1. ABOUT

Physical Medicine & Rehabilitation Research – Copenhagen (PMR-C) is a multidisciplinary research program in physical medicine and rehabilitation, based in Copenhagen, Denmark. PMR-C is the research division of the Department of Physical- and Occupational Therapy at Hvidovre Hospital, University of Copenhagen, Denmark. The core of PMR-C is an extensive collaboration between three departments at the hospital: Department of Physical- and Occupational Therapy, Department of Orthopedic Surgery, and Clinical Research Centre. The hospital is well known for a broad clinical research within enhanced recovery after surgery, and the research focus of PMR-C is inspired by this research tradition.

The main research focus of PMR-C is the use of physical medicine to enhance recovery in patients, or to prevent injury or disease. Our approach is clinical, but we also conduct basic research to investigate mechanisms and research to develop new outcome measures.

PMR-C was initiated by Thomas Bandholm, Morten Tange Kristensen and Kristian Thorborg, and was formally established in 2013 in collaboration with Jette Christensen, Head of the Department of Physical- and Occupational Therapy, Peter Gebuhr, Head of the Department of Orthopedic Surgery, and Ove Andersen, Head of Clinical Research Centre, Hvidovre Hospital, University of Copenhagen. These six people form the PMR-C steering committee. Finally, four highly esteemed researchers form an advisory board that advises the steering committee in the management of PMR-C.

2. MAIN ACHIEVEMENTS IN 2013

Firstly, PMR-C was successfully launched, which was officially celebrated at a large PMR-C research symposium in collaboration with Metropolitan University College, Copenhagen. More than 300 people attended the symposium. Secondly, people from PMR-C published 29 peer-reviewed papers in 2013 and had an additional 5 accepted. Thirdly, Kristian Thorborg continued on the editorial board with British Journal of Sports Medicine, and published his second invited Editorial (Advancing hip and groin injury management – from eminence to evidence). Morten Tange Kristensen continued on the editorial board with World Journal of Orthopedics, and Thomas Bandholm joined the editorial board with PLOS ONE. Finally, PMR-C had its first PhD defence in 2013.
3. PEOPLE

**Jette Christensen:** Ms Christensen is Head of PMR-C and Head of the Department of Physical- and Occupational Therapy. Curriculum and list of publications can be found at pmrc.dk/people.

**Thomas Bandholm:** Dr. Bandholm is a senior researcher and research coordinator at PMR-C. He is responsible for enhanced recovery program research in patients following total hip and knee arthroplasties and acute hospitalization for medical illnesses in older patients at PMR-C. Curriculum and list of publications can be found at pmrc.dk/people. Please see summary below.

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**Morten Tange Kristensen:** Dr. Kristensen is a senior researcher at PMR-C. He is responsible for enhanced recovery program research in patients with hip fracture and lower limb amputations at PMR-C. Curriculum and list of publications can be found at pmrc.dk/people. Please see summary below.

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**Kristian Thorborg:** Dr. Thorborg is a senior researcher at PMR-C. He is responsible for sports medicine research at PMR-C. Curriculum and list of publications can be found at pmrc.dk/people. Please see summary below.

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**PhD-students**

**Lise Kronborg:** Ms Kronborg is a PhD-student at PMR-C and enrolled at University of Copenhagen. Her PhD deals with in-hospital exercise to enhance recovery following a hip fracture (Morten Tange Kristensen, faculty supervisor, Thomas Bandholm co-supervisor).

**Mette Merete Pedersen:** Ms Pedersen is a PhD-student at PMR-C, co-affiliated with Optimized Senior Patient Programme (OPTIMED), and enrolled at University of Copenhagen. Her PhD deals with exercise to prevent functional decline following acute hospitalization for a medical illness in older patients (Thomas Bandholm, faculty supervisor).

**Christine Bodilsen:** Ms Bodilsen is a PhD-student at PMR-C, co-affiliated with Optimized Senior Patient Programme (OPTIMED), and enrolled at University of Copenhagen. Her PhD deals with prediction of low functional performance following acute hospitalization for a medical illness in older patients (Thomas Bandholm, faculty supervisor).

**Derek Curtis:** Mr. Curtis is a PhD-student at PMR-C, co-affiliated with Gait Analysis Laboratory, Department of Orthopedic Surgery, Copenhagen University Hospital, Hvidovre, and enrolled at University of Copenhagen. His PhD deals with exercise to improve functional performance in children with cerebral palsy (external supervisors).
**Patrocinio Ariza-Vega:** Ms. Ariza-Vega is a PhD-student at the University of Granada, Spain and co-affiliated with PMR-C. Her PhD deals with the recovery of function and mortality within one year of hip fracture surgery in southern Spain (Morten Tange Kristensen, co-supervisor).

**Thomas Linding Jakobsen:** Mr Jakobsen was a PhD-student at PMR-C, co-affiliated with the Lundbeckfoundation Centre for Fast-Track Hip- and Knee Arthroplasty. His PhD dealt with exercise to enhance recovery following a total knee arthroplasty (faculty supervisor: Thomas Bandholm).

**MSc-students**

**Nadia Ørbæk:** Ms Ørbæk is an MSc-student at PMR-C, and enrolled at University of Southern Denmark. Her MSc deals with patient experiences of rehabilitation in hospital and after discharge in patients with hip fracture (Morten Tange Kristensen, co-supervisor).

**Linette Kofoed:** Ms Kofoed is an MSc-student at PMR-C, and enrolled at University of Southern Denmark. Her MSc deals with strength training in patients with exacerbation in chronic obstructive pulmonary disease and is a collaboration with North Sealand Hospital, Frederiksund (Morten Tange Kristensen, co-supervisor).

**Maria Svennergren:** Ms Svennergren is an MSc-student at PMR-C, and enrolled at Lund University. Her MSc deals with the development of a measure of Achilles tendon length (Morten Tange Kristensen, co-supervisor).

**Louisa Wilquin:** Ms Wilquin is an MSc-student at PMR-C and enrolled at the University of Southern Denmark. Her MSc deals with the effect of contraction velocity during strength training on efferent activation of the quadriceps muscle shortly following total knee arthroplasty (Thomas Bandholm, co-supervisor).

**Elin Mikkelsen:** Ms Mikkelsen was an MSc-student at PMR-C and enrolled at the University of Southern Denmark. Her MSc dealt with central (CNS) activation of the quadriceps muscle during strength training with repetitions to contraction failure after total knee arthroplasty (Thomas Bandholm, co-supervisor).

**Gry Søbye:** Ms Søbye was an MSc-student at PMR-C and enrolled at the University of Copenhagen. Her MSc dealt with Variables that influence the response to progressive strength training shortly following total knee arthroplasty (Thomas Bandholm, faculty supervisor).

**Lars Tang:** Mr. Tang was an MSc-student at PMR-C, and enrolled at University of Copenhagen. His MSc dealt with previous knee injuries and self-reported lower limb function score as risk factors for future knee injuries in adolescent female soccer (Kristian Thorborg, faculty supervisor).
Jan Overgaard: Mr Overgaard is an MSc-student at PMR-C, and enrolled at University of Southern Denmark. His MSc deals with reliability of the six minutes’ walk test in patients with hip fracture and is a collaboration with Lolland Municipality (Morten Tange Kristensen, co-supervisor).

4. ADVISORY BOARD

The PMR-C is proud to have an advisory board of highly esteemed researchers to advise the management of PMR-C. The members of the PMR-C advisory board are listed below. Their biographies can be found at pmrc.dk/advisory-board/

Per Hölmich, Associate Professor, MD
Professor Hölmich is Head of Arthroscopic Centre Amager, Hvidovre Hospital, Copenhagen, Denmark.

Henrik Kehlet, Professor, Dr Med Sci
Professor Kehlet is Head of The Lundbeck Foundation Centre for Fast-Track Hip and Knee Arthroplasty and Section of Surgical Pathophysiology, Rigshospitalet, Copenhagen, Denmark.

Michael Kjær, Professor, Dr Med Sci
Professor Kjær is Head of Institute of Sports Medicine – Copenhagen, Bispebjerg Hospital, Copenhagen, Denmark.

Jens Bo Nielsen, Professor, Dr Med Sci
Professor Nielsen is Head of Neural Control of Movement – Copenhagen, University of Copenhagen, Copenhagen, Denmark.

Comments from the advisory board to the annual report
The first year of PMR-C activities has been impressive with numerous scientific publications as well as extensive educational activities. The focus for the coming year should be to consolidate this level of productivity.
5. PUBLICATIONS

People from PMR-C published 29 papers in 2013, and an additional 5 were accepted. Thank you to all our collaborators. Please see pmrc.dk/collaborators for a list.

![Peer-reviewed papers](image)

**Figure 1**: Trend in peer-reviewed papers. *Accepted papers to be published in 2014. Status per January 1st, 2014.*
Published peer-review papers


**Accepted peer-reviewed papers**


6. COMPLETED THESSES


Elin Mikkelsen, MSc-thesis, University of Southern Denmark. Project title: Central (CNS) activation of the quadriceps muscle during strength training with repetitions to contraction failure after total knee arthroplasty (Thomas Bandholm, co-supervisor).

Gry Søbye, MSc-thesis, University of Copenhagen. Project title: Variables that influence the response to progressive strength training shortly following total knee arthroplasty: secondary analyses of a randomized controlled trial (Thomas Bandholm, faculty supervisor).

Lars Tang. MSc-thesis, University of Copenhagen. Project title: Previous knee injury and self-reported lower limb function score as risk factors for future knee injuries in adolescent female soccer (Kristian Thorborg, faculty supervisor).

7. RESEARCH GRANTS

With PMR-C acting as main or co-applicant, we received a total of 5,113,896 DKK (686,316 Euro) in 2013 from a variety of funding bodies. Thank you very much for the support. The funding bodies included:

The Research Foundation of the Capital Region: Quadriceps muscle inhibition after total knee arthroplasty: mechanisms and perspectives. Main applicant: Thomas Bandholm (1,499,125 DKK).

The Research Foundation of the Capital Region: Implementing risk-patient identification in the acute medical ward. Main applicant: Ove Andersen, co-applicant: Thomas Bandholm (1,490,301 DKK).

The IMK Foundation: Early and intensive in-hospital strength training and rehabilitation in municipalities in Denmark after surgery for an acute hip fracture. Main applicant: Henrik Kehlet, co-applicant: Morten Tange Kristensen (592,000 DKK).
The Research Foundation of the Danish Physical Therapy Organization: Early and intensive in-hospital strength training and rehabilitation in municipalities in Denmark after surgery for an acute hip fracture. Main applicant: Lise Kronborg, enclosed CVs from PMR-C supervisors: Thomas Bandholm and Morten Tange Kristensen (38,750 DKK + 400,000 DKK [PhD-scholarship]).

The Research Foundation for Hvidovre Hospital: Early and intensive in-hospital strength training and rehabilitation in municipalities in Denmark after surgery for an acute hip fracture. Main applicant: Lise Kronborg, enclosed CVs from PMR-C supervisors: Thomas Bandholm and Morten Tange Kristensen (50,000 DKK).

The Research Foundation of the Hvidovre Hospital: An early, structured intervention in the acute medical unit to identify the frail older medical patients. Main applicant: Christine Bodilsen, enclosed CVs from PMR-C supervisor: Thomas Bandholm (25,000 DKK).

The UCSF Lundbeck foundation: Early and intensive in-hospital strength training and rehabilitation in municipalities in Denmark after surgery for an acute hip fracture. Main applicant: Lise Kronborg, enclosed CVs from PMR-C supervisors: Thomas Bandholm and Morten Tange Kristensen (100,000 DKK).

The UCSF Lundbeck foundation: Early identification of older patients with low functional level in the acute medical unit. Main applicant: Christine Bodilsen, enclosed CVs from PMR-C supervisor: Thomas Bandholm (100,000 DKK).

The Research Foundation of the Danish Physical Therapy Organization: Six versus twelve weeks of progressive strength training in patients with hip fracture: a randomized controlled trial. Main applicant: Jan Overgaard, enclosed CVs from PMR-C supervisors: Morten Tange Kristensen (25,000 DKK).

The Research Foundation for Danish Sports Physical Therapists. Elastic band stretch sensor used in rehabilitation of patients with patellofemoral pain. Main applicant Michael Rathleff, co-applicants: Kristian Thorborg and Thomas Bandholm (25,000 DKK).


The University of Copenhagen: Mild Cognitive Impairment Status and Mobility Performance: an Analysis from the Boston RISE Study. Supporting 4 month in Boston as a visiting scholar for the main applicant. Main applicant: Mette Merete Pedersen (42,500 DKK).

The Capital Region of Denmark: Mild Cognitive Impairment Status and Mobility Performance: an Analysis from the Boston RISE Study. Supporting 4 month in Boston as a visiting scholar for the main applicant. Main applicant: Mette Merete Pedersen (16,470 DKK).

The Research Foundation of the Danish Physical Therapy Organization: In-hospital and post-discharge training of older medical patients. Main applicant: Mette Merete Pedersen, enclosed CVs from PMR-C supervisors: Thomas Bandholm (90,000 DKK).

The UCSF Lundbeck Foundation: In-hospital and post-discharge training of older medical patients. Main applicant: Mette Merete Pedersen, enclosed CVs from PMR-C supervisors: Thomas Bandholm (100,000 DKK).

8. INVITED LECTURES


Lecture title: Prevention of soccer injuries. Venue: Danish Football Association seminar for physical trainers 2013, Copenhagen, Denmark (Kristian Thorborg).

Lecture title: Patient-related scores for groin pain: HAGOS. Venue: 3rd Sporting Groin pain Conference 2013, Doha, Qatar (Kristian Thorborg).

Lecture title: Strength measurements in groin pain. Venue: 3rd Sporting Groin pain Conference 2013, Doha, Qatar (Kristian Thorborg).


9. MAIN TEACHING AND COURSE ACTIVITIES


4 days of course leading and teaching. Course: Exercise in clinical practice. Post-graduate PT level, Copenhagen. Danish Physical Therapist Organization (Thomas Bandholm).

4 days of course leading and teaching. Course: Exercise in clinical practice. Post-graduate PT level, Ålborg. Danish Physical Therapist Organization (Thomas Bandholm).

4 days of course leading and teaching. Course: Targeted Training introductory course. Kirkebækskolen (Derek Curtis).


2 lectures. Residence Course: Tests of functional performance in the geriatric patient. Post-graduate MD level, Gentofte Hospital, Danish Health and Medicines Authority. (Christine Bodilsen).


10. SYMPOSIA

PMR-C was the organizer or co-organizer of two large symposia in 2013.

**PMR-C research symposium 2013**

The symposium marked the launch of PMR-C and was held at the Metropolitan University College in Copenhagen in collaboration with the Metropolitan University College. More than 300 people attended the symposium, which included talks by the PMR-C advisory board members, the chairperson of the Danish Physical Therapy Organization, Tina Lambrecht, in addition to a large number of PMR-C people and invited non-PMR-C people.
Symposium on rehabilitation after total hip and knee arthroplasty

The symposium was organized by the Lundbeck Foundation Centre for Fast-Track Hip and Knee Arthroplasty, PMR-C and the Danish Physical Therapist Organization. It was held at Rigshospitalet in Copenhagen, and more than 300 people attended. The symposium included talks by Professor Bente Klarlund Pedersen as well as the chairperson of the Danish Physical Therapy Organization, Tina Lambrecht.

11. PEER REVIEWING OF RESEARCH

**Editorial board work:** British Journal of Sports Medicine, World Journal of Orthopedics, and PLOS ONE (Kristian Thorborg, Morten Tange Kristensen, Thomas Bandholm).


**Grant reviewing:** Arthritis Research UK (Thomas Bandholm), Research Foundation of the Danish Physical Therapy Organization, (Kristian Thorborg), Research Foundation in Danish Regions (Kristian Thorborg).

**External review of PhD-protocols prior to enrolment:** Blinded (University) (Thomas Bandholm, Kristian Thorborg).