

# Technically Assisted Rehabilitation TAR – an Overview

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Innovative technological devices offer promising therapeutic approaches for numerous applications in rehabilitation. In several contexts they are essential for achieving the goal of reintegrating people into their professional, social and family life after an accident or a serious disease. For various reasons, the significance of these technical solutions will grow more and more in the future. The ageing societies in all industrialised countries will lead to an increasing demand while, unfortunately, the growing number of so-called civilisation diseases will also result in an increase in the number of patients in need of effective rehabilitation. In addition, as a consequence of new developments, the solutions themselves will become even better so that they may be applied in more and new indications.

- **Musculoskeletal System**

Diseases of the musculoskeletal system are widespread, and for several reasons the number of patients is even expected to increase in future. Innovative assistive technologies such as robotics or prosthetics may improve the patient's situation in an effective and sustainable manner. For example, intelligent endo- and exo-protheses; hybrid prostheses based on functional electrical stimulation and innovative fluid actors to support patients suffering from neuroparalysis; and rehabilitation robotics for stroke therapy will be presented and discussed under this heading.

- **Vision**

For a long time there were only slim therapeutic and rehabilitation chances for people with vision impairment, in particular for those with disturbances of the retina – e.g. macular degeneration – and its function. Recent years have seen impressive developments in this field. Retina implants and other technical solutions for an artificial accommodation system, power supplies for implants,

and durability of implants are upcoming topics in the focus of interest.

- **Audition**

Not only due to demographic change, the number of people with a hearing impairment is growing. Young people, for example, have an increased risk of developing hearing disturbances owing to their lifestyle. There are innovative technologies to treat patients suffering from hearing impairments, and implantable devices have been improved remarkably within the last few years.

- **Central Nervous System**

Diseases and disturbances of the brain have very different causes and also lead to completely different symptoms. Nevertheless, many of them can be influenced by a treatment based on innovative rehabilitation technologies. Thus the functional magnetic stimulation of specific neuronal areas is in therapeutic use with patients with hemipareses; mechatronic implants improve liquor drainage in cases of hydrocephalus. There are many more technical devices for therapy and rehabilitation of affections of the central nervous system the presentation of which will be welcome at this conference.

Besides disease-oriented topics, the following cross-sectional topics are also of great relevance for Technically Assisted Rehabilitation:

- **Ambient Assisted Living**

The needs of an ageing society are addressed by intelligent ICT devices that help people to live independently in their own surroundings. The ambient assisted living concept aims to support healthy people and people with health-related limitations to increase their autonomy and to carry out their daily life activities. In this context, it is strongly connected to ICT-based rehabilitation technologies such as tele-rehabilitation.

- **Tele-rehabilitation**

Neurological rehabilitation - in particular after a stroke - often takes too long to keep patients in hospital until it is finished. On the other hand, effective neurological rehabilitation depends on regular exercises under qualified instruction. Tele-rehabilitation concepts are a very promising approach to close this gap and are shown to be effective with regard to patients' recovery and costs.

- **Business Models**

Even the most innovative rehabilitation concept is useless without a business model to back it up. In this track, we will discuss appropriate business models (private, public, insurance-based) in the context of different health care systems.

## Microsystems are one of the main key technologies for TAR

Referring to a study of the Federal German Ministry of Education and Research (BMBF) in 2005, three main

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trends are important in the field of Medical Technology: computerisation, miniaturisation and molecularisation. All three trends have already a great influence on Technically Assisted Rehabilitation. For example, Functional Electrical Stimulation (FES) – so-called neuroprostheses – is able to restore, with the use of electrical impulses, lost control, motor or sensory functions of the body. Necessary for a physiological stimulation are miniaturised sensors, actors, multi-channel electrodes, fast data collecting and processing and an intelligent closed-loop system. In the case of implantable devices, biocompatible coating especially for the interface tissue/technology is necessary. Sensors also play an important role for gait rehabilitation robots. Even the sizes of those robotic systems are mostly very big (see HapticWalker in the article by H. Schmidt and R. Riener) force or acceleration sensors help to simulate the experienced

hand of the therapist in the patient-machine interaction.

**TAR 2009 - 2<sup>nd</sup> European Conference on March 18 - 19, 2009, in Berlin**

TAR 2009 ([www.tar-conference.eu](http://www.tar-conference.eu)) will bring together experts from a broad range of disciplines and institutions working on Technically Assisted Rehabilitation. Berlin, the Health City, is an adequate platform for this meeting, offering an inspiring research-driven climate for all health topics. The focus of TAR 2009 will be on diseases and disturbances of the musculoskeletal system, vision, hearing, and the brain. Interdisciplinary and cross-sectional topics will also be addressed as well as Ambient Assisted Living and tele-rehabilitation, which are closely linked to the TAR focus. Next year's conference will, for the first time, consider business models for the integration of these innovative procedures into health care systems. Subsequent to

the TAR Conference, the German AutoMed Conference will take place on March 20-21, 2009, at the same venue ([www.automed2009.de](http://www.automed2009.de))

Please note: The deadline for the call for papers TAR 2009 is October 15, 2008.

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