

Breakthroughs

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Northwestern University scientists are exploring a novel therapy to treat highly aggressive brain cancers: a combination of a personalized vaccine, chemotherapy, and surgical technique.

Parsa: Science, Surgery Key to Solving Brain Cancer

What if brain cancer was a chronic disease rather than a ruthless killer?

“The solution to that transition is likely to be based upon a combination of chemotherapy, surgical technique, and novel vaccine development,” said [Andrew Parsa, MD, PhD](#), chair of [Neurological Surgery](#). “With our vaccine work, we are not attempting to cure the disease, but focus on how the immune system can be used to fight back.”

The vaccine Parsa speaks of—HSPPC-96—is a groundbreaking new therapy produced using a patient’s own removed tumor tissue. It’s unique to the individual, containing a precise genetic “fingerprint” of a patient’s particular cancer, and is engi-

neered to reprogram the body’s immune system to target only cells bearing this fingerprint, thus killing tumor cells that may remain following surgery while reducing risk to healthy cells.

Parsa’s research on brain tumor immunology has provided landmark insights crucial to the therapy’s success, including the identification of an unknown link between tumor formation and immune-resistance in brain tumors. He is currently serving as study chair of the national randomized phase II clinical trial that investigates whether the HSPPC-96 vaccine is safe and if it can be made more effective when given with a drug (Avastin) known to shrink tumors. The trial is the largest of its kind to be funded by the National Cancer Institute.

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Science, Surgery Key to Solving Brain Cancer
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Career Trajectory

A renowned neurosurgeon and author of more than 300 peer-reviewed articles, Parsa is as likely to be folding scrubs as tweaking a manuscript for publication.

“Early in my career I would say, ‘I am a surgeon who does science,’ but coming to Northwestern has crystalized the concept that I am a surgeon-scientist, and that’s what I’ll always be,” said Parsa. “I knew from the time I was an undergrad that I wanted to be a physician. When I was working on my MD-PhD I realized that you can be a surgeon-scientist if you really focus your efforts surgically and scientifically on the same problem.”

For Parsa, his fixation became the brain, particularly skull-based tumors. He initiated one of the first vaccine studies for brain tumor patients while still an MD-PhD student at State University of New York (SUNY) Downstate Medical Center.

“Collectively, my work with vaccines has given me terrific satisfaction in terms of moving something from the bench to the bedside. It’s been the ultimate translational research experience,” said Parsa, co-leader of the Translational Research in Solid Tumors Program at the [Robert H. Lurie Comprehensive Cancer Center of Northwestern University](#). “In the realm of skull-based tumors, I also have worked closely with radiation oncology colleagues to devise treatment paradigms that are predicated upon not necessarily taking out as much tumor as possible, but being thoughtful about what tumor we leave behind.”

This adaptive hybrid approach is a balancing act between removing more tumor—putting the patient at greater risk for surgical complications—and resecting less, which requires the patient undergo more potentially toxic radiation.

“The concept in essence is finding that sweet spot, where you’ve taken out enough tumor to relieve symptoms, while leaving a small target for radiation that can be controlled easily,” said Parsa.



Andrew Parsa, MD, PhD, made a seminal finding in 2007 when he linked the loss of a tumor suppressor (PTEN) to immunoresistance.

Goal-Oriented Leadership

Parsa plans to lead neurosurgery with an open-door and a guiding philosophy.

“It’s really important to me that everybody’s clinical discipline feeds into their educational or research interests,” he said. “That concept is something that on the surface looks straight forward but can be challenging and take time.”

Surrounded by global leaders in fields from nanotechnology to three-dimensional printing, Parsa believes it’s paramount for members of Northwestern’s neurosurgery community to create a scientific concentration and develop it over time to elevate the knowledge base.

“I strive to make it clear to everyone I train and to my colleagues that you can do anything, including becoming a surgeon-scientist, if you put yourself in the right environment and thoughtfully select exactly what it is that you want to go after,” he said. “Every resident is different, and I think the most important aspect of understanding how to mentor them is to drill down and understand what they really want to do and help them pursue that goal.”

Parsa knows that his lab may not solve adaptive hybrid surgery or develop a full-proof cancer vaccine. And that’s a big reason he finds teaching and mentoring so important.

“The reality is that the chance I create the algorithm for brain tumor management that changes a malignant cancer into a chronic disease is low, even though the odds are as high as they’ve ever been,” he said. “What I want to guarantee is that one of the people I train, or one of the people they train, will have an opportunity to make that discovery.”

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