Amsterdam Movement Sciences

VU VRIJE UNIVERSITEIT AMSTERDAM

Amsterdam UMC University Medical Centers

Amsterdam Movement Sciences

Annual Report 2020

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2020 - An eventful and memorable year

Without any doubt 2020 was an outrageous year in every sense of the word. COVID-19 struck the Netherlands in March and rapidly changed our lives. The pandemic brought us in many ways to a standstill, both in our private and professional lives. The COVID-19 pandemic had, and still has detrimental effects on physical fitness, and lockdowns reduce our radius of action. However, despite and perhaps because of the Covid-19 limitations, many of us found new ways to be physically active and started new sports activities either at home or outdoors.

The same holds for teaching, research and hospital care in general. Universities had to cancel their lectures and the IC departments of the hospitals were overloaded with patients. Research could not always continue in its original set up. This had major implications for the movement sciences research within our institute. However, like in many cases, with a resilient attitude new opportunities emerge. The researchers adapted very fast to the new situation and previous research into the recovery of ICU patients turned out to be extremely relevant during the COVID-19 pandemic. This interdisciplinary research underlines the urgency of teamwork to develop interventions to restore exercise tolerance and enhance recovery. Also, the apps that are used in a home situation to exercise and monitor training load, turned out to be very useful for recovering COVID-19 patients. Research on burn patients and insight in the involvement of our immune system in wound healing may be of high importance to develop treatment against COVID-19 symptoms. You can read more about these items in the interviews further on in the annual report of Amsterdam Movement Sciences Research Institute.

Despite the limitations to travelling and physical movement through the country and around the world, many interesting meetings and symposia were organized digitally. The Friday lecture series within the sports program attracted a true global audience. New centres of expertise have been set up to communicate our findings to physicians, paramedics, athletes and coaches, policy makers and those interested in the moving body. Moreover, several AMS researchers were successful in obtaining funding to start a business or bringing their knowledge to the market in collaboration with private partners. A key feature of our institute is our interdisciplinary approach, which turns out to be a strong basis for our societal impact.

As we look forward to another year, which undoubtfully will include more COVID-19 waves, one of the important issues that are at play for AMS is the evaluation and continuation of the successful mentorship program, that you can read more about further up in the report. In our talent policy we aim to guide, inspire and stimulate aspiring researchers, and the mentorship program is one of our talent pillars. In 2020 the five AMS research programs will receive funding to strengthen the connection with the end users further, be they professionals or layman. The multidisciplinary expertise center Amsterdam Bone Center (ABC) will have its kick-off meeting. An expertise center for professionals is also under construction within the AMS program Restoration and Development. This field represents a major area for our research, and the expertise center aims to be

a center for all rehabilitation related research in the greater Amsterdam area. The sports program will go on to further intensify the outreach activities, and in 2021 there will be a vacancy for an impact manager whose task will be to bridge the gap between sports science and practise. The institute further aims to become more visible as a partner for private enterprise in developing and improving diagnostics and medical equipment through research.

Finally, after a year with many new challenges, hurdles and opportunities, one bottom line remains clear: **Movement remains, more than ever, the base for a long and healthy life**. Whether you are recovering from a disease like COVID-19, or you are a healthy person. We invite you to scroll through this annual report to see what we have accomplished and meet some of our truly extraordinary members.

On behalf of the AMS management,

Prof. Richard Jaspers
Prof. Mario Maas

Directors
Amsterdam Movement Sciences

Professor Richard Jaspers

Professor Mario Maas

Research Programs

The research within AMS is organized in five programs which capture the key research topics in the field of movement sciences. The programs each have 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 present the five 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.

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.

Within the Sports program, research focuses on the optimization of life long healthy participation and performance in physical activity and sports, by healthy individuals, disabled individuals, clinical patients, as well as recreational and (young) elite athletes.

Interdisciplinary collaboration between named foci is actively pursued with the theme to deepen our understanding of contemporary issues and to optimize impact of interventions related to Sports.

Highlight

Tailored Injury Prevention in Adapted Sports (TIPAS)

The TIPAS study aims to reduce the number of injuries due to sports and exercise in disability sports and reduce their negative consequences, through early recognition of health complaints and the delivery of timely tailored preventive advice.

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

Musculoskeletal Health

The overall aim of this program is to improve the physical performance, the activities of daily life and health related quality of life for people who suffer from musculoskeletal disorders through high quality research. This program focuses on common musculoskeletal disorders, such as osteoarthritis, back- and neck pain.

Musculoskeletal conditions affect people across the life-course in all regions of the world. While the prevalence of musculoskeletal conditions varies by age and diagnosis, 20% to 33% of people across the globe live with a painful musculoskeletal condition.

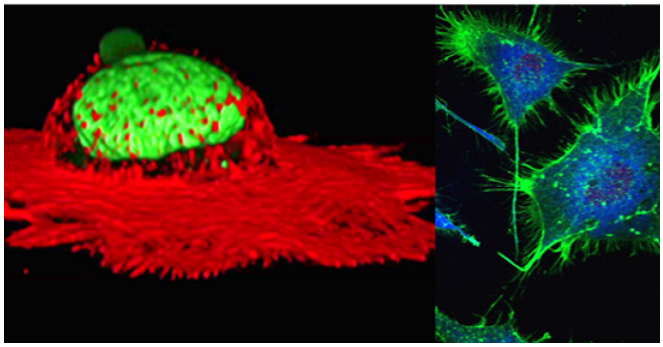
Highlight

Neuroimmune responses following joint mobilisation and manipulation in patients with neck pain

The aim of the MOTION study is to gain insight into how joint mobilisation and manipulation induces immediate pain relief in patients with persistent non-specific neck pain. The main objective is to compare the neuroimmune responses immediately and two hours post-treatment between those with a positive effect on manual therapy compared to no positive effect and the placebo group.

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

Tissue Function & Regeneration



The aim is to develop and combine (new) techniques to investigate musculoskeletal and skin tissue function and regeneration at different biological length scales in vitro and vivo.

This program fosters collaboration between clinicians, physiotherapists, basic scientists, and private partners to facilitate multi-way traffic between fundamental and applied sciences to develop new interventions, biomaterials, as well as training and therapy.

Highlight

Osteogenesis Imperfecta (OI)

OI patients can experience hundreds of bone fractures in their lifetime caused by defects in collagen type I.

Compared to genetic diseases caused by a specific mutation, it is caused by hundreds of different mutations in the collagen type I genes. The quesstion is how to treat effectively a disease with such high genetic heterogeneity?

Director: **dr Nathalie Bravenboer**, Amsterdam UMC, location VUmc, and deputy-director **dr Marco Helder**, both Amsterdam UMC, location VUmc.

Ageing & Vitality

This research program aims to understand the effects of physiological and pathological ageing on mobility and to facilitate vitality and health preservation in ageing and patient populations.

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, and balance performance deteriorate with ageing and age-related diseases.

Although physical and cognitive declines appear unavoidable results of ageing, they are boosted by physical inactivity. Older people generally show a decrease in physical activity, which has been shown to be an important determinant of disability and mortality risk. In addition, inactivity levels during hospitalisation is a leading cause for rapid functional deconditioning and reduces recovery rate during and after hospital stay.

Older adults, and in particular older patients, require adequate fitness levels to maintain independence, recover from illness and reduce their high risk of falls. Understanding and advancing mobility and active aging within the ageing population is therefore currently one of the top priorities in (inter) national health care policies, but also for the target group of older adults.

Highlight

Perturbation-based gait training programme to prevent falls of older adults

The purpose of this project is to develop a fall-preventive training programme with gait perturbations on a treadmill and investigate the effects on functional balance and gait performance, self-efficacy, physical activity and gait quality in daily life as well as daily-life falls incidence in the older population at risk of falling.

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

Rehabilitation & Development

This program includes all translational research addressing optimization of mobility and physical performance of disabling disorders affecting the locomotor functions and brain, including children, adults and the typical rehabilitation target populations, including intensive care unit and diabetic foot disease populations.

The program Rehabilitation & Development aims to optimize physical performance of individuals, including children, with musculoskeletal injuries, neurological disorders and chronic diseases affecting movement abilities. Movement is sub-served by our musculoskeletal system, which relies on the neural, endocrine, immune, respiratory, and cardiovascular systems that control and support it. The interactions of these systems are studied, to reveal how physical performance can be maintained.

Interventions cover: surgery, pharmacological interventions, cognitive and motor learning and training strategies, assistive devices, (care giver) support.

Precision diagnostics of movement impairments, based on etiology, will be developed to personalize therapies that restore, adapt, or support the neuro-musculoskeletal system to optimize the restoration, development and preservation of movement abilities and physical performance.

The research addresses

1. the biological mechanisms underlying declines in physical performance and the effect of interventions preventing/reducing these declines;
2. diagnosis and prediction of declines in physical performance and the underlying impairments;
3. efficacy and (cost-)effectiveness of interventions to prevent/reduce declines in physical performance.

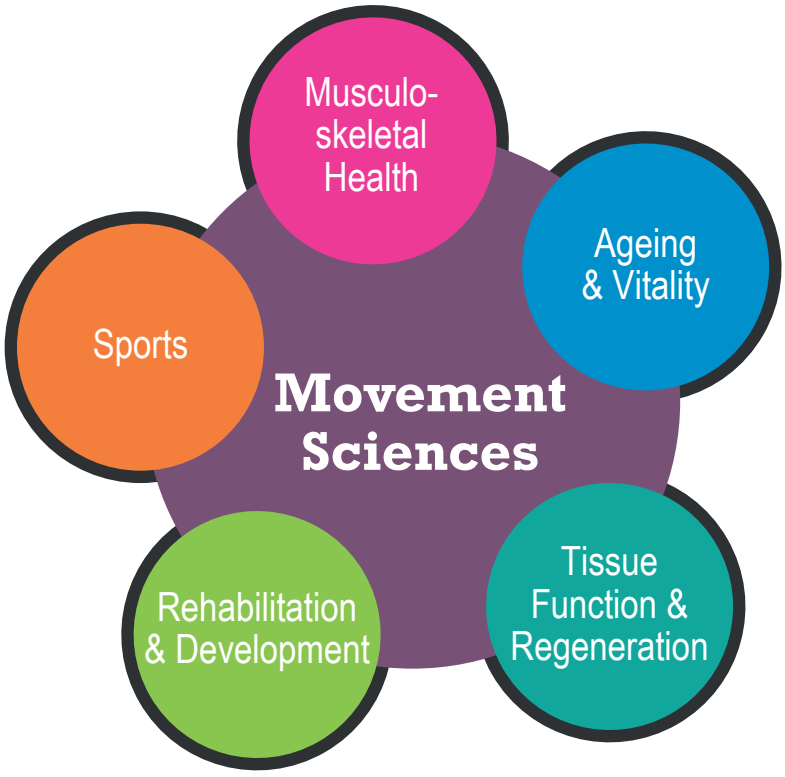
Highlight

Optimal physical recovery after hospitalization

The purpose of the OPRAH trial is to investigate the effect of a blended intervention, focused on personal feedback and coaching regarding physical activity and protein intake, in cancer patients planned for gastro-intestinal or lung surgery on the outcome 'recovery in physical functioning'.

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

More information on alle research Programs"https://www.amsterdamumc.org/en/research/institutes/amsterdam-movement-sciences/programs.htm



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)

The MT consists of the two AMS directors, the research program directors, an ECR and a PhD representative.

- **Professor Richard Jaspers** (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,
- **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.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AMS in times of COVID
Interviews

Rehabilitation in times of Covid

Marike: 'We were running our REACH project ('REhabilitation After Critical illness and Hospital discharge) when the COVID pandemic started. REACH is a research project by Amsterdam University Medical Centre and the Research Group Rehabilitation in Acute Care at the Amsterdam University of Applied Sciences (HvA). Within that project, we had developed and implemented a rehabilitation network with physiotherapists, occupational therapists and dieticians, for patients who had been treated in an Intensive Care unit and were discharged. This turned out to be effective. We also developed a toolkit for allied health with recommendations for practice. In the context of the COVID outbreak, the REACH network accelerated the provision of the 'Post Intensive Care Toolkit', to support professionals in the treatment of these patients after the hospital phase. As the COVID crisis developed, this was suddenly in high demand across the country. In fact, many of the complaints raised by IC patients resemble those of COVID patients. We developed, implemented and evaluated this program in a community of practice with professionals. Within this group, we could exchange our knowledge and experiences very well. It turns out that COVID patients, especially those who were sick at home, have many similarities with patients with Post Intensive Care Syndrome (PICS).

A new website and e-learning

We then very quickly built a website together with the Netherlands Paramedic Institute to make this knowledge more widely available: www.reachnetwerk.nl In addition, with the NPi we developed an e-learning that has already been followed almost 500 times. Within a month we had had requests from 3000 colleagues from all over the country who wanted to join the REACH network. The next step is to formalize and implement the REACH network into a transmural, interdisciplinary care network. The REACH network has offered many opportunities in terms of valorization.

Marike van der Schaaf, Associate Professor Rehabilitation in Acute Care, and **Sicco Bus**, Associate Professor, chair of the AMS program Rehabilitation & Development

"Our interdisciplinary approach to rehabilitation of ICU patients proved very suitable for COVID patients"

Especially people with long-term COVID symptoms, in particular those who have gone through the disease at home, including young people, are extremely tired after a slight effort. Some of them cannot even walk a hundred meters after a year has gone by. Corona patients who are admitted to an ICU are likely to develop PICS; they are usually admitted fairly acutely and remain on a ventilator for a long time, two important risk factors for developing PICS. The period of recovery in the ICU can be particularly traumatic: at the moment they become conscious, they are using a breathing tube in an unfamiliar environment, with professionals wearing masks and face shields and without their family at their bedside. Research has shown that roughly 50 to 70 percent of ICU patients develop PICS symptoms.

Patients were referred to the group of passionate professionals who worked within the REACH community. We met frequently with ZOOM meetings to exchange knowledge and experiences. We also organized webinars during which a lot of know-how was shared. Together with the HvA we applied for a ZonMw grant to develop a remote intervention to monitor patients' daily physical activities, oxygen saturation, heart rate and fatigue, and to gain insight in how people react to different training loads.

Together with **Marike van der Leeden** and **other collaborating researchers and practitioners** (see interview page 18.) we found many hooks and eyes and noticed that this is the care of the future. This will be extended with e-health modules, which we aim to offer to people with a migrant background, and secondly, we want to make e-health more accessible for professionals. It may be good to continue this online, even when the pandemic is over.

Nutrition and Movement

We also contributed to guidelines from the Federatie Medisch Specialisten, Koninklijk Nederlands Genootschap Fysiotherapie, Nederlandse Vereniging voor Diëtisten for ICU aftercare and the rehabilitation for patients with COVID-19. The interdisciplinary character that we already had in the treatment of PICS has also been continued here, but because of COVID the development of the program was fast tracked. Out ambition is to expand the network while maintaining the quality and the enthusiasm. We are also working on a new center of expertise in Nutrition and Movement, *www.voedingenbeweging.nu*. This is a good example of the cross fertilization that we already had in various projects; we can pool our knowledge there'.

"Thanks to the broader AMS network, people know how to find each other, which enables cross-pollination with other medical specialties and fundamental research"

Cross fertilization turns out to be effective

Sicco: 'AMS has taken a good look at how to respond to the current situation, with Marike's research as an example of a rapid response to the pandemic, while not neglecting other important research that is independent from the pandemic. During the pandemic, our research group received grant funding from ZonMw for a nationwide project on the (cost-) effectiveness of a personalized integrated treatment approach to help prevent foot ulcers in people with diabetes.

How can the AMS program Rehabilitation & Development gain more exposure? Within AMS, we are setting up a Rehabilitation Research Network Amsterdam. This is quite something, but how do we put its objectives on the map, also internationally? As a program, we would like to facilitate collaboration and cross-pollination between researchers and other stakeholders as much as possible. A coordinator for the network should help shape these ambitions and goals. Organizing inspiring meetings that researchers want to speak at and people want to attend, having a project database, and knowing who are useful stakeholders, should create a research network that helps put rehabilitation medicine on the research map more effectively and in acquiring grant funding. Thanks to the broader AMS network, people know how to find each other and this enables cross-pollination with other medical specialties and fundamental research. The idea of a rehabilitation research network has been accepted with enthusiasm by the AMS board and many members, and will hopefully further strengthen the research field'.

Marike van der Leeden, Research Associate, Rehabilitation Medicine, Amsterdam UMC

Remote physical training for cancer - and COVID 19 patients

In 2020 Marike van der Leeden and Edwin Geleijn received a grant of €15.000 euro from ZonMw for a study into a creative solution during the COVID-19 pandemic. In this study we focused on patients under medical treatment for cancer who were unable to visit a physiotherapist because of the COVID-19 restrictions. Physiotherapists could monitor physical activity and heart rates while the patient trained at home and adjust the training advice accordingly.

Marike: 'The project started with an AMS PhD grant in 2019, using motion sensors and an app for patients to self-monitor their recovery after cancer surgery. With this technology, physiotherapists and other professionals are able to track and coach the patient's physical activity remotely. Marijke de Leeuwerk is working on this project as a PhD candidate. A grant from ZonMw made it possible to use this technology in the COVID period, when

it became even more urgent to be able to provide remote care to patients. Together with an ICT partner (Peer code), we developed this into an Atris training kit, where heart rate can be measured and displayed in the app while training. Now we can monitor how intensive the training is and whether it is sufficient to improve the patient's condition.

The Department of Rehabilitation Medicine at Amsterdam UMC, location VUmc, coordinates a network of physiotherapists who guide cancer patients in their physical training during chemotherapy. During the lockdown, these patients could not receive this care. We offered the physiotherapists to work with our training kit, thanks to the ZonMw budget. We then collected experiences from both patients and physiotherapists and used them to further develop the technology.

The training kit has also been used in a project of the REACH network (PI Marike van der Schaaf), where patients, including COVID-19 patients, are guided after discharge from the Intensive Care Unit. Saturation was one of the items measured in these patients. We want to further develop this tool and introduce it to more patients in the near future, as there is a huge demand for it.

We are working more and more with dieticians. In that area, it is interesting to monitor protein and energy intake, in addition to physical activity, in people who have undergone surgery. Together with the department of Dietetics and Nutrition Sciences from Amsterdam UMC and the HvA we intend to start a knowledge center for nutrition and exercise, where all knowledge will be brought together.

Amsterdam Movement Sciences is also involved in this center. The idea is that researchers, healthcare providers and patients can retrieve information and share their experiences. Nutrition and exercise are inextricably linked.

COVID 19 has definitely increased the urgency of this type of interdisciplinary research

We want to further develop and try out the different possibilities of self-monitoring of physical activity, protein and energy intake in different target groups and across various projects. For the future we aim to expand the cooperation, also with other institutes, as there are many opportunities for remote training. Covid 19 has definitely increased the urgency and oppotunities of this type of interdisciplinary research into remote rehabilitation care.'

Edwin Geleijn, Physiotherapist, Rehabilitation Medicine, Amsterdam UMC

"Our research on burns goes beyond COVID"

Paul van Zuijlen Professor in the medicine of Burn Scars at the dept of Plastic, Reconstructive and Hand Surgery, Amsterdam UMC, medical director Dutch Burn Center, Red Cross Hospital, Beverwijk

Burns, immune treatment and Covid19

Paul van Zuijlen investigates whether a medication for burn patients can also be used to treat COVID sufferers. 'In 2020 I was a fellow at the Institute for Advanced Study (IAS) in Amsterdam, which is a hub of the famous IAS in Princeton, led by Robbert Dijkgraaf. There I discussed with the scientific director professor Peter Sloot the complexity of burns, but also about the immune response of the patients. The use of alkaline phosphatase came up, which protects your cells from becoming involved in the shock. The idea arose in conversation with Evelien de Jong, one of our ICU doctors; if your immune system goes off the rails due to a virus, alkaline phosphatase can have a positive influence on the degree of derailment. We had been working on this for two years, then the coronavirus struck and we thought, can this work for the coronavirus as well?'

'We have started from the Red Cross Hospital, and we are expanding the research on alkaline phosphatase at various ICUs in the Netherlands and in Belgium. Unfortunately, I cannot say anything about the outcomes at this stage because the study is not completed yet. There are also studies on the effect in the preventive sphere; to strengthen the immune system. The body is prepared for injury, be it a burn, an accident or illness. The body has a defense system which normally is in balance. If the virus has done its work, the body can suffer a major setback, as the immune system is not working according to its design. The virus affects an ACE2 (Angiotensin-Converting Enzyme 2) receptor, it affects blood clotting, etc. It gets into the body's mechanisms at all levels, and then you get sick. So, it is conceivable that one could apply this medicine in an early stage of the infection, or perhaps even in healthy people; we are also doing research on elderly people. As a plastic surgeon, I always try to be open-minded, and I am excited about these kinds of scientific challenges that offer unique opportunities and are likely to open many new doors. We do this research on the immune system in times of COVID, but it goes deeper than that. It has to do with a general response where we

hope to have an interesting input. There will be more threats to the immune system in the time to come.'

Fireworks

'In the context of burn prevention, I have in recent years done my bit about banning fireworks during the end of year celebrations. I posted a tweet in early November about a little boy who had had his hand blown off. That tweet went completely viral and the reactions were fierce. There were many sympathizers, but also a stunning amount of hate mail. There is a group that does not want to see their fun taken away. It does not help if you point out the serious consequences. I try to stay out of the way of emotions and to start a conversation. What had been impossible for years, suddenly became possible on New Year's Eve 2020. The result was an enormous drop in the number of victims. Never waste a good crisis. You have now been able to show that things can be done much better from the point of view of the victims; it is now much easier to persevere. We have had a momentum. The government cannot ignore it'.

"We can learn a lot from sweat"

Hein Daanen, Professor of Exercise Physiology, Department of Behavioural and Movement Sciences, VU Amsterdam

Hot and humid: how do you perform at Olympic level?

Hein Daanen was quoted many times in the press in 2020. Not just about his research on heat, but also in relation to COVID. He is, for example involved in research that monitors nursing staff who are wearing cooling vests while caring for COVID patients.

'The garments worn by nursing staff have reduced permeability for air. Therefore, the sweat that you produce during work in protective clothing does not evaporate, and thus does not lead to cooling. I am involved as a supervisor in a study in Munich, where we investigate cooling undergarments for medical staff.'

Research on sweat

'Humans have dry and wet heat loss mechanisms. Dry heat loss is when the skin is warmer than the environment, induced by radiation, convection and conduction. Wet heat release happens through the evaporation of moisture from the skin and mucosa. We always produce heat, as we sit and rest we produce 100 watts of heat! That is equivalent to a large light bulb. Loosing heat is more of a challenge in hot circumstances. Therefore, it is important to have a closer look at the climate change that is taking place. We are facing a challenge. The thermal environment is changing because of climate change, and in particular because cities are warming up. It is hard to get the heat out of the cities. In addition, you have the industrial heat. How can we keep the cities livable? We organized an interesting online Lorentz conference in March: *Hot but habitable*. Architects must design houses that absorb less heat; urban planners are researching the effect of green (trees) and blue (water) spots in the city. The entire infrastructure has to change. Mitigation techniques are being developed so that we can still live on this warming planet. NWO, ZonMw and the EU have provided funds for research on problems in the heat. It may sound strange that at the moment more people die in the winter than in the hot summer, but as the world warms up, that will change. Depending on our behavior, the moment that heat related mortality exceeds cold related mortality may appear as early as 2080. Strangely enough, it is not the very weak who die from heat, but the vulnerable group that is not yet in the hands of Grim Reaper. We still have to find out more about the physiological aspects of this.

Heat and exercise

In recent years we have invested a great deal in knowledge relating to the athletes going to the Olympic Games. In our climate research room at the Department of Human Movement Sciences we investigate how athletes react to heat, and how the human body can adapt to it. It turns out that it can adapt very well, but it takes time, it often takes 10 days. PhD candidate Puck Alkemade in her research focusses on heat acclimation on both able bodied and Paralympic Athletes.

In 2019, the World Congress of Thermophysiology took place at the Royal Tropical Institute in

Amsterdam. That was a tremendous success. In 2020, it was supposed to take place in Canada, but because of COVID it took place online: *www.icee2021.com*.'

Future plans

'For the future there are several plans. Thanks to post-doc Nicola Gerrett, PhD candidate Lisa Klous and the skilled technicians at VU, we currently have a sophisticated system to measure local sweat rate. In a recent webinar we organized about clinical aspects of sweat analysis, the presenters discussed patients with cystic fibrosis, in which the salt content is a determinant of the severity of the disease, but also which components in sweat are related to cancer, or the relationship between sweat and diabetes. There is more in sweat than we think, and in the future sweat sensors may be integrated in smart garments.'

'Smart garments are the future, not only the smart wearables that are restricted to the wrist area. We can measure skin and body temperature; we can insert both cooling and heating elements. This integration of physiological measurement and clothing is something I really like. We are always sweating, if you sweat profusely, it can be up to 3 liters per hour.'

'We still do not have an answer to the question of why some people are heat intolerant. There is growing evidence that a genetic component plays a role in this. Do we have an increased risk for heat or not? This is of interest to firefighters, military personnel and athletes. For example, we see that some people get unwell during the 'Vierdaagse' (The Four Days Marches) in Nijmegen. Will we at some stage be able to pick them out in advance?'

"The quality of movement is a good indicator of the quality of life"

Mirjam Pijnappels, Professor of Mobility in Ageing, Department of Human Movement Sciences, VU Amsterdam

Healthy movement, healthy ageing

'During the COVID pandemic, the effects of immobility have increased, and these are going to be major issues in the years ahead. I definitely see that the urgency of our research has further increased by corona, both because people are affected by COVID

and because of the immobility of being locked down. Old COVID patients, especially the elderly, often have respiratory problems and a deteriorated condition. In older people, cognitive decline is also boosted by the lock-down. The social isolation can lead to feelings of depression.

Younger elderly

I focus on the somewhat 'younger elderly' from 65 years of age, who are still active and live at home, but also on a group that is under 65; in terms of lifestyle modification the most can be achieved in this group. People with a sitting job who retire generally become more active, people with a physically more strenuous job often become more inactive. On the whole, we see that the importance of good nutrition and a healthy lifestyle has become more widely accepted. We see this particularly among the higher educated part of the populaiton. Our goal is to get the lower educated and migrants on board as well.

What did get a boost are (the need for) e-health programmes, the remote monitoring of health status and physical activity, but also the effects of an intervention, such as surgery or physiotherapy. Information on diagnostics or recovery can now be monitored online. We are going to develop this further, for example in a tool for orthopedic surgeons and patients to remotely monitor and visualize recovery of gait function after a knee replacement. This will be even more urgent as many patients will receive delayed joint replacement surgery because of COVID-19. In the autumn of 2021, there will be a backlog of eighteen months to clear; a major problem. Some patients will have worse function although it also seems that others have benefited from prolonged physiotherapy. By monitoring gait function in daily life, we hope to also identify those who will benefit most from surgery. The added value of a knee replacement, in terms of function, is not yet proven beyond doubt. The backlog of patient care due to COVID-19 also applies to cardiology. Older people in particular are less likely to see a doctor, which means that diagnoses may be made late. The effects are then often more difficult to remedy. Cooperation with various disciplines, but also with companies, is very important here.

Falling as a new pandemic

For the future, my research focus is to preserve and improve the physical function of elderly people. To improve and balance control. Technological support works well for that. Marcel Levi, the former director of Amsterdam UMC, recently spoke of a new pandemic: that of falling. We only see the tip of the iceberg of the fall problem. Because people sit at home more because of COVID-19, they may fall a little less, but their (age-related) decline in muscle function is boosted by physical inactivity, as does endurance. So, when people do start being physically active again, the chance of falling is larger, as are the consequences, because bone quality is also affected by sedentariness. I wonder how many people will remain cycling as that requires a lot of skills. The chance of falling is greater. People's self-estimation is crucial here, over- or underestimation affects people's behavior and may result in inactivity or risky behavior. Clinical interventions should not only address what can they do, but also what do they do. Particularly after a year of being much less active. Illness plus inactivity accelerates the ageing process. These multifactorial

issues require interdisciplinary teams of researchers and clinicians, to optimize and personalize good care of an elderly person.

What is good for whom?

We know that a physically active lifestyle is good, but we do not always know why and how. We do a lot of studies on general populations but we are now moving more and more towards personalized medicine, where we include characteristics of individuals to look at what works for whom. Characterizing subgroups and individuals is important. Not every treatment is good for everyone. The gender effect also something that has not been well researched. As a movement scientist, I find it very fascinating to find the right measures that properly indicate physical function and mobility. In particular, the quality of movement.

We strive to keep our biological age below the chronological age and to maintain the quality of life up to old age. People are getting older and I believe that mobility, in particularthe quality of movement, is a good indicator of quality of life. Mobility facilitates one's independence and social and physical activities. Understanding and promoting this is an important task for Amsterdam Movement Sciences.'

Fitsurance, a moving start up

A holistic approach is the key to preventing disease

Interview with Sauvik Das Gupta, Stef Beijk, Tommie Koppens

'More than 33 % of the Dutch male population suffers from the metabolic syndrome. A small beer belly, combined with an elevated blood pressure, low good cholesterol, high triglyceride and sugar levels. You are already in a preliminary stage of becoming sick. The doctor often measures only one part. With a tailored program of exercise and diet we can prevent heart disease or diabetes' says Tommie Koppens. He, Sauvik Das Gupta and Stef Beijk set up a thriving start-up in 2019: **Fitsurance** (https://www.fitsurance.nl/). Its scientifically based and easy to carry out health checks, give people a quick insight into their health, fitness and capacity. The Fitsurance team analyzes the test results and translates them into practical nutrition and exercise advice. The team supports athletes, coaches, the general public and companies in obtaining a healthy and active lifestyle.

'We started as a course project in the Faculty of Human Movement Sciences in 2018, as part of a course given by prof. Masurel, who later directed us to professor Ianuzzi, that's where the idea of an entrepreneurship came from. We were accepted by the Demonstrater Lab at VU and could start with our measurements. Thanks to the guidance and some grants we could buy equipment and do lab tests. The first event we started was at the VU, on the Day of Sustainable Employability, where students and employees could undergo a quick health check. There was a queue, people had to wait, we didn't expect so much enthusiasm. At that time no one knew us. Most of the people who were measured were people who were already working on their health. That is a fact we are still facing:

Sauvik Das Gupta, Stef Beijk, Tommie Koppens, Moritz Eggelbusch

people in a privileged situation, with a good job and high education are often in a better shape and already work more on their health than people in a less privileged situation. We want to work on that, we are one step away from cooperating with health insurance companies. For instance, to negotiate with other parties to offer it for free. In collaboration with a private partner, we aim to construct a consortium to support people in the lower economic class. We have several partnerships. We collaborate with Clear, a company that offers a personalized nutrition program based on real-time biomarkers in combination with AI-driven dietary recommendations. We do not yet work for large organizations with many employees. We found that these organiztaions mostly focus on sick leave, whereas within 10 years people might get heart disease or diabetes, but these companies are not yet envisioning a long term plan.'

'What we learned during our entrepreneurship course was a good and solid base, but you have to learn much to bring a product to the market, to learn how clients and companies will perceive your proposition. You have to do a lot of market research to reach your goals. So, it would be good if there would be more attention on how to convert your research into practice.'

'After the outbreak of COVID, we changed some of our services, some groups of clients are now being tested on an individual base; we send our test by mail, and the clients can send the blood samples to the labs so we can collect the data. We are living in strange times: people are aware of the fact that they should move more and eat better, but at the same time they become inactive. We encounter a reduction in physical activity and an increased consciousness. We have adjusted our exercises so anyone can do them at home or in the neighborhood and added exercises on muscle strength, flexibility, mobility and over-all activity were added to the training program'.

'Fitsurance has also started a branch in India. People in India are becoming more enthusiastic about lifestyle and also the vegan lifestyle. 'We are working on a project with the university where Sauvik Das Gupta did his Bachelor. The market is very different from the Netherlands, due to geographic and cultural circumstances. We are concentrating on the market research part. COVID has increased the enthusiasm for health. We concentrate on urban India, two cities, and try to build a brand from there.'

'Our goals for the future are to cooperate with other companies to combine more research, from blood test, tests on microbiology of the intestines, so we can check what the effect of the diet is, in a pre- and a post-check on your microbiome, and your organs. We also work on a program with EkoMenu that delivers a personalized food box over a period of ten weeks to people's homes. We call that B(usiness) to B(usiness) to C(onsumer). With this holistic approach we aim to lower the threshold to a happy, healthy lifestyle'.

AMS in the press

In 2020 various AMS research results appeared in the press. A few examples:

https://www.parool.nl/nederland/na-de-ic-wacht-het-lange-herstel-mensen-weten-niet-wat-ze-overkomt~bc01bc22/

Raymond Ostelo:

https://www.noordhollandsdagblad.nl/cnt/dmf20200922_97691624?utm_source=google&utm_medium=organic

Masterclasses by Dutch public broadcaster MAX:

https://www.maxvandaag.nl/programmas/tv/max-masterclass/max-masterclass/POW_04765787/

Het Parool
Vrij. Onverveerd

Na de IC wacht het lange herstel

Na een verblijf op de intensive care wacht coronapatiënten vaak een lange weg naar herstel. 'Ik moet nog rustig aan doen om te voorkomen dat mijn emmertje volloopt.'

Raounak Khaddari 8 juli 2020, 10:27

"Je kunt het je waarschijnlijk niet voorstellen," zegt fysiotherapeut Frank Mulder als hij Michiel van der Hulst (46) uit de wachtruimte haalt. "In april kwam hij met een rollator binnen. Hij kon amper lopen." Nu loopt Van der Hulst helemaal zelf naar de behandelkamer. "Ik was de eerste in Hilversum met corona," zegt Van der Hulst. "Ik ben vrachtwagenchauffeur. Begin maart was ik onderweg met een vracht motorfietsen van België naar Düsseldorf. 's Avonds kreeg ik rillingen."

Van der Hulst zit op een stoel in de hoek bij Fysiotherapie Douma. Hij zit in dezelfde kamer als waar hij begin april met zijn rollator naar binnen schuifelde. De coronapatiënt vertelt ontspannen, soms verbaasd over zijn eigen woorden, wat hem overkwam.

Na die avond in maart veranderde het leven van der Hulst, vader van twee kinderen (9 en 11), in razend tempo. Hij werd positief getest op Covid-19, maar mocht na een dag naar huis. Na twee nachten ging het mis. "Ik lag als een goudvis op het droge te happen naar adem. De ambulance heeft me

opgehaald en toen is zuurstof toegediend." Maar zijn situatie verslechterde. "Ze kwamen bij me aan het bed vertellen dat ik er rekening mee moest houden dat ik aan de beademing moest op de intensive care."

Negen dagen later werd de vrachtwagenchauffeur wakker op de ic in het AMC, onderdeel van Amsterdam UMC. "Ik was stabiel genoeg voor vervoer vanuit Hilversum en ze hadden daar plaats nodig voor andere patiënten."

Het is 8 april als Van der Hulst wordt ontslagen. "Ik moest nog wel een krachttest doen in het ziekenhuis, maar ik merkte aan alles dat ze me snel weg wilden hebben. Ik moest laten zien dat ik zelf trappen kon lopen; ik wilde zo graag naar huis dat ik alles op alles zette."

Spiermassa

Hij mocht naar huis, maar Van der Hulst kon weinig. In de negen dagen dat hij op de ic lag, viel hij 17 kilo af. "Dat is voor een groot gedeelte spiermassa," zegt zijn fysiotherapeut. Van der Hulst kon amper lopen, werd in een rolstoel het ziekenhuis uitgereden en kreeg een brief mee waarin stond dat hij contact kon opnemen met mensen van Reach. Dat is een onderzoeksproject van Amsterdam UMC en de Hogeschool van Amsterdam waarbij onderzoek wordt gedaan naar de revalidatie van ic-patiënten (zie kader).

Dat een lichaam fysiek veel te verduren krijgt tijdens en na een ic-opname, staat buiten kijf. "Maar het heeft ook gevolgen voor je mentale gezondheid, je werk, je kwaliteit van leven," zegt Mel Major van de HvA, de promovendus die het onderzoek leidt. "We willen de nazorg verbeteren. Want nog altijd voelen mensen zich verloren als ze naderhand met klachten bij hun fysio aankloppen. Post-ic-klachten worden nog te weinig herkend."

Van der Hulst benoemt het nog een paar keer als hij zijn verhaal vertelt: "Ik mag in mijn handjes knijpen dat ik deze mensen heb." Hij wijst ook naar zijn ergotherapeut, Remco Blok van Ergotherapie Gooi en Omstreken, die lid is van het team deskundigen dat coronapatiënten helpt revalideren.

Hoogmoed en ontkenning

Aan het begin van zijn revalidatie werd Van der Hulst drie keer per week een uur begeleid bij Fysiotherapie Douma in zijn woonplaats Hilversum. Het team, waartoe ook een diëtist en een ergotherapeut behoren, overlegt nauw over patiënten die ze begeleiden en stemmen alles op elkaar af. De belasting tijdens de fysieke sessies in de sportzaal wordt besproken tijdens de ergotherapie. De diëtist leerde hem opnieuw te eten: Van der Hulst had ook spierkracht verloren in de kaken en moest weer vast voedsel leren eten.

Mulder: "Je dacht dat je heel wat was toen je binnenkwam." Van der Hulst lacht, terwijl Mulder en Blok jolig doorpakken. "Ik weet nog goed dat ik aan je vroeg binnen hoeveel weken jij weer aan het werk zou zijn." Van der Hulst herinnert zich dat moment ook. Hij dacht binnen twee weken weer volledig terug te zijn. Dat kwam voort uit een combinatie van hoogmoed, ontkenning, onwetendheid en optimisme, geeft hij nu toe. Major: "Grof gezegd staat een dag op de ic gelijk aan een maand revalideren."

Voor Van der Hulst gaat het allemaal langzamer dan hij dacht en wilde. Hij is nu drie maanden verder en werkt twee dagen per week.

Blok helpt hem langzamerhand terug te keren in het arbeidsproces. Dat gaat verder dan hoe iemand zich voelt. “Geld kan ook een rol spelen,” zegt Blok. Van der Hulst krijgt tijdens zijn ziekteverlof dan wel doorbetaald. “Maar ik was ook afhankelijk van mijn onkosten en overuren,” zegt hij. “Ik ben er nu zeker 1100 euro per maand op achteruit gegaan.”

Dat kan stress opleveren, weet de ergotherapeut. Spanning is er ook door de situatie van de vader van Van der Hulst, die ook besmet raakte met corona en inmiddels bijna honderd dagen op de intensive care ligt.

De vrachtwagenchauffeur zal het ‘emmertje’ nooit meer vergeten, geeft hij toe. Het is een metafoor van zijn ergotherapeut: “Er gaan allemaal gedachten, taken en bezigheden in dat emmertje, dat mijn hoofd moet voorstellen. En waar bij een ander het emmertje na verloop van tijd zichzelf leegt, blijft die van mij vol. Dus moet ik voorlopig nog rustig aan doen om te voorkomen dat mijn emmertje overloopt. Dat durf ik nu wel te erkennen.”

‘Mensen weten vaak niet wat ze overkomt’

De nazorg voor patiënten die op de intensive care hebben gelegen, moet beter, vinden de onderzoekers van Project Reach. Dat is een praktijkgericht onderzoek van Amsterdam UMC en de Hogeschool van Amsterdam en onderdeel van het lectoraat Revalidatie in Acute Zorg van Marike van der Schaaf.

Het project loop sinds 2018, legt hoofdonderzoeker Mel Major-Helsloot uit. “We zien dat patiënten die ontslagen worden, zich verloren voelen. Hun fysieke en mentale klachten worden niet goed herkend bij zorgprofessionals.”

Het project heeft een programma opgesteld voor een samenwerking tussen zeven ziekenhuizen en dertig praktijken, waaronder Fysiotherapie Douma en Ergotherapie Gooi en Omstreken, met als doel een team van experts aan elkaar te koppelen om patiënten zo goed mogelijk te begeleiden na een ic-opname.

“We weten bijvoorbeeld dat veel mensen die van de ic afkomen een delier krijgen. Dat is heftig, aangezien je problemen met je geheugen en concentratie kunt krijgen. Dat zijn dingen die onmisbaar zijn om bijvoorbeeld goed te functioneren op je werk. Evenals genoeg spierkracht. Mensen weten vaak niet wat ze overkomt en zijn gebaat bij de juiste begeleiding, bij maatwerk. Met zo’n interdisciplinair team dat de juiste kennis heeft, kan dat.”

Al betreurt Major – en met haar ook andere zorgverleners – de huidige situatie. “Wie nu geen aanvullende zorgverzekering heeft, moet het grotendeels zelf betalen. Wij willen doorpakken met dit onderzoek en laten zien dat het écht werkt en hopen dat ook mensen met alleen een basisverzekering hulp vergoed krijgen.”

Raymond Ostelo on low back pain.

Noordhollands Dagblad

Iedere (chronische) rugpatiënt zou eigenlijk zijn eigen casemanager moeten krijgen. Die kan hem wegwijs maken in het woud aan behandelingen, oefeningen en therapieën.

© Foto: Getty Images/Thomas Trutschel

Robbert Minkhorst
07/10/2020 om 08:08

Het grootste risico voor een rugpatiënt is dat hij na herstel weer rugpatiënt wordt

„In mijn beleving is er een enorme versplintering aan behandelvormen ontstaan", zegt hoogleraar **Raymond Ostelo**, waarbij iedere behandelaar zijn favoriete hobby of specialisme heeft. Er zijn ontzettend veel hulpverleners die zich met rugklachten bezighouden. Zonder dat er nou heel veel afstemming is. Er is weinig coördinatie in de zorg voor deze groep patiënten. Dat zie ik wel als een bottleneck."

„Adviezen kunnen ook nog wel eens verwarrend zijn voor patiënten", geeft Ostelo aan. „De een zegt bijvoorbeeld: Het is slijtage, je moet rust houden. Een ander zegt: Nee, je moet blijven oefenen."

Bij de Vrije Universiteit en Amsterdam UMC bekleedt Ostelo de leerstoel evidence based fysiotherapie. Binnen zijn vakgroep hoopt iemand binnenkort te promoveren op musculoskeletale geneeskunde (MSK), een van die 'vele vormen' trouwens. De musculoskeletale geneeskunde richt zich op verstoringen in het bewegingsapparaat, vaak ook op spierschade. „Wat MSK-artsen van de meeste andere paramedische behandelaars onderscheidt, is dat het artsen zijn", noemt Ostelo een belangrijk verschil. „Zij hebben een traditionele opleiding in de geneeskunde."

Inzicht

Bovendien is het promotie-onderzoek bedoeld om meer wetenschappelijk inzicht te krijgen en juist dat ontbreekt vaak. Voor Ostelo is dat ook een van de oorzaken van het ontstane woud aan therapieën.

,,Als je kijkt naar het wetenschappelijk bewijs, is er voor lage rugklachten geen enkele succesvolle ingreep of behandeling ('interventie') die er écht bovenuit steekt. Daar is ook veel discussie over in de wetenschappelijke literatuur. Bij grofweg negentig procent van de patiënten weten we niet goed waar de klachten vandaan komen.''

,,Dat leidt ertoe dat iedereen zijn eigen bril opzet'', aldus Ostelo, ,,dat vanuit dat ene perspectief iemand behandeld wordt. En je krijgt het verhaal van de individuele patiënt. Die is vaak met de ene therapie wel geholpen, maar met een andere niet. Zo is een heel aanbod aan 'paramedische' zorg ontstaan, waarbij niemand heel goed weet: wat is nou de beste optie?''

,,Het betekent ook dat patiënten heel erg aan het shoppen slaan. Dat ze in een circuit van hulpverleners terecht komen. We weten dat actief blijven en goede voorlichting helpt, maar vanuit de wetenschap kunnen we niet zeggen welke therapie nou echt beter werkt dan een andere. En het nadeel van rugproblemen is dat ze weliswaar meestal over gaan, maar dat ze vaak ook weer terugkomen. Het grootste risico voor een rugpatiënt is dat hij na herstel weer een keer rugpatiënt wordt.''

Er geldt wel een 'generieke aanbeveling' binnen Ostelo's vakgebied - fysiotherapie - en dat van aanverwante terreinen, aldus de hoogleraar. Je moet ten eerste zorgen dat de patiënt goed geïnformeerd is. Daarnaast is het belangrijk dat hij (weer) actief wordt, of blijft, en dat hij een serie bewegingsoefeningen meekrijgt. ,,Maar welke oefeningen of therapieën nou het beste werken, weten we niet - waardoor we ook geen harde aanbevelingen kunnen doen, omdat daarvoor het wetenschappelijk bewijs niet sterk genoeg is.''

Er is een flinke lijst aan potentiële behandelingen. Fysiotherapie vanzelfsprekend. De daarvan afgeleide manuele therapie en oefentherapie. Cesar-Mensendieck. Maar er zijn ook bewegingsagogen. Acupunctuur. Chiropraxie, body stress release, yoga, 'lifestyle-geneeskunde', orthomanuele geneeskunde. Waarbij de ene behandelvorm meer gangbaar is dan de andere.

Scholen

,,En binnen de oefentherapie heb je weer allerlei 'scholen'. Bijvoorbeeld de McKenzie-therapie'', zegt Ostelo. ,,Er zijn oefeningen die vooral de spierkracht vergroten. Anderen zeggen weer: je moet juist je core stability (rompstabiliteit) versterken. Dan krijg je oefeningen die je veel in de sportwereld ziet.''

Tegelijk wil het nog wel eens belemmerend werken dat een rugpatiënt behandeling verwacht - en niet dat hij met een set oefeningen als huiswerk wordt weggestuurd. ,,Dat is een interessant verschil in perceptie. Een consult bij een fysiotherapeut of oefentherapeut waarbij veel aandacht is voor uitleg over pijn en het dagelijkse functioneren van een patiënt, en wat hij zelf zou kunnen doen om dat te verbeteren, wordt dan vaak niet als een échte behandeling gezien. Ze verwachten gemasseerd, gemanipuleerd of 'gekraakt' te worden. Maar die voorlichting, adviezen ten aanzien van dagelijkse activiteiten, en oefeningen ter bevordering van deze activiteiten, zijn op dit moment - bewezen - de meest effectieve interventies die we hebben.''

Misleiden

Ostelo waarschuwt dat een MRI-scan ook kan misleiden. ,,Je ziet dat mensen terug blijven komen bij hun huisarts en dan uiteindelijk toch doorverwezen worden voor een MRI. Ook dat is een verkeerde aanname, dat er een foto gemaakt móet worden. Als het richting een hernia gaat, is het zinvol. Maar je ziet altijd wat op zo'n MRI. Terwijl het maar de vraag is of dat wat je ziet ook daadwerkelijk de oorzaak van jouw klachten is.''

,,Eén van de problemen met de rug is dat klachten blijven terugkomen. Dat is inderdaad even de uitdaging. We moeten zorgen dat patiënten beter begeleid worden. Niet zomaar naar huis gestuurd worden.''

,,In de tweedelijnszorg - in het ziekenhuis onder andere, zie je vaak een meer gecoördineerde aanpak. De orthopeed, de neuroloog en een chirurg kijken samen naar een rugpatiënt. In de eerstelijnszorg, waar de meesten in blijven, ontbreekt dat. Je zou een casemanager voor rugklachten moeten hebben. Iemand die de zorg voor een patiënt coördineert. Zodat er een overall en een beter beeld van die patiënt ontstaat.''

Twee miljoen mensen kampen met (chronische) rugklachten. Grofweg driekwart van de Nederlanders krijgt ooit rug- of nekklachten – dat zijn er zo'n 12,8 miljoen. Maar voor hooguit vijf procent van de klachten in de rug wordt een aanwijsbare oorzaak gevonden. In 2018 waren er ruim 600.000 nieuwe gevallen van lage rugpijn, de meest voorkomende klacht.

Max Masterclass

Dutch broadcaster Omroep MAX in 2020 joined forces with **prof. Erik Scherder**, **prof. Andrea Maier** of AMS, **prof. Leonard Hofstra** and **prof. Eric van Gorp**, to investigate the problems of the elderly in times of the corona virus and social distancing. The research results will be used to create content for various MAX programmes with the aim to make senior citizens more resilient to the virus and its effects. The scientists will regularly publish a column on the MAX website where they share their experiences and findings.

Amsterdam UMC Run 2020

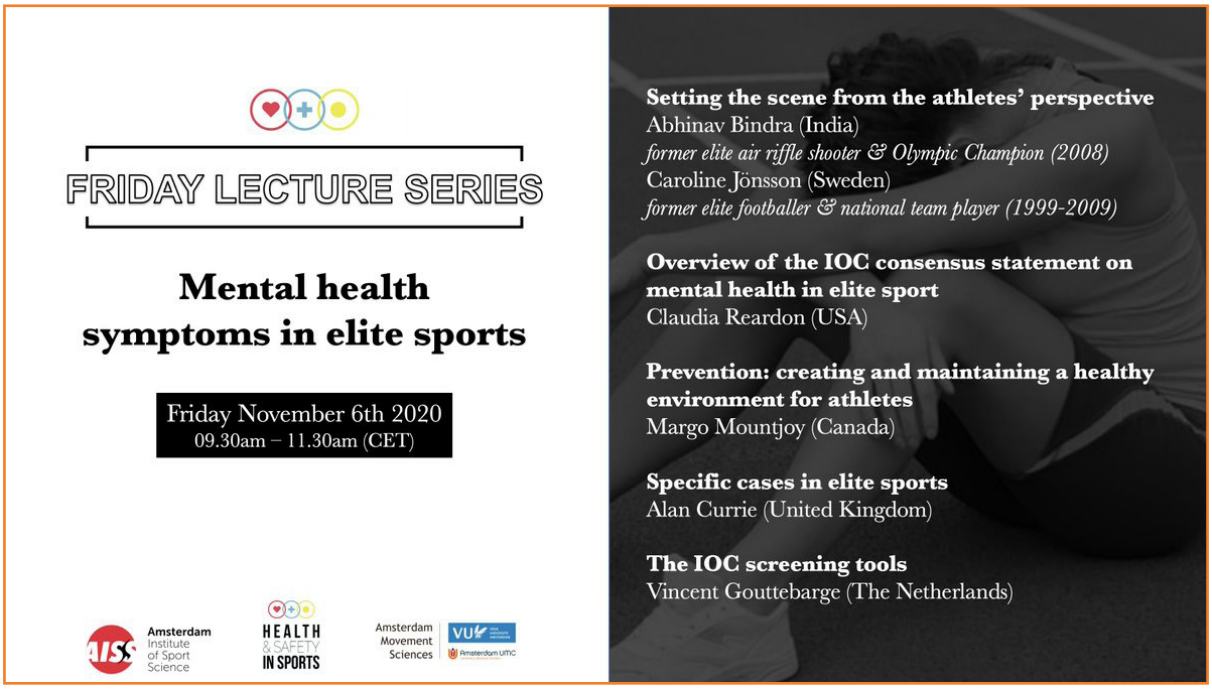
Every year the Amsterdam UMC run is organized to support more money, opportunities and research for patients with Post Intensive Care Syndrome (PICS). PICS has been the charity of the Amsterdam UMC Run for several years and has become more topical than ever due to COVID-19. In 2020 a virtual run took place!

AMS Activities

In 2020, due to COVID 19, many webinars took place with over 200 participants.

Science Transmission Meeting #27

The topic of this meeting will be a **motivational speech**. Challenges are everywhere. In your PhD, in your life, in times of Corona. Keeping motivated to face these challenges helps us to stay strong. As a personal trainer, Dennis Toppin, knows how to awaken people's strengths and will give a motivational speech. Please note that the meeting will take place via **Zoom**. The meeting will **not** be held on the first Monday of the month as it is an official closing day of the VU. Date: **May 11, 2020**. Time: 13.00-14.00. Venue: Zoom Meeting, ID: 950 5374 2260. Password: 050394. Chair: Moira van Leeuwen.



FRIDAY LECTURE SERIES

Save the Date:

INJURIES ARE THE BEST TEACHERS

How Do Athletes Cope With Injury & What This Means For Optimal Care

July 3, 2020
09.30am - 11.30am
Central European Time

More information tba

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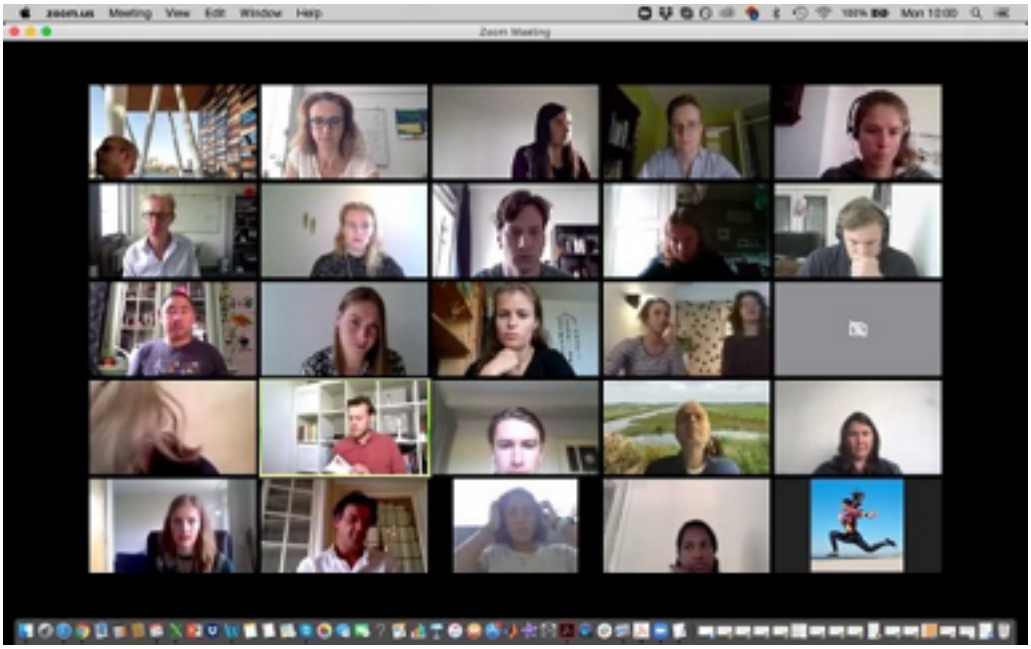
A link on You Tube of the Friday Lecture Series of June 5, 2020 on COVID-19 & Elite Athletes is now available

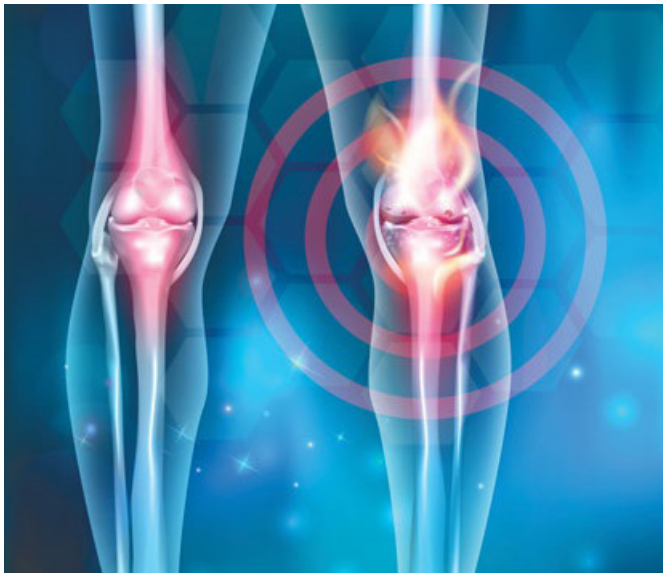


Annual Conference Research Master Program Human Movement Sciences

Every year the Human Movement Sciences Research Master students present their Research Projects in a conference. About 12 presentations were held from students and 3 invited presentations. Invited speakers: Prof. dr. Heleen Slagter, dr. Richard Jaspers and dr. Maarten Prins. Due to the pandemic, the meeting was held online for the first time. The meeting had more than 60 researchers attendants. The students gave lively presentations on a variety of topics. Professor Richard Jaspers, VU, spoke about physico-chemical cues at different biological scales (i.e. at cell organ and whole body level) which contribute to adaptation of muscle size and endurance, and how insight in these adaptive mechanisms may translate into strategies to improve physical performance in (top)sport and disease. Professor Heleen A. Slagter (VU) gave a lecture about the possibilities to increase the ability to pay attention and the underlying brain circuitry of this. She discussed different methods that have been used to try to optimize attention, including electrical brain stimulation and meditation. Research Master alumnus dr. Maarten Prins described how his career as human movement scientist had advanced and gave the current students some considerations to increase their chance of success as future academics. The meeting ended with social encounters online and was chaired by dr. Huub Maas https://research.vu.nl/en/persons/huub-maas and dr. Nadia Dominici. **Date: August 24 and 25, 2020**.

AMS Symposium 'Perception-Action In Sports'

Chairman: **dr. John van der Kamp**, VU Amsterdam
15.15 Room open;
15.30-15.40 Intro- program leaders Sport, **Prof. dr. Geert Savelsbergh**, VU Amsterdam & **prof. dr. Evert Verhagen**, Amsterdam UMC, location VUmc;
15.40-16.10 **Dr. Gareth Paterson**, University of Stellenbosch, South Africa: Perception-action in football and hockey;
16.10-16.40 **Prof. dr. R. Canal-Bruland**, University of Jena, Germany: Auditory contributions to visual anticipation in tennis;
16.40-17.10 **Prof. dr. D. Araujo**, University of Lisbon, Portugal, Sequential affordances in sport;
17.10-17.40 **Prof. dr. O. Hoener**, University of Tuebingen, Germany: Talent development in football;
17.40 Closing remarks;
Date: January 15, 2020. **Venue:** Main Building VU 7A33 (7th floor).
All interested parties are welcome.



Online Seminar: Prevention and Treatment of Osteoarthritis in the Lower Limbs

How can we prevent and treat Osteoarthritis in the Lower Limbs? What are the interesting treatment developments? Speakers: Liam Paget (Orthopedics, location AMC): *From Ankle Injury to Ankle OA*; Arjan de Zwart (Amsterdam Rehabilitation Research Center / READE): *Resistance training in knee osteoarthritis: high or low intensity?* Organisers: Marike van der Leeden PhD, (Rehabilitation med., location VUmc / Amsterdam Rehabilitation Research Center/READE); Vincent Gouttebarge PhD, (Orthopedics, location AMC), board members Musculoskeletal Health Research Program, Amsterdam Movement Sciences. **Date: November 27, 2020, 16:00 – 17:00. Zoom Meeting**.

PhD Enthusiasm

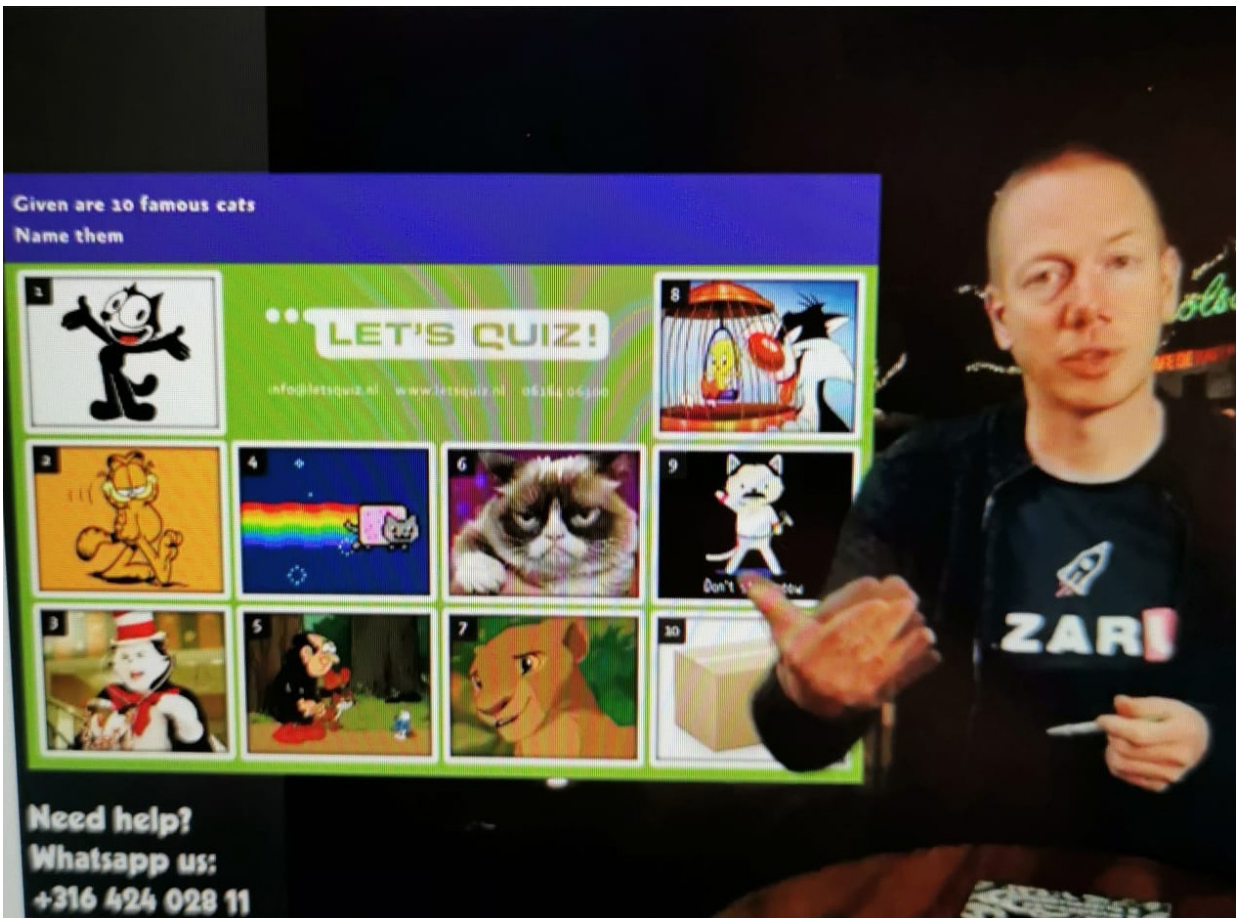
Tim Veneman, chair PhD Committee

Tim Veneman is a PhD candidate at the department of Rehabilitation Medicine at Amsterdam UMC location AMC, and is chair of the AMS PhD committee, which was set up in 2017. 'The main goal of the committee is to achieve more interaction and cooperation between researchers within the institute; it aims to be a platform that helps PhDs to meet, interact and collaborate. Meeting other PhDs and learn about their projects can be inspiring, stimulate collaboration and enhance peer support. PhD candidates from both AMC, VUmc and VU are all represented within the PhD committee.

'2020 was a strange year. Due to the pandemic we could not organize the Spring Meeting. We did organize an online PhD meeting in November 2020 and that was a big success with almost 70 participants. The event started with 4 AMS alumni who talked about their career paths and the choices they made after their PhD. Igor Tak, Yvette Kerkum, Daniel van Leeuwen and Kaj Emmanuel addressed topics that most PhD candidates will have to think about one day: Do you stay in academia, or do you choose a different career path? And what are the possibilities outside academia? A lively discussion followed. Subsequently Evelien Jagtman gave a workshop on the design of the PhD thesis cover. A cover can give a clear image of a complicated research subject! Evelien challenged the PhDs to draft a thesis cover based not only on the topic and main outcomes of their thesis, but also on their personality traits and personal preferences. Through inspiring examples of existing thesis covers and the brainstorm sessions with peers, the PhDs designed drafts of their own thesis covers.
The event ended with an online pub quiz. While enjoying drinks and snacks, groups of PhDs competed against each other to win a prize. For many PhD candidates the online PhD meeting was one of the first online events during the pandemic. The meeting was highly appreciated, with many stating that it was the first time since the pandemic they were able to meet PhDs other than their direct colleagues.

The PhD committee has, during the pandemic, functioned well as a source of information to other PhD candidates: if people need help, we can refer to the right person to solve the problem. The goal for the future is to increase our visibility, to organize even more events and workshops, and to intensify the cooperation with the ECR committee. We also plan to survey what wishes there are among our members, so that we can organize adequate events and provide support where needed. We finally want to organize more institution-wide activities on themes that inspire us'.

Members of the PhD Committee in 2020:
Ludo van Haasterecht, Lisa Klous, Mireille Folkerts, Wouter Schallig, Ton Leenen, Amber von Gerhardt, Tim Veneman



Screenshot from one of the online PhD activities in 2020, organized by the AMS PhD committee.

AMS Mentorship Program

Melissa Hooijmans and Eric Voorn

Melissa Hooijmans and **Eric Voorn**
on the AMS Mentorship Program

The ECR (Early Career Researcher) committee (set up in 2017 by Lynn Bar-On and Eric Voorn) initiated the AMS Mentorship program in 2019. This program is intended for PhD and ECR researchers to help them extend their network and receive support and guidance from an independent AMS affiliated senior researcher. Within the program mentees can identify what they need from their mentor in their development as a researcher.

'The group of Early Career Researchers is difficult to define. They are often in danger of ending up in a purgatory of contiguous temporary contracts, and as an ECR you are more or less responsible for arranging your next appointment. This results in having almost no peace of mind, as you are busy with one project and already have to think about funding for the next one. It is illustrative that only 5% of PhD researchers pursue a career in academia. In 2020, some young researchers found themselves squeezed between a rock and a hard place. Due to COVID they were at times unable to collect data and no measurements could be made. Young researchers have found themselves in a precarious situation, where they have a one year appointment and no one who can offer a solution at the moment. The ECR Mentorship program was a support in these difficult times.

Due to COVID there have been no ECR meetings in 2020, but the mentoring program has continued. The program involves about 20 couples of junior and senior researchers. In general, the testimonials are very positive, although the formal evaluation has yet to take place. When mentoring a PhD candidate, we have looked for a match outside the supervising team. An ECR does not have a whole team around them, like a PhD candidate does, therefore a little guidance from a senior scientist is welcome. A mentor can offer a new angle for your research, how to approach the data inventory, how to plan it, and e.g. where to put your focus when you already have your next application. It is constructive to discuss this with someone outside the hierarchical structures.

For the future, we would like to involve the clinical researchers more. COVID-19 has led to more

online meetings, which might be more accessible to medical doctors with busy schedules. We want to organize more online meetings but also draw more attention to the Mentorship Program and to investigate what the researchers need most and to organize a formal evaluation'.

Testimonials mentorship program

Marike van der Leeden and **Marije Goudriaan** about the ECR Mentorship Program

Early career researchers are sometimes in danger of ending up between ship and shore when it comes to guidance. AMS has established a Mentorship Program to coach this group better. What are the experiences so far?

Marije Goudriaan, ECR at VU Amsterdam, focuses her research on motor control of gait in young children with cerebral palsy, is supervised by Marike van der Leeden (PI Rehabilitation and Development Amsterdam UMC, location AMC). Marije finds the coaching very useful: 'You get advice on how to walk your academic path. You have to take the initiative yourself; I think that is a good thing too. It is up to me to maintain contact. You can also have contact about matters like a job application or possibilities within the clinical field'.

Marike: 'There were no frameworks, so we had an interview based on Marije's questions, and agreed that we could arrange for a follow up later. You should not frame too much, but leave it to the needs of the researcher. You do not have a working relationship with each other, and therefore you have another conversation. It can sometimes be pleasant to have guidance 'from outside', also for PhD candidates, in particular if the communication with the supervisor does not go well. I am also a member of a 'Women Leadership Program', a European program in Rheumatology which is interesting because you can see that women walk a more difficult path towards certain positions than men. Women are attracted to each other in science. Surely that is an element that plays a role. There should be more attention to diversity in leadership'.

Marije: 'In the mentorship program it is important that you express clear expectations to one another. We have done that informally and that works very well. Others may need more formal agreements, but it is good that we have the freedom to do so. It is everyone's responsibility to frame that well in the first conversation. It has worked very well for me. With a deeper understanding of yourself you will be much better positioned to seek a mentoring relationship and resolve mentoring relationship challenges.

Even with a clarified view of what you are seeking from mentors it is critical to keep in mind how the two of you can collaborate to meet your mutual needs. A continuation of this initiative is warmly recommended for the years to come'.

Sander Oorschot and Sjoerd Bruijn about the ECR Mentorship Program

Sander: 'In May 2020 I started with the AMS mentorship program. Every 2-3 months Sjoerd and I have a video-meeting to discuss general points concerning my research project and the progress of my PhD. It is really helpful to share and discuss these points with Sjoerd, as he is not involved in any way in my research project. However, he is involved in similar trajectories of PhD candidates and has experience with many (finished) research projects. He can shine his light on topics from the side of a senior researcher/co-promotor and as a mentor. This makes it easy, more open and very helpful to discuss what is on my mind and how to cope with for example setbacks, internal discussions, and communication with involved parties in the research project. Especially during the first corona lockdown it was very helpful to have a mentor and discuss the influence of the lockdown on the research project and my PhD-trajectory. It helped me to focus on the parts of my work that were still possible during the corona measures and put the setbacks due to the corona measures into perspective. Although we have not met in person due to the corona regulations, the communication is going well. We will continue this mentorship program in 2021 and aim to evaluate the mentorship and continuation of it after several sessions. I am thankful for the possibility AMS provided for this mentorship program and I recommend every PhD-student to start a similar mentorship program'.

Appointed Professors

Annelies Pool-Goudzwaard

Annelies Pool-Goudzwaard was by VU Amsterdam appointed Endowed Professor to the chair *Pelvic Physiotherapy*, hosted by the department of Human Movement Sciences. She got her PhD in 2003 from Erasmus University where she worked alongside an appointment at the Spine & Joint Centre in Rotterdam. In 2015 she started working for VU, at the Faculty of Behaviour and Movement Sciences. She is part of the staff of the Master educational programme on Musculoskeletal Physiotherapy. In addition, she is the head of the Bachelor of Science at Somt University of Physiotherapy. Annelies Pool-Goudzwaard has numerous publications in scientific journals with the main focus on the pelvic, pelvic girdle pain, low back pain and pelvic floor dysfunctions.

Michel van den Bekerom

VU Amsterdam in 2020 appointed Michiel van den Bekerom endowed professor to the new chair *Sports Traumatology of the Upper Extremity*. The chair is hosted by the department of Human Movement Sciences and is funded by the Onze Lieve Vrouwen Gasthuis hospital and aims to promote research into the causal mechanisms and the prevention and treatment of sports injuries, particularly elbow and shoulder injuries. With this chair the collaboration between the OLVG and the department of movement sciences is expected to develop further and parties interested in collaboration were invited to explore the possibilities.

Hans Tol

Has Tol was in 2020 appointed as the first full professor of *Sports Medicine* at the University of Amsterdam. Tol is an expert on conducting multi-center randomized controlled trials in muscle and tendon injuries and regenerative medicine. Besides his clinical work and research projects, he carries out sports medical work in practice as a sports medicine physician at AFC Ajax. Tol: "For clinical research, hands-on-experience remains essential for addressing the athlete's questions and to feel what is going on in the real sports world. We use these experiences when teaching our medical students.

Tol has placed emphasis on collaboration and conducting international trials. Sports medicine research is embedded in the IOC accredited Research Centre for Prevention of Injury and Protection of Athlete Health, The Amsterdam (UMC) Collaboration for Health and Safety in Sports and Academic Centre for Evidence Based Sports Medicine (ACES).

Appointed PIs

Merel Brehm

Paul van Zuijlen

Tim Forouzanfar

Carel Meskers

In 2020, six PIs were appointed within AMS. The research of Merel Brehm focuses on lower limb orthotics in patients with chronic disabling conditions. Specific areas of interest include optimization of lower limb orthoses to maximize treatment outcomes and exercise testing, mainly in neuromuscular diseases and cerebral palsy.

Tim Forouzanfar is Head of the Department of Oral and Maxillofacial Surgery, Amsterdam UMC, location VUmc. His research centers on Traumatology, Head-neck oncology and 3-D printing.

Paul van Zuijlen is director at the Dutch Burn Centre (Brandwondencentrum) in Beverwijk. His research interests are burn care, reconstructive surgery, tissue engineering and complexity sciences.

Carel Meskers is a rehabilitation physician and senior researcher at Amsterdam UMC, location VUmc. His field of interest is movement disorders in patients after neurological injury and aging.

Edgar Peters

Dimitra Micha

Edgar Peters' main research interest is infections of the musculoskeletal system, especially diabetic foot infections. Edgar Peters is an internist, infectiologist, acute physician and head and trainer of the section Infectious Diseases and Head of the internal medicine clinic, Amsterdam UMC, location VUmc.

Micha Dimitra is the group leader of the Center for Connective Tissue Diseases, Amsterdam UMC, location VUmc. This center focuses mainly the study of osteogenesis imperfecta, and other monogenetic disorders of skeletal fragility and dysplasia. Her research aims the identification of new genetic causes and the development of meaningful therapy which is still lacking for these disorders.

Prizes

On the picture the winner of the award, Judith Vloothuis (top right hand corner) receives the news that she has won the award for 2020

AMS Outstanding Paper Award for Judith Vloothuis

On April 9 2020, Judith Vloothuis, rehabilitation physician and doctoral candidate at Reade and Amsterdam UMC, location VUmc, was presented with the AMS Outstanding Paper Award 2020 in an online meeting. The jury, consising of Jaap van Netten (chair), Marelise Eekhoff, Jennifer Kerkman, Evert Verhagen and Rob Wust chose Judith's paper *Caregiver-mediated exercises with e-health support for early supported discharge after stroke (CARE4STROKE): a randomized controlled trial out of a number of outstanding papers that were submitted for the award.*

Hamburger Prize for Stephan van der Zwaard

Stephan van der Zwaard, was in 2020 awarded the Hamburger Prize for his PhD thesis entitled *Why muscles matter: Optimizing sprint and endurance performance in athletes* by a panel of three independent assessors. The award was given by the Dutch Physiological Society, which yearly organizes a didactic symposium, aimed at updating knowledge of physiologists on an important topic. The award is named after Hartog Jakob Hamburger (1859 - 1924), a Dutch Professor in Physiology of the University of Groningen. Particular attention was paid to the originality and quality of the thesis and the variety of physiological methodologies applied. The focus was also on the introduction and discussion of the thesis, which is where the student really has the floor. In addition, the number of publications and their impact were important criteria.

FGB Team wins Cybathlon Global Edition 2020

The Dutch Dream Team PULSE Racing has won the cybathlon Global Edition! VU_FGB Pulse Racing athlete Sander Koomen set a time of 2 minutes and 40 seconds over a distance of 1200 meters in the Functional Electrical Stimulation (FES) category, the category for athletes with spinal cord injury. These athletes are no longer able to cycle independently due to their spinal cord injury, but functional electrical stimulation makes it possible for them to perform a pedal movement while recumbent. The VU student team PULSE Racing was founded to further develop FES technology for people with spinal cord injury and to guidethe athletes.

Award Amsterdam UMC Young Talent Fund for Jana Tuijtelaars

Jana Tuijtelaars was in 2020 awarded the AMC Young Talent Fund for her research proposal *Balance and gait in neuromuscular diseases*.

This research focuses on the ability to adapt walking to environmental circumstances, i.e. walking adaptability, which is essential for safe ambulation. Several clinical populations are known to have reduced walking adaptability, which often relates to a high fall frequency. Recently, a qualitative study showed that adults with stroke highlighted sensory deficits as having a direct impact on their balance and mobility. This especially becomes clear while making gait adaptations, rather than during steady state walking. Jana is supervised by professor Frans Nollet and dr. Merel Brehm, and together with a research group at Salford University in the UK, Jana will study the role of lower limb sensation deficits on walking adaptability in adults with stroke. Understanding this relation will probably help to work towards potential solutions, like the use of sensory stimuli or sensory stimulating insoles, that could reduce the fall risk in this population.

Award Amsterdam UMC Young Talent Fund for Eline Flux

Eline Flux was in 2020 awarded the Amsterdam UMC Young Talent Fund. Her research focuses on developing methods to measure and decrease stretch hyperreflexia (i.e. spasticity) in patients with neurological conditions, especially children with cerebral palsy and adults with spinal cord injury. Eline has developed a custom-made virtual gaming environment to provide feedback on hyperreflexia with her research group at the department of rehabilitation medicine at Amsterdam UMC, location VUmc.

Grants

VENI Grant for Melissa Hooijmans

(Amsterdam UMC, location AMC) received in 2020 a personal NWO VENI grant of €250.000 in the field of Applied and Engineering Sciences (AES) for the project: "*Non-invasive MR platform to study muscle ageing during in-magnet exercise.*"

Reduced muscle oxidative capacity and decreasing muscle strength are key contributors to loss of mobility with age. Non-invasive, dynamic and functionally relevant outcome measures targeting skeletal muscle oxidative capacity are lacking. In this project dr. Hooijmans will develop non-invasive state-of-the-art MRI platform, using in-magnet exercise, to assess muscle oxidative capacity in ageing muscle.

Wound Infections Following Implant Removal (WIFI-2)

In 2020 the ZonMw financed project (€650.000) *Wound Infections Following Implant Removal (WIFI-2)* got off to a start. It is a follow up to the WIFI study (Wound Infection Following Implant removal), and dr. Tim Schepers (Amsterdam UMC, location AMC) is the PI on the project. The project is coordinated by Amsterdam UMC, location AMC, it runs in 20 centers and aims to uncover the effect of 2g prophylactic cefazoline on post-operative wound infections in implant removal following lower extremity trauma.

ITN grant for David Mann & Eli Brenner

Dr. David Mann and dr. Eli Brenner (both VU-HMS Amsterdam) have, as part of a collaborative network with the International Paralympic Committee, Rijksuniversiteit Groningen and several partners from the UK, Germany, Denmark and Italy, received a grant of €4 million from the EU-H2020 Marie Skłodowska-Curie actions (MCSA) - Innovative Training Networks (ITN) for the project OptiVisT (Optimal support of Visually impaired individuals through inclusive Tests and Tools for testing, training and augmenting Functional Vision). The grant runs for a period of 4 years, and there are in total 15 PhD positions in the project, two of which will be appointed at VU Amsterdam. The research project will seek to improve the quality of vision testing for people with vision impairment and aims to realize scientific and technological breakthroughs needed for new and better solutions for vision care and rehabilitation. Their key mission is to enhance the societal participation of individuals with vision impairment through innovative and inclusive care.

ITN grant for Esther Middelkoop

SkinTERM, an ITN network on skin tissue engineering and regenerative medicine was granted from the EU-H2020 Marie Skłodowska-Curie actions (MCSA) program. Prof. Esther Middelkoop (Amsterdam UMC, location VUmc) received as partner in this network a grant of €269.000. This project aims to address wound healing by recapitulating regeneration rather than repair. Middelkoop's group will investigate the influence of different foetal ECM components and soluble factors on the mesenchymal cell phenotype and ultimately prepare an artificial ECM which includes anti-scarring components.

ZonMw Grant for Research on Foot Ulcer Prevention

ZonMw has awarded a grant of €460.000 for a nationwide project in which diabetes patients with increased risk of foot ulceration are treated with a personalized integrated approach to help prevent foot ulcers. Sicco Bus, Jaap van Netten and Tessa- Busch Westbroek (Amsterdam UMC, location AMC) coordinate this project, and collaborate with several hospitals (Reinier de Graaf Ziekenhuis and Maxima Medisch Centrum Veldhoven), orthopedic shoe companies (Livit, Wittepoel, Penders and Buchrnhornen), and health organizations (Diabetes Association Netherlands and Dutch Association for Podiatry).

Grant EFSD for Rob Wüst

Rob Wust (VU) received €100,000 from the European Foundation for the Study of Diabetes (EFSD) as part of the EFSD / Boehringer Ingelheim European Research Program on *Multi-System Challenges in Diabetes* 2020. The project addresses the question if an altered glucose signaling in skeletal muscle contributes to exercise intolerance in patients with type I diabetes mellitus. Richie Goulding has been appointed postdoc on the project.

Rob Wüst

ZonMW Grant for DynaSti project

Bernadette van Wijk

In 2020, Dr. Bernadette van Wijk received a ZonMW grant of €243.000 for the project DynaSti in the EU funding stream Joint Programming Initiative Neurodegenerative Diseases (JPND). The Dynasti consortium (coordinated by Dr. van Wijk) aims to enhance the outcome of deep brain stimulation in Parkinson's disease through the individualization of stimulation settings.

ZonMw Grant for Mirjam Pijnappels

Mirjam Pijnappels, professor in Human Movement Sciences VU, in collaboration with Bart Visser of the HvA, Judith Bosmans of VU-FEW, and VeiligheidNL, were in 2020 n awarded a grant within the ZonMw programme 'Effect Research Knowledge Gaps'. A PhD Candidate will be appointed at FGB, VU. The project concerns a study into the (cost) effectiveness of the fall prevention training 'In Balance' on falls and fall injuries in elderly people living at home with an increased risk of falling.

ZonMw grants for Helga Haberfehlner and Niels Waterval.

Helga Haberfehlner (Amsterdam UMC, location VUmc) and Niels Waterval (Amsterdam UMC, location AMC) in 2020 received an IMDI (Innovative Medical Device Initiative) grant from ZonMw (www.imdi.nl) of €120.000 each, for a period of 1.5 years. Helga's project is entitled *Home-based measurements of dyskinesia using smartphone coupled inertial sensor technology and machine learning (MODYS@ home)*. The aim of this project is developing an application for the automatic assessment of movement disorders in children, that allows measurements over a longer period of time at home.

Niels Waterval received the grant for his proposal *Precision simulations to predict the individual optimal ankle foot orthosis.* He will study whether the predictive, forward simulations can predict the individual, optimal orthosis settings.

Helga Haberfehlner

Niels Waterval

ZonMw Grants for Erwin van Wegen, Gert Kwakkel and Carel Meskers

VUmc Researchers from the Neuro-unit, Erwin van Wegen, Gert Kwakkel and Carel Meskers, in collaboration with researchers from RadboudMC, TU Twente, ErasmusMC, TU Delft, de Maartenskliniek and several Tech companies (Motek Medical, Lode, 2M Engineering) have received two collaborative grants from ZonMW in the DCVA-IMDI round. The projects involve several PhDs, post-docs and research assistants. The first project is *ArmCoach4Stroke: An interactive tool for self-directed, home based and personalized arm rehabilitation after stroke*, the PI for the project is Dr. H. Bussmann. This project focuses on upper limb rehabilitation, medical technology, home treatment and autonomy of the patient. The second project that was awarded by ZonMw is the *HEROES project: Home-based ExeRgame for Enhancing Resistance to Falls after Stroke*, where the PI is dr. Vivian Weerdesteyn. This project focuses on balance rehabilitation, medical technology, home training and falls-prevention of the patient.

Grant Johanna Kinderfonds for Research on Children with Cerebral Palsy

Johanna Kinderfonds awarded a grant of €40.000 for a study to determine the effect of wearing orthoses on (the complexity of) motor control of walking in children with CP, before the development of their gait pattern. If shown that motor control of walking in young children with CP can be changed, it might not only improve their daily functioning, but it allows for optimization of complex motor control before future interventions. This could reduce medical costs by shortening rehabilitation time and the need for walking aids. Applicants of the grant were: Marije Goudriaan Nadia Dominici and Andreas Daffertshofer (all VU, FGB) Annemieke Buizer and Marjolein van der Krogt (both CP Centre of Expertise, Amsterdam UMC, location VUmc).

Take-off grant for Strike-f(x): The Intelligent Boxing Bag

Nilas van Woersum (department VU-HMS) received a grant through a Take-off programme from NWO for his project *Strike-f(x): The Intelligent Boxing Bag*. With this funding, Nilas and his team will upgrade the Strike-f(x), design gamified workouts and outsource the production. Strike-f(x) is a free-hanging, intelligent punching bag that measures the impact force of punch and kick actions in an accurate way at any location.

David Mann received NWO Take-off Grant for VROOM: A virtual 3D room to accelerate tactical sports training.The development of athletes in team sports can be accelerated by the use of virtual training tools. These training tools are especially promising for the improvement of tactical skills. In this project a virtual 3D room (VROOM) will be further developed to enable tactical training within soccer by using an extended reality (XR) training tool that displays soccer situations in a 3D space. The VROOM tracks the position of the soccer player and has custom algorithms that allow computer-

generated avatars to interact with the athlete in real time, thus providing an interactive individualized learning environment.

NWO Take-off Grant for SoundTomics

A Take-off grant has been awarded to Guido Weide and Richard Jaspers for the project SoundTomics. Three-dimensional imaging and measuring organs and anatomical structures is importance for diagnosis and for monitoring during follow-up after treatments. This is possible with MRI, however, this technique is too expensive for a physiotherapist, and there is a limitation in the joint positions in which measurements can be executed. SoundTomics has developed a fast and cost-effective 3D ultrasound approach which allows 3D muscle morphometry in any position. With this funding from NWO, market opportunities will be explored through a feasibility study.

ZonMw Grant for Research Project 'Safe and effective home training for people with cancer'

Edwin Geleijn and Marike van der Leeden, (both Amsterdam UMC, location VUmc) in 2020 received a grant of €15.000 from ZonMw. The research concentrates on medical treatment for cancer patients who are unable to visit a physiotherapist because of the COVID-19 pandemic. Marijke Leeuwerk (Amsterdam UMC, location VUmc), is the the PhD researcher working on the project. For more information see the interview with dr. Marike van der Leeden.

AMS funded grants

Investment Grants

Elke Vlemincx, department of Health Sciences, VU, was in 2020 granted €30.000 for her proposal in collaboration with professor Vincent de Groot and dr. Erwin van Wegen, both Rehabilitation medicine, VUmc, for the proposal *Psychophysiological monitoring and biofeedback*. The monitor will facilitate research lines with high clinical impact, incorporating (ambulatory) measurements and biofeedback of a wide range of physiological variables in ongoing research projects and new research collaborations within AMS and Amsterdam UMC.

Marike van der Leeden, Amsterdam UMC, location VUmc, was granted €10.000 for the proposal *Accelerometers for assessing quantity and quality of physical activity* for the purchase of activity monitors that can be used on a wide range of running projects and to strengthgen future grant applications.

All five AMS research programs were in 2020 each given €50.000 to further strengthen and develop the research and collaboration within each program. The five program boards had all submitted plans for the various approaches. The results of the various research program strategies will be presented at a later stage.

In 2020 AMS awarded talent grants to 12 AMS PhD candidates and four MA-students. The grants were given as encouragement and to develop the talented junior AMS members and 16 different research projects.

Key Numbers

Output*	2017	2018	2019	2020
Scientific (Refereed) publications	824	802	769	831
Non-refereed articles	n.a.	15	29	22
PhD theses*	39	50	47	59
Professional publications	38	40	43	27
Books & Chapters	17	21	18	5
Total	**918**	**928**	**906**	**944**

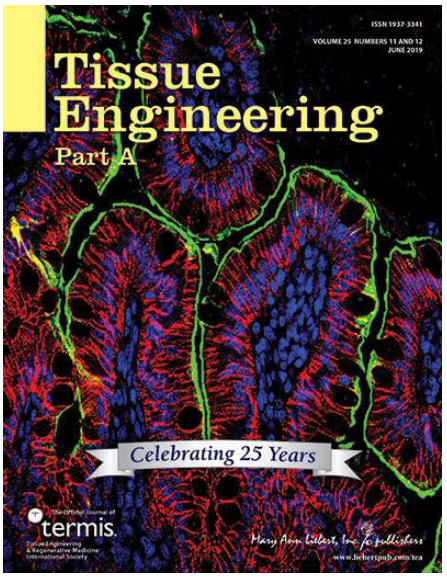
Membership Base

	Full Professor*	Endowed Professor	Associate Professor	Assistant Professor	Lecturer	Medical Specialist**	Other Academic Staff**	Physician**	Research Associate**	Visiting Professor	Visiting Fellow*; **	Standard PhD Candidate*; **; ***	MD-PhD / Promoverende medewerker**; ***	External PhD candidate**; ***	Total PhD candidates***	Total
AMC	14	0	3	3		26	15	0	18	0	0	102	9	0	111	190
VU	13	4	15	18	1	0	0	0	16	0	14	40	5	114	159	240
Vumc	15	2	4	5	2	23	0	12	16	0	32	29	7	48	83	195
AMS	**42**	**6**	**22**	**26**	**3**	**49**	**15**	**12**	**50**	**0**	**46**	**171**	**21**	**162**	**353**	**625**

* If affiliated at more than one AMS party, the affilliation is counted half at both parties.

** If a researcher holds more than one position, the full count is one.

*** PhD candidates registered in either the PURE research database of AMC, VU or VUmc, or the VU/Vumc Hora Finita PhD registration system. Registrations counted only once.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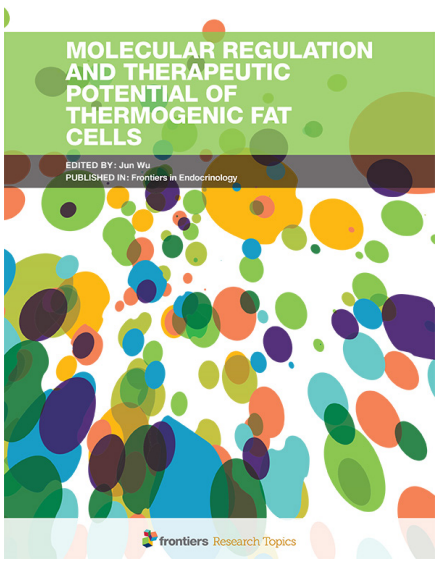
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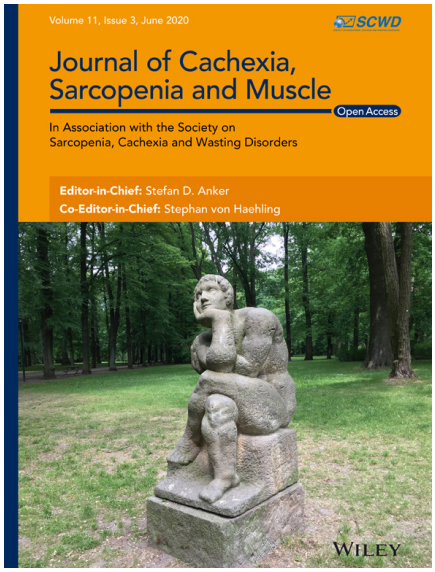
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AMS publications 2020

Below is a selection of 25 topical academic papers published in 2020 that represent the outstanding and relevant research that takes place within Amsterdam Movement Sciences Research Institute.

1. Carmody, S, Murray, A, Borodina, M, Gouttebarge, V & Massey, A 2020, '**When can professional sport recommence safely during the COVID-19 pandemic? Risk assessment and factors to consider**', British Journal of Sports Medicine, vol. 54, no. 16, pp. 946-948. https://doi.org/10.1136/bjsports-2020-102539

2. Chronic Low Back Pain IPD Meta-Analysis Group 2020, '**Exercise treatment effect modifiers in persistent low back pain: an individual participant data meta-analysis of 3514 participants from 27 randomised controlled trials**', British Journal of Sports Medicine, vol. 54, no. 21, 101205, pp. 1277-1278. https://doi.org/10.1136/bjsports-2019-101205

3. Jorstad, HT & van den Aardweg, JG 2020, '**Balancing act: when is an elite athlete who has had COVID-19 safe to return to play? When does prudent investigation go offside into overmedicalising?**', British Journal of Sports Medicine, vol. 54, no. 19, pp. 1134-1135. https://doi.org/10.1136/bjsports-2020-103259

4. Pas, HIMFL, Pluim, BM, Kilic, O, Verhagen, E, Gouttebarge, V, Holman, R, Moen, MH, Kerkhoffs, G & Tol, JL 2020, '**Effectiveness of an e-health tennis-specific injury prevention programme: Randomised controlled trial in adult recreational tennis players**', British Journal of Sports Medicine, vol. 54, no. 17, pp. 1036-1041. https://doi.org/10.1136/bjsports-2019-101142

5. Rojer, AGM, Ramsey, KA, Trappenburg, MC, van Rijssen, NM, Otten, RHJ, Heymans, MW, Pijnappels, M, Meskers, CGM & Maier, AB 2020, '**Instrumented measures of sedentary behaviour and physical activity are associated with mortality in community-dwelling older adults: A systematic review, meta-analysis and meta-regression analysis**', Ageing Research Reviews, vol. 61, 101061, pp. 1-14. https://doi.org/10.1016/j.arr.2020.101061

6. van Dijk, FS, Semler, O, Etich, J, Köhler, A, Jimenez-Estrada, JA, Bravenboer, N, Claeys, L, Riesebos, E, Gegic, S, Piersma, SR, Jimenez, CR, Waisfisz, Q, Flores, CL, Nevado, J, Harsevoort, AJ, Janus, GJM, Franken, AAM, van der Sar, AM, Meijers-Heijboer, H, Heath, KE, Lapunzina, P, Nikkels, PGJ, Santen, GWE, Nüchel, J, Plomann, M, Wagener, R, Rehberg, M, Hoyer-Kuhn, H, Eekhoff, EMW, Pals, G, Mörgelin, M, Newstead, S, Wilson, BT, Ruiz-Perez, VL, Maugeri, A, Netzer, C, Zaucke, F & Micha, D 2020, '**Interaction between KDELR2 and HSP47 as a Key Determinant in Osteogenesis Imperfecta Caused by Bi-allelic Variants in KDELR2**', American Journal of Human Genetics.

7. van den Helder, J, Mehra, S, van Dronkelaar, C, ter Riet, G, Tieland, M, Visser, B, Kröse, BJA, Engelbert, RHH & Weijs, PJM 2020, '**Blended home-based exercise and dietary protein in community-dwelling older adults: a cluster randomized controlled trial**', Journal of Cachexia, Sarcopenia and Muscle, vol. 11, no. 6, pp. 1590-1602. https://doi.org/10.1002/jcsm.12634

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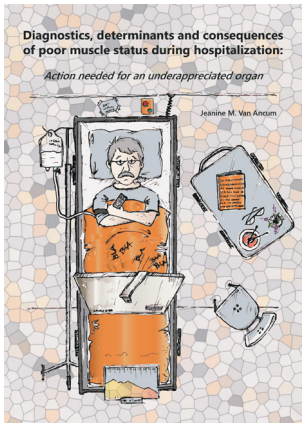
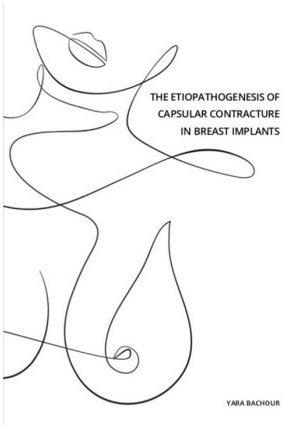
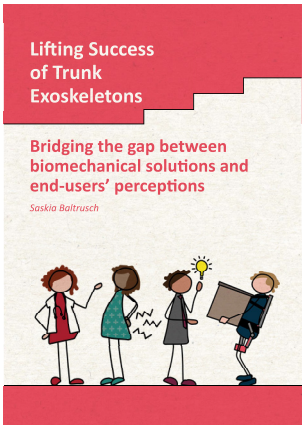
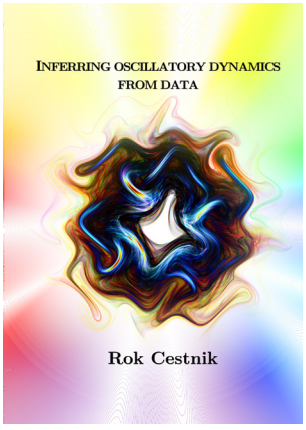
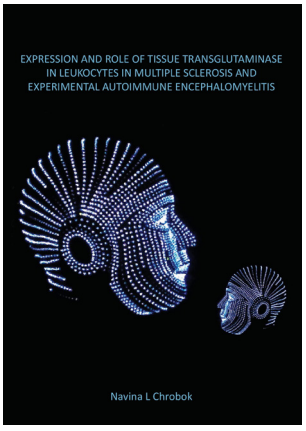
Dissertations

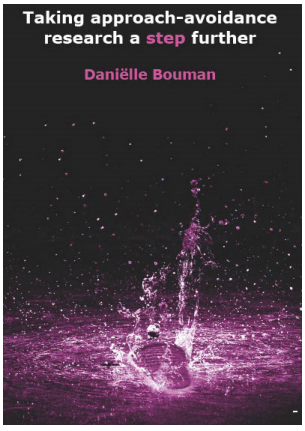


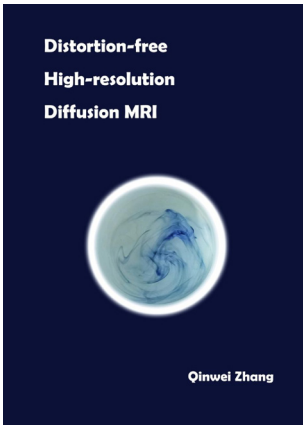


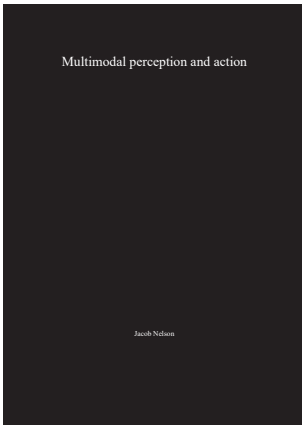


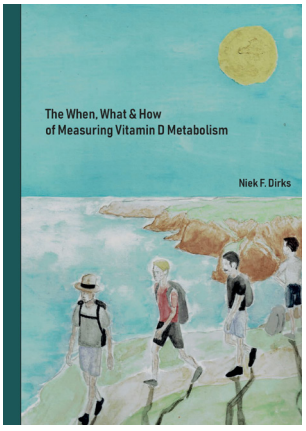


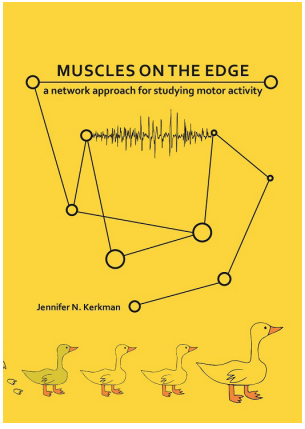


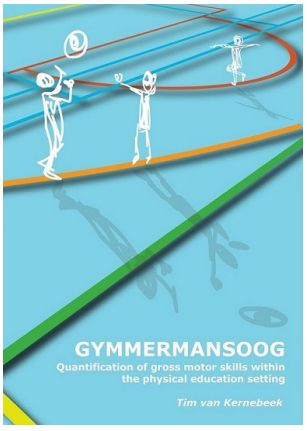


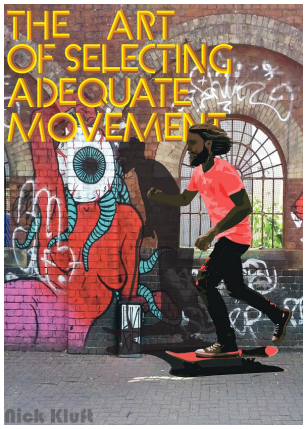


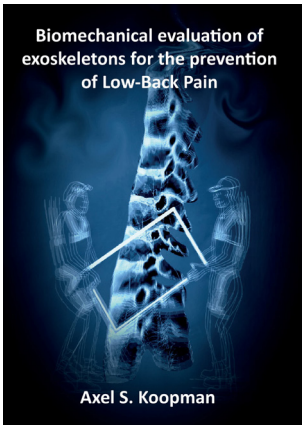




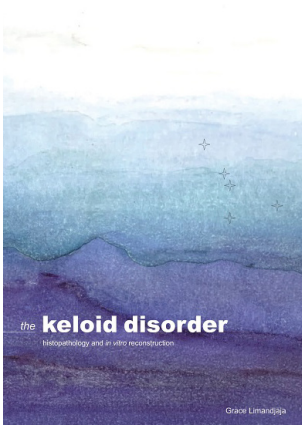


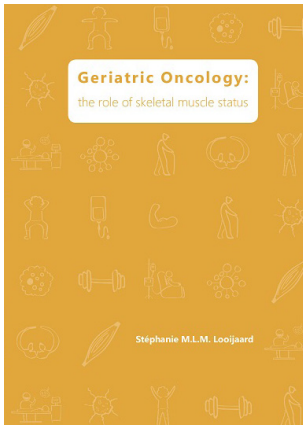



THE ART OF SELECTING ADEQUATE MOVEMENT
Nick Kluft


Biomechanical evaluation of exoskeletons for the prevention of Low-Back Pain
Axel S. Koopman

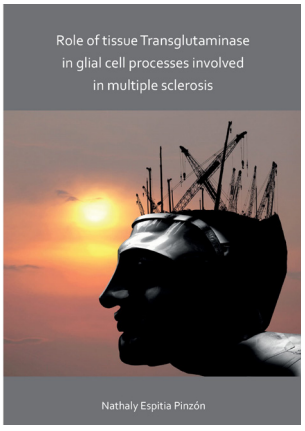

THE MUS

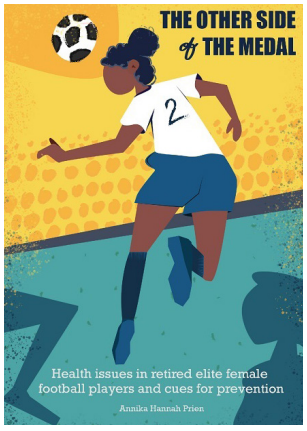

the keloid disorder
histopathology and in vitro reconstruction
Gracie Limandjaja

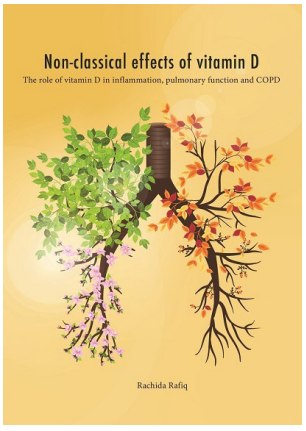

Geriatric Oncology:
the role of skeletal muscle status
Stéphanie M.L.M. Looijaard

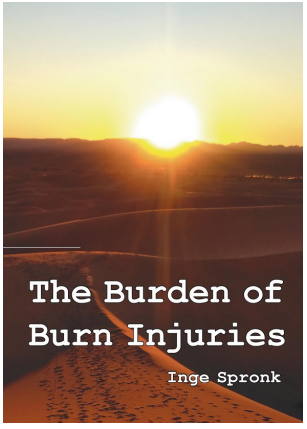

Injury of the Wrist
Sezgi Özhan

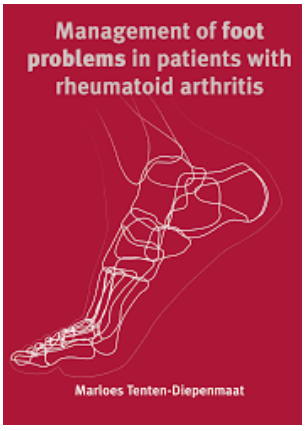

Perception – action coupling and decision-making in sport
Gareth Paterson

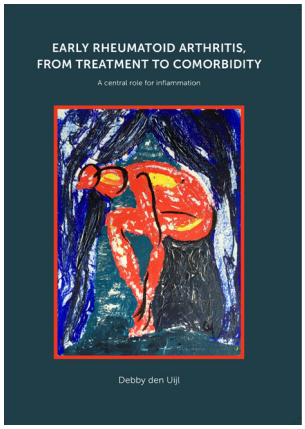

Role of tissue Transglutaminase in glial cell processes involved in multiple sclerosis
Nathaly Espitia Pinzón

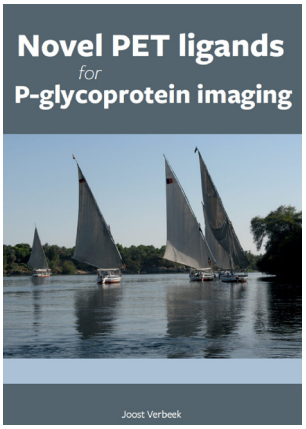

THE OTHER SIDE of THE MEDAL
Health issues in retired elite female football players and cues for prevention
Annika Hannah Prien

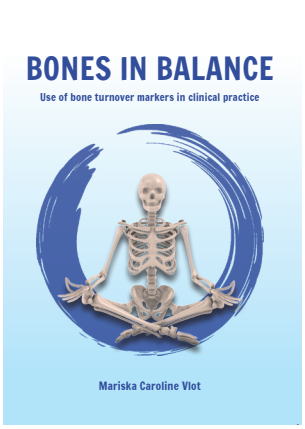

Non-classical effects of vitamin D
The role of vitamin D in inflammation, pulmonary function and COPD
Rachida Rafiq

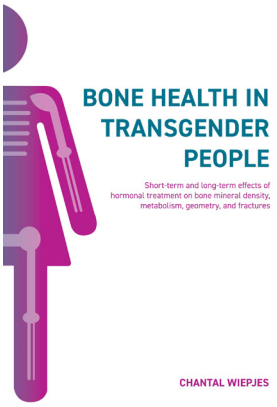

The Burden of Burn Injuries
Inge Spronk

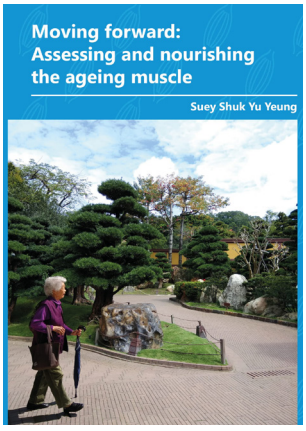

Management of foot problems in patients with rheumatoid arthritis
Marloes Tenten-Diepenmaat

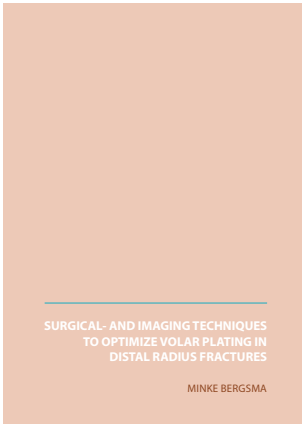

EARLY RHEUMATOID ARTHRITIS,
FROM TREATMENT TO COMORBIDITY
A central role for inflammation
Debby den Uijl

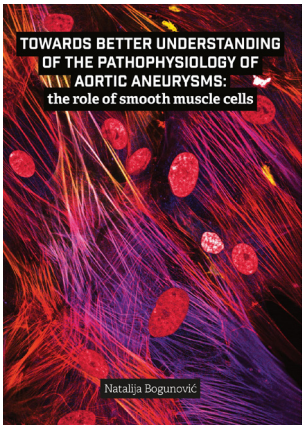

Novel PET ligands
for
P-glycoprotein imaging
Joost Verbeek

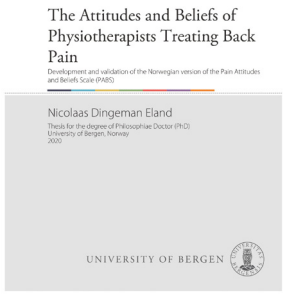

BONES IN BALANCE
Use of bone turnover markers in clinical practice
Mariska Caroline Vlot

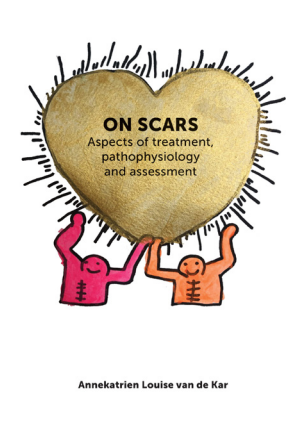

BONE HEALTH IN
TRANSGENDER
PEOPLE
Short-term and long-term effects of
hormonal treatment on bone mineral density,
metabolism, geometry, and fractures
CHANTAL WIEPJES

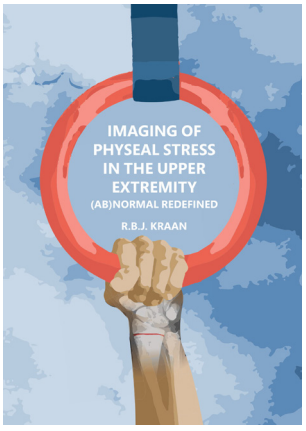

Moving forward:
Assessing and nourishing
the ageing muscle
Suey Shuk Yu Yeung

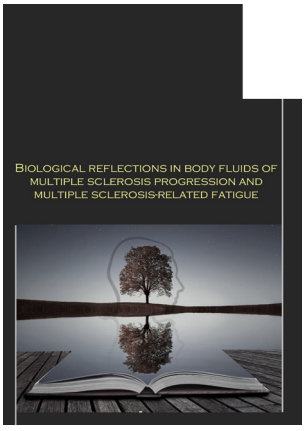

SURGICAL- AND IMAGING TECHNIQUES
TO OPTIMIZE VOLAR PLATING IN
DISTAL RADIUS FRACTURES
MINKE BERGSMA

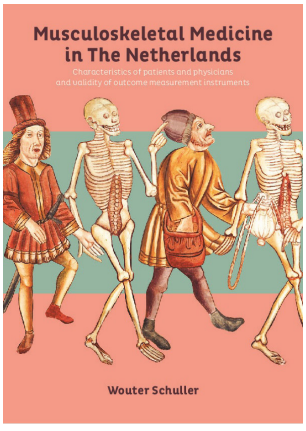

TOWARDS BETTER UNDERSTANDING
OF THE PATHOPHYSIOLOGY OF
AORTIC ANEURYSMS:
the role of smooth muscle cells
Natalija Bogunović


The Attitudes and Beliefs of
Physiotherapists Treating Back
Pain
Development and validation of the Norwegian version of the Pain Attitudes
and Beliefs Scale (PABS)
Nicolaas Dingeman Eland
Thesis for the degree of Philosophiae Doctor (PhD)
University of Bergen, Norway
2020
UNIVERSITY OF BERGEN

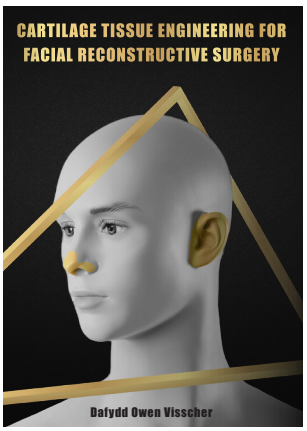

ON SCARS
Aspects of treatment,
pathophysiology
and assessment
Annekatrien Louise van de Kar

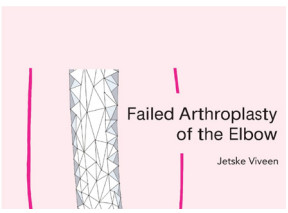

IMAGING OF
PHYSEAL STRESS
IN THE UPPER
EXTREMITY
(AB)NORMAL REDEFINED
R.B.J. KRAAN

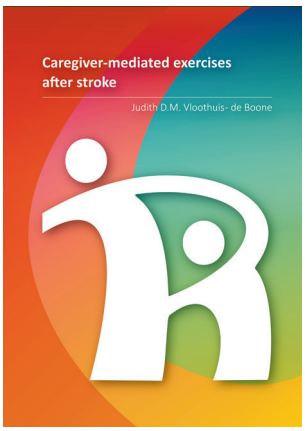

BIOLOGICAL REFLECTIONS IN BODY FLUIDS OF
MULTIPLE SCLEROSIS PROGRESSION AND
MULTIPLE SCLEROSIS-RELATED FATIGUE

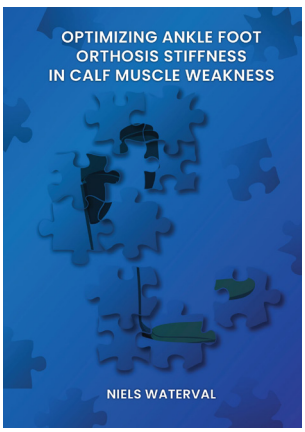

Musculoskeletal Medicine
in The Netherlands
Characteristics of patients and physicians
and validity of outcome measurement instruments
Wouter Schuller

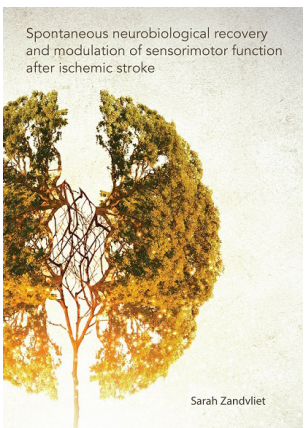

TRAUMATIC SPINAL FRACTURES
The fall and rise
Arjen J. Smits

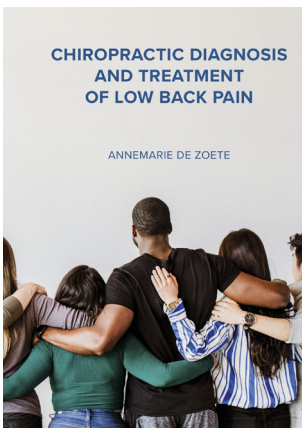

CARTILAGE TISSUE ENGINEERING FOR FACIAL RECONSTRUCTIVE SURGERY
Dafydd Owen Visscher

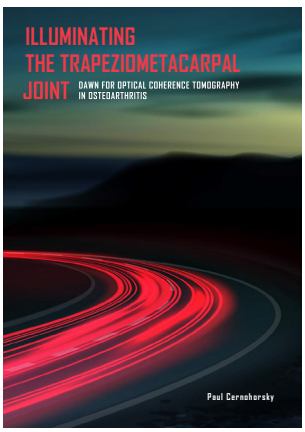

Failed Arthroplasty of the Elbow
Jetske Viveen

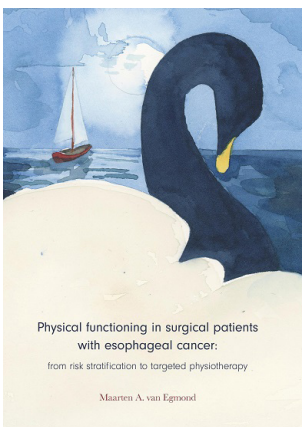

Caregiver-mediated exercises after stroke
Judith D.M. Vloothuis- de Boone

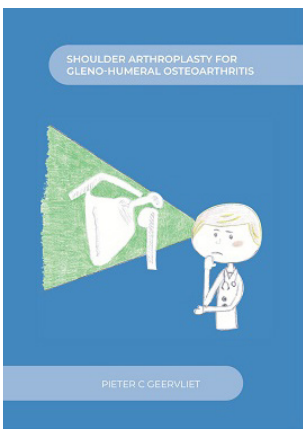

OPTIMIZING ANKLE FOOT ORTHOSIS STIFFNESS IN CALF MUSCLE WEAKNESS
NIELS WATERVAL

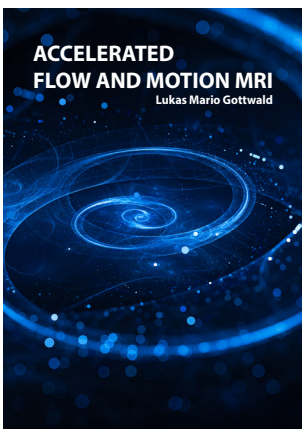

Spontaneous neurobiological recovery and modulation of sensorimotor function after ischemic stroke
Sarah Zandvliet

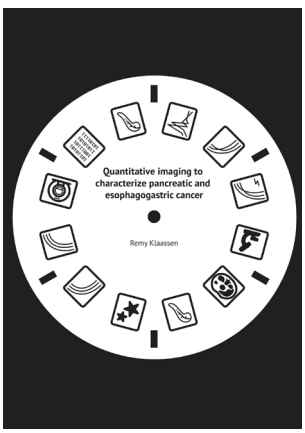

CHIROPRACTIC DIAGNOSIS AND TREATMENT OF LOW BACK PAIN
ANNEMARIE DE ZOETE

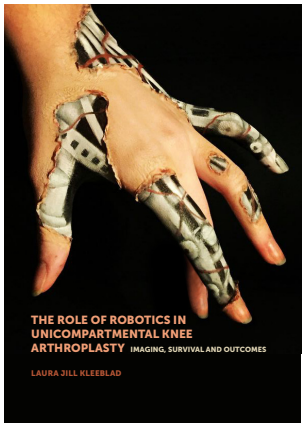

ILLUMINATING THE TRAPEZIOMETACARPAL JOINT
DAWN FOR OPTICAL COHERENCE TOMOGRAPHY IN OSTEOARTHRITIS
Paul Cernohorsky

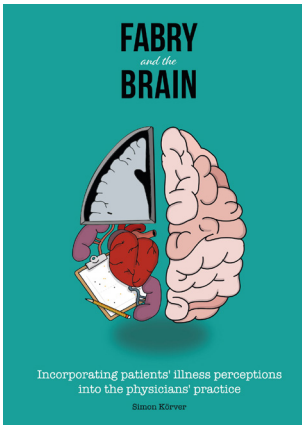

Physical functioning in surgical patients with esophageal cancer:
from risk stratification to targeted physiotherapy
Maarten A. van Egmond

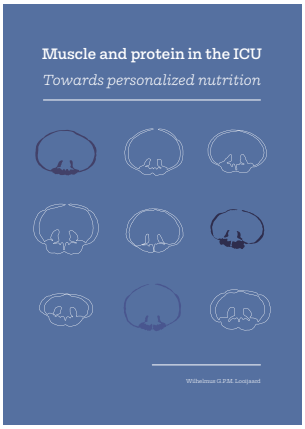

SHOULDER ARTHROPLASTY FOR GLENO-HUMERAL OSTEOARTHRITIS
PIETER C GEERVLIET

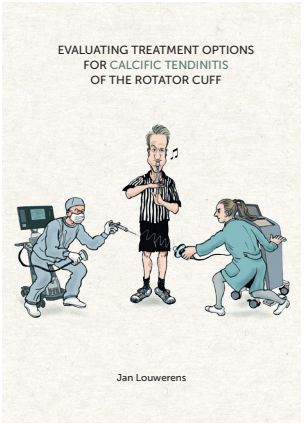

ACCELERATED FLOW AND MOTION MRI
Lukas Mario Gottwald

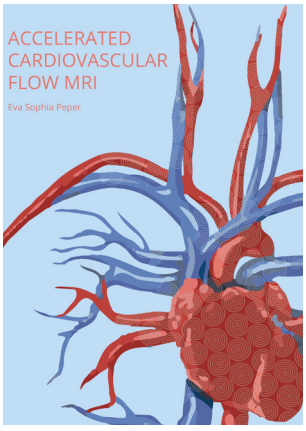

Quantitative imaging to characterize pancreatic and esophagogastric cancer
Remy Klaassen

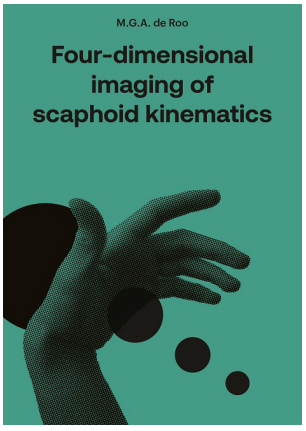

THE ROLE OF ROBOTICS IN UNICOMPARTMENTAL KNEE ARTHROPLASTY IMAGING, SURVIVAL AND OUTCOMES
LAURA JILL KLEEBLAD

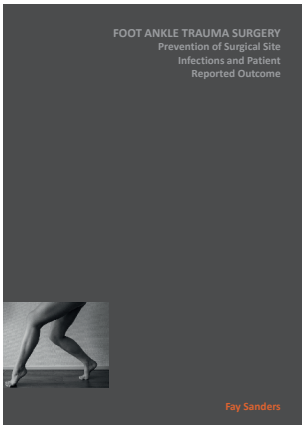

FABRY
and the
BRAIN
Incorporating patients' illness perceptions into the physicians' practice
Simon Körver


Muscle and protein in the ICU
Towards personalized nutrition

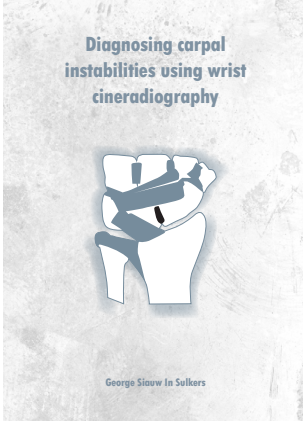

EVALUATING TREATMENT OPTIONS FOR CALCIFIC TENDINITIS OF THE ROTATOR CUFF
Jan Louwerens

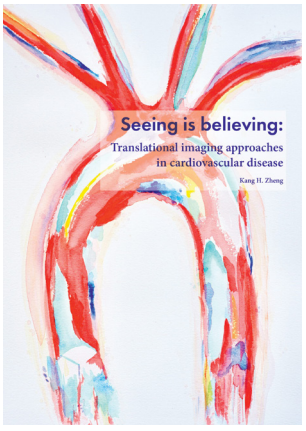

ACCELERATED CARDIOVASCULAR FLOW MRI
Eva Sophia Peper

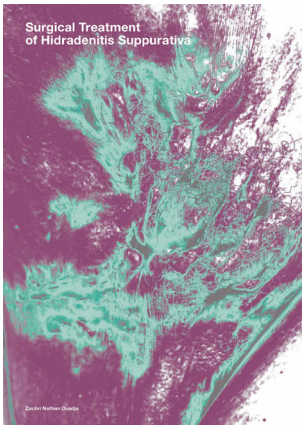

M.G.A. de Roo
Four-dimensional imaging of scaphoid kinematics


FOOT ANKLE TRAUMA SURGERY
Prevention of Surgical Site Infections and Patient Reported Outcome
Fay Sanders


Innovations in Sparse MRI
In search of a free lunch
Jasper Schoormans


Diagnosing carpal instabilities using wrist cineradiography
George Siauw In Sulkers


Seeing is believing:
Translational imaging approaches in cardiovascular disease
Kang H. Zheng


Surgical Treatment of Hidradenitis Suppurativa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