Whether attacking a deadly cancer, helping a child born without an eye, or exploring ways to restore vision after a traumatic accident, David T. Tse, M.D., F.A.C.S., takes on the toughest surgical challenges.

A member of the faculty since 1986, Tse specializes in oculofacial plastic surgery, reconstructive surgery, orbital surgery and oncology. “In our subspecialty, we are frequently confronted with some lethal orbital conditions where patients can go blind or even die,” he says. “I subscribe to the philosophy that engaging in research activities is a stimulating and effective way of encouraging the imaginative thought necessary to avoid regimented treatment approaches. By participating in this dynamic interplay, I believe one can advance the standard of patient care to preserve vision and save lives.”

In a recent ceremony, Tse was named the inaugural holder of the Dr. Nasser Ibrahim Al-Rashid Chair in Ophthalmic Plastic, Orbital Surgery and Oncology, reflecting his dedication to the field and acknowledging contributions to training ophthalmologists in the Middle East.

“We have been able to establish a very good educational connection to the region and have trained more than 40 fellows to date,” he says. “As a result, the Bascom Palmer name is recognized as the finest center for eye care and ophthalmic learning in the world. We get a steady flow of referrals from the Middle East, including one surgical patient [Dr. Nasser Ibrahim Al-Rashid] who was very satisfied with our services and graciously endowed a chair for me.”

FINDING AN EFFECTIVE APPROACH TO A DEADLY CANCER

As a researcher, Tse has focused on turning laboratory discoveries into effective methods of treatment, a process called translational research. “We need to understand the molecular underpinnings of diseases,” he says. “As a surgeon, I tend to look for surgical remedies to solve patient problems, but in reality, the clues often lie in the molecular mechanism causing the disease.” Tse adds, “If we are to advance, the need for basic research to solve pressing clinical
problems cannot be over emphasized. Medicine is a dynamic field where change is a constant, and the future is just an experiment or two away.”

That multidisciplinary approach has paid off for Tse and his patients in treating cancer of the lacrimal gland, an organ responsible for tear production. “The lacrimal gland is a structure inside the orbital socket that is prone to spawning tumors,” says Tse. “While these can be benign as well as malignant, there is one very aggressive form called adenoid cystic carcinoma, where the 10-year survival rate is only 20 percent. Surgical intervention alone is often ineffective and, in rare instances, potentiates tumor extension,” Tse notes.

Therefore, Tse has developed a different approach that involves using chemotherapy to shrink the tumor before any surgical manipulation. The first step involves inserting a catheter in the patient’s groin to deliver a high dose of chemotherapy directly into the artery serving the lacrimal gland. “Unlike most of the body’s organs, this gland is served by one artery and one vein,” Tse says. “That means we can infuse a high concentration of chemotherapy into the tumor without being toxic to the patient.” The tumor will absorb most of that medication and by the time the drug reaches the venous circulation, the concentration has dropped to a safe level. Normally, after two cycles of chemotherapy, the lacrimal tumor shrinks significantly. Then the Bascom Palmer orbital surgery team goes to work, removing the diseased gland.

“This treatment strategy has achieved a survival rate of over 80 percent – a dramatic improvement over surgery combined with radiation,” says Tse, who pioneered this treatment more than a decade ago. “Most orbital surgeons around the world are now considering this treatment option in a disease that’s very lethal,” says Tse. “In that regard, we have initiated a dialogue with the global medical community and become a thought leader in this area.”

Now, Tse is taking the next step forward, looking at the molecular clues of lacrimal gland cancer. “By deciphering the genetic information, we can find even better ways to attack this cancer and improve survival. We are looking at tumor cell markers and other genomic information that would permit us to tailor the therapy with the aim of delivering a pinpoint strike to the tumor without much collateral damage.”

HELPING CHILDREN BORN WITHOUT AN EYE

There are other ophthalmic conditions where effective treatment has been both elusive and costly. One example is children who are born without one eye, a congenital defect that typically results in lifelong facial disfiguration. “In the absence of an eye, the surrounding bone structure called the orbit will fail to grow,” says Tse. “Therefore, one side of the face will grow normally and the other will be smaller.”

Traditionally, oculoplastic surgeons would use a series of ever-larger implants to expand the orbital bone structure. This expansion process involves multiple surgeries over a course of several years for the child, whose bony structure development is delayed. “When you have to do several surgeries and still don’t have a good cosmetic outcome, there’s something wrong with the current method,” says Tse, “and this dilemma offers an opportunity to innovate.”

In a strategic collaboration with a local medical device manufacturer, Tse recently patented a new tissue expander for the orbit. This is an expandable balloon anchored to the socket bone by a titanium plate so that the device will not move. By inserting a needle into the center, the oculoplastic surgeon can gradually inflate the balloon with different volumes of fluid, eliminating the need for repeated surgeries to insert larger solid-ball implants. By inflating the balloon serially, the device can exert sustained pressure against the surrounding orbital bones to stimulate bone growth. This invention, which was recently selected as a winner in the 2010 Medical Design Excellence Awards, will reduce a substantial burden on health care by reducing the number of surgeries and, more importantly, less trauma to the child.

Three years ago, after Tse completed a proof-of-concept study, the U.S. Food and Drug Administration gave approval to use the expander in patients. Tse has now inserted it in patients with excellent results.
In his work, Tse has found that the orbital device can be inserted in babies as young as 8 to 12 months old. “We have had referrals of children age 6 or 7, when the socket is well developed, which is often a bit late to do the catch up.” He adds, “The best outcomes occur when the child is young. It definitely stimulates orbital bone growth and is well tolerated by the body.”

ADDRESSING TRAUMATIC INJURIES

There’s no question that Tse relishes a surgical challenge. Several years ago, he decided to take a fresh look at a condition called traumatic optic neuropathy. In these patients, a blow to the head, an automobile accident, or other injury, squeezes the optic nerve running through a bony tunnel to the brain, resulting in blindness. Even though the eye is uninjured, current therapies have been unsuccessful in rescuing the injured optic nerve to restore vision.

Drawing on research relating to spinal cord injuries, Tse is exploring a new approach to treat traumatic optic nerve injury. “Because both the optic nerve and spinal cord are part of the body’s nervous system, there may be similarities in developing therapeutic modalities,” he says.

Tse is receiving research support to pursue his novel treatment approach from the U.S. Department of Defense, which is concerned about the number of traumatic optic nerve injuries suffered by U.S. military personnel in Iraq and Afghanistan.

Tse has already been successful in developing an effective treatment for patients who have suffered a traumatic injury to an eye muscle. In these cases, the patient is unable to move the eye and suffers from disabling double vision. As a result, the patient must cover the eye with a patch, leaving only one eye for vision.

In searching for a solution, Tse developed an eye-muscle prosthesis that consists of a spring-like coil insulated by a special polymer. The prosthesis aligns the injured eye and allows it to move because of the spring. It then recoils back to primary position to eliminate double vision.

“Normally, healing in the eye socket would form scar tissues around a coil to immobilize its function,” Tse says. “So in collaboration with industry, we have identified a way to put an ‘insulation’ around the coil using a non-reactive polymer that does not invite scarring. It’s an excellent combination that produces a...
Also known as a great humanitarian and philanthropist, Al-Rashid has contributed to worthy causes throughout the world. Following his support of St. Jude Children’s Research Center in Memphis, Tennessee, he donated the funds to build the King Fahd Children’s Medical Center in Riyadh. Modeled after St. Jude, the hospital treats Saudi children with cancer free of charge. Al-Rashid donated the facility to the government. He also built, equipped and staffed a modern eye clinic in his home village. He was recognized by the University of Texas (UT) as a distinguished graduate of the College of Engineering in 1980 and in 1990, honored as a distinguished alumnus of UT at Austin. The Dr. Nasser Al-Rashid Strength and Training Center in Austin is named in his honor.

For more than 20 years, Al-Rashid has supported Tse’s to advance research in finding life-saving solutions for conditions that are dear to Al-Rashid’s heart: orbital cancers and children born without an eye. “Dr. Tse’s work with my father’s blind eye, and maintaining the vision in his good eye, has made him a hero to my father and our family,” said Ibrahim Al-Rashid at the chair presentation ceremony. “Our family owes Dr. Tse a profound debt of gratitude. I hope this endowment gives due recognition to him in some small way.” The investment in Tse’s research activities will provide support for oculoplastic vision research, including orbital cancer therapy, congenital socket abnormalities and development of an eye muscle prosthesis.

“My father has an inescapable belief in bettering the world and this gift makes an ongoing family commitment to advancing medical research and charitable giving.”

– Ibrahim Al-Rashid speaking at the chair ceremony for Dr. David Tse on behalf of his father, Dr. Nasser Ibrahim Al-Rashid