

Research field

Neurological and Geriatric Rehabilitation Sciences



Senior researchers

- Prof. Dr. Peter Feys (coordination, applied neurological examination)
<http://www.ncbi.nlm.nih.gov/pubmed/?term=Peter+feys>
- Prof. Dr. Raf Mac (basic neurological exam)
<http://www.ncbi.nlm.nih.gov/pubmed/?term=Raf+meesen>
- Prof. Dr. Bart Villegas
<http://www.ncbi.nlm.nih.gov/pubmed/?term=Bart+van+wijmeersch>

Postdoctoral researchers

Dr. Ilse Baert
Dr. Koen Cuypers
Dr. Ilse Lamers
Dr. Joke Spildooren

Research background

In today's society, more and more people get older, causing a rise in the prevalence of neurological disorders. For some disorders, such as multiple sclerosis (MS) and strokes, rehabilitation is a cornerstone of the treatment, in addition to the purely medical follow-up. Through optimal rehabilitation, people with MS or stroke, for example, are able to return to the home situation. Although it is widely known that movement and exercise is important in neurological populations, there are still plenty of questions unanswered. In the clinical field, for example, there continues to be uncertainty about the selection and interpretation of the appropriate outcome measures, the interference between cognition and motor skills, specific symptoms as motor fatigue, the effect of specific active exercises for upper and lower limb (task oriented versus function based) on the functioning in the everyday life and neuroplasticity, the effect of brain stimulation on the recovery, the value of virtual learning environments and technology in supporting the rehabilitation and so on. On the other hand, questions remain on the underlying causes of recovery or improvement in daily life activities. With the study of the neurophysiological mechanisms of certain rehabilitation techniques, an answer could be found.

The prevalence of BPPV (benign paroxysmal vertigo position), MCI (mild cognitive impairment) and problems with falling in elderly, also increases with the ageing of the population. BPPV is a non-cancerous degenerative disorder of the semi-circular canals of the vestibular system with vertigo. The actual prevalence of vertigo is estimated on 1/3^e of the elderly, but the influence of vertigo on falling is only limited investigated. Furthermore, the therapy adherence in falling elderly is often too low, making rehabilitation methods and a multidisciplinary approach insufficient effective. Current scientific research usually studies motivated healthy elderly people without cognitive problems. This creates a non-realistic picture of the impaired elderly. The geriatric researchers in this research group would therefore like to explore the high age group with cognitive impairment, which is undoubtedly a population becoming an important group in the ageing population.



Research activities

The senior researchers developed expertise in the field of neurological rehabilitation in patients with MS, but also in people with other neurological disorders, such as Parkinson's disease or stroke.

Researchers led by Prof. Dr. Feys focus mainly on the clinical applied research, to improve the evaluation and clinical treatment of patients with neurological disorders, for example by the use of rehabilitation technology (I-travle, <http://i-travle.tumblr.com>).

Prof. Dr. Meesen and his team try to unravel the underlying mechanisms of rehabilitation of neurological patients with the use of transcranial magnetic stimulation and applying direct current stimulation or inhibition on the skull. Further, work is related to improve and expand the expertise in the field of neuro-imaging.

Within REVAL, there are collaborations with other clusters on themes of rehabilitation technology, training, motion analysis of shoulder and arm movements, motor learning and qualitative research.

Prof. Dr. Van Wijmeersch is the supervisor of clinical trials and is actively involved in both immunological, neurophysiological and rehabilitation research.

Dr. Spildooren focuses on the rehabilitation of the elderly. In a first research track she evaluates patient therapy compliance in falling elderly and how health care providers can improve the compliance. Secondly, the prevalence of BPPV in nursing homes will be studied, as well as the possible underlying link with falling prevalence. Finally, with the use of virtual reality, the influence of cognitive double tasks training on balance, gait and cognition will be examined in the very elderly with MCI (mild cognitive impairment).

Operational methods and techniques

There is expertise in various areas within the research group neurological rehabilitation.

Clinical research

Objective and subjective assessment instruments for both the upper and the lower limb

The use of custom made sensors for motor learning processes.

The evaluation of falling

Clinical evaluation of BPPV

Neurophysiological research

Transcranial Magnetic Stimulation (TMS)

Medical imaging (MRI)

Neuro Navigation (Brainsight)

Stimulation using direct current ((tDCS), TENS) and alternating current (tACS, tRNS)

Surface Electromyography

Motion analysis

The registration of daily activities, using accelerometers as Actigraph and Withings

The registration of balance and gait patterns with different portable measurement set-ups (Gaitrite, APDM)

The registration of eye movements using BlueGain EOG

Registration of multi-limbs coordination

Technology in rehabilitation

The use of technology (Haptic Master, Hydra Razer, TagTrainer Symbio therapy, Diego Tyromotion) for the rehabilitation of the upper limb.

The use of BioRescue (virtual reality) for the rehabilitation in the elderly and double task training.



Consultancy

The members of the research group present regularly at numerous international and national conferences or for pharmaceutical companies in MS. Further, they assist various initiatives to promote moving in individuals with MS and to increase the independence of elderly people living at home. They also provide workshops for clinicians. (www.movetosport.be, national congress in geriatrics). Prof. dr. P. Feys is the current president of RIMS, the European network for rehabilitation in MS (www.eurims.org).

Cooperation

The research group works closely together with several other research groups for the development of virtual learning environments for rehabilitation robotics and clinically targeted use of sensors, including the Expertise Centre for Digital Media (Prof. Karin Campbell) and the Institute for materials research (Prof. Michael Daenen and Prof. Ronald Thoelen). The research group has several national and international collaborations, for example with ETH Zurich (Prof. Nicole Wenderoth, Prof. Roger Gassert and Olivier Lambercy), Georg-August University of Göttingen (Prof. Michael Nitsche) the Catholic University of Leuven (Prof. Stephan Swinnen), University Hospitals of Leuven (Prof. Dr. Johan Faisal, Prof. Dr. Koen Madin), IMOB (Prof. Tom Banat), the knowledge centre Adelante in Hoensbroeck (Prof. Henk Seelen), Aarhus University (Prof. Ulrik Dalgas), University of St-Louis (Joanne Wagner), Plymouth University (Prof. Jonathan Marsden) and other.

The research group closely collaborates with clinical centres such as the Flemish MS centers in Overpelt (RMSC), melsbroek (NMSC) and Brasschaat (The Mick) and rehabilitation centers in Lanaken and Herk-de-Stad. There is also cooperation with the Flemish MS League.