

from chronic pain, suggestive of a postural deficiency syndrome (PDS), also have VH. A prospective random study [2] showed that VH treatment usually restored VO and that this recovery was associated with clear-cut diminution of pain, assessed using a subjective visual analog scale, normalization of clinical balance tests, and improved mobility of spinal and peripheral joints. When VO recovery requires bite modification, an occlusion dysfunction is likely. If VH persists, manipulation of the reflexed tendons of the obliques superior muscles achieves pain relief, normalization of balance tests, and improved spinal and joint mobility. Thus, during the course of PDS, any input dysfunction must be evaluated as a function of its relationship to a set of dysfunctions, for which it may be a cause or consequence, but that, we are unable to predict.

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20.24 A new appraisal of the biomechanics of gait for improved rehabilitation outcomes

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Biomechanical analyses (eg1) have provided detailed information about joint excursions, forces and powers occurring through the gait cycle. Interpretation of this information has overlooked the moment in time when the foot first makes contact with the ground to begin the gait cycle [1,2]. Initial contact provides one of the most complex challenges of locomotion. At this time the body must cope with the re-introduction of ground reaction force (G.R.F.) to the leading limb. The impact of the G.R.F. would be to cause flexion and abduction at the hip and extension at the knee(2) yet kinematic data (1) show us that the hip is extending and adducting and that the knee is flexing at initial contact. Kinetic data (1) reveal that the body overcomes these impact moments using concentric muscle torques at the knee and hip. Only after the retarding forces of impact have been overcome do we see the body able to employ eccentric work allowing energy to be stored in the muscles of propulsion. Intervention based on this appraisal of gait biomechanics can better target key muscle groups for training as well as suggest means by which the impaired individual can overcome the retarding forces associated with initial contact allowing the body to utilise its normal energy saving mechanisms.

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20.25 Balance rehabilitation with movable platform vers us exercises: a crossover study

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Introduction: Efficacy of movable platform (P) and exercises (E) treatment on balance rehabilitation has been assessed in patients with disorders due to sensory, vestibular or cerebellar disease.

Methods: Thirty-two patients entered the program in a cross-over design. Sixteen patients underwent P, then E treatment (group P-E). The others underwent the reverse protocol (group E-P). During P, patients balanced on a sinusoidally oscillating platform

(antero-posteriorly, A-P and latero-laterally in separate trials) in two visual conditions. During E, balance exercises (specific for the disease) were administered by a physical therapist. Both treatments were administered for 1 week, 1 h daily. Balance evaluations were performed before treatment (t0), after the first (t1) and the second treatment cycle (t2). At each time, we recorded body sway under quiet stance, subjective evaluation of stability, head oscillation during A-P oscillation of the platform, Tinetti Balance Performance-Oriented Mobility scores.

Results and Discussion: At t1, stabilometry, subjective stability and Tinetti scores improved to a similar extent in both treatment groups. At t2, a further improvement occurred in both groups. Therefore, balance control is continuously improved during the two-week treatments, irrespectively of the sequence. Head stability on the movable platform improved at t1 in P-E group, but at t2 in E-P group. The specific effect of P treatment on balance measured by means of the mobile-platform is confirmed (learning to exploit sensory inputs and anticipatory postural adjustments since the perturbations are predictable). On the other hand, this result rules out a placebo effect of treatment on stability.

20.26 Custom made dynamic foot orthoses: an investigation into their effect on balance and gait in people with multiple sclerosis

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Introduction: Despite clinical use of dynamic foot orthoses (DFOs) there is little good evidence of their efficacy in assisting gait and balance in Multiple Sclerosis (MS).

Methods: Seventeen ambulant people with MS (median EDSS=3.5) were compared to ten healthy control subjects on initial receipt of the insoles and 4 weeks later. Subjects stood with their feet on separate force plates (Kistler, Switzerland). The effect of the DFOs, vision and stance width were compared. The root mean square (RMS) movement of the centre of pressure (CoP) and a marker at C7 (CODAmotion, UK) were measured over 20 seconds. The MS walking scale (MSWS-12) and 10 m timed walk assessed changes in gait. Results were analysed using a repeated measures ANOVA and Wilcoxon matched pairs test as appropriate.

Results: In both groups, the DFOs produced a medial and posterior shift of the mean CoP position under each foot and a significant increase in CoP [F(2,17)=9.8, P<0.005] and C7 RMS [F(2,17)=5.8, P<0.05] on initial and repeat measurement. Romberg's quotient was significantly reduced [F(1,16)=10.6, p<0.005] in the MS group when assessed 4 weeks later and there was an improvement in the MSWS-12 (Z=-2.3; p<0.05), in contrast no change was seen over time in the control group. Gait speed remained unchanged in both groups.

Discussion and Conclusion: The foam construction of the DFOs could account for the increase in CoP and C7 RMS; however, the decrease in the destabilising effect of vision over time may indicate a training effect.

20.28 Stabilometric evaluation of the effects of auriculotherapy on postural control. Double blind randomized study

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Introduction: The AA wanted to verify with normalized stabilometry (Amplifon Svp model) the effects of Auriculotherapy upon the postural control of the subject. After a long experimentation, specific auricular points were identified, for postural rebalancing, ATPS method [1].

Methods: 2 groups of patients suffering with muscular skeletal pains, in chronic phase, were subdivided randomly in 2 groups. group A, 150 patients evaluated with stabilometry before and after postural

Auriculotherapy. group B, 150 patients evaluated with stabilometry before and after administration of a placebo.

Results: The research has evidenced statistically significant differences between group A and group B.

Discussion and Conclusion: The stabilometric evaluation has confirmed what had been shown clinically: Auriculotherapy following the ATPS method is capable of modifying the postural control of the subject. Auriculotherapy seems thus capable of producing a disruption, mostly immediate, in that complex system of dysfunctional postural compensations and adaptations, with normalization of the musculofascial tensions, thus facilitating the re-elaboration of the bodily scheme.

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20.29 Training of balance under single and dual task conditions in older adults with balance impairment: three case reports

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Introduction: Traditionally, rehabilitation programs emphasize training balance under single task conditions to help the elderly improve balance control and reduce the risk of falling. The purpose of this study is to describe the effects of three approaches to training balance in older adults with balance impairment.

Methods: Three participants with similar balance characteristics were randomly assigned to one of three treatment interventions, including 1) balance training under single task conditions; 2) training under dual task conditions using a fixed-priority instructional set (FP); and 3) training under dual task conditions using a variable-priority instructional set (VP).

Results: Only participants who received balance training under dual task conditions showed dual task training benefits and this benefit was maintained for at least 3 months. In addition, only the participant who received VP training showed improvement on novel dual tasks.

Discussion and Conclusion: The elderly may be able to learn to improve their balance performance under dual task conditions only following specific types of training. This study answers the important clinical question of how this intervention might be combined with more traditional physical therapy programs.

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20.30 The second side of fes – it is not only a prosthesis of function but also direct function recovery tool

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At present time, the FES systems are used mainly only as assistive devices or prosthesis of motion management system CNS. Central Prosthesis Institute in Moscow, Russia, continued research into using FES as primary rehabilitation tool for the last 30 years. A number of experimental works were dedicated to neurophysiological aspects of influence of electrical impulses on human muscles [1]. The effectiveness of methods was examined experimentally and improved at the next stage according to the achieved results. The practical usage of FES in Russia is also different from that abroad. Instead of stimulating nerves, as done abroad, Russian researchers prefer to stimulate body of muscles. The second difference is the contingent of

patients. These are not only patients with hemiplegia or spastic spinal-cord-injured subjects, but also different orthopedic and neurological patients with normal CNS or almost saved peripheral nervous system. This practice includes lower extremity prosthetic patients, low back pain and scoliosis patients, patients with consequences of poliomyelitis, cerebral palsy, stroke, occlusive diseases of arteries of lower extremity. The FES method proved to be good for all kinds of above described pathologies [1]. The neurophysiological and biomechanical investigations of the FES treatment results show the global effect of the FES therapy [2,3]. One of the main results is reprogramming the muscle automatic program in the walking cycle. This effect stays for a period from half a year to a year or longer, depending on the disease.

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20.31 Do gait impairment correlates with strength reduction in ambulatory patients with multiple sclerosis?

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Introduction: A prospective analysis of gait and strength parameters was performed in 100 patients diagnosed with MS and pyramidal involvement to assess the correlation between strength and gait impairments.

Methods: The patients were divided into two groups based on their ability to walk in daily life (non-assisted or cane-assisted gait) and into four clinical subgroups depending on associated involvements such as sensory loss or cerebellar ataxia. Twenty healthy subjects were studied as a control group. Gait parameters were evaluated with a locometer and muscle strength with an isokinetic dynamometer.

Results: The average velocity and strength of the hamstring and quadriceps were strongly correlated and reduced in the MS group in comparison with the control, and in the cane-assisted group compared with the non-assisted group. Gait velocity tended to be more correlated to hamstring strength in the non-assisted group with a determination coefficient (r^2) reaching a value of 0.44 in the sensory subgroup.

Discussion and Conclusion: These findings provide evidence that a correlation between strength reduction and gait impairment is obvious whichever clinical form in patients with MS but may change depending on the disability level and the clinical form. This could be taken into account in the individual assessment of further rehabilitation programs.

20.32 Tai chi practitioners have better standing balance control after vestibular stimulation than healthy elderly

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Introduction: This study was launched to examine whether older Tai Chi practitioners had developed better standing balance control after vestibular stimulation than healthy age-, gender-, height- and physical-activity-level-matched subjects.

Methods: Tai Chi and control subjects ($N = 24$ each, aged $69.3 \pm SD 5.0$ years and 71.6 ± 6.1 years, respectively) stood on a force platform with their eyes closed before and after stimulation of their horizontal