

International PhD Course, University of Southern Denmark, November 2017

ASSESSMENT AND EVALUATION OF HUMAN MUSCLE, NERVOUS SYSTEM AND TENDON-APONEUROSIS FUNCTION IN SPORTS SCIENCE, CLINICAL SCIENCE AND AGING

Course content: This PhD course will present and discuss various measuring methods and data related to the assessment of maximal muscle strength/power of human skeletal muscle, including explosive muscle strength (RFD) and maximal muscle power. Also, relevant methods to evaluate neuromuscular function in athletes, elderly and patients will be presented and discussed. Likewise, methods to assess muscle morphology, fibertype composition and MHC distribution will be presented, along with a number of cellular and molecular analysis methods including measurements of mRNA expression, satellite cell activation/proliferation and compartmental glycogen localization/depletion. Various methods to assess tendon-aponeurosis function in vivo from the macro level to the molecular level will also be presented and discussed. Finally, various types of biomechanical analysis to evaluate knee-injured patients (athletes, non-athletes) also will be presented.

Presentations and discussions typically will address specific types of interventions (i.e. training, injury, immobilization) in relation to relevant clinical aspects and subject groups (i.e. athletes, patients, old adults, very old). Half a day will be allocated for presentation and discussion of participants' own study projects (optional).

Topics: muscle mechanical function, neuronal function, muscle morphology and architecture, tendon and aponeurosis function in vivo, regulation of tendon collagen synthesis in overload injury and rehabilitation, myofibre growth and atrophy, molecular signalling mechanisms involved in the regulation of human skeletal muscle mass, myogenic satellite cells, glycogen deposition and utilization, aging and sarcopenia, functional capacity in ADL, immobilization and disuse, physical assessment and training in patients with chronic diseases (neck and shoulder muscle pain, myalgia, stroke, COPD), tendinopathy and recurrent muscle strain injury, prevention and rehabilitation of non-contact ACL injury, evaluation of biomechanical and neuromuscular function in orthopaedic patients (meniscectomy, ACL reconstruction), physiological testing of elite athletes, adaptive aspects of exercise: from athletes to patients.

Time: Monday 6th to Saturday 11th of November, 2017

Course points: 6 ECTS

Venue: Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark, Campusvej 55, 5230 Odense, Denmark

International PhD Course

Assessment and evaluation of human muscle, nervous system and tendon-aponeurosis function in sports science, clinical science and aging

November 6-11th 2017, University of Southern Denmark

TENTATIVE PROGRAMME

Assessment of mechanical muscle function in vivo

Per Aagaard: Assessment and evaluation of mechanical muscle function in vivo - paradigms and applications from elite sports to patient rehabilitation

Adaptive plasticity in human skeletal muscle with exercise

Jesper L. Andersen: Assessment and evaluation of muscle morphology, fibertype composition and MHC isoform distribution - paradigms and applications.

Cellular muscle adaptation - signalling pathways and muscle growth

Peter Schjerling: Assessment and evaluation of molecular mechanisms related to myofiber growth – signalling pathways, growth factors, growth inhibitors, effects of exercise

From macroscopic muscle architecture to single fiber contractility

Olivier Seynnes: Assessment of skeletal muscle architecture in vivo – adaptive changes induced by exercise and disuse

Lars Hvid: Contractility of isolated single myofibers – influence of training and disuse in young and old adults

Human tendon and aponeurosis function in vivo

Peter Magnusson: Assessment and evaluation of muscle tendon and aponeurosis function in vivo - paradigms and applications.

Jens Bojsen-Møller: Muscle use and force transduction in vivo evaluated by imaging techniques (PET, MRI, US) - evidence of non-uniform tendon force transmission

Cellular signaling effects with contrasting exercise modalities

Lars Holm: Resistance exercise intensity: effects on muscle protein turnover and related cellular signaling, muscle growth, and optimization with protein supplementation.

Kristian Vissing: The Akt–AMPK switch mechanism - Antagonistic cellular signaling with resistance exercise vs. endurance exercise

Molecular and cellular aspects related to tendon adaptation in vivo

Katja Heinemeier: How do tendons adapt to exercise? Possible roles of species, growth factors and tissue turnover rates

Skeletal muscle glycogen and fatigue resistance

Joachim Nielsen: Subcellular glycogen localization in skeletal muscle - assessment techniques, regulation, role in cellular fatigue, effects of exercise aging and disuse

Assessment and evaluation of neuronal function in vivo - paradigms and applications.

Per Aagaard: Use of surface EMG recording and evoked H-reflex responses to evaluate neuromuscular function – adaptations elicited by resistance training

Jesper Lundbye-Jensen: Use of transcranial magnetic stimulation and neuroimaging methods to evaluate the effect of disuse and exercise on human neuromotor function

Myogenic satellite cells

Fawzi Kadi: Regulation of myonuclear number in human skeletal muscle - role of satellite cells and effects of exercise, relationships to 'muscle memory'

Abigail Mackey: Activating satellite cells in humans: mechanical and pharmacological stimuli

Muscle atrophy and regrowth with disuse/disease and reloading

Charlotte Suetta: Molecular mechanisms and treatment options for muscle atrophy and muscle wasting with disuse and disease – age related aspects

Ulrik Frandsen: Molecular factors and mechanisms related to apoptosis – effects of disuse, aging and exercise

Evaluation of neuromechanical function in orthopaedic patients

Anders Holsgaard-Larsen: Subjective and objective outcome measures of functional knee joint performance in ACL-reconstructed patients - Implications for rehabilitation and return to sport

Jonas Thorlund: Patient reported outcomes and muscle function following meniscal surgery

Muscle, sarcopenia, neuromuscular function and training in the elderly

Jesper L. Andersen: Changes in muscle morphology and fibertype composition with aging – effects of resistance training, adaptive responses in the very old

Per Aagaard: Neuromuscular and sarcopenic changes with advanced aging – use of exercise as a countermeasure, exercise in the hospitalized elderly

Paolo Caserotti: Changes in body composition with aging, impact on function, and reversibility with training

Use of resistance exercise in clinical patients

Lars L. Andersen: Muscle function in clinical patients – effects of exercise in myalgia and stroke patients, influence on ADL function and movement performance

Injury rehabilitation and prevention in human muscle, tendon and ligaments

Tine Alkjær: Biomechanical analysis of walking, forward lunging and isolated maximum knee extension in patients with ACL deficiency

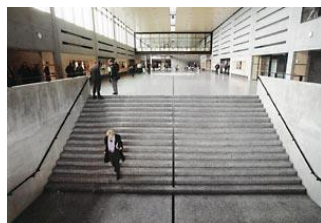
Mette Zebis: Neuromuscular screening for non-contact ACL injury, Effects of evidence-based prevention training on neuromuscular and biomechanical risk factors for ACL injury

Per Aagaard: Prevention and rehabilitation of musculo-tendinous overuse injury by use of exercise – biomechanical and neuromuscular aspects

Project presentations by participants

Course Participants own projects - Presentations by participants

For more information please contact Prof. Per Aagaard (paagaard@health.sdu.dk)



Odense International PhD course – November 2017

Invited Speakers

Fawzi Kadi, Associate Professor MD PhD
School of Health and Medical Sciences, Division of Sport Sciences, Örebro University, Örebro,
Sweden

Peter Magnusson, Professor PhD
Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg University Hospital, University of
Copenhagen

Olivier Seynnes, Professor PhD,
Norwegian School of Sports Science (NIH), Oslo, Norge

Bojsen-Møller, Associate Professor PhD,
Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark

Jesper L. Andersen, Associate Professor PhD,
Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg University Hospital, University of
Copenhagen

Peter Schjerling, Associate Professor PhD,
Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg University Hospital, University of
Copenhagen

Charlotte Suetta, Associate Professor MD PhD,
Dept Clinical Physiology and Nuclear Medicine, Glostrup University Hospital, University of
Copenhagen

Kristian Vissing, Associate Professor PhD,
Section of Sports Science, University of Aarhus

Paolo Caserotti, Associate Professor PhD,
Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark

Abigail Mackey, Associate Professor PhD,
Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg University Hospital, University of
Copenhagen

Mette Zebis, Associate Professor PhD,
Metropol University College, Copenhagen

Tine Alkjær, Associate Professor PhD,
Department of Neuroscience & Pharmacology, University of Copenhagen, Copenhagen

Jonas Thorlund, Associate Professor PhD,
Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark

Anders Holsgaard-Larsen, Associate Professor PhD,
Department of Orthopaedic Surgery, Odense University Hospital, University of Southern Denmark

Lars L. Andersen, Professor PhD,
National Research Centre for the Working Environment (NFA), Copenhagen

Ulrik Frandsen, Associate Professor PhD,
Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark

Jesper Lundbye-Jensen, Associate Professor PhD,
Department of Neuroscience & Pharmacology, University of Copenhagen, Copenhagen

Katja Heinemeier, Associate Professor PhD,
Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg University Hospital, University of
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Lars Holm, Associate Professor PhD,
Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg University Hospital, University of
Copenhagen

Joachim Nielsen, Associate Professor PhD,
Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark

Lars Hvid, Associate Professor PhD,
Section of Sports Science, University of Aarhus

Per Aagaard, Professor PhD,
Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark