MedicalXpress

Study discovers new method of classifying low-grade brain tumors

June 10 2015

A Case Comprehensive Cancer Center (CCCC) brain surgeon and neurosurgery professor is among the primary authors of a new approach to classifying tumors that could lead to significant improvements in their diagnosis and treatment. The research and recommendations appear online June 10 in *The New England Journal of Medicine*.

Andrew Sloan, MD, Director of the Brain Tumor and Neuro-Oncology Center at University Hospitals Case Medical Center, said the new classification system has the potential to provide far more accurate assessments of brain tumors known as low and intermediate grade gliomas (LGGs) - which in turn could enhance patients' outcomes.

Scientists and physicians from Cleveland and 43 other federally designated cancer centers used molecular and genetic analysis to develop an approach that reduces the role of individual observers' assessments of the tumors' appearance.

"This genome-wide analysis will be much more objective and likely will be practice changing," said Sloan, Professor of Neurosurgery and Vice Chair of Neurosurgery at Case Western Reserve School of Medicine. "It can be easily implemented and will markedly improve diagnosis, patient care and treatment planning."

Sloan said that the findings would need to be validated by other groups before they could be implemented in practice.

In the past, pathologists classified LGGs based on two primary factors: their presumed cell of origin (or lineage) and the degree of severity (graded I through IV, less to most severe) based on how the glia looked when viewed through a microscope. This classification, in turn, drove oncologists' decisions regarding treatment.

"Choice of therapy takes into account lineage and grade based on the microscopic appearance," explained Sloan, "which is necessarily subjective with variability between observers."

The new system shrinks six categories into three and also offers greater correlation between the classification and the patients' most likely prognosis. Under the existing model, some patients with low- or intermediate-grade gliomas suffered symptoms as quick and lethal as those with glioblastomas, considered the most severe form of brain tumor. Others with LGGs, meanwhile, had far better prognoses - even though their tumors' appearance strongly resembles ones with bleaker results.

To develop the new system, the study's authors performed genome-wide analysis of 293 adult LGGs from cancer centers that are part of the National Institutes of Health's Cancer Genome Atlas Research Network. A genome contains the complete set of DNA for an organism -in other words, its genetic information and instructions. Cancers emerge from errors in DNA, and the Atlas provides a national, coordinated effort to understand more about which of those errors contribute to the more than 200 kinds of cancer known to exist today.

For this project, the researchers applied such techniques as next-generation gene sequencing and then correlated the findings with data regarding patients' clinical outcomes -in this case, how long those with different molecular and genetic markers survived.

The researchers found that the characteristics of one group of LGGs had significant scientific similarities to those of glioblastomas, the most serious form of brain cancer. Patients with this kind of LGG had median survival rates of about 1.7 years. Those with glioblastomas have median survival rates of 1.1 years.

Patients with one of the other two kinds of LGG - also identified by scientific markers - had median survival rates of 6.3 and 8 years, respectively.

Sloan's team analyzed tissue samples of patients from the Seidman Cancer Center. As was the case with all other tissue samples, patients consented for the samples to be used for research, and their names were not attached to the data.

One of the markers -the IDH-1 mutation -previously has been linked to low- and intermediate gliomas; the U.S. Food and Drug Administration already has approved testing for its presence. Some brain tumor centers have used it - as well as the other two markers (P53 and LOH at 1p and 19q) have for years.

"The findings demonstrate that these three groups of LGGs can be identified objectively by three different markers," Sloan said. "While different centers have been using various markers, this study should validate these three markers as the accepted standards."

Provided by University Hospitals Case Medical Center