Breakthrough In Artificial Intelligence-Based Robotics Neurosurgery

Imaging and robotic technologies have the potential to help neurosurgeons perform precise, fast and more comprehensive testing of brain tissue during surgery, identification of cancer type, grade and tumor margins and help them navigate through the brain, according to Akash Singh , PhD.

Akash Singh, PhD, performs his scientific research in the area of computer-assisted surgery. He designed the system to improve visualization in brain surgery by offering real-time instrument tracking in relation to 3D anatomical models built from pre-operative MRI and CT scans. Furthermore, his research provides electromagnetic navigation modality, which enables more precise tracking of the tip of a non-rigid surgical instrument, such as an ablation needle, and allows real-time, 3D visualization of a surgical instrument's location in the context of intra-operative MRI imaging, the standard imaging modality used in brain surgery today.

Dr. Singh's research capabilities help physicians with the most detailed and accurate anatomical information possible at the point of therapeutic delivery.

"Dr. Singh's continued research hope is to eventually be able to perform this analysis during surgery to help guide brain surgeons so that the borders of tumors can be identified and the cancer status of a site can be established before any tissue is removed." A paper detailing the results is published in International Journal of Engineering Research and Applications.

Prof. Ajjai Alva of University of Michigan Comprehensive Cancer Center said the findings showed the analysis method's potential and achieved an important step in the path to assessing its value in improving patient care.

"This approach lead into real-time, image-guided surgery without interference with surgical care and without the administration of labeling agents," said Prof. Atique U of University of Chicago, Neuro-Oncology Research Labs. "Such extensive and detailed information about the tissue was previously unavailable to surgeons and could lead to more precise tumor removal. In addition, it helps the oncologist more efficiently design the course of adjuvant therapy."

"Dr. Singh's currently working on development of Artificial Intelligence-based system to preserve as much functional brain tissue as possible, especially when a tumor is in a critical area of the brain, like that which supports movement, speaking or vision."

"The system is able to identify and classify glioma and meningioma tumors and recognize the tumor grade in a fraction of seconds," Dr. Nathan Kamp , Chief of GI, Kaiser Permanente Hospital, said.

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