

Annual report 2017

Physical Medicine & Rehabilitation Research – Copenhagen (PMR-C)

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1. ABOUT

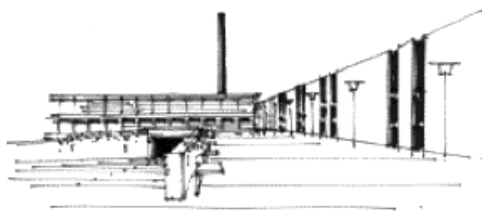
Physical Medicine & Rehabilitation Research – Copenhagen (PMR-C) is a multidisciplinary research program in physical medicine and rehabilitation, based in Copenhagen, Denmark. PMR-C is the research division of the Department of Physical- and Occupational Therapy at Copenhagen University Hospital, Amager-Hvidovre, 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, and 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, Copenhagen University Hospital, Amager-Hvidovre, Denmark. 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 2017

Firstly, Thomas Bandholm was appointed Professor of Clinical Exercise Physiology and Rehabilitation with the Department of Clinical Medicine, University of Copenhagen. Secondly, Kristian Thorborg and Morten Tange Kristensen were both found academically qualified at the professor-level. Thirdly, PMR-C became part of the clinical academic group "Physical Activity and Sports in Clinical Medicine: Disease Prevention, Treatment and Rehabilitation" under Copenhagen Health Science Partners (<https://chsp.dk/>).



3. PEOPLE

Curriculum and list of publications of PMR-C people can be found at www.hvidovrehospital.dk/forskning/pmrc/about-pmr-c

PMR-C steering committee

Thomas Bandholm: Dr. Bandholm is a senior researcher and head of research at PMR-C, and Professor of Clinical Exercise Physiology and Rehabilitation with the Department of Clinical Medicine, University of Copenhagen. He is responsible for research in enhanced recovery programs following total hip and knee arthroplasties and acute hospitalization for medical illnesses in older patients at PMR-C. Dr. Bandholm has published more than 90 international peer-reviewed papers since 2006.

Morten Tange Kristensen: Dr. Kristensen is a senior researcher at PMR-C. He is responsible for research in enhanced recovery programs in patients with hip fracture and lower limb amputations at PMR-C. Dr. Kristensen has published more than 50 peer-reviewed papers since 2005.

Kristian Thorborg: Dr. Thorborg is a senior researcher at PMR-C and an Associate Professor with the Department of Clinical Medicine, University of Copenhagen. He is responsible for sports medicine research at PMR-C. Dr. Thorborg has published more than 100 peer-reviewed papers since 2004.

Jette Christensen: Ms. Christensen is head of the Department of Physical and Occupational Therapy, Copenhagen University Hospital, Amager-Hvidovre.

Peter Gebuhr: Dr. Gebuhr is head of the Department of Orthopedic Surgery, Copenhagen University Hospital, Amager-Hvidovre.

Ove Andersen: Professor Andersen is head of the Clinical Research Center, Copenhagen University Hospital, Amager-Hvidovre and research director for Copenhagen University Hospital, Amager-Hvidovre.

Visiting researchers

Rui Cadilha, MD: Mr. Cadilha was a research fellow with PMR-C for 1 month in 2017. Mr. Cadilha is a medical doctor finishing his specialist training in physical medicine and rehabilitation at Oporto University, Oporto, Portugal.

Postdocs

Mette Merete Pedersen: Dr Pedersen is a Postdoc at PMR-C and co-affiliated with Optimized Senior Patient Programme (Optimed). Her Postdoc deals with physical activity and exercise to prevent functional decline following acute hospitalization for a medical illness in older patients.

PhD-students

Helle Gybel Juul-Larsen: Ms. Juul-Larsen is a PhD-student with Optimized Senior Patient Programme (Optimed), co-affiliated with PMR-C, and enrolled at the University of Copenhagen. Her PhD deals with multimorbidity-grouping based on disease patterns to optimize disease management programs for older patients with several chronic diseases (Thomas Bandholm, co-supervisor).

Mikkel Bek Clausen: Mr. Clausen is a PhD-student with Sports Orthopedic Research Centre - Copenhagen (SORC-C), co-affiliated with PMR-C, and enrolled at the University of Copenhagen. His PhD deals with rehabilitation of impairments in patients with subacromial impingement (Kristian Thorborg, main supervisor).

Martin Wollin: Mr. Wollin is a PhD-student at La Trobe University, Melbourne, Victoria, Australia, and co-affiliated with Sports Orthopedic Research Centre - Copenhagen (SORC-C) and PMR-C. His PhD deals with Athlete monitoring including hamstring and hip strength profiles, injury and training load in elite youth football (Kristian Thorborg, co-supervisor).

Rasmus Skov Husted: Mr. Husted is a PhD-student with PMR-C and Clinical Orthopaedic Research Hvidovre (CORH). His project deals with coordinated non-surgical and surgical care of patients with end-stage knee osteoarthritis (Thomas Bandholm, main supervisor).

Tobias Wörner: Mr. Wörner is a PhD-student at Lund University, Sweden, and co-affiliated with Sports Orthopedic Research Centre - Copenhagen (SORC-C) and PMR-C. His PhD deals with current rehabilitation practice in Scandinavia and outcomes after hip arthroscopy (Kristian Thorborg, co-supervisor).

Neil Light: Mr. Light is a PhD-student at Chichester University, England, and co-affiliated with Sports Orthopedic Research Centre - Copenhagen (SORC-C) and PMR-C. His PhD deals with groin injury in English elite youth football (Kristian Thorborg, co-supervisor).

Erneste Esteve: Mr. Esteve is a PhD-student at Girona University, Spain, and co-affiliated with Sports Orthopedic Research Centre - Copenhagen (SORC-C) and PMR-C. His PhD deals with groin injury in Spanish male footballers: Incidence, prevalence, risk factors and prevention (Kristian Thorborg, main supervisor).

Research Assistants

Line Holst: Ms. Holst is a research assistant with PMR-C. Her project deals with coordinated non-surgical and surgical care of patients with end-stage knee osteoarthritis (temporary project lead).

Signe Hulsbæk: Ms. Hulsbæk is a research assistant with PMR-C. Her project deals with cross-continuum rehabilitation to enhance recovery of patients with hip fracture (project coordinator).

Stephanie Mann: Ms. Mann is a research assistant with PMR-C in collaboration with Copenhagen Center for Health Technology (CACHET). Her project deals with health technology (Spraino) to reduce ankle sprains in cutting sports.

Jonas Bak: Mr. Bak is a research assistant with PMR-C in collaboration with Copenhagen Center for Health Technology (CACHET). His project deals with health technology (Injurymap) to enhance recovery from acute ankle sprains.

PMR-C affiliates

Jan Arnholtz Overgaard. Mr Overgaard is a research physical therapist at the Department of Rehabilitation in the Municipality of Lolland, Denmark. His area of expertise is patients with hip fracture.

Stays with other research environments

Kristian Thorborg: Six weeks appointment as Honorary Visiting Associate Professor in La Trobe University Sports and Exercise Medicine Centre, School of Allied Health within the College of Science, Health and Engineering. Contacts: Dr. Tania Pizzari and Professor Kay Crossley.

Rasmus Skov Husted: Three months at the School of Physiotherapy, University of Otago, Dunedin, New Zealand with Dr Cathy Chapple (change of research environment during PhD).

Mikkel Bek Clausen: Four weeks at Department of Rehabilitation Sciences and Physiotherapy, Ghent University, Ghent, Belgium. Contact: Dr Ann Cools (change of research environment during PhD).

4. ADVISORY BOARD

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

<https://www.hvidovrehospital.dk/forskning/pmrc/collaboration/Sider/Advisory-Board.aspx>

Per Hölmich, Professor, Dr Med Sci

Professor Hölmich is Head of Sports Orthopaedic Research Center – Copenhagen (SORC-C), Amager-Hvidovre Hospital, University of Copenhagen, 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 Laboratory, University of Copenhagen, Copenhagen, Denmark.

5. PUBLICATIONS

Published peer-review papers

People from PMR-C published 51 papers, and students supervised by people from PMR-C successfully defended 3 PhD and 5 MSc theses in 2017. Thank you to all our collaborators.

Ussing A, Dahn I, Due U, Sørensen M, Petersen J, Bandholm T. Supervised pelvic floor muscle training versus attention-control massage treatment in patients with faecal incontinence: Statistical analysis plan for a randomized controlled trial. *Contemp Clin Trials Commun.* 2017 Dec 1;8:192-202.

Hansen MS, Barfod KW, Kristensen MT. Development and reliability of the Achilles Tendon Length Measure and comparison with the Achilles Tendon Resting Angle on patients with an Achilles tendon rupture. *Foot Ankle Surg.* 2017 Dec;23(4):275-280.

Krommes K, Petersen J, Nielsen MB, Aagaard P, Hölmich P, Thorborg K. Sprint and jump performance in elite male soccer players following a 10-week Nordic Hamstring exercise Protocol: a randomised pilot study. *BMC Res Notes.* 2017 Dec 4;10(1):669.

Tavenier J, Haupt TH, Andersen AL, Buhl SF, Langkilde A, Andersen JR, Jensen JEB, Pedersen MM, Petersen J, Andersen O. A high-protein diet during hospitalization is associated with an accelerated decrease in soluble urokinase plasminogen activator receptor levels in acutely ill elderly medical patients with SIRS. *Nutr Res.* 2017;41:56-64.

Ishøi L, Hölmich P, Aagaard P, Thorborg K, Bandholm T, Serner A. Effects of the Nordic Hamstring exercise on sprint capacity in male football players: a randomized controlled trial. *J Sports Sci.* 2017 Dec 1:1-10.

Jønsson LR, Ingelsrud LH, Tengberg LT, Bandholm T, Foss NB, Kristensen MT. Physical performance following acute high-risk abdominal surgery: a prospective cohort study. *Can J Surg.* 2017 Dec 1;60(6):12616.

Rathleff CR, Bandholm T, Spaich EG, Jorgensen M, Andreasen J. Unsupervised progressive elastic band exercises for frail geriatric inpatients objectively monitored by new exercise-integrated technology-a feasibility trial with an embedded qualitative study. *Pilot Feasibility Stud.* 2017 Nov 13;3:56.

Wollin M, Thorborg K, Pizzari T. Monitoring the effect of football match congestion on hamstring strength and lower limb flexibility: Potential for secondary injury prevention? *Phys Ther Sport.* 2017 Sep 15;29:14-18.

Vicens-Bordas J, Esteve E, Fort-Vanmeerhaeghe A, Bandholm T, Thorborg K. Is inertial flywheel resistance training superior to gravity-dependent resistance training in improving muscle strength? A systematic review with meta-analyses. *J Sci Med Sport.* 2018 Jan;21(1):75-83.

Ariza-Vega P, Ortiz-Piña M, Kristensen MT, Castellote-Caballero Y, Jiménez-Moleón JJ. High perceived caregiver burden for relatives of patients following hip fracture surgery. *Disabil Rehabil.* 2017 Oct 16:1-8.

Bandholm T, Henriksen M, Thorborg K. Slow down to strengthen sport and exercise medicine research. *Br J Sports Med.* 2017 Oct;51(20):1453.

Vicens-Bordas J, Esteve E, Fort-Vanmeerhaeghe A, Bandholm T, Thorborg K. Skeletal muscle functional and structural adaptations after eccentric overload flywheel resistance training: Letter to the editor. *J Sci Med Sport.* 2018 Jan;21(1):2-3.

Kristensen MT, Kehlet H. The basic mobility status upon acute hospital discharge is an independent risk factor for mortality up to 5 years after hip fracture surgery. *Acta Orthop.* 2017 Sep 26:1-6.

Bandholm T, Christensen R, Thorborg K, Treweek S, Henriksen M. Preparing for what the reporting checklists will not tell you: the PREPARE Trial guide for planning clinical research to avoid research waste. *Br J Sports Med.* 2017 Oct;51(20):1494-1501.

Kristensen MT, Nielsen AØ, Topp UM, Holmehave-Brandt J, Petterson CF, Gebuhr P. Development and psychometric properties of the Basic Amputee Mobility Score for use in patients with a major lower extremity amputation. *Geriatr Gerontol Int.* 2017 Aug 31. doi: 10.1111/ggi.13156. [Epub ahead of print].

Thorborg K, Krommes KK, Esteve E, Clausen MB, Bartels EM, Rathleff MS. Infographic: Effects of specific injury prevention programmes in football. *Br J Sports Med.* 2017 Oct;51(20):1493.

Wied C, Tengberg PT, Kristensen MT, Holm G, Kalleose T, Troelsen A, Foss NB. Total Blood Loss After Transfemoral Amputations Is Twice the Intraoperative Loss: An Observational Cohort Study of 81 Nontraumatic Amputations. *Geriatr Orthop Surg Rehabil.* 2017 Sep;8(3):123-127.

Wörner T, Thorborg K, Moksnes H, Eek F. Similar views on rehabilitation following hip arthroscopy among physiotherapists and surgeons in Scandinavia: a specialized care survey. *Knee Surg Sports Traumatol Arthrosc.* 2017 Aug 14. doi: 10.1007/s00167-017-4676-6. [Epub ahead of print].

Harøy J, Thorborg K, Serner A, Bjørkheim A, Rolstad LE, Hölmich P, Bahr R, Andersen TE. Including the Copenhagen Adduction Exercise in the FIFA 11+ Provides Missing Eccentric Hip Adduction Strength Effect in Male Soccer Players: A Randomized Controlled Trial. *Am J Sports Med.* 2017 Nov;45(13):3052-3059.

Wollin M, Pizzari T, Spagnolo K, Welvaert M, Thorborg K. The effects of football match congestion in an international tournament on hip adductor squeeze strength and pain in elite youth players. *J Sports Sci.* 2017 Aug 3:1-6.

Eckard TG, Padua DA, Dompier TP, Dalton SL, Thorborg K, Kerr ZY. Epidemiology of Hip Flexor and Hip Adductor Strains in National Collegiate Athletic Association Athletes, 2009/2010-2014/2015. *Am J Sports Med.* 2017 Oct;45(12):2713-2722.

Clausen MB, Witten A, Holm K, Christensen KB, Attrup ML, Hölmich P, Thorborg K. Glenohumeral and scapulothoracic strength impairments exists in patients with subacromial impingement, but these are not reflected in the shoulder pain and disability index. *BMC Musculoskelet Disord*. 2017 Jul 17;18(1):302.

Mosler AB, Weir A, Eirale C, Farooq A, Thorborg K, Whiteley RJ, Hölmich P, Crossley KM. Epidemiology of time loss groin injuries in a men's professional football league: a 2-year prospective study of 17 clubs and 606 players. *Br J Sports Med*. 2017 Jun 30. doi: 10.1136/bjsports-2016-097277. [Epub ahead of print].

Kronborg L, Bandholm T, Palm H, Kehlet H, Kristensen MT. Effectiveness of acute in-hospital physiotherapy with knee-extension strength training in reducing strength deficits in patients with a hip fracture: A randomised controlled trial. *PLoS One*. 2017 Jun 29;12(6):e0179867.

Lindberg-Larsen V, Bandholm TQ, Zilmer CK, Bagger J, Hornsleth M, Kehlet H. Preoperative methylprednisolone does not reduce loss of knee-extension strength after total knee arthroplasty: A randomized, double-blind, placebo-controlled trial of 61 patients). *Acta Orthop*. 2017 Oct;88(5):543-549.

Serner A, Weir A, Tol JL, Thorborg K, Roemer F, Guermazi A, Yamashiro E, Hölmich P. Characteristics of acute groin injuries in the hip flexor muscles – a detailed MRI study in athletes. *Scand J Med Sci Sports*. 2017 Jun 26. doi: 10.1111/sms.12939. [Epub ahead of print].

Krommes K, Bandholm T, Jakobsen MD, Andersen LL, Serner A, Hölmich P, Thorborg K. Dynamic hip adduction, abduction and abdominal exercises from the Holmich groin-injury prevention program are intense enough to considered strengthening exercises – A cross-sectional study. *Int J Sports Phys Ther*. 2017 Jun;12(3):371-380.

Klausen HH, Bodilsen AC, Petersen J, Bandholm T, Haupt T, Sivertsen DM, Andersen O. How inflammation underlies physical and organ function in acutely admitted older medical patients. *Mech Ageing Dev*. 2017 Jun;164:67-75.

Münter KH, Clemmesen CG, Foss NB, Palm H, Kristensen MT. Fatigue and pain limit independent mobility and physiotherapy after hip fracture surgery. *Disabil Rehabil*. 2017 Apr 17:1-9.

Langkilde A, Jakobsen TL, Bandholm TQ, Eugen-Olsen J, Blauenfeldt T, Petersen J, Andersen O. Inflammation and post-operative recovery in patients undergoing total knee arthroplasty-secondary analysis of a randomized controlled trial. *Osteoarthritis Cartilage*. 2017 Aug;25(8):1265-1273.

Harøy J, Clarsen B, Thorborg K, Hölmich P, Bahr R, Andersen TE. Groin Problems in Male Soccer Players Are More Common Than Previously Reported. *Am J Sports Med*. 2017 May;45(6):1304-1308.

Reiman MP, Thorborg K, Covington K, Cook CE, Hölmich P. Important clinical descriptors to include in the examination and assessment of patients with femoroacetabular impingement syndrome: an international and multi-disciplinary Delphi survey. *Knee Surg Sports Traumatol Arthrosc.* 2017 Jun;25(6):1975-1986.

Klausen HH, Petersen J, Bandholm T, Juul-Larsen HG, Tavenier J, Eugen-Olsen J, Andersen O. Association between routine laboratory tests and long-term mortality among acutely admitted older medical patients: a cohort study. *BMC Geriatr.* 2017 Mar 1;17(1):62.

Skjelboe AK, Bandholm TQ, Hakmann S, Mourier M, Kallemose T, Dixen U. Cardiovascular exercise and burden of arrhythmia in patients with atrial fibrillation - A randomized controlled trial. *PLoS One.* 2017 Feb 23;12(2):e0170060.

Peters S, Laing A, Emerson C, Mutchler K, Joyce T, Thorborg K, Hölmich P, Reiman M. Surgical criteria for femoroacetabular impingement syndrome: a scoping review. *Br J Sports Med.* 2017 Nov;51(22):1605-1610.

Husted RS, Wilquin L, Jakobsen TL, Holsgaard-Larsen A, Bandholm T. Rapid knee-extensions to increase quadriceps muscle activity in patients with total knee arthroplasty: A randomized cross-over study *Int J Sports Phys Ther.* 2017 Feb;12(1):105-116.

Ardern CL, Glasgow P, Schneiders AG, Witvrouw E, Clarsen B, Cools AM, Gojanovic B, Griffin S, Khan K, Moksnes H, Mutch S, Phillips N, Reurink G, Sadler R, Gravare Silbernagel K, Thorborg K, Wangensteen A, Wilk K, Bizzini M. Infographic: 2016 Consensus statement on return to sport from the First World Congress in Sports Physical Therapy, Bern. *Br J Sports Med.* 2017 Jul;51(13):995.

Zebis MK, Andersen CH, Bencke J, Ørntoft C, Linnebjerg C, Hölmich P, Thorborg K, Aagaard P, Andersen LL. Neuromuscular Coordination Deficit Persists 12 Months after ACL Reconstruction But Can Be Modulated by 6 Weeks of Kettlebell Training: A Case Study in Women's Elite Soccer. *Case Rep Orthop.* 2017;2017:4269575.

Mosler AB, Crossley KM, Thorborg K, Whiteley RJ, Weir A, Serner A, Hölmich P. Hip strength and range of motion: Normal values from a professional football league. *J Sci Med Sport.* 2017 Apr;20(4):339-343.

Wied C, Tengberg PT, Holm G, Kallemose T, Foss NB, Troelsen A, Kristensen MT. Tourniquets do not increase the total blood loss or re-amputation risk in transtibial amputations. *World J Orthop.* 2017 Jan 18;8(1):62-67.

Reiman MP, Thorborg K, Goode AP, Cook CE, Weir A, Hölmich P. Diagnostic Accuracy of Imaging Modalities and Injection Techniques for the Diagnosis of Femoroacetabular Impingement/Labral Tear: A Systematic Review With Meta-analysis. *Am J Sports Med.* 2017 Sep;45(11):2665-2677.

Thorborg K, Krommes KK, Esteve E, Clausen MB, Bartels EM, Rathleff MS. Effect of specific exercise-based football injury prevention programmes on the overall injury rate in football: a systematic review and meta-analysis of the FIFA 11 and 11+ programmes. *Br J Sports Med.* 2017 Apr;51(7):562-571.

Curtis DJ, Woollacott M, Bencke J, Lauridsen HB, Saavedra S, Bandholm T, Sonne-Holm S. The functional effect of segmental trunk and head control training in moderate-to-severe cerebral palsy: A randomized controlled trial. *Dev Neurorehabil.* 2017 Jan 3:1-10.

Kofod LM, Døssing M, Steentoft J, Kristensen MT. Resistance Training With Ankle Weight Cuffs Is Feasible in Patients With Acute Exacerbation of COPD. *J Cardiopulm Rehabil Prev.* 2017 Jan;37(1):49-56.

Thorborg K, Branci S, Nielsen MP, Langelund MT, Hölmich P. Copenhagen five-second squeeze: a valid indicator of sports-related hip and groin function. *Br J Sports Med.* 2017 Apr;51(7):594-599.

Serner A, Roemer FW, Hölmich P, Thorborg K, Niu J, Weir A, Tol JL, Guermazi A. Reliability of MRI assessment of acute musculotendinous groin injuries in athletes. *Eur Radiol.* 2017 Apr;27(4):1486-1495.

Overgaard JA, Larsen CM, Holtze S, Ockholm K, Kristensen MT. Interrater Reliability of the 6-Minute Walk Test in Women With Hip Fracture. *J Geriatr Phys Ther.* 2017 Jul/Sep;40(3):158-166.

Wollin M, Thorborg K, Pizzari T. The acute effect of match play on hamstring strength and lower limb flexibility in elite youth football players. *Scand J Med Sci Sports.* 2017 Mar;27(3):282-288.

Bloch ML, Jønsson LR, Kristensen MT. Introducing a Third Timed Up & Go Test Trial Improves Performances of Hospitalized and Community-Dwelling Older Individuals. *J Geriatr Phys Ther.* 2017 Jul/Sep;40(3):121-126.

Mikkelsen LR, Petersen AK, Mechlenburg I, Mikkelsen S, Søballe K, Bandholm T. Description of load progression and pain response during progressive resistance training early after total hip arthroplasty: secondary analyses from a randomized controlled trial. *Clin Rehabil.* 2017 Jan;31(1):11-22.

Thorborg K, Rathleff MS, Petersen P, Branci S, Hölmich P. Prevalence and severity of hip and groin pain in sub-elite male football: a cross-sectional cohort study of 695 players. *Scand J Med Sci Sports.* 2017Jan;27(1):107-114.

Peer-reviewed papers per year

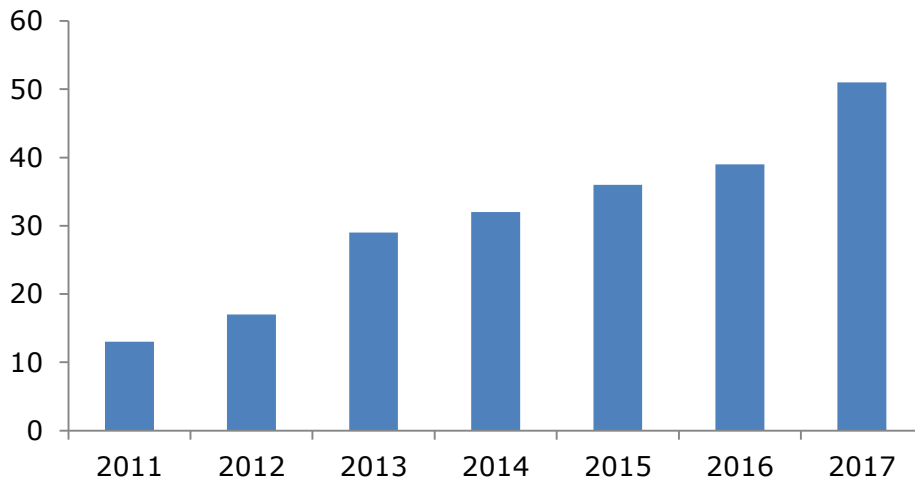


Figure 1: Trend in peer-reviewed papers. Status per January 1st, 2018.

Defended theses - supervised by people from PMR-C

Dorte Melgaard: PhD thesis, Aalborg University. Main affiliation: Center for Clinical Research, Vendsyssel Hospital, co-affiliated with PMR-C. Project title: Treatment of community-acquired pneumonia: A therapeutic perspective – Early mobilization and Dysphagia (Morten Tange Kristensen, co-supervisor).

Andreas Serner: PhD thesis, Copenhagen University. Main affiliation: Aspetar Sports Medicine Center and Sports Orthopedic Research Center – Copenhagen (SORC-C). Project title: Diagnosis of acute groin injuries in athletes (Kristian Thorborg, co-supervisor).

Christian Wied: PhD thesis, Copenhagen University. Main affiliation: Clinical Orthopedic Research Hvidovre (CORH), Department of Orthopedic Surgery, Copenhagen University Hospital, Hvidovre, co-affiliated with PMR-C. Project title: The perioperative blood loss and complications in lower extremity amputations (Morten Tange Kristensen, principal co-supervisor).

Anja Ussing: MSc thesis, University of Copenhagen. Main affiliation: PMR-C. Project title: Supervised pelvic floor muscle training versus attention-control massage treatment in patients with faecal incontinence (Thomas Bandholm, main supervisor).

Daniel Kristensen and Nikolaj Odderskær: MSc thesis, Aalborg University. Main affiliation: Aalborg University, co-affiliated with PMR-C. Project title: Effect of rehabilitation of lower limb amputee citizens with expected use of prosthesis (Morten Tange Kristensen, co-supervisor).

Charlotte Anker Petersen: MSc thesis, University of Southern Denmark. Main affiliation: Sports Orthopedic Research Center – Copenhagen (SORC-C), co-affiliated with PMR-C. Project title: Six-weeks of high-load training and rehearsal across pre-season show structural changes of the Achilles tendon in professional ballet dancers – an observational cohort study (Kristian Thorborg, co-supervisor).

Line Holst: MSc thesis, University of Southern Denmark. Main affiliation: PMR-C. Project title: The impact of two supervised follow-up sessions on adherence to home-based strength exercise in patients with end-stage knee osteoarthritis: Data from the QUADX-1 Trial (Rasmus Skov Husted, co-supervisor).

6. RESEARCH GRANTS

With PMR-C acting as main or co-applicant, we received a total of 4,148,861 DKK (557,328 Euro) in 2017 from a variety of funding bodies. Thank you very much for the support. The funding bodies included:

The Velux Foundation: Physically active older patients during and after hospitalization: The WALK-Copenhagen implementation study. Main applicant: Jeanette Wassar Kirk, enclosed CV's from PMR-C: Thomas Bandholm (2,545.371 DKK).

Capital Region, Cross-continuum funds: Effect of physiotherapy with strength training and protein supplement in combination with anabolic steroids in cross-continuum rehabilitation of patients with hip fracture. Main applicant: Morten Tange Kristensen (450.000 DKK).

CACHET, Copenhagen Center for Health Technology: A pilot study investigating the use, adherence, and preliminary efficacy of the app InjuryMap® in providing exercise rehabilitation for people with acute lateral ankle sprains seen at the Emergency Department – a mixed-methods pilot study. Main applicant: Thomas Bandholm (250,000 DKK).

CACHET, Copenhagen Center for Health Technology: A randomized pilot trial to evaluate the preliminary effect and safety of using Spraino® to prevent lateral ankle sprains in indoor sports (The Spraino Pilot Trial). Main applicant: Thomas Bandholm (250,000 DKK).

Research Foundation, Region Zealand: TREATright: The right treatment for the right patient at the right time – A prospective cohort study of 5,000 patients with knee osteoarthritis. Main applicant: Lina Holm Ingelsrud, enclosed CV from PMR-C: Thomas Bandholm (176,000 DKK).

Research Foundation, Næstved, Slagelse, Ringsted Hospitals: TREATright: The right treatment for the right patient at the right time – A prospective cohort study of 5,000 patients with knee osteoarthritis. Main applicant: Lina Holm Ingelsrud, enclosed CV from PMR-C: Thomas Bandholm (167,490 DKK).

Research Foundation, Amager-Hvidovre Hospital: TREATright: The right treatment for the right patient at the right time – A prospective cohort study of 5,000 patients with knee osteoarthritis. Main applicant: Lina Holm Ingelsrud, enclosed CV from PMR-C: Thomas Bandholm (100,000 DKK).

Research Foundation, Amager-Hvidovre Hospital: Reduced elongation of the Achilles tendon after rupture is considered the key to optimized treatment. Main applicant: Maria Swennergren Hansen (90.000 DKK).

The Danish Rheumatism Association: TREATright: The right treatment for the right patient at the right time – A prospective cohort study of 5,000 patients with knee osteoarthritis. Main applicant: Lina Holm Ingelsrud, enclosed CV from PMR-C: Thomas Bandholm (50,000 DKK).

The Danish Physical Therapist Organization: Effect of physiotherapy with strength training and protein supplement in combination with anabolic steroids in cross-continuum rehabilitation of patients with hip fracture. Main Applicant: Morten Tange Kristensen (50.000 DKK).

Danish Society for Sports Physical Therapy: Physical therapy with blood flow restriction training to enhance recovery in patients with early weight bearing restrictions after knee surgery: A feasibility study. Main applicant: Thomas Linding Jakobsen, enclosed CV's from PMR-C: Thomas Bandholm and Kristian Thorborg (20,000 DKK).

7. INVITED LECTURES

Innovation day, Copenhagen Healthtech Cluster, Copenhagen, Denmark. Title: New trends in technology-supported rehabilitation: the case of the Bandcizer (Thomas Bandholm).

Theme day on clinically relevant research, Sundhedsfagligt Forum, North Zealand Hospital, Hillerød, Denmark. Title: Better treatment through clinical research (Thomas Bandholm).

Rapid recovery after surgery-symposium, Zimmer Biomet, Vienna, Austria. Title: Searching for the best physiotherapy regimen after total hip and knee replacements (Thomas Bandholm).

Annual 2-day "Snekkersten" symposium for the PhD graduate program: Basic and Clinical Research in Musculoskeletal Sciences (MUSCOS), University of Copenhagen, Snekersten, Denmark. Title: Rehabilitation after joint replacement (Thomas Bandholm).

Inaugural Professor lecture, University of Copenhagen and Amager-Hvidovre Hospital, Hvidovre, Denmark. Title: Physical activity and exercise to enhance clinical recovery in patients (Thomas Bandholm).

5th PMR-C research symposium, Copenhagen, Denmark. Title: Physical activity and exercise to enhance recovery in older acutely admitted medical patients (Thomas Bandholm).

5th PMR-C research symposium, Copenhagen, Denmark. What is enhanced clinical recovery? (Thomas Bandholm).

5th PMR-C research symposium, Copenhagen, Denmark. Physical activity to enhance recovery from hip fracture surgery (Morten Tange Kristensen).

5th PMR-C research symposium, Copenhagen, Denmark. Physical activity and exercise to enhance recovery from acute abdominal surgery (Line Rokkedal Jønsson).

5th PMR-C research symposium, Copenhagen, Denmark. Enhanced treatment of shoulder pain using quantification of exercise dosage (Mikkel Bek Clausen).

Symposium on design, registration and reporting of clinical research, IOC Sports Medicine Research Copenhagen. Title: Registration and reporting of clinical research (Thomas Bandholm).

National Amputee Conference – arranged by Sahva, Middelfart, Denmark. Title: Use of the One Leg Stand Test and the Basic Amputee Mobility Score (BAMS) in rehabilitation of lower limb amputee patients (Morten Tange Kristensen).

6th Fragility Fracture Network Global Congress, Malmø, Sweden (Pre congress physio day). Title: Clinical Practice Guidelines (CPG) for physical rehabilitation and outcome measures for patients with hip fracture. Providing result on review process with uncovered gaps and limitations (Jan Arnholtz Overgaard).

6th Fragility Fracture Network Global Congress, Malmø, Sweden. Title: Recommendations for physical rehabilitation and outcome measures in daily clinical practice after hip fractures (Jan Arnholtz Overgaard and Morten Tange Kristensen).

Muscle-tendon symposium, University of Southern Denmark. Title: Treatment of muscle tendon injuries – what does the newest research tell us? (Kristian Thorborg).

Hamstring symposium, La Trobe University, Melbourne, Australia. Hamstring research highlights – the Copenhagen experience! (Kristian Thorborg).

Second World Congress in Sports Physical Therapy: Optimal loading in sport. Title: Load management and injury prevention (Kristian Thorborg).

IAGG 2017 World Congress, San Francisco, USA. Title: Mobility during and after hospitalization in older medical patients: The STAND-Cph Trial (Mette Merete Pedersen).

Department of Physiotherapy, Dunedin Hospital, Dunedin, New Zealand. Title: Prehabilitation for knee OA and TKA (Rasmus Skov Husted).

School of Physiotherapy, University of Otago, Dunedin, New Zealand. Title: Coordinated conservative and surgical care of patients with end-stage knee osteoarthritis: A pragmatic approach (PhD project presentation, Rasmus Skov Husted).

IOC World Conference on prevention of injury and illness in sport, Monaco. Title: Strength and flexibility factors related to groin injury (Kristian Thorborg).

IOC World Conference on prevention of injury and illness in sport, Monaco. Title: Implementation issues in hamstring injury prevention – challenges and opportunities (Kristian Thorborg).

8. MAIN TEACHING AND COURSE ACTIVITIES

3 days of course leading, tutoring, and lecturing. PhD-course: Clinical Research in Health & Medical Sciences, PhD-program: Basic and Clinical Research in Musculoskeletal Sciences (MUSCOS), University of Copenhagen (Kristian Thorborg and Thomas Bandholm).

6 weeks of course leading, tutoring, and lecturing. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen (Kristian Thorborg).

6 weeks of tutoring and lecturing. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen (Thomas Bandholm).

6 weeks of course leading. MSc course: Rehabilitation of muscle injuries. University of Southern Denmark, Odense, Denmark (Kristian Thorborg).

Single lecture. PhD-forum, Research Unit for General Practice, Aarhus, Aalborg, Copenhagen, Odense, Aalborg, Denmark. Title: Enhancing the quality and transparency of health research (Thomas Bandholm).

Single lecture. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen. Topic: Basic exercise physiology (Thomas Bandholm).

Single lecture. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen. Topic: The "sick" joint – Arthrosis and arthritis (Kristian Thorborg).

Single lecture. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen. Topic: What is problem-based learning? (Kristian Thorborg).

Single lecture. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen. Topic: Levels of evidence (Kristian Thorborg).

Single lecture. Course: Outcome measures for occupational and physical therapist. The Capital Region of Denmark, Copenhagen, Denmark. Topic: Reliability of outcome measures (Morten Tange Kristensen).

Single lecture. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen. Topic: Outcome measures – Theory and Practice (Morten Tange Kristensen).

Single lecture. MSc-course: Physical activity. Cand.Scient.San., University of Copenhagen. Topic: Motivation and barriers for change of lifestyle: Older adults and physical activity (Mette Merete Pedersen).

Single lecture. PhD-course: Clinical Research in Health & Medical Sciences, PhD-program: Basic and Clinical Research in Musculoskeletal Sciences (MUSCOS), University of Copenhagen. Topic: Pilot and Feasibility studies (Morten Tange Kristensen).

Single lecture. PhD-course: Clinical Research in Health & Medical Sciences, PhD-program: Basic and Clinical Research in Musculoskeletal Sciences (MUSCOS), University of Copenhagen. Topic: Outcome measures (Kristian Thorborg).

Single lecture. PhD-course: Clinical Research in Health & Medical Sciences, PhD-program: Basic and Clinical Research in Musculoskeletal Sciences (MUSCOS), University of Copenhagen. Topic: Trial protocol finalization and trial registration (Thomas Bandholm).

Single lecture. MSc-course: Cand. Scient. Fys., University of Southern Denmark, Odense. Topic: Quality development, assurance and implementation (Jan Arnholtz Overgaard).

Single lecture. MSc-course: Cand. Scient. Fys., University of Southern Denmark, Odense. Topic: Epidemiology of muscle injuries (Kristian Thorborg).

Single lecture. MSc-course: Cand. Scient. Fys., University of Southern Denmark, Odense, Denmark. Topic: Hip and groin injuries (Kristian Thorborg).

9. SYMPOSIA, SEMINARS, AND WORKSHOPS

PMR-C was the organizer or co-organizer of the following in 2017:

Symposium: 5th PMR-C research symposium

The symposium marked the fifth year of PMR-C and was held at the Metropolitan University College in Copenhagen in collaboration with IOC Sports Medicine Copenhagen: Center for Injury Prevention and Protection of Athlete Health; Metropolitan University College; and Optimized Senior Patient Program, Amager-Hvidovre Hospital. Around 400 people attended the symposium entitled "Enhanced clinical recovery-programs: the effect of physical activity and exercise" (Thomas Bandholm and Kristian Thorborg).

Symposium: Design, registration and reporting of clinical research

The symposium was a scientific and social event for senior researchers affiliated with IOC Research Centre Copenhagen. Speakers included: Thomas Bandholm (PMR-C), Kristian, Thorborg (PMR-C) and Marius Henriksen (DK) (Thomas Bandholm and Kristian Thorborg).

Symposium: Annual Snekkersten Symposium

The 2-day symposium marked the end of the year for the PhD graduate program Basic and Clinical Research in Musculoskeletal and Oral Sciences (MUSCOS), University of Copenhagen. Speakers included Bente Klarlund Pedersen (DK) and Jørn Wulff Helge (DK) (Thomas Bandholm).

Oral presentation competition: Snekkersten PhD Cup

The oral presentation competition was part of the annual 2-day symposium for the PhD graduate program: Basic and Clinical Research in Musculoskeletal and Oral Sciences (MUSCOS), University of Copenhagen, held in Snekkersten, Denmark. The 5 best rated abstracts were presented using a "how simple can you go-format" with 3 minutes to present and without any audiovisuals. Invited judges were: Thea Feveile Sejr (DK), Bente Klarlund Pedersen (DK), and Peter Schwarz (DK) (Michael Kjær and Thomas Bandholm).

Oral presentation competition: Danish Sports Medicine Congress

The oral presentation competition was part of the annual Danish Sports Medicine Congress (#sportskongres) in Copenhagen, Denmark. The 6 best rated international conference abstracts were presented, and formed a competition symposium. Invited judges were: Karim Khan (Editor-in-chief, Br J Sports Med), Bruce Reider (Editor-in-chief, Am J Sports Med), and Jon Karlsson (Editor-in-chief, Knee Surg Sports Traumatol Arthrosc) (Thomas Bandholm and Kristian Thorborg).

Symposium: Blood-flow resisted exercise in rehabilitation

The symposium was part of the annual Danish Sports Medicine Congress (#sportskongres) in Copenhagen, Denmark. Invited speakers included: Jeremy Loenneke (US), Per Aagaard (DK), and Hans Christian Heitkamp (GER) (Thomas Bandholm).

Workshop: How to do blood-flow restricted exercise?

The workshop was part of the annual Danish Sports Medicine Congress (#sportskongres) in Copenhagen, Denmark. Invited speaker was Jeremy Loenneke (US) (Thomas Bandholm).

Workshop: Future of tendon imaging in sports medicine: Novel imaging modalities for tendinopathy in athletes

The workshop was part of the annual Danish Sports Medicine Congress (#sportskongres) in Copenhagen, Denmark. Invited speakers were Jarrod Antflick (UK) and Lorenzo Masci (AU) (Kristian Thorborg).

1-day workshop: Fragility Fracture Network Physiotherapy Group: 2017 Pre-Congress Workshop

The workshop was a pre-congress physio day held before the 6th Fragility Fracture Network Global Congress, Malmö, Sweden. It focused at guidelines for; falls and fragility fracture prevention; interventions and outcome measures following hip fracture; optimizing physical function following vertebral fractures, and update of the worldwide survey of acute hospital physical therapy following hip fracture (Morten Tange Kristensen).

10. CONGRESSES

PMR-C helped organize the following congresses in 2017:

Danish Sports Medicine Congress (#sportskongres) 2017, Copenhagen, Denmark. Chairman of the scientific committee: Kristian Thorborg.

Danish Sports Medicine Congress (#sportskongres) 2017, Copenhagen, Denmark. Scientific board member: Thomas Bandholm.

14th Scandinavian Congress of Medicine & Science in Sports (#sportskongres) 2018, Copenhagen, Denmark. Chairman of the scientific committee: Thomas Bandholm (Ongoing work).

14th Scandinavian Congress of Medicine & Science in Sports (#sportskongres) 2018, Copenhagen, Denmark. Scientific board member: Kristian Thorborg (Ongoing work).

Danish Physical Therapy Congress 2018, Odense, Denmark. Scientific board member: Thomas Bandholm (Ongoing work).

The 6th Fragility Fracture Network Global Congress 2017, Malmö, Sweden. Local Organizing committee member: Morten Tange Kristensen.

11. ACADEMIC EVALUATION

Assessment of theses: PhD evaluation committee member, Leeds Beckett University, Leeds, United Kingdom (Kristian Thorborg).

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

Ad-hoc peer-review work: Acta Orthop, Arch Phys Med Rehabil, Eur J Phys Rehabil Med (Morten Tange Kristensen and Thomas Bandholm).

Assessment of applications for study entry: Member of the admission committee for the MSc education in Health Sciences, University of Copenhagen (Thomas Bandholm).

12. ADVISORY OR OTHER BOARD-WORK

Board member, Board for the PhD-graduate program: Basic and Clinical Research in Musculoskeletal and Oral Sciences (MUSCOS), University of Copenhagen (Thomas Bandholm).

Steering committee member, the National Database of Geriatrics (Mette Merete Pedersen).

Board member, Board of research, Amager-Hvidovre Hospital (Thomas Bandholm).

Executive committee member, Board of research, Amager-Hvidovre Hospital (Thomas Bandholm).

Executive board member, The International Federation in Sports Physical Therapy (Kristian Thorborg).

Evaluation committee member, the Johannes Lindhart Prize and the Ove Bøje Prize. Danish Societies for Sports Medicine and Danish Sports Physiotherapists (Kristian Thorborg and Thomas Bandholm).

Advisory board member, IOC Diploma in Sports Physical Therapies (Kristian Thorborg).

Steering committee member, IOC Sports Medicine Copenhagen: Center for Injury Prevention and Protection of Athlete Health (Thomas Bandholm and Kristian Thorborg).

Steering committee member, Clinical evidence and guidance in sports physiotherapy-catalogues. Danish Society for Sports Physiotherapists (Thomas Bandholm, Kristian Thorborg and Rasmus Skov Husted).

Board member, Board for education and courses offered under the Danish Society for Sports Physiotherapists. Responsible for implementation of new educational structure for Danish Sports Physiotherapists from 2013 (40 ECTS) (Kristian Thorborg).

Board member, Board of education, University College Metropol, Copenhagen (Kristian Thorborg).

Invited board member, Sports Surgery Clinic Research Retreat, Dublin (Kristian Thorborg).

Working group member, working group for the development of Clinical Practice Guidelines for the physical therapy-management of persons with fragility fracture of the hip. A collaboration between the Academy of Geriatric Physical Therapy and the Orthopaedic Section of the American Physical Therapy Association, US (Morten Tange Kristensen and Jan Arnholtz Overgaard).

Steering committee member, The Nationwide Danish Multidisciplinary Hip Fracture Database (Morten Tange Kristensen).

Expert group member, National expert group for improving quality of hip fracture treatment in Denmark (Morten Tange Kristensen and Jan Arnholtz Overgaard).

Advisory board member, National clinical guidelines developed by the Danish Health Authorities (Morten Tange Kristensen).