

POTENTIAL OF MOBILE MONITORING OF PHYSICAL ACTIVITY TO IMPROVE HUMAN HEALTH:

RESULTS OF AN INTERNATIONAL EXPERT PANEL WORKSHOP

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Introduction

Physical activity is an outcome parameter for measuring the efficacy of treatment/rehabilitation, as well as often being a therapy in its own right [4].

There are almost no standardized ways for prescribing and controlling either the dosing or the effects of the PA treatment [6].

We conducted an international expert panel meeting to evaluate the usefulness of various telemedicine devices to monitor physical activity.

The following diseases and health conditions with a known relationship to PA were discussed:

- MS
- Parkinson's disease
- Obesity/Diabetes
- Osteoporosis
- Dementia
- Cardiovascular Diseases
- Protheses
- Asthma
- COPD

Fig. 2: Parkinson's disease ratings represent only a snapshot of daily life mobility. Optimized monitoring of patients' mobility in clinical practice (therapy monitoring/optimization) and clinical studies necessary which represents a cross-section of daily mobility.

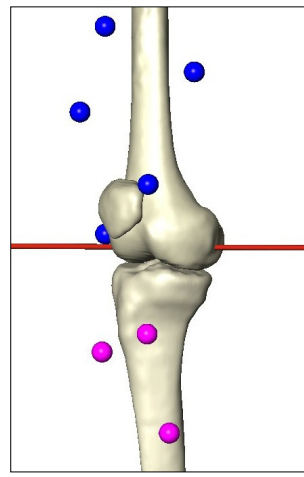
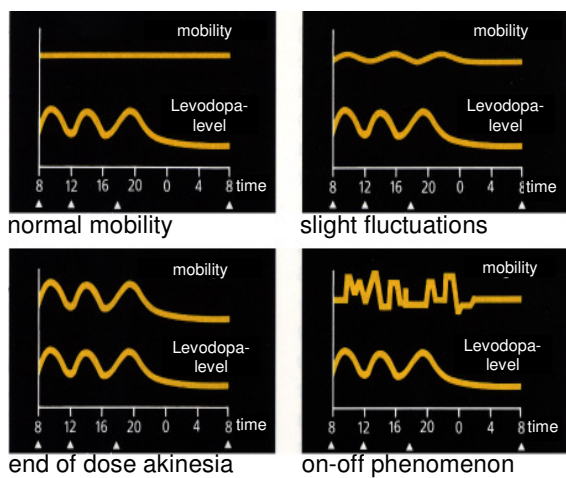


Fig. 4: The actibelt® is a belt with a high-tech buckle carrying a 3D-acceleration sensor to continuously, unobtrusively monitor long-term physical activity in the course of daily life. [1]

Fig. 3: PA as treatment and outcome measure for Osteoporosis in the FP7 Project "The Osteoporotic Virtual Physiological Human (VPHOP)" which aims to develop a modelling technology based on conventional diagnostic imaging methods, other clinical and lifestyle data and information that makes it possible to predict for each patient the strength of his/her bones.

Parameter	Relative Changes in %:			
	Pat1	Pat2	Pat3	Mean
Speed	56,4	484,7	79	206,7
Step Length	53	315,1	252,9	207
Duration of turning around	-55,4	-89,6	-90	-78,3

Tab 1: Experiment with the actibelt® and 3 parkinson's disease patients: Relative changes in speed, step length and duration of turning around from off- to on-phases.



Fig. 5: PA as treatment and outcome measure with Protheses: New BCBS Policy effective May 15, 2007: Microprocessor Prosthetic Knees are "Medically Necessary" for qualified transfemoral amputees" [6].

Key questions

- How should PA be measured?
- What are the most relevant aspects of PA?
- Should other biosignals be coupled with PA?
- What are the roadblocks – technological, financial, psychological – preventing the increased adoption of PA as therapy and outcome for chronic disease?
- What are key projects?

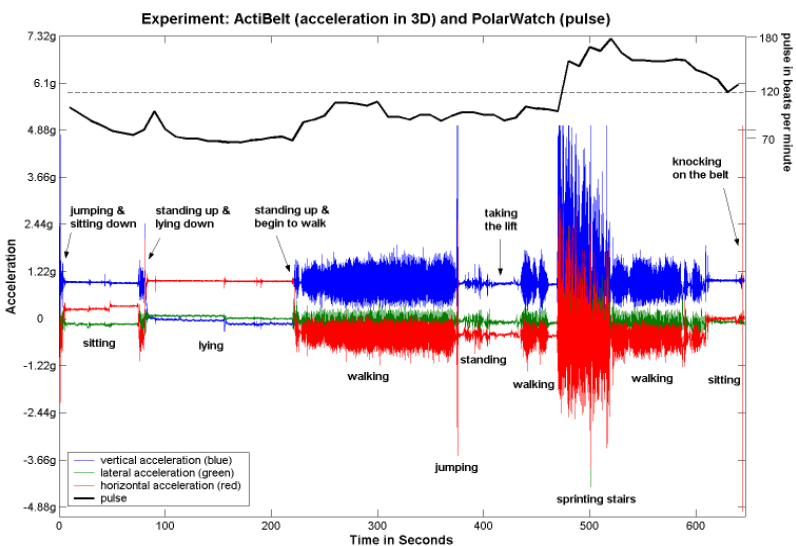


Fig. 6: 3D acceleration data measured with the actibelt® and heart rate measured with a POLAR watch as preliminary work for the NETSIM FP7 project which connects acceleration data and ECG.

Results/Conclusions

There exists a serious problem in monitoring the long-term evolution of disability – an essential element for assessing the long-term effect of drug treatments e. g. in MS and Parkinson's disease. An unobtrusive, easy-to-use system like the actibelt® could improve outcome assessments. Additional biosignals could give further information.

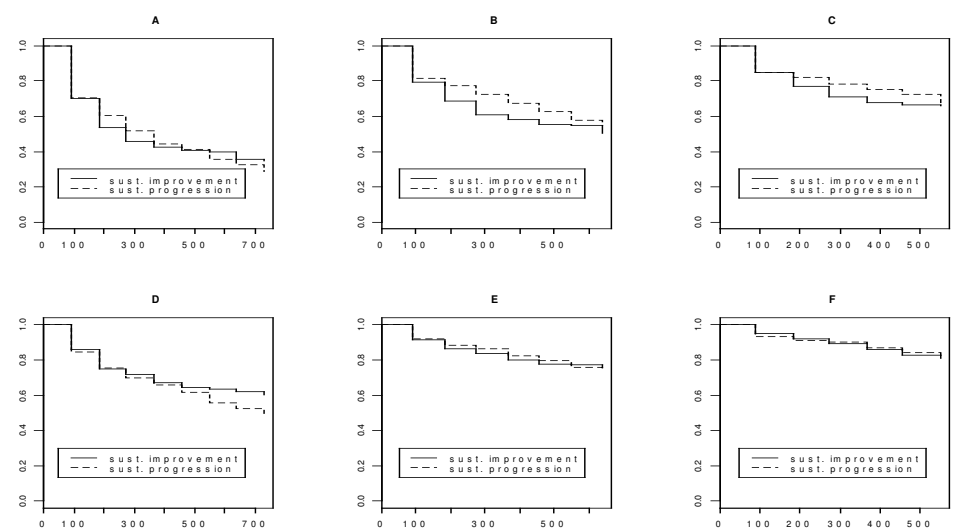


Fig. 7: Comparison of sustained improvement and sustained progression of Multiple Sclerosis RR patients. In relapsing-remitting MS examination of widely used definitions of treatment failure demonstrated that disability progression was no more likely than similarly defined improvement. Clinical surrogates of unremitting disability used in trials of relapsing-remitting MS cannot be validated. [5]

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