

# Case based

MU's medical school begins an innovative curriculum using stories of real patients.

STORY BY DALE SMITH  
PHOTOS BY NANCY O'CONNOR

## Monday 11/29

The eight medical students in Lab G are among the first to consider the story of Fred Stanley, a 71-year-old retired lawyer. Stanley is a widower, and it was his daughter who finally persuaded him to see a physician. The last straw for Stanley was that his golf handicap had gone up, mainly due to some errant putting. His right hand had developed a "shake." His daughter noticed that the shake also made it harder for him to feed himself and button his shirt. She had been concerned for some time that it might be something serious.

Stanley answered the physician's questions:

No previous hypertension, diabetes, cancer or stroke. Never smoked. Rarely have more than one glass of wine twice a week with meals. Parents died in their late 70s with heart problems. No one else in the family has had the right-hand shakes.

Other than that, Stanley mentioned that he urinates more often than he used to but averages smaller output each time.

These first-year students, M-1s, pause, studying the written case. Their class, which started in August 1993, is the first to take part in a new problem-based



MU's new approach to medical education puts students in groups where they teach each other as they work through problems. At left, Lab G talks about this week's case. Below, on left, Tami Hopkins pages through a text with Susan Stackhouse.



curriculum. The students study anatomy, biochemistry and other subjects in combination to solve realistic problems, such as those of Fred Stanley (a fictitious name). Learning from cases improves memory by putting information in context, and students get practice thinking like physicians right away. MU is among a minority of schools

nationwide to innovate this way. At this time last year, M-1s were immersed in memorizing lecture and lab notes. Lacking patient problems, they were left, for the time being, to think like students. Unlike this year's class, faculty say, they were looking fatigued and stressed.

Student Steve Haas is Lab G's "quarterback" this week. At his

suggestion, the group offers entries for question lists, which soon cover the chalkboard like Venetian blinds. One list feeds the next. Signs and Symptoms suggest Hypotheses

*Tell me, and I forget,  
Teach me, and I "may" remember,  
Involve me, and I learn. — Ben Franklin*

about Fred Stanley's problem, which suggest tests for the Things To Do list. Brian Rekus is the "scribe," writing the lists as discussion progresses.

M-1 Tami Hopkins, formerly a nurse, picks up on the urinary symptoms. "I don't think this is the main problem, but at his age he could have an enlarged prostate. We could do a prostate exam." She has probably diagnosed Stanley's disease privately, but lets the group find its own way.

About five minutes in, Holly Fleming suggests Parkinson's disease.

Tutor Dr. Allan Jones prods a little, "What is Parkinson's?"

"It's a degenerative condition," Chris Hey says. "They have the gait, and they don't make dopamine like they should." Someone suggests that part of the brain called the substantia nigra could be involved. Hey reads aloud from a textbook, which seems to support their tentative diagnosis of Parkinson's.

Jones, chairman of physiology, prods a little more. "Can you come up with anything else? Here's an old guy who has to make it on his own cooking. (Laughs) Maybe the problem is from some poison under the sink?" Then the discussion takes off:

"I don't think it's anything chemical with only one hand affected."

"When there's low brain glucose, you can shake."

"He could have a tremor if he's an alcoholic in withdrawal."

"What about a cerebral lesion? I don't think that's so far off. I saw someone in clinic with a lesion, and the right hand was where it localized to."

When the fire dies down, the quarterback feeds it by reading more of Fred Stanley's story — the physician's physical examination.

Lungs, heart, abdomen, genitalia and rectum normal. Little facial expression, though his mood seemed normal. Speech, vision and memory fine. Equal gripping strength in both hands. At rest, the right hand's fingers trembled until he moved the arm. Gait characterized by small steps and a slightly hunched posture.

The students pause briefly, and the pace picks up again.

"I still think it's Parkinson's. No facial expression is classic if I remember right."

"They also describe the Parkinsonian gait."

"How would you test for Parkinson's? Can you test for that?"

Someone re-reads the textbook entry. "Sounds pretty darn close to what we have here."

Grave nodding all around. Jones smiles. "What does that do to

your hypothesis of prostate enlargement?" Lab G smiles a collective smile of tension release. The pressure is off for the moment. "You guys focused in on Parkinson's disease in half an hour. When you are professionals, it won't take more than a day or two," he jokes.

The session enters its final phase with the construction of yet another list, this time a string of learning objectives. By now they know that Parkinson's has something to do with a neurotransmitter called dopamine and a group of nerves in the brain called the basal ganglia. They seem grateful enough with that much.

Other cases have been difficult or impossible to diagnose. Each student agrees to the somewhat humbling task of making a short presentation Wednesday morning on a learning objective. These range from drug treatment to neurological tests for Parkinson's. Then they'll get another installment of Fred Stanley's story and see what they can do to help him. But now it's time for lunch.

Dr. Dan Vinson, assistant professor of family and community medicine, is leading the after-lunch lecture to all M-1s. His talk is called "How to Manage the Difficult Encounter."

"What makes a difficult encounter?"

By Tuesday night, each student in Lab G has visited the library to research a learning objective. Finding information is a crucial part of problem-based learning because it's impossible for a medical student to learn all the facts that educators have to offer. Physicians of the future, like Tami Hopkins, right, must learn how to cull the latest information about a problem in short order. They learn how to perform computer data base searches and also become familiar with an array of reference texts.



he asks.

"Anxiety."

"They could have been coerced into coming."

"They could be in denial."

"Depression."

"Drugs."

"They might speak another language."

Vinson stops after the list doubles.

"This is not a bad list. But all of these are patient issues." He suggests that physicians may sometimes be the "difficult" part of an encounter. Why? Prejudice, fatigue, inexperience, lack of time, lack of payment from the patient. He moves on. "If you have a rambling patient, what do you do?"

"Interrupt."

"Interrupt how?" he asks. No reply.

"You need to make a transition," he says, offering a time-tested pearl: "I find it fascinating to hear about your cranberry bog, but I'd like to know more about your diabetes."

## ✧ Tuesday 11/30

Tuesday morning's lecture covers the substantia nigra and basal ganglia, which were important learning objectives in Lab G. They are part of a complex feedback system in the brain that helps control movement. The new curriculum carefully



integrates its cases and lectures, trying to ensure that basic sciences — anatomy, biochemistry, histology, microbiology, pathology, pharmacology and physiology — are covered thoroughly. Previously, departments planned lectures for their own separate courses in relative isolation.

Critics of the problem-based learning approach, sometimes called PBL, often point to slightly lower scores on basic science tests for these students, says Dr. Ted Groshong, associate dean for medical education. On other national exams that cover patient problems, students from problem-based curricula score consistently higher than traditional students. During the internship year, PBL students score substantially higher. "These students may have learned fewer facts, but they recall them better and integrate them better to solve patient problems," Groshong says.

The M-1s are getting a lot of basic science. Tuesday's lecture is engagingly delivered and accompanied by an excellent handout, both by Dr. Donald York, professor of physiology. The overhead projector is less comforting. Slide after slide of schematic drawings of the brain's nerves appear on the screen. Mastering this material must be like memorizing several plates of spaghetti.

After the formal lecture, York introduces his former patient, Penny Bailey, to the group. She's been a paraplegic since an auto accident a few years ago. They see her sweater and learn that the body's control of temperature can be affected by spinal cord injury. York points out that she shifts in the chair every few minutes. It's a conscious habit, she says. Lacking sensation below the waist, she must shift to assure that her skin stays healthy.

## ✧ Wednesday 12/1

Wednesday morning is the second case session. Having left Monday's meeting somewhat humble, they begin offering their learning objective reports. Still

# Making memories

In what must be one of the most novel studies of memory, two groups of divers received lists of words to memorize. One group studied the list on shore, the other under 15 feet of water. Later, they tried to remember the words. They also traded places and tried to remember their lists again. Both groups remembered far more words when in the same setting where they had learned them. For physicians, the study means that it's best to learn anatomy and biochemistry in the context of cases. Cues from their patients will help them remember the science they need to know.

"The cases give students hooks to hang their knowledge on," says Dr. Michael Hosokawa, professor of family and community medicine and assistant to the dean for medical education. This year's M-1s also find hooks for knowledge in their Ambulatory Care Experience (ACE). Twice a month, students get their feet wet in the office of a practicing physician.

struggling with new ideas, their presentations are cautious, sometimes a little uncomfortable. But their voices have changed since Monday. A faint ring of authority can be heard in the room.

"First pass to Tami," Haas says.

"Neurology exams."

"OK. I made this list because I wanted something to take with me into the clinic. These are just cut and dried — if you have a problem with visual acuity or ocular fundi, it's cranial nerve two. Hearing — cranial nerve eight. Gaits — you can watch for the Parkinsonian gait, cerebellar ataxia, pronator drift. I put a paragraph on each one."

In about five minutes, she's done.

"Touchdown," Haas says. Her organization of the material is a hit.

"Where'd you get the information?" asks Susan Stackelhouse.

"Partly out of lectures, partly out of a couple of neurology texts," Hopkins says.

"We'll let Susan go next," Haas says.

"We had a lecture on basal ganglia, which seemed kind of vague, I guess because there's a vague understanding of what they do. I made my own drawing of the ganglia, so if I made a mistake let me know."

A picture emerges in which "motor tracts" of the brain continually send messages telling the muscles to contract. These motor tracts pass through structures called the basal ganglia, which

have neurons that use dopamine to send messages. The basal ganglia act like a squeaky knob on a citizens band radio, only allowing certain important motor impulses to pass. But in Parkinson's, those dopamine neurons break down, says Ann Saunders, whose learning objective is dopamine.

So, why not just give dopamine pills? Fleming is the drug treatment reporter. She says that dopamine won't cross the blood-brain barrier. But L-dopa, a precursor of dopamine, will cross the barrier. To complicate matters, L-dopa is quickly converted or "metabolized" into dopamine, and only a little reaches the brain. She says that giving L-dopa with a substance called carbidopa slows the drug metabolism and allows more to reach the brain.

As students continue their reports for an hour or so, more and more brief discussions are sparked by new remarks or by cues from Jones. With Fred Stanley's case in the back of their minds, they are teaching each other and integrating information from what last year would have been separate lectures in the disciplines of anatomy, biochemistry and pharmacology.

Finally the group gets back to the case of Fred Stanley, who missed his follow-up appointment by eight months. His tremor worsened. His right arm was ever stiffer and moved ever slower so that he had to use his left for most things. Only a week after he was diagnosed with Parkinson's and started on medicine, Stanley's movement improved substantially. Over time, he dropped his golf handicap by two strokes. Everything went along fine for two years until he suddenly "froze up" one day and became very rigid. He visited his doctor who said to stop medication for 10 days and return in two weeks. That part was a mystery for Friday's session.

In the meantime, the session's learning objectives are supplied by the faculty planning committee. As Lab G talks through the first 10, they realize that they've covered virtually all of them already. A final question quiets the room: "11. Discuss the complexity of psychological/physical adjustments and the impact of neurological disease in the older adult."

Nobody jumps on this one. A few students push back from the table. Finally they decide that everyone should think it

over for next time.

It has been an exhausting session. A few students can be heard grumbling in the hallway afterward that the case-based approach takes too much time — too much talking, too much research for presentations. It's just plain inefficient, they say. True, says Hosokawa, if the only goal is to memorize lists of facts and other lecture notes. But the outwardly tortuous route of case-based learning is quite efficient at teaching a particular set of skills that physicians need — learning facts, applying them to help patients and learning how to find information in the ever growing body of scientific knowledge.

Student opinions flow both ways about the new curriculum. "I have a friend at another medical school," says Susan Stackelhouse. "I wouldn't trade places with her for anything. They have constant tests and no time in clinic. She loves medical school, but I'd hate to tell her everything we're doing because she'd really be jealous."

That afternoon Lab G stretches skills in yet another direction. In addition to their interviews with real patients, students role-play for each other. Hopkins interviews Fleming, who pretends to be 65-year-old Mrs. Hawthorne, a diabetic with high blood pressure and a sinus infection. She's pretty sure she picked up the infection from a granddaughter in Springfield, Mo. Mrs. Hawthorne would like her prescriptions refilled and her sinus infection checked out. She mentions during the interview that she had a benign breast lump six months ago. One by one, Hopkins works through her patient's complaints. Then part by part, she asks about Mrs. Hawthorne's body — any problem with your eyes, nose, throat . . .

Dr. Kristofer Hagglund, assistant professor of physical medicine and rehabilitation, agrees with two student reviewers that Hopkins' interview was quite thorough. She has the basics down pat, so he moves on to a tougher skill.

Hagglund has noticed that most students, while trying to remain objective, fail to make empathetic statements when opportunities arise. "You could say, for example, 'that must have been scary for you when you had that breast lump.' You can get a lot of

information from something like that and build a lot of rapport. You don't have to do a lot of self-disclosure, but that's a major human event and you can address that issue. That's a concern I have in general — that doctors don't address the really important issues head on."

## ✧ Thursday 12/2

Although Fred Stanley's name never comes up, Thursday's lectures and demonstrations must remind everyone of his case — more on the workings of nerves and transmitters. Nothing in the afternoon. Friday comes quickly.

## ✧ Friday 12/3

Stanley was incapacitated after stopping his medication. He started it again after only three days and went to see his doctor. He reported involuntary movements about 1 1/2 hours after each dose. The medication was increased and changed to a controlled release form. A month later he returned to the clinic with better mobility and was no longer having "on-off" problems.

Lab G criticized Stanley's hypothetical doctor for taking him off medication in the first place — an outdated approach, according to their reading. Then it was on to question No. 11. After some hesitation, talk turned to the question of who'll take care of the elderly.

"How much do you think a nursing home costs?" Jones asks.

Students offer several estimates, all low.

"When my grandmother was in a nursing home," Stackelhouse says, "they charged for aspirin, for helping her go to the bathroom — everything. She had trouble answering the phone, and sometimes they would unplug it."

"We don't have this problem in Haiti," Carolee Silney says. "All old people stay home. Their families take care of them."

"I'd let them live with me," Hey says, "but I want to be wealthy enough that I can pay someone to take care of them. I want to take care of my parents, but I probably won't be able to do that. I probably won't be able to handle it. I'll probably have so many other things going."

"More important things?" Silney asks. "Well, I don't know if they'll be more



Dr. Dan Vinson examines Peggy Williams during M-1 Tami Hopkins' clinical training at the Boone County Health Department. Traditionally, this experience took place in the third year of medical school. "My job is to get the chief complaint, medical history and do any physical exam I can. Then the resident asks what I think the problem is, what I would do and takes me back in with the patient to show me specifics." Below, Hopkins checks for tremor in the hand of John Hayes at the medical school. Hayes, who has Parkinson's disease, volunteered to answer students' questions about his illness.

important things, but I just don't know if I'll be able to do it all. It'll be very hard to watch them go down."

Jones moves the discussion back into the realm of physicians and patients. For patients and caretakers, he says, it's a big relief just knowing that their physician is responsive. "You'll get a call some night or weekend that an elderly patient you've been treating for eight years has been admitted to the hospital with pneumonia. It's not the happiest job you'll have some night. You know this person has a progressive disease, you know they go critical in a hurry, you know the end is soon. And you're not only treating the patient but the family, too. I don't know any drug you can prescribe for that one."

The quarterback speaks up. "I think we've covered all the questions."



"At first, I noticed it in my hands," Hayes begins. "I couldn't shave or use a washcloth. But now with the medicine I can."

Stacy says Hayes had been successful in the grocery business in Tipton, Mo. Although Parkinson's is a progressive disease, the medication has been a great boon. He and his wife are able to continue their custom of travel.

"You have some abnormal involuntary movements from the medication," he says to Hayes. "What has that done?"

"I have few friends now," Hayes says. "People see me in the store and think I'm retarded."

"That's not fair, is it?" Stacy says.

Marie Hayes joins her husband on the stage.

"How has your life changed?" Stacy asks.

"I mostly take care of him now," Marie says. "I remember our 50th wedding anniversary, we dressed up and he looked real nice. I think that you would think so, too." Then she switched to an important trip they took in 1979. "We were going to the Holy Land. I watched him climb the steps to the plane, and I knew something was wrong. It was a long two weeks getting him back home." ☐

A few minutes later in a small auditorium, Lab G joins the other M-1s for the final story this week. It's as though Fred Stanley has sprung to life from the pages of their case.

"I want you to meet Mr. John Hayes," says Dr. Mark Stacy, assistant professor of neurology. He helps Hayes onto the stage. "Mr. Hayes has had Parkinson's disease since 1979." The room is perfectly quiet, as though extreme concentration in the students were sponging off any sound. Hayes' gait is the characteristic shuffle of Parkinson's. The audience is mesmerized.