



**CENTER FOR
SENSORY-MOTOR
INTERACTION
(SMI)
25TH ANNIVERSARY
1993-2018**



AALBORG UNIVERSITY
DENMARK



AALBORG UNIVERSITET

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LAYOUT

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Novagraf A/S, Denmark

PHOTOS

The pictures are taken from the SMI Photo Gallery

PRINTING

Novagraf A/S, Denmark

PUBLISHING YEAR

December 2018

FURTHER INFORMATION

<http://www.smi.hst.aau.dk/>

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PREFACE



Center for Sensory-Motor Interaction (SMI) was established 25 years ago in 1993 based on a grant from The Danish National Research Foundation. Over the years, SMI has steadily grown to a large internationally recognized research center of excellence.

From day one, SMI had a clear strategy for the center encompassing:

- Internationalization
- Interdisciplinarity
- Infrastructure

This strategy has been continuously and successfully pursued and implemented.

The international strategy has over the entire period resulted in approx. half of the staff and Ph.D. students coming from abroad. Furthermore, half of the scientific production has been published with external international collaborators.

The interdisciplinary strategy is represented by a variety of different professions (e.g. biomedical engineering, biomechanics, neuroscience, bioscience, sports science, pharmacology, dentistry, medicine, biophysics, psychology) integrated into interdisciplinary research projects.

From the beginning, it was of utmost importance to establish a professional administrative research infrastructure to support the staff and the management.

Along the way, SMI has adapted to the different political agendas, e.g. that research should benefit society via public/private partnerships. Therefore, SMI was one of the first research centers in Denmark to develop and implement a research-based innovation strategy:

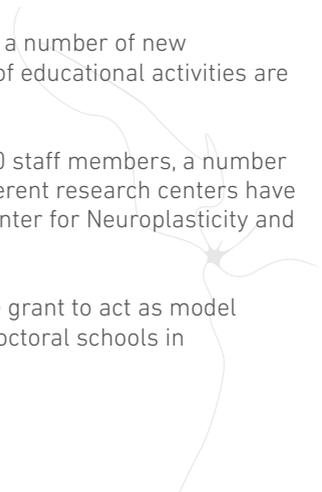
- Research based innovation

This innovation strategy has resulted in establishing spin-outs and developing a substantial network of collaborations with national and international companies.

In addition, the research production has been the lever for establishing a number of new educational initiatives at Aalborg University, and a substantial amount of educational activities are provided by SMI Ph.D. students, post-docs, and faculty.

Concurrently with SMI growing from a few researchers to more than 70 staff members, a number of gemmations have taken place. New research areas have arisen; different research centers have been embedded; a new basic research center of excellence – CNAP (Center for Neuroplasticity and Pain) – has been spun out.

In 1997 The Danish National Research Foundation awarded SMI a large grant to act as model for International doctoral education, and one of the first international doctoral schools in



Denmark was established. More than 200 Ph.D. students have successfully completed their training.

As the research center has grown, SMI has adjusted the organization both research and management wise in order to optimize the division and organization of research areas and research management. As SMI continued to expand over the years, it was decided to implement a decentralization strategy in 2009 where five individual Research Interest Groups (RIGs) with individual chairs were established. New centers of excellence benefit from establishing new focused groups across RIGs.

In recent years, SMI has developed more and more into an umbrella research organization for all the activities taking place with an overall professional infrastructure to support the activities. Due to strategic and educational reasons, the Physical Activity and Human Performance RIG decided to leave SMI in 2018 and was established as an independent research unit.

Over the 25 years, SMI has raised approximately EURO 70 mill. in external funding from national and international granting bodies, from foundations, and from collaborators, and has made a significant impact on the research field with more than 3,000 published peer-reviewed papers.

A LinkedIn alumni profile has been established, which today counts close to 200 previous SMI affiliates.

We would like to thank all present and former SMI employees and students as well as national and international collaborators and partners/foundations for contributing to the success of SMI.

This anniversary publication is in honor of all contributors.

Lars Arendt-Nielsen

On behalf of the SMI Board

*Royal visit at SMI,
Thomas Sinkjær and
Lars Arendt-Nielsen are
"experimenting" with
H.R.H. Crown Princess
Mary of Denmark – 2004*





The Annual SMI Seminar – 2018



ORGANIZATION



SMI®



**RESEARCH
INTEREST
GROUPS**



**RESEARCH
CENTERS**



INNOVATION

The management structure of SMI consists of the SMI Board. SMI is divided into a number of research areas which are organized in Research Interest Groups (RIGs). Furthermore, innovation activities and research centers are embedded under the SMI umbrella.

SMI BOARD

SMI is headed by Professor Lars Arendt-Nielsen (Co-Founder) and the Heads of the RIGs, who will be presented in the following:



*Lars Arendt-Nielsen
Professor, dr.med.sci., Ph.D.
Director of SMI
Head of Translational Pain Biomarkers
Aalborg University, Denmark*



*Ole Kæseler Andersen
Professor, dr.scient., Ph.D.
Co-Director of SMI
Head of Integrative Neuroscience
Aalborg University, Denmark*



*Thomas Graven-Nielsen
Professor, dr.med.sci., Ph.D.
Head of Pain and Motor System Plasticity
Director of CNAP
Aalborg University, Denmark*



*Winnie Jensen
Professor, Ph.D.
Head of Neural Engineering and
Neurophysiology of Movement
Aalborg University, Denmark*

” No other field has had as significant an impact on health science at AAU as the research conducted by Center for Sensory-Motor Interaction (SMI). Without this unique research and the talented researchers who have advanced the field over the last 25 years, we would not have had the cornerstone for the Faculty of Medicine. As Rector of AAU and Dean of the Faculty of Medicine, it is our great pleasure to express our appreciation and recognize the contributions of SMI on the occasion of this anniversary.

A presence for now 25 years, SMI existed long before the formation of the Faculty of Medicine. As a research environment, it has repeatedly proven its excellence and its significance as a driving force. SMI has not only greatly helped to define the research conducted at the Faculty of Medicine today. SMI has also been the primary motor for the biomedical engineering program, and early on helped to create an understanding of the importance of internationalization and health science research training at AAU.

Center for Sensory-Motor Interaction began as a center of excellence and evolved into a strong, internationally recognized research center. SMI is not only the pride of the faculty. SMI is the pride of the entire university”.

**Rector Per Michael Johansen
and Dean of Faculty of Medicine
Lars Hvilsted Rasmussen,
Aalborg University, Denmark**

Summer school in Kotor,
Montenegro – 2002



HISTORY



The establishment of Center for Sensory-Motor Interaction (SMI) in October 1993 by the grant from the Danish National Research Foundation was an important achievement and a milestone at Aalborg University. It concluded several years of work on establishing an interdisciplinary, integrated biomedical and neuroscience research environment at an international level.

SMI and the International Doctoral School were founded by Professor, dr.med., Ph.D. Thomas Sinkjær (left SMI in 2006) and Professor, dr.med.sci, Ph.D. Lars Arendt-Nielsen.

The purpose of SMI was to apply biomedical and neuroscience principles to the study of human sensory systems, motor systems and particularly the sensory-motor interactions under normal and pathophysiological conditions. The research activities were concentrated on three inter-linked main focus areas: Rehabilitation, Motor Control, and Pain.

All activities were characterized as interdisciplinary fields of research involving a wide range of biomedical and experimental neuroscience disciplines organized around common themes. New research areas emerged along the way, e.g. sports science, sports technology, and tele-health/tele-rehabilitation.

The collaboration between SMI, Aalborg University Hospital, and many other external partners increased steadily over the years and led to many new interdisciplinary and collaborative projects.

In 1997, the SMI International Doctoral School in Biomedical Science and Engineering was established by a grant from the Danish National Research Foundation.

Today SMI has grown from a few to more than 70 staff members (2018 staff numbers) of which approx. 50% comes from abroad. Interdisciplinary scientific strengths, commitment, and empathy for the individual employee's contribution to the center have been paramount in order to create an internationally oriented, entrepreneurial research environment and a SMI family spirit.

Annual SMI Seminar –
1995



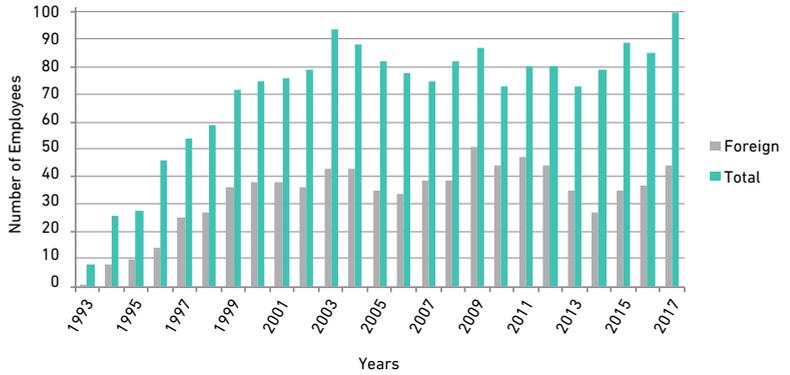
SMI Annual Seminar –
2000



Annual SMI Seminar –
2017



National/international employees



SMI has made several organizational changes during the years. The first was initiated in 2009 with the division into Research Interest Groups (RIG) with a RIG Head for each group in order to secure SMI in future - especially at management level.

Due to steady growth in recent years, SMI has developed more into an umbrella organization with embedded RIGs, research centers, and innovation.

SMI is occupying approx. 1,500 m² of office space and 650 m² of modern, fully equipped laboratories.

The Annual SMI Seminar, cooking dinner for SMI and waiting for pancakes – 2012



IT TAKES MORE THAN EXCELLENT SCIENCE TO MAKE A SUCCESSFUL, 25-YEAR-OLD RESEARCH CENTER



*SMI co-founder
Thomas Sinkjær*

A lot can be learned from SMI! The scientific process itself is what defines science! By its very nature, science is never-ending. Once you have grappled with one aspect and understood it, further problems arise – in turn, creating new hypotheses. Your experiments and the conclusions you draw, irrespective of any controversy this may create, must be independently tested and confirmed before other people will agree to your findings. Then, your conclusions are subjected to further research and hypotheses. It is the vicious circle of this scientific process that results in what we consider scientific truth.

Center for Sensory-Motor Interaction (SMI) at Aalborg University has over the last two decades earned an enviable reputation among its peers due to its rigorous approach to hypothesis-driven research and its consistency in remaining true to the scientific process. Research at SMI spans from neuroscience to engineering, and this is yet another important aspect of its success. The center has been able to recruit talented young and senior scientists, often from abroad and typically with diverse scientific backgrounds. However, they are all driven by the same interest in research on the sensory-motor system. This unique blend of scientists, with differing research training and different ways of approaching a common hypothesis, is what

makes SMI stand out as an exceptional research and training environment. The Danish National Research Foundation (which founded SMI from 1993-2006) had its centers evaluated in 2014. A few of these centers demonstrated a 'paradigm shift', and SMI was one of the few. However, in today's highly competitive research-funding landscape, excellent research does not guarantee a 25-year-old research center! For this to transpire, and to justify a university base, much larger obligations need to be met.

There must be true commitment to undergraduate teaching and strong focus on research training and putting the science to use. SMI has very successfully met all of these parameters. It has established new teaching curricula within health science and technology (e.g. the first five-year Master's degree in biomedical engineering) and a three-year international doctoral school in biomedical science and engineering (approximately 50% of its students coming from abroad). One of SMI's main aims is to develop new diagnostic and therapeutic methods in the fields of pain, motor control, and rehabilitation. To ensure that the most promising science within these research areas is put to use, SMI also prioritizes collaboration with established industries and facilitates establishment of new

neuro-technology companies. Science on science has given us two important insights: 1) the young talents are those most willing to pick up on new science, and 2) if the research or researcher is only funded short term, the results delivered are often only of short-term interest! To be able to address the truly daring questions in science, you need a research environment that attracts young talents from all over the globe and is able to look at least ten years ahead. With the exception of a few cases, commitment of this magnitude can only be given by a research center's host university. To ensure that SMI continues to flourish for the benefit of science – but more importantly for the benefit of society as a whole – Aalborg University must maintain its long-term commitment.

Congratulations to SMI and Aalborg University. SMI delivers on all essential parameters, 25 years after it was established. With the right people on board, and the right commitment from the University, it will be a strong ship for many years to come.

I am proud to have sailed with SMI on the first good 10 years of its journey.

Today, Thomas Sinkjær is Senior Vice President at the Lundbeck Foundation. From 2007 to 2015, he was Director of the Danish National Research Foundation. Lars Arendt-Nielsen and Thomas Sinkjær established SMI in 1993, and Thomas Sinkjær was director of the center from 1993 to 2006.

Thomas Sinkjær and Lars Arendt-Nielsen together with Director of the Danish National Research Foundation Peder Olesen Larsen at SMI's 20th anniversary celebration – 2013



NEURAL ENGINEERING AND NEUROPHYSIOLOGY OF MOVEMENT

OBJECTIVE

We believe in improving the quality of life for people with impaired sensory or motor capabilities. We work towards bridging animal and human research to create knowledge that leads to novel rehabilitation systems and strategies. We aim to develop innovative solutions that are inspired by and integrated with human biology;

- By revealing, understanding, and modulating neuro-plastic mechanisms in the peripheral nervous system (somatic and autonomic) and the central nervous system in the healthy body, and in disease development and prevention
- By investigating and controlling sensory-motor functionalities in the healthy body or in diseases affecting the nervous systems

RESEARCH STRATEGY

Our research areas include brain computer interfacing, motor control and learning, neural plasticity, neural prostheses, neural interfaces, and neuro-modulation. We work to apply our tools and knowledge for patients suffering from stroke, epilepsy, phantom limb pain or neuropathic pain, resistant hypertension, paralysis or amputations.

We use a technological and engineering approach to problem solving, and our research “tool box” includes expertise within;

- Animal models ↔ human translation
- Implantable/non-invasive systems, interfaces, and bio-electronic medicine
- Electrophysiology to gather information from neural tissue and muscles (invasive/non-invasive)
- Neuro-modulation (electrically and magnetically, invasive and non-invasive)
- Neuro-signal processing and modelling

ACCOMPLISHMENTS

Major grants: Danish Council for Independent Research Fund, Innovationsfonden, BEVICA Fonden, Det Obelske Familie Fond, EU ICT and Health Programme, Velux Fonden

Awards and Prizes: Vanførefondens Forskningspris, EliteForsk Rejsestipendium, Annual BCI Research Awards (3rd place 2015: *“The changing brain: Bidirectional learning between algorithm and user”*; and winner 2017: *“Online adaptive brain-computer interface with attention variations”*).

We have state-of-the-art laboratory facilities and equipment within:

- Animal laboratory facilities for acute and chronic work on small and large animals and equipment for electrophysiological recording and stimulation at peripheral, spinal and cortical level
- Equipment for electrophysiological recording and stimulation at the peripheral and cortical levels (non-invasive and invasive) in humans, including multiple electroencephalography recording devices
- Facilities for design of electrical nerve stimulation paradigms evoking muscle contractions or providing artificial sensory feedback
- Technology for manufacturing implantable electrodes for neuroprostheses

PERSPECTIVES

Novel rehabilitation technologies and rehabilitation strategies will lead to increased quality of life for patients suffering from any kind of neural damage affecting the sensory-motor system. This includes technology to improve the therapeutic efforts during initial rehabilitation efforts after the neuro-trauma (exploiting neuroplasticity), but also assistive devices to make daily life easier for patients with permanent disabilities. Often, this also has an impact on pain/discomfort and soreness on the long perspective. There is a major socioeconomic impact by improvements in rehabilitation that lead to more independent patients. Better rehabilitation may also have an impact on the return-to-work frequency.

INTEGRATIVE NEUROSCIENCE

OBJECTIVE

The research objectives of the Integrative Neuroscience group are to obtain knowledge and develop innovative technologies within pain neuroscience, neurorehabilitation & robotics, and tele-health.

This indicates an interest in both fundamental neural mechanisms related to sensory-motor processing and the application within neurorehabilitation with specific focus on pain transduction, processing of sensory information in the central nervous system, and neuronal plasticity associated with robust sensory input (e.g. long lasting pain) and how that interacts with motor learning. Knowledge on neuronal plasticity mechanisms is highly relevant for exploitation within neurorehabilitation, i.e. how to design new therapeutic technologies and novel assistive devices for optimal rehabilitation and support. In recent years, tele-health has been a third focus. This has included new technologies and effect assessments including a focus on tele-rehabilitation.

Today, the group consists of 9 senior researchers and approximately 20 Ph.D. students and postdocs.

RESEARCH STRATEGY

Through development of novel strategies for probing the nociceptive system, insight is gained into central mechanisms related to transduction, transmission, and modulation of nociceptive activity. This includes separate foci on peripheral nociception through advanced methods for electrical stimulation, on spinal nociception through the use of polysynaptic spinal reflexes (part of SMI since 1993), and on brain processing of nociceptive input using multichannel electroencephalography (EEG) recordings. Signal processing and advanced statistical tools are used extensively. EEG is also a central approach for assessing plastic changes in relation to neurorehabilitation interventions. Such interventions may involve electrical stimulation of sensory and/or motor nerves, and it may also involve electromechanical systems like robots. It may also be assistive robots controlled by sophisticated interfaces (e.g. tongue control, see picture). Rehabilitation at a distance is another strategy for helping neurologically impaired subjects or patients with a history of heart failure.

ACCOMPLISHMENTS

The main accomplishment is a continued flow of top-tier scientific papers in high-end journals and presentations at renowned international conferences. Several of the research projects have ended with patents being filed. This has led to spin-out companies including TKS Technology and Nordic NeuroSTIM that entered the commercial market with products for the benefit of patients. In 2010, one of the research projects was elected to be "Årets Danske Forskningsresultat" by the users of videnskab.dk later leading to the product "Incedo".

The group has access to several laboratories equipped with frontline equipment for research within electrophysiology, robotic devices, and advanced techniques for controlled stimulation of the sensory motor systems.

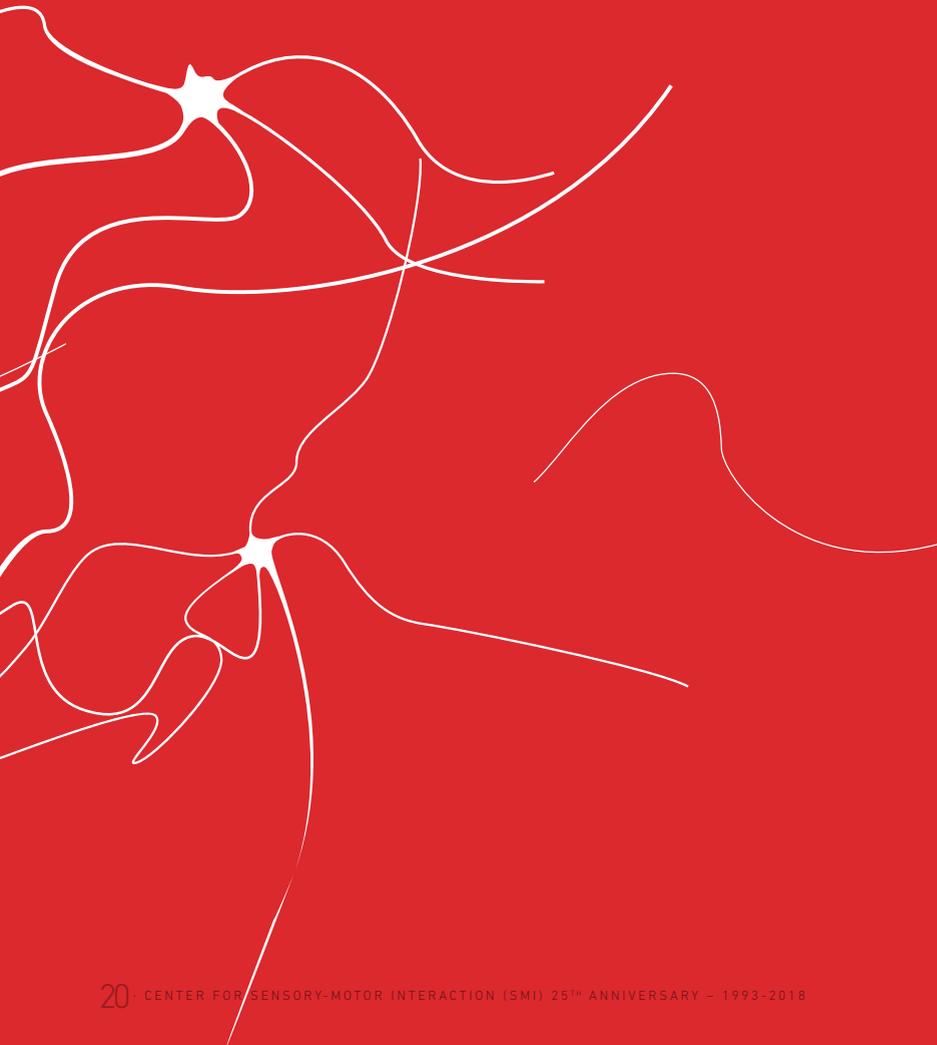
The group has received substantial funding from internal AAU funds, private foundations, national funding agencies, and from the EU for continuing the activities.



PAIN AND MOTOR SYSTEM PLASTICITY

OBJECTIVE

The scope is to investigate fundamentals and interactions of the pain and motor systems by applying multidisciplinary research methods and technologies. The group focuses on exploring and understanding neuroplasticity phenomenon as well as translating basic research to clinical applications.



RESEARCH STRATEGY

The aim of our multidisciplinary research team is to provoke, probe, and modulate inhibitory and facilitatory mechanisms in experimental and clinical models, such as osteoarthritis, and myofascial pain, in order to uncover and reveal properties of the pain and motor systems for improving pain management strategies.

Cornerstone achievements:

- Technologies for pain and neuroplasticity provocation
- Quantitative protocols and technologies for sensory assessment/probing and modulation
- Neurophysiological assessments
- Screening tools, including drug screening.
- Models reflecting mechanisms in persistent pain – provoking, probing, and modulating pain neuroplasticity
- Computational modelling (e.g. tissue characteristics, biomechanics)

ACCOMPLISHMENTS

Our RIG members are internationally recognized for their innovative work on human studies of, e.g. referred pain, widespread hyperalgesia, descending pain control, and pain neuroplasticity. This innovative work resulted in

the development of automated pressure algometry and cuff algometer technologies for user-independent assessment of pain sensitivity, temporal summation of pain, and conditioning pain modulation. Such measures have shown predictive value in patient populations. Capturing and analyzing pain distribution by advanced software applications have led to important discoveries of referred pain mechanisms and have been used to describe variations of the pain system as based on large cohort studies. A number of unique models of pain have emerged from our group which recreate pain in healthy and patient populations. These pain models, which range from minutes to weeks, are combined with behavioral and electrophysiological assessments to better understand the transition from acute to prolonged pain as seen in patient populations. Cortical neuroplasticity has been of particular interest for the prolonged pain models. Moreover, the interaction between the pain and motor systems has been meticulously studied in our group using advanced neurophysiological assessments such as movement analysis, single motor unit recording, and motor evoked potentials as elicited by transcranial magnetic stimulation.

PERSPECTIVES

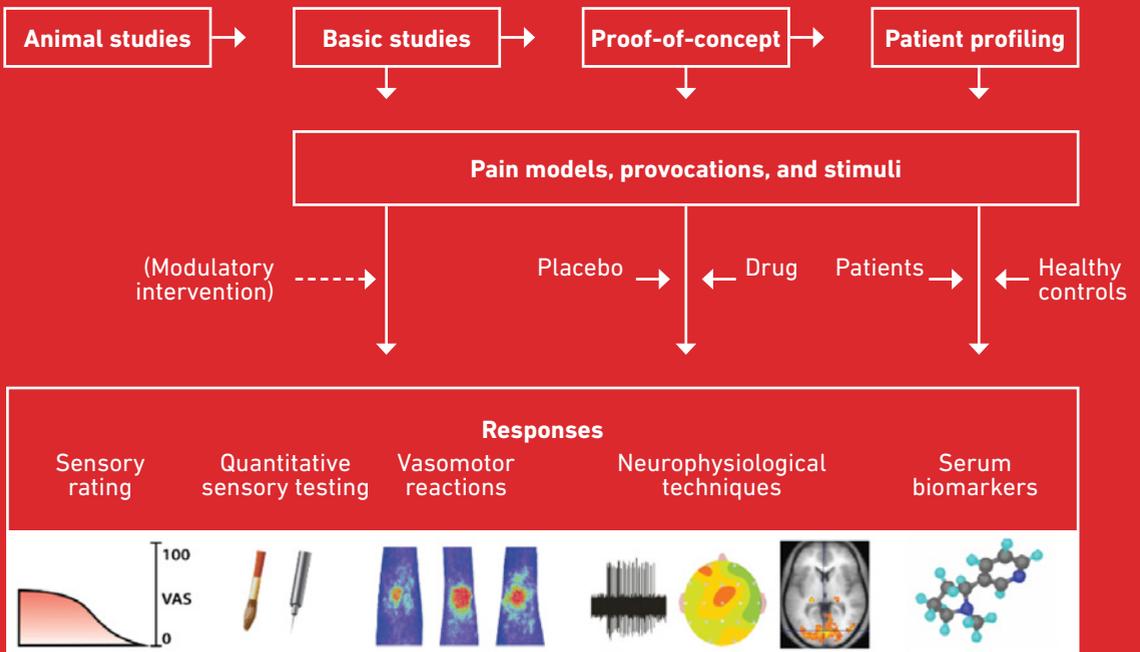
Achieving a better understanding of the pain and motor system will ultimately lead to novel and improved pain management strategies for a range of patient populations where pain is a major symptom.



TRANSLATIONAL PAIN BIOMARKERS

OBJECTIVE

The Translational Pain Biomarkers (TPB) group aims to investigate aspects of translational pain and itch research from the animal to the patient. A common goal is to generate knowledge, skills, and competences for developing new experimental methods, new clinical screening/diagnostic biomarkers, and to apply those testing regimes for developing personalized pain/itch medicine.



RESEARCH STRATEGY

The vision is to develop mechanistic, quantitative, and translational pain biomarkers for pre-clinical, human experimental, and clinical pain and itch research and to apply sophisticated techniques to mechanistically profile both chronic pain and itch patients. The tools are applied for profiling and testing new analgesic/antipruritic compounds under development (early clinical trial phases I and II) to achieve clinically applicable knowledge on the mechanisms of the nociceptive and the itch nervous systems through comparative studies.

In the last five years, we have increased our focus on itch as there are many similarities, but also many interesting dis-similarities within pain. Many chronic itch patients share mechanistic manifestations such as peripheral and central sensitization with chronic pain patients.

The biomarkers developed and explored in clinical settings are used for profiling and phenotyping patients, and in recent years these profiling tools have been intensively used for predicting the outcome after surgical or pharmacological interventions.

ACCOMPLISHMENTS

The group is publishing 30-40 peer reviewed papers per year and has edited several books.

The grant portfolio includes EU, NIH, private foundations, national innovation and research granting bodies, university talent program, private companies, and patient organizations.

A substantial global collaborative network ensures that around 80% of the published papers are in collaboration with international groups. The network includes collaborations in Australia, Japan, Italy, Spain, Switzerland, Germany, France, Belgium, the Netherlands, the UK, Norway, Sweden, USA,

Canada, Argentina, and Brazil. As the research has a strong appeal with screening tools being highly warranted by the pharmaceutical industry, the group is interacting with more than 20 international companies, and two research and innovation biomarker centers are currently sponsored by major international companies. This has also led to the establishment of new spin-outs.

As many of the research projects have a general appeal to the public, group members often (approx. 20 times per year) appear in radio, TV, and other news media.

In recent years, group members have proudly received numerous national and international talent prizes, awards, and other research recognitions.

The faculty members of the group have a strong interest in bridging the science with education, and the group is actively pursuing this in the educations related to biomedical sciences/engineering, translational medicine, and medicine.

In the last five years, the group has managed to be leading: 1) within fields where pain and itch are integrated, and 2) in developing predictive pain biomarkers for treatment outcome.

PERSPECTIVES

Chronic pain and itch are major worldwide health-related issues. Advanced treatment options exist but still many patients continue having significant pain/itch problems reducing their quality of life. The clinical application of quantitative biomarker assessments for phenotyping patients is limited. Developing pain and itch models, biomarkers, and assessment tools, related to treatment outcomes will be the cornerstone of personalized pain and itch medicine in future, and the group is dedicated to develop such models, biomarkers, and assessment tools.



Overall strategy for the Translational Pain Biomarker Group

SPORT SCIENCES - FORMER RIG OF PHYSICAL ACTIVITY AND HUMAN PERFORMANCE

OBJECTIVE

Our objectives are multifold due to the interdisciplinary character of Sport Sciences. This includes research areas covering humanities, social, natural, and technical sciences. We conduct: 1. Sociological and anthropological studies, 2. Psychological and pedagogical studies, 3. Experimental studies on motor control, ergonomics, neuro-mechanics and exercise physiology, 4. Intervention studies based on, e.g. training and rehabilitation, and 5. Modeling studies.

Our core values are novelty, curiosity, diversity, and authenticity.



*Pascal Madeleine,
Professor, Ph.D.,
dr.scient., Head of Sport
Sciences (Head of
Former RIG of Physical
Activity and Human
Performance)*

RESEARCH STRATEGY

We adopt a holistic approach to both applied and fundamental research questions. The researchers of the group study and analyze the influences of physical work, exercise, and sports. For that purpose, research within health, humanities, social and natural sciences is combined.

In order to achieve these goals, the Sport Sciences section is divided into two groups focusing on the following areas:

- i. Performance and technology and sports (directed by Prof. Uwe Kersting) - <https://www.hst.aau.dk/research-groups-centres/sport-sciences/performance-and-technology/>
- ii. Social issues (directed by Prof. Sine Agergaard) - <https://www.hst.aau.dk/research-groups-centres/sport-sciences/Sports+and+social+issues/>

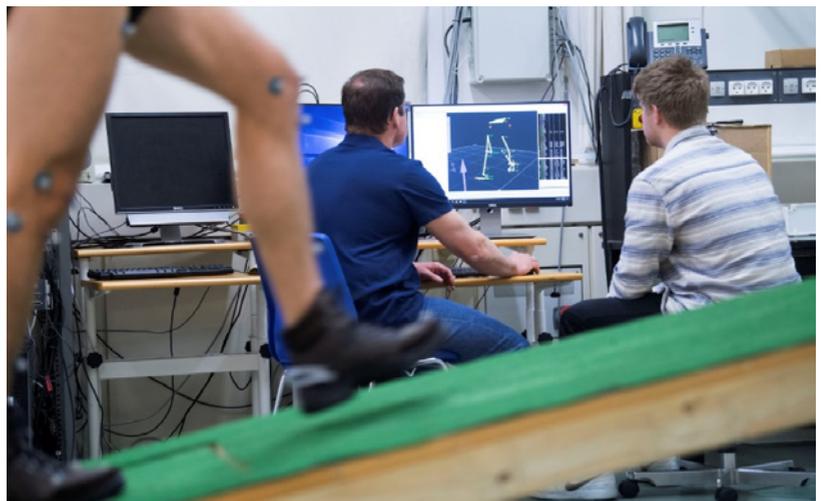
In parallel to the two research groups, we also have a teaching development strategy (directed by Dr. Kenneth K. Larsen) focusing on various topics like, e.g. practical-theoretical approaches.

ACCOMPLISHMENTS

In 2009, the RIG Physical Activity and Human Performance was created within SMI due to the specificity of our research profile. In 2014, the research activities developed towards humanities and social sciences related to sports. In 2018, the RIG unanimously decided to leave SMI.

In 2018, the section has published 67 peer reviewed articles, 2 peer reviewed review articles, 2 books, 1 anthology, 1 report, 6 Ph.D. theses, and 48 book chapters/conference papers. We have organized one conference: "From talent development to injured athletes". Our research has also been publically disseminated (public dissemination: 42 articles).

The Sport Sciences section is one of the major actors at the Department of Health Science and Technology. The researchers are responsible for ten research laboratories – see: <https://www.hst.aau.dk/research-groups-centres/sport-sciences/>



SMI - A GLOBAL NETWORK AND SMI ALUMNI

Internationalization has been integrated into all activities at SMI. As part of the internationalization strategy, SMI has through the years increased collaborations and participation in networks within biomedical science, neuroscience, and clinical disciplines with international collaborators from research centers, hospitals, and private companies all over the world. These networks and collaborations are of major importance to SMI and constitute a substantial resource.

The below map shows the countries worldwide, with which SMI has collaborated in the period 2013-2018. The dot size reflects the number of co-publications.

Furthermore, the next map shows the specific countries in Europe, with which SMI has collaborated in the period 2013-2018. The dot size reflects the number of co-publications.

The international contacts have been utilized in a mutually beneficial way in terms of exchanging researchers, Ph.D. students, and students for short or long stays. In more recent years, the research exchange with companies has been substantially expanded.

In addition, the international collaborations have permitted the possibility of establishing satellite laboratories in a number of countries in close collaboration with international researchers.

SMI's global network of collaborators





Many former Ph.D. students and post docs have continued the collaboration with SMI after leaving Aalborg and are now sending their students to SMI. This corps of ambassadors is today a main asset of SMI.

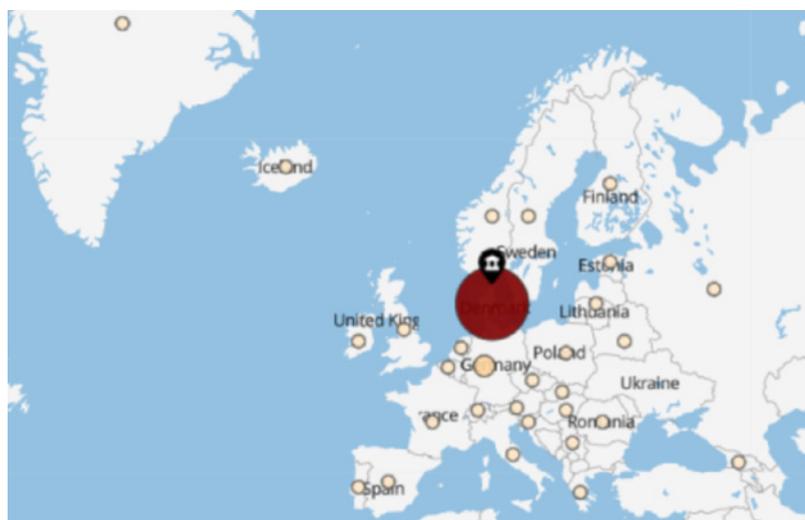
All these initiatives help the continued development of SMI research and the SMI researchers to the highest international level.

In order to stay connected, a recent initiative has been to develop a SMI LinkedIn Alumni & Affiliates group with the purpose of connecting former and present SMI employees and affiliations. This presents an opportunity to interact with researchers from all over the world within the research

areas of SMI. Signing up for the LinkedIn group can be done via this link: <https://www.linkedin.com/groups/13520916>.

The SMI Alumni and Affiliates group (SMI's Ambassador Corps) is steadily growing making this a very good tool for reaching out to all our national and international friends throughout the world.

SMI's European network of collaborators



” When I started working with SMI, I was a resident with no experience in pain research. I have had the privilege to be one of the witnesses of the birth and development of SMI. Looking back, it is hard to imagine our current knowledge of pain in humans without the fundamental work done at SMI. My whole career as a scientist has been inspired and supported by the enormous knowledge, dedication, and enthusiasm of my colleagues and friends at SMI. I have been rewarded by the feeling that thanks our work, we can explain better to patients why they suffer and what can be done to improve their lives. Happy birthday SMI, I feel lucky, proud and honored to be part of your story!”

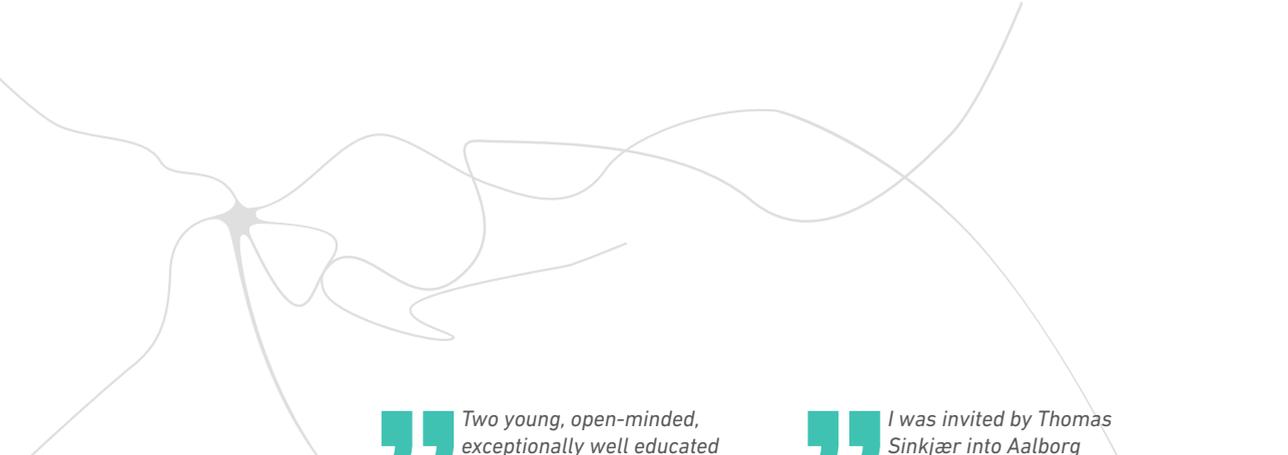
Honorary Professor at Aalborg University
Michele Curatolo,
University of Washington, USA

” Congratulations on the 25th anniversary of SMI. I have enjoyed my productive and collegial relationship with many SMI investigators, trainees, and administrative staff for the past 20 years, and am proud to be a “SMI Fellow”. The relationship has been built upon animal-based investigations in Toronto and Aalborg-based investigations in human subjects that have afforded translational insights into processes underlying orofacial pain as well as its influence on orofacial sensorimotor functions. A true reflection of sensorimotor interaction at its best! Best wishes for continued success, and I look forward to continue to be a contributor to your future achievements”.

Honorary Professor at Aalborg University
Barry Sessle,
University of Toronto, Canada

” It was a great experience to be immersed in the multidisciplinary teams at SMI. Working together with enthusiastic and very knowledgeable colleagues from a variety of disciplines has opened new horizons and was inspirational for my future research and career. I am convinced that in its 25 years of existence, SMI and its unique concept have given many other young, but also more experienced scientists the opportunity to enjoy the width and wealth of a multidisciplinary “research-only” environment, and this has been for many a start, a booster, or an “intellectual holiday”, for which they will always be very grateful. Happy birthday!”

Honorary Professor at Aalborg University
Antoon De Laat,
KU Leuven, Belgium



” Two young, open-minded, exceptionally well educated Danes, with enormous sense and understanding of the times that are coming were given a chance to make a difference, and they succeeded. Thomas Sinkjær and Lars Arendt-Nielsen formed the core team of SMI in 1993. From that time, SMI raised from a small research center to a world-recognized scientific giant. Scientists from many countries joined forces with many talented students at SMI, and today there is an army of experts who graduated at SMI under the umbrella of Aalborg University. The basic and applied motor control research results, contribution to neuro-rehabilitation and pain treatment, medical signal processing for new devices and diagnostics, and many other findings come from SMI. The friendly atmosphere that was created at SMI was an essential element in the development of individual and team activities. The early social life that characterized SMI in the first stage was an attraction for both senior and junior staff to come and stay. The incredible productivity of SMI people, the number of scientific events that have been organized, and the number of projects where SMI people participated make the center the world leader. Aalborg and Denmark gained recognition because of SMI. In summary, the first 25 year-long life of SMI can be qualified as a big success”.

Professor Emeritus
Dejan Popovic,
University of Belgrade, Serbia

” I was invited by Thomas Sinkjær into Aalborg University’s ActiGait project for artificial walking in 1989. Sinkjær and Morten Haugland created from the university a company, Neurodan, in order to develop the project. I continued to work as a surgical specialist in this company into Europe until 2015. Already in 1995, I was appointed associated professor at Aalborg University where we founded the Virtual Brain Group with the task to develop a Virtual Surgical training model. We succeeded with international collaboration from Singapore and US and made this project world- known. Several publications and scientific novelties were born from this group including a unique Ph.D. thesis on: “Spatula Simulator - Developing an Area based Surgery Simulator” by Lars Brix. The exciting and friendly atmosphere at SMI is for me one of the reasons why SMI has developed into an extremely well recognized international scientific center. Novelties continuously develop including the new departments, CNAP, and Sport Sciences. In my spare time, I have served as physician for Aalborg Pirates Ice Hockey Team, and we linked this with AAU in order to physically test the players at the AAU Sports Science laboratory. During the A-Hockey World Championship in Denmark, May 2018, we conducted an AAU Ph.D. course: “From Talent Development to Injured Athletes in Danish Hockey”, with key emphasis on sequelae to concussions”. This was again an international event that adds to the world-wide success of SMI”.

Professor Emeritus
Jens Haase,
Denmark

” I had the good fortune to work at SMI from 1997-2001 and both before and after to enjoy good collaboration and friendship. The early days at SMI were, from my perspective, characterized by a true pioneer atmosphere. Everything was possible and almost nothing impossible in terms of initiating innovative experimental pain models and sophisticated research projects. The establishment of the orofacial pain lab added to the fantastic research activity at SMI, and I am confident that the many collaborators and visitors appreciated the unique environment and facilities. One of the major strengths was the genuine interdisciplinary approach to understand and solve complex clinical problems related to sensory-motor integration within the trigeminal system which was an amazing opportunity to promote science within dentistry. For sure, the days at SMI have been a leverage for my future research activity and a fountain of long-lasting inspiration”.

Professor
Peter Svensson,
Aarhus University, Denmark

SMI Annual Seminar – 2013

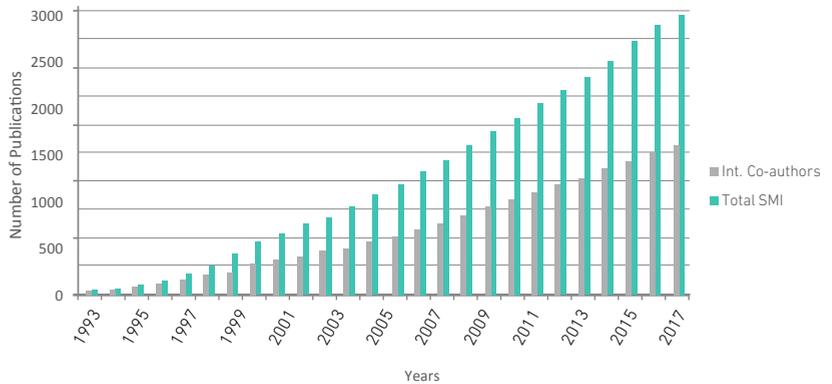


BIBLIOMETRIC PROFILE

From the start of SMI (1993-until now), a thorough registration of many statistical data has taken place. Therefore, it is today possible to draw a bibliometric profile of SMI, which shows the key parameters below.

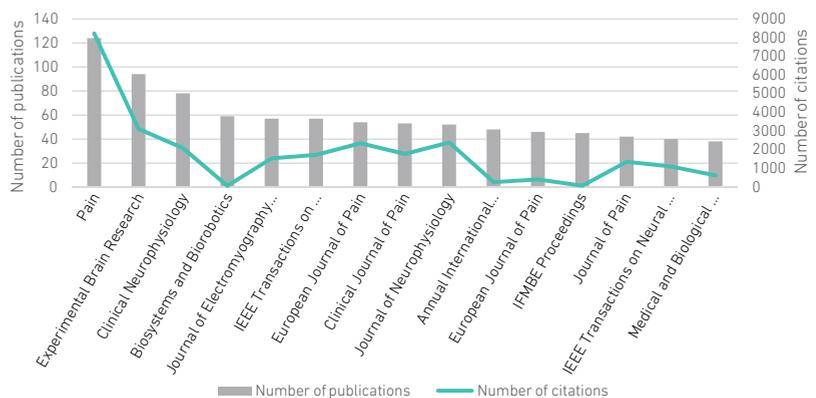
The following graph shows the accumulated number of publications from 1993 to 2018 where 50% of the publications are together with international co-authors.

Accumulated number of publications and the proportion published together with international co-authors



The next graph shows the top 15 journals, in which SMI has published articles as well as the total number of citations received by publishing in those journals. The total number of accumulated SMI citations are 72,921. The graph reflects the impact of the chosen journals, for instance the articles published in Pain have received a rather high amount of citations reflecting the use of these articles by other researchers.

Publication and citations per most used journals - top 15



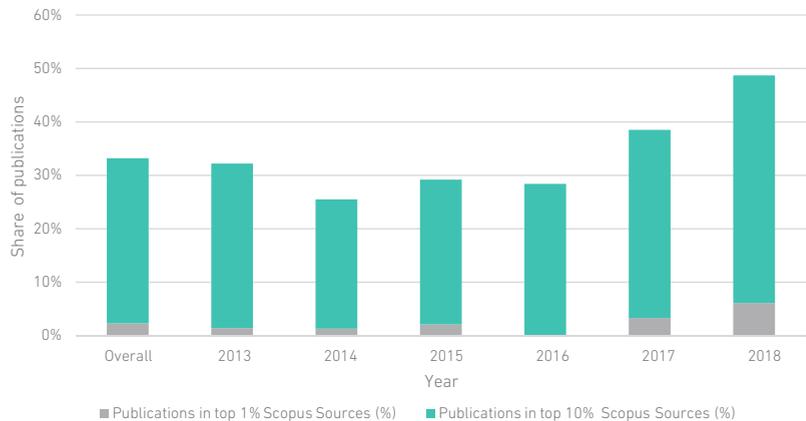


Three SMiling ladies – 2002

Publications in top journal percentiles by CiteScore Percentile.

The next graph illustrates the share of SMI's publications from 2013-2017 published in the top 10% (light green) and the top 1% (grey) journals with most impact measured by Citescore Percentile¹. The graph reflects the degree to which SMI is able to publish substantially in high impact journals. The percentage is increasing from 2014 and forward.

On average over the period 2013-2018, the share of publications in the top 10% journals with most impact is 30.9%:



SMI's degree of international, national, and Aalborg University internal collaboration as well as the number of citations and Field Weighted Citation Impact² (FWCI) to these publications have likewise been calculated for the publications in the years 2013-2017.

SMI has a large degree of international collaboration, and the FWCI of the co-authored publications is 28% above world average. The national SMI collaborations have a FWCI of 67% above world average.

¹ CiteScore is the number of citations received by a journal within a year to publications that have been published in the previous three years divided by the number of publications published in the journal for the same three years.

² Field Weighted Citation Impact takes differences in subject areas into account. It is a way of measuring how the number of citations for a set of publications compare to the average number of similar publications in Scopus. An FWCI over one (1) means that you receive more citations than the world average within a given scientific field.

Publications at SMI - September 2018 by amount of international, national, and institutional collaborations

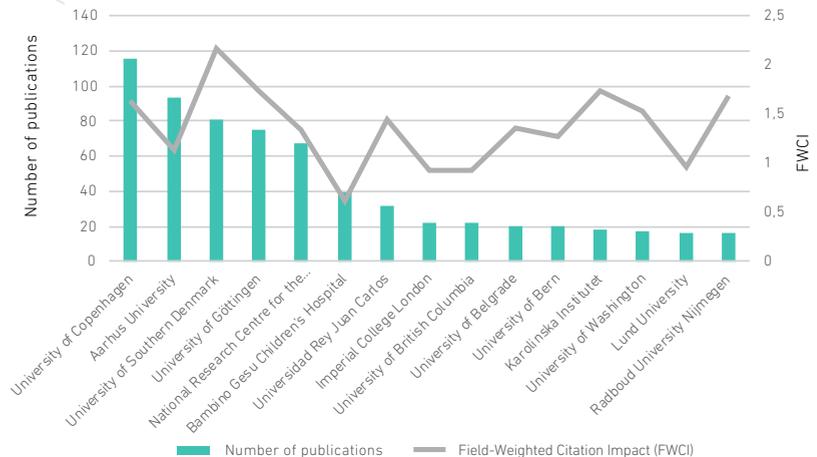


Metric	Publications	Citations	Citations per Publication	Field-Weighted Citation Impact	
International collaboration	56.4%	616	4,372	7.1	1.28
Only national collaboration	16.5%	180	1,631	9.1	1.67
Only institutional collaboration	23.6%	258	1,175	4.6	0.78
Single authorship (no collaboration)	3.6%	39	82	2.1	0.51

Field Weighted Citation Impact takes differences in subject areas into account. It is a way of measuring how the number of citations for a set of publications compare to the average number of similar publications in Scopus. An FWCI over one (1) means that you receive more citations than the world average within a given scientific field.

For each of the top 15 institutions with which SMI collaborates, the FWCI has been calculated. The co-authored publications with a FWCI above 1 indicate that the collaboration between SMI and the respective institution has an impact above world average. For instance, the collaboration with the University of Southern Denmark has an impact twice as high as the world average.

Collaboration and impact - top 15 institutions



Number of publications related to 15 top collaborative institutions. Field Weighted Citation Impact takes differences in subject areas into account. It is a way of measuring how the number of citations for a set of publications compare to the average number of similar publications in Scopus. An FWCI over one (1) means that you receive more citations than the world average within a given scientific field.

The following map shows the top 50 key phrases by relevance based on the titles and abstracts of publications published by SMI in 2013 and in 2017. Each key phrase is given a relevance between 0 and 1, with 1 being the most frequently occurring key phrase. Remaining key phrases are given a value based on their relative frequency. The larger the key phrase is, the more frequently the key phrase occurs. The colors reflect whether the key phrase is growing (green: more publications using this key phrase were being published in 2013 than in 2017) or declining (blue: fewer publications using this key phrase were published in 2013 than in 2017):



The font size of the different keywords/phrases in the figure above represents the number of publications using this word/phrase.

Green represents that the word/phrase was used more in 2017 than in 2013. Blue represents that the word/phrase was less used in 2017 than in 2013.

EDUCATIONAL ACTIVITIES

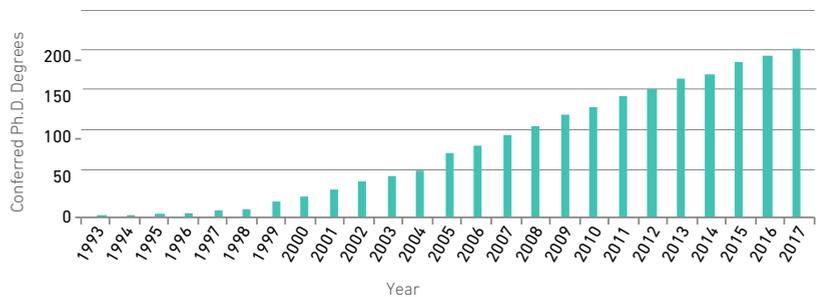
In 1997, the SMI International Doctoral School in Biomedical Science and Engineering was established by a grant from the Danish National Research Foundation to act as a model for international doctoral education in Denmark.

The purpose was to offer Ph.D. programs within the research areas of SMI. Furthermore, the aim of the SMI International Doctoral School in Biomedical Science and Engineering was to act as a model for efficient international doctoral education and to train Ph.D. students for the benefit of research and industry. The School has had significant impact and has attracted both national and international attention (awarded as a Marie Curie Training Site) and was the first to implement:

- Education for Ph.D. supervisors
- An industrially related Ph.D. education
- A Ph.D. program with 50% international students
- An interdisciplinary program bridging technology and health sciences

Today the Doctoral School is operated at faculty level. Since the start of the School, 50% of the students have been international, and more than 200 Ph.D. degrees have been conferred via the School:

The development in the number of conferred Ph.D. degrees

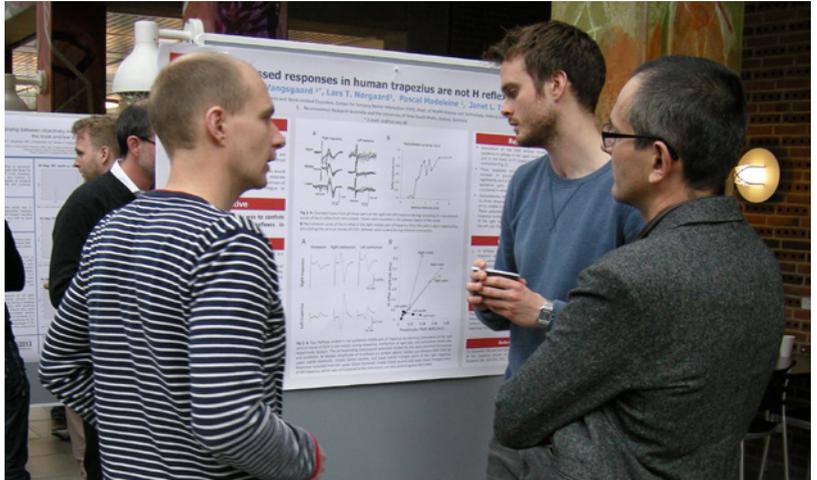


In 2000, SMI was recognized by the European Union as a Marie Curie Training Site.

In 2006, the School was awarded a grant from The Danish Ministry of Science, Technology and Innovation to start a doctoral program for elite students. This was a major milestone.

In recent years, the SMI Ph.D Student Presentation Day has been an annual event.

*SMI Annual Ph.D. Student
Presentation Day – 2013*



At all educational levels, SMI has taken pride in involving the students in research activities together with collaborators from industry and health sector hereby allowing the students to combine theory with real-life problems and with that addressing societal challenges. This has been a very beneficial two-way strategy in that the students and future employers get a chance to know each other which has subsequently led to employment in industry and health sector for many students.

*Course in Translational
Neurobiology, Coffee
Break – 2012*



” *Congratulation on 25th Anniversary for SMI!
It is my great pleasure to have stayed at SMI from 2009-2012 and to get a Ph.D. for: “Conditioned pain modulation (CPM): experimental studies in the craniofacial region in healthy humans”. Thanks to Prof. Lars and “SMI-family”, I could manage it. I really appreciate your warm kindness and help. I miss you all. However, we continue our research in Japan. The theme is: “to apply CPM to predict acute and chronic post-operative pain” to relieve patients from pain!! I wish SMI will have many more successful years”.*

*Former Ph.D. Student
Yuka Oono,
Meikai University School of Dentistry,
Japan*

” *SMI offered me a unique opportunity. Moving to Denmark and being immersed in a culture of excellence in research was a career changing experience. There’s no doubt that the rigor and professionalism of SMI and the professors are a remarkable learning experience. I look back with great fondness on this time and am so grateful for the opportunities my time at SMI afforded me”.*

*Former Ph.D. Student
William Gibson,
The University of Notre Dame, Australia*

” *SMI for me has been an international, academic, and open-minded pluralistic setting. It is this kind of place where you can get scientific ideas to investigate, knowledge, tools, support, and the feeling that the sky is the limit. It is indeed one of those families that hugs you, gives you the opportunity to share experiences, and makes you feel respected for your contributions. Personally, I was lucky I had the chance of staying there in 2003-4. No doubt it had a great impact on the development of my academic career later on. Thank you all for including me as a member of the “SMI-family”, and I wish we will keep the connection and continue our long lasting friendship”.*

*Former Ph.D. Student
Dorit Pud,
University of Haifa, Israel*



Aalborg University’s 40th anniversary, Michele Curatolo appointed honorary doctor – 2014

” Congratulations on the 25th anniversary of SMI! I spent two years at SMI (2000-2001) and learned a lot. I learned how to plan research, how to conduct it, how to present it at a congress, how to write a paper, and how to get a Ph.D., and these experiences are still helpful to educate young doctors as a professor at medical college. Besides above experiences, I also learned how to enjoy life, how to love others, and how to fish with flies on the river in Denmark. I am afraid that I have not been able to fully utilize these experiences for my life in Japan, but hope it will help after the retirement”.

Former Ph.D. Student
Hiroyuki Sumikura,
Juntendo University School of Medicine,
Japan

” When I joined SMI, I had been working as a clinician for about 10 years. It was exciting to see how the center supports Ph.D. students by giving them several opportunities and challenges. SMI opened a very important page in my life. Besides getting very good friendships, I have learned how I will be able to transfer research results to clinical conditions. This experience played an important role in the development of my scientific knowledge. I also had the opportunity to transfer my knowledge and experience to my colleagues in my own clinic. For me it was such a pleasure and privilege to be a member of the SMI family”.

Former Ph.D. Student
Aysen Yücel,
Anadolu Medical Center, Turkey

Social event, Attending a test concert at Musikkens Hus – 2014



INNOVATION AND INDUSTRY COLLABORATION

Through the noughties, Denmark experienced a political change in research policy and public research funding where the focus shifted from basic to applied research for the benefit of societal challenges and industry. From this point on, public research funding implied a demand for more and more public/private collaboration with an application-oriented goal.

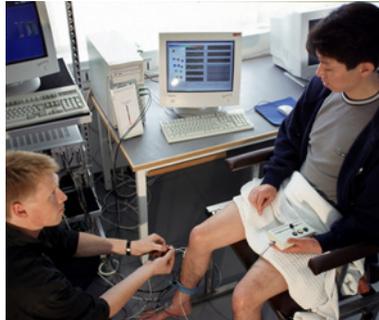
SMI was one of the first-movers to react to this new reality and established in 2006 an innovation unit based on a grant from the Ministry of Science, Technology and Innovation. The focus of the innovation unit was to:

- Facilitate private/public research-based innovation with national and international

SMI Annual Seminar – 2012



Doing experiments in SMI laboratories – 2000



private/public collaborators
(biomedical and pharmacological industry, health sector)

- Pursue commercial research-based opportunities
- Facilitate the spinning out of new research-based companies
- Support the development of an entrepreneurial culture among researchers and students
- Facilitate networking activities

In 2011, Eir – Empowering Industry and Research (see: <http://www.eirbusinesspark.com/>) was established by the SMI management as a research-based business park by means from the European Regional Development Fund and the North Denmark Region. Eir now serves as an innovation platform for research-based innovation and interaction with society for The Department of Health Science and Technology and The North Denmark Region.

Regarding innovation activities, SMI has:

- Initiated 10 spin-off companies
- During the last ten years attracted nearly EURO 7 mill. in external innovation funding
- During the last ten years attracted more than EURO 4.8 mill. in collaboration with private companies (private companies, The Innovation Fund, The Advanced Technology Foundation, Proof-of-concept funds, etc.)
- Attracted a Center of Excellence – EURO 1 mill.



FOCAL POINT – “krumTAP’perne”



*Susanne Nielsen Lundis
Head of Secretariat*

From day one, the administrative infrastructure of SMI has been an indispensable focal point of the research center. It has been a deliberate vision and strategy of SMI to prioritize the research administration. This has meant that research resources have been used to do research and carry out educational tasks instead of administrative duties.

A professionally and internationally oriented administrative infrastructure has been built up with the aim of giving supplying quality service at the highest level. The number of important tasks are many, but just to mention a few:

- Support regarding submission of Ph.D. theses
- Quality assurance regarding ethical approvals
- Professional conference and meeting handling
- Medical English proof-reading
- Receipt of new employees and guests

In all these areas, the SMI administrative team has developed a best practice that is now copied in many departments at the university.

The SMI administration is the first to welcome you when you arrive at SMI with an always polite and smiling attitude. They help us; are ready to drop everything they have in their hands; provide care when necessary; are squids when required, and act as fire

extinguisher. In short, act as problem solvers with love and consequence. They make the wheels run.

ANECDOTES FROM PREVIOUS SMI ADMINISTRATOR – PETER THONNING OLESEN

From its beginning, Center for Sensory-Motor Interaction (SMI) was internationally oriented. More than half of the scientific staff came from abroad, and often more than 20 nationalities were represented. This meant that English became the working language, both orally and written, but since SMI was established in Danish settings, the administrator had ample opportunity to observe intercultural interaction going on – and sometimes with a little humorous twist.

Everyday life and work in Denmark is characterized by a seemingly low degree of hierarchy – from their start in school, Danish children are encouraged to utter their opinion freely, and it falls natural to call their teacher, and later in life colleagues and leaders, by first name. This was a rather new experience to many of the foreign researchers. Especially Ph.D. students found it difficult to address the more senior staff by first name. Accordingly, Professor Lars-Arendt-Nielsen and Professor Thomas Sinkjær became “Professor Lars” and “Professor Thomas” in daily communication! A pragmatic and elegant solution



*Lone Schødt Andersen
Senior Secretary*

to avoid potentially awkward situations.

An Indian Ph.D. student who came to my office to discuss an important matter gave another thought-provoking example of cultural difference. He had found it still more difficult to reconcile himself with his standard of living in Denmark compared with what he was used to. He had therefore sought advice from his Guru and found that he had to stop. I tried to explain that he was in no way economically in the clover – considering the costs of living and the level of taxes in Denmark. His supervisor assured me that the student progressed satisfactorily with his project, and there was no professional reason to stop – but all in vain.

A Russian guest researcher did not suffer from doubts about the superiority of Russian fruit and vegetables compared with

Danish, and I certainly could not convince him that it would be at least as safe to undergo medical surgery in Denmark as at home. He later won eternal fame among the administrative staff when at a monthly SMI meeting he whispered, sitting next to our female office trainee: "Why, T..., you are growing a mustache!" Russian humor or a slip of the tongue?

Certainly, the Danes also had their difficulties in mastering the English language. The immortal example at SMI is the Ph.D. student meticulously explaining his project at the annual scientific seminar, including the "number of suspects" he would use in his experiments. This saved the day for the administrator who, with a background in the humanities, certainly only at rare occasions understood what the researchers were discussing. Fortunately, this was not a requirement in my job description as administrator at SMI!

SMI Annual Seminar – 2011



SMI'S GLOBAL IMPACT



Doing experiments at SMI laboratories – 2002

Not only has SMI developed into an internationally recognized research center, but SMI researchers have also due to their CVs been involved in a number of prestigious organizations and positions with the possibility to impact Danish and international research agendas. To mention a few, SMI researchers have carried out prestigious tasks in:

- The Danish Research Councils
- The International Association for the Study of Pain – IASP (President, Editor-In-Chief IASP Press, Special Interest Group Chairs, Chair and Member of Grant Committee, Digital Strategy Working Group, Membership and Chapter Committee)
- The Scandinavian Association for the Study of Pain – SASP
- The Danish IASP Chapter (Vice-chair)
- International Society of Electrophysiology and Kinesiology – ISEK
- International Functional Electrical Stimulation Society – IFESS
- International Conference on NeuroRehabilitation – ICNR (Members of Steering Committee)
- Member of many international granting committees and editorial boards

Also internally at Aalborg University, SMI employees have been highly involved at all managerial levels, e.g.:

- AAU Board member
- Vice Head – Research, the

Department of Health Science and Technology

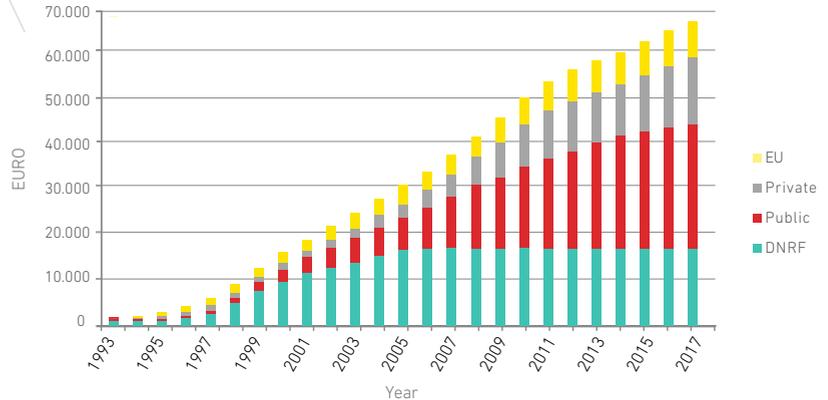
- Vice Dean – Research, Faculty of Medicine
- Participants in various bodies and organs at department and faculty level (study boards, Department Board, Academic Council, etc.)

ESTEEMED PRIZES ACHIEVED DURING THE YEARS

- Vanførefondens forskningspris
- EliteForsk Rejsestipendier
- Annual BCI research award (3rd place 2015 and 1st place in 2017)
- The "Pasteur Prize" for best managed public-private research project in Denmark (Højteknologifonden)
- The Fibromyalgia Research Award
- The Director Ib Henriksen Foundation Research Award
- Dansk Magisterforenings Forskerpris (The Research Award of the Danish Association of Masters and Ph.D. Students)
- The Bagger-Sørensen Research Award
- The Honorary Award of The Danish Association of Chronic Pain Patients (Foreningen af Kroniske Smertepatienter (FAKS))
- Queen Ingrid Research Award
- The Leadership Award for Northern Denmark
- SparNord Research Awards
- Philip A. Spiegel IASP Congress Award
- Danish Science Communication Award
- Danish Biomechanical Society (1st place twice)

FUNDING

Accumulated public and private funding (EU: European Union; Private: private foundations; Public: public national and international funding agencies; DNRF: The Danish National Research Foundation (initial grant to establish SMI))



SMI's progressive funding strategy has resulted in grants from prestigious national and international foundations and private companies. Over the years, SMI has obtained public and private external funding for almost EURO 67.1 mill.:

Nearly EURO 7 mill. of these have been innovation activities, and EURO 4.8 mill. of these have come directly from private companies, Proof-of-Concept funds and funds supporting public/private collaborations. EURO 7.1 mill. have come from EU funds. Some of the prestigious foundations which have supported SMI are:

- The Danish National Research Foundation
- Independent Research Fund Denmark (DFF)
- The Obel Family Foundation
- The Spar Nord Foundation
- Innovation Fund Denmark
- Advanced Technology Foundation
- National Institutes of Health
- EU – Seventh Framework Programme
- EU - European Regional Development Fund
- EU - ICT and Health Programme
- EU-IMI program
- The Norwegian Research Council
- Research Foundation for Work Environment
- The American Fibromyalgia Syndrome Association
- Danish Agency for Science, Technology and Innovation
- The Lundbeck Foundation
- The Novo Nordisk Foundation
- The Velux Foundation
- The Bevica Foundation
- The Ministry of Culture, Denmark
- North Denmark Region
- Team Denmark
- Aage and Johanne Louis-Hansens Fondation
- Svend Andersen Fonden
- Private foundations and companies
- Patient organizations (e.g. Gigtforeningen)

*SMI Annual Seminar –
2005*



*The Annual SMI Seminar,
SMI Management
together with Director
of the Danish National
Research Foundation
Peder Olesen Larsen –
2003*



*Lars Arendt-Nielsen inaugurated as
President of The International Association
for the Study of Pain – 2018*

THE SMI FAMILY



SMI Annual Seminar – 2002



The Annual SMI Seminar, Sæby, teambuilding at the beach – 2005



Besides focusing continuously on developing research and research-based education at the highest international level, SMI prioritizes the value of a good social working environment where the employees thrive and feel comfortable not least due to the diversity of colleagues and guests coming from all over the world. SMI wants all of you to feel welcome and be part of our family.

SMI has always prioritized the welcoming of new employees and encouraged different social activities. The SMI secretariat has developed a welcome package where new employees and guests are taken care of until they are fully settled. New employees and guests are introduced to the organization and get help with all practical issues: computer, network access, keys, accommodation, procedures regarding social security number, bank account, etc.

Also a number of regular traditions are taking place. Each year SMI holds an Annual SMI Seminar focusing on scientific issues

(guest lectures, presentations, strategic discussions). These days always end up with a social event where people get the chance to network informally, get the possibility of entering into team building activities, get common experiences, etc. These events are most valued by all of us at SMI.

Also, a half-day Ph.D. Student Presentation Day every year is a tradition where the Ph.D. students and supervisors also engage in social activities after the scientific program. Social activity groups have over the years organized many events for the benefit of socializing across groups, and in more recent years the social activities in the various RIGs has gradually increased.

The highly internationally recognized research and educational activities together with the social environment make us all proud of being part of the SMI family.



“ I was in Japan for a Congress when I met Prof. Arendt-Nielsen for the first time. We were in a bus leading us to the hotel after the farewell party. It was 1998. He asked me whether I would be interested in starting a collaboration with the research center he was heading in Aalborg. I did not know this center, which had been opened for a few years and totally addressed to research on pain, but I accepted enthusiastically. As from that moment, my collaboration with SMI has never stopped. I had the opportunity to meet and work together with many scientists coming from all over the world, with a prodigious exchange of ideas and experiences. This is the SMI philosophy, and this is why, after a quarter of a century, SMI is known as the undisputed leader in pain research”.

Adjunct Professor
Massimiliano Valeriani,
Ospedale Pediatrico Bambino Gesù, Italy

“ Congratulations to SMI on their incredible productivity over the past 25 years. Over that period of time, SMI has become a world leader in pain research and has truly placed Aalborg on the map. Importantly, they have excelled as a hub for collaborations and have amplified the research efforts of scientists across the world. For me personally, the innovative blend of technologies and ideas provided by collaboration with Ole Kæseleer Andersen and Carsten Dahl Mørch has allowed us to address truly novel questions about basic pain mechanisms. The wonderful mix of people has ensured that these collaborations will endure and will continue to lead to cutting edge breakthroughs in our understanding of pain”.

Guest Professor
Robert C. Coghill,
Cincinnati Children's Hospital Medical Center, USA

“ My interest in pain and electrophysiology began already before SMI was established, but was driven by the “fiery souls” that later founded SMI. Already from the beginning, SMI formed the framework on which I could build up my basic and translational research, and it made a strong link to the hospital with collaborations into clinical research. At this time, Aalborg Hospital had status of a county hospital without the necessary organization and support needed for doctors that wanted to do research. The institutions at Aalborg University - where SMI was the main driver - formed the necessary bridge for me and many other researchers to establish an academic carrier. SMI was also involved during the gradual transition from a county to a university hospital. During these days, there was also major research collaboration where I was employed at SMI as professor together with my position as chief consultant. This fruitful collaboration formed the basis for >200 publications in these years and was one of the main arguments used in the negotiations with the Danish Health Authorities in the transition of the hospital to an independent university hospital with its own medical school. Since then, our collaboration has continued, and with the strong position of SMI it will undoubtedly be intensified in the years to come”.

Affiliated Professors
Asbjørn Mohr Drewes,
Aalborg University Hospital, Denmark

” Congratulations on the 25th anniversary of SMI. It was a precious time for me to work together with great professors and nice friends in Aalborg. I learned so much at SMI which is today contributing to my ongoing research at Kochi University, Japan. I wish SMI many more successful years”.

Guest Researcher
Masashi Izumi,
Koichi University, Japan

” First of all, uncountable thanks for accepting me as a guest researcher from pharmaceutical industry in SMI for one year 2015-2016, and many congratulations on the 25th anniversary!! I was grateful to have one year - from building a protocol to publishing a paper, which was fulfilled with really tough and heart-warming moments. So in my opinion, possible impact of our collaboration would be if beginning by the more direct one, that I would persuade the company (managers) to utilize the technique, which I learned at SMI, for future clinical trials, which is in fact about to come true. The second impact would be that we will be collaborating through our funding activities, which just means the typical “Money – Research” exchange platform. But much more excitingly, since we know each other very well, not only as an independent “pharma” and “institution”, but as a more “ameba-like” business-research hybrid platform, more collaborative activities could be expected including frequent exchange of human resources, complete preclinical and clinical data-sharing through academia, industry, and clinical practice (real world)”.

Guest Researcher
Yosuke Imai,
Asahi Kasai Medical Co. Ltd., Japan

” Dear SMI members,
I congratulate you all with the 25th anniversary of Center for Sensory-Motor Interaction!
I feel part of the SMI family! My memories go back to the second half of the eighties when I met Thomas Sinkjær in the framework of a series of European Concerted Actions under the guidance of Antonio Pedotti. Our collaboration grew, and we collaborated in several subsequent European projects. I met Winnie Jensen and Lotte Andreassen when they came to Twente for a student project. Hans Struijk was a Ph.D. student in our group before he started working in Aalborg, also Nico Rijkhoff originated from our group at Twente. In 1997, I came to Aalborg to perform my sabbatical with Thomas and Michel Ladouceur. Subsequently, I have returned many times to Aalborg, especially as a Ph.D. examiner and reviewer. Over many years, Susanne Nielsen Lundis and her colleagues played an essential role in my life line between Aalborg and Twente. I wish SMI a prosperous future for the next 25 years”.

Guest Researcher
Peter Veltink,
University of Twente, The Netherlands

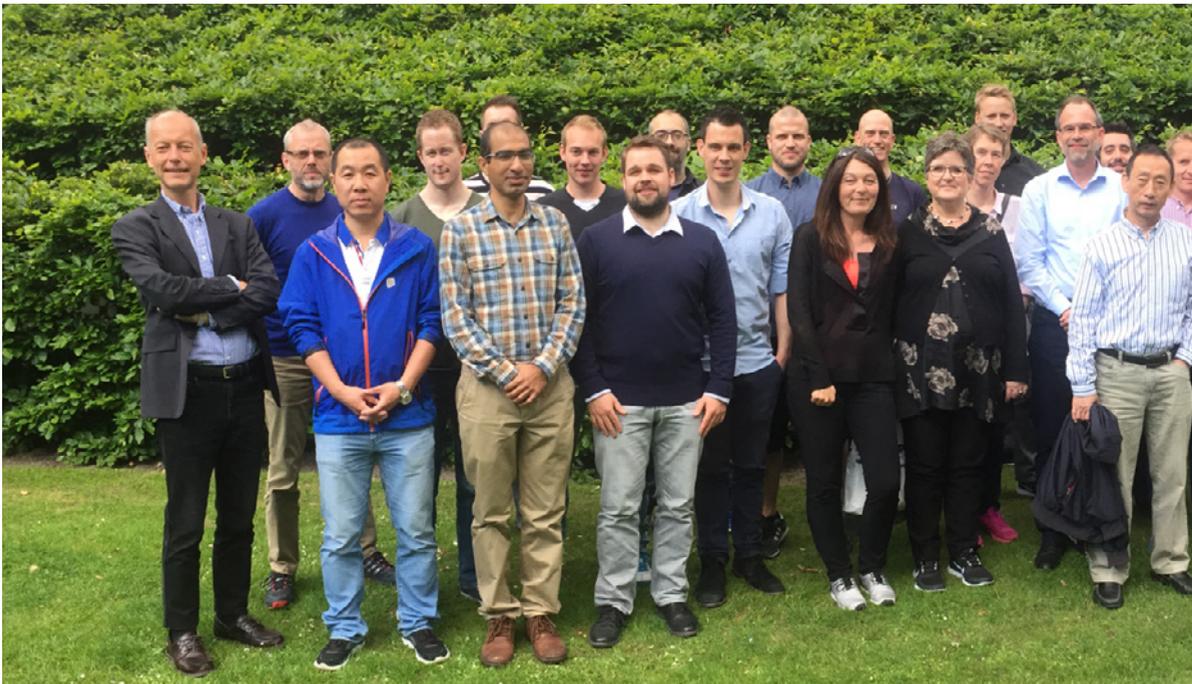
*Integrative Neuroscience
RIG, canoe trip – 2014*



*The Annual SMI Seminar –
Løkken Action House –
2011*



Shellie Boudreau, Teacher of the Year – 2012



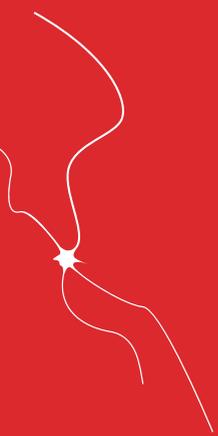
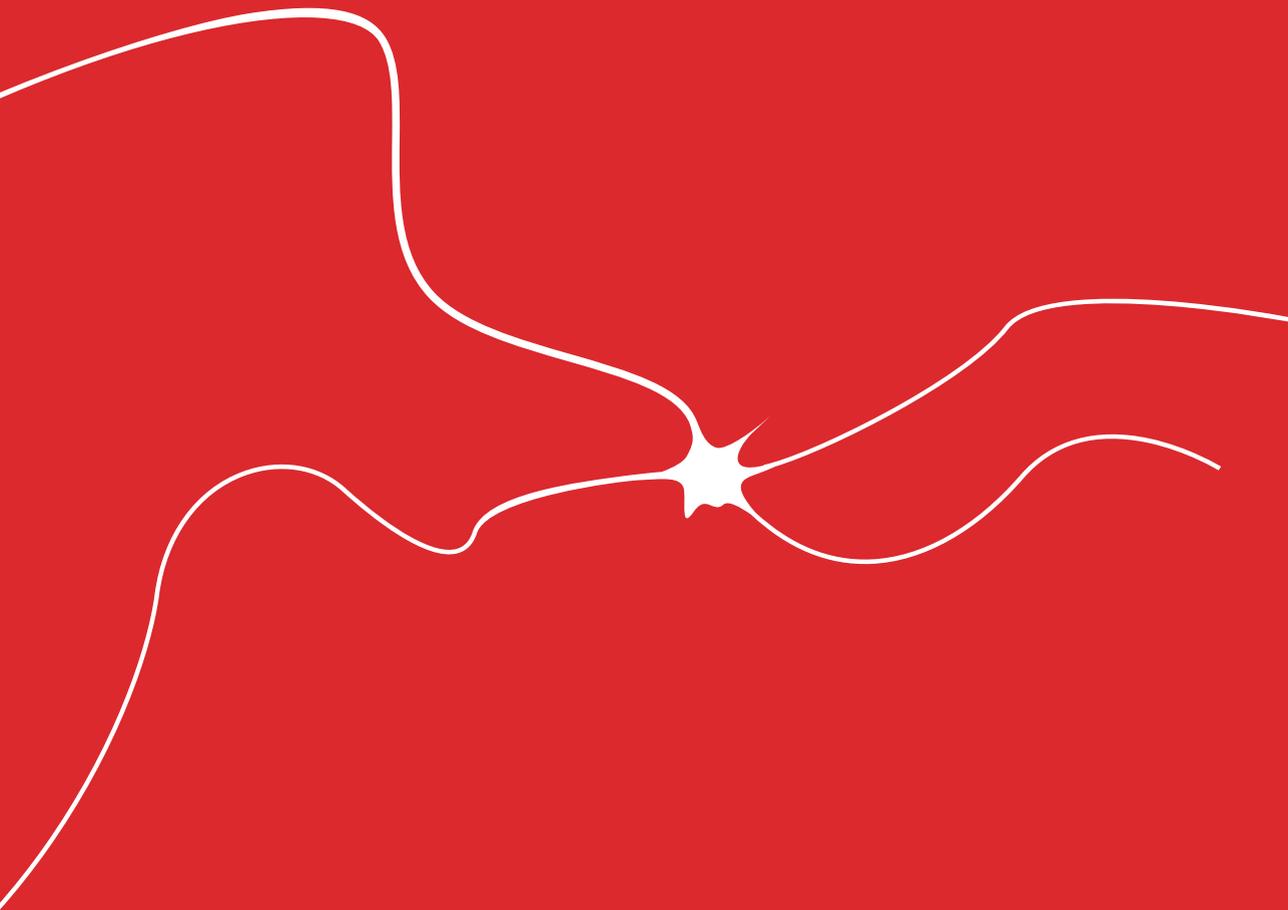
SMI Annual Seminar – 2015

*Integrative Neuroscience
RIG garden party – 2013*



*Laboratory presentations
at the Scandinavian
Association for the Study
of Pain Conference at
SMI – 2002*





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