4th European Congress of Neuro Rehabilitation

Conference details: October 25-28, 2017, Lausanne, Switzerland.
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The beautiful city of Lausanne on Lake Geneva with surrounding mountains is home to the International Olympic Committee headquarters with Chaplin's world museum nearby the east of the city. Swiss Tech Convention Centre at EPFL, (École Polytechnique Fédérale de Lausanne) hosted 450 delegates from different countries to attend the 4th European congress of neurorehabilitation from 25th to 28th October 2017. It was an exciting time to be amongst the expertise in the field of neurorehabilitation and to get a chance to stroll in the EPFL campus or alongside Lake Geneva.

The congress objectives were the following topics:

- Acute neurorehabilitation
- Impairment vs compensation oriented approaches in stroke rehabilitation: How shall future rehabilitation be organised following our current neuroscientific knowledge
- Better epistemological and biometric strategies for clinical trials
- Use of high tech approaches such as intelligent training devices or virtual reality in neurorehabilitation
- New horizons in Neurobiology and Neuropharmacology
- New drugs against impairment in combination with rehabilitation procedures
- Better cognitive training strategies
- Nutritional aspects in neurorehabilitation

The congress parallel lectures, workshops and sessions were held in several halls (gardens) and a number of companies exhibited their latest technology in the field of neurorehabilitation.

Speakers of "newest in motor rehabilitation for upper and lower extremities" on the first day were the programme Chair, Volker Hömberg and congress President, Leopold Saltuari. The latter concluded his talk with the following summary:

- Early verticalisation seems to be beneficial to the patient, but should not be performed at least in the first 24 hours. There is no evidence that one physiotherapy technique is superior to another but intensive interaction between therapist and patient, motivation, repetition, and duration are critical.
- Robotic treatment of the lower limbs in combination with classical physiotherapy reduces the physical burden of the therapist, and allows for an increase in the number of therapeutic sessions.
- Pharmacological treatment can enhance recovery, but use of anti-spastic and antiepileptic medications at the wrong time and when patient uses the spasticity for better balance can also hamper clinical evolution.
- Cranioplasty in "SSF, sinking skin flap syndrome" should be considered early. Sinking skin flap syndrome is a rare complication after large craniectomy that may progress to paradoxical herniation as a consequence of atmospheric pressure exceeding intracranial pressure. Cranioplasty after post injury decompressive craniectomy (DC) is routinely performed with a three-month delay to avoid the risk of infection and other complications. Recent experience suggests that performing Cranioplasty surgery at shorter period than three months following DC not only may not cause more infections, but also has the advantage of easier dissection, less bleeding, and reduced costs.

At the end of the talk, there was a discussion about the role of FES (Functional Electrical Stimulation) in rehabilitation of lower limb;

some of the audience, including me, did not fully agree with dismissing FES without proper objective assessments like 6 metre walking speed or measuring energy expenditure. NICE suggests: current evidence on the safety and efficacy (in terms of improving gait) of FES for drop foot of central neurological origin appears adequate to support the use of this procedure provided that normal arrangements are in place for clinical governance, consent and audit.

Other interesting topics were the "role of neuropharmacology in stroke and neuro-rehabilitation" and the discussion around "drugs available to manipulate plasticity". Levodopa, SSRIs, memantine and amphetamine all have been tried. Most of the studies included small sample sizes and are not powered RCTs, whilst safety and efficacy still need to be further investigated. Neuroleptics could be harmful for neural plasticity and some agents (e.g. methylphenidate or amphetamines) are applicable just to a small minority of patients. Dopaminergic agents and selective serotonin-reuptake-inhibitors (SSRI) are promising candidates and out of SSRIs, Fluoxetine is probably the most promising. However, when a question was put to one of the speakers that "Shall we use fluoxetine for patients who suffer from post stroke depression to kill two birds with one stone" the answer was not fully in favour of fluoxetine and the advice was to use sertraline or citalopram, as we currently do in our clinical practice.

The most interesting experience for me was the "Mental Work" at the art-science exhibition which was not practically part of the conference programme. From a technical standpoint, thought is at the core of the *Mental Work* exhibit. Brain-computer interfaces (BCIs) are systems that measure brain activity, extract relevant features from that brain activity, and translate these features into messages or commands. BCIs entail research in several disciplines, including engineering, cognitive neuroscience, psychology, computer science, and mathematics. The main focus of BCI research is clinical application (e.g. BCI-based communication and prostheses for people with physical disabilities). It is gaining attention in games and human-computer interaction and is applied in various branches of experimental research, such as driving safety, neuro-usability, and neuro-ergonomics.

Embark on a cognitive revolution at EPFL

Use your brainwaves to control the workings of a machine and contribute to science at EPFL Art Lab's next art-science exhibition, "Mental Work" from October 27th – February 11th, 2018. (Visitors have the opportunity to experience what it's like to control machines using thought alone via brain-machine interfaces, and it requires a fair share of concentration).

More and more studies have shown the beneficial effect of rich environment on neurorehabilitation and post-stroke recovery. In (VR) Virtual Reality technology, various rich environments can be simulated for patients with software. Also, a real and safe training environment will provide subjects task-specific training and accurate sensory feedback, in which key elements such as repetitive practice feedback and motivation maintenance should be included. The Rehabilitation physician should develop an individualised rehabilitation programme based on different dysfunctions to keep patients' interest and active participation and such programmes can go far beyond traditional therapies. VR technology used to focus more on upper limb rehabilitation but one of the companies demonstrated its product for gait retraining and balance rehabilitation. There has also been some research to claim that virtual reality could potentially reduce pain in paraplegic patients and creates the illusion that they can feel their paralysed legs being touched again. The results could one day translate into therapies to reduce chronic pain in paraplegic patients.

Functional disorder in neurorehabilitation was another interesting topic. *Is Functional Neurological Disorder (FND) a good description of this condition?* One of the speakers believed that it is probably the least bad description! Epigenetic factors, methylation of O2 receptors and higher amygdala activity as well as sense of agency (refers to the experience that we cause our own actions) and right temporal-parietal dysfunction were discussed in the neurobiology of FND. This condition is also common in children and particularly girls between 10-14 years old. In treatment of this condition in children, long term medications and invasive procedures should be avoided. Motor action abnormalities, emotion-action interactions, higher order processes and hypo-activation of the dorsolateral prefrontal cortex were focused on the neuroimaging in FND. These sessions were presented by S Bayek from Bern, K Muller from Germany and I Sinanaj from Geneva in order.

Education, lifestyle modification, energy conservation and pacing strategies, work simplification and environmental modifications were the main focuses of management of fatigue in Multiple Sclerosis. Behavioural changes post-stroke can be summarised as sadness, passivity, aggressiveness, indifference and disinhibition. There was an interesting session about ethical issues in end-of-life decision making in acute neurorehabilitation by Dr Borasio from Lausanne. The speaker gave an interesting example of his parents and the different views they have towards disease and death. Delicate balance exists between emotional discharge of family and patient's best interest and ethics of dialogue should be reflected in expression of caring.

In recent years, robotic devices have been utilised to replace the manpower and physical needs of therapists in the field of neurological rehabilitation. Robotic rehabilitation devices can be divided based on the driven principles: exoskeleton robot (e.g. Lokomat, AutoAmbulator) and end-effector robot (e.g. G-EO-systems, Gait Trainer, Gait Master). A number of pieces of research on exoskeleton robot and end-effector robot have been studied and there was an interesting round table discussion on rehabilitation technology about these methods. However, no method has shown to be superior to another.

Vagus Nerve Stimulation (VNS) has been used in thousands of patients with epilepsy. Using a system named Serenity, one of the exhibitors told us how pairing sounds with VNS can decrease brain hyperactivity in treating tinnitus. Using another system, named Vivistim, VNS may also have a useful role in the rehabilitative movements of stroke patients in the future.

What is the definition of natural recovery? An interesting question from one of the audience! Is it when there is absolutely no input or any form of therapy in someone who had a stroke for example in one of the most under-developed countries and any minimal intervention excludes natural recovery?

Many e-posters were also presented at the conference and the event attracted very good feedback. I enjoyed the conference, exhibitions, workshops as well as the beauties of Lausanne!