RENISHAW
apply innovation™

Excerpts from clinical literature – neuro | mate®

"The integration of a tailored computerized environment, CT and MRI imaging and the stereotactic robot developed by the neurosurgical and scientific teams in Grenoble has simplified many procedures for the benefit of the operated patients."

Devaux in Talairach (2007). Souvenirs des études stéréotaxiques du cerveau humain

"neuromate is a well-established robot in stereotactic functional neurosurgery. It provides a fast and easy way for trajectory modifications."

Benabid & Nowinski (2003). The Operating Room for the 21st Century

Frameless stereotaxy

"We have been able to demonstrate an application accuracy [of the neuromate in frameless mode] in phantom and clinical settings that is comparable to frame-based systems. A major advantage has been the ability to separate the imaging from the surgical procedure. Ample time is available for detailed image analysis and trajectory planning."

Varma & Eldridge (2006). Use of the neuromate stereotactic robot in a frameless mode for functional neurosurgery. MRCAS 2:2 107-13

"Robotic stereotactic neurosurgery is particularly appealing, as it enables neurosurgical procedures in excellent conditions, optionally freeing oneself from the stereotactic frame."

Blond et al. (2002). Clinical applications of stereotactic methodology. Ann Fr Anesth. 21:162-9

Stereotactic EEG

"Robot-guided stereotactic implantation of multiple deep brain electrodes for stereotactic electroencephalography (SEEG) is a less invasive technique and allows the creation of a three-dimensional grid of electrodes. As the procedure is considerably less risky [than conventional electrocorticography], it has the potential to revolutionise the investigation of the focal epilepsy using depth electrodes."

Abhinav K et al.(2013) Use of robot-guided stereotactic placement of intracerebral electrodes for investigation of focal epilepsy: initial experience in the UK. British Journal of Neurosurgery 27(5): 704–705

"SEEG is a safe and accurate methodology that is gaining popularity for invasive electroencephalography recordings aimed to identify the epileptogenic zone. The traditional Talairach methodology, recently updated by the use of the most advanced multimodal planning tools and robot-assisted surgery, allows one to directly record electric activity from every brain structure, providing valuable information in the most complex cases of refractory epilepsy."

Cardinale F et al.(2013) Stereoelectroencephalography: Surgical Methodology, Safety, and Stereotactic Application Accuracy in 500 Procedures. Neurosurgery 72(3) 353-366

Frame-based stereotaxy

"Each robot that is produced goes through a rigorous calibration process to ensure the highest accuracy possible. The robot arm can achieve a given prescribed target position with multiple arm orientations and tool orientations. The frame-based robotic system has the same level of application accuracy as the best standard localization system. [Standard] frame-based approaches are cumbersome to use and limited in terms of instruments."

Li et al. (2002). The application accuracy of the neuromate robot – A quantitative comparison with frameless and frame-based surgical localization systems. CAS 7:2 90-8

Deep brain stimulation

"The improvement was dramatic, postoperatively in the off medication condition, at five years. Most patients were independent in the activities of daily living […] whereas before surgery most had been fully dependent on a caregiver […] The cost of the hardware and all of the expenses related to the surgery, including hospitalization, is lower than the cost of medication, caregivers, accessories such as wheelchair, etc., during a period equivalent to the duration of life of the IPG."

Benabid et al. (2009) in Textbook of Stereotactic and Functional Neurosurgery

"37 out of 50 STN targets were satisfactorily identified using a single microelectrode trajectory and a mean of 1.6 trajectories were used. The final electrode position varied from the planned trajectory by a mean of 1.7 mm."

Varma et al. (2003). Use of the neuromate stereotactic robot in a frameless mode for movement disorder surgery. Stereotactic and functional neurosurgery 80:1-4 132-5

Renishaw plc

Neurological Products Division
New Mills, Wotton-under-Edge,
Gloucestershire, GL12 8JR
United Kingdom

T +44 (0)1453 524777
F +44 (0)1453 524901
E medicalimplants@renishaw.com
www.renishaw.com/neuro

RENISHAW apply innovation™

Neuro-endoscopy

"Data from our series [of 33 patients with hypothalamic hamartoma] demonstrate that frameless stereotactic endoscopic disconnection should be considered as the treatment of choice in the presence of favorable anatomic conditions. A robot-guided endoscopic approach results, in almost all cases, in a seizure-free outcome or in a considerable seizure reduction—with an extremely low morbidity rate compared with conventional neurosurgical approaches."

Procaccini et al. (2006). Surgical management of hypothalamic hamartomas with epilepsy: the stereoendoscopic approach. Neurosurgery 59:4 Suppl 2 ONS336-44

Drug delivery

"Stereotactic endocavitary irradiation is a precise, focal, and noninvasive technique for the primary or adjuvant treatment of cystic craniopharyngiomas. It is a safe procedure, with a low rate of morbidity and a high (80%) rate of tumor control, and most often improves or preserves visual, cognitive, and endocrinological functions. Stereotactic methodology notably reduced the risk of leakage in the subarachnoid space or in the intraventricular system."

Derrey et al. (2008). Management of cystic cranio-pharyngiomas with stereotactic endocavitary irradiation using colloidal ^{186}Re: a retrospective study of 48 consecutive patients. Neurosurgery 63:6 1045-52

"Catheter placement in cystic craniopharyngioma allows intermittent drainage of the cyst and the placement of [chemotherapy drug] bleomycin. The neuromate stereotactic robot provides an accurate means of placing catheters into cysts. Advantages of neuromate include its stability, its excellent accuracy, and the ability to plan suitable tracks through the brain."

Golash et al. (2000). Robotic stereotactic placement of catheters into cystic craniopharyngiomas. Child's Nervous System 16 384

Radiosurgery

"Adjustable dose rates and steep dose gradients can be obtained. Radiosurgical tumour treatment can be executed immediately after the stereotactic biopsy without requiring radiation protection measures or dedicated facilities. The use of robotic systems to position, orientate and guide the system can guarantee a much higher level of accuracy than stereotactic headframe-based techniques."

Rossi et al. (2005). A telerobotic haptic system for minimally invasive stereotactic neurosurgery. MRCAS 1:2 64-75

Cell graft

"The development of a primordial structure of the nervous system after transplantation in human brain had never been observed. This study represents the first in vivo demonstration that a human striatal anlage, transplanted into the adult human brain, is able to progress in its development and to generate a new anatomical structure in the host."

Gallina et al. (2008). Development of human striatal anlagen after transplantation in a patient with Huntington's disease. Experimental neurology 213:1 241-4

"Our operative [technique], at best allowing to tailor the stereotactic procedure to the patient's anatomy, provided an optimization of the neurotransplantation technique in the devastating Huntington's disease."

Gallina et al. (2008). Human fetal striatal transplantation in Huntington's disease: a refinement of the stereotactic procedure. Stereotactic and functional neurosurgery 86:5 308-13

Biopsy

"The neuromate was used in the frameless mode. In 18 of 19 biopsies, diagnostic tissue was obtained. In one case the tissue obtained was not diagnostic but a postoperative scan confirmed that the biopsy had been obtained from the area of abnormality."

Varma & Eldridge (2006). Use of the neuromate stereotactic robot in a frameless mode for functional neurosurgery. MRCAS 2:2 107-13

"Robot-guided biopsy is an accurate procedure allowing easier transcerebellar approach than frame-based stereotactic biopsies."

Haegelen et al. (2006). Robotic stereotactic biopsies in the management of brain stem lesions: about a first series of 15 patients. Acta Neurochirurgica 148 XLIX

Transcranial magnetic stimulation

"Image-guided TMS, precisely orienting the electric field to be normal to the cortical surface at the targeted site, will be useful and may possibly be critical for applications anywhere in the cortex."

Fox et al. (2004). Column-based model of electric field excitation of cerebral cortex. Human brain mapping 22:1 1-14

"The overall accuracy in positioning the planned site of the TMS coil was approximately 2 mm. Robotic systems can provide exceptional aiming and holding capabilities for TMS coils."

Lancaster et al. (2004). Evaluation of an image-guided, robotically positioned transcranial magnetic stimulation system. Human brain mapping 22:4 329-40

For worldwide contact details, please visit our main web site at www.renishaw.com/contact

Issued: 08.2014

Part no. H-4149-0030-02-A