New Study shows that Genomic Profiling can help Improve Treatment of Brain Tumors in Children

Release Date:
Thursday, September 14, 2017 5:05 pm EDT

Terms:
The Oncologist Health Sciences

Dateline City:
Hoboken, NJ

Contacts:
Dawn Peters (US) +1 781-388-8408
Penny Smith (UK) +44 1243 770448
sciencenewsroom@wiley.com
Follow us on Twitter @WileyNews

The largest genomic profiling study ever conducted into a type of brain tumor known as glioma in children has identified genetic alterations in 96% of cases. As reported in The Oncologist, this genetic information could help to identify the most effective treatments for specific cases of glioma, hopefully improving the prognosis for what is currently the leading cause of death for children with cancer in the US.

“Before, we didn’t have a way to distinguish between different gliomas that were causing similar symptoms,” says corresponding author Shakti Ramkissoon, associate medical director at Foundation Medicine, a genomic profiling company based in Cambridge, MA. “We hope that the collection of objective genomic data will one day become ‘standard of care’ for children with brain tumors.”

Pediatric gliomas are a diverse collection of brain tumors affecting children that arise from glial cells in the brain and spinal cord. Despite their diversity, pediatric gliomas can be categorized into two broad classes: low-grade gliomas (LGGs) and high-grade gliomas (HGGs), with LGGs more benign and less malignant than HGGs. Nevertheless, treatment options for both LGGs and HGGs are limited, and the long-term prognosis for children with malignant gliomas is not good. Anything that can improve this prognosis is thus to be welcomed.

With this aim in mind, Ramkissoon and a team of scientists from Foundation Medicine and several universities and medical centers in the US conducted genomic profiling of 125 LGGs and 157 HGGs taken from children varying in age from less than one to 18. To do this, they employed a technique termed hybridization-captured, ligation-based sequencing. This involves extracting DNA from each tumor sample and then introducing it to a chip covered in short strands of synthetic DNA able to capture sequences from 315 cancer-related genes and 28 genes commonly rearranged in cancer. Captured DNA is then sequenced on the chip to determine which of these genes are altered and how they are altered. These alterations can include mutations to single genes, where DNA sequences are rearranged, deleted or inserted, and the fusing together of several genes.

Ramkissoon and his team detected genetic alterations in 96% of the tumor samples, with the most frequently altered genes differing between LGGs and HGGs. They found that genes known as BRAF, FGFR1, and NF1 were most frequently altered in LGGs, whereas genes known as TP53 and H3F3A, together with NF1 again, were most frequently altered in HGGs. Not only does this finding show that genomic profiling can distinguish between different gliomas, but it also confirms that genomic profiling can help identify the most effective treatments for those different gliomas.

“Our findings highlight the importance of identifying mutations that have been shown to be diagnostically and prognostically significant,” says Ramkissoon. “For example there is strong evidence to show that LGGs harbouring BRAF fusions have significantly better outcomes compared to LGGs with BRAF mutations; therefore, determining the BRAF status for all pediatric LGGs is important for clinical management. Additionally, our findings identify targets for targeted therapies and highlight the utility of small molecule inhibitors for the treatment of recurrent pediatric gliomas.”

Thus this study shows that BRAF-inhibitors such as dabrafenib, which are currently undergoing clinical trials for treating pediatric gliomas, are likely to be more effective against LGGs than HGGs. It also shows that targeting H3F3A mutations could offer an effective way to treat HGGs. Furthermore, Ramkissoon and his team found that nine of the HGGs had a particularly high number of mutations, known as a high tumor mutation burden, which previous research has indicated responds well to immunotherapy.
Building on this work, Ramkissoon and his team are next planning to conduct a genomic profiling study of a type of glioma known as a glioblastoma in young adults, aged between 18 and 40.

"Pediatric gliomas represent a truly unmet clinical need in oncology. This work demonstrates that molecular profiling of these tumors provides potential therapeutic opportunities for these patients, including targeted therapies and immune checkpoint inhibitors," says Priscilla Brastianos, director of the Central Nervous System Metastasis Program at Massachusetts General Hospital and assistant professor of medicine at Harvard Medical School, who is a section editor of The Oncologist and was not involved in the study.

**Additional Information**


**URL Upon Publication:** http://dx.doi.org/10.1634/theoncologist.2017-0242

**Author Contact:** To arrange an interview with Shakti Ramkissoon, please contact Lee-Ann Murphy, Corporate Communications, Foundation Medicine (pr@foundationmedicine.com).

**About The Oncologist**

Now celebrating its 22nd edition, this internationally peer-reviewed journal focuses on clear and concise interpretation addressing the multimodality diagnosis, treatment and quality of life of the cancer patient. Each issue is meant to impact the practice of oncology and to facilitate significant communication in the introduction of new medical treatments and technologies. *The Oncologist* is the official journal of the Society for Translational Oncology (STO).

**About AlphaMed Press**

Established in 1983, AlphaMed Press, which has offices in Durham, NC, San Francisco, CA, and Belfast, Northern Ireland, is the publisher of three internationally renowned peer-reviewed journals. The Oncologist® ([www.TheOncologist.com](http://www.TheOncologist.com)), which is entering its 20th year, is devoted to community and hospital-based oncologists and physicians entrusted with cancer patient care. STEM CELLS® ([www.StemCells.com](http://www.StemCells.com)), celebrating its 35th year, is the world’s first journal devoted to this fast paced field of research. STEM CELLS Translational Medicine® ([www.StemCellsTM.com](http://www.StemCellsTM.com)), currently in its sixth year, is dedicated to significantly advancing the clinical utilization of stem cell molecular and cellular biology.

**About Wiley**

Wiley, a global company, helps people and organizations develop the skills and knowledge they need to succeed. Our online scientific, technical, medical and scholarly journals, combined with our digital learning, assessment and certification solutions, help universities, learned societies, businesses, governments and individuals increase the academic and professional impact of their work. For more than 200 years, we have delivered consistent performance to our stakeholders. The company's website can be accessed at [www.wiley.com](http://www.wiley.com).

**Language:** English

**Source URL:** http://newsroom.wiley.com/press-release/oncologist/new-study-shows-genomic-profiling-can-help-improve-treatment-brain-tumors-