Neurosurgery publishes findings of three important studies in June issue

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The results of three important studies have been published in the June issue of *Neurosurgery*, official journal of the Congress of Neurological Surgeons.

One study indicates that continuous "machine learning" using artificial neural networks (ANNs) may improve the ability to predict survival in patients with advanced brain cancers. Another study in the June *Neurosurgery* supports increased use of stereotactic biopsy for obtaining samples of brainstem tumors; while another calls for medical professionals and specialty societies to play an increased role in evaluating "off label" uses of medications.

Artificial Neural Networks Predict Brain Cancer Prognosis

Dr. Matthew Ewend of University of North Carolina and colleagues evaluated the use of ANNs to predict the chances of survival for patients with brain cancer. Based on the biological functioning of brain cells, ANNs are computer programs designed "to learn patterns within a data set and then apply that learning for recognition and prediction."

The researchers performed a pilot study of ANNs using data on patients treated for advanced brain cancer at several hospitals. The results showed that ANNs beat standard prediction models for predicting patient survival. "Pooled voting" of five ANNs correctly predicted the

risk of death within one year in 84 percent of patients, compared to 78 percent with a single ANN and 74 percent using standard statistical techniques.

The predictive power of ANNs would likely increase over time, providing a "facile and powerful means or predicting survival" in patients with brain cancers or other conditions. The researchers conclude, "With the explosion in clinical data over the past few years….we anticipate a growing need for modern machine learning techniques such as ANNs to properly make use of the information at our disposal and realize its full benefit for clinical care."

New Proposal for Evaluating 'Off Label' Uses of Medications

An improved process for evaluating "off label" use of drugs—using medications for purposes other than those for which they were approved—is described by Donlin Long, MD, PhD, of Johns Hopkins School of Medicine and Clark Watts, MD, JD, of University of Texas School of Law. They cite the example of bone morphogenetic protein-2 (BMP-2), a product approved to promote bone growth in one specific type of spinal fusion surgery.

After approval, surgeons started using BMP-2 for various other types of spinal surgery—leading to complications in some cases. The authors believe that problems resulting from "uncontrolled" off-label use have had a chilling effect, leading to missed opportunities to develop effective uses of BMP-2.

In the proposed approach, medical specialty societies such as the Congress of Neurological Surgeons would play a leading role in setting parameters for off-label use of new products, and in systematically

gathering evidence of effectiveness. Drs. Long and Watts write, "Our goal is to challenge our professional societies to take a leadership role in the study of valid uses of new drugs and devices in a cooperative, constructive relationship with government regulators and industry."

Stereotactic Biopsy for Brainstem Tumors

Dr. Philipp Kickingereder of University Hospital of Cologne and colleagues present a review of research evidence on stereotactic biopsy—using triangulation techniques to precisely localize tumors—to obtain samples of uncommon brainstem cancers. While stereotactic biopsy is not a new technique, surgeons may hesitate to use it for brainstem tumors because of the perceived risks of the procedure.

But the available data show a diagnostic success rate of 96 percent, with a relatively low complication rates. Dr. Kickingereder and coauthors conclude that stereotactic biopsy is a safe and valuable procedure that provides samples for simultaneous tissue and genetic analysis—which may allow more individualized treatment. They recommend its use in all adult patients with brainstem cancers, as well as in certain groups of children.

Provided by Wolters Kluwer Health

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