

Annual
Report
2017

Amsterdam
Movement
Sciences
Research
Institute



Amsterdam
Movement
Sciences



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2017 was an important year for our institute: the first year as Amsterdam Movement Sciences research institute. The institute had its official kick-off meeting in January 2017; it was an inspiring meeting with scientists from all member faculties, which promises good for the future. As the year progressed, more events were organized and the new management team settled in with regular meetings and discussions on how to progress. We financed the first AMS call to stimulate collaboration, and the first PhD meeting took place, you can read more about this in this report.

In addition, movement as an interdisciplinary field is becoming ever more important, and even though it is not a traditional approach

within a hospital environment, it has recently been affirmed once again that movement plays an extremely important role in healthcare. Movement plays an important role in the resurgent processes; from recovery in intensive care units, to rehabilitation from cancer and elite or recreational sports; movement encompasses all that is important for human beings: health, and freedom to move about and be happy. Our institute represents movement research in its broadest form, from research on cell biology to research on top athletes; it is all movement!

We hope you enjoy reading the summary, should you have any queries, do not hesitate to get in touch.

On behalf of the management team,



Professor dr. Frans Nollet M.D.
*Joint director, Amsterdam Movement
Sciences Research Institute*



Professor dr. Mario Maas M.D.
*Joint director, Amsterdam Movement
Sciences Research Institute*

Amsterdam Movement Sciences strives to optimize physical performance in health and disease to contribute to well-being and societal participation, based on a fundamental understanding of human movement.

Vision

Daily life activities and social participation critically depend on our ability to move. Physical activity contributes to health and enjoyment of life. Staying fit and active becomes increasingly important, as life expectancy rises, survival after severe disease increases and the incidence of multimorbidity and chronic diseases grow. Societal changes put increasing demands on physical performance and independence of individuals. Therefore, optimizing human movement becomes increasingly important to improve physical performance in daily life, in work and sports, to prevent injury and to reduce disability due to medical conditions that impair movement.

Optimal physical performance

The research within Amsterdam Movement Sciences is driven by questions arising from the clinic, from society, and from our interest in the nature of the human motor system and human movement. The research of the institute focuses on improving, preserving and restoring the human motor system to allow optimal physical performance in work, sports, aging and disease, based on fundamental knowledge of underlying mechanisms and principles. Interventions subserving these aims span physical training and learning, technical devices and implants, pharmaceutical and surgical treatments as well as musculoskeletal tissue repair and tissue engineering.

Exchange of knowledge

Amsterdam Movement Sciences performs excellent, interdisciplinary research in all of these areas. Moreover, the institute facilitates the exchange of knowledge between different applications, such as between elite sports and rehabilitation, and between basic and applied science, based on the conviction that integrating knowledge from different disciplines and from different biological scales on the continuum from molecules to physical performance of individuals, fosters innov-

ation. The institute strives to cover the full research range from fundamental studies, translational proof-of-concept studies, to clinical studies on effectiveness and implementation of results.

Aim

Amsterdam Movement Sciences focuses on human movement, a key issue for today's society, and approaches this in a broad interdisciplinary composition, covering from fundamental to clinical and from cellular to population research, which is unique in the world. The institute aims at being world leading in the field of interdisciplinary translational research on human movement and physical performance, and to disseminate its results to end-users so that society benefits optimally from our research results.

Research Programs

Amsterdam Movement Sciences studies human movement and physical performance in healthy individuals and in individuals with disorders causing movement impairments. The research of the institute is organized in three programs: *Sports and Work*, *Ageing and Morbidity*, and *Restoration and Development*.

Sports and Work

The program Sports & Work aims at life-long healthy participation in sports and work, by healthy and disabled individuals. Optimization of physical performance is key in this program that encompasses elite sports performance and talent development, recreational sports and work activities. Prevention and optimizing recovery of musculoskeletal injury are other key topics in this program. Interdisciplinary collaboration is actively pursued to deepen our understanding of contemporary issues and to optimize impact of interventions.

Ageing and Morbidity

The program Ageing and Morbidity aims to combat the negative effects of ageing and age-related disorders. Movement is subserved by our musculoskeletal system, which relies on various organ systems that control and support it. The interactions of these systems are studied to reveal how physical performance can be maintained with ageing and optimized in chronic dis-

eases. Since physical activity is also crucial for the maintenance of the underlying systems, the aim is to understand how physical stimuli can optimize structure and function of the musculoskeletal system in order to sustain adequate mobility and physical performance.

Restoration and Development

The program Restoration and Development aims to optimize physical performance of individuals, including children, with musculoskeletal injuries and neurological

disorders affecting movement abilities. Consequences of these disorders become apparent at the three WHO-ICF levels of functioning: impairments in function of body structures (tissues and organs), limitations in functional activities, and restrictions in participation in society. Translational research comprises all these three levels and their interrelationships to understand and improve movement and physical performance in the context of personal and environmental factors.

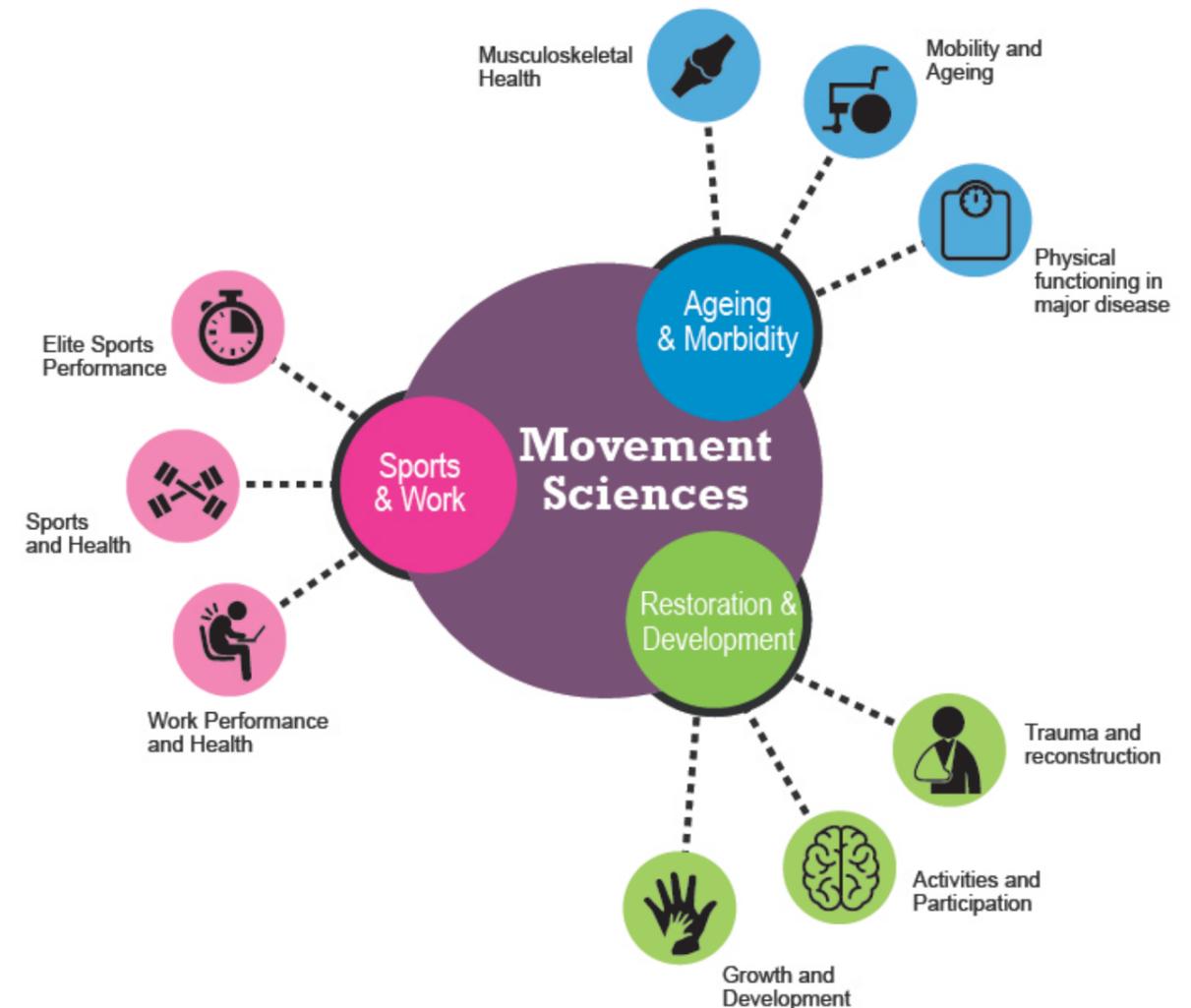


Figure 1: Research Programs and Themes

The Board of Deans of the three participating faculties (FBMS VU Amsterdam, VUmc and AMC) govern the institute. The daily management and structure is set out below.

Management Team

Management Team	Position	Affiliation
Prof. Frans Nollet, MD	Director	VU, VUmc, AMC
Prof. Mario Maas, MD	Director	AMC
Prof. Geert Savelsbergh	Program Leader P1 Sports and Work	VU, FBMS
Prof. Evert Verhagen	Program Leader P1 Sports and Work	VUmc
Prof. Raymond Ostelo	Program Leader P2 Ageing and Morbidity	VU, FS
Sicco Bus, PhD	Program Leader P2 Ageing and Morbidity	AMC
Prof. Theo Smit	Program Leader P3 Restoration and Development	AMC
Erwin van Wegen, PhD	Program Leader P3 Restoration and Development	VUmc
Richard Jaspers, PhD	Member	VU FBMS
Eric Voorn, PhD	Postdoc Representative	AMC
Kerensa Beekman	PhD Representative	VUmc/AMC
Ms. Mirjam van Bavel	Research support officer	AMC
Ms. Solveig Lund, MA	Research support officer	VU, FBMS

Program and Theme Leaders

P1 Sports and Work	Elite Sports Performance	Sports and Health	Work Performance and Health
Program leaders	Theme leaders	Theme leaders	Theme leaders
Prof. Geert Savelsbergh	Prof. Geert Savelsbergh Motor Control FBMS VU	Prof. Evert Verhagen Public & Occupational Health VUmc	Prof. Maurits van Tulder Health Sciences FS VU
Prof. Evert Verhagen	Jos de Koning, PhD Physiology FBMS VU	Prof. Mario Maas, MD Radiology AMC	Idsart Kingma, PhD Neuromechanics FBMS VU
P2 Ageing and Morbidity	Musculoskeletal Health	Mobility and Ageing	Physical Functioning in Major Diseases
Program leaders	Theme leaders	Theme leaders	Theme leaders
Prof. Raymond Ostelo	Prof. Raymond Ostelo Health Sciences FS VU Epidemiology & Biostatistics VUmc	Prof. Mirjam Pijnappels Neuromechanics FBMS VU	Sicco Bus, PhD Rehabilitation AMC
Sicco Bus, PhD	Leendert Blankevoort, PhD Orthopedics AMC	Peter Bisschop, PhD Endocrinology and Metabolism AMC	Irene Bultink, MD, PhD Rheumatology VUmc
P3 Restoration and Development	Trauma and Reconstruction	Activities and Participation	Growth and Development
Program leaders	Theme leaders	Theme leaders	Theme leaders
Erwin van Wegen, PhD	Astrid Bakker, PhD Oral Cell Biology ACTA	Erwin van Wegen, PhD Rehabilitation Medicine VUmc	Annemieke Buizer, MD, PhD Rehabilitation Medicine, VUmc
Prof. Theo Smit	Margriet Mullender, PhD Plastic, Reconstructive and Hand Surgery VUmc	Richard Jaspers, PhD Physiology FBMS VU	Prof. Theo Smit Medical Biology AMC

Research Areas

The research within the institute is interconnected and profits from the researchers' complementary expertise. The institute aims to foster innovative translational research by the integration of knowledge from different fields of expertise covering the range from the cellular level to the performance of individuals, ranging from elite athletes to patients. Therefore, AMS researchers engage in projects of different programs or projects that bridge the various research programs and involve end users in their research. The main research areas within the institute are depicted in fig. 2. Below is a list of the coordinators of the research areas.

Coordinators research areas

Research Area	Coordinator
Molecular Biology	Richard Jaspers, PhD
Mechanobiology	Astrid Bakker, PhD
Physiology	Richard Jaspers, PhD
Biomechanics	Sicco Bus, PhD
Motor Control	Prof. Geert Savelsbergh
Musculoskeletal Imaging	Prof. Mario Maas
Biomedical Engineering	Prof. Theo Smit
Epidemiology	Prof. Raymond Ostelo

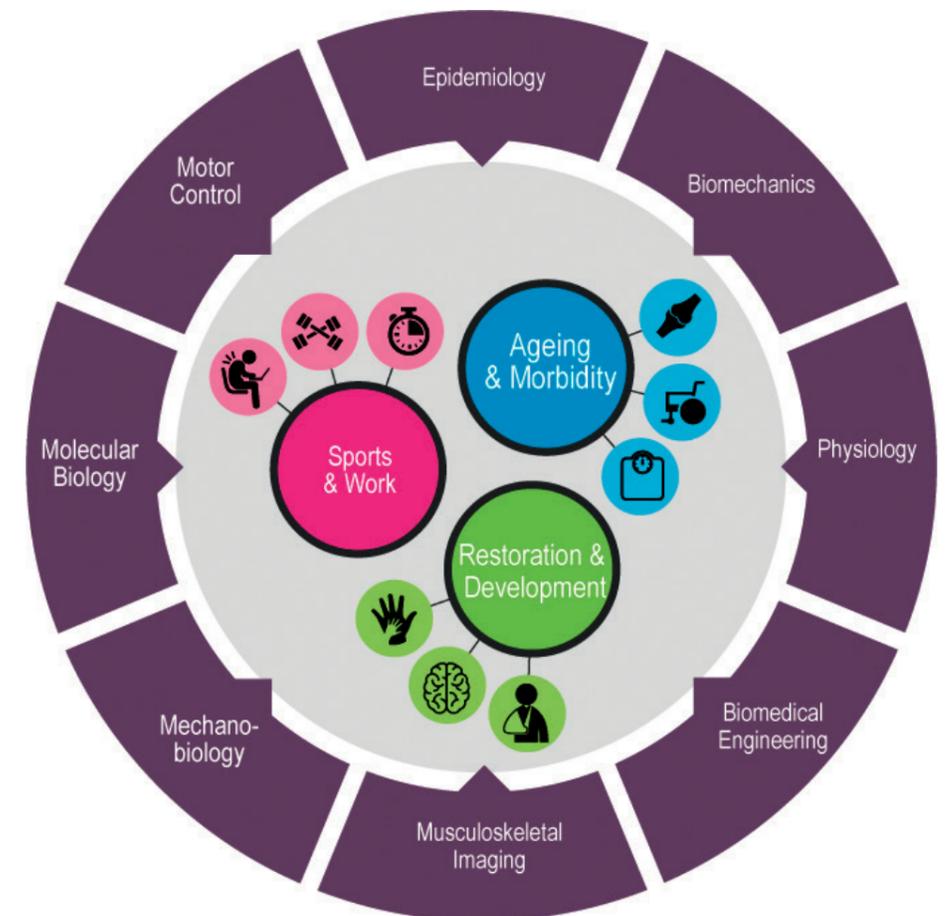


Figure 2: Research areas

For 2017 we would like to highlight the following members for their achievements in obtaining successful grants, either as individual researchers or as project leaders.

Grants (€ 1 Million and above)

Peter Beek (FBMS) and fellow researchers were in the NWO domain Applied and Engineering Sciences (Toegepaste en Technische Wetenschappen – TTW) awarded a large consortium grant. The VU part of the grant was € 1.274.000, and the total grant awarded to the consortium was € 4.786.000. The grant was awarded for the project CITIUS ALTIUS SANIUS: Injury-free exercise for everyone, and is a collaboration with TU Delft, in collaboration with various non-academic industry partners.

Tim Forouzanfar and Marco Helder (both VUmc) were Eurostars-Eureka! awarded € 2.143.000 for the project ‘Rapid and low-cost 3D printing service for personalized biocompatible prosthesis for facial reconstruction’, over the period 2017-2020. This is a collaboration with Nanotechmarin GmbH, Urobotics; Oceans and Mediafarm Aps.

Personal grants

Lynn Bar-On (VUmc), was awarded an personal VENI grant (€ 250.000) by The Netherlands Organisation for Scientific Research (NWO) for the project *The means towards etiology-driven treatment of joint hyper resistance in spastic Cerebral Palsy*, the project is a collaboration with researchers at KU Leuven.

Sjoerd Bruijn (FBMS) was given an individual VIDI grant of € 800.000 by The Netherlands Organisation for Scientific Research (NWO)

for the project *Understanding stability of walking – active control towards a passively stable pattern?*

Grants (€ 500.000 – €1 Million)

Sue Gibbs (VUmc) was awarded € 970.000 by the NWO domain Applied Engineering Sciences (AES, previously Technology Foundation STW) for the *NextSkin* project: *A novel in vitro platform for testing penetration of actives via hair shafts in human metabolically and immune competent skin equivalents*. This project is a collaboration with TU Berlin, TissUse and Unilever. The grant includes apparatus for € 100.000.

Gustav Strijkers (AMC) was awarded € 782.000 by the NWO domain Applied and Engineering Sciences (Toegepaste en Technische Wetenschappen – TTW) for the project *Development of an Innovative MRI technology to assess microtrauma in skeletal muscles*.

Esther Middelkoop (VUmc) was given a grant of € 699.000 by The Netherlands Organisation for Health Research and Development (ZonMw), for the project *INCreEASE*.

Gustav Strijkers (AMC) was also awarded € 520.000 by the Applied Engineering Sciences (AES, previously called Technology Foundation STW) for the project *Fluorine Magnetic Resonance and Ultrasound Imaging of Cardiac Inflammation*.

Grants (€ 200.000 – € 500.000)

Jeroen Smeets (FBMS) was as project leader awarded € 498.000 by the NWO domain Applied and Engineering Sciences (Toegepaste en Technische Wetenschappen)

– TTW) for the project: *The Dark Side of Reward: Physical rehabilitation by reward absence and punishment*.

Dimitra Micha (VUmc) was awarded € 400.000 by the Dutch Horstingstuit Foundation, for a project on Research on *Osteogenesis Imperfecta*, also known as Brittle Bone Disease.

Aart Nederveen (AMC), was by the AMC awarded € 376.000 for the project *Klinische evaluatie van nieuwe scantechnieken voor brain imaging met 3.0 Tesla MRI*.

Jaap van Dieën (FBMS) was awarded € 300.000 by the NWO domain Applied and Engineering Sciences (Toegepaste en Technische Wetenschappen – TTW) for a project in the Perspective program *Wearable Robotics*. This project entitled *Wearable Robotics Exo-Aid for augmenting human ophysical capacities* is part of a larger grant of € 1.000.000 awarded to a consortium with researchers from U. Twente and TNO.

Esther Middelkoop (VUmc) was given a grant of € 300.000 by The Netherlands Organisation for Health Research and Development (ZonMw), for the project *Cellular skin substitute*.

Annelies Pool-Goudzwaard (FBMS) was awarded € 300.000 by the Nederlandse Vereniging voor Manuele Therapie (NVMT) for the project *Advanced Clinical Practitioner in primary care*.

Marika van der Schaaf (AMS and HvA) was awarded a RAAK-Publiek grant of € 300.000 for the project *REhabilitaiton After Critical Illness and Hospital discharge (REACH)*.

Hans Tol (AMC) was by GE Healthcare awarded € 299.000 for the *Game changing innovative sports research: The Basketball and Muscle Injury (BAMI) study*.

Astrid Kappers (FBMS) was awarded € 293.000 as part of a larger EU funded project of € 2.360.000 entitled *SUITCEYES: Smart, User-friendly, Interactive, Tactual, Cognition-Enhancer that Yields Extended Sensosphere – Appropriating sensor technologies, machine learning, gamification and smart haptic*

interfaces. The project is coordinated by Högskolan i Borås, Sweden, and various other European academic institutions participate.

In addition to the above mentioned grant awarded to Aart Nederveen (AMC), he was also awarded € 252.000 for the project *Exercise magnetic resonance imaging and spectroscopy of the long-chain fatty acid α -oxidation deficient heart*, a project financed by the Netherlands Organisation for Health Research and Development (ZonMw).



Frans Nollet (AMC) and fellow researchers were given a grant by the Princes Beatrix Spierfonds of € 245.887 for the project *IMproving Fitness in Neuro-muscular diseases (I'M FINE)*.

AMS Financed Grants

In addition to the above mentioned grants, Amsterdam Movement Sciences awarded the following scientists grants as part of the first AMS Innovation Call 2017. The call was set out to boost the development of the research programs within the institute, and to strengthen the translation chain from bench to bedside. Grants aimed to support tenure and post-doc career development, grant applications and infrastructure. In total € 840.000 was available.

Type: Tenure development to Principal Investigator call

Dimitra Micha (VUmc): *Old drugs with new indications ease the path to the clinic for rare bone disorders* (€ 120.000);
 Marika van der Schaaf (AMC): *Training intensity in critically ill patients during and after stay in the ICU* (€ 120.000);

Type: Post-doc career call

Alessandro Chiarotto (VUmc): *Optimizing physical functioning measurement in low back pain (CAT)* (€ 60.000);
 Guus Reurink (AMC): *Hamstrings injuries: kinematics and muscle architecture; effects of preventive exercises* (€ 60.000);
 Kaj Emanuel (AMC): *Development of a reproducible OA-model, as an evaluation tool for future treatments* (€ 60.000);
 Lizeth Slot (VUmc): *Quantification of*



Laureates of CITIUS ALTIUS SANIUS

neuromuscular control in patients with CP by combining neuromuscular modelling and treadmill perturbations (€ 60.000);

Type: Grant application call

Nathalie Bravenboer (VUmc): The identification of novel pathways involved in the mechanoresponse and implementation of a cell culture platform of osteocytes (€ 25.000);
Sicco Bus (AMC): EU Marie Skłodowska-Curie Innovative Training Network grant application on the prevention of foot ulceration and amputation in diabetes (€ 25.000);

Type: Infrastructure call

Carel Meskers (VUmc): PROFITS-DPM: Dynamic Prognosis Module for long-term outcome after stroke (€ 50.000);
Evert Verhagen (Vumc): OptiForm: development of an automated database platform to monitor athletes from grassroots to elite level (€ 50.000);
Harald Thune Jørstad (AMC): MRI-compatible bicycle ergometer (€ 50.000);
Merel Brehm (AMC): C-Mill; applications in a clinical setting (€ 50.000);

Types: PhD & MSc grants

Kirsten Veerkamp (VUmc): Improving patient-specific musculoskeletal models in

children with cerebral palsy (€ 3.000);
Marit Zandbergen (VUmc): The effect of different foot models on the simulated muscle-tendon lengths of the gastrocnemius medialis and lateralis in children with cerebral palsy and typically developing children (€ 3.000).
Vera Meeke (AMC): MRI characteristics of muscles in various types of neuromuscular diseases (€ 3.000);

Awards

International Awards

Sjoerd Bruijn (FBMS) was awarded the Promising Scientist Award by the International Society of Posture and Gait Research (ISPGR), in acknowledgement of his superior research on posture and gait in his early career.

Femke van Beek (FBMS) was awarded the Eurohaptics Society PhD award for the best thesis at the World Haptics Conference 2017, in Fürstfeldbruck, Germany. Femke was awarded the prize for her thesis *Making sense of haptics – fundamentals of haptic perception and their implications for haptic device design* (2016).

Guus Reurink (AMC) was runner up at the 2017 International Thesis Award given by the British Journal of Sports Medicine

(BJSM) PhD Academy Award for this thesis *Managing Acute Hamstring Injuries in Athletes* which he completed in 2016.

Helga Haberfehlner (FBMS) won the annual science prize for children's orthopaedics awarded by the Vereinigung für Kinderorthopädie at the 31st Annual meeting of the Vereinigung für Kinderorthopädie in April 2017, held in St. Gallen Switzerland. The prize was awarded for the paper *Knee Moment-angle characteristics and semitendinosus muscle morphology in children with spastic paresis selected for medial hamstring lengthening* (2016) published in *PLoS ONE 11, e0166401* by Haberfehlner H, Jaspers RT, Rutz E, Becher JG, Harlaar J, van der Sluijs JA, Witbreuk MM, Romkes J, Freslier M, Brunner R, Maas H and Buizer AI (2016).

Laura Kox (AMC) was awarded the RSNA (Radiological Society of North America) student travel grant to attend the 2017 RSNA Annual Meeting for her abstract *Physcal Overuse Injury: Is Radial Epiphysitis a Misnomer? 3T MRI of the Distal Radial Growth Plate in Young Gymnasts Compared to Non-Gymnastic Controls*.

National Awards

Karen van der Meijden (VUmc) in November 2017 won the Best Paper Award 2015–2017, given once every two years by the Dutch Bone and Mineral Society (NVCB) for her paper the paper *Effects of 1,25(OH) D and 25(OH)D on C2C12 Myoblast Proliferation, Differentiation and Myotube Hypertrophy*. The paper was published in *J Cell Physiol 231:2517-2528* by Van der Meijden K, Bravenboer N, Dirks NF, Heijboer AC, den Heijer M, de Wit GM, Offringa C, Lips P and Jaspers RT (2016).

Esmee Botman (VUmc) in November won the Curaphar Best Presentation Award 2017 at the Annual Meeting of the Dutch Bone and Mineral Society (NVCB). The award is given every year to the best presentation of a PhD candidate and was awarded for the presentation: [18F] NaF PET: A good modality for recognizing chronic disease

in Fibrodysplasia Ossificans Progressiva. The award was given at the 27th Annual Meeting of the NVCB, held in Woudschoten in Zeist on 8 and 9 November 2017.

Marieke van der Schaaf and Juultje Sommers (both AMC) were awarded the Audience Award for their project *First Steps to Recovery*, aimed at improving the recovery of walking ability for patients in ICUs (Intensive Care Units).

Jeanine van Ancum (FBMS) won the best poster award at the Dutch national falls symposium for her poster entitled *Lifestyle-Integrated Exercise interventions delivered by the use of ICT or an instructor – PreventIT Feasibility RCT*.

Elmar Kal (FBMS) was awarded the prize for the best poster at the Dutch congress of Rehabilitation medicine (DCRM), held in Maastricht on November 8 and 9, 2017 for his poster entitled *Do external focus instructions benefit motor learning post-stroke? A randomized controlled trial*.

Appointments

Aart Nederveen (AMC) was in 2017 appointed professor of *Applied Magnetic Resonance (MR) Physics*. Professor Nederveen will give his inaugural speech entitled *Je ziet niet wat je niet ziet* on June 6th 2018.

Bianca Buurman-Van Es (AMC) was appointed professor of *Acute Geriatrics* in July 2017. Professor Buurman-van Es is also Associate professor (lector) *Transmural Geriatrics* at Amsterdam University of Applied Sciences (HvA).

Evert Verhagen (VUmc) was appointed professor of *Epidemiology of sport, physical activity and health* on the University Research Chair (URC) program per January 1, 2018. In this program VU Amsterdam aims to recognize outstanding scientists as leaders in their field and potential for the future, and it is a great honour to be appointed on this program. Professor Verhagen will hold his inaugural speech in the spring of 2018.



Kick-off meeting

Amsterdam Movement Sciences held its kick off meeting in conference center De Nieuwe Liefde (meaning *New Love!*), in the heart of Amsterdam on January 27, 2017. Approximately 200 clinicians, scientists, PhD candidates and other interested parties were present at the meeting, which was kicked off by a Dutch comedian Raoul Heertje, who challenged all present to get out of their comfort zones. The two directors, professors Nollet and Maas urged all present members to stimulate research collaboration on human movement across traditional boundaries; to meet and exchange; to build bridges and facilitate new collaborations across traditional focus! The meeting was defined by a positive and amicable atmosphere and was definite success and a great first meeting.

Institute plan

In June 2017, the AMC and VUmc Executive Boards enthusiastically endorsed the AMS institute plan over the period 2017–2020, and in addition also gave their stamp of approval to the shared directorship by professors Mario Maas and Frans Nollet. The institute plan is available at the AMS website.

Research Audit AMC

At the end of 2017, the research within AMC was audited over the period 2011–2016. The site visit took place from October 23–25, 2017, when an international evaluation committee, chaired by Prof.dr. John Creemers of Human Genetics, KU Leuven, was introduced to the AMC research within AMS research institute. During the session several outstanding research projects were presented to the international evaluation committee by AMS members of the program for Movement and Musculoskeletal Medicine; Frans Nollet, Gino Kerkhoffs and Sicco Bus. It became evident that the current research and researchers within AMC were positive towards being part of a larger institute, and that this will lead to a much needed strengthened clinical profile of AMS, and furthermore that the alliance with VUmc was an excellent opportunity for the field of movement sciences. With this approach the aim is to advance the research within the field and become more visible in AMC and beyond. The presentations by the researchers were followed by a panel discussion where also Mario Maas, Theo Smit, Aart Nederveen, Astrid Bakker and Richard Jaspers participated. The research program *Movement and*



Musculoskeletal disorders was positively reviewed as part of the AMS wide audit; the enthusiasm of the researchers had soundly convinced the committee of the benefits of the broader collaboration.

PhD and PostDoc committees

Later in the year, the PhD committee was installed, with PhD members from AMC, VU and VUmc. The committee has a seat on the AMS MT, and has a voice on all matters discussed within the Management team. In November 2017 the first AMS PhD meeting was held, organized by the PhD committee members for PhD candidates from all participating partners, and for both established and newly started candidates. The meeting was a success, with 70 PhD candidates attending. It was reviewed well, and fellow PhD candidates appreciated the self-organized ‘bottom-up’ approach.

The PostDoc committee was also established in 2017. The Post docs within the institute form a relatively small group, and it is expected that they will benefit from having an own network. This committee also has a seat and vote on the MT, and the talent development policy of the institute has aims to encourage young, talented institute members holding a PhD to go further with their research.

The PhD candidates at the department of Human Movement Sciences, VU University, initiated the Science transmission meetings, organized for and by PhD candidates within the institute. These meetings are held once a month, with an invited speaker who covers items of interest, in particular for PhD candidates. Some of the subjects that were covered in 2017 were; *the Publication Cycle* and *How to lay out a thesis*.

Science Committee

The Science Committee (CWO), which was established under MOVE, was in 2017 broadened with recruited members from AMC, and officially started as a new committee in January 2018. The CWO will, in addition to judge and offer advice on research proposals, also co-judge calls set out by the institute, and monitor the quality policy and quality safeguarding of the research within the institute. Until further notice, the committee judges VUmc and some

FBMS proposals, and as a service AMC members may also submit proposals for advice, although this is as yet not compulsory for AMC members. When the committee has approved a proposal, it may be sent on to the METc.

The new science committee has the following members:

- Prof.dr. Willem Lems (VUmc, chair);
- Dr. Peter Bisschop (AMC);
- Dr. Nathalie Bravenboer (VUmc);
- Dr. Dimitra Micha (VUmc);
- Dr. Renate de Jongh (VUmc);
- Dr. Huub Maas (FBMS);
- Dr. Jaap van Netten (AMC);
- Dr. Josien van den Noort (AMC);
- Prof. dr. Barend van Royen (VUmc);
- Prof.dr. Evert Verhagen (VUmc);
- Dr. Erwin van Wegen (VUmc);
- Dr. Janneke Wilschut (VUmc).

Program and expert meetings

The research program *Sports and Work* organized their inaugural program meeting in December 2017 with a meeting for all scientists on the theme of Sports and Work related issues. The meeting was held at the Amsterdam Arena Congrescentrum, home of AJAX football club and was set up as a ‘get to know’ one another, with well-known external speakers from the world of sports in the Netherlands.

The expert meetings within the field of Mechanobiology, organized by Astrid Bakker, Nathalie Bravenboer, Richard Jaspers and Jenneke Klein Nulend were organized for the second year running. Each time they offered exceptional speakers, and with an eye to the Amsterdam University hospital merger, speakers were invited from both VUmc, AMC as from elsewhere. All meetings have had a wide audience from MA students to PhD candidates, researchers and clinicians from all participating partners, and have led to stimulating discussions.

The colloquia organized by the department of Human Movement Sciences in collaboration with AMS, are steadfast monthly events open to all members. During 2017 there were several external speakers, to mention a few: dr. Nick Stergiou, U. of

Nebraska, Omaha, on *Harnessing Movement Variability to Treat and Prevent Motor Related Disorders* and Dr. Martina Navarro, U. of Portsmouth, UK on *Influence of prior information on the perception of ball position in tennis serve: Testing Bayesian Decision Theory*, and prof. Philip Row, U. of Strathclyde, UK on *Visualization for Rehabilitation*.

Other Developments

Sue Gibbs (VUmc/ACTA) and Astrid Bakker (ACTA) participate in the national collaboration hDMT (*Human organ and disease model technologies*). The opening and introduction to the VUmc campus program was held

on March 21, 2017 with presentations on *Skin-on-Chip* and *Bone-on-Chip*. Some of these researchers are based at the new o/2 building on the VU campus, which offers excellent facilities for collaboration on societally relevant research and again state-of-the-art facilities for both basic and applied research.

In May 2017, the laboratory for Myology (MYOLAB), headed by Richard Jaspers (FBMS) moved to new facilities at the new o/2 building on the VU campus. Researchers from a selection of departments here collaborate, using the state-of-the-art facilities available for their research.

Societal Impact and Relevance

Impact of the research on the general public or professionals

Several of our members took part in the Amsterdam Science and Innovation Award 2017. Marike van der Schaaf and Juultje Sommers (both AMC) were awarded the Audience Award for their project *First Steps to Recovery*, aimed at improving the recovery of walking ability for patients in ICUs (Intensive Care Units). Ben van Oeveren (FBMS/VU) was nominated for the project *MOVE Metrics*, a cloud based analytical tool to support runners to interpret their training sessions.

Our distinguished members Mario Maas, Gino Kerkhoffs and Evert Verhagen trained an internationally selected group of IOC (International Olympic Committee) medical doctors to the strictest requirements. The AMS professors are part of only 4 world-wide based centers who may train and host the IOC-MD exams.

Andrea Maier (FBMS) in January 2017 published her Dutch language book *Eeuwig houdbaar, de ongekende toekomst van ons lichaam*. The book, aimed at the general public aims to inform the reader about ageing and the current state of geriatrics, and how to age healthily.

In 2017, the running project *Running with Arthritis / Hardlopen met Reuma* started in Amsterdam upon the request of patients. The running program was developed and targeted at patients with an inflammatory rheumatic disease, who wanted to (re-)start running. The program was a collaboration between VUmc, Reade, Centrum Aangepast Sporten Amsterdam, Reumafonds (Dutch Arthritis Foundation), Atletiekunie and expert patients. Irene Bultink (VUmc) was one of the initiators of the project. The project was a success and has been scaled up to take place on five different locations in the Netherlands.

Each year our members contribute to clinical guidelines, to improve the health care policy and the treatment and speedily recovery of patients:

- Bus SA, juni 2017, Orthopedische Techniek, Nieuwe richtlijn diabetische voet 2017.
- Verkerk GJQ, Beelen AAJM, Meulmeester L, 2017, Handleiding voor het afnemen van de COPM bij het kind zelf. Ergotherapie magazine.



Andrea Maier



Running project *Running with Arthritis*

In our first year as Amsterdam Movement Sciences research institute we are proud to announce our output:

- PhD Theses: 39
- Scientific publications: 824
- Professional publications: 38
- Book / chapters: 17

The complete list of publications can be found online via:

VU: <https://research.vu.nl/en/organisations/amsterdam-movement-sciences-2>

VUmc: <https://research.vumc.nl/en/organisations/amsterdam-movement-sciences/network/>

AMC: <https://www.amc.nl/web/leren/research-62/research-institutes.htm>

Key Publications

- 1 Armstrong, D.G., Boulton, A.J.M., & Bus, S.A.A. review paper on *Diabetic Foot Ulcers and their Recurrence* in the June 2017 issue of the NEJM (New England Journal of Medicine) Jun 15;376(24):2367-2375. (IF 79.258).
- 2 Juch, J.N.S., Maas, E.T., Ostelo, R.W.J.G., George Groeneweg, J., Kallewaard, J.W., Koes, B.W., Van Tulder, M.W. (2017). Effect of radiofrequency denervation on pain intensity among patients with chronic lowback pain the mint randomized clinical trials: The Mint Randomized Clinical Trials. JAMA – Journal of the American Medical Association, 318(1), 68-81. (IF: 37,684).
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Ankle fracture

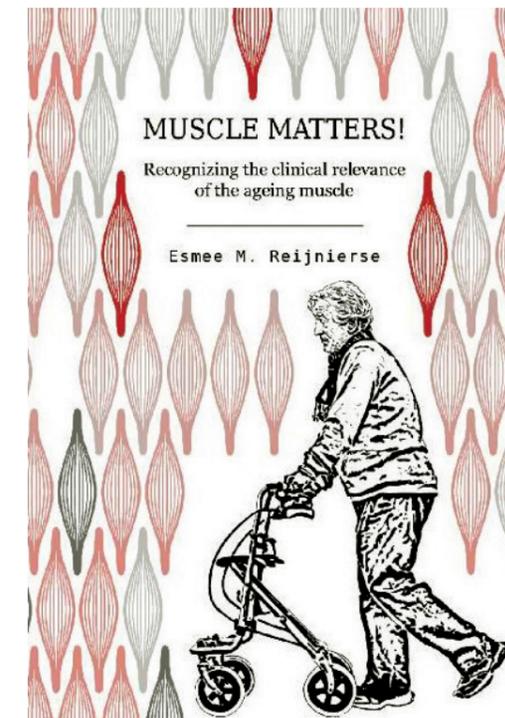
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Dissertations

(Defended at either University of Amsterdam or VU University Amsterdam)

- 1 Backes M., 'Complications in calcaneal fracture surgery and implant removal'. 28-09-2017. (Co-)supervisors: Goslings J.C., Schepers T., Schep N.W.L. University of Amsterdam.
- 2 Bernabei, M., 'Neuromechanical Consequences of Epimuscular Myofascial Force Transmission: Impact of connective tissues on muscle action', 18-01-17. (Co-)supervisors: van Dieen, J.H., Maas, H. Vrije Universiteit Amsterdam.
- 3 Boomsma, M.F., 'Heavy reading in heavy metal: Unraveling the mystery of hip tissue in metal on metal total hip arthroplasty'. 17-05-2017. (Co-)supervisors: Maas, M., Verheyen, CCPM, Streekstra, G.J. University of Amsterdam.
- 4 Brinkman, R.J.C., 'On the innovative genius of Andreas Vesalius'. 28-09-2017. (Co-)supervisors: van der Horst, C.M.A.M., Oostra, R.J., Hage J.J. University of Amsterdam.
- 5 Calder J.D.F., 'Advances in the management of ankle injuries in athletes'.

- 05-07-2017. (Co-)supervisors: van Dijk, C.N., Blankevoort L. University of Amsterdam
- 6 de Jong, T., 'A clinically translatable concept for periodontal ligament engineering around dental implants: The characterization of patient-friendly materials with optimal biomechanical properties'. 17-02-2017. (Co-)supervisors: Smit, T.H., Bakker, A.D., University of Amsterdam.
- 7 de Muinck Keizer, R-JO., 'Imaging in fracture surgery'. 27-06-2017. (Co-)supervisors: Goslings, J.C., Eygendaal, D., Schep, N.W.L. University of Amsterdam.
- 8 Dettling-Ihnenfeldt, D.S., 'The Post-Intensive Care Syndrome (PICS)'. 16-02-2017. (Co-)supervisors: Nollet, F., van der Schaaf, M. University of Amsterdam.
- 9 Eken, M.M., 'Lower limb muscle endurance and muscle strength in children and adolescents with cerebral palsy', 10-02-17. (Co-)supervisors: Harlaar, J., van Bennekom, C.A.M., Houdijk, H., Dallmeijer, A., Doorenbosch, C. Vrije Universiteit Amsterdam.
- 10 Gurney-Champion, O.J., 'MRI of pancreatic cancer for radiotherapy'. 29-03-2017. (Co-)supervisors: Stoker, J., Rasch CRN, Nederveen, A.J., Bel, A. University of Amsterdam
- 11 Kleinlugtenbelt, Y.V., 'Research methodology in distal radius fracture care: 1 step backward, 2 steps forward'. 27-09-2017. (Co-)supervisors: Goslings, J.C., Bhandari, M., Poolman, R.W., Scholtes V.A.B. University of Amsterdam.
- 12 Lummel, R.C., 'Assessing Sit-to-Stand for Clinical Use', 30-03-17. (Co-)supervisors: van Dieen, J.H., Beek, P.J., Vrije Universiteit Amsterdam.
- 13 Maas, J.C., 'Knee-ankle-foot orthosis treatment in children with spastic cerebral palsy', 6-07-17. (Co-)supervisors: Becher, J., Huijing, P.A., Dallmeijer, A., Jaspers, R.T., Vrije Universiteit Amsterdam.
- 14 Melker Worms, J.L.A., 'Human Balance Control: Effects of Fear and Attention in Standing and Walking', 3-07-17. (Co-)supervisors: Loram, I.D., Beek, P.J., Stins, J.E., Vrije Universiteit Amsterdam.
- 15 Ooijen-Kerste, M.W., 'Steps to follow: Toward the clinical assessment and training of walking adaptability'. 26-04-17. (Co-)supervisors: Beek, P.J., Janssen, T.W.J., Roerdink, M. Vrije Universiteit Amsterdam.
- 16 Otterman, N.M., 'Factors influencing the use of evidence in physical therapy'. 20-06-2017. (Co-)supervisors: Nollet, F., Kwakkel, G., van der Wees, P.J., Schiemanck, S.K. University of Amsterdam.
- 17 Oudeman, J., 'Diffusion tensor imaging: A diagnostic tool for neuromuscular conditions'. 11-10-2017. (Co-)supervisors: de Visser, M., Maas, M., Verhamme, C., Strijkers, G.J., Nederveen, A.J. University of Amsterdam.
- 18 Peeters, M., 'Towards tissue engineering of the intervertebral disc: evaluation of facilitating technologies'. 3-10-17. (Co-)supervisors: Smit, T.H.H., Helder, M.N. Vrije Universiteit Amsterdam.
- 19 Punt, M. 2017, 'Gait stability in stroke survivors: The assessment and training of gait stability in chronic stroke survivors'. 31-10-17. (Co-)supervisors: van Dieen, J.H., Bruijn, S.M., Wittink, H.M. Vrije Universiteit Amsterdam.
- 20 Raven, E.E.J., 'Osteoarthritis and rheumatoid arthritis of the carpus'. 13-06-2017. (Co-)supervisors: van Dijk, C.N., Blankevoort, L. University of Amsterdam.
- 21 Reijnierse, E.M., 'Muscle matters! Recognizing the clinical relevance of the ageing muscle'. 3-04-17. (Co-)supervisors: Maier, A.B., Meskers, C.G.M., de van der Schueren, M., Trappenburg, M.C. Vrije Universiteit Amsterdam.
- 22 Salentijn, E.G., 'Midfacial trauma patients: An epidemiological survey'. 13-12-17. (Co-)supervisors: Forouzanfar, T., Schulten, E.A.J.M. Vrije Universiteit Amsterdam.
- 23 Stenvers, D.J., 'Light, the circadian timing system, and type 2 diabetes'. 18-04-2017. (Co-)supervisors: Fliers, E., Kalsbeek, A., Bisschop, P.H.L.T. University of Amsterdam.
- 24 Stevens, T.G.A., 'External load during football training: the power of acceleration and deceleration'. 23-02-17. (Co-)supervisors: Savelsbergh, G.J.P., Beek, P.J., de Ruitter, C.J. Vrije Universiteit Amsterdam.
- 25 Stunt, J.J., 'The validity of arthroscopic simulators and performance tools'. 18-01-2017. (Co-)supervisors: Kerkhoffs, G.M.M.J., van Dijk, C.N. University of Amsterdam.
- 26 Su, T., 'Cognitive impairment and MRI-findings in patients with HIV on antiretroviral treatment'. 07-02-2017. (Co-)supervisors: Majoie, C.B.L.M., Reiss, P., Caan, M.W.A., Wit, F.W.N.M. University of Amsterdam.
- 27 Tak, I.J.R., 'Hip and groin pain in athletes: Morphology, function and injury from a clinical perspective'. 20-09-2017. (Co-)supervisors: Kerkhoffs, G.M.M.J., Agricola, R., Weir, A. University of Amsterdam.
- 28 ten Berg, P., 'Characterizing scaphoid nonunion deformity using 2-D and 3-D imaging techniques'. 22-03-2017. (Co-)supervisors: van der Horst, C.M.A.M. Streekstra, G.J., Strackee, S.D., Dobbe, J.G.G. University of Amsterdam.
- 29 van de Ven, R.M., 'Computer-based Cognitive Flexibility Training after Stroke'. 09-06-2017. (Co-)supervisors: Schmand, B.A., Murre, J.M.J., Veltman, D.J. University of Amsterdam.
- 30 van den Heuvel, M.R.C., 'Augmented visual feedback in Parkinson's disease: Assessing and improving postural control'. 22-12-17. (Co-)supervisors: Daffertshofer, A., Kwakkel, G., Beek, P.J., van Wegen, E.E.H. Vrije Universiteit Amsterdam.
- 31 van der Bel, R., 'Kidney oxygenation under pressure'. 15-12-2017. (Co-)supervisors: Stroes, E.S.G., Homan van der Heide, J.J.J., Krediet, C.T.P., Nederveen, A.J. University of Amsterdam.
- 32 van der Leij, C. 'Advanced MRI in inflammatory arthritis'. 19-05-2017. (Co-)supervisors: Maas, M., Lavini, C., van de Sande, M.G.H. University of Amsterdam.
- 33 van der Meijden, K., 'Local Vitamin D Metabolism in Bone and Muscle'. 11-01-17. (Co-)supervisors: Lips, P.T.A.M., den Heijer, M., Bavenboer, N., Jaspers, R.T., Lips, P.T.A.M. Vrije Universiteit Amsterdam.
- 34 van Eijnatten, M.A.J.M., 'Challenges in medical additive manufacturing'. 8-12-17. (Co-)supervisors: Forouzanfar, T., Wolff, J.E.H. Vrije Universiteit Amsterdam.
- 35 van Rijn, M., 'Nurse-led multifactorial care in community-dwelling older people: Outcomes on daily functioning, experiences and costs'. 13-10-2017. (Co-)supervisors: de Rooij, S.E.J.A., Buurman-van Es, B.M., Moll Van Charante, E.P. University of Amsterdam
- 36 Vashaghian, M., 'Biomimetic matrices for pelvic floor repair'. 31-05-2017. (Co-)supervisors: Smit, T.H., Roovers, J.P.W.R. University of Amsterdam.
- 37 Weel, H., 'Stress fractures: Solutions towards better treatment and patient reported outcome measures'. 15-12-2017. (Co-)supervisors: Kerkhoffs, G.M.M.J., van Dijk, C.N., Blankevoort, L. University of Amsterdam.
- 38 Zengerink, M., 'Osteochondral talar lesions and ankle biomechanics'. 11-01-2017. (Co-)supervisors: van Dijk, C.N., Blankevoort, L., Tuijthof, G.J.M. University of Amsterdam.
- 39 Zhang, Z., 'Hypothalamic regulation of metabolism: Role of thyroid hormone and estrogen'. 19-01-2017. (Co-)supervisors: Fliers, E., Kalsbeek, A., Bisschop, P.H.L.T., Boelen, A. University of Amsterdam.



Muscle matters!

VU / Faculty of Behavioural and Movement Sciences	A	B	C	D	E	
Movement Sciences: Coordination Dynamics	6	1	9	7	1	24
Movement Sciences: Motor Learning and Performance	7	4	1	5	9	26
Movement Sciences: Neuromechanics	13	8	16	33	5	75
Movement Sciences: Physiology	8	2	8	8	3	29
Movement Sciences: Sensorimotor Control	7	4	5	2	5	23
VU / Faculty of Behavioural and Movement Sciences Total						177
VU / Faculty of Sciences	A	B	C	D	E	
Health Sciences	2	0	1	0	0	3
Dept. of Physics and Astronomy	3	0	0	0	0	3
VU / Faculty of Sciences Total						6
VU Total	46	19	40	55	23	183

VUmc	A	B	C	D	E	
Clinical Chemistry	0	2	1	0	0	3
Clinical Genetics	0	1	0	0	0	1
Dermatology	1	0	3	1	3	7
Epidemiology & Biostatistics	1	0	0	0	0	1
Gastroenterology and Hepatology	0	1	0	0	1	2
General Practice and Elderly Care medicine	0	0,5	0	0	1	1
Internal Medicine	1	6	0	2	2	11
Neurosurgery	0	1	0	0	0	1
Obstetrics and Gynaecology	1	0	0	0	0	1
Oral and Maxillofacial Surgery / Oral Pathology	7	7,5	1	1	10	26
Orthopaedics	1	7	1	1	2	12
Paediatrics	1	0	0	0	0	1
Plastic, Reconstructive and Hand Surgery	2	2	1	2	4	11
Public and Occupational Health	2	0	0	5	1	8
Radiology and Nuclear Medicine	1	1	0	0	0	2
Rehabilitation Medicine	5	13	9	2	4	32
Rheumatology	1	1	0	0	0	2
Surgery	0	1,5	0	2	1	4
VUmc Total	24	45	15	16	27	126

AMC	A	B	C	D	E	
Biomedical Engineering & Physics	3	3	3	0	0	9
Surgery	1	6	13	0	0	20
Internal Medicine	1	9	9	0	0	19
Clinical Epidemiology	0	0	1	0	0	1
Clinical Immunology	1	0	0	0	0	1
Clinical Methods & Public Health	0	0	2	0	0	2
Medical Biology	1	0	0	0	0	1
Medical Psychology	0	2	0	0	0	2
Neurology	0	1	1	0	0	2
Operating theatre	0	0	1	0	0	1
Orthopaedics	2	4	21	0	0	27
Plastic, Reconstructive and Hand Surgery	1	6	3	0	0	10
Psychiatry	0	0	1	0	0	1
Radiology (and Nuclear Medicine)	2	6	13	0	0	21
Rehabilitation Medicine	2	12	10	0	0	24
Obstetrics and Gynaecology	0	0	1	0	0	1
Unknown	0	3	31	0	0	34
AMC Total	14	52	110	0	0	176

ACTA (Guest members)	A	B	C	D	E	
Oral Cell Biology	4	2	0	0	0	6
Oral Implantology and Prosthetic Dentistry	2	0	0	0	0	2
Oral Kinesiology	2	0	0	0	0	2
Periodontology	0	1	0	0	0	1
ACTA Total	8	3	0	0	0	11

Total	A	B	C	D	E	
Total members and guest members	92	118	165	71	50	496

- A** Professor/Hgl; Associate professor/UHD; Assistant professor/UD;
- B** Researcher/Onderzoeker (senior, postdoc and junior), Other Scientific staff/
Overig WP, Artsen met onderzoekstijd incl. med. Specialist/Medical staff with
dedicated research tasks, including medical specialists;
- C** Standard PhD: Employed (SEP 2015-2021 def.)
- D** Contract PhDs (externally or internally funded, but not employed) (SEP 2015-2021 def.)
- E** Guest researchers, visiting professors and endowed chairs

The institute continues on the path of becoming a world leading network institution on human movement disorders. As the merger between the two university hospitals in Amsterdam approaches, further collaboration is essential and the clinically based research will form a sound foundation for the institute. In the years to come we will use the innovation budget facilitated by the AMC and VUmc to strengthen cooperation and innovative research even further; we inspire talent, and will offer both PhD candidates and Postdocs grants especially aimed at these groups. Furthermore, we will use the budget to set out research projects in the fields covered by our research programs and themes. The next call will be set out in 2018 and will enable us to take this several steps further.

We aim to increase collaboration with the other Amsterdam research institutes, especially on themes that bridges the individual institutes. Furthermore, we aim to improve the joint infrastructure by making equipment available for all institute members and beyond.

As the institute advances, we aim to stimulate further collaboration with industry and other external partners, and stimulate research according to the Dutch NWA (Nationale Wetenschapsagenda / National Science Agenda), where the research within AMS can pursue several of the suggested routes. As institute, we actively support researchers who want to apply for national Dutch or EU grants, or aim to collaborate in European wide consortia; this is part of our policy as set out in the call for proposals 2017.

