Introduction
Stereo-EEG is a well-established method for the placement of and recording from intracranial depth electrodes, in order to better delimitate the epileptogenic zone in adult and child patients with intractable focal epilepsy who are candidates for resective surgery. Following our experience with Robot-assisted stereotactical placement of depth electrodes for S-EEG recording with the Neuromate (Renishaw) in over 150 pediatric patients, we here report our series of children who have been explored with the aid of a new Robot system ROSA (Medtech).

Methods
From November 2009 through March 2010, 172 multilead electrodes were placed with a new robot based navigation system in stereotactic surgery (ROSA: Robotized Surgical Assistant) in 15 children (8 boys and 7 girls; 3 to 14 years, mean age 6.5). Each procedure included 9 to 15 electrodes for a Video-EEG recording period of 4 to 21 days. Two children underwent bilateral exploration. Sixty-one electrodes were implanted in the frontal lobe (35.5%), 55 in the temporal lobe (32%), 21 in the opercula (12.2%), 27 in the parietal lobe (15.7%) and 8 in the occipital lobe (4.6%). Thirty-six explored the Insula as well. All electrode’s entry sites and trajectories were defined on preoperative contrast-enhanced, high-resolution MRI imaging studies with the software.

Results
The provided software for the ROSA Robot allows an easy and fast procedure for the planification of the electrodes trajectories. All implantation procedures that lasted between 1.5 and 3 hours for up to 15 electrodes were performed under general anaesthesia. The image fusion of MRI with the planned trajectories and the postoperative CT-scan demonstrated a precise placement for most electrodes. In a few cases, we observed an electrode deviation from the theoretical trajectory, consisting either in a progressive deviation from the point of entry on (mainly seen in trajectories with a very oblique angle of incidence), or a translational deviation (the electrode being up to 2 mm parallel to the planning trajectory). There were no surgery-related complications.

Conclusions
The clinical application of this new robotic system in stereotactic surgery offers a simple and accurate way for the placement of multiple depth electrodes for S-EEG in order to define the epileptogenic zone in complex cases of drug-resistant focal epilepsy in children. A regular accuracy assessment of both MRI and the Robot is crucial in order to ensure a precise trajectory targeting.

References
Dorfmüller G, Bulteau C, Fohlen M, Jalin C, Delalande O
Frameless stereotactic robot-guided placement of depth electrodes for stereoencephalography in pre-surgical assessment of children with refractory partial epilepsy.
7th European Congress on Epileptology, Helsinki, 2-6 July 2006.
Planification image of multiple trajectories in the 3 planes
Registration process using anatomical surface landmarks
Intraoperative photograph displaying the trajectory arm mounted on the robotised surgical assistant
Postoperative photograph after the placement of all depth electrodes