

magnetic resonance imaging (fMRI) was used to determine the directional regional brain activities during RSCPD vs. RSCAE for antagonist resistive static contraction. *Materials and Methods:* Each antagonist resistance exercise (RSCAE vs. RSCPD) on the right side of the pelvis in a left side-lying position was performed for 30 sec in fMRI to investigate the different areas of brain activation. The effects of order were controlled by randomly assigning the resistive static contraction approach among eighteen normal subjects. Each subject resisted the traction force, which was 5% of the subject's weight, applied by the corset without movement to induce RSCPD or RSCAE. Region of interest (ROI) based measurements of the percent signal change were examined during RSCPD or RSCAE. Two-way ANOVA was used to determine the exercise and region of brain effects on the difference in percent signal change. *Results:* The ROI were identified, corresponding to sensorimotor areas (SMC), basal ganglia, inula, thalamus, anterior and posterior cerebellum, and the supplementary motor area (SMA), based on the group random effect analysis, to compare the percentage signal change. ANOVA revealed a significant main effect for exercise and the region of the brain. The percent signal change showed a significant increase during RSCAE ($F(1, 238)=5.001, p=0.026$) in the left hemisphere. However, there was no region of brain effect in the left hemisphere ($F(6, 238)=0.831, p=0.547$). By contrast, the percent signal change in the right hemisphere showed a non-significant exercise effect ($F(1, 204)=0.186, p=0.667$). However, a region of brain effect was observed in the right hemisphere ($F(5, 204)=2.306, p=0.046$). *Conclusion:* Non-specific brain areas in the right hemisphere with RSCAE showed significant changes of signal intensity during RSCAE. Significant direction-dependent activation was observed between the antagonist resistive static contractions.

PC1128

Repetitive Sensory Stimulation in Neurorehabilitation

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The limited outcome of standard rehabilitation methods has fostered the development of additional and alternative approaches that could supplement, enhance, or even replace conventional training procedures. Recent research has demonstrated that human sensorimotor learning can be effectively acquired by an approach complementary to training, in which the learning is driven by mere exposure to repetitive sensory stimulation protocols - rSS (Beste, Dinse 2013). Numerous studies employing rSS in healthy young adults and elderly individuals demonstrated substantial improvements of tactile, haptic and sensorimotor performance parallel to cortical reorganization (Dinse et al., 2011). We here summarize findings from several studies in subacute or chronic patient groups suffering from brain injury or stroke affecting the upper extremities. rSS consisted of intermittent high-frequency electrical stimulation, applied 45 min/day, 5 days a week for 2 weeks (subacute patients) or several months (chronic patients), and was transmitted using custom-made stimulation-gloves with in-built electrodes (tip stim®). For the healthy and the affected limb we broadly assessed various aspects of sensory, sensorimotor, motor and proprioceptive functions including every day tasks (JTHF). In subacute stroke patients, rSS improved not only sensory performance (touch threshold and acuity), but similarly sensorimotor (e.g. dexterity), proprioceptive and motor performance (e.g. grip force). According to a recently completed randomised, sham-controlled trial, a combination of standard therapy with rSS over 2 weeks results in a greater recovery of sensory, motor and proprioceptive function as compared to standard therapy alone. In chronic patients suffering from brain injury, comparable broad-range positive effects emerged, but often after months of intervention, indicating the need for extensive treatment durations. Our data from subacute and long-term chronic patients showed that rSS induces substantial improvement of tactile and sensorimotor performance long lastingly. This effectiveness together with the advantage of usage under everyday conditions by laypeople at

their homes and the absence of significant side-effects, make repetitive sensory stimulation-based principles prime candidates for ambulant interventions in impaired populations. Beste C, Dinse HR (2013) Learning without Training. *Curr Biol* 23, R489-R499 Dinse HR, Kattenstroth JC, Gattica Tossi MA, Tegenthoff M, Kalisch T (2011) Sensory Stimulation for Augmenting Perception, Sensorimotor Behavior and Cognition. In *Augmenting Cognition*. EPFL Press, pp 11-39.

PC1129

The Ankle Plantar and Dorsal Flexion Torque While Walking with the Ankle Foot Orthosis in Healthy and Poststroke Hemiplegic Subjects

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Background: Hemiplegic patients often suffer from spastic equinus foot, and need to wear an ankle foot orthosis (AFO). If hemiplegic patients walk wearing the AFO, what force is loaded on it during a swing phase? The objectives of this study are: (1) to quantify ankle plantar flexion (PF) and dorsiflexion (DF) torque while walking with the AFO (Torque-walk); (2) to clarify the relationship between Torque-walk and PF torque against passive DF at rest (Torque-pf-rest); and (3) to find the factors which influence Torque-walk other than Torque-pf-rest. *Material and Methods:* 70 poststroke hemiplegic subjects, age of 30-70, who can walk without any assistance at least 15m, and 10 healthy subjects. We developed two devices, 'Atom-walk' and 'Atom-rest'. Atom-walk is to measure Torque-walk on a treadmill. It is attached to the AFO. While Atom-rest is to measure Torque-pf-rest. Before the tests by these devices, subjects were clinically assessed with manual muscle testing (MMT) of anterior tibial muscle (TA), modified Ashworth Scale of ankle plantar flexors and the frequencies of ankle clonus. Subjects walked on a treadmill at a self-selected speed wearing the Atom-walk attached AFO. 10 seconds were recorded after walks got stabilized. Of all the gait cycles recorded, the average minimum torque of the swing phase (Min-swing) was calculated for the main outcome measure of Torque walk. Then Torque-pf-rest was measured by Atom-rest. The ankle was passively dorsiflexed from 20° PF to 10° DF at 5°/s (slow stretch) and 90°/s (fast stretch). Angle and torque during passive DF were recorded. The torques at ankle 10° DF during slow stretch (T10-slow), fast stretch (T10-fast), and T10-gap (=T10 fast-T10 slow; velocity dependent component), were set for the parameters of Min-swing. The relationship between T10-slow and Min-swing, T10-fast and Min-swing were collated and tabulated. Furthermore, Min-swing was stratified by the MMT of TA and T10-gap. *Results:* Min-swing was more linearly related to T10-slow than T10-fast. Min-swing of the higher T10-gap group was smaller than that of the lower T10-gap group. The higher MMT score of TA, the smaller Min-swing. *Conclusion:* The AFO suppressed a velocity dependent increase of the ankle PF torque during a swing phase of a gait.

PC1130

Effect of Exercise on Quality of Sleep in Patients with Ankylosing Spondylitis

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Background: Ankylosing spondylitis (AS) is an inflammatory rheumatic disease, associated with limited mobility of the spine, sleep disturbance, and fatigue. The exercise aims are to preserve mobility and decrease sleep disorders. *Aim:* Compare the influence of an exercise program on two groups of patients with AS, home based and group based, and analyze the effect of it in sleep quality, cervical inability and Bath Index. *Methods:* One sample composed of individuals with AS, with more than 18 years, sedentary and without severe complications and comorbidities sample,

previously divided into group based, and home based, were subjected in an exercise program for 12 weeks. The Neck Disability Index (NDI) was used to assess cervical disability, Bath indices to characterize the EA and the Quality Index Pittsburgh Sleep, to evaluate the quality of sleep. **Results:** The significant improvement is observed only in the group based on the increased cervical capacity ($p=0.031$) and functional ($p=0.055$), while the quality of sleep does not show any significant result in both groups. On the other hand spine mobility was the only variable with a significant difference in intergroup evaluation. Meanwhile, the correlations were found, mainly, between the Index of Bath and the quality of sleep that showed a correlation coefficient of 0.668 and 0.896. **Conclusion:** The exercise program applied proved effective for this sample, showing improvements in almost all variables. However, it was found that the program had little impact on sleep quality in these individuals. **References:** 1) Aissaoui, N., Rostom, S., Hakkou, J., Berrada Ghziouel, K., Bahiri, R., Abouqal, R., & Hajjaj-Hassouni, N. (2012). Fatigue in patients with ankylosing spondylitis: prevalence and relationships with disease-specific variables, psychological status, and sleep disturbance. *Rheumatology International*, 32(7), 2117-2124. 2) Batmaz, I., Sariyildiz, M. A., Dilek, B., Bez, Y., Karakoc, M., & Cevik, R. (2013). Sleep quality and associated factors in ankylosing spondylitis: relationship with disease parameters, psychological status and quality of life. *Rheumatol Int*, 33(4), 1039-1045. 3) Jiang, Y., Yang, M., Wu, H., Song, H., Zhan, F., Liu, S., Gu, J. (2014). The relationship between disease activity measured by the BASDAI and psychological status, stressful life events, and sleep quality in ankylosing spondylitis. *Clin Rheumatol*.

PC1131

Influence of Exercise on Functional Capacity and in the Lumbar and Thoracic Disability in Ankylosing Spondylitis

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Background: Ankylosing Spondylitis (AS) is a chronic inflammatory disease, associated to spine mobility limitations. Until today it isn't known an efficient treatment; although, there are therapeutic strategies, like exercise, that can alleviate and delay the disease complications. **Aim(s):** Measure the influence of an exercise programme in the lumbar and thoracic incapacity and function, in AS patients. **Methods:** Quasi-experimental study, a sample with 16AS patients, divided into group-based ($n=9$) and home-based ($n=7$). After the initial evaluation, who contemplates Bath indexes, Oswestry index on disability, version 2.0, cytometry and the Six-minute Walking Test (6MWT), the participants were subjected to a 12 weeks programme of exercise, supervised or not, according to the group, and, posteriorly, the final evaluation was conducted. **Results:** Between groups its verified slight improvements, but without statistical significance ($p<0.005$). In intra-group comparison, the group-based presents significant results in all variables, with exception to Bath Ankylosing Spondylitis Metrology Index (BASMI) and Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), the same doesn't happen with the home-based who only presents significant results in 6MWT. In intra-group comparison in the second evaluation moment, it's verified significant values in BASMI ($p=0.009$) and cytometry, in the level of the xiphoid line ($p=0.023$). **Conclusion:** The accomplished exercise programme seems to induce positively both groups, however it isn't possible to determinate which group is better. **References:** 1) Berdal, G., Halvorsen, S., Van Der Heijde, D., Mowe, M., & Dagfinrud, H. (2012). Restrictive pulmonary function is more prevalent in patients with ankylosing spondylitis than in matched population controls and is associated with impaired spinal mobility: a comparative study. *Arthritis Res Ther*, 14(1), R19. doi: 10.1186/ar3699. 2) Cho, H., Kim, T., Kim, T. H., Lee, S., & Lee, K. H. (2013). Spinal mobility, vertebral squaring, pulmonary function, pain, fatigue, and quality of life in patients

with ankylosing spondylitis. *Ann Rehabil Med*, 37(5), 675-682. doi: 10.5535/arm.2013.37.5.675. for spasticity. That risk is augmented in patients receiving anticoagulation therapy. In the absence of national or international guidelines, physician approaches to injecting patients on anticoagulant therapy may be variable. The purpose of this study was to compare physician preferences and attitudes for controlling bleeding risk during BoNTA injections in 3 countries in distinct geographic regions of the world: Canada, South Korea and Turkey. **Material and Methods:** A prospective cross-sectional questionnaire was sent to clinicians treating spasticity across Canada, South Korea and Turkey with variable range of experience with BoNTA injections. The questionnaires were translated into Korean and Turkish languages. **Results:** A total of 250 clinicians participated in the questionnaire (70 Canada, 100 South Korea, 80 Turkey). Physicians checked patients' INR before injecting 44% of the time in Canada, 69% in South Korea and 93% in Turkey. Physician preference for injections with an INR<2 was 10% in Canada, 40% in South Korea and 45% in Turkey. Physician preference for an INR range 2-3, was 60% in Canada, 41% in South Korea and 55% in Turkey. For an INR>3, physician preference was 20% in Canada, 15% in South Korea and 0% in Turkey. Physicians injected the deep compartment 83% of the time in Canada, 39% in South Korea and 81% in Turkey, and encountered compartment syndrome 1% of the time in Canada, 0% in South Korea and 1% in Turkey. **Conclusion:** Among the three countries, Turkish physicians were most conservative in checking INR values before injecting patients, and did not inject when INR values exceeded 3. South Korean physicians appear to be more reluctant to inject deep muscle structures compared to their Canadian and Turkish counterparts. In spite of aggressive INR checking, rates of compartment syndrome remained low. Studies are underway to image hematoma size following BoNTA injections in the deep compartment.

PC1132

Application of an Electronic Neurorehabilitation Census Board and Throughput Improvement: a Multi-Disciplinary Approach to Minimization of Length of Stay and Avoidable Hospitalization Days

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Introduction: Throughput and discharge efficiency is critical to the continued care curriculum. The expedition of post-stroke pathways amalgamates benefits of provision of efficient effective care, maximization of time-limited treatment windows, and limitation of post-stroke complications. This study presents a unique solution to throughput in stroke care. **Methods:** We developed a novel system of multidisciplinary communication and systems planning called the Neurorehabilitation Census Board (NRCB); a multimodal electronic communication system combined with protocolized multidisciplinary communication to identify various barriers to discharge. We highlighted discharge barriers categorized by medical, rehabilitation, case management, social work, and neuroimaging in a daily multidisciplinary review. This system was implemented over 2 neurology floors in a 953-bed teaching over 3 months, with the same 3 month block from the preceding year providing control data. **Results:** Implementation of the NRCB system quickly demonstrated an earlier discharge of patients. Within the first month, there was a marked drop in LOS by 1.61 (16.81%) and 2.15 (29.33%) days on the neurology floors respectively. LOS decreased from 9.58 until a nadir of 6.51 on the follow-up month. A comparison to the previous year demonstrated a decline of 8.332 (SD 0.52) to 7.234 (0.69), a difference of 1.098 days ($p\leq 0.01$). The second floor improved from a mean LOS of 6.71 (SD=0.2488) to 5.48 (SD 0.25), an improvement of 1.23 days ($p\leq 0.000027$). **Conclusions:** NRCB expedited higher and more efficient throughput throughout the study group and resulted in earlier discharges, while decreasing avoidable days and lengths of stay. These benefits are attributed to increased communication and tracking.