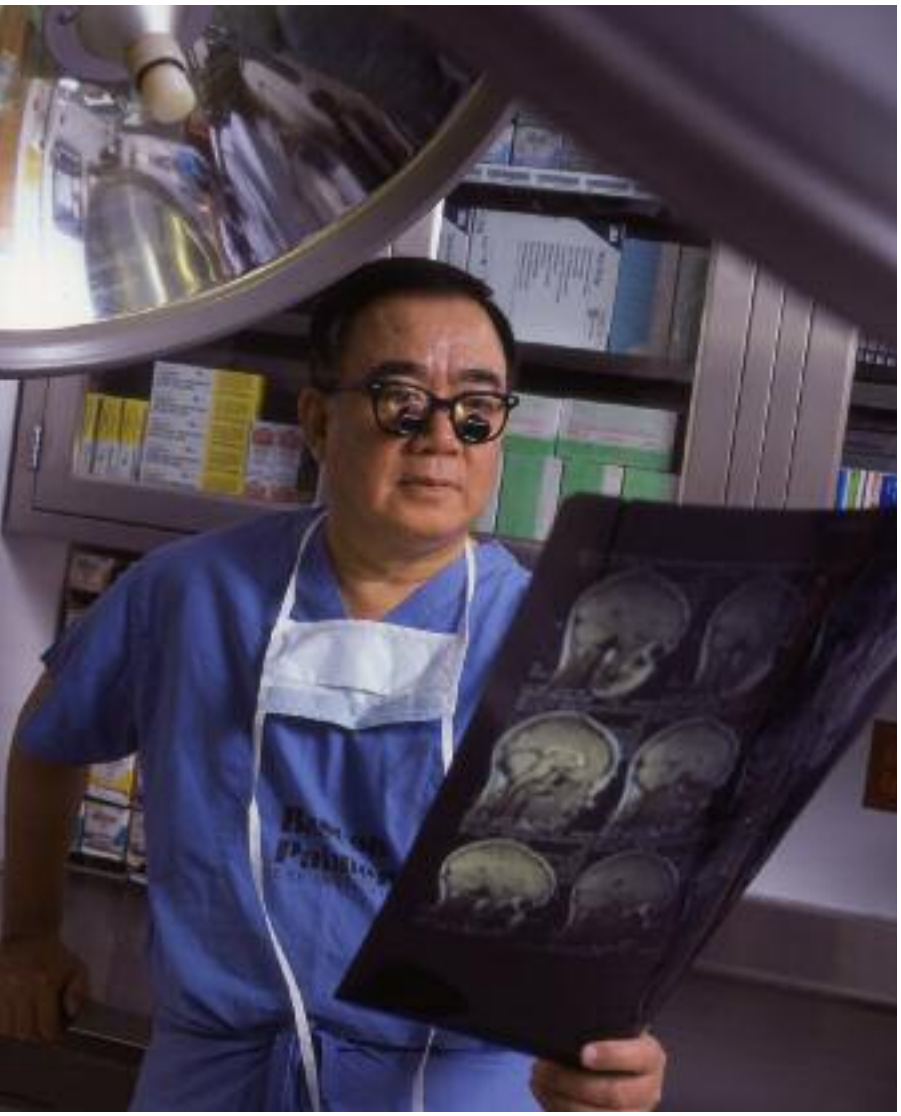
David T. Tse, M.D., F.A.C.S.
When eye conditions get tough,



"For me, every problem provides an opportunity to innovate and to find new treatment remedies. At Bascom Palmer, we are continually searching for new ways to improve the current treatments. After all, many of our patients are here because they have exhausted conventional therapies and still have a problem."

— David T. Tse, M.D., F.A.C.S.

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

Tse gets tougher

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

Nasser Al-Rashid endows chair for David Tse

Fahad Al-Rashid, Ibrahim Al-Rashid, UM President Donna Shalala, Dr. Eduardo Alfonso, UM Miller School of Medicine Dean Pascal Goldschmidt, Dr. David Tse

Nasser Al-Rashid, Ph.D., is the founder and chairman of Rashid Engineering in Riyadh, Saudi Arabia. One of 16 children, Dr. Rashid grew up in a modest mud house in an Arabian desert. He lost the vision in his left eye at the very young age of 12. Through hard work, determination, perseverance and a Saudi government scholarship program, he was able to attend the University of Texas in Austin. He graduated with a bachelor of science degree in civil engineering and earned his doctor of philosophy degree from the same institution.

After completing graduate studies, Al-Rashid joined the faculty of King Fahd University of Petroleum and Minerals in Dhahran, Saudi Arabia. He was first appointed director of construction and campus development, advancing to become dean of business affairs and then dean of engineering.

In 1975, he left academia to establish Rashid Engineering in Riyadh. The company began with a small contract when King Khaled asked Al-Rashid if it was feasible to build a first-class hotel in eight months in Taif, a summer resort in the Kingdom, in time for the coronation ceremony. When Rashid Engineering completed the task on schedule, the feat was etched into the annals of Saudi construction lore.

In the ensuing decades, the firm played a pivotal role in the country's economic evolution, participating in more than 90 major projects, including hospitals, schools, conference centers and government complexes. He was the principle architect and builder of the largest and most modern eye hospital in the Middle East, the King Khaled Eye Specialist Hospital in Riyadh.

working mechanism so the patient can move the eye by restoring part of the lost eye-muscle function. We are still refining the prosthesis and the anchoring platform."

TREATING SEVERE DRY EYE SYNDROME

Tse is also addressing the problem of severe dry eye syndrome, an uncomfortable, vision-threatening chronic condition frequently found in patients over age 50. Dry eye can occur when the lacrimal gland fails to produce enough tears or when moisture cannot flow through the tear film to clean the surface of the eye.

Recent studies show that many times dry eyes may be related to a buildup of inflammatory chemicals in the tear film that trigger a feedback inhibition of tear production. Tse's innovative treatment strategy involves "tricking" the brain into overriding the body's automatic feedback mechanism. By putting an electrode into the bony socket next to the lacrimal nerve, he then stimulates the lacrimal nerve to override the neural inhibition mechanism, leading to tear production.

Tse says he got the "signaling" concept from other surgical subspecialties. For instance, urologists use electrodes to treat incontinence, and spinal cord surgeons can implant an electrode to stimulate the patient's diaphragm to promote movement.

Two years ago, Tse and Dr. Andrea Lora received an industry grant to initiate a proof-of-concept study. By using optical coherence tomography, they were able to demonstrate an increase in tear volume production in a preliminary study. Now they are seeking additional funding to move Tse's research to the next stage.

TRAVELING THE ROAD TO 'MASTERY'

As Tse looks ahead to the next decade of research, education and patient care, he believes Bascom Palmer's ophthalmic surgeons will continue to move forward on the road to mastery. "Our group has achieved excellence in multiple areas," he says. "The goal for our service is to achieve mastery in multiple disease entities through translational research. We strive to carry on the goals of the organization: to continuously improve what we do best; to provide excellent patient care; and to inspire continual learning. Doing so assuredly will improve the quality of the oculoplastic practice to serve the public."

"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

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.