



ACMIT

Austrian Center for Medical Innovation and Technology

Main location	Wiener Neustadt, Lower Austria
Other locations	-
Thematic field	Medical Robotics, Neurosurgery

Success story summary

High-precision tool targeting in delicate tissue

Submillimetric precision is essential for stereotactic neurosurgical procedures. Research goal of this project is to evaluate the feasibility and accuracy of a novel robotic positioning device for stereotactic neurosurgical procedures in both phantom and clinical trials. The results achieved so far have been very positive so that further steps towards product development are planned.

Success story

Operations involving positioning of needles and catheters are amongst the most common procedures in cranial neurosurgery. However, submillimetric precision is essential for the success of most neurosurgical procedures. Although some neurosurgical procedures are performed using a skull-mounted stereotactic frame for high precision, such a setup is costly and time-consuming. To overcome these problems, navigation-guidance was implemented and established over the last two decades – but accuracy reached with this method, especially for freehand tool placement, sometimes is not sufficiently good.

In a joint research project between ACMIT, iSYS Medizintechnik GmbH and the Department of Neurosurgery of the Medical University Vienna, the feasibility and value of the iSYS1 robot system have been evaluated for intraoperative trajectory alignment in stereotactic neurosurgical procedures. The performance of the robot was compared with the standard freehand or mechanical arm-based alignment method in a clinical setting. Applications evaluated include brain biopsy procedures, shunt catheter placement as well as depth electrode placement for epilepsy monitoring.

After an extensive phantom trial with very promising results, a clinical study were started with currently 45 patients involved (26 biopsy, 11 shunt, 8 electrode placement). A seamless integration of the robot into the clinical workflow could be established – all interventions have been completed without any complication. Both our preclinical and clinical results indicate that the application of the iSYS1 robotic system significantly increases the accuracy and reduces operating time of stereotactic neurosurgical procedures.



Impact and effects

The clinical evaluation performed in the framework of this project clearly reveals that the iSYS1 robot system -- developed during the first ACMIT funding period between 2010 and 2014 -- has a significant potential for frameless stereotactic procedures in neurosurgery. Based on the very promising results achieved so far, a transfer of the setup towards a certified product is already in preparation.

Contact:	ACMIT – Austrian Center for Medical Innovation and Technology Dr. Gernot Kronreif Viktor Kaplan Str. 2, A-2700 Wiener Neustadt +43 (0) 2622 22859 0 gernot.kronreif@acmit.at, www.acmit.at
-----------------	--