Patient Resource Center for NBS in neurosurgery launched

Nexstim has developed a dedicated Patient Resource Center website for the NBS System. The new site helps explain the role NBS mapping can play in helping patients with a diagnosis of brain tumor or epilepsy. The website at www.neurosurgerystartshere.com brings together feedback from physicians and patients. The primary goals of the site are to educate patients about the benefits of NBS mapping in making the optimum treatment decision and to help patients find institutions with an NBS device.

The site explains how NBS works, how the NBS motor and speech mapping procedures are performed as well as where more information may be found. The site has examples of different brain disease states where NBS mapping results have helped improve outcomes. Our video material has been uploaded for viewing from the site. The Patient Resource Center is “brand new” and we welcome feedback to further develop communications with patients, relatives and support groups.

Currently the site is in English, but we have plans for a German version shortly. With a more simplified approach and vocabulary, the new patient site may prove useful for “internal marketing” of NBS services within your hospital.

Webinar: NBS mapping results can be easily integrated into radiosurgical planning

In June, Nexstim arranged a webinar to allow neurosurgeons to share their experiences of using the NBS System to optimize dose delivery in radiosurgery. Participants heard presentations by Dr. Kufeld from the Charité-Universitätsmedizin Berlin and from Assistant Professor Conti from the Department of Neurosurgery in University of Messina in Italy.

From their experiences at the Charité CyberKnife Center, Dr. Kufeld estimated that the availability of NBS results influenced radiosurgery planning in approximately half of their cases: in a series of ten patients the Charité clinicians found that one patient benefited from a dose reduction of 10% (considered significant), two patients from a dose reduction of 5% and in a further two patients isodose optimization was achieved. In the remaining patient cases the clinicians considered the added NBS data still to be useful for risk estimation.

Dr. Conti summarized the results of his recently published study* showing that adding non-invasive pre-surgical diagnostic tools of NBS mapping and fMRI can reduce the radiation dose to functional brain areas by 25%. Dr. Conti’s group found that, compared to fMRI, NBS mapping indicates much smaller volumes for eloquent areas. In practice, NBS mapping can therefore allow for better dose sparing without compromising the efficacy of radiation treatment. Additionally, NBS results were not confounded by changes in blood flow – of particular importance when planning for radiosurgery in AVMs.

The webinar sparked a lively discussion on balancing local control and radiation effects: patients are surviving treatment for longer than earlier, making radiation necrosis an important issue to address. In particular, patients treated for AVMs are generally younger and have to live longer with any side-effects of treatment. Since there is little evidence of a safe upper limit, radiation dose should be minimized whenever possible.

The webinar concluded that NBS data can be easily integrated into radiosurgery planning systems and that NBS mapping can be easily made part of the clinical routine.

Survey shows high level of customer satisfaction

During the summer we conducted a web-based survey of 50 sites using NBS. Participation in the survey was high – with 34 sites responding. The results include sites using NBS for clinical and research use.

Compared to other medical equipment, 82% of respondents ranked the quality of the NBS System as Excellent (5) or Very Good (4) on a 5-point scale, while another 15% ranked it as Good (3). In particular, accurate and intuitive navigation, reliability, and integration were mentioned as being well implemented, as was the 3D rendering. Experiences of product support were also very positive, with 82% of respondents ranking support as Excellent or Very Good, and 18% as Good.

Areas where improvements were considered still desirable included coping with the weight of the coil, shortening the MR-image loading time, further development of speech analysis, and more features for research.

When asked about likelihood to recommend the NBS System, two-thirds of respondents answered that they would Definitely Recommend (5) the NBS System to other hospitals and potential users and the remainder answered Probably Recommend (4), on a 5-point scale. When asked how they see Nexstim, respondents replied most frequently that Nexstim is associated with being Practical, Innovative, High Tech, Sophisticated, Competent and Reliable.

The survey also generated useful information on how the NBS System is being used in practice. Almost half of responding sites are now using NBS for therapy, with more than half of the therapy sites using NBS for pain management or stroke rehabilitation.

These survey results are “breaking news” for us all. We will be implementing your feedback in our plans for the future, coil management and general usability enhancements being some of the areas where we concentrate on. We thank all participants for their time and interest.

Clinical Spotlight

Landmark UCSF study validates NBS for preoperative speech mapping

Clinicians at the University of California, San Francisco, USA have compared navigated repetitive TMS (nTMS), magnetoencephalographic imaging (MEG) and direct cortical stimulation (DCS) for language mapping in patients with lesions around cortical language areas. The clinicians used the field navigation features of the NBS System to avoid stimulating cranial and facial nerves and adjusted the stimulation intensity to a level each patient found tolerable. The investigators did not find any correlation between stimulator intensity and the number of language disturbance sites identified.

When compared with intraoperative DCS results, the sensitivity of nTMS was found to be 90%, specificity was 98%, the positive predictive value was 69% and the negative predictive value was 99%. The authors conclude that maps of language function generated with nTMS correlate well with those generated by DCS. Negative nTMS mapping was also found to correlate with negative DCS mapping.

In their paper*, the authors discuss that, “the real contribution of nTMS is in the preoperative preparation that it allows. By mapping a subject before surgery, the surgeon can generate a precise map of potentially positive language sites, which then may be swiftly interrogated with DCS during surgery. Additionally, if the preoperative nTMS map shows clear speech arrest sites distant from the region of surgical exposure, the surgeon may have increased confidence in the reliability of a negative intraoperative DCS map”. The authors also found that NBS speech mapping helps patient-surgeon discussions and prepares patients for the experience of intraoperative speech arrest.

The USCF clinicians concluded that, “nTMS may offer a lesion-based method for noninvasively interrogating language pathways and be valuable in managing patients with peri-eloquent lesions.” They also stated that, “nTMS is a useful modality for generating language maps non-invasively. It is thus of immediate interest in the clinical management of subjects with eloquent brain tumors; it also has wide-ranging implications in basic science and translational studies of cortical language representation and physiology.”

Clinical Spotlights from ESC 2013

Navigated 1 Hz rTMS improves motor outcome in acute stroke

It has been proposed that hemiparesis in the early recovery phase after stroke can, in part, be due to persisting contralesional activity limiting functional recovery of the affected hemisphere. In an abstract presented at the XXII European Stroke Conference in May, 2013, researchers at the McGill University, Montreal, Canada reported on the use of repetitive TMS (rTMS) and transcranial direct current stimulation (tDCS) prior to physiotherapy as compared to physiotherapy preceded by sham stimulation. Their study was designed to test the hypothesis that down-regulation of activity in the contralesional primary motor cortex (M1) improves the effect of standard physiotherapy. 14 acute stroke subjects were randomized to receive active rTMS (5 patients), active tDCS (5) or sham rTMS and tDCS (4). The duration of the active or sham stimulation was 15 min. All the active and sham stimulation treatments were combined with physiotherapy in once-daily sessions lasting 40-60 minutes over an average of 8 days. In the active rTMS session, 900 pulses of TMS were applied at a frequency of 1 Hz using the NBS System.

The study demonstrated the feasibility of a double-blind controlled, non-invasive brain stimulation trial and showed that, combined with physiotherapy, inhibitory rTMS over the unaffected M1 significantly improves upper limb motor recovery compared to physiotherapy preceded by tDCS or sham stimulation. The Chedoke Arm and Hand Activity Inventory (CAHAI) scores after treatment were significantly higher (p<0.05) for subjects in the rTMS group (19) than for subjects receiving either tDCS (11) or sham stimulation (6). CAHAI scores were similar at baseline. The results of this study suggest that, early after stroke, 1 Hz rTMS on the contralesional M1 increases rehabilitation potential and can potentially shorten patient length of stay.

Navigated rTMS accelerates motor recovery after stroke

In another abstract, the Medical and Rehabilitation Center, Moscow reported on the effect of using both fast and slow repetitive TMS (rTMS) as an adjunct to basic rehabilitation. 35 patients who had suffered a stroke in the previous 1-24 months were recruited. 25 of the patients had been diagnosed with ischemic stroke and 10 with intracerebral hemorrhage. The cohort was randomized into a treatment group (21 patients) and a control group (14 patients). The control group patients received basic rehabilitation, while patients in the treatment group had daily stimulation sessions in addition to rehabilitation. The NBS System was used to map the cortical representation area for the individual patient’s most affected limb prior to stimulating the target with rapid, 5 Hz rTMS in daily sessions. Additionally, the motor area on the patient’s unaffected hemisphere was stimulated with slow, 1 Hz rTMS.

After 15 days, muscle strength in the treatment group patients had increased to 3.8±1.1 from 2.9±1.3 prior to treatment vs. an increase to 3.0±0.9 from 2.8±1.4 in the control group (p=0.05). Stroke severity by NIHSS score decreased from 18.1±5.7 to 14.1±3.8 in the treatment group vs. a decrease from 17.7±5.3 to 15.2±5.3 in the control group (p=0.09). The Barthel Index increased from 19.5±5 to 41±8 in the treatment group vs. an increase from 20.1±5 to 35±5 in the control group (p=0.04). The authors concluded that “rhythmic nTMS accelerates motor recovery after ischemic stroke and intracerebral hemorrhage”.


Eight NBS presentations now on the DGNC website

This year’s annual meeting of the German Society of Neurosurgery (DGNC) event witnessed a significant contribution from NBS System users. Neurosurgeons from university hospitals in Berlin, Cologne, Munich and Bochum gave 13 presentations on the use of the NBS System in neurosurgery. Eight of the presentations can now be viewed on the official DGNC website at http://dgnc.conference2web.com/content/nexstim.
Second NBS for Oulu University Hospital

Oulu University Hospital in the north of Finland has now purchased a second NBS System to add to their older NBS installation. NexTalk asked Mika Kallio, Head, Department of Clinical Neurophysiology and Usko Huuskonen, Senior Consultant, at Oulu University Hospital about their experiences with their NBS Systems.

Q: Which indications do you use your NBS Systems for?
A: We mainly use the NBS Systems for presurgical motor mapping. We also use NBS for targeting rTMS treatment in 20 to 30 patients per year, primarily in patients with depression but also for pain. We have recently started to treat patients with tinnitus, too.

Q: What kind of rTMS protocols do you use in treatment?
A: In the treatment of depression we mainly use excitatory 20 Hz rTMS targeted at the DLPFC on the left hemisphere. A total of 3000 pulses of TMS per session are administered. Originally, treatment involved 5 sessions per week for 2 weeks, but due to the long distances many patients need to travel we are now using 3 sessions per week for a duration of 4 weeks. In the treatment of pain we generally use 20 Hz rTMS targeted to the primary motor cortex, using a total of 2000 pulses per session in 3-5 sessions per week over a period of 2 to 4 weeks. In the treatment of tinnitus we use low frequency 1Hz rTMS at 100-110% of resting motor threshold with the same number of sessions and duration as for pain treatment.

Q: Who performs NBS therapy?
A: For the initial session, a physician and a technician perform NBS together. In subsequent sessions NBS treatment is usually delivered by a technician, however a physician is always available.

Q: What have the results from NBS therapy been like?
A: Not all patients respond to NBS, but some patients with depression and patients suffering pain do benefit. In our experience younger patients with depression generally respond quite well, as previously documented elsewhere. Also, the earlier treatment can be started after diagnosis, the better the treatment response appears to be. In treatment responders, NBS therapy has resulted in a reduction in Beck Depression Inventory (BDI) scores of 25-40 to 5-25 (see figure). NBS therapy is well-tolerated in the main. Some patients can experience pain, but this is due to cramping scalp muscles.

Q: What are your experiences with the new 4.3 version of NBS System?
A: With everything integrated it is much easier and faster to use, so we can treat more patients. With the new capabilities we can now plan new clinical research into rTMS. Neuroplasticity is of interest and, after discussing with our neurologists, stroke and epilepsy also seem promising. With the new NBS System we are able to export mapping results to the surgical navigation system and our neurosurgeons have been very satisfied with the functional data visualization in the intra-operative microscope. This has made neurosurgeons take a keener interest in NBS and they now attend more frequently mapping sessions with the patient – a very useful development for all parties.

Nexstim across the globe

Nexstim Oy | Elimäenkatu 9 B, FI-00510 Helsinki, Finland | Tel. +358 9 2727 1710 | www.nexstim.com