

Study area Rehabilitation of Cardiopulmonary and Internal Diseases (CRI)



Senior researcher

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prof. dr. Bert Op 't Eijnde (movement sciences & sports medicine)

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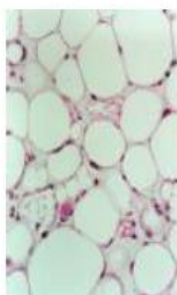
prof. dr. Paul Dendale (rehabilitation medicine & cardiology)

Postdoctoral researchers

dr. Inez Wens (biomedical sciences & neurology)

Background

Our current society experiences an increasing prevalence of chronic internal diseases such as obesity, type 2 diabetes, cardiovascular disease, chronic obstructive pulmonary disease, and cancer. The increase in prevalence of these diseases is often the direct consequence of physical inactivity and an unhealthy lifestyle, but also of sedentarism due to neurologic and/or orthopedic disease. In this context the CRI research cluster of the **REVAL Rehabilitation Research Center** frequently cooperates with investigators from the neurological (prof. dr. Peter Feys) and musculoskeletal (prof. dr. Frank Vandennebeele, prof. dr. Annick Timmermans, dr. Pieter Van Noten) research groups. These chronic internal diseases lead to substantial healthcare costs, a shorter life expectancy and/or lower quality of life. Therefore, research programs that lead to enhanced prevention, care and treatment of these internal diseases is of great significance to our current society.



Research activities

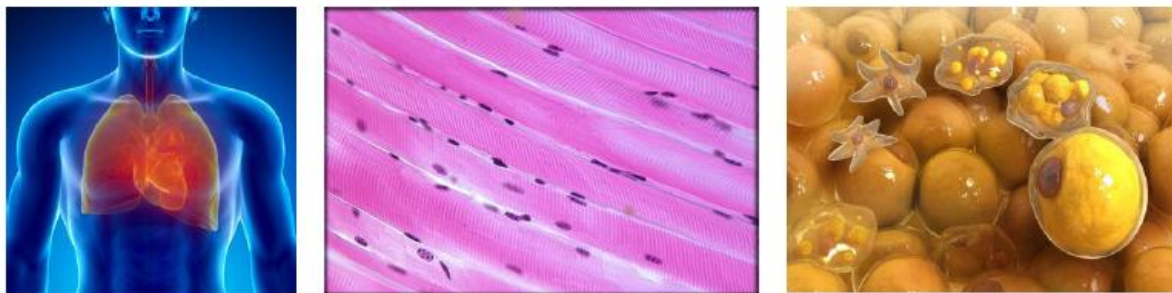
The CRI research cluster of the **REVAL Rehabilitation Research Center** focusses on (i) further optimization of exercise training interventions and rehabilitation programs for the above-mentioned diseases and on (ii) the underlying mechanisms that contribute to the therapeutic effects of exercise training interventions and rehabilitation program on a broad range of internal diseases.

(i) Optimization of exercise training interventions and rehabilitation programs. The CRI research cluster examines the impact of different forms of rehabilitation and exercise training interventions on functional capacity (exercise tolerance, contractile characteristics of skeletal muscles, body composition, metabolism, etc.) in subjects with the above-mentioned diseases. For this attempt high-intensity interval training (HIT), endurance and/or strength training, muscle electrostimulation, sometimes with manipulation of substrate selection (exercise training in fasted state, supplementation of carbohydrates, dietary restrictions), but also rehabilitation on distance (tele-rehabilitation) is implemented. The goal of these studies is to determine which type of exercise training intervention leads to the greatest clinical and molecular benefits in patients with chronic internal diseases.



(ii) Underlying mechanisms. Next to reporting the general effects of the above-mentioned interventions, the CRI research cluster examines the clinical and molecular underlying mechanisms leading to such effects. In the CRI research cluster metabolic/endocrine (adipocyte physiology, glycemic control, insulin sensitivity, endocrine hormones), cardiopulmonary (cardiac and pulmonary function), and muscular (muscle cell physiology and muscle fiber type composition) adaptations are of central interest. For this reason, CRI studies are very often a combination of clinical and molecular examinations.

The CRI research cluster is often financially supported by FWO, IWT, MS Liga, INTERREG, TRANSCEND, H2020, Koning Boudewijnstichting, gifts (legates) and from Hasselt University (internal grants, BOF grants).



Operational methods and techniques

In the CRI research cluster the following examination techniques and methods are operational:

- °endurance and strength training facilities (Technogym®)
- °endurance training facilities for laboratory animals
- °skeletal muscle biopsies (Bergström procedure) and associated molecular study methods, such as study of muscle fiber type composition, angiogenesis, satellite cells
- °subcutaneous fat biopsies (with in vitro examination of lipolysis and membrane receptors) and subcutaneous fat micro dialysis
- °echocardiography and electrocardiography
- °ergospirometry, VO₂ kinetics tests (Jaeger Oxycon®), metabolic flexibility tests
- °spirometry

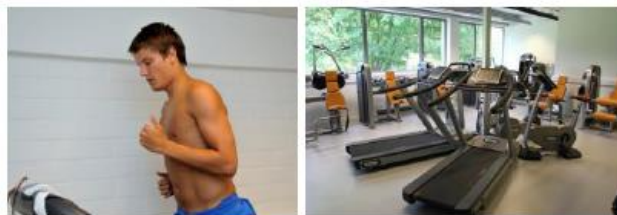
- °cardiovascular autonomic regulation studies
- °examination of basal metabolism (Jaeger Oxycon®)
- °Study of glycemic control and insulin sensitivity by: oral glucose tolerance test (Analog®), euglycemic hyperinsulinemic clamp test, and fasted blood samples
- °immunologic markers (cytokines)
- °dual x-ray absorptiometry scan (GE Hologic DEXA scan®) and skinfold thickness measurements (Harpenden®)
- °Isometric and isokinetic muscle strength tests (BIODEX®)

Next to these measurements, animal models for chronic heart failure (Dahl high salt model), obesity/diabetes (cafeteria & high fat feeding), and multiple sclerosis (EAE model) are operational. Hereby the pathophysiology of the above-mentioned diseases, but also the impact of exercise training intervention (on metabolic, cardiac, skeletal muscle cell, and immunologic function), can be studied in greater detail.



Services

Next to scientific research the CRI research cluster provides various services. This includes a fully operational sports medical screening center (ADLON, www.adlon.be) where amateur and professional athletes can undergo a medical screening (clinical examination, exercise tolerance, body composition, muscle strength, blood analysis, podology), and receive nutritional advice and/or psychological support or mental coaching. In addition, members of the CRI research cluster provide many lectures on national and international conferences and symposia, but also for industry and companies. On a regular basis educational classes are organized in Hasselt University or externally by these members as well.



Collaboration

The CRI research cluster closely collaborates with many other laboratories, universities and researchers, such as Rehabilitation & MS Center at Overpelt (Prof. Dr. Bart Van Wijmeersch), M2S vzw (Paul Van Asch), FWO research community (prof. dr. Piet Stinissen), Expertise Center for Digital Media (EDM, prof. dr. Karin Coninx), Institute for Mobility (IMOB, Prof. dr. Geert Wets), CIRO Rehabilitation center at Hornerheide (The Netherlands, prof. dr. Martijn Spruit), BioBank Limburg (prof. dr. Jean-Luc Rummens, dr. Loes Linsen), Laboratory for Experimental Hematology of Antwerp University (dr. Nathalie Cools), Ghent University (prof. dr. Patrick Calders, prof. dr. Wim Derave), Maastricht University (The Netherlands, NUTRIM, prof. dr. Luc Van Loon, prof. dr. Ellen Blaak, prof. dr.

Mathijs Hesselink, prof. dr. Kenneth Meijer, prof. dr. Hans Savelberg), the Sport Sciences Institute of Aarhus University (Denmark, prof. dr. Ulrik Dalgas) and Heart Centre Hasselt.