Efficacy of the Power Balance™ bracelet to improve balance and flexibility: A randomized controlled trial
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Keywords: Balance; Flexibility; Sport performance

Objective.– The Power Balance™ bracelet is a “product conceived by athletes for athletes whose intention is to optimize the sports performances. Power Balance™ gains an enormous success at the top athletes for whom the balance, the strength and the flexibility are very important”. The aim of our study is to estimate the efficacy of the Power Balance™ bracelet to improve balance and flexibility.

Patients.– Thirty adults healthy adults, from 20 to 50 years old.

Material and method.– We conducted a double-blind randomized controlled study. The Power Balance (PB) group used a bracelet acquired from an approved retailer. The control group used an identical bracelet without holograms. The presence or the absence of holograms was masked.

The subjects of every group underwent an evaluation of the balance by a stabilometric analysis (SETEL platform) and an evaluation of flexibility (distance finger-ground) with and without the bracelet. A second randomization was made in each group for the order of performing the evaluations with and without bracelet.

Results/Conclusion.– The analysis of the results is in progress. The preliminary results are in favour of an improvement of the performances of balance and flexibility with the bracelet in both groups, without significant difference between the groups PB and control. These results are in favour of an efficiency of the bracelet related to its placebo effect.


Brain–computer interface: New approaches for disability
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Keywords: Paralysis; Brain–computer interface

Paralysis has many causes including trauma, stroke, infection, and autoimmune diseases. The primary damage can be manifested in the brain, spinal cord, spinal nerves, or the muscles themselves. Over the past years, most research devoted to paralysis has involved cell biology approaches (i.e. embryonic stem cells). Although such approaches represent the ultimate cure hope for paralysis, effective application is still now limited due to the number of breakthroughs that are required. However near-term solutions are possible. Technology could help to restore motor function in impaired patients. Brain–computer interfaces and virtual reality devices are systems that can be used for patients in order to provide or supplement sensory motor functions that have been lost. Brain–computer interfaces rely on the translation of neural volitional signals into control signals for external devices. In a similar way, different researches have demonstrated that motor imagery can be used to promote post-injury training in patients with stroke. Motor Imagery has become paradigmatic in the study of the relation between cognition and action because of its crucial role in motor planning and execution. MI refers to ability to mentally rehearse functional movements without executing movements. In this short lecture, emergent applications using these various techniques will be presented and discussed in relation to extensive functional and structural plasticity of the cerebral cortex. The interaction with physical medicine and rehabilitation will be discussed.


Rehabilitation robotics: The role of the exoskeleton
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The Canadian recommendations [1] conclude that there is a high level of evidence that the sensorimotor training provided by robots improves upper limb function and motor function at elbow and shoulder level. There is also a high level of evidence that robotic devices do not improve the motility of the wrist and hand. The grip is fairly taken into account at the present time by the robotic for the upper limb while the transport function is widely favored. The type of existing robots is essentially manipulendums: The handle is caught upon installation of the patient and is transported into the space. Suspension systems associated with a virtual environment such as NeReBot [2] provide a comprehensive work without assistance in handling. The design of these manipulendums robots extracted the problem of joint centers of rotation and seeks to control the end effector (hand). Conversely exoskeletons attempt to control each robot joint, and try to prove that this type of control has a better result. In their motorized version, not yet commercialized, the principle is to adjust the controls on each axis by an actuator through a global algorithm for joint coordination. The robot Armee® is a non-motorized upper limb exoskeleton designed on the basis of the robot T-Wrex [3]. One randomized controlled trial (RCT) has evaluated its effectiveness after stroke in the chronic phase. Comparatively, 13 RCTs were conducted on the robot In Motion (manipulendum), its only commercial competitor. Among the RCTs done with robots subacute phase of stroke, all but one showed an improvement of the transport function of the upper limb in the treated groups. Thus a place for this type of care may exist in rehabilitation process subject to the same effectiveness of exoskeletons.

References

Interest of automatic motivity involvement in hemiplegic patients rehabilitation
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Keywords: Automatic motivity; Hemiplegia; Rehabilitation

Introduction.– Many patients present gripping disability after a stroke. Most of conventional rehabilitation techniques are based on intentional motivity and repetitive exercises. The main objective consists in comparing the effects on the recovery of gripping ability of a rehabilitation program carrying out automatic motivity with the usual rehabilitation program.

Methods.– We conducted a prospective randomised, single-blind clinical trial. We compared 2 groups of 5 patients with hemiplegia, at least 6 weeks after a vascular brain injury:
– a group of patients participated in a rehabilitation program including exercises of aiming a mobile target on a motorised table. Moreover, patients continued their usual rehabilitation program;
– the control group had a rehabilitation program including exercises of aiming an immobile target on the same table as the other group. Moreover, patients continued their usual rehabilitation program.

Evaluations were carried out before the start, immediately at the end of the rehabilitation program, then after 2 weeks. The main scale was the Fugl-Meyer
motor scale. Other validated scales were used like the motor activity log or the frencay arm test. In addition, we used a system of 3D movement analysis in order to study the effects of the rehabilitation program on the reorganisation of the motor control.

Results.– The score on the Fugl-Meyer motor scale was improved so as in the other tests. We noted an improvement of the Fugl-Meyer score of 14% in the group which benefited of the rehabilitation program carrying out automatic motivity whereas the improvement of the Fugl-Meyer score was 5% in the control group.

Discussion.– It seems that the stimulation of the automatic motivity leads to an improvement of the gripping ability of the patient with hemiplegia. An explanation may lie in the decrease of attentional abilities attract. We can make the hypothesis that stimulating automatic motivity could increase the activation of sensory-motor loops during action or stimulate the recovery of automatic components of action regulation.

This is a preliminary result. This trial has to be continued for 2 years in order to include 32 hemiplegic patients so as to improve the statistical power of the results.


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Pressure ulcer prevention in spinal cord injury subjects using the TexiSense pressure sensing textile

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Keywords: Pressure ulcers; Pressure sensor; Prevention; Biomechanical modeling

Goals.– A pressure ulcer is an ischemic skin lesion stemming from a persistent compression of the soft tissues between a hard surface and bony prominences. This complication is particularly harmful for the spinal cord injury subjects due to sensorial and motor deficiencies but also to the associated vegetative paralysis. Unlike an able-bodied subject, the spinal cord injured person seated in his or her wheelchair does not automatically change position when overpressures occur. Pressure ulcer prevention is essential to avoid the functional, psychological and social consequences, as well as important economical effects (major and costly)

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Aim.– Current use of FIM in France.

Material.– Questionnaire on the SOFMER website for French PMR practitioner.

Questions are about: (1) daily use of the FIM in facilities, (2) its use in patient files, (3) training users, (4) interpretation of results, (5) medico-economic consequences, (6) assessment of the care burden, (7) patients’ follow-up, (8) clinical research, (9) language tool between professionals, (10) potential interest in the constitution of a French national database. A last question would consist in the criticisms of the FIM tool in order to cancel it and replace it by a brand new one.

The results will be explained on the Sofmer Meeting in Nantes. Since the FIM was inserted in France 20 years ago [1], it has been given the status of Gold Standard. Most of MPR teams use it as a tool of interdisciplinary communication to refer to the independence of disabled people and the burden of care. Yet, an international copyright owned by UDMSR in Buffalo (US) curtails scientific publications.

Discussion.– The Federative Institute of Research on Disability suggests to develop a national data base based on information collected by PMR teams/facilities using the FIM. Its aim is to create the first part of a platform of tools for clinical assessment, to be used by PMR and social professionals (comparative data based on groups of patients and pathologies... [2]) and to enable international collaborations.

Conclusion.– A consensual tool of the functional independence and of care burden is essential to interdisciplinary communication, in the field and for clinical research. Will the FIM succeed in it?

References


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Participation assessment according to ICF: Preliminary results of the assessment grid of activity and participation (G-MAP)


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Keywords: ICF; Participation; Assessment; Traumatic brain injury; Schizophrenia

Community participation is a major challenge for most disabled patients. However, current assessments of participation lack a theoretical base, making assessment problematic. The ICF taxonomy (WHO, 2000) of activity limitation and participation restriction provides an interesting framework.

Aims.– The present study aims at developing a new, ICF-derived assessment tool of participation restriction in two populations suffering from psychic or cognitive disability: schizophrenia and traumatic brain injury.

Methods.– Items have been selected from international literature, clinicians and proxy opinions. A