

A Promise of Better Brain Cancer Treatment

New Computational Tool Will Help Doctors Diagnose, Treat Gliomas

Gliomas are the most common, and deadly, form of brain cancer. Unfortunately, they are difficult to diagnose and treat successfully. There are different types of gliomas, and each type also has a grade, reflecting the likelihood of the tumor's growth and spread.

All of these factors have implications for a patient's short- and long-term chance of survival. Effective treatment depends on identifying and understanding the tumor as quickly as possible.

Understanding a Tumor's "Signature"

Here at UVA, Jason Papin, Ph.D., assistant professor of biomedical engineering, and James Mandell, M.D., Ph.D., associate professor of neuropathology & pathology, are in the early stages of developing a computational tool that will help doctors more quickly diagnose and effectively treat gliomas.

Mandell and his research team analyze sections of tumor biopsies to determine where particular antibodies are binding to their targets. They look for the presence of particular proteins, and try to determine the state of the switches that turn cell pathways on and off. These biomarkers form a tumor's "signature" and can be used to identify and differentiate tumor types and grades.

With the aid of high-performance computing and sophisticated mathematical techniques, Papin and his team use these biomarkers to reconstruct and analyze the biochemical networks that direct cellular processes in a tumor. Understanding these networks offers a new way to assess prognosis, and analyze a tumor's response to particular drug combinations and other therapies.

Papin and Mandell also aim to correlate each type of glioma with average survival. The "survival curve" for a particular tumor type is critical information, because it dictates how aggressive and/or experimental the treatment strategy should be for each patient.

Once these specific tumor profiles are identified, then the investigators will match them with current treatment options (surgery, chemotherapy, and radiation—often in combination), to determine which would be most effective.



From the Lab to the Clinic

The tool Papin and Mandell create holds promise for brain cancer patients, and will be used first here at UVA, in clinical trials at the Neuro-Oncology Center. David Schiff, M.D., recognized as one of the nation's best cancer doctors, co-directs this center and runs its clinical trials program. The collaboration between Schiff, Papin, and Mandell is an example of translational research, a multidisciplinary approach that attempts to more directly connect scientific discoveries in the lab to clinician care at the bedside.

Moving Forward

Papin and Mandell's research was awarded initial funding from the Wallace H. Coulter Foundation as part of its Translational Research Partnership with UVA, as well as pilot funds from the UVA Cancer Center. Continued progress will rely on additional funding. Specifically, the investigators need immediate support for a full-time technician to assist in data gathering and analysis. Once they have this data in hand, they will be well-positioned to seek funding from federal and private sources to validate their approach.

For more information, please contact Amy Siddons Karr at the UVA Health System Development Office, (800) 297-0102 or (434) 924-8432.