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THE NEWSLETTER OF THE UAB DEPARTMENT OF OPHTHALMOLOGY

A three-dimensional tomographic angiogram of the circle of Willis demonstrates an intracavernous internal carotid artery aneurysm (see arrow).

in this issue

Neural Networks

Understanding the Underlying Visual System

DURING HIS FELLOWSHIP in neuro-ophthalmology at the University of Miami's Bascom Palmer Eye Institute in the late 1970s, Lanning Kline, M.D., was already seeing patients from Alabama. "It wasn't unusual to see as many as a half-dozen patients each month referred to us from Birmingham, Huntsville, Montgomery, and Mobile," he recalls. "There were so few neuro-ophthalmologists in those days that patients had to travel all the way to Florida to see someone."

That shortage is one of the reasons Kline was recruited to UAB in 1979, in fact—to establish a neuro-ophthalmology service in the Department of Ophthalmology, which he now chairs. "Thanks to the guidance and support of quite a few remarkable individuals, I was welcomed into the UAB community and provided access to the worlds of neurology, radiology, and neurosurgery, which allowed me to build an interdisciplinary neuro-ophthalmic service," he says. "Of course, it's just that sort of collaborative attitude that makes UAB such a special place."

Constant Collaboration

One individual who was especially supportive in developing the service was J. Garber Galbraith, M.D., then chief of the Division of Neurosurgery. "He was a great man, both for UAB and for the medical profession as a whole," Kline says. "He allowed me to see his patients, he'd invite me into the operating room, and I'd go to neuropathology conferences with him. He was truly a mentor."

That close collaboration between ophthalmology and neurosurgery exists to this day, according to current Division Chief Richard B. Morawetz, M.D. "It's a 20-year relationship, and that's because Dr. Kline is a superb neuro-ophthalmologist," he says. "I deal with a number of conditions, such as pituitary tumors and craniopharyngiomas, that produce visual loss, and I rely on Dr. Kline to help me determine whether any visual symptoms are due to the presence of a tumor or something else. That's one of the great things about UAB: We provide a unique setting in which experts in two or more areas can collaborate to solve a patient's problems."

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It's a mutually beneficial relationship, according to Kline. "I might have a patient who has presented with visual failure due to an intracranial tumor, and I need the neurosurgeons to operate on him. At the same time, Dr. Morawetz might have a patient he's operated on for an aneurysm or an arteriovenous malformation of some kind, and he would need me to monitor that patient's visual function since further impairment might be the first sign of a recurrence.

"And those are just a couple of examples," says Kline. "There's a tremendous amount of collaboration between neuro-ophthalmology and neurosurgery."

From left: Neuro-ophthalmologist Lanning Kline, neurosurgeon Richard Morawetz, neuroradiologist Glenn Roberson (seated) and neurologist Edward Faught consult one another frequently to ensure the best possible treatment for the patients they share.

Complex Connections

According to Edward Faught, M.D., professor and interim chair of the Department of Neurology, interaction between the two departments is a natural. "Since the eyes are really a part of the nervous system, many of the things that affect vision are going to have an effect on the nervous system and vice versa," he says. "That's why all of us in the department consider the neuro-ophthalmology service to be such a valuable resource."

One of the most frequent reasons UAB neurologists seek Kline's advice is for patients with abnormal eye movements. "Eye movement control systems are very complex, and they involve several levels of the nervous system, all the way from the cortex to the brainstem to the cranial nerves down to the very muscles that move the eyes themselves," says Faught. "Quite often we'll run into patients who are seeing double or having some movement-related difficulty, and Dr. Kline is able to help us sort that out and localize where in the nervous system the problem lies."

Faculty aren't the only ones who benefit from the relationship, he says. "All of our neurology residents spend at least a month with Dr. Kline in neuro-ophthalmology, and that is routinely acclaimed as one of their favorite months," says Faught. "They really enjoy it."

Advances in Imaging

Probably the most important advances in the field of neuro-ophthalmology over the past two decades have come in the area of imaging. "Since the early 1980s, the progress made in neuro-imaging has been spectacular," says Kline. "In neuro-ophthalmology, the name of the game is to take the clinical finding and then localize the disease process, and having powerful methods such as MR and CT scans to immediately corroborate your clinical impression is really exciting.

"One very good example involves optic nerve sheath meningiomas," he continues. "In the pre-imaging days, it was difficult to make a diagnosis without conducting an exploratory craniotomy. With neuro-imaging, and especially MRI, we can now detect these benign tumors without a tissue biopsy because they have typical imaging characteristics." *(Please see related story on page 5.)*

Kline says he is so impressed with the work of UAB neuroradiologists that he has them review all of his patients' scans. "These individuals are so good at what they do that they can immediately determine whether the existing scans are adequate or if we should go ahead and schedule a new series," he says. "They've been able to detect abnormalities that were missed in previous scans, and they also use imaging techniques such as a fat-suppression algorithm that helps differentiate between the optic nerve and the underlying bed of fat in the orbit, which is extremely helpful."

There are several reasons images that accompany patients referred to UAB demand such close observation, according to Glenn Roberson, M.D., professor and chief of the Neuroradiology Section in the Division of Radiology. "If you're a physician working outside of a large medical center such as UAB, then you may not be in a position to recognize something beyond the ordinary in initial scans," he explains. "It's also true that, at the onset of a disease process, the findings may be very subtle, so they could be overlooked or thought to be within normal limits. But these things can change very quickly, and something could be different in a very short time."

Staying in close contact with the neuro-ophthalmologist while screening images is also key to success, says Roberson. "The communication between Dr. Kline and the neuroradiologist is extremely important, because it's a lot easier to find something if you know the clinical findings," he says, adding that he and his colleagues usually consult with Kline on a weekly basis. "Medicine is too big for one person to know everything, and you have to put your heads together if you're going to have the best result. That's exactly what we're able to achieve by communicating frequently."

Electronic Interaction

The aspect of neuro-ophthalmology that Kline enjoys most is playing the role of a medical detective. "These are usually very complicated problems, so a lot of work goes into sorting out all of your clinical observations and trying to make some sense of it all," he says. "It really keeps you on your toes, though, because you often encounter unusual, challenging cases that really send you into the library, or back to the textbooks, and have you calling your colleagues asking for their advice.

"These colleagues can be around the country or right here at home," he continues. "One of our former residents, Angela Lewis, completed a fellowship in neuro-ophthalmology at the Mayo Clinic. She practices here in Birmingham, and she is of great help to me in dealing with these difficult cases." *(Please see profile of Lewis on page 11 of this issue.)*

Kline says membership in the North America Neuro-Ophthalmology Society (NANOS) is especially helpful in such instances. "From the organization's Web site, I can access what's known as NANOSNET, which allows me to communicate with my colleagues via a listserv," says Kline, adding that there are some 400 members of NANOS

(continued on back cover)

from the department chair

Preparing this issue of Vision *proved to be an interesting personal experience for me. When Russ Willcutt of UAB Publications interviewed me for the cover story dealing with neuro-ophthalmology, it became a time of reflection and great satisfaction. It had been many years since I'd thought of the key ingredients that attracted me to UAB and the Department of Ophthalmology. Certainly the physical facilities were—and still are—second to none: the major teaching hospitals, the clinics, the operating rooms, the state-of-the-art equipment, an outstanding library, and great bench and clinical research laboratories.*

But, given more thought, it became clear to me that the real attraction was, and still is, the people—those individuals who create an attractive and exciting institution engaged in cutting-edge biomedical research and 21st-century clinical care. Being a neuro-ophthalmologist, I've interacted with a diverse group of colleagues including neurologists, neurosurgeons, neuroradiologists, neuropathologists, internists, radiation therapists . . . and the list goes on. It is the individual skills and collective synergy of UAB physicians and researchers that has made my 22 years here so unforgettable. As the Department of Ophthalmology grows and expands, its faculty will add to the fabric of this great medical center by further enhancing its reputation.

Other articles in this issue support this contention. Milton White, M.D., describes surgical techniques of the retinal vasculature and optic nerve, which are only in their infancy yet provide a ray of hope for retinal disorders that are often visually devastating. Ramon Dacheux, Ph.D., a national authority on the complexities of retinal circuitry, describes a new aspect of his research program, as he applies his expertise to possible mechanisms of glaucoma. Kay Scilley, Ph.D., is acquiring important outcomes research data, investigating the impact of visual disabilities and their treatments on the elderly population, particularly those in nursing homes. Finally, Martin Cogen, M.D., and John Parker, M.D., discuss the fundamental but important clinical challenges ophthalmologists face every day.

These are exciting times in the growth and development of the UAB Department of Ophthalmology, and it is the knowledge and skill of our faculty that establish the department as an outstanding resource for patient care and vision science research.

Lanning B. Kline, M.D.
Alabama Eye Institute Chair and Professor
UAB Department of Ophthalmology

Current Issues in Ophthalmology

New Treatments for Retinal Vein Occlusion

IT WASN'T TOO LONG AGO that performing surgery on retinal vessels or the optic nerve was considered to be too delicate and hazardous. These days, UAB ophthalmologists are performing such procedures nearly every week, marking a new advance in the treatment of retinal vein occlusion.

According to Milton F. White, Jr., M.D., an assistant professor in the department who specializes in retinal diseases, retinal vein occlusion is second only to diabetic retinopathy in causing vision loss due to retinal vascular disease. The disease comes in two forms—branch retinal vein occlusion (BRVO) and central retinal vein occlusion (CRVO).

"Until recently, the only options were laser treatment to stop the leakage or medication to lower eye pressure," he says. "But those options treat the results of the blockage rather than getting to the core problem." New procedures, however—including arteriovenous crossing sheathotomy for BRVO and radial optic neurotomy for CRVO—show considerable promise for repairing the blockages that are at the heart of both conditions.

The primary risk factors for both BRVO and CRVO are age (65 or over), high blood pressure, diabetes, and glaucoma. White explains that BRVO occurs at a point where the artery and vein cross on the surface of the retina, creating a hardening of the arterial wall that then blocks the small veins that drain blood from the retina. If the blocked veins are also responsible for nourishing the macula, some central vision is lost.

BRVO occurs in one of every 500 to 750 people in the 65-and-over age group. Some patients become legally blind, particularly if the macula is involved. "The natural history of BRVO is that it does get better in most patients, but it may take four to 12 months to resolve on its own," White says. "You're looking at about a 60-percent chance of vision improving. But even if that does occur, you have a long delay where the patient can't read or function. Swelling in the macula may cause permanent central-vision impairment, and this new treatment offers a chance at a better result in a much quicker time frame."

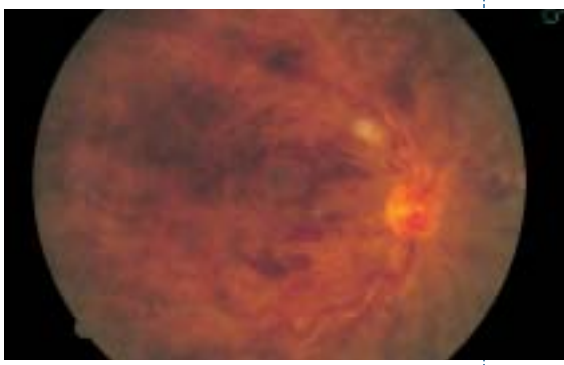
Sheathotomy—also known as decompression surgery—is a relatively straightforward process, according to White. "We use a small cutting instrument to remove the vitreous gel, which allows us to get back to the retina. Then, using a light probe for illumination and a sharp microsurgical blade, we gently incise the sheath and push the artery away from the vein. This allows blood to flow and restores function."

Technological advances have made this procedure possible. "Some of the retinal vessels aren't much bigger than a human hair, but our new instrumentation and microscopic viewing systems give us a steadier, more reliable view of what we're doing."

Sheathotomy has been performed on 15 patients at UAB to date. In 90 percent of those patients, vision has either improved or stayed the same. "About 60 percent had significantly improved vision, from 20/625 to 20/60, which is almost a tenfold improvement in visual function," White says.

CRVO occurs when the main retinal vein, located at the optic nerve, becomes blocked, and it can have even worse effects on vision than BRVO. A procedure called radial optic neurotomy, which has been used in Columbus, Ohio—and the results published, as well—offers a solution that once seemed unthinkable.

BRVO. *Intraretinal hemorrhages and macular edema accompanied by yellow lipid exudates*



CRVO. *Marked venous congestion and hemorrhagic macular edema*

"With this new technique, we go in with a small blade and incise where the optic nerve passes through a canal to the back of the eye, which gives the main vein more room to allow blood to leave," White says. "To me, this is even more radical than sheathotomy because you just don't think of operating on the optic nerve."

While the procedure has only been performed on five patients at UAB to date, it has been reported on a series of 12 patients in Columbus, with 60 to 70 percent of patients experiencing improved vision quickly. "It's pretty exciting to see a patient's vision improve so quickly and drastically. Both procedures represent major advances in retinovascular surgery."

Mapping Out ONS Meningiomas

IN 1999, JACK ROOTMAN, M.D.—head of the Department of Ophthalmology at the University of British Columbia in Vancouver, Canada—was contacted by the University of Amsterdam and asked to train one of their ophthalmologists in orbital surgery. As part of that training, he suggested conducting a multi-institutional study of the "natural history" of optic nerve sheath meningiomas. Rootman discussed the results of that project during an October 2001 Grand Rounds presentation to the UAB Department of Ophthalmology.

Jack Rootman, M.D.

Between the two universities, the study involved 88 patients, and we've been able to show that there is a correlation between the appearance of the tumor and the visual prognosis. In addition, we found that there is a correlation between the age of the patient and the prognosis. The younger the patients, the more likely they are to have intracranial extension and more rapid growth. We've also shown that tumors that have a component deep in the orbit more frequently have intracranial involvement as well.

Another interesting finding was that, in tumors with significant calcification—which was seen in approximately 30 percent of the cases—there was slower tumor growth. We documented that finding not only by using serial scanning, but also by looking at the proliferation rate using pathologic techniques on tumors that had been removed. We found that the ones that had high calcification proliferated at a much slower rate than those without calcification. So, from a clinical point of view, if you see significant calcification of the optic nerve sheath via imaging, you could reassure the patient that it's likely to be a very slow-growing tumor.

Another finding related to natural history of meningiomas is that, if a patient presents with vision that is better than 20/50, their chance of holding onto that level of vision for at least five years is quite significant—unless they have some other negative prognostic factor, such as young age or involvement at the orbital apex. You have time to intervene, in other words. On the other hand we did show, with a limited number of cases, that if the patient starts to show deterioration of vision, radiotherapy is very effective not only in stabilizing, but also in reversing visual loss in some cases.

If a surgical approach is required, then an en bloc removal is much more successful than an incomplete removal, which tends to be associated with recurrence of the disease. Another new finding was that, if the tumor was globular with irregular margins, it usually infiltrated the soft tissues of the orbit and was not possible to remove without removing the surrounding tissues, which obviously would lead to significant damage. If infiltrative, you have to be aggressive about the removal. This is only seen in a small percentage of meningioma cases, but it's important to recognize that such situations exist.

I found some of the findings of our study to be very interesting and slightly unexpected. I think the calcification factor was very reassuring, and we also found that about half of the patients with bilateral tumors had other tumors—either other meningiomas or vascular anomalies in the brain. Although the numbers were small, it's worth noting that patients with bilateral meningiomas may be prone to having other brain tumors.

We found a strong confirmation of the association of youth with more rapid meningioma growth—even though histologically the tumors are the same, they appear to grow quicker in young patients. That's been known in brain meningiomas and suspected in optic nerve meningiomas, but we've now shown it with volumetric studies.

As for the reasons, we don't have the answers. Meningiomas have been found to occur more commonly in women than men, and some people have shown that there are hormone receptors on meningiomas. And so there was a theory that maybe hormonal receptors affected growth of tumors. I've wondered about that in terms of growth hormone itself: perhaps the childhood tumors grow more because of growth hormone. But I think that's entirely speculative. We've just started studying a nine-year-old patient with a tumor that doubled in size over four months, so perhaps that case will provide us with answers.

UAB department of ophthalmology

TO PROVIDE *our readers a glimpse into projects and personalities in the department, we will profile selected faculty members in each issue of* Vision. *The names of faculty profiled in this issue appear in bold below.*

Academic Faculty

Michael Callahan, M.D.	*Professor*
Martin Cogen, M.D.	***Associate Professor***
Jeffrey Crain, M.D.	*Assistant Professor*
Christine Curcio, Ph.D.	*Professor*
Ramon Dacheux, Ph.D.	*Professor*
Frederick Elsas, M.D.	*Associate Professor*
Richard Feist, M.D.	*Assistant Professor*
Donald Fletcher, M.D.	*Associate Professor*
Christopher Girkin, M.D.	*Assistant Professor*
Clyde Guidry, Ph.D.	*Assistant Professor*
Greg Jackson, Ph.D.	*Assistant Professor*
Wade Joiner, M.D.	*Assistant Professor*
Arthur Kelly, M.D.	*Assistant Professor*
James Kimble, M.D.	*Associate Professor*
Lanning Kline, M.D.	*Professor and Chair*
Virginia Lolley, M.D.	*Assistant Professor*
John Long, M.D.	*Assistant Professor*
John Mason, M.D.	*Assistant Professor*
Andrew Mays, M.D.	*Assistant Professor*
Robert Morris, M.D.	*Associate Professor*
Cynthia Owsley, Ph.D.	*Professor*
John Parker, M.D.	*Assistant Professor*
Robert Phillips, M.D.	*Associate Professor*
James Powell, M.D.	*Associate Professor*
Russell Read, M.D.	*Assistant Professor*
Carol Rosenstiel, O.D.	*Assistant Professor*
Kay Scilley, Ph.D.	***Assistant Professor***
Harold Skalka, M.D.	*Professor*
Shu-Zhen Wang, Ph.D.	*Assistant Professor*
Milton White, M.D.	*Assistant Professor*
Douglas Witherspoon, M.D.	*Associate Professor*

Clinical Faculty

James Byrne, M.D.	*Clinical Instructor*
Alston Callahan, M.D.	*Clinical Professor*
Britton Carter, M.D.	*Clinical Instructor*
William Cox	*Adjunct Assistant Clinical Professor*
Susan Eiland, M.D.	*Assistant Clinical Professor*
Greer Geiger, M.D.	*Assistant Clinical Professor*
Curtis Graf, M.D.	*Instructor/Fellow*
Paul Levine Kaufman, M.D.	*Instructor/Fellow*
Christopher Kelly, M.D.	*Clinical Instructor*
James Kelly, M.D.	*Clinical Instructor*
Price Kloess, M.D.	*Assistant Clinical Professor*
Ferenc Kuhn, M.D.	*Associate Clinical Professor*
Elmar Lawaczeck, M.D.	*Clinical Professor*
Ralph Levene, M.D.	*Clinical Professor*
Angela Lewis, M.D.	*Assistant Clinical Professor*
Michael Massey, M.D.	*Assistant Clinical Professor*
Nancy Medeiros, M.D.	*Assistant Clinical Professor*
Thomas H. Metz, M.D.	*Assistant Clinical Professor*
Marc Michelson, M.D.	*Assistant Clinical Professor*
John Morgan, M.D.	*Assistant Clinical Professor*
John Owen, M.D.	*Clinical Instructor*
Roswell Pfister, M.D.	*Clinical Professor*
Elise Cox Pratt	*Adjunct Instructor*
Stephen Sherrod Scott, M.D.	*Instructor/Fellow*
Donald Stephens, M.D.	*Instructor/Fellow*
Thomas Tann, M.D.	*Instructor/Fellow*
Wayne Taylor, M.D.	*Clinical Instructor*
Donald Turnbull, M.D.	*Associate Clinical Professor*
Yujen Wang, M.D.	*Instructor/Fellow*

Martin Cogen, M.D.

Clinical Faculty Profile

AS MARTIN COGEN USHERS a visitor into his examination room, it quickly becomes apparent that he is not your typical ophthalmologist. He presses a pedal with his foot and a toy owl on the far wall begins to hoot. Another pedal sets a toy chimpanzee in motion, banging tiny cymbals together. Yet another causes a film featuring various Disney characters to flash across a small screen.

"When you're dealing with children, half the battle is having the right tricks," says Cogen, a pediatric ophthalmologist in the UAB Department of Ophthalmology. "With a few toys—a little 'smoke and mirrors'—you can get through most eye exams pretty well with kids. It seems to make their parents more comfortable, too."

As a child growing up in Philadelphia, Cogen always knew he wanted to enter medicine. He first earned his bachelor's degree at Trinity College in Hartford, Connecticut, before entering the University of Alabama School of Medicine. He says he was unsure of his specialty until he took an ophthalmology elective during his fourth year.

"If you're a practical person—as I am—ophthalmology is a wonderful profession," he says. "I don't like what I call

Kay Scilley, Ph.D.

Research Faculty Profile

LOOKING BACK, Kay Scilley says her mother was probably the reason she decided to study psychology. "She originally trained as a nurse, and her favorite assignment was working in a psychiatric ward," Scilley says. "But she later became a preschool teacher and took a number of developmental psychology courses along the way, so I heard a lot about that growing up."

Her decision to specialize in gerontology is also a result of early exposure. "I worked in a retirement community when I was in high school, and I was fascinated by the knowledge and wisdom the elderly have to share with us."

These experiences and influences convinced Scilley to work toward an undergraduate degree in psychology at St. Cloud University in Minnesota, and then to earn her master's degree in clinical psychology at Minnesota State. She then accepted a position at the University of Pittsburgh as a project coordinator, and when the study's principal investigator was later recruited to UAB, his entire research team—including Scilley—came along with him.

Martin Cogen says close observation—and a good toy—can mean a stress-free exam for everyone involved.

'it-might-be-this-or-it-might-be-that' medicine. In ophthalmology we can usually spot the problem, measure it, and then fix it. I take great satisfaction in being able to do that."

After his residency in Birmingham, Cogen completed a fellowship in pediatric ophthalmology and strabismus at the James Hall Eye Center at the Scottish Rite Children's Hospital in Atlanta. He joined the UAB Department of Ophthalmology in 1989, becoming a full-time faculty member in April 2001.

Cogen says he spends the average day in a variety of ways. "The bulk of my time is spent refracting since a lot of kids need glasses for nearsightedness, farsightedness, or astigmatism, but I also do a lot of general pediatric ophthalmology," he says. "We see cysts on eyelids, blocked tear ducts, and eye infections, but we also see some life-threatening conditions such as eye tumors or brain tumors, where the first symptom is blurred vision."

One of Cogen's special interests is strabismus, or ocular misalignment, which is found in about one out of every 100 children. While glasses are the only corrective needed in about 80 percent of childhood strabismus cases, other cases require patching or even eye-muscle surgery.

"Around the age of two, if a child is farsighted, he or she will over-use the eye muscle to see things up close," he says. "That brings the eye in toward the nose, causing misalignment. But the child has to do that just to see the world."

The problem then shifts toward amblyopia, in which "the brain 'shuts off' the crossing eye in order to prevent double vision," Cogen says. "If the condition isn't treated, the nerve fibers will become set between the ages of six and nine, and the vision loss in that eye will be permanent."

Because of this, Cogen recommends regular eye examinations for children at an early age. "Mother Nature gave us straight eyes so that we can have depth perception. Without straight eyes, we lose our binocular vision and the ability to judge distances. Many infants with strabismus won't walk or go down stairs until their eyes are straightened."

Cogen finds correcting such problems rewarding. "As strange as it might sound, one of the best things about working with kids is that they will eventually grow up," he says. "So if you're able to correct a problem when a child is young, then it will be better for the rest of their lives."

Kay Scilley is gathering data on nursing home residents, especially "quality-of-life" issues such as access to eye care.

While working toward her doctorate in developmental psychology at UAB, Scilley studied quality-of-life issues in local nursing homes. "I was struck by how debilitating visual impairments are to the elderly, and also by how little research had been done into how nursing home residents access eye care services."

It was then she met Cynthia Owsley, Ph.D., who is best known for her research into age-related vision loss. "I had wanted to work with her for quite some time. Fortunately, the opportunity presented itself, and I was able to transition straight into the type of quality-of-life, outcomes research that I wanted to do." Scilley joined the UAB Department of Ophthalmology in 1998, just as she was completing her doctorate.

Scilley says it's understanding the whole process of eye-care delivery that interests her most, especially the positive outcomes associated with improved vision. "We're really starting to understand how the whole process works—everything from how someone is identified as needing an eye exam to how it is conducted and how that information is actually delivered to the ophthalmologist's office," she says. "We're also looking at whether family members and social workers are notified and educating them, as well as the nursing-home staff, on issues related to eye care."

Scilley says the underlying theme of her research is outreach to underserved populations—a group that often includes the residents of nursing homes. "We have all of this great research into detecting and treating eye diseases, but not enough work has been done to examine the barriers underserved populations face when trying to access eye-care services," she says, adding that she's in the beginning stages of writing a proposal to study and identify these obstacles. "No one should be denied eye care because of age, race, gender, or financial circumstances."

As for the personal rewards of her work, Scilley says they are many. "I feel that it's a privilege to be able to spend time with these people," she says. "It gives me the opportunity to learn from the lives they've lived."

Adhesive Alternatives

Sticky Solutions for Corneal Perforations

According to John Parker, cyanoacrylate adhesives are an excellent treatment for most corneal perforations.

OPHTHALMOLOGISTS HAVE a number of high-tech options for the treatment of corneal diseases. But a decidedly low-tech substance plays a prominent role in the treatment of some patients, according to John Parker, M.D., an assistant professor in the UAB Department of Ophthalmology. "Surgeons know it as cyanoacrylate adhesive," he says, "but most people just call it super glue."

Parker is an expert in using these adhesives in the repair of corneal perforations; he has even taught a course for the past two years on the ophthalmic use of cyanoacrylates at the annual meeting of the American Academy of Ophthalmology. He says that, when cyanoacrylates were first developed in 1959, scientists were quick to realize their potential for a variety of biological uses—and that ophthalmologists have used them extensively since around 1968.

"A study several years ago at Johns Hopkins compared patients who had corneal perforations or holes during the 10 years before the use of super glues to patients during the 10 years after the glue came into use," says Parker, who completed his fellowship in corneal and anterior segment surgery at that institution. "The study's results proved that the prognosis was dramatically improved for the patients after glue became available."

Corneal perforations result from a number of causes, Parker says, including systemic disorders (rosacea, cancer, rheumatoid arthritis), dry eye, and infections. "Fortunately, cases in which we need to use super glue are few and far between," he says. "But of the ones we do see, the patient is desperately ill—in fact, there is usually about a 10 percent risk of losing the eye."

If the hole is small enough, a patch might be used for repair. For larger holes, corneal transplant might be required. But for holes of a certain size—3 millimeters or less—many specialists believe that super glue is the best option. "We put a dab of glue on the cornea, and as soon as it touches moisture, the polymerization characteristics of the glue are activated, causing it to solidify," Parker says. "In some cases, the glue will prevent a perforation that is about to form. We usually apply the glue right here in the office, but it must be done in the operating room in the most serious cases."

While ophthalmologists still use stitches to close lacerations of the eye—and probably always will, due to the nature of that type of wound—stitches usually aren't appropriate for corneal perforations. "Stitches are useful when you have a cut or slice in the eye, but when you have a very small hole, you just can't close it with stitches. You also have to be mindful of the proper relationship between the eye and the eyelid, which glue helps us do."

While the methods for using glue in the repair of corneal perforations have not changed much over the years—nor has the material itself—Parker says there is greater understanding of the underlying problems. "We have more diagnostic ability to understand the causes of perforations, and we have more drugs for fighting infections, but the glue has been used the same way since the mid-1970s."

Parker says he enjoys working on the cornea because it harbors relatively few mysteries. "The cornea is a fun area in which to work because you can see it and measure it easily, and we have all sorts of diagnostic and therapeutic tools for treating corneal diseases," he says. "It's an area that allows us to help a lot of people. It's a very accessible, observable, treatable part of the body."

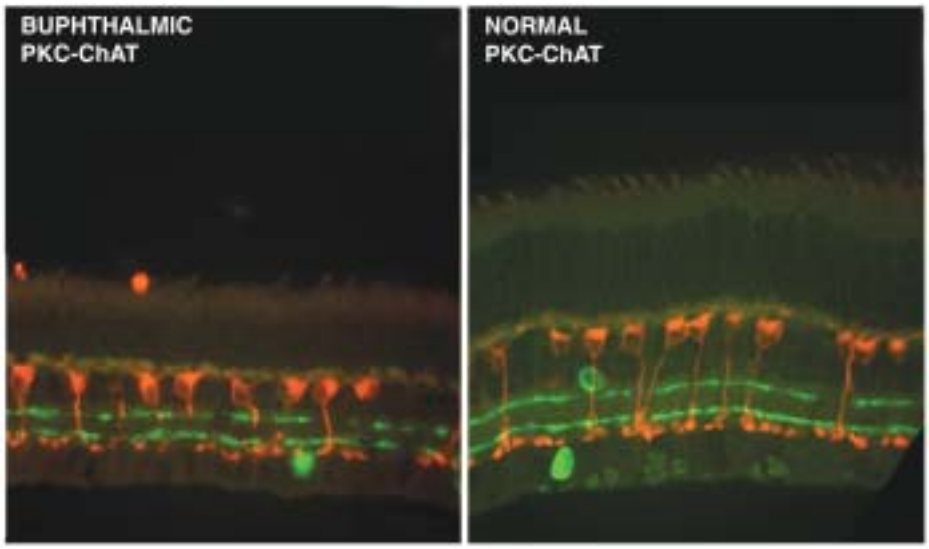
Retinal Revelations

Dacheux Ponders Ocular Hypertension

RAMON DACHEUX, PH.D., holds many distinctions. He is a renowned expert on the circuitry of the mammalian retina, has served on many National Eye Institute study sections, and received a prestigious Jules and Doris Stein Professorship from Research to Prevent Blindness, Inc. But in the last year he's achieved yet another claim to fame: He is the proud owner of the only colony of buphthalmic rabbits currently in existence. "Never thought I'd be in the rabbit business," he says, "but there you have it."

Dacheux became interested in the creatures—also known as "moon-eyed" rabbits for their enlarged eyeballs with light-blue corneas—when he decided to study glutamate levels in the rabbits' vitreous as well as their retinal structure. Locating the rabbits turned out to be more difficult than he'd expected, and it was some time before he found a veterinarian with Covance, Inc., in Denver, Pennsylvania, who had a male and two females. "He said if I wanted to buy them, we could establish a colony," Dacheux recalls. "So that's what I did."

In the six months since, Dacheux's research has led him in unexpected directions. "We'd been looking into the inhibitory transmitters such as GABA [gamma-aminobutyric acid] and glycine, and I did a little additional reading on glutamate, which is a major excitatory transmitter in the nervous system and in the retina. The ironic thing is that even though glutamate is an important transmitter that cells need to communicate, too much of it can lead to what's called 'excitotoxicity,' in which calcium floods into the cell and causes it to die," he says, adding that glutamate is also released by neurons in response to injury or trauma, such as the elevated intraocular pressure associated with glaucoma. "So the thing that drew me to the buphthalmic rabbits is that, even though they had this increased pressure in the eye, they did not have the damage to the optic nerve, which is characteristic of glaucoma. So that's what I wanted to figure out—why do the rabbits have increased intraocular pressure without the optic nerve involvement that defines glaucoma?"



The image of a buphthalmic retina, left, indicates the same structures that exist in the normal retina, right, but they are "stretched" across a larger surface area.

Dacheux consulted with biochemist John Baker, Ph.D., who runs UAB's amino acids analysis core facility. "Unlike published reports claiming to have found high levels of glutamate in animals with induced glaucoma, we didn't find elevation in the buphthalmic rabbits," he says. "So that knocked me off the glutamate path right there."

What Dacheux decided to do next was compare the retinas in the buphthalmic rabbits to those found in controls. By using antibodies as markers for specific neurons, he and medical student Lacey Thomas were able to determine that there were no abnormalities in the buphthalmic retinas besides a certain "stretching" of the structure to cover the eyeball's expanded surface area. "This is a normal retina," he says. "It's 30 percent thinner and the cells are truncated, but there doesn't appear to be elevated glutamate and there's no ganglion cell damage. So why is that?"

Dacheux's hypothesis is that high intraocular pressure has nothing to do with the optic nerve damage found in glaucoma. He believes that the secret will be found in the tissue of the lamina cribrosa—the sieve-like structure in the sclera where the optic nerve passes out of the eye and connects with the central nervous system. "Either the rabbit has a very rigid lamina cribrosa that protects the optic nerve or it's very pliable and yields to the pressure. What I know for a fact is that elevated intraocular pressure has no effect on the retina at all."

Although Dacheux has written a proposal to continue this line of research, he will need a collaborator if he receives funding. "I'm a retina circuitry person," he says with a smile. "That's my bag."

Glaucoma Fellowship

Curtis Graf, M.D.

Curtis Graf is the first to admit that he hasn't yet been struck by wanderlust. A native of Mobile and a graduate of Birmingham-Southern College, he earned his medical degree from the University of Alabama School of Medicine. "I'm about as inbred as a person can be," he laughs. "I've done all my training in Birmingham, and it's been a wonderful experience."

Even from a professional standpoint, he's only migrated a couple of inches. "I originally thought I'd become an ear, nose, and throat specialist, but then I was exposed to ophthalmology during my internal-medicine rotation," he says. "Just like that, I was hooked."

So hooked, in fact, that he entered the UAB Department of Ophthalmology's residency program, graduating in June 2001. He is currently involved in a year-long glaucoma fellowship, working alongside Christopher Girkin, M.D., a well-known clinician, researcher, and director of the department's glaucoma service. This relationship has been especially meaningful, says Graf.

"Dr. Girkin is just a few years older than I am, so I have the sense of working with a peer while learning from someone who has already established a strong reputation in the area of glaucoma," says Graf. "He brings a lot of energy and excitement to his work, and it's impossible not to get caught up in that. He's helped a number of residents become interested in glaucoma, and he's been a major inspiration in my career."

Graf started the fellowship last July, and he says it keeps him on a busy schedule. He works on glaucoma cases at UAB Hospital and the Callahan Eye Foundation Hospital, as well as the VA Medical Center and Cooper Green Hospital. "It's a clinical fellowship, with a lot of surgical work," he says. "I cover the glaucoma clinics in all four hospitals, I spend time in Dr. Girkin's clinic, and I have my own clinic as well. Over the course of the year, I'll log close to 150 surgical glaucoma cases."

Glaucoma is a leading cause of blindness in the United States, and *the* leading cause among African Americans. "It's a group of diseases that have a characteristic optic neuropathy in common," Graf says. "It's more common in people over the age of 65, but we see patients of all ages with it, including newborns."

The disease presents a number of challenges for clinicians. "It causes damage that is irreversible, and there is no cure at this time," Graf says. "It can only be controlled in some cases, and the only strategy we have at present is lowering the intraocular pressure. We can do that in a variety of ways, including medical therapy with eye drops, laser procedures, and even surgery in advanced cases."

The vision loss associated with glaucoma is caused by damage to the optic nerve. High intraocular pressure (IOP) has long been thought to be the primary risk factor, but it is only one of many. People who do not have high IOP can develop glaucoma, in fact. *(Please see related story on page 9.)*

Graf points out that, while the vast majority of glaucoma patients do not become blind, the disease can be frustrating for patients and physicians alike. "It's a chronic disease, and there's no going back with glaucoma," he says. "Once a patient loses vision, it's gone forever. Our challenge is to halt visual loss where it is and prevent further vision loss."

The good news, though, is that more is now known about glaucoma than ever before.

"I think this is an exciting time in glaucoma care," says Graf, who plans to enter a private practice in Mobile after completing his fellowship. "We have a lot of new imaging technology that allows us to monitor the disease better, and I think that over the next five to 10 years, we'll see advances that will really change the way we approach both the diagnosis and treatment of glaucoma."

Curtis Graf, a graduate of the UAB residency program, is helping create a patient database as part of his glaucoma fellowship.

Alumni Spotlight

Angela Lewis, M.D.

A neuro-ophthalmologist who practices with her father—also a graduate of the department's residency program—Angela Lewis enjoys teaching the residents part-time.

WHEN ANGELA LEWIS was in grade school, her show-and-tell presentations were always the best in her class. "My father was in this 30s when he left the military and went back to school at LSU, so I was around 10 when he entered medical school and went through his ophthalmology residency," she says. "When he was practicing surgical techniques on pig's eyes, I was right there with him. Needless to say, I always had something neat to take to school."

Now she and her father, James Lewis, M.D., have come full circle. Both are ophthalmologists and even practice together in downtown Birmingham. "In addition to that, my sister is an orthopedic surgeon, so I think you could say that dad has been a real inspiration to us both."

Yet another bond joins Lewis and her father, since they both completed their residencies at the UAB Department of Ophthalmology. "I'm the program's first legacy," she says. "And since he only finished about 10 years ahead of me, a lot of my instructors would say, 'You make me feel old, because I taught your dad, too!'"

Lewis—who refers to herself as a "military brat" who grew up all over the United States before earning her undergraduate degree at Stanford University—spent her first two years of medical school at Baylor University and then finished at LSU in New Orleans. "I thought about going into general surgery," she says, "but the ophthalmologists I had met seemed like very happy people, and that made an impression on me."

In August 1994, Lewis completed a one-year fellowship in neuro-ophthalmology at the Mayo Clinic. "When I was in college and medical school, I was always attracted to the 'neuro' side of things—how neurons worked and how they connected. Finding the lesion was something I always found fascinating," she says. "I also remembered the old saying about surgery that 'a chance to cut is a chance to cure.' Neuro-ophthalmology allows you to do both."

Lewis says that about 30 percent of her practice now involves neuro cases, with referrals coming from around the Southeast. "Neuro-ophthalmology involves diseases that affect the brain and the eye simultaneously," she says. "It might be a brain tumor that affects vision, or multiple sclerosis that leads to eye problems, or a stroke where the first manifestation of the event was loss of vision, so you've got to have a real understanding of how things work together." *(Please see cover story.)*

Lewis says she has particularly fond memories of her time at the Mayo Clinic. "It's so steeped in history and tradition, and you're always hearing about 'the Mayo Way,'" she says. "You would ask why you were doing something a particular way, and they would say, 'Because it's the Mayo Way!' For example, you have to put your left glove on first in the OR because the Mayo brothers were left-handed. And it's such an international clinic—I saw princes and monarchs from all over the Middle East. So I had the opportunity to see a lot of diseases there that you wouldn't normally see in the United States."

In addition to her private practice, Lewis serves as a clinical assistant professor in the UAB Department of Ophthalmology, where she presents a lecture once a month and conducts rounds with residents. "When Dr. Kline first asked me to teach, I wasn't interested. But he kept telling me that I had something important to share with them. Once I got started, I discovered that I enjoyed teaching and was actually pretty good at it."

Perhaps it comes from those earlier successes in show-and-tell at school, but Lewis still believes in the importance of props. "I come in with lots of slides and visual aids," she says. "I've always found that people respond well to that sort of thing, no matter their age."

(cover story continued)

located around the country and throughout the world. "If I'm puzzled over a particular case, I can send out a query and get the input of other neuro-ophthalmologists who may have seen something similar. It's amazing how helpful it can be to have that kind of interaction with other physicians."

Such interaction between neuro-ophthalmologists and others is central to the field, says Kline. "Neuro-ophthalmology really is about reaching out," he says. "My relationships with physicians in other fields helps me to be successful in my own, and I'm constantly learning from them even as I'm teaching their residents who are rotating through the Department of Ophthalmology.

"Whether I'm consulting with a neurologist on a case involving multiple sclerosis or a neurosurgeon regarding a brain tumor, I'm confident that, by relying on each other's experience and expertise, we'll be able to provide the best care possible for our patients."

UAB Ophthalmology on the Web

www.uab.edu/eyedoc

alumni notes

• RAY CAIN, M.D. (1983-86), resides with his wife Sandra in Decatur, Alabama, where he's practiced solo since 1987. The couple has three daughters: one 13-year-old and 11-year-old twins.

• JOON Y. KIM, M.D. (1981-84), practices in Jonesboro, Georgia, where he resides with his wife, Michelle. They have four children: Jennifer, Elaine, Jason, and Jeffrey.

• ALAN B. RICHARDS, M.D. (1976-79), is a pediatric ophthalmologist and resides in Shreveport, Louisiana. He is married with two grown children.

• WAYNE TAYLOR, M.D. (1991-94), specializes in retina/vitreous and resides in Tuscaloosa, Alabama, with his wife, Elizabeth.

WE ARE PLEASED TO ANNOUNCE *that* Vision *has won an Award of Excellence for External Newsletters in the 2001 CASE District III Advancement Awards Program. It is the second such award* Vision *has received since its launch in 1999.*

PLEASE MAKE PLANS *to join us Saturday, June 1, at the Callahan Eye Foundation Hospital for the 2002* ***Annual Clinical and Research Symposium.*** *Guest lecturers will be Dan Jones, M.D., chair of the Department of Ophthalmology, Baylor College of Medicine, and Robert Nussenblatt, M.D., scientific director at the National Eye Institute. For more information contact Jean Clayton at (205) 325-8507 or jrclayton@uabmc.edu.*

• IN MEMORIAM: JAMES R. GLASSNER, M.D. It is with great sadness that we mark the death of Dr. Glassner in a tragic accident while bicycling in December 2001. He is survived by his wife, Rebecca, and their daughters Kristen, 17, and Sarah, 14. He will be remembered for his love of family, of sports, and of his profession.

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