

## Research Area: Musculoskeletal Diseases



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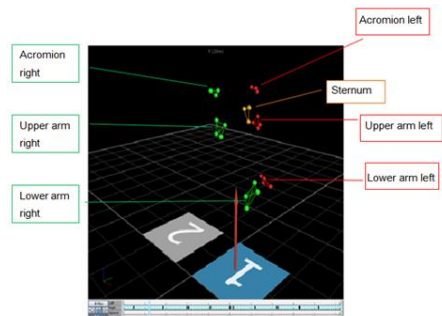
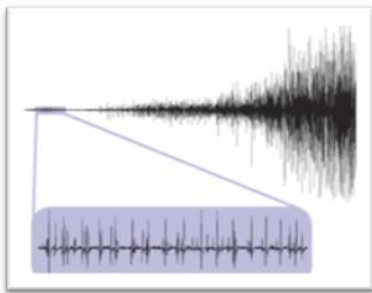
### ***Context***

Seventy five percent of the population experience pain problems of musculoskeletal origin in her/his life. Because of demographic changes and an augmented sedentary lifestyle, an increase of musculoskeletal problems is ongoing, and is often accompanied with other comorbidities. In this context, the cluster “Musculoskeletal Rehabilitation” collaborates with other clusters within **REVAL Rehabilitation Research Center**, namely with the cluster CRI (Prof. Dr. B. Op ’t Eijnde, Prof. Dr. D. Hansen) and with the cluster neurology (Prof. Dr. P. Feys). Musculoskeletal diseases are responsible for 50% of work absenteeism. Research into musculoskeletal diseases is of great societal importance.

## Research Activities

### **Expertise of the musculoskeletal research group pertains to:**

- sport-related tissue damage and repair mechanisms
- technology supported rehabilitation (robotic systems, sensor systems, apps), such as: evaluation of training concepts in combination with technology, the study of underlying working mechanisms, technology as evaluation tool for motor control and treatment progress
- the supervision and evaluation of high intensity training in musculoskeletal diseases
- the evaluation of movement- and muscle activation patterns for the optimisation of a diagnosis, a prognosis, and of treatment strategies



- investigation into muscle contractile properties, into morphological properties (type, satellite cell proliferation,...), and into metabolic activities (inflammatory markers and muscle enzymes) of skeletal muscles (on muscle and muscle fiber level) during and after interventions



### **Methods and techniques:**

Following research methods are used: Accelerometry/IMU (inertial measurement unit), 3D movement registration, electromyography, muscle biopsies (immunohistochemistry), in vitro muscle activation (static and dynamic), dynamometry (BIODEX), cardiorespiratory fitness (Jaeger, Oxycon),

body composition (DEXA scan), blood analyses (inflammatory parameters and muscle enzymes). For the expertise with regard to high intensity training and the evaluation of cardiorespiratory profiles a collaboration is ongoing with the cardiorespiratory research team (Prof. B. Op 't Eijnde, Prof. D. Hansen) and with the sport medical advice institute ADLON (Prof. B. Op 't Eijnde).



### ***Valorisation and service delivery:***

The research expertise in technology supported rehabilitation is valorized via the expertise center assistive technology. Evaluations on activity-/ participation level and courses/advice on technology use for therapists and their patients are offered in a service delivery context. Furthermore there is a close collaboration with companies. For companies, we can offer our expertise with regard to scientific clinical evaluations of technology in a rehabilitation context, we can give advice for system development according to state of the art rehabilitation insights, and we can contribute to the development of quality labels for products. In this way, economic valorization is stimulated.

### ***Collaborations:***

The research group Musculoskeletal Research collaborates with a number of regional, national, and international partners from care institutions, companies, and universities. Regionally we collaborate with: the Mobile Health Unit (Universiteit Hasselt, Dr. Valerie Storms & Dr. Lars Grieten), Expertise centre Digital Media (Universiteit Hasselt, Prof. K. Coninx & Prof. M. Haesen), Jessa Hospital (Dr. G. Claes & Dr. X. Huybrechts), Ziekenhuis Oost Limburg (Dr. A. Van Goethem), IMOB (Universiteit Hasselt, Prof. D. Janssens, Dr. A. Neven). Nationally a collaboration is ongoing with Katholieke Universiteit Leuven (Prof. I. Jonkers, Prof. S. Brumagne), Universite de Liège, ULG (Prof. Dr. C. Demoulin), PXL (Dr. A. Spooren, Mr. S. Palmaers). Internationally a collaboration is ongoing with Eindhoven University of Technology (NL, Prof. P. Markopoulos), Maastricht University (NL, Prof. Dr. Henk Seelen, Dr. I. Huijnen), with ETH Zurich (CH, Dr. Ellen Jaspers), and with ZHAW (CH, Dr Christophe Bauer).