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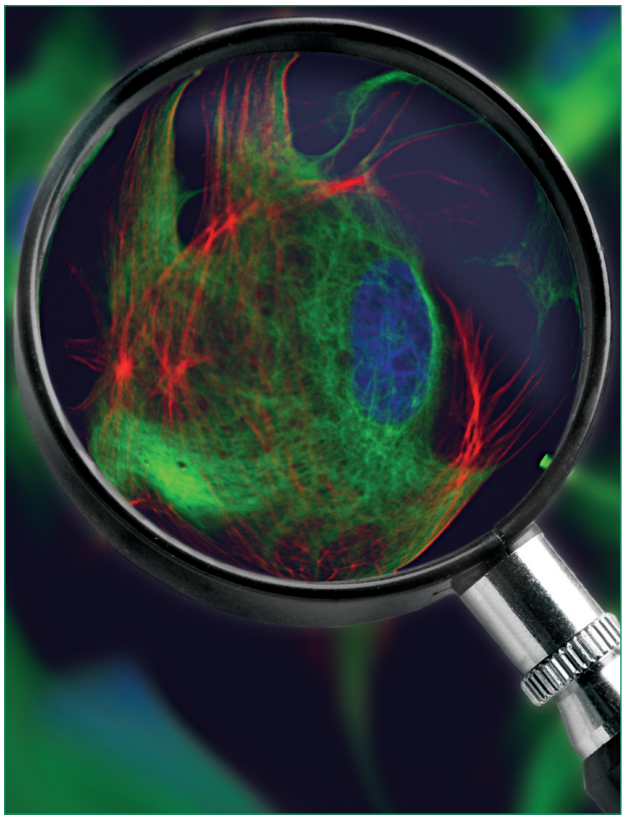


Basic science researchers in the UAB Department of Ophthalmology are studying retinal diseases at the cellular level, as seen in this image of a Müller cell.

in this issue

Investigations in Ophthalmology

Exploring the Mysteries of Ocular Disease

THREE CATEGORIES COMPRISE the UAB Department of Ophthalmology's mission—patient care, education, and research—but it's the research, in particular, that strengthens the treatments and training so crucial to the ophthalmic enterprise. "So much of what we have to offer our patients, as well as our residents, is the result of the dedication and creativity of basic-science researchers around the world," according to Lanning Kline, M.D., the department's chair. "And that's especially true of our own research faculty, who are making great strides in magnifying our understanding of how the eye functions while also addressing the root causes of a host of debilitating vision-related diseases."

As important as these discoveries are, especially in terms of leading to effective therapies, these five scientists provide additional benefits to the department. One involves raising the department's stature, both on the UAB campus and beyond, when their papers are published in renowned academic journals. Another is the funding provided by prestigious organizations such as the National Institutes of Health, Research to Prevent Blindness, the International Retinal Research Foundation, the Foundation Fighting Blindness, and the EyeSight Foundation of Alabama. Yet another are the collaborations established with researchers in other disciplines at UAB and universities found around the world, which enhances the department's reputation. Their accomplishments also facilitate faculty recruitment, attracting scientists and clinicians alike who thrive in an atmosphere of curiosity and discovery.

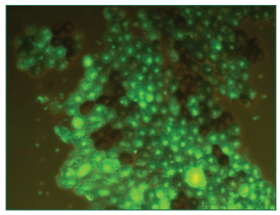
One point of which Kline is particularly proud involves the researcher's efforts toward "translational" breakthroughs, or those which could someday make the transition from the bench to the bedside. "When you look at the lines of investigation our scientists are pursuing, you can easily see the direct link to a wide variety of blinding diseases," he says. "They are working at the genetic and cellular levels to identify the factors that set off a cascade of events that can eventually lead to vision loss. So not only are they allowing us to fulfill that critical aspect of our mission in the department, they are also playing an important role in moving vision science research forward as a whole."

Richard B. Marchase, Ph.D., who is vice president for research and economic development at UAB, says the university's collaborative environment supports this quest. "UAB has a proud history of facilitating interdisciplinary research," he says. "Department and school barriers have never stood in the way of productive collaborations. That's certainly the case in the neurosciences, and in vision science in particular. This spirit leads to opportunities that require the cross-cutting expertise that characterizes so many of our research programs."

In speaking of the department, Kline says that he has often used the analogy of a table, which requires a minimum of three legs in order to remain standing. "In the same way, the three related aspects of our mission must be equally strong for the department to continue building on its past successes," he says. "I'm proud of our researcher's contributions toward achieving that goal."

This special feature, concluded on page seven, provides an overview of the important work being conducted by the department's research faculty.

(continued on page 2)



The Kapp Laboratory

At left, freshly isolated retinal pigment epithelial cells from mice that express the green fluorescent protein demonstrate a typical hexagonal pattern.

ACCORDING TO JUDITH KAPP, PH.D.—a professor and vice chair for basic research in the UAB Department of Ophthalmology—there's a fairly straightforward question at the core of her research: what causes the rejection of transplanted tissue? "One aspect of our work involves identifying the cells that cause rejection as well as the ones that inhibit that reaction," she says, "and we're using corneal grafts as one of our models."

Although corneal transplantation is successful approximately 80 percent of the time, according to the National Eye Institute, with some 40,000 performed each year in the United States alone that still leaves a significant number of cases that fail. "It's wonderful that it works as well as it does, but that's still not good enough," she says. "So there's a tremendous need to develop a strategy to treat those patients, because there's no substitute for a cornea, and no other therapy is currently available."

Another promising avenue she is pursuing involves the transplantation of retinal pigment epithelial (RPE) cells into an animal model in order to explore novel ways of treating eye diseases such as age-related macular degeneration (ARMD). "In that case we know that RPE cells are the first ones to expire, which subsequently causes photoreceptor cell death, leading to vision loss," she says. "So the idea is that, if we could transplant healthy RPE cells into the eye that would 'take' and not be rejected, then you might be able to prolong the survival of the photoreceptor cells and therefore protect the patient's vision. But we're still at the very early stages of that investigation, simply looking at the question of whether or not the cells survive under various experimental conditions."

Kapp's work is supported by a number of funding sources—including the NIH, the Foundation Fighting Blindness, and Research to Prevent Blindness, from which she was honored with a senior scientist award—and also by her experienced colleagues in the lab she shares with Pat Bucy, M.D., Ph.D., her husband, who is a professor in the Department of Pathology. One of them is Xiao-Yan Xu, the lab's designated "mouse surgeon," who also handles corneal graft transplantations. Kazuhito "Kaz" Honjo, Ph.D., specializes in cell tissue cultures, conducting a great deal of the in-vitro work necessary to Kapp's studies. Her sister, Linda Kapp, is a technician who also focuses on tissue culture systems, and Kelly Goldsmith is the operation's mouse geneticist and breeder. "Our lab isn't huge right now, but we've achieved a critical mass of really good people," she says.

Beyond the department, Kapp points to Enid Keyser—lab manager of UAB's flow cytometry and cell sorting facility—as a key resource, and she collaborates with scientists at other universities as well. "I came to the ophthalmology department from Emory University, where I'd begun several studies with Dr. Hans Grossniklaus, who's an ocular pathologist, that we're just now completing," she says. "He's interested in the development of choroidal neovascularization, or CNV, and we're currently working on a paper for publication."

Looking to the future, Kapp is interested in a number of potential projects, one involving ocular melanoma. "One of my postdoctoral fellows at Emory and I had taken a look at ocular tumors using a non-melanoma model, and we recently published a paper on the results," she says. "But we wanted to make the work more relevant, from a clinical standpoint, by doing some studies involving melanoma and asking the question of whether the induction of immunity to reject a tumor is inhibited by the same things that allow a graft to survive. If we can alter immunilogical tolerance, we could possibly achieve ways for a patient to 'reject' a deadly intraocular tumor."

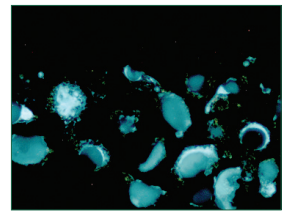
Interestingly, one of the anti-cancer drugs that has caught her attention—and which she has tested before, though not on ocular melanomas—is called Noscapine, which has been marketed for years in Europe as a cough suppressant. "Working in vivo we found that the compound is profoundly suppressive of the tumor's growth rate, but it does not kill it directly," she says. "It appears to be causing the immune system to work in overdrive to reject the tumor, and that's something I'd really like to know more about. Especially in light of the metastatic aspects of ocular tumors, which often seed the periphery of the orbit and therefore require further treatment."

Many obstacles have already been eliminated should she decide to pursue this line of inquiry since toxicity testing has been completed and the drug deemed safe for human use, even at very high levels, and a pharmaceutical company has acquired the patent for its use in the treatment of human tumors. "This is something that you once bought over the counter in a bottle to take for a cough," Kapp says, "and it turns out that it's many times more important as an anti-tumor agent. But in research of this nature, you never know where your inspiration will come from."

Judith A. Kapp, Ph.D.

Undergraduate:	Miami University
Master's degree:	Indiana University Medical School
Doctorate:	Harvard University
Contact:	(205) 975-7081, jkapp@uab.edu

The Curcio Laboratory



As seen here, drusen can be isolated from human donor eyes, concentrated, and stained (bright blue) to reveal that they contain abundant cholesterol.

WITH AN ACADEMIC BACKGROUND in neuroscience, Christine Curcio, Ph.D., freely admits that "very little of what goes on in this lab is something that I was actually trained to do," she says with a laugh. "I'm here by the efforts of a lot of wonderful people who worked hard and took my crazy ideas and implemented them, and by having access that many scientists don't have to specimens with macular degeneration from the Alabama Eye Bank."

Her interest in aging in the retina led to her eventual specialization in age-related macular degeneration (ARMD), especially once she'd determined that there were "big holes in the literature because people didn't have access to these specimens of eyes at different stages of the disease's progression," Curcio explains. "So by having this human tissue to study, we learned about some normal processes in the eye that no one else knew were happening there. It was our lab that made these observations and put them in print, and I'm very proud of that."

In beginning to learn about ARMD, Curcio delved into the existing literature on atherosclerosis, wanting to learn about plaque deposition and, more importantly, the source of the cholesterol. "By and large, the cholesterol that accumulates as plaques on the vessel walls are low density lipoproteins, or LDL," she says, "the 'bad' cholesterol in the bloodstream that we've all read about. But I felt there had to be a simpler explanation, and by making use of the facilities that were available to me—as well as the input of my colleagues here in the department and across campus—I was finally able to put all the pieces together and postulate a local production source: namely that the cholesterol that plays such an important role in ARMD are actually produced within the eye, and which we refer to as RPE lipoproteins."

Having published her findings in academic journals, Curcio is gratified to learn that at least three other labs are now working in the same area, taking her discoveries as a starting point and carrying them forward. "And I couldn't be more pleased," she says. "It may sound funny, but the longer you work on something without somebody else trying to replicate your findings, or build on them, the more you start wondering about the validity of your own research. So it's good that other people are trying to follow up, even if that means competition, because you'd really rather have that than not."

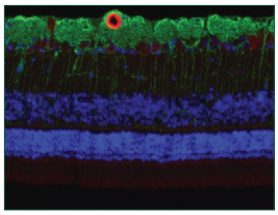
Stated simply, Curcio's work focuses on three different areas: human tissues, cell cultures, and animal models. Two main thrusts of the human-tissue studies involve isolating and comparing drusen—the retinal lesions characteristic of macular degeneration—and analysis of lipoprotein particles in the eye. The lab's cell culture studies have led to the growth of a cultured line of RPE cells, basically "feeding" them fatty acid components, observing how the cells change, how they process the lipids, and what they secrete into the surrounding medium. Curcio says the preliminary evidence points to the production of "something very lipoprotein-like." The work with mice—which is just now getting underway—involves introducing different inhibitors and modulators of the lipoprotein assembly and secretion system, using pharmacalogic methods in order to determine whether these pathways are active in the mammalian retina.

As one would expect, many talented individuals come together in conducting these studies. Full-time staff include molecular biologist Chuan-Ming Li, M.D., Ph.D.—who also has a master's degree in biostatistics and handles most of the lab's statistical analysis, among other responsibilities—and Jeff Messinger, who is a research assistant with a strong interest in imaging techniques, including electron microscopy. Two fellows are Lan Wang, an ophthalmologist from China, and Martin Rudolf, M.D., who hails from Germany. Others whose assistance is invaluable include Mark Clark, an ophthalmic photographer who also works in the department's Clinical Research Unit, lab manager Susan Vogt—"her lab is down the hall, where she is Dr. Read's research associate, but we consider her a friend with a capital F," Curcio says—and Beth Busbey, an administrative associate in the department who oversees matters pertaining to grant proposals, allocation, and budgeting. "I also have these wonderful clinical ophthalmologists in the department to consult with, including Nancy Medeiros, Jim Kimble, and Russell Read, who's also in our research unit," she says. "I value their expertise, and they're a tremendous resource for me."

Combined, these professionals make up a formidable team, and Curcio is gratified by the success they've achieved so far, and pleased to see it being taken seriously by scientists at other institutions. "My attitude has always been, feel free to use my work, but be sure to cite it," she says. "And that's just what's happening. You're starting to see papers appearing in the literature that have clearly used our work as a starting point from which they're using their own expertise to forge ahead in new directions. And that's how it's supposed to work—that is the nature of the scientific enterprise."

Christine A. Curcio, Ph.D.

Undergraduate:	Brown University
Master's degree:	University of Wisconsin, Madison
Doctorate:	University of Rochester
Contact:	(205) 325-8632, curcio@uab.edu

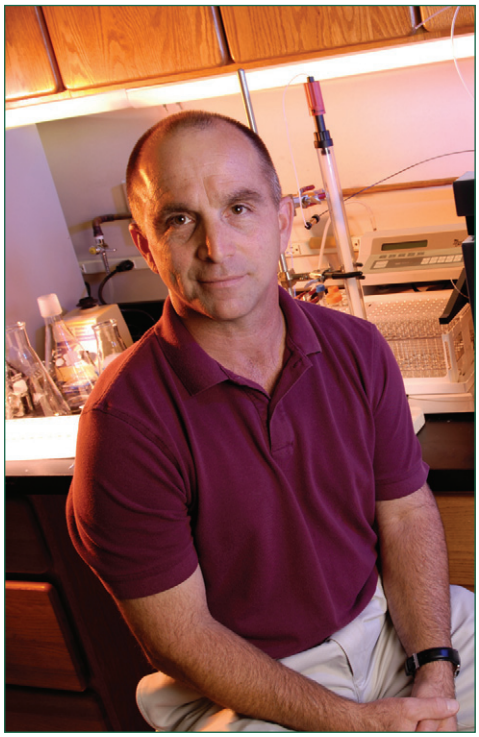


The Guidry Laboratory

At left, retinal Müller cells can generate tractional forces. On the cover, a Müller cell in a normal retina.

TRAINED AS A BIOCHEMIST AND CELL BIOLOGIST, Clyde Guidry, Ph.D., says that his lab is a merger of those two disciplines. "Everything that we're involved in is very basic in nature," he says, "but it's primarily focused on retinal diseases."

The work being conducted in Guidry's lab has to do with examining the cells involved in the diseases that ultimately lead to traction retinal detachment, namely proliferative diabetic retinopathy (PDR) and proliferative vitreoretinopathy (PVR). The two types of cells being studied are retinal pigment epithelial cells and a type of glia in the retina called Müller cells. In these two disease processes the cells change phenotype and their activities are altered, resulting in the development of the scar tissue that causes traction retinal detachment. The RPE work is supported by a grant from the International Retinal Research Foundation and the Müller cell study is funded by the National Institutes of Health, which provides approximately 90 percent of the laboratory's operating funds. Additional funds have been awarded by Research to Prevent Blindness, and past contributors include the EyeSight Foundation of Alabama and the Juvenile Diabetes Research Foundation.



According to Guidry, the turn his work has taken recently involves trying to determine how these activities are controlled. "The tractional force generation is a lot like cell growth—it doesn't just happen, it has to be stimulated," he says. "And the most common stimuli are in the form of soluble growth factors in the eye which, in association with disease, cause these cells to do their thing. So we've already gone through a fairly elaborate study identifying which growth factor families are responsible for this, and now we're trying to figure out where the activity comes from. And, coincidentally for both cell types, it's the insulin-like growth factor family. So that's turning out to be the common theme between PDR and PVR."

In the lab Guidry relies on Jeffery King, a research associate who has worked with him for nearly six years. Sudipto Mukherjee was a graduate assistant who recently defended his dissertation and joined an internal medicine program at the William Beaumont Hospital in Royal Oak, Michigan, to complete his postgraduate training. Within the Department of Ophthalmology Guidry depends on John Mason, M.D.—clinical associate professor and vitreoretinal surgeon—to provide important input on the diabetes-related study. "We have also collaborated with a number of other vitreoretinal surgeons in the department, including Drs. Robert Morris, Doug Witherspoon, Luke White, and Richard Feist," Guidry says. "Working with people who actually treat patients with these diseases is absolutely essential to our program, and I can't sing their praises highly enough."

Collaborations are in place beyond the department, as well, especially with Sam Cartner, a veterinarian and interim director of UAB's Animal Resources Program. "Sam is someone who knows how to deal with whole animals, and that's been really important for my work. We developed a pig model for diabetes, for instance, and Sam was critical in that project's success. He's an important resource with respect to animal physiology and handling, and I've depended on his expertise a great deal over the years."

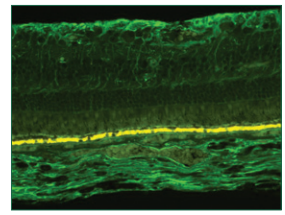
Another colleague who contributes to his work is Mary Elizabeth Hartnett, M.D., an associate professor in the Department of Ophthalmology at the University of North Carolina's School of Medicine. "She works on one of the cell types I'm interested in, so we send some specimens back and forth, but we're really just getting that relationship up and running," Guidry says.

As to what he enjoys most about his work, he points to the potentially important discoveries that may await around every corner he turns. "There was a time in college when I was thinking about becoming a physician," he says, "but all that changed once I entered the laboratory and observed the fascinating world that exists at the cellular level. It's something I enjoy and get excited about every day, because you never know when you might be the one to discover an important process that leads to a whole new understanding of a particular disease, such as diabetic retinopathy."

Clyde Guidry, Ph.D.

Undergraduate: University of Texas, Arlington
Graduate/Doctorate: University of Texas Health Science Center, Dallas
Contact: (205) 325-8673, cguidry@uab.edu

The Read Laboratory

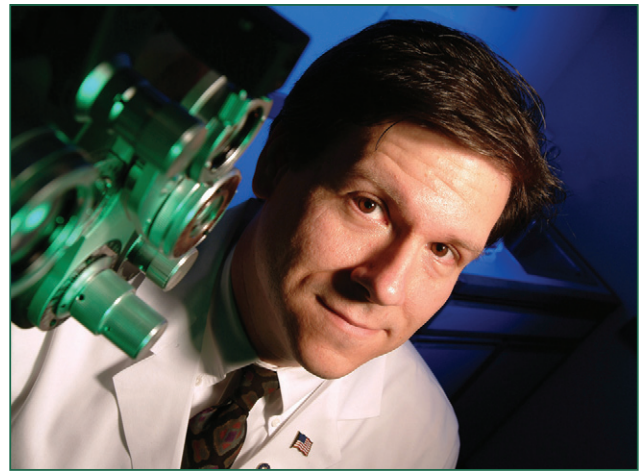


At right, vimentin staining highlighting Müller cell structure in the inner to middle retina of a normal human donor.

IT'S INTERESTING TO CONSIDER that, even as his research is focused on the future—perhaps leading to medications that may someday be useful in treating vision loss—Russell Read, M.D., is concerned with the most ancient, basic portion of the immune system. "It's known as 'complement,' and it's a series of proteins that, when activated, results in the amplification of an inflammatory response against a variety of conditions," he says. "It's part of the innate immune system, which is basically preprogrammed, as opposed to the adaptive immune system, which is somewhat malleable and responsive to the environment. And it's becoming more and more obvious that complement plays a role in many different conditions, including those that affect the eye. So that's at the core of my research right now, studying the role of complement in ocular disease."

Just at the beginning stages in this line of inquiry, Read is faced with many questions he'd like to answer—is complement the match that starts the fire, the fuel that accelerates it, or both?—but that's to be expected, he says. "Good research always generates more questions than answers, but our preliminary work is suggesting that it's more of a disease modifier than the underlying, initiating factor."

Read says there was a time when the role of complement in ocular disease was a fairly hot topic, but once the research had been taken to the limits the technology would allow, interest waned. He now has equipment and techniques at his disposal that simply weren't available 10 or 20 years ago, and he also has another important tool in his belt—transgenic knockout mice. "To have an animal model of uveitis, for example, that we can manipulate genetically has made all the difference," he says, giving the credit to his colleague and collaborator Scott Barnum, Ph.D., a professor of microbiology at UAB, whose lab is the source of the mice. "That's one of the things that drew me to UAB, in fact, was knowing about Scott and that I would have access to these transgenic mice."



While he admits there are others working in the same area, they are not using the same animal models or the same type of uveitis, so their paths are parallel rather than a duplicate of his own research. "Ours is a completely different protocol, but that's fitting," he says. "There's certainly room for many investigators since human uveitis isn't a single disease, there are multiple forms, so taking different approaches makes sense."

In addition to Barnum, Read has also worked closely with Christine Curcio on a study funded by the EyeSight Foundation of Alabama to examine the role of certain complement proteins in macular degeneration. He has also worked with Alexander Szalai, Ph.D., an associate professor in the UAB Division of Clinical Immunology & Rheumatology, in the Department of Medicine, who has also assisted in providing mice and evaluating data. The two have co-authored papers on the results of their work.

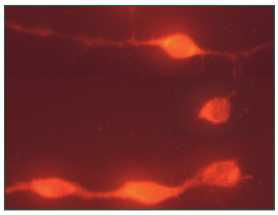
Someone to whom he is especially appreciative is Susan Vogt, the sole research associate in his lab. "Without her this stuff might have still happened, but not for another decade or two," he says. "She's a true professional, and an invaluable resource for me as well as many others here in the department."

Read says that the EyeSight Foundation has been instrumental in making this work possible. "They have been very generous, especially since they funded some of my original work when I joined the department in 2000," he says. "They provided me with a three-year grant at that time, which also allowed me to apply for—and receive—a five-year career development grant from the NEI. And I received a Physician-Scientist award from Research to Prevent Blindness, allowing me to use these resources as I see fit in terms of furthering my research."

Sources providing "venture capital" of this nature are crucial to young scientists who need to provide results before applying for funding from federal organizations such as the NIH. And with purse strings being tightened across the board, Read says that private donors are more important than ever before. "In fact, we welcome inquiries from anyone who's interested in touring our facility and learning more about the work we're doing," he says. "Not only is that good PR, it's good stewardship, because people have a right to know how their tax dollars—or potential contributions—are being used."

Russell W. Read, M.D.

Undergraduate:	Auburn University
Medical School:	University of Alabama School of Medicine at UAB
Internship:	Carraway Methodist Medical Center
Fellowships:	Uveitis/Ocular Inflammatory Diseases and Ophthalmic Pathology, Doheny Eye Institute, University of Southern California
Contact:	(205) 325-8620, rwr@uab.edu



The Wang Laboratory

The image shown at left contains photoreceptor cells taken from young chicks and suspended in culture.

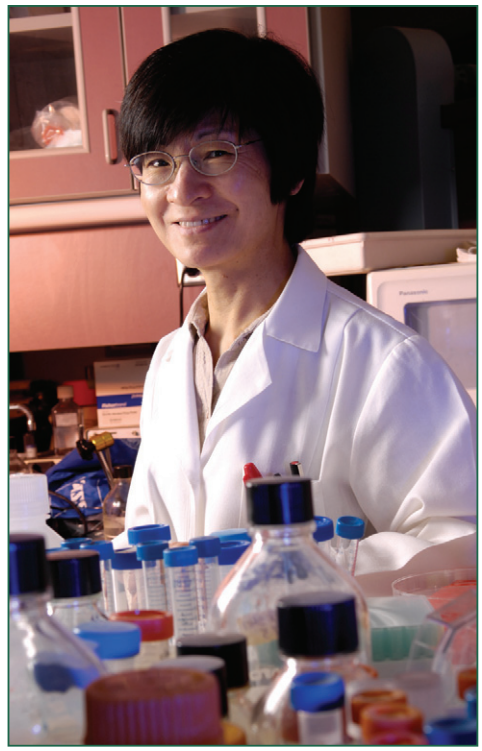
FOR ANY OPHTHALMOLOGIST dealing with patients whose vision has been compromised due to retinal cell death, the work of Shu-Zhen Wang, Ph.D., an associate professor in the Department of Ophthalmology, should be particularly exciting. In essence, she is pursuing the means by which to direct young, undifferentiated cells to become viable, functioning photoreceptor cells.

"I've been working on cell differentiation since I joined the department 12 years ago," she says, "but over the past five years we've developed a new avenue of research in our lab, which is to make stem cells—or stem cell-like, 'potential' cells—differentiate into particular types of retinal neurons. First we identify the molecules that play this important 'division-making' role, and then we use them to guide the cell's growth and development."

Wang points to an article published in *Nature* last year describing the transplantation of young photoreceptor cells into blind mice, which were then able to see. "That encouraged scientists to consider actually developing these new cells," she says, "and that's what we're doing, too."

Although she's been very successful working with an animal model—chick cells, in her case, in which she was able to identify the "decision-making" genes and then produce the desired results—progress has been slower since she turned her attention to human cells. "In the chicks we can amplify a particular group of cells and guide them to become neurons and then transplant them into the retina," she says. "But it's very hard to introduce genes into human cell lines."

One reason for this difficulty involves the current state of technology. "For example, there is a virus we can use as a vector that's easily introduced into chick cells, but we can't introduce that virus into human cells because then we would infect ourselves," she explains. "You would have to have a B3 lab, for biological safety level three, which has negative pressure, and we don't have access to that right now. Because of this we have to use other vectors, and they don't work as efficiently as viral vectors.



So we're somewhat impeded by a combination of biology and the simple realities of doing research, and also by the fact that human stem cells are hard to obtain."

At present Wang's three research projects are funded by three primary sources. "The NIH, which is our bread and butter, has provided a grant supporting our basic-science study into the biology of retinal development," she says. "The EyeSight Foundation of Alabama is funding research into how you make RPE cells into neurons, and the International Retinal Research Foundation is allowing us to investigate the genetic links between diabetes and retinopathy. In these last studies we've found that some of the genes that are responsible for photoreceptor cell development are also important for the development of insulin-producing cells in the pancreas, so we are testing whether diabetic retinopathy has less to do with glucose than with gene mutation."

Three professionals assist Wang in her lab. Run-Tao Yan, Ph.D.—"my right and left hand," she says—is an assistant professor in the department, and Wenxin Ma, M.D., Ph.D., has recently been named an instructor. Weiming Mao is a student in the university's vision science doctoral program. She also collaborates with Christine Curcio and Clyde Guidry, as well as Timothy Kraft, Ph.D., in the UAB School of Optometry's Vision Science Research Center.

Having come to the United States from China for advanced training in plant molecular biology, Wang entered the field of vision research when she joined the Wilmer Eye Institute at the Johns Hopkins School of Medicine in 1990. Five years later she was recruited to the UAB Department of Ophthalmology, where she says she enjoys—and relies upon—the open atmosphere of scientific discovery. "Not only do I have my colleagues here in the department to collaborate with, but also the faculty of the Vision Science Research Center and other departments and divisions across campus," she says. "Sometimes these relationships are formal, supported by grants and resulting in the joint publication of academic papers, but quite often they involve casual conversations in which we discuss our ideas and provide input that helps us each see our work in exciting new ways."

"It's very important to constantly be seeking out fresh ideas and information," she says, "because that—in addition to very hard work in the lab—is what can lead to observations and discoveries that you might not have made on your own."

Shu-Zhen Wang, Ph.D.

Undergraduate:	Hebei Agricultural University
Graduate:	Chinese Academy of Agricultural Sciences, Beijing
Doctorate:	Virginia Polytechnic Institute and State University
Contact:	(205) 325-8628, szwang@uab.edu

DISSEMINATING THE DATA

As much as these scientists contribute to the UAB Department of Ophthalmology—helping create an environment of intellectual curiosity and collaboration, and conducting research that may someday lead to novel therapies to use in treating its patients—it is also important to have venues to disseminate the results of their studies. In addition to Grand Rounds presentations, the Annual Clinical & Research Symposium provides an opportunity for both the clinical as well as the basic-science faculty to discuss their findings with ophthalmologists and vision scientists in the department, around the university, and across the state and nation.

"We also host the Loris and David Rich Lecture Series in Visual Science," Kline says, "which is made possible by a gift endowed by the Rich family. For this lecture series each researcher chooses someone to visit our department and give a presentation, and it's open to anyone in the larger vision-science community. And these are nationally-renowned scientists who will spend two to three days here on the UAB campus, giving them time to meet with our researchers and graduate students individually, tour their labs, brainstorm, and hopefully take away as many new ideas as they contribute themselves."

Just as the basic-science research division was established by Alston Callahan, M.D.—the namesake of the Callahan Eye Foundation Hospital, which he founded, and the department's original chairman—the Rich Lecture Series also has its genesis in his efforts. "Sometime after Dr. Rich's death, Dr. Callahan gave Mrs. Rich a tour of the department's laboratories," Kline says. "She was a very intelligent woman, and one of her first questions was 'How do these researchers know what's going on at other eye institutes?' Dr. Callahan pointed out that national meetings and academic journals are two ways in which that is achieved, but she had the idea of actually bringing researchers from other hospitals and universities to visit the department. This has become an event that our entire faculty anticipates each year, and that the vision science community here at UAB benefits from as a whole."

In many ways these efforts exemplify one of UAB's hallmarks—that it is a university where barriers between disciplines have virtually been eliminated. "When you bring people together of like mind, their conversations and collaborations can result in new lines of inquiry and important findings that can lead to better treatments and therapies for patients experiencing vision loss, whatever the cause," Kline says. "And I think it's clear that our basic-science faculty is certainly at the leading edge of those efforts."

from the department chair

ONE OF THE MOST EXCITING ASPECTS of any branch of science is the promise of discovery—of gaining new insights into how a process works, and how that series of events may be modified. Vision science clearly falls into the pursuit of discovery, with the promise of understanding a variety of blinding diseases and the hope this will lead to new avenues of treatment.

The UAB Department of Ophthalmology is actively engaged in the universe of vision science. This issue of Vision *highlights a group of outstanding investigators undertaking cutting-edge research. And just think of the possibilities: Judith Kapp, Ph.D., examining the role of immune tolerance both as a way of facilitating transplantation as well as a method of attacking ocular tumors; Christine Curcio, Ph.D., developing a whole new paradigm in conceptualizing age-related macular degeneration; Clyde Guidry, Ph.D., delineating the proteins which promote a series of devastating events in patients with diabetic retinopathy; Russell Read, M.D., studying the immune mechanisms of uveitis in order to develop specific forms of therapy for intraocular inflammation; and Shu-Zhen Wang, Ph.D., exploring specific genes that are able to differentiate cells into photoreceptors with the hope of making retinal cell replacement a viable therapy in the future. The promise of these scientists is staggering, and they are all having an important impact in their respective disciplines of vision science. But the excitement and potential their work represents is truly amazing—they are all at the frontiers of combating blindness.*

It takes a special person to become a scientist, someone who is willing to ask difficult questions and devise experiments to answer these questions, all while remaining open to unexpected results that may move lines of investigation into new directions. These individuals are dedicated, hard-working, creative, and willing to think "outside the box" in approaching their unique areas of study.

The UAB Department of Ophthalmology is honored to have these individuals as faculty members. They are an integral part of our research program, both inspiring and challenging the clinical faculty and resident physicians. I hope this issue of Vision *will give you new insight into the world of vision science. It is a world that affects us all, requires our support, and is our hope for the future!*

Lanning B. Kline, M.D.
EyeSight Foundation of Alabama Chair and Professor
UAB Department of Ophthalmology

Creative Connections

Joanne Wood adjusts a camera mounted to the specially equipped car used in the study she conducted with Jennifer Elgin and Cynthia Owsley.

WHEN YOU'RE INVOLVED in a fairly specialized field of research, such as delving into the connections between vision loss and driving ability, collaborators can be few and far between. Such was the case for Cynthia Owsley, Ph.D.—professor and director of the Clinical Research Unit, and vice chair for clinical research in the UAB Department of Ophthalmology—and Joanne M. Wood, Ph.D., MCOptom, FAAO, a professor in the School of Optometry at the Queensland University of Technology in Brisbane, Australia. Their answer? A three-month sabbatical at UAB for Wood, during which the two scientists gathered data on the effects of hemianopic visual field loss on driving performance.

"We'd gotten to know each other at meetings over the years, and by reading each other's academic papers, and I'd long admired her work," says Owsley. "And our research dovetails nicely, since she's mostly interested in the impact of vision on actual driving performance, while I tend to focus on vision loss and the rate of crash involvement. So we decided that working together would be a really exciting mix of talents and skills, which definitely turned out to be the case."

More than a year in the planning—which involved writing the proposal and gaining IRB approval, among other things—Wood arrived in Birmingham to begin work on the project last February, returning to Australia in early May. From her perspective, there were quite a few benefits to entering into the collaboration. "One advantage to coming here involved the fact that we could test patients with hemianopia on the open road, which isn't allowed in Queensland, where we are restricted to a closed-circuit track," she says. "But an equally important reason was the opportunity to work with Dr. Owsley, who is one of the leading vision and driving researchers in the world, and her team. That was something that I just couldn't pass up."

Hemianopia is the loss of half the visual field in each eye. "It's as if you're looking straight ahead, and half of your visual world has simply vanished," Owsley says. "Some people experience this on the right side, and some on the left. It varies according to which part of the brain has been injured. Causes include stroke, tumor, some sort of traumatic brain injury, or an arteriovenous malformation."

While some countries, such as Australia, and a few states within the U.S. don't allow people with this condition to drive, there is little data behind the decision, which is something Wood finds problematic. "If we find good reason for these restrictions, that's fine," she says. "But for someone to lose their driving privilege—which can be especially hard on younger people who are still holding a job—without hard evidence to back it up can lead to extreme difficulties in their lives that might be possible to avoid."

Owsley agrees. "Part of the reason we were interested in this is because no one has really taken people out on the road after they've recovered from their original brain injury to see what they can do," she says, "so there's sort of an unfairness about it. There are all kinds of medical conditions that people can have and still be allowed to drive, and it just seems like a rather sweeping and potentially discriminatory policy if there is no data that says they're unsafe. So that's why we went into this study: We wanted to actually see how people with hemianopia functioned while operating an automobile, and in a way that would allow us to measure their actual driving abilities."

The research itself was fairly straightforward, involving gathering hemianopic patients to monitor as they drove around Birmingham in a specially-equipped vehicle. A variety of driving conditions were utilized, such as wheeling through suburban neighborhoods before taking to the interstate, and the passengers included one or both of the two researchers, a "rater" to record details of the excursion, and Jennifer Elgin, OTR/L, CDRS, "our certified driving rehabilitation specialist," according to Owsley. The patients were recruited from a number of sources within the department, including ophthalmologists Lanning Kline, M.D., Mi-

chael S. Vaphiades, D.O., and Ronald Braswell, M.D., in addition to Dawn DeCarlo, O.D., director of the UAB Center for Low Vision Rehabilitation. The ophthalmology department's Gerald McGwin, Jr., Ph.D., and David Brenner, M.D., of the UAB Department of Neurology also contributed their expertise, and the study was "masked"—at least to Owsley and Wood—by including a certain number of non-hemianoptic drivers in the mix.

In addition to the watchful eyes provided by the car's trained passengers, the automobile was outfitted with an array of instrumentation, including cameras and a device that monitored acceleration and braking. "And we had a whole series of checklists that we used at different locations, and at each one we were assessing their scanning, braking, speed, steering control, lane position, judgment, their ability to use the blinker, and how well they obeyed the posted signs," Wood says. "So it's as objective as possible and repeatable, and each time we went out it was on exactly the same circuit, and with the same scoring criteria."

With more than 30 hemianopic drivers involved in the study, a wealth of information was accumulated, which is currently under review and will eventually result in the publication of the researcher's findings. The study was made possible, in part, by an unrestricted grant provided by Research to Prevent Blindness (RPB).

"Our department is fortunate that RPB has provided grant support for Dr. Kline to use at his discretion," Owsley explains. "RPB is involved in supporting a great deal of eye disease and vision impairment research, and the only stipulation is that the funds be used for various research projects rather than teaching or clinical applications. So I spoke with Dr. Kline about this study, and he thought it was a great idea, so he was able to provide us with the financial resources we needed not only to purchase the necessary equipment, but also to help with the protocol costs such as patient testing and issues of that nature."

Wood says the experience was a positive one, even beyond the important data that has been compiled. "Birmingham is very pretty, and the people I met were extremely friendly," she says. "I was overwhelmed by the kindness shown me, both by people in the department as well as everyone I met around town and on campus. There is a multidisciplinary approach to research at UAB that I found to be quite remarkable."

An approach, Owsley adds, from which everyone involved can benefit. "Joanne and I found that we work very well together, and that we bring complementary things to the table. When you have people coming together with different perspectives and backgrounds, that's what really makes research exciting," she says. "And it results in better science, as well."

UAB department of ophthalmology

THE FOLLOWING LISTS ALL MEMBERS of the department's faculty, along with their specific designation. Full-time faculty appear in bold. For more information on subspecialties, etc., please go to www.uab.edu/eyedoc.

Academic Faculty

Ronald Braswell, M.D.	***Assistant Professor***
Michael Callahan, M.D.	*Clinical Professor*
Martin Cogen, M.D.	***Associate Professor***
Jeffrey Crain, M.D.	***Associate Professor***
Christine Curcio, Ph.D.	***Professor***
Dawn DeCarlo, O.D., M.S.	***Associate Professor***
Laura Dreer, Ph.D.	***Assistant Professor***
Frederick Elsas, M.D.	*Clinical Associate Professor*
Andy Everett, M.D.	***Assistant Professor***
Richard Feist, M.D.	*Clinical Associate Professor*
Christopher Girkin, M.D.	***Professor***
Clyde Guidry, Ph.D.	***Associate Professor***
Wade Joiner, M.D.	*Clinical Assistant Professor*
Judith Kapp, Ph.D.	***Professor and Vice Chair***
James Kimble, M.D.	*Clinical Associate Professor*
Lanning Kline, M.D.	***Professor and Chair***
Rena Lewis, O.D.	***Clinical Instructor***
John Long, M.D.	*Clinical Associate Professor*
John Mason, M.D.	*Clinical Associate Professor*
Andrew Mays, M.D.	*Clinical Associate Professor*
Gerald McGwin, Jr., Ph.D.	***Associate Professor***
Robert Morris, M.D.	*Clinical Associate Professor*
Cynthia Owsley, Ph.D.	***Professor and Vice Chair***
John Parker, M.D.	*Clinical Assistant Professor*
Robert Phillips, M.D.	*Clinical Associate Professor*
James Powell, M.D.	*Clinical Associate Professor*
Russell Read, M.D.	***Associate Professor***
Carol Rosenstiel, O.D.	***Associate Professor***
Jennifer Scruggs, M.D.	***Assistant Professor***
Harold Skalka, M.D.	***Professor***
Jason Swanner, M.D.	***Assistant Professor***
Michael S. Vaphiades, D.O.	***Professor***
Shu-Zhen Wang, Ph.D.	***Associate Professor***
Milton White, M.D.	*Clinical Associate Professor*
Douglas Witherspoon, M.D.	*Clinical Associate Professor*
Jeff Yee, M.D.	***Assistant Professor***

Clinical Faculty

Michael Boyle, M.D.	*Instructor/Fellow*
James Byrne, M.D.	*Clinical Instructor*
Britton Carter, M.D.	*Clinical Instructor*
Anthony Correnti, M.D.	*Instructor/Fellow*
William Cox	*Clinical Adjunct Assistant Professor*
Susan Eiland, M.D.	*Clinical Assistant Professor*
Brett Gerwin, M.D.	*Instructor/Fellow*
Christopher Kelly, M.D.	*Clinical Instructor*
Price Kloess, M.D.	*Clinical Assistant Professor*
Ferenc Kuhn, M.D.	*Clinical Associate Professor*
Elmar Lawaczeck, M.D.	*Clinical Professor*
Ralph Levene, M.D.	*Clinical Professor*
Gregory Lewis, M.D.	*Instructor/Fellow*
A. Brent McKinley, M.D.	*Instructor/Fellow*
Michael Massey, M.D.	*Clinical Assistant Professor*
Nancy Medeiros, M.D.	*Clinical Assistant Professor*
Thomas H. Metz, M.D.	*Clinical Assistant Professor*
Marc Michelson, M.D.	*Clinical Associate Professor*
John Morgan, M.D.	*Clinical Assistant Professor*
John Owen, M.D.	*Clinical Instructor*
Tarek Persaud, M.D.	*Instructor/Fellow*
Roswell Pfister, M.D.	*Clinical Professor*
Elise Cox Pratt	*Adjunct Instructor*
Matthew Sapp, M.D.	*Instructor/Fellow*
Jeffrey Shere, M.D.	*Instructor/Fellow*
Wayne Taylor, M.D.	*Clinical Instructor*
Martin Thomley, M.D.	*Clinical Instructor*
Andrew Velazquez, M.D.	*Clinical Assistant Professor*
Matthew Vicinanzo, M.D.	*Clinical Instructor*
Jacob Yunker, M.D.	*Instructor/Fellow*

Staff Spotlight

Cassandra Page

WHEN SHE APPLIED for a position with UAB about five years ago, Cassandra Page was surprised by the speed with which her paperwork was processed. "I had an interview set up within 24 hours, and I was working for the Department of Ophthalmology less than two weeks later," she recalls. "It was almost like this is where I'm supposed to be."

Initially hired to provide administrative support for the department, she soon found herself with the opportunity to be part of the Glaucoma Service, working with specialists Christopher Girkin, M.D., and Jason Swanner, M.D., just as the division was beginning a period of tremendous growth. "Dr. Girkin had just received a grant that required additional space and support personnel, so he asked me to join the Glaucoma Service when it was moving into its new quarters on the fourth floor of the Callahan Eye Foundation Hospital," says Page, who is the service's administrative coordinator. "It's amazing how much we've grown in such a short period of time."

One example of that growth can be found in the number of patients now being seen. When Page first joined the service, Girkin was seeing about 100 patients each week. Since that time the number has almost tripled, with Girkin and Swanner now seeing as many as 275 patients weekly. The number of referrals from general ophthalmologists and other glaucoma specialists continues to rise, as well, with Page often acting as the point person for patients entering the service's system.

"Although the referring physicians will often contact one of our doctors first, sometimes they just know to call me because we've worked together in the past," she says. "But if they do call Dr. Girkin or Dr. Swanner, they will usually just say 'call Cassandra, she'll take care of it.' So in that case I'll call the patient and explain when our doctors are in clinic so that they can choose a time that's convenient for them, and I'll take down the information we need and forward it to scheduling."

Since many of the patients are traveling from beyond the city and might not be familiar with Birmingham or the UAB campus, Page makes a point of discussing the best routes and how to enter the hospital's parking deck in order to increase their comfort level prior to their appointment. And there are times when more is required, as in the case of a patient in need of surgery who is hesitant due to the fact that she cares for her elderly mother and can't leave her on her own. "So I called her insurance company to see what they cover, and I identified a couple of home-care services that could look after her mother while the patient is in surgery and recovery," she says. "You just do whatever you can to help the patient, even if that requires a little more than is expected."

In addition to her responsibilities in support of the service's clinical activities, Page is also involved in making sure its research enterprise flows smoothly, working with the department's administrative staff to develop and monitor budgets and ordering any necessary equipment and supplies. She also assists glaucoma fellows in acquiring whatever credentials they'll need prior to beginning their training and addresses human-resource issues as they arise.

As for Page's path to UAB, her varied background made her the ideal candidate to assist in the Glaucoma Service's operations. A Miami native, she is a graduate of Florida International University, where she majored in personnel management. She worked as a college and professional recruiter for many years before joining Georgetown University, where she was the liaison between the medical center and bone-marrow donors. She and her husband—Alfred, who is a recently retired Naval officer—then relocated to Tuscaloosa, where she worked for the University of Alabama in the dean's office in the School of Medicine, also serving as coordinator for the Rural Medicine Scholar's Program under John Wheat, M.D. After a stint working for an international law firm in Washington, D.C., Page returned to Alabama, where her relationship with the Department of Ophthalmology began.

Since settling in Alabama, her career and her family have thrived. Her son, Alex, is a graduate of Troy State University and currently an NFL scout for the Atlanta Falcons. Ashley, her daughter, has just begun her senior year at Hoover High School, and completed the Capstone Honor's Program at the University of Alabama—which she plans to attend—last summer.

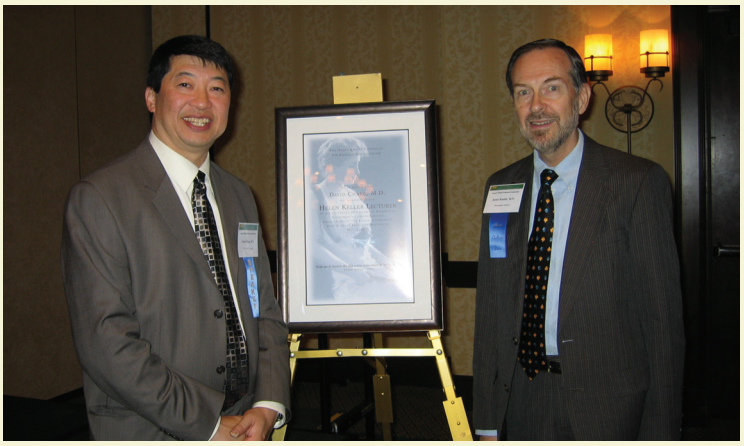
Page says she thoroughly enjoys her work in the Glaucoma Service, doing what she can to help the doctors as well as their patients. "I work with such a wonderful group of people, I really do," she says. "We have a lot of fun, but we're very professional. It's a pleasure being part of a team that's so dedicated to helping people overcome the challenges they face in dealing with glaucoma. It means a lot to know that we're making such a difference in people's lives."

2007 Symposium Update

The 2007 Annual Clinical & Research Symposium was held May 11-12 at the famed Ross Bridge Golf Resort & Spa. This year's event was a great success, with a record number of attendees and an extraordinary amount of fun. Festivities began on Friday at noon, with a "State of the Department" presentation given by Chairman Lanning Kline, M.D. Additional presentations continued throughout the afternoon, until the Alumni Reception on Friday evening. The reception was held on the terrace at Ross Bridge overlooking the swimming pool, with a beautiful view of the golf course. Back by popular demand, DJ Joe Palmer provided entertainment along with Razzle the clown for the children, resulting in the department's largest alumni event to date. Presentations resumed on Saturday morning and ran until lunch. Afterward, alumni and friends teed off for the annual golf tournament on the premier Robert Trent Jones Ross Bridge Golf Course. Congratulations to the winners: Eric Sputh, M.D.; Tom Lampkin, M.D.; Michael McEwen, M.D.; and J.D. Compton, M.D.

In addition, three ophthalmology residents are recipients of the 2007 McMahon Awards for their research presentations at the symposium. The Best Third-Year Resident Podium Presentation was given by Rhonda Barrett, M.D.: "Underestimation and variability of orbital floor fracture measurement by CT scan," along with co-authors John Long, M.D., Matthew Vicinanzo, M.D., and Gerald McGwin, Ph.D. The Best Second-Year Resident Podium Presentation was delivered by Alexander Talalight, M.D., who—along with co-authors John Mason, M.D., Milton White M.D., Richard Feist, M.D., and Martin Thomley, M.D.—discussed "Retinal detachment laser prophylaxis for eyes undergoing vitrectomy for removal of retained lens fragments." The Best First-Year Resident Poster Presentation was prepared by Tyler Hall, M.D.: "Comparing outcomes of penetrating keratoplasty and posterior lamellar keratoplasty" along with co-author John Parker, M.D. We hope to see you next year!

Richard Tipperman, M.D., at left, and seen here with Lanning Kline, M.D., and his wife Ricki—was the symposium's alumni-sponsored lecturer.



David Chang, M.D.—the Helen Keller guest lecturer—with James Kimble, M.D., UAB associate professor of ophthalmology.

A large crowd of opthalmologists from around the Southeast region enjoyed this year's event.

Razzle the clown paints the face of a young attendee.

department news

Incoming Residents

Taylor A. Mosley, M.D.
University of Alabama School of Medicine
Undergraduate: Auburn University

Kristin C. Bains, M.D.
University of Alabama School of Medicine
Undergraduate: Washington and Lee University

Kristen M. Hawthorne, M.D.
Medical University of South Carolina
Undergraduate: Clemson University

Shelly R. Gupta, M.D.
Northeastern Ohio Universities College of Medicine
Undergraduate: University of Akron

Luke W. Deitz, M.D.
Johns Hopkins University School of Medicine
Undergraduate: Johns Hopkins University

Graduated Residents

Brett Gerwin, M.D.
Retina fellowship with Retina Specialists of Alabama

Jacob Yunker, M.D.
Retina fellowship with Retina Consultants of Alabama

Kali B. Cole, M.D.
Pediatric ophthalmology fellowship at Medical University of South Carolina

Rhonda V. Barrett, M.D.
Oculoplastic and Reconstructive Surgery Fellowship with Dale Meyer, M.D., Albany Medical College, New York

Peter Goodwin, M.D.
Research fellowship for one year at the Henry and Corinne Bower Laboratory, Wills Eye Hospital in Philadelphia, followed by a retina fellowship with Retina Consultants of Alabama

UAB Ophthalmology on the Web
www.uab.edu/eyedoc

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THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Department of Ophthalmology
EFH 601 • 700 18th Street South
1530 3RD AVE S.
BIRMINGHAM, AL 35294-3361

(205) 325-8507

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