1 to 1.5×. The time of double appui increases by 15% for the median (extremities 3 to 18% vs. controls 5% to 11%). The highest difficulties of the patient and the therapist are observed in the turning process and when turning around a corner. This is consistent with clinical observation. When compared to the normals (3 to 11%), the percentage of patients who experienced difficulties was higher (15%). It is noticeable that the effects of motor disabilities are limited to the quadriceps femoris and the hamstrings. The patient's ability to control movements was used in a virtual environment to assess the patient's ability to move independently. The results show that the ISIDORE simulator for electric wheelchair navigation can be used to evaluate the patient's ability to move independently. Further reading


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Rapid development of assistive technologies for quadriplegics

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Keywords: Disability; Human machine interface; Technical aids. Technical aids enable many quadriplegics to perform tasks that they could not do otherwise: read their emails, change TV channel, etc. According to Laffont (2008), the ability to control its environment is crucial to the quality of rehabilitation and family. Other works (Pino, 2000; Verdonck, 2009) studied the significance of the uses of assistive technologies by persons with tetraplegia. Five major categories were identified as: autonomy, freedom, security, time for oneself and relationships with others. This work suggests that these aids should be seen as a "fundamental human right" and reaffirm the need to work with users. Nevertheless, there is a large proportion of technical aids on the market that little or no use. This low acceptance rate is due to several reasons summarized by Philips (1993) and Scherer (1996): lack of attention in the selection of aid, difficulty in obtaining aid, performance and change needs of the patient.
The recent development of technologies at a very low cost (either hardware devices like android, teensy, raspberry ft, or software tools), the public’s enthusiasm for the “DIY” (Do It Yourself – Do It Yourself own) (Hurst, 2011) and dissemination of knowledge in human-computer interaction (HCI) show that it is possible to design “customized and personalized” assistive technologies. Moreover, empowering disabled users with development of such aids may improve the adoption and diffusion of these technologies.

In HCI, one of the goals of rapid prototyping is to test a number of innovative solutions that can be useful to users. The feedback process can then be used for example to guide further developments. We believe that this process is adequate to design useful systems for deficiencies. We illustrate this process through an experiment conducted for the design and the implementation of assistive technologies for quadriplegics.

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Nanostructured flexible implantable microelectrodes for stimulation and recording neural activity
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Many people severely disabled following a stroke or a lesion of the spinal cord, remain totally immobilized. In most severe cases, as in the case of locked-in syndrome (LIS), patients are completely deprived of means of communication and action, while their cognitive abilities are preserved. BCI devices, based on functional connections between brain and machine, are employed to direct a cursor on a computer screen in order to use software, to type text... The new assistance systems are based evidently on knowledge of brain functioning but also on the design of adapted machines (robots, computers, etc.). The physical interface between the brain and the system, composed usually by implantable microelectrodes, is a third fundamental element of the device whose properties directly affect the quality of the recording and stimulation.

Currently, whatever the kind of employed microelectrodes, two critical aspects very disadvantageous for long-term implementations concern the lifetime of electrodes, not exceeding a few months after implantation in general, and their biocompatibility with a high rejection rate for many implants. Our work combines the surface nanostructuring of electrodes and the use of flexible substrates promoting intimate contact electrode-neurons. These complementary approaches favor the growth and adhesion of neuronal cells [1]. The modification of the electrode by electrochemical deposition of conducting polymers (PEDOT) results in an increase of electrode lifetime/composed usually by implantable microelectrodes, is a third fundamental element of the device whose properties directly affect the quality of the recording and stimulation.

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Reference

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Proposed method to assess walking aids in the elderly with observation and simple timing parameters
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Keywords: Geriatric physical medicine; Preclinical stage; Robuwalker; AAL DOMEO; ANR/CNSA

Smart walking aids with robotics, adapting to the person and the environment, are most relevant for walking difficulties in the elderly (adding motor, visual, cognitive, hearing impairments...). Such devices don’t cope with the French refunding agreement scheme. A trial-based medicotechnical evaluation is required, prior to medical-trials, to check that the device, used by the volunteer, provides the expected service.

Method.-- Four healthy aged volunteers (H) and 4 patients (P) with walking (v < 1 m/s, Timed Get Up & Go > 15s) and cognitive (MMSE < 26) impairment had 3 tries at 4 M straight-line walk (4 M) then modified TUG (including going round the chair before seating again) with their usual way (U), then a regular walker (S), then Robuwalker (rW) motorized automat with command buttons on the handles, tests were filmed by a single camera.

Results.-- In both H and P: there is no big difference on 4 M between U and S, with rW time is more increased in the healthy subjects (X5 to 10 vs. 2 to 3). One patient failed using the interface even during 4 M. Steps average duration is increasing 1.8 to 3× between S and rW, for H, vs. 1 to 1.5× for P. The duration of double contact is increasing in H with a median of 15% (extremes 3 to 18%) vs. only 5% (3 to 11%) in P. Some P and H failed to turn smoothly in front of the wall with rW or to use it to stand.

Discussion.-- Increased duration of tasks and steps in H are a clue of a lesser benefit for them in terms of stability. The trend towards an increased proportion of double contact could mean a push of healthy subjects against rW (fixed max speed). This fits with the variations of trunk to vertical and to the shoulder-wrist axis as clinically observed. The failure of two patients, the difficulties at turns and to stand with rW imply a human robot interface (HRI) problem. We propose that the speed should adapt to the user and the HRI be improved.

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Communications affichées

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Prise en charge multidisciplinaire d’un cas complexe de positionnement
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Mots clés : Positionnement au fauteuil ; Multidisciplinaire ; Déficiences multiples ; Subluxation hanche

Introduction.– La démarche de positionnement est le processus clinique visant à placer une personne ayant des troubles posturaux, dans une posture requise au moyen d’une aide technique à la posture. La complexité de certaines situations cliniques associant des déficiences multiples, des limitations d’activité variables et devant être maintenues ainsi que la prise en compte de l’environnement, impose des stratégies multidisciplinaires structurées dont voici un exemple.

Observation.– Une patiente de 20 ans présentant un syndrome cérébelleux bilatéral avec dystonies à type de myotonies prédominant au membre supérieur droit et hémiparésie gauche suite à l’exérèse d’un astrocytome pylocitique du cervelet est adressée. La principale doléance était l’apparition de douleurs de hanche gauche au fauteuil, limitant la capacité de transfert et de propulsion podale du fauteuil.

En position assise, on observait une rotation droite du bassin de plus de 25°, pas d’abordéquité de bassin, un membre inférieur gauche plus court en rotation interne et en abduction. En décubitus dorsal : limitation de la flexion de hanche gauche à 60° avec une spasticité des adducteurs cotée à 3 (Ashworth). Les radiographies