Texas A&M Health Science Center professor Dr. George Chiou, the director of Texas A&M's Institute of Ocular Pharmacology, has developed a treatment to prevent the progression of age-related macular degeneration, the leading cause of blindness and vision loss in people over 50.

Seeing The Future

By Stephanie Jeter '06

There's a disease that leads to blindness. Like most debilitating illnesses of the eye, its progression is defined as gradual, choosing to take sight slightly. One day you can see, and the next—there are shadows, fuzziness, spots. Dark. What would it be like to lose sight? An Aggie-owned company is changing the question: What would it look like to not?

PHOTO COURTESY OF THE TEXAS A&M HEALTH SCIENCE CENTER

You can't help but feel watched in Dr. George Chiou's office. Hanging on the walls are photos of eyeballs, posters of eyeballs and molecular drawings of a drug that can help the eyeball.

The Mona Lisa may follow your gaze, but it's Chiou's life work that keeps it.

Chiou, a Texas A&M Health Science Center professor and director of Texas A&M's Institute of Ocular Pharmacology, has developed an eye drop that, once approved by the Food and Drug Administration, will treat a condition that progresses to leave a patient partially blind.

Age-related macular degeneration, known as AMD, affects more than 30 million people worldwide and is the leading cause of legal blindness and vision loss in people over the age of 50. Because of reduced blood flow and damage to the retina, Chiou said, AMD gradually destroys central vision, leaving a blind spot in the center of a patient's eyesight (see photos below).

"There are two forms of AMD," Chiou said, "dry and wet." Though dry is the less advanced form—"In wet, the patient is almost blind," he said—dry accounts for 90 percent of all those diagnosed.

And for that 90 percent of more than 30 million people, Chiou said, there is no treatment.

"No, not in the whole world, there's not a single drug approved for treatment for dry AMD, not a single one," Chiou said.

But he's working on it, and so is Texas A&M.

Because in the whole world, before Chiou and his pharmaceutical company MacuCLEAR, there wasn't a single other start-up company to receive support from The Texas A&M University System and the College of Medicine. Not a single one.

Becoming MacuCLEAR

Once a year, the names of several Aggie inventions are placed in a hat. One by one, names are drawn from the jumble and handed to teams of MBA students at the Mays Business School to assess and determine the commercial appeal of each. Will the invention succeed in the market? Will it fail? Students have one week to decide.

It's an exercise in applying classroom knowledge to real-world situations, said Philip Ralston, CEO of MacuCLEAR–and judges sit at the ready.

That's where Ralston found himself in spring 2006—sitting before students, listening to ideas, grading the work of learners in a field in which he is quite learned.

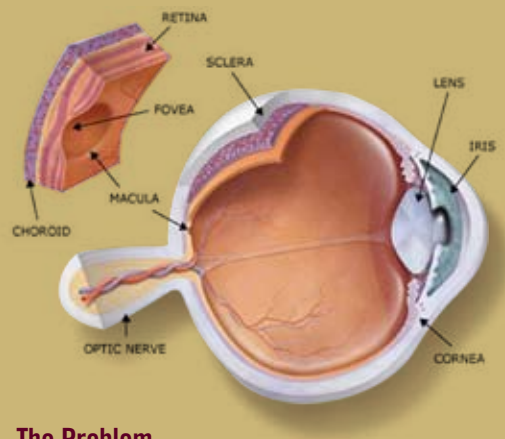
With more than 35 years in the life science industry and, at that point, four successful business startups behind him, when the student group stood to assess Chiou's discovery of the lead proprietary compound of MC1101 to treat the dry form of AMD, Ralston was held rapt.

He was interested, so interested that he made it known to A&M's Office of Technology Commercialization that he would help spin out the company. Ralston got the offer, came up with the name MacuCLEAR and got busy raising money. Clinical trials, ranging from preclinical to human, require big money, Ralston said.

Ralston's initial investors were The Texas A&M University System and the Texas A&M Health Science Center College of Medicine.

"As of right now, we (the System) own the majority of shares," said Guy Diedrich, vice chancellor for federal relations and commercialization. The criteria that the A&M System requires before it selects a company for spinoff are demanding, Diedrich said. An invention has to have

The image at left shows two boys as seen by someone with normal vision. The image at right is manipulated to show the same scene as it would be seen by someone with age-related macular degeneration.



The Problem

Age-related macular degeneration is the leading cause of blindness for people over 50. Thirty million are affected worldwide. Ninety percent have the early or "dry" form, for which there is no approved treatment. If the dry form progresses until there is bleeding into the retina, or the "wet" form, the patient loses his or her central vision. AMD has an estimated economic impact of more than $30 billion annually.

The Solution

The fundamental difference between dry and wet AMD is the integrity of the Bruch's Membrane. MacuCLEAR treats dry AMD by restoring blood flow in the small or choroid vessels of the macula, which typically has been reduced due to aging, similar to atherosclerosis. It also treats inflammation and oxidative stress common with aging. Restoring blood flow removes waste and debris that if allowed to accumulate can cause a rupture of the critical Bruch's Membrane that separates the choroicapillares from the retina.

The Technology

MacuCLEAR delivers an eyedrop that can get to the back of the eye that restores blood flow, provides anti-inflammatory and anti-oxidant effects, and prevents progression to the wet form of AMD. MC-1101 is based on a previously approved compound, resulting in the FDA granting 505(b)2 status and Fast Track status. The company has three issued patents and a worldwide license from Texas A&M University. All known competition is new chemical entities that do not address choroidal blood flow.

The Funding

$1.9 million (from Founders, Angels), $1.7 million from the Texas Emerging Technology Fund, signed by the Governor.

Source line: Information From MacuCLEAR

"extraordinary promise" and "tremendous market potential," he said, and it has to involve a research scientist "of the caliber of George Chiou."

Chiou is well known in the ocular pharmacology realm. Thirty-one years ago, he led the discovery of the drug Timolol, a pioneering treatment for glaucoma. Now he's doing it again with AMD.

"We get a new disclosure of innovation every working day," Diedrich said. But because of MacuCLEAR's potential, because of the impact it could have, and proved by the strides the drug continues to make within FDA, "this technology is of tremendous benefit to society and a great opportunity for our investors," Diedrich said.

MacuCLEAR is capable of changing the world, Ralston said. "With a million new cases every year, what's the chance of a person over 50 getting AMD?" he asked. The answer is 1 in 3. He can see the odds when he sits down for dinner at a restaurant, at the airport and when he looks in the mirror, as someday, the odds could catch up with him.

In January 2009, MacuCLEAR received approval for $1.7 million from the Texas Emerging Technology Fund to further the development of MacuCLEAR's lead compound, MC-1101. Gov. Rick Perry '79 (far left) signed off on the funding.

So Logical, So Obvious

That is how Ralston explains the business of MacuCLEAR. Here is how Chiou explains the chemistry of it:

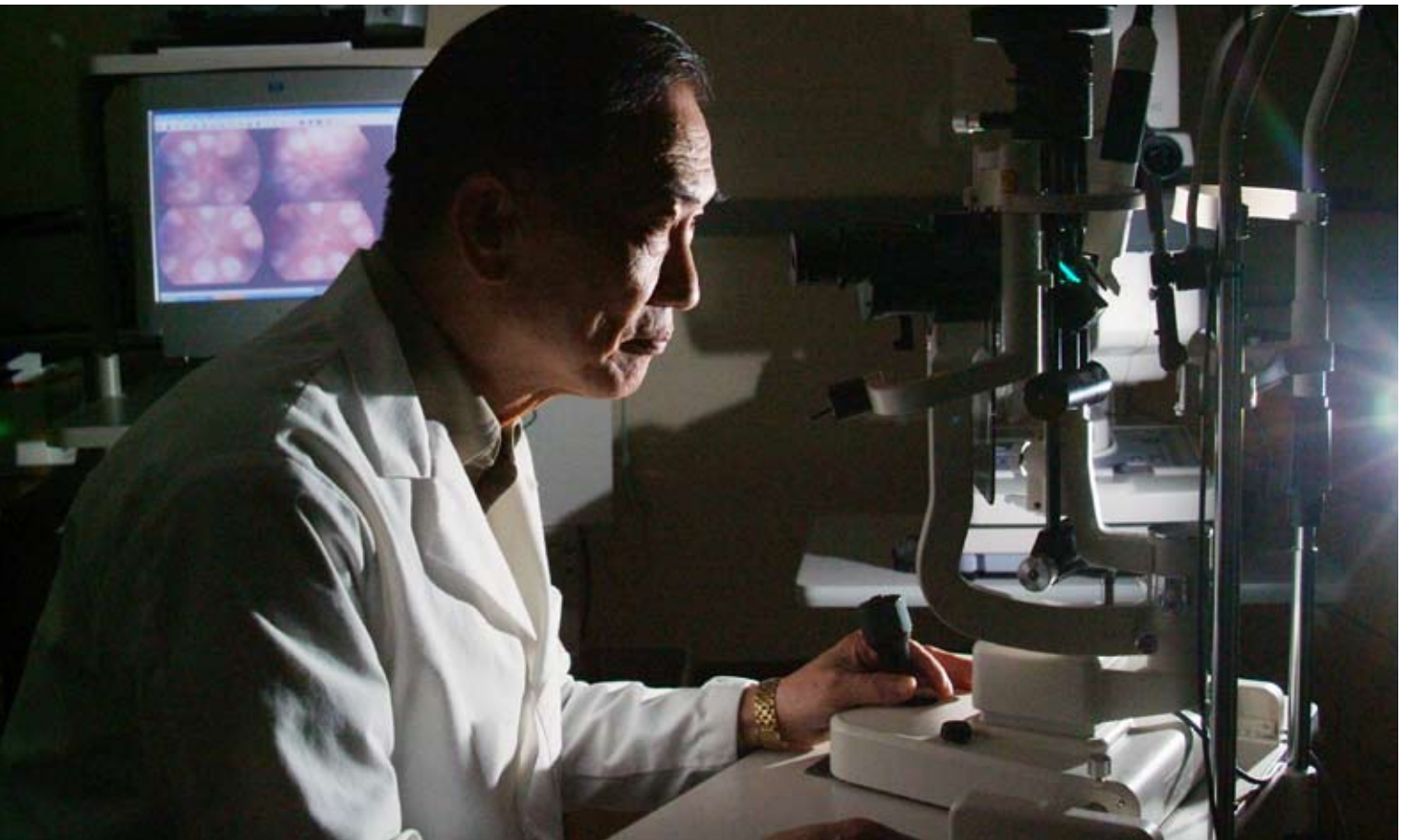


PHOTO COURTESY OF THE TEXAS A&M HEALTH SCIENCE CENTER

As less blood flow gets to the back of the eye, AMD starts with the growth of deposits, called drusen, on a layer of the eye called Bruch's membrane, Chiou said. The Bruch's membrane is separated from the retina by a layer of cells that deliver nutrients and remove waste from retinal cells. As the deposits continue to grow, eventually nutrients are unable to get to the retina. "Then you have a problem," he said. The removal of waste is blocked, cells degenerate and vision suffers.

Then, because the retina needs the nutrients, the body responds by growing new blood vessels that extend from under a part of the eye called the chloroid, which provides oxygen and nourishment to the retina. But as the eye works to fix the reduced blood flow, the new blood vessels can grow through the Bruch's Membrane, if it has been ruptured, forming leaks that release blood.

Top: MacuCLEAR won the Big 12 Business Plan Competition.
Bottom: MacuCLEAR at the Food and Drug Administration for a Pre-Investigational New Drug meeting. Left to right: Dr. Yu Guang He, senior medical advisor; Dr. George Chiou, chief scientific officer; Pam Lewis, of Pam Lewis & Associates scientific research and development services; and Phil Ralston, chief executive officer.

"That's the difference between wet and dry," Chiou said. Dry is before the release of blood.

If left untreated, scar tissue can grow and result in blindness, he said. The majority of wet AMD treatments involve injections to the eye. They are both unpleasant and expensive, he said. But that's all that's available right now.

What MacuCLEAR does, in a topically delivered solution, is restore choroidal blood flow in the eye and control inflammation, preventing the progression of damage associated with dry AMD progression. It's a vascular fix, protecting vision and keeping AMD from turning into its wet form.

Path To The Prescription Pad

Since MacuCLEAR's arrival in 2006, the treatment has moved quickly through the Investigational New Drug Application process—"our application was 5 inches thick"—and Food & Drug Administration's requirements. The FDA gave MacuCLEAR a "fast track" designation in January, which helps facilitate development and expedite review for drugs that fill unmet medical needs, Ralston said.

"It was very exciting to get that," Ralston said. "It could save some real time in the approval process."

MacuCLEAR has already completed preclinical studies and received its clearance to do human studies in October 2008. The company's first human trial is expected to conclude midsummer. Next, Ralston said, MacuCLEAR starts looking for a larger pharmaceutical company with which to partner and take the product all the way to market. As it gets closer, Ralston's excitement level increases. "We have a real chance of helping people," he said.

As these development milestones are checked off, Chiou's thrill becomes contagious—"Treatment provides a tremendous improvement in the quality of life."

Following MacuCLEAR's development, soon, many will be taking a look at this Aggie-developed technology, Ralston said, taking a look at technology that you can see.

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