS and Android, that is part of the Fitsurance platform.



Sportlab Sedoc

Former Dutch top athlete and Olympian Gregory Sedoc in 2019 made a television program on Dutch public broadcasting AVRO TROS about top sports performance and how athletes in our time use sports innovations to reach the top and improve their performance to stay ahead of the competition. Gregory Sedoc made a series of six television programs, and the Myology lab, headed by dr Richard Jaspers (VU Amsterdam), was one of the labs he visited as part of the series. In the series dr Jaspers

and dr Guido Weide demonstrated and analysed 3D reconstructions of Gregory Sedoc's muscles.





AMS in the Press



MAX Masterclass

Hoogleraar klinische neuropsychologie Erik Scherder en hoogleraar veroudering Andrea Maier geven 3 gloednieuwe en interessante masterclasses over geluk, gezond ouder worden en het criminele brein.

Do 12 september 2019 20:35 NPO 1
Herhaald op 15 september 2019 NPO 1
Programma's TV MAX Masterclass Gezond 130?

Gezond 130?

Hoogleraar veroudering Andrea Maier praat u bij over oud worden. Ook geeft zij tips en aanwijzingen om gezond oud te worden.

In elke krant staat tegenwoordig wel iets over ouder worden. Niemand ontsnapt tenslotte aan het verouderingsproces. Er zijn berichten over een pil tegen ouderdom, de groei van het aantal honderdjarigen en levensverwachtingen van 130 jaar.

Wat is hier nu echt van waar? Hoogleraar veroudering Andrea Maier legt het uit. Andrea doet een cognitieve test met het publiek. Ook gaat ze in op de belangrijke rol die onze spieren spelen in ons lichaam. Verder krijgt u middels deze masterclass tips en aanwijzingen om gezond oud te worden.



Cor Speksnijder 10 april 2018, 20:30 Concept van een zelfrijdende auto van Volvo. Beeld Volvo

de Volkskrant

Hoe voorkom je wagenziekte in zelfrijdende auto

Wagenziekte is een van de meest voorkomende vormen van reisziekte. Hoe voorkom je dat je er last van krijgt in een zelfrijdende auto? Bewegingswetenschapper Ouren Kuiper onderzocht het.

Het begint met lichte duizeligheid. Dan: zweten, vermoeidheid en misselijkheid. En uiteindelijk: braken.

Reisziekte. De een heeft er meer last van dan de ander, maar volgens de statistieken hebben drie op de vier mensen zich ooit wel eens beroerd gevoeld door *kinetosis*, zoals het ongerief in medische termen heet.

Wagenziekte is een van de meest voorkomende vormen van reisziekte. De bewegingen van de auto maken dat de reiziger zich slap en ellendig voelt. Op de achterbank slaat wagenziekte eerder toe dan voorin. Kinderen hebben er vaker last van dan volwassenen.

De kans om ziek te worden kun je verminderen door recht voor je uit naar buiten te kijken en de horizon in het oog te houden. Als je daarentegen op een kaart of een beeldscherm kijkt, vergroot je de kans op misselijkheid. Een boek lezen op de achterbank is een uitgelezen recept voor een akelige reis.

Wagenziekte ontstaat als de signalen van ogen, evenwichtsorgaan en spieren over de positie van het lichaam niet meer overeenkomen met de signalen die de hersenen verwachten. Het brein herkent de nieuwe beweging niet en raakt in de war. Als je een boek leest in de auto suggereren je ogen dat je stilstaat, terwijl het evenwichtsorgaan beweging voelt. Een recept voor wagenziekte. Een bestuurder heeft vrijwel nooit last: hij anticipeert op de bewegingen van het voertuig en vermindert daardoor discrepantie tussen de voorspelde en de waargenomen positie van het lichaam.

Als over een aantal jaren de zelfrijdende auto gemeengoed is geworden zullen inzittenden vaker last krijgen van wagenziekte, voorspelt onderzoeker Ouren Kuiper van de Vrije Universiteit. Omdat ze niet meer hoeven te sturen zullen ze de neiging krijgen hun reistijd te gebruiken voor werk of ontspanning en op een laptop gaan turen. Dat is nu eenmaal een van de voordelen van autonoom rijden. Nadeel: het maakt reizigers gevoeliger voor bewegingsziekte.

Samen met twee collega-wetenschappers van TNO onderzocht Kuiper hoe de kans op misselijkheid in een zelfrijdende auto kan worden verkleind. Hij liet proefpersonen op de stoel naast de bestuurder een oefening doen op een beeldscherm, terwijl de auto hevig slalomde. De helft van de deelnemers keek naar een scherm ter hoogte van het handschoenkastje, de andere helft had een scherm dat op ooghoogte was bevestigd.

Degenen die recht voor zich uit konden kijken werden minder vaak ziek dan de inzittenden die schuin naar beneden moesten kijken. Passagiers die

het scherm op ooghoogte voor zich hebben zijn minder gevoelig voor geslingering omdat ze meer zicht op de omgeving houden, legt Kuiper uit. 'Het hoger plaatsen van een beeldscherm is een eenvoudige manier om de kans op wagenziekte te verminderen.'

Er zijn volgens Kuiper meer mogelijkheden om fysiek ongemak in de zelfsturende auto te voorkomen. Als je weet dat bewegingen eraan komen, zijn ze minder misselijkmakend. Je kunt met een signaal aankondigen dat de auto een bocht gaat maken. Dat kan een geluidssignaal zijn, een visueel signaal of een vibratie in de stoel. 'Naast het verbeteren van zicht op de omgeving kunnen dergelijke signalen mogelijk eenvoudig wagenziekte verminderen. Daar moeten we verder onderzoek naar doen', zegt Kuiper.

de Volkskrant

Hoe voorkom je wagenziekte in zelfrijdende auto

Wagenziekte is een van de meest voorkomende vormen van reisziekte. Hoe voorkom je dat je er last van krijgt in een zelfrijdende auto? Bewegingswetenschapper Ouren Kuiper onderzocht het.

Cor Speksnijder 10 april 2018, 20:30





NPO 1

Waarom loop je met veel spierballen geen marathon uit?

Geneeskunde

Ben je een bodybuilder met de droom om een marathon uit te lopen? Dan moeten we je helaas teleurstellen. Onze spieren zijn nu eenmaal niet gemaakt om én kracht én een goed uithoudingsvermogen te leveren. In dit college vertelt bewegingswetenschapper Richard Jaspers hoe jouw spieren zich aanpassen aan jouw unieke situatie. Dr Richard Jaspers is als bewegingswetenschapper verbonden aan de Vrije Universiteit Amsterdam.

<https://www.ad.nl/video/kanalen/universiteit-van-nederland~c331/series/universiteit-van-nederland~s519/waarom-loop-jij-met-al-je-spierballen-geen-marathon-uit~p108490?referrer=https%3A%2F%2Fwww.google.com%2F>



Nieuwsuur • Binnenland • Voetbal • 08-07-2019, 12:06

Twee jaar na hartstilstand Nouri pleiten cardiologen voor betere controles

Guido van Gorp, sportredacteur

De standaardmethode om hartstoornissen bij sporters vroegtijdig op te sporen is verouderd, stellen cardiologen van het Amsterdam UMC. Het ziekenhuis gaat onderzoeken hoe de hartscreening kan worden verbeterd. Daarmee willen de cardiologen voorkomen dat ongelukken gebeuren op het sportveld, zoals de hartstilstand van Ajax-speler Abdelhak Nouri vandaag precies twee jaar geleden.

Samen met onder meer sportkoepel NOC*NSF, Amsterdam Movement Sciences en het Sportmedisch Centrum Papendal gaan de cardiologen een groep van bijna 800 potentiële olympiërs screenen met nieuwe technieken, zoals cardiogenetica, MRI-scans en echocardiografie.

Uiteindelijk hoopt men zo in kaart te brengen wat de beste methode is om verborgen gebreken aan het hart te ontdekken.

“Over een paar jaar weten we veel beter hoe het hart van een topsporter werkt en eruitziet”, vertelt cardioloog Harald Jørstad. Vanuit het Amsterdamse ziekenhuis zal hij de kar trekken bij dit onderzoek, dat dit jaar moet beginnen.

Verouderd protocol

Cardiologen begonnen de zoektocht naar betere hartscreening vanuit onvrede. Ze zien dat een groot gedeelte van de sportwereld werkt met een protocol dat al sinds 2004 bestaat, maar nooit echt is herzien.

Dit zogenoemde Lausanne-protocol (vernoemd naar de plek waar het bedacht werd: het hoofdkantoor van het Olympisch Comité in Lausanne) is een standaardwerkwijze om hartproblemen vroeg te ontdekken. Het protocol bestaat uit een vaste combinatie van vragenlijsten, lichamelijke oefening en een hartfilmpje.

Nu, vijftien jaar later, vinden de cardiologen van het UMC Amsterdam dat het tijd is voor aanpassingen. Hoewel er in de afgelopen jaren diverse technieken zijn bijgekomen om efficiënter en sneller stoornissen op te sporen, is het protocol nooit aangepast.

Ook is er onder sportcardiologen over de hele wereld verdeeldheid over welke techniek het beste werkt voor het screenen van sporters. Met dit nieuwe initiatief moet daar nu een eind aan komen.

“Het hartfilmpje levert niet genoeg informatie op”, stelt Jørstad. “En andere onderzoeken die we toen hadden waren óf ontzettend moeilijk, óf extreem duur. Nu kun je echo’s overal maken. MRI’s kunnen sneller en accurater. We kunnen de genen testen, we kunnen invasieve testen doen. We zien: hoe beter de techniek wordt, hoe beter we begrijpen hoe het hart in elkaar zit.”

Nouri

Het onderzoek kan niet los gezien worden van het drama met voetballer Nouri, vandaag exact twee jaar geleden. De toen twintigjarige Ajacied viel op 8 juli 2017 tijdens een oefenduel in Oostenrijk plots neer op het veld door een hartstilstand, ondanks uitgebreide screening volgens het Lausanne-protocol.

Na een periode in het AMC (zo heette het UMC Amsterdam tot vorig jaar) verzorgen zijn familieleden hem momenteel thuis.

Volgens cardioloog Jørstad speelt de relatie tussen het ziekenhuis en de voetballer een rol om nu onderzoek te doen. Al is hij er óók van overtuigd dat dit initiatief gestart had kunnen worden vanuit een willekeurig ander ziekenhuis.

“De motivatie was heel groot om iets te doen”, Jørstad doelt hierbij op het verbeteren van hartscreenings. “Zo’n ingrijpende gebeurtenis schudt iedereen wakker.”

Of Nouri niets was overkomen met een betere screening is maar de vraag. “Geen enkele screening is perfect”, zegt Jørstad. Door een samenloop van omstandigheden kan er altijd iemand door de keuring glippen. “Maar we hopen dat we vergelijkbare incidenten in de toekomst beter kunnen voorkomen, als we goed onderzoek doen.”

AMS Activities

3rd Annual Meeting

During the 3rd AMS Annual Research Meeting held in March 2019, more than 200 researchers in the field of Movement Sciences gathered at the Royal Tropical Institute in Amsterdam for an inspirational day on movement research in all its aspects. The meeting was chaired by dr Marjolein van der Krogt (Amsterdam UMC, location VUmc) and dr Jos de Koning (VU Amsterdam). There were three keynote speakers on a varied range of topics, from professor Lars Engebretsen (Oslo University Clinic), who spoke on his expertise from IOC and musculoskeletal medicine, then professor Guszti Eiben (AI expert at VU Amsterdam) who spoke about what artificial life can tell us, and finally professor Davide Iannuzzi, (Experimental physics, VU Amsterdam and head of the Demonstrator Lab at VU Amsterdam), who gave his lecture *Scientist and Entrepreneur, Mission (Im-) possible?*

Annual Meeting, Marjolein van der Krogt and Jos de Koning

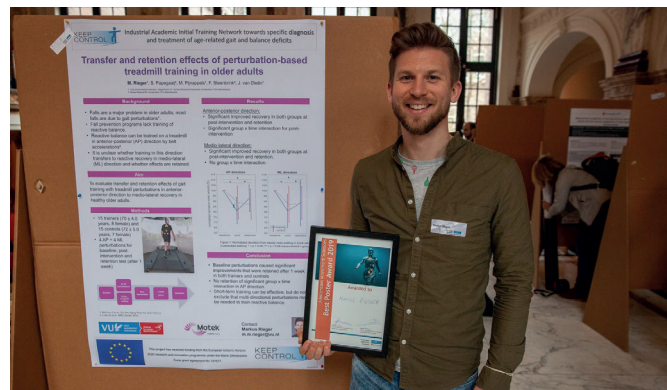
During the Annual Meeting the much lauded *AMS Outstanding paper award* was given to PhD candidate Jennifer Kerkman (VU Amsterdam) and co-authors, for their paper *Network structure of the human musculoskeletal system shapes neural interaction on multiple time scales*, published in Science Advances in 2018. The jury, chaired by dr Huub Maas (VU Amsterdam), chose among 16 submitted papers. The winner was chosen for its scientific quality, innovation and relevant contribution to AMS, as well as its societal relevance. In the paper, the authors used network analysis to investigate the relationship between anatomical and functional connectivity among 36 muscles.



Annual Meeting, Marjolein van der Krogt and Jos de Koning



Posters Annual Meeting



Markus Rieger



The jury report said that ‘This study contributes to our understanding of the coordination of movement and fits excellent in the framework of Amsterdam Movement Sciences’.

Posters Annual Meeting

At the Annual Meeting, PhD candidate Markus Rieger (VU Amsterdam) was given the AMS Best Poster Award 2019 for this poster *Transfer and retention effect of perturbation-based treadmill training in older adults*. The poster was selected for its highly scientific as well as societal relevance, in addition to a good presentation, a clear lay-out and clarity of content.

Mentorship program

A group of ECR (Early Career Researchers) in 2019 set up a mentorship program within AMS aimed at PhD candidates and other ECRs. Interested AMS

members were encouraged to join the program, as either mentee or mentor. The idea behind was to provide every interested AMS researcher with the opportunity to get guidance and mentorship from a more senior member who is not directly affiliated with their project. The mentor will provide guidance that is different to that given by the supervisor on issues such as career guidance, stress and time management, work/life balance, setting priorities, networking and visibility and funding opportunities etc. For the mentor, this is an opportunity to get acquainted with issues that are most likely also affecting their own researchers and to get in contact with talented individuals outside their own network. ECR candidate Lynn Bar-On (Amsterdam UMC, location VUmc) was the initiator of the program, which received a lot of support from both junior as well as senior researchers willing to participate.

Scientific mini-symposium: SPORTS



ORGANIZERS

[Prof.dr. Geert Savelsbergh](#)

[Prof.dr. Evert Verhagen](#)

DATE AND TIME

September 10, 2019

14:30 – 17:30 hrs.

VENUE

1928 Olympic Room;
Olympic Stadion nr. 2;
Amsterdam

REGISTER

[here](#)



Amsterdam
Institute
of Sport
Science



amsterdam-movement-sciences

Program

14:30: Kick off;

14:45: [dr. Steve Cobley](#) (Assistant Professor in Skill Acquisition and Sport & Exercise Psychology, Faculty of Health Sciences, U. of Sydney, AUS.);

15:45: PhD Pitches;

16:45: [dr. Erik van der Graaff](#) (AISS PhD Award winner for his thesis [Perfecting Your Pitch](#));

17:15: Wrap up;

17:30: Extra time Drinks and Snacks

Participation is free of charge, but advance registration kindly requested. Deadline for registration: September 2, 2019.

Amsterdam
Movement
Sciences



Amsterdam UMC
University Medical Centre

AMS Summer Meeting

The summer meeting was organized in June 2019 to present the restructuring of the institute and the new research programs. The five new research programs were presented to a good audience of senior and junior researchers, and it was followed by a lively discussion on how to progress further and how to enable even more interdisciplinary collaboration. Read up about the new research programs and their program directors at the beginning of the Annual Report.

AMS Research Program Meetings Sports meetings

The AMS research program *Sports* in 2019 organized a number of meetings with sports on the agenda. These meetings are aimed at both senior scientists in the sports theme as well as for PhD candidates and interested students. The September meeting elaborated on *Integrating Scientific Finding into a High-Performance Environment*.

Foot & Ankle meetings

Professor Theo Smit (Amsterdam UMC, location AMC) and dr Erwin van Wegen (Amsterdam UMC, location VUmc), together organized a series of Foot and Ankle Colloquia, which offered the experiences and distinguished speakers such as professor Gino Kerkhoffs, dr Idsart Kingma and PhD candidate Wouter Schallig. In their talks they shared their view of problems that may arise with Foot and Ankle issues, how to solve these and where to go in the future.

Amsterdam Spine Center Meetings (ASC)

The ASC researchers organized several meetings for interested researchers, both AMS members and

beyond. Professor Maurits van Tulder spoke in the March meeting on *Low Back pain: a call for action*, with reference to the viewpoint series published by a group of law-back pain experts in the Lancet in 2018. In another meeting dr Idsart Kingma spoke on potential benefits for workers using *Exoskeletons to unload the spine during manual work*. These meetings offer a multidisciplinary approach to Spine issues and are popular and well visited by both senior and more junior researchers.

Mini Symposium: Physical Functioning: Methods and Outcomes in Health and Disease

The research program Ageing and Morbidity organized a meeting in June with a selection of distinguished speakers. The focus of the meeting was various modes of assessment of physical functioning in the context of ageing and different diseased populations. Professor Mirjam Pijnappels spoke on the theme of *Physical Functioning in the elderly population*, and Dr Marike van der Schaaf spoke on *Physical functioning in ICU patients*.

Annual Research Master Graduation Conference

The annual research master graduation conference was held at the end of August, with distinguished AMS speakers and keynote holders, among others professor Andreas Daffertshofer, dr Melvyn Roerdink and professor Frank Bloemers. The event is a two-day meeting where Research master students present the results of their one-year research projects. The research master students, after graduation, are members of a skilled pool of potential PhD candidates.



FUNCTIONAL TRAINER

INSTRUCTIONS

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

VU medisch centrum



PhD Enthusiasm

Interview



Wouter Schallig

PhD candidate Wouter Schallig is connected to the Rehabilitation Medicine department of Amsterdam UMC, location VUmc and the Radiology and Nuclear Medicine department of Amsterdam UMC, location AMC. He is gender neutral 'chair' of the PhD Committee, which was established in 2017.

'The main goal of the committee is to provide a platform for PhDs within the research institute to meet, to learn from each other, to interact and collaborate. In 2019, the committee organized an inspiring PhD day that was attended by more than 50 PhD candidates. There were a number of substantial aspects to the day, including guest speaker, Kaspar Jansen, who spoke about the influence of sleep on the performance as researcher. There was also an interesting discussion about the new programme structure within AMS. The program directors gave a short introduction about the programs and we discussed the role of PhD candidates within the program and what the program can signify for the PhD Candidate. Per program one or two PhD

candidates are currently member on the program boards, to ensure that PhD candidates' interests are covered and to help in the development of the programs. In the afternoon, we had organized a Pecha Kucha session, which offered several impressive presentations. In the end, Roel Weijer won the award with his Pecha Kucha about the risks of falling in elderly people. Although measures of actual and perceived physical ability appear to predict falls in older adults, a disparity between these two, also known as misjudgement, may even better explain why some older adults fall, while their peers with similar abilities do not.

The next speaker was Danielle Bouman, PhD candidate at VU Amsterdam and AMS. She gave a talk about the effects stress can have and how to prevent a burnout. An interesting topic for PhD researchers. She did this by interactively sharing her own experiences and her knowledge of professional literature with the public. This gave insight, support and lively discussions. The day ended with a squash match and drinks.

In addition to the yearly PhD-day, we also organized a Spring Meeting for the first time, with a workshop on how to present your data. The day concluded with some games of beach volleyball at the VU Campus. The meeting was visited by about 30 people.

The PhD Committee also serves as a source of information: if fellow PhD candidates need help, we can refer to the right person to solve the problem. This occurred more frequently last year than the years before. In the future, the committee would like to keep organizing events that bring PhDs together

to interact. Moreover, we will do that with some new faces!



@AMSmovement on Twitter

PhD day presentation on “Falls and self-efficacy: Chicken or the egg?”

Roel Weijer wins the prize for best PechaKucha presentation at the AMS PhD day! Congratulations Roel!



Roel Weijer wins Pecha Kucha Prize. From left to right: Ton Leenen; Roel Weijer and Lisa Klous (all AMS).

In 2019, the AMS PhD committee had the following PhD candidate members:

- **Mireille Folkerts**, VU Amsterdam;
- **Amber von Gerhardt**, Amsterdam UMC, location AMC;
- **Ludo van Haasterecht**, Amsterdam UMC, location VUmc;
- **Lisa Klous**, VU Amsterdam;
- **Ton Leenen**, VU Amsterdam;
- **Wouter Schallig**, Amsterdam UMC, location VUmc;
- **Tim Veneman**, Amsterdam UMC, location AMC.

Research Highlights

We are proud to announce our top twenty publications in 2019. The publications have been selected for their relevance to the research institute, and contribution to the scientific output as a whole.

- Rubinstein, SM, De Zoete, A, Van Middelkoop, M, Assendelft, WJJ, De Boer, MR & Van Tulder, MW 2019, 'Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: Systematic review and meta-analysis of randomised controlled trials', *BMJ (Online)*, vol. 364, l689.
- Pietras, B & Daffertshofer, A 2019, 'Network dynamics of coupled oscillators and phase reduction techniques', *Physics Reports*, vol. 819, pp. 1-105. <https://doi.org/10.1016/j.physrep.2019.06.001>.
- Bomers, MK, van Doorn-Schepens, MLM, van der Valk, P & Peters, EJG 2019, 'Poststreptococcal Myalgia and Myositis', *Annals of Internal Medicine*, vol. 170, no. 12, pp. 901-904. <https://doi.org/10.7326/L18-0589>.
- van Vollenhoven, R 2019, 'Treat-to-target in rheumatoid arthritis – are we there yet?', *Nature Reviews Rheumatology*, vol. 15, no. 3, pp. 180-186. <https://doi.org/10.1038/s41584-019-0170-5>
- Carmody, S, Jones, C, Malhotra, A, Gouttebauge, V & Ahmad, I 2019, 'Put out to pasture: What is our duty of care to the retiring professional footballer? Promoting the concept of the 'exit health examination' (EHE)', *British journal of sports medicine*, vol. 53, no. 13, pp. 788-789. <https://doi.org/10.1136/bjsports-2017-098392>.
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Network dynamics of coupled oscillators and phase reduction techniques

Bastian Pietras^{a,b,1}, Andreas Daffertshofer^{a,*}

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^b Department of Physics, Lancaster University, Lancaster LA1 4YB, United Kingdom

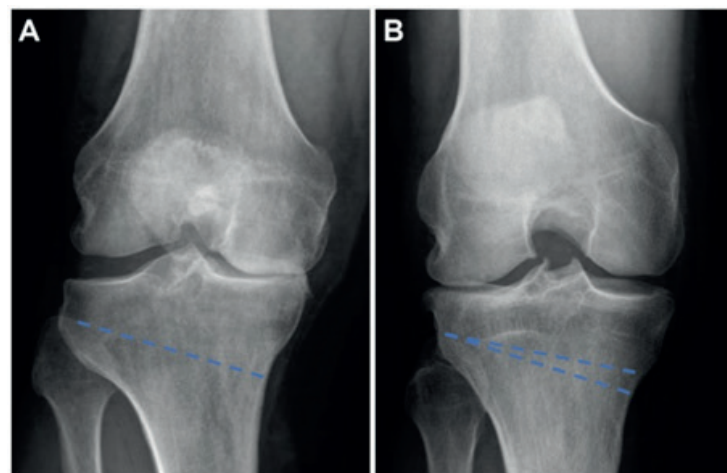


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Preoperative anteroposterior radiographs of high tibial osteotomies (HTOs) with projected osteotomy cuts (striped lines). (A) Right knee before opening wedge HTO. (B) Right knee before medial closing wedge HTO.

14. Chiarotto, A, Maxwell, LJ, Ostelo, RW, Boers, M, Tugwell, P & Terwee, CB 2019, 'Measurement Properties of Visual Analogue Scale, Numeric Rating Scale, and Pain Severity Subscale of the Brief Pain Inventory in Patients With Low Back Pain: A Systematic Review', *Journal of Pain*, vol. 20, no. 3, pp. 245-263. <https://doi.org/10.1016/j.jpain.2018.07.009>.
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IOC Accreditation



From left to right: **Mario Maas, Gino Kerkhoffs, Lars Engebretsen, Evert Verhagen, Frans Nollet**

The Amsterdam UMC IOC (International Olympic Committee) was in 2019 again accredited for a period of 4 years (2019 – 2023) with a grant of 400k€. This research centre is part of the AMS Sports research program, and is a collaboration between the departments of Public Health, represented by professor Evert Verhagen, (Amsterdam UMC, location VUmc), Orthopaedics, represented by professor Gino Kerkhoffs, professor Mario Maas of Radiology and Harald Jørstad of Cardiology (all location AMC). The multidisciplinary research centres on the prevention of sports injuries and rehabilitation of injuries

that have already occurred, and is an outstanding example of collaboration between the AMC and VUmc locations. Needless to say, the expertise the team of specialists acquire when treating top athletes also benefits the sports men and women who do grass root sports, as well as patients who have similar injuries that they have acquired beyond the sports arena.

Spinoza Lecture

In March 2019 Professor Lars Engebretsen (Oslo U. Clinic / Med. Sc. IOC) held the Spinoza lecture



Vista 2019

at Amsterdam UMC, location AMC, entitled *The Importance of Clinician-Researchers to Progress Musculoskeletal Medicine*. Amsterdam UMC hosts were professors Gino Kerkhof's and Mario Maas, both location AMC. Professor Engebretsen was given the opportunity to speak at several occasions during his brief stay in Amsterdam, and met with several researchers on sports injuries and rehabilitation.

VISTA Conference

Vista 2019 was held in Amsterdam in September, with the theme of the conference being *Healthy and Fit for Optimal Performance*. The conference

was host to a vast group of experts and scientists on Paralympic sports and was hosted by AMS professors Evert Verhagen (Amsterdam UMC, location VUmc) and Thomas Janssen (VU Amsterdam), in collaboration with Amsterdam Institute of Sports science and the International Paralympic Committee (IPC). The meeting aims at providing a platform for sport scientists and researchers to meet with experts in the field of sport for athletes with impairments to discuss, exchange, and gain advanced knowledge in this area.



7TH EUROPEAN CONFERENCE ON
Weaning and Rehabilitation in Critically ill Patients

MOVE AS ONE TEAM

9th and 10th of November

Amsterdam, Netherlands

Movement Analysis Conference

From 23 – 28 September, the Annual Meeting of the European Society for Movement Analysis in Adults and Children (ESMAC) was organized in Amsterdam by dr Marjolein van der Krogt (Amsterdam UMC, location VUmc) and dr Han Houdijk (VU Amsterdam). The congress was visited by a record 650 participants from 47 different countries, and offered courses on how to apply movement analysis in patient care (the gait course), to great success and served as a wonderful opportunity to share with other researchers the facilities that are available to AMS researchers of VU and Amsterdam UMC, location VUmc.

7th European Conference on Weaning and Rehabilitation

In November the 7th European Conference on Weaning and Rehabilitation was organized, under the supervision of dr Marike van der Schaaf (Amsterdam UMC, location AMC). The motto for the conference was *MOVE as one Team* and the specialists aim to show that rapid recovery from critical illness can be achieved when professionals and patients act together as one team. Part of the conference was the Amsterdam UMC run where several ex-ICU patients took part in the 5k run.





Appointed Professors

In June, professor **Peter Weijs** gave his inaugural lecture at VU Amsterdam entitled *Zonder Voeding Staat Alles Stil*. The inaugural lecture was preceded by a symposium entitled *Protein, Nutrition and Exercise: Top care = Top Sports*. The symposium was open to all interested parties and was fully booked.



Annemieke Buizer

Annemieke Buizer was in October 2019 appointed full professor of Pediatric Rehabilitation Medicine at Amsterdam UMC, location AMC. Professor Buizer is primarily concerned with children who have mobility limitations due to disorders of the brain, mainly due to cerebral palsy. Her research focusses on unravelling mechanisms of underlying motor impairments restricting mobility, and on determining the effects of short and long-term effects of interventions. Her goal is to improve current treatment and to develop new treatment strategies for children with cerebral palsy and related disorders. Ultimately, this will lead to individually tailored, personalized treatment. Annemieke Buizer is head of the multidisciplinary Amsterdam UMC Cerebral Palsy Center of Expertise, and project leader of the Netherlands Cerebral Palsy

Register. Professor Buizer will give her inaugural lecture in 2020.

Raoul Engelbert was per November 1, 2019 appointed to the endowed chair of Paediatric Physical therapy at the University of Amsterdam. Professor Engelbert is a lecturer at the Amsterdam University of Applied Sciences, and focuses on the moving function of children at Emma Children's Hospital, including chronically ill children. Professor Engelbert also focuses on the optimization of the transfer of ill children from a hospital setting to a home situation, especially for premature babies and children who have been admitted to the ICU.

In December 2019 **Peter Bisschop** (Amsterdam UMC, location AMC) was appointed full professor of Internal Medicine, in particular Clinical Endocrinology at the University of Amsterdam. Professor Bisschop's research focuses on the neuro-endocrine regulation of bone metabolism.

As the year came to a close **Frank W. Bloemers** (Amsterdam UMC, location VUmc) gave his inaugural lecture on December 20, 2019, entitled *Een Juichtoon*. Professor Bloemers was appointed to the chair of Trauma surgery and is a researcher with a heart for multidisciplinary collaboration, movement research (on eg. AJAX FC), as well as combining trauma care, new technology and educating the future generations of surgeons.



Frank Bloemers

A brief extract from professor Bloemers' his inaugural lecture: 'Healthcare is currently in an exciting time. A time in which we are most likely going to write history because there is so much going on, both worrisome and innovative. Writing this history can be a positive thing, but it might also go the other way. It's all about the right vision and putting the right forces and expertise in the correct positions. Literally, when your child falls ill in Amsterdam, there is not enough room and you have to go to Groningen and, at the same time, there is so much possible to make better interventions. These contrasts now need to be crystallized and bundled'.

Appointed PIs

In 2019 AMS could welcome the following PIs, who were nominated for their outstanding research and expertise:

- **Professor Denise Eygendaal** (Amsterdam UMC, location AMC) is an orthopaedic surgeon who specializes in the elbow joint and addition traumatic injuries of the shoulder and forearm;
- **Dr Marjolein van der Krogt** (Amsterdam UMC, location VUmc); specializes in clinical movement analysis, cerebral palsy and musculoskeletal modelling;
- **Dr Paul Kuijer** (Amsterdam UMC, location AMC) specializes in enhancing work participation among knee and hip osteoarthritis patients by improving prevention and integrated patient-centred care;
- **Dr Marike van der Leeden** (Amsterdam UMC, location VUmc) focuses on the development, evaluation and implementation of rehabilitation and allied health care interventions, mainly in patients with musculoskeletal disorders (osteoarthritis, rheumatoid arthritis, and chronic widespread pain), and patients with cancer (with a focus on peri-operative care);
- **Dr Marike van der Schaaf** (Amsterdam UMC, location AMC) an expert in the rapidly developing field of rehabilitation in acute care for critically ill and vulnerable patients.

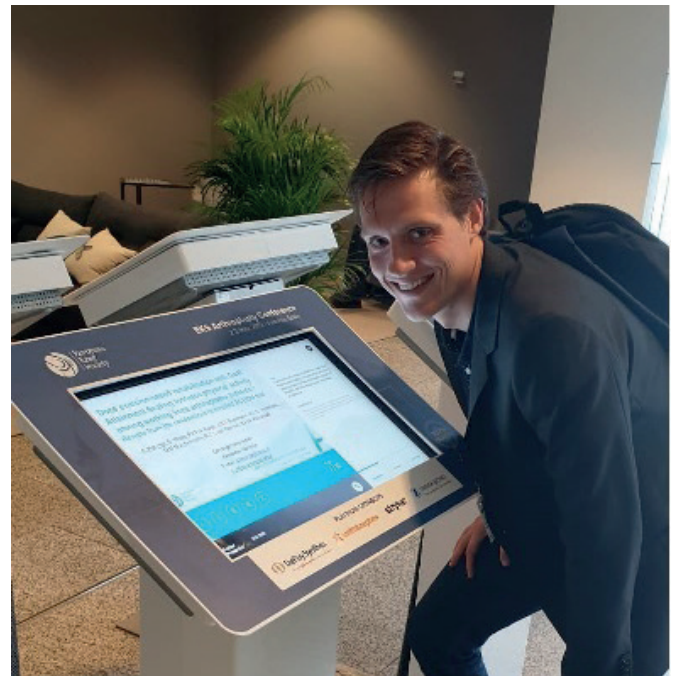
Prizes



Paul Kuijer (l) and Gino Kerkhoffs

Paul Kuijer (Amsterdam UMC, location AMC) is the Anna Price Laureate 2019-2020 for research and development of better work-directed care for working age knee osteoarthritis and knee

arthroplasty patients. The prize is awarded once every two years by Anna Fonds/NOREF (Nederlands Orthopedisch Research en Educatie Fonds), and was given to him for his research (in collaboration with professor Gino Kerkhoffs, Amsterdam UMC, location AMC) and colleagues, which shows that individualized care is needed following orthopedic surgery in order to successfully return to work. This applies to both the general patient population as well as elite athletes.



Sander Hoorntje

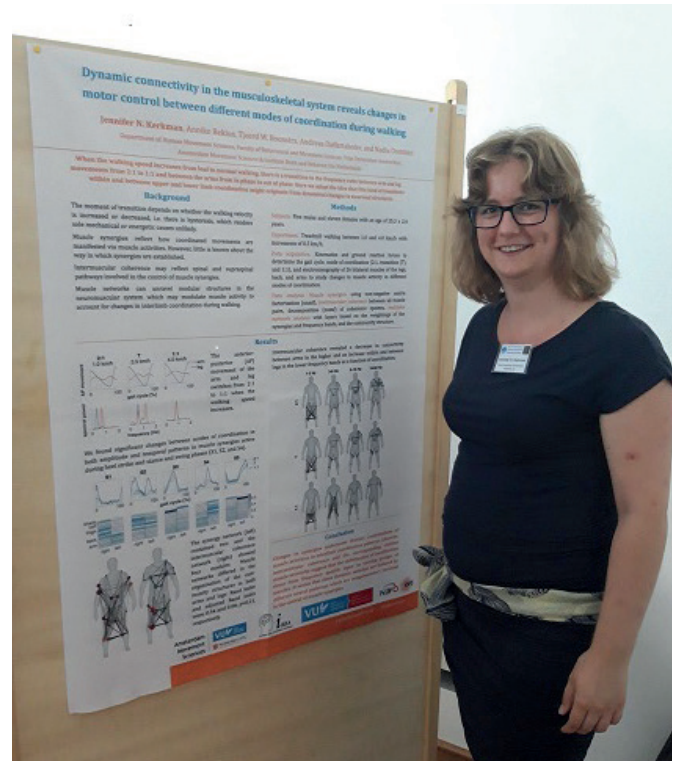
In May 2019, Sander Hoorntje (PhD candidate at Amsterdam UMC, location AMC) was given a Best Poster Award in Valencia during the European Knee Society Arthroplasty Conference which took place

in Valencia, Spain. Sander won the prize for his poster *Does exercise-based rehabilitation with Goal Attainment Scaling increase physical activity among working knee arthroplasty patients? Results from the randomized controlled ACTION trial.*



Marieke Mens and Mario Maas

Marieke Mens was awarded the AMC Graduate School PhD scholarship with her project proposal *Preventing diabetic foot ulcers: personalized treatment using 3D-imaging of the plantar fat-pad.* Supervisors on the project are professors Mario Maas and M. Nieuwdorp, and dr Geert Streekstra and dr Sicco Bus, (all Amsterdam UMC, location AMC).



Jennifer Kerkman

Jennifer Kerkman, PhD candidate at VU Amsterdam, won the Best Poster Award at ISNINP (the Second International Summer Institute on Network Physiology) held at Lake Como in Italy in August. Jennifer won the prize for her poster *Dynamic connectivity the musculoskeletal system reveals changes in motor control between different modes of coordination during walking.* Jennifer also won the AMS Outstanding paper Award for 2019, see further on in the Annual report.



Wouter Schallig (centre)

At the Annual Meeting of the European Society of Movement Analysis in Adults and Children (ESMAC), held from 23-28 September in Amsterdam, Wouter Schallig (Amsterdam UMC, location VUmc) won the Audience Best Paper Award with his study entitled *The effect of soft tissue artefacts on foot kinematics in multi-segment foot models*. Daphne Geerse (VU Amsterdam) was the runner-up for this award with her study *Walking adaptability for targeted fall-risk assessments*. At the same conference the Jury's runner up for the Best Paper Award was granted to Melvyn Roerdink (VU Amsterdam) for his study *Haste makes waste: on the trade-off between walking speed and target-stepping accuracy*.

Lisa Klous, PhD candidate at VU Amsterdam, in July won the first prize for the best oral presentation at the ICEE (International Conference on Environmental Ergonomics) conference held in Amsterdam in July. Lisa was awarded the prize for her presentation *Time course of sweat content during heat acclimation and re-acclimation*. Lisa was also given an FGB travel grant to visit the EEL (Environmental Ergonomics Lab) the faculty of Applied health Sciences, at Brock U. Ontario, Canada, where she will research human physiology related to sweat composition.

During the VvBN (Vereniging voor Bewegingswetenschappen Nederland) Annual Symposium in Utrecht in March 2019, Stephan van der Zwaard was awarded the Best Thesis Award for his theses *Why Muscles Matter Optimizing sprint and endurance performance in athletes*, which he defended at VU Amsterdam in March 2018.

Erik van der Graaff was given the AISS (Amsterdam Institute of Sport Science) Award 2019 for his PhD thesis *Perfecting Your Pitch: In search of the perfect baseball pitch and its training*. Eric defended his thesis at VU Amsterdam on April 10, 2019. The jury credited the thesis for its quality of research and applicability for sports practice.



Mohammadreza Mahaki

Mohammadreza Mahaki, PhD candidate at VU Amsterdam, was given the Best Poster Award at the VvBN PhD day in Groningen in November. Mohammadreza was given the prize for his poster *How does external lateral stability constrain normal gait pattern, besides from improving mediolateral gait stability.*

Keenan Ramsey, PhD candidate at VU Amsterdam, was given an FGB travel grant to visit Department of Physiotherapy at the U. of Melbourne, Australia. Keenan will compare physical activity patterns between patients receiving home-based hospital care and inpatients at the Royal Melbourne Hospital in the P.J. Paralysis trial.

Anna Rojer, PhD candidate at VU Amsterdam, won an FGB travel grant to visit the Department of Physiotherapy and Exercise Physiology at the Royal Melbourne Hospital, in Australia. During her stay down under, Anna will join the PJ paralysis trial, which encourages physical activity in hospitalized geriatric patients.

Grants



From left to right: Sjoerd Bruijn, Maarten Prins (MRC Doorn), Nick Klufft, Han Houdijk, Jaap van Dieën en Wieke Philippart

Below is a selection of grants that AMS members were given during 2019. All grants are the results of collaboration with a group of researchers. We have mentioned the main AMS members, but this does not exclude other researchers involved in the projects.

Professor Evert Verhagen was awarded a ZonMW grant of K€ 670 or the 4-year TIPAS Project: *Tailored Injury Prevention in Adapted Sports*. The project is a collaboration between researchers at Amsterdam UMC, location VUmc, READE and InHOLLand

University of Applied Sciences, as well as various industrial partners.

Raoul Oudejans and Vana Hutter (both VU Amsterdam) were in 2019 given an EU financed H2020 grant of M€ 5.05 as partners in a consortium for the project *Shotpros: A human factors based (VR) training framework for decision-making and acting capabilities under stress and in high-risk situations for European LEAs*. The project coordinator is USECON, in Austria. The VU part of the grant is €485,000.





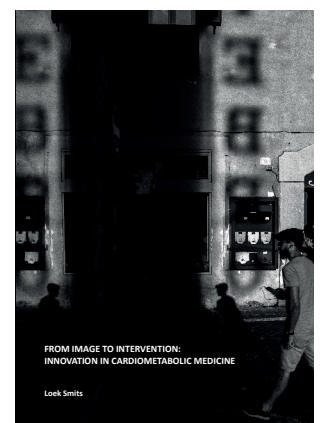
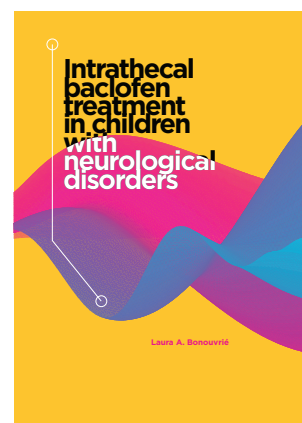
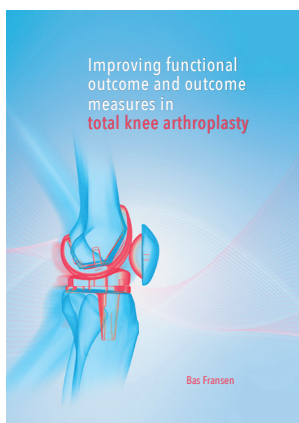
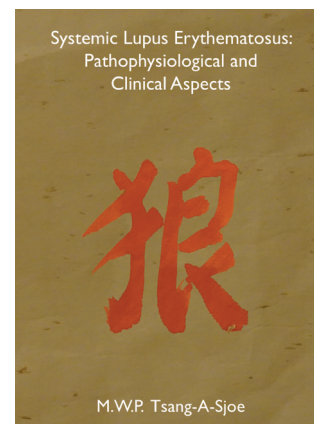
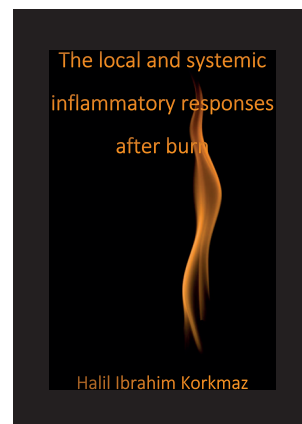
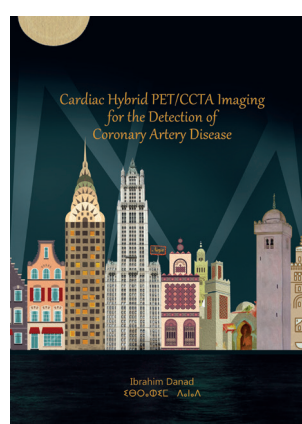
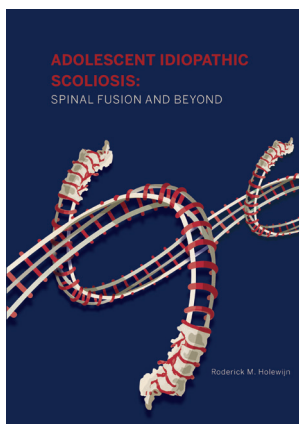
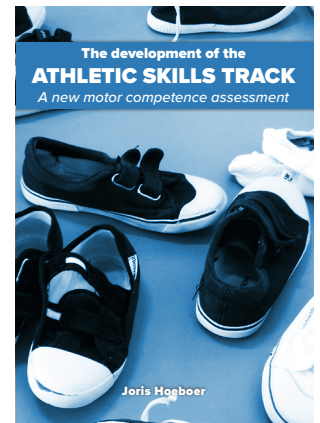
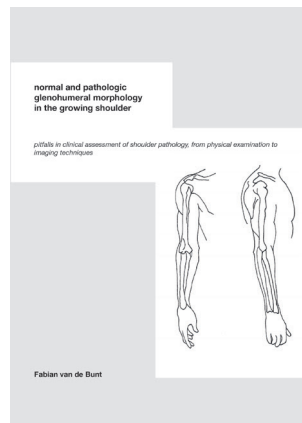
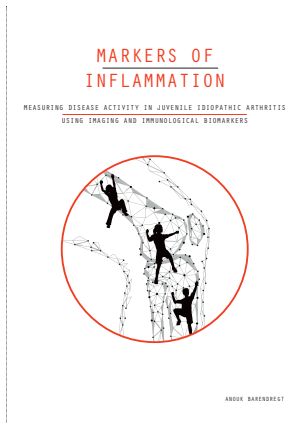
The Amsterdam UMC IOC (International Olympic Committee) accreditation was paired with a grant of K€400. This collaborative project includes researchers from the departments of Public Health, represented by professor Evert Verhagen, (Amsterdam UMC, location VUmc), Orthopaedics, represented by professor Gino Kerkhoffs, professor Mario Maas of Radiology and Harald Jørstad of Cardiology (all location AMC). The multidisciplinary research centres on the prevention of sports injuries and rehabilitation of injuries that have already occurred, and is an outstanding example of collaboration between the AMC and VUmc locations.

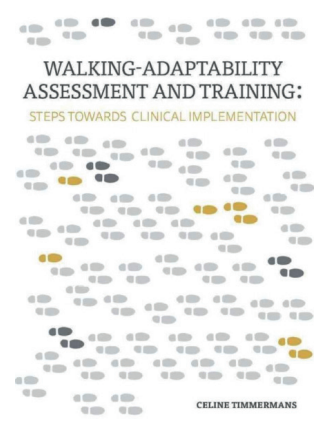
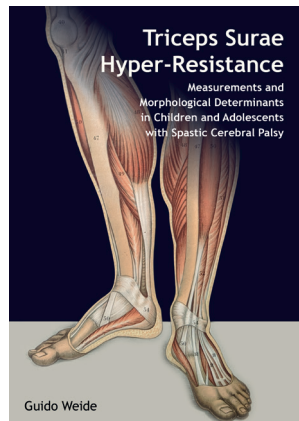
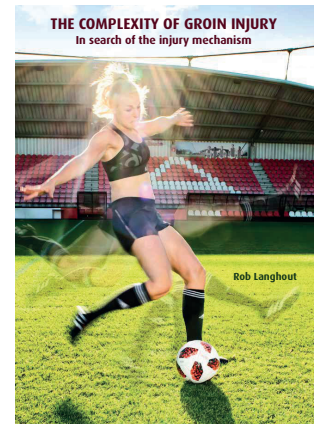
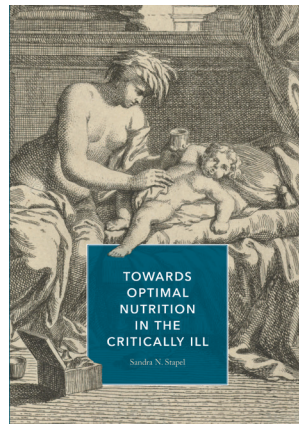
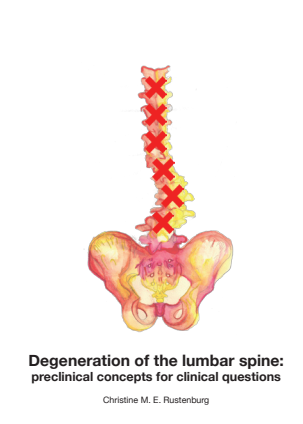
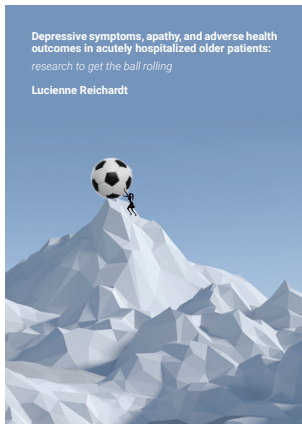
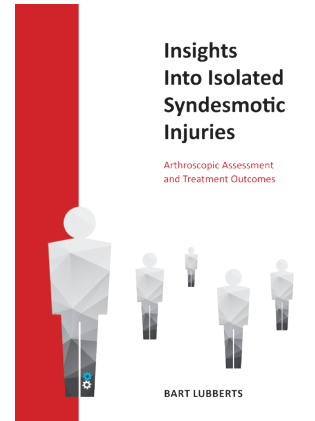
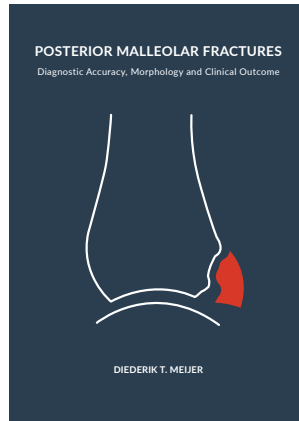
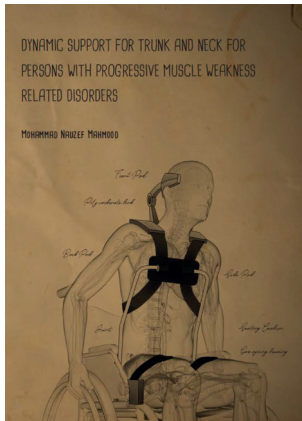
Professor **Jaap van Dieën** (VU Amsterdam) and collaborators were given an EU grant of K€100 for the project *Ups and Downs: benchmarking gait stability of wearable robotic assistive devices and humanoid robots on slopes and lateral inclines*. The project is a collaboration with Military Rehabilitation Center Aardenburg (NL) and rehabilitation center Heliomare.

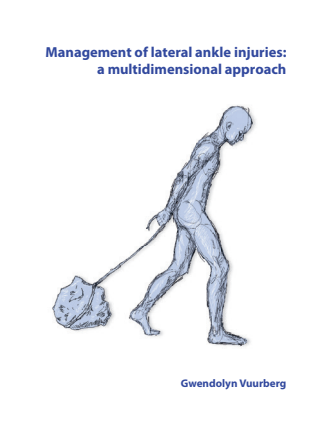
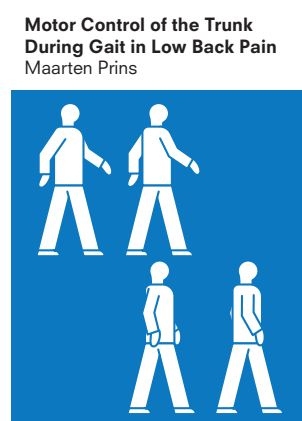
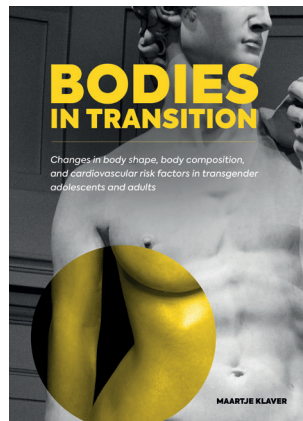
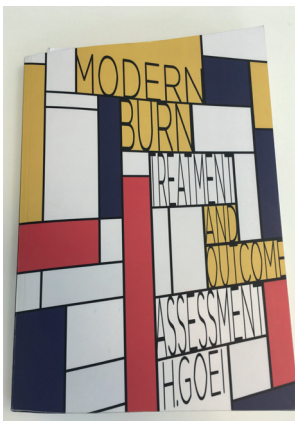
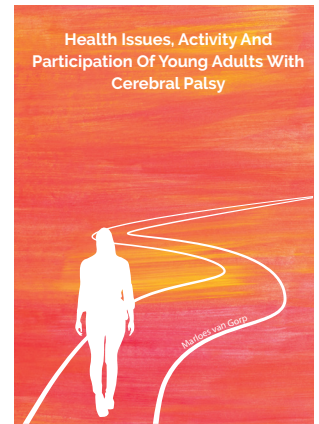
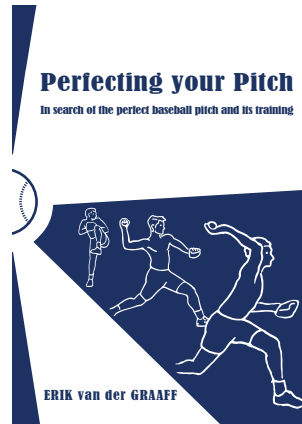
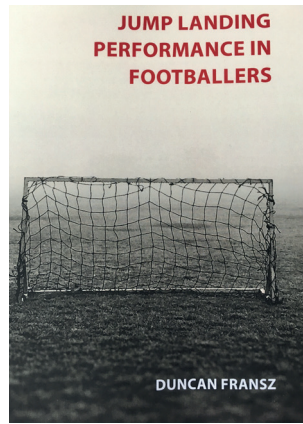
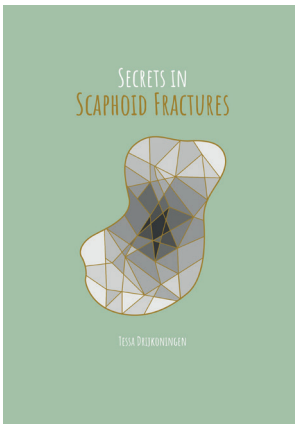
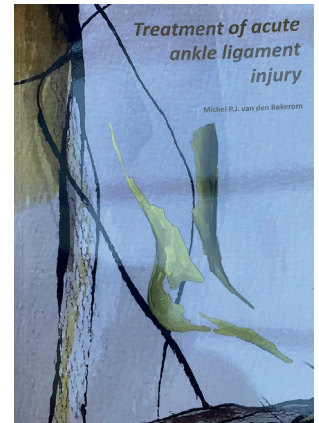
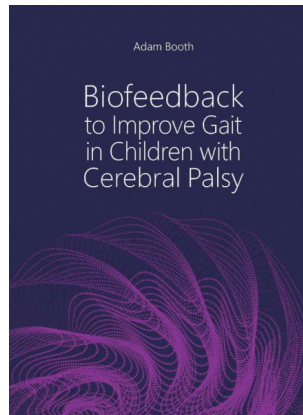
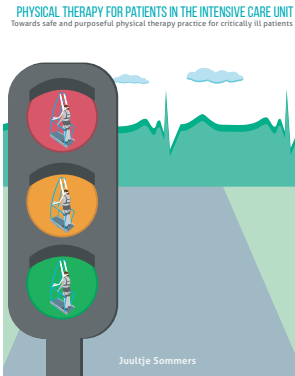
Dissertations

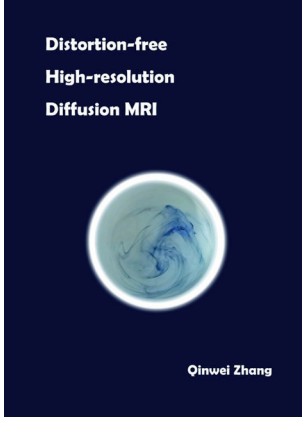
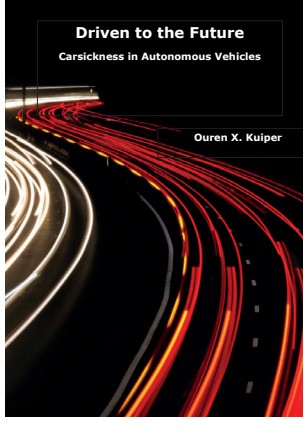
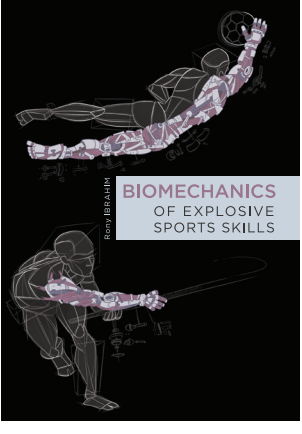
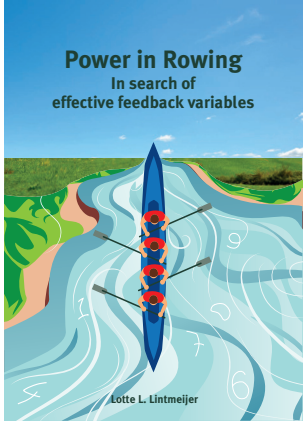
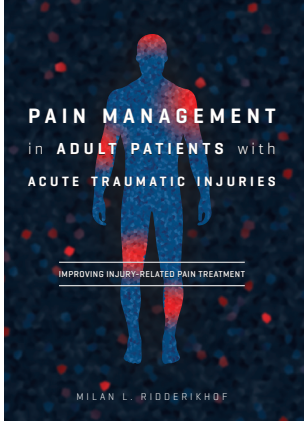
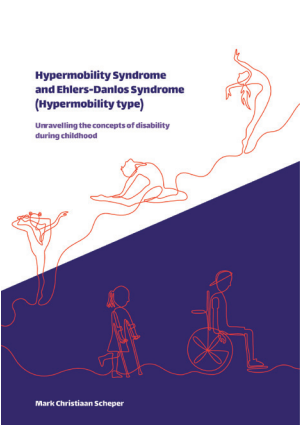
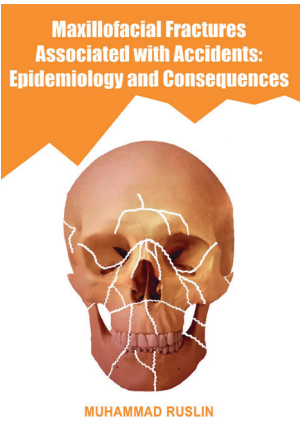
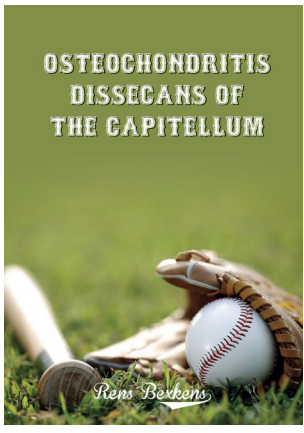
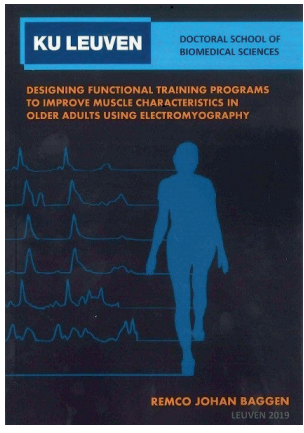
The dissertations below were all defended during 2019, at either one of the participating universities, University of Amsterdam, or Vrije Universiteit

Amsterdam and with the supervision of one or more institute members.









Ernst Jan Bos - Cartilage tissue regeneration for facial reconstruction in burn patients
Ernst Ja

Key Numbers

| Output* | 2017 | 2018 | 2019 |
|------------------------------------|-------------|-------------|-------------|
| Scientific (Refereed) publications | 824 | 802 | 769 |
| Non-refereed articles | n.a. | 15 | 29 |
| PhD theses** | 39 | 50 | 47 |
| Professional publications | 38 | 40 | 43 |
| Books / Chapters | 17 | 21 | 1 / 17 |
| Total | 918 | 946 | 907 |

* Based on information from the Research Information System PURE database, over the year 2019.

** Defended at either University of Amsterdam or Vrije Universiteit Amsterdam.

Membership Base

| | Assistant Professor | Associate Professor | Contract PhD Candidate* | Endowed Professor | External PhD Candidate | Full Professor | Lecturer* | MD-PhD* | Medical Specialist | Other Academic Staff | Physician | Research Associate | Standard PhD Candidate* | Visiting Fellow | Visiting Professor | |
|------|---------------------|---------------------|-------------------------|-------------------|------------------------|----------------|-----------|---------|--------------------|----------------------|-----------|--------------------|-------------------------|-----------------|--------------------|-----|
| AMS | 22 | 23 | 1 | 4 | 87 | 38 | 5 | 18 | 54 | 4 | 8 | 50 | 165 | 39 | 1 | 519 |
| AMC | 3 | 2 | 0 | 0 | 0 | 11 | 0 | 12 | 29 | 2 | 0 | 12 | 113 | 0 | 0 | |
| VU | 15 | 16 | 1 | 2 | 75 | 13 | 4 | 0 | 0 | 0 | 0 | 22 | 40 | 9 | 1 | |
| Vumc | 4 | 5 | 0 | 2 | 12 | 14 | 1 | 6 | 25 | 2 | 8 | 16 | 12 | 30 | 0 | |

* PhD candidates registered in either the PURE research database (Community Module) or VU/Vumc Hora finita PhD registration system, double registrations counted once.

The institute members are registered researchers at one of the partner institutions, be it Amsterdam UMC, location AMC or VUmc, or Vrije Universiteit Amsterdam, either faculty of Sciences or faculty of Behaviour and Movement Sciences. In addition, there are a number of researchers from ACTA who are personal members, these are not included in the table below. The membership table is based on information from the Community Module of the Research Information System PURE database,

over the year 2019, as well as the VU/VUmc Hora Finita PhD registration system, and data from AMC PhD Graduate School. The registrations are counted once only.

Looking Ahead

As this annual report is finalized, we write 2020, and COVID-19 has taken hold of the world. As clinicians and scientists, we see from close by the havoc this has created in the clinics, labs, and society in general. However, as movement scientists, this creates new opportunities for us to help find a solution to this disease, and we have taken the opportunity to appoint a young talented researcher, whose main task is to identify the possibilities for our researchers and bring researchers together for new collaborative projects. Rehabilitation after COVID-19 and the Post Intensive Care Syndrome (PICS) has been much in the news, and the importance of good and stable rehabilitation trajectories will become apparent in the years to come, we will undoubtedly return to this in next year's report.

Furthermore, we aim to set out new calls for collaborative research projects, as Amsterdam UMC will continue their financing of innovative, multidisciplinary research. We look back at the start of the institute in 2017, and see that a lot has been done, we aim for a mid-term audit in 2021, which should tell us if we are heading in the right direction.

Do not hesitate should you want to get in touch, and stay safe!

Richard Jaspers and Mario Maas