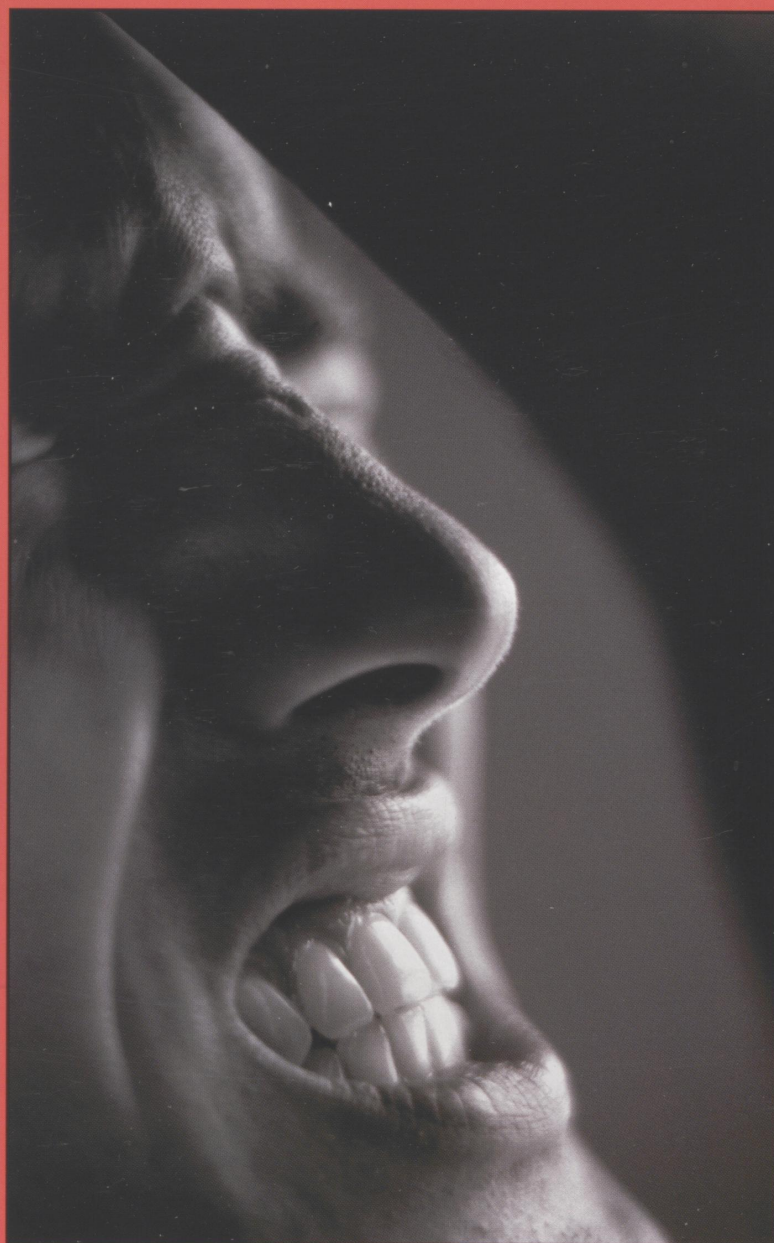
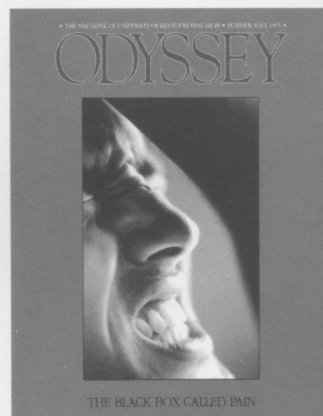


• THE MAGAZINE OF UNIVERSITY OF KENTUCKY RESEARCH • SUMMER/FALL 1995 •

ODYSSEY



THE BLACK BOX CALLED PAIN



The University of Kentucky, the commonwealth's graduate education and research institution, exists to provide opportunities for the education, personal growth and development of individuals and to contribute to the improvement of society.

With this mission as its premise, one goal of the university is to conduct programs of basic and applied research which support graduate and professional education, provide for the advancement of knowledge, and seek solutions for the acute problems of society.

The university's research mission also acts as a magnet for attracting top graduate students who want to participate in nationally competitive research projects. This research experience can offer them a significant advantage in their education while laying the foundation for future research and development. *ODYSSEY*, through articles about various research projects and graduate education programs, reflects the breadth of the university's search for new knowledge and the myriad of research endeavors underway. The progress that the university has made toward achieving its research mission and securing the extramural funds required to support these types of endeavors would have been impossible without the talents and dedication of our researchers.

The goal of *ODYSSEY* is to offer the reader the opportunity to share in some of the excitement, curiosity and creativity evident in the research underway at the University of Kentucky.

ODYSSEY



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Volume XIII, No. 1

Odyssey is published by the Office of the Vice President for Research and Graduate Studies. Each issue of *Odyssey* describes only a few of the many University of Kentucky research projects underway in a variety of areas.

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What Were We Doing in Vietnam?

by Sharon Reynolds

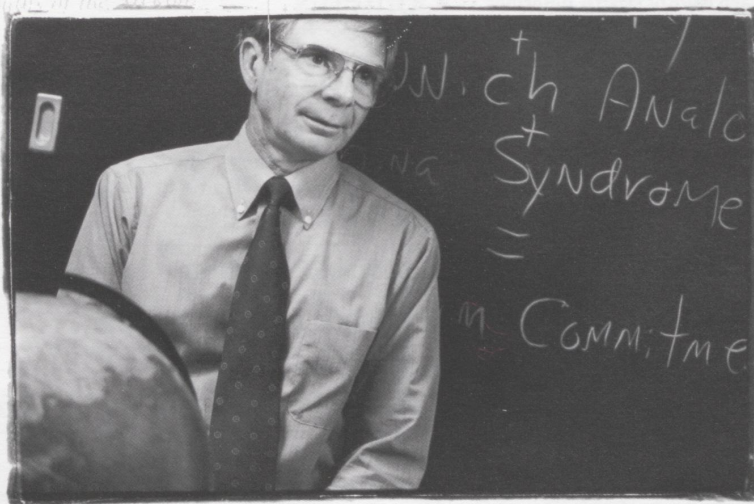
UK's Vietnam War Scholars and Students Working to Answer the Question of a Generation

Two decades after the end of the Vietnam War, scholars continue to mine the subject for new information about an incredibly divisive era in American life. Among those conducting some of the most significant research on the Vietnam conflict are graduate students in the Department of History at the University of Kentucky. Drawn by the reputation of noted Vietnam scholar George Herring, these students are exploring a great range of topics—from the nature of the enemy in Vietnam to the Buddhist opposition movement within South Vietnam to the way the American press responded to the war. In researching their theses and dissertations, these students have been innovative and persistent, going off the beaten path—some-

times, literally—in their search for answers.

Herring, their mentor and guide on this journey, began his own quest while teaching history at Ohio University in 1965, a time when student interest in Vietnam was just beginning to grow. By the mid '70s he had made the Vietnam War his specialty and won a National Endowment for the Humanities (NEH) fellowship to begin a book. Published in 1979, Herring's *America's Longest War* has become a standard text in history and political science classes. Now in its third printing, the book has been used in more than 400 schools. "I never expected the reaction I've gotten from this book," says Herring. "It's been very exciting and led to quite a few invitations to give lectures worldwide."

The question of whether the National Liberation Front operated independently or as a satellite of Ho Chi Minh's regime was a central issue in the debate on the war in the 1960s and remains controversial today.



George Herring's book, *America's Longest War*, has become a standard text in history and political science classes. Herring is chairman of the Department of History.

Photo by Lee Thomas

UK alumnus Robert Brigham, who now teaches at Vassar College, sought the advice of several scholars when he was deciding where to pursue his doctoral degree. "By far, they recommended UK because of George Herring," he says.

Herring predicts that Brigham will also attract widespread attention because of Brigham's work. His dissertation focuses on one of the most controversial issues of the war—the nature and origin of the National Liberation Front (NLF) of the south. The question of whether that organization operated independently or as a satellite of Ho Chi Minh's regime was a central issue in the debate on the war in the 1960s and remains controversial today.

In conducting his research, Brigham went to Cornell University to learn the Vietnamese language. And although there were no diplomatic relations between the United States and Vietnam then as now, he was able to get a research visa to that country in 1992. "Dr. Herring's name played a big role in my getting permission to go there," he says. Brigham received research grants from the UK Graduate School and the Society for Historians of American Foreign Relations, and an NEH fellowship to help fund several months of study.

He thus became one of the first Americans to do historical research in Vietnam, working in Vietnamese government archives and interviewing many people there who fought in the war. "I interviewed hundreds of people," Brigham says, "some of whom were extremely helpful to me." Brigham credits an historian in the Foreign Ministry, Vu Hu Phuc, for giving him the "big picture of the war" from the Vietnamese perspective. "Hu Phuc also had what I would call a 'good sense of documents,'" he adds.

Brigham explains that archives in Vietnam are not catalogued. "Materials are scattered, many in leaky warehouses that sometimes have no electricity. It's a poor country with limited resources, and storing archives isn't a top priority," he says. Brigham describes walking into one

such "library" with Hu Phuc, who was undaunted by the seemingly chaotic piles of books, magazines and letters strewn around. "He somehow knew where things were," Brigham says, with a still slightly incredulous smile. "He could find articles and books I needed in a few minutes."

Brigham was also fortunate to have a window of opportunity for research opened to him. Just before he went to Vietnam, the southern factions whom he was writing about came into power. Nguyen thi Binh, the chief diplomat for the NLF and a prominent figure in Brigham's study, became vice president of Vietnam.

"As a result, I was shown documents I probably wouldn't have had access to beforehand," he says. For example, Brigham was given not only published but unpublished memoirs of NLF diplomats who had represented the organization in countries all over the world.

Brigham's dissertation, "The National Liberation Front's Foreign Relations in the Vietnam War," concludes that the relationship between the NLF and Hanoi was marked by cooperation and conflict. While the two sides shared similar goals, they differed on how to achieve those goals. He is cur-

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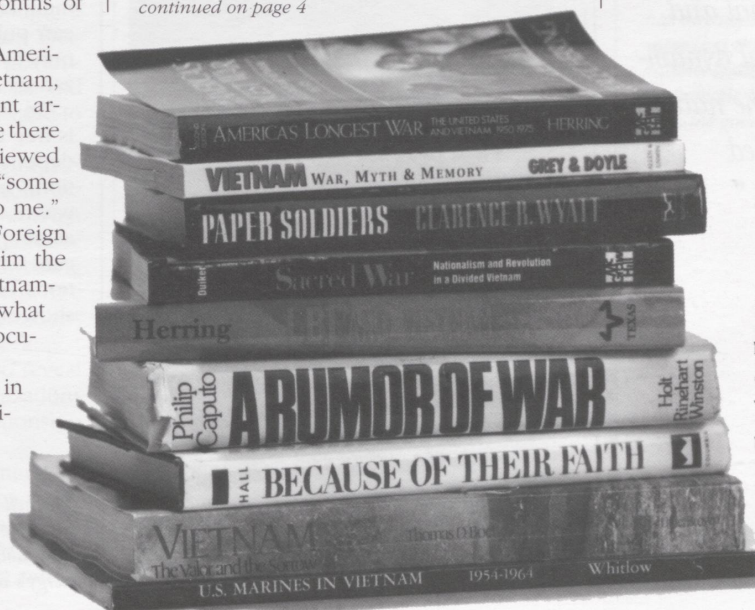


Photo by Lee Thomas

"Like the U.S. government, the charitable relief agencies misunderstood the social and political dynamics of the nation they tried to help."

Photo by Peggy Brisbane
Central Michigan University News Bureau

rently negotiating with Cornell University Press to have his manuscript published.

Two other UK graduates, Mitchell Hall and Clarence Wyatt, have published their scholarly works on the Vietnam War. Hall, who received his Ph.D from UK in 1987, became interested in the American clergy's role in antiwar protests when he stumbled upon some records of the Clergy and Laymen Concerned About Vietnam (CALCAV) while doing research at Swarthmore College. *Because of Their Faith: CALCAV and Religious Opposition to the Vietnam War* was published by Columbia University Press in 1990.

Wyatt's book, *Paper Soldiers: The American Press and the Vietnam War*, was published in 1993 by W.W. Norton, and was favorably reviewed by the *New York Times* and the *Washington Post*. A review in the *London Economist* found it a convincing refutation of the view that the press had played a crucial role in ending the war: "His verdict is a cruel blow to the self-esteem of

American journalism," the reviewer wrote.

Now a history professor at Centre College, Wyatt is another example of an innovative researcher: He was one of the first persons to gain access to internal documents and memoranda kept in the archives of the *New York Times*. He found out about the documents while reading Harrison Salisbury's memoir about his years with the *New York Times*. He contacted Salisbury who arranged to get Wyatt into the archives.

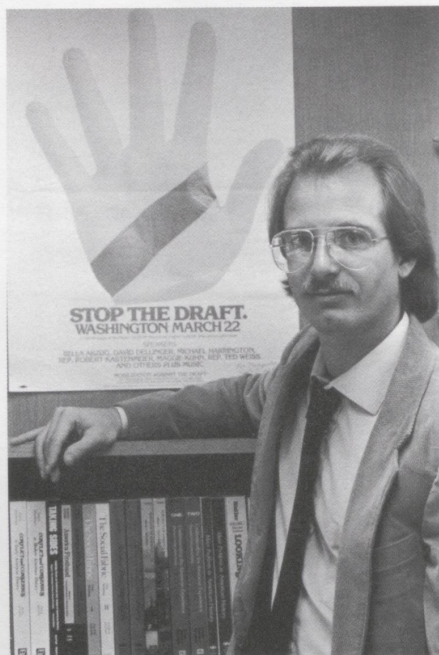
"To the *Times*' credit, the management was eager to let me in," says Wyatt. Reading through communications between managing editors and reporters in the field, he was better able to see how journalists functioned in relation to the Vietnam story.

"One of the issues that was confirmed for me more and more is how much economics drives news coverage," says Wyatt. "For example, most Americans are interested in reading about or seeing what happens to other Americans. As a result, the press focused on combat." Reporting information about battles or showing footage of fire fights is usually simpler than reporting on more complex issues, Wyatt says.

He also found, in research that included digging through obscure military and government archives, that much of what the American public saw or read was censored—not only by officials but also by the news organizations.

"In combat situations, even when the press is free to go where they want, they are very dependent on the government for information," he says. "That's one reason the press was not as decisive in ending the Vietnam war as people may think. There was also significant self-censorship, with the news organizations trying to balance coverage or avoid showing too many of the gory details."

Mitchell Hall, who received his doctorate from UK in 1987, has published a book on the American clergy's role in antiwar protests.



Wyatt found that much of what the American public saw or read during the Vietnam War was censored—not only by officials but also by the news organizations.

Delia Pergande, whose dissertation is in progress, is taking a look at another group that prides itself on making a difference—non-governmental organizations (NGOs). These are the front-line people, the charitable relief agencies that seek to win hearts and minds by risking their lives to bring aid to war-torn civilians. She focuses on five NGOs that came into Vietnam in the mid 1950s, following the 1954 Geneva accords.

"I began to get interested in this subject when I ran across a reference in some records given to me by Dr. Herring regarding the International Rescue Committee setting up the Saigon Jaycees. I thought, how strange," Pergande recalls.

"Although these NGOs considered themselves non-political, they believed humanitarian aid would help secure countries from communism. Their efforts to introduce the Vietnamese people to American culture and initiate self-help programs paralleled aid efforts by the U.S. government. Consequently, NGOs played a significant role in America's failed attempts at nation building in South Vietnam.

"Most of their work was sincerely charitable yet there was significant cultural chauvinism," she says. "Many of them thought if we just kept filtering in money, South Vietnam would stabilize. Like the U.S. government, NGOs misunderstood the social and political dynamics of the nation they tried to help."

Pergande has already received two awards to work on her dissertation—one from the Society for Historians of American Foreign Relations and another from the Kentucky Foundation for Women. She is traveling around the country, digging through the archives of these charitable organizations and the memoirs of former relief workers.

Her research has already begun to reveal that, like the press, charitable organizations appear to have had a symbiotic relationship with the government.

"Before the U.S. government commits to extensive foreign aid, you often see many private groups go in, then publicly plead for government assistance," she says. "It's almost as if they play a role in heightening public



Photograph by Lee Thomas

awareness of hot spots and prepare for government action. Certainly in Vietnam, this was the case. There was a huge publicity blitz, with CARE and Catholic Relief Services demanding that the public should respond to the refugee crisis in that country in 1954."

But NGOs are also very dependent upon the government for assistance in their efforts to resettle refugees, develop villages and bring in food and medical supplies, Pergande has found. "Some of the agencies in Vietnam wanted to disassociate themselves from U.S. policy and bring humanitarian relief to everybody who needed it. Yet their dependence on the government for security increased once military tensions escalated. Obviously, that created a dilemma for their supposed nonpolitical aims," she says.

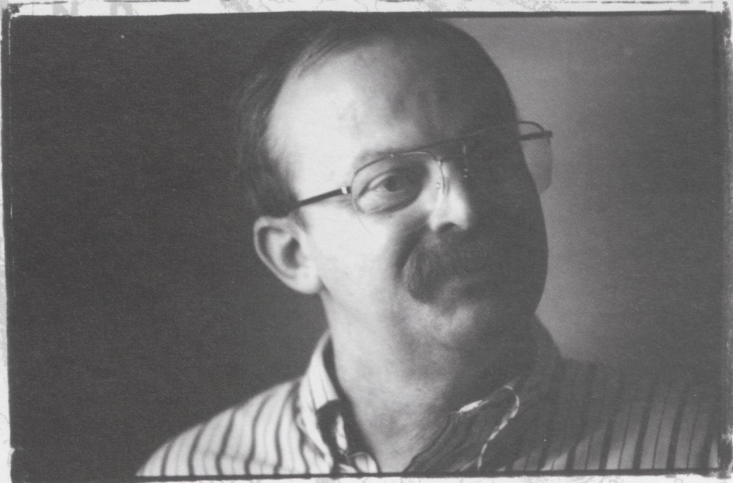
Pergande is typical of many of today's students who were just entering grade school when the anti-war movement was heating up. Robert Topmiller, however, a first-year doctoral student from Washington state, brings a personal perspective—that of a Vietnam veteran—to his research.

"As a medic, I saw a lot of combat," says Topmiller. "And I came back with a lot of questions. I wanted to find out, for example,

Delia Pergande's dissertation will focus on charitable relief agencies that came into Vietnam in the mid 1950s, following the 1954 Geneva accords. Her research, she says, has already begun to show that these organizations tended to have a symbiotic relationship with the government.

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"As a medic, I saw a lot of combat," says Topmiller. "And I came back with a lot of questions. I wanted to find out, for example, why those people wanted to kill me."



Photograph by Lee Thomas

Robert Topmiller, a medic in Vietnam, was in the 1967 Siege of Khe Sanh where Topmiller and 6,000 other troops were surrounded for 77 days by the enemy. Topmiller says, "We lost 2,000 of our 6,000 men in that battle."

why those people wanted to kill me." Topmiller recalls one particularly vivid memory from his combat experience, the 1967-68 Siege of Khe Sanh. In this compound 12 miles from North Vietnam and only seven miles from Laos, Topmiller and about 6,000 other troops were surrounded for 77 days by the enemy. "It was terrifying," says Topmiller, who was then 19 years old. "We were shelled every day, we were constantly on the verge of running out of ammunition, and whenever one of our supply planes landed nearby, the North Vietnamese would bombard it."

On January 1, 1968, the expected assault came. The compound was hit hard by rocket attacks, and Topmiller found himself treating two dozen casualties almost immediately. "Then we heard," he recalls, "an unbelievably thunderous explosion. It was a direct hit on our ammo dump—180 tons of explosives." Topmiller watched the blast lift his good friend Gary Crawford eight feet straight up in the air and slam him onto the wall before the building collapsed. The explosion also blew out Topmiller's eardrums. "We lost 2,000 of our 6,000 men in that battle," he says. "It was a tremendous reversal." The Vietnamese, inexplicably, failed to press their advantage, and

the following day U.S. bombers devastated the North Vietnamese troops surrounding the compound. "More bombs were dropped that day," Topmiller says, "than were dropped on Japan during all of World War II."

Topmiller survived Vietnam and after spending 20 years in the business world decided to return to college. He had developed a special interest in Buddhism, attracted by its emphasis on peace, love and non-materialistic values. His dissertation, which is in progress, examines the Buddhist opposition movement to the war in South Vietnam in the early 1960s.

"The Buddhists wanted to be a third force of neutralism," says Topmiller. "Had they succeeded, there would not have been a Vietnam War. But in calling for peace, they caused the Americans and the communists to oppose their movement."

To help in his research, Topmiller plans to learn Vietnamese at the University of Wisconsin. He wants to be able to read magazines published by the monks during the mid-1960s and to travel to Vietnam to interview monks. It's a task fraught with difficulties, he says, since they are still outspoken critics of the current government. However, he hopes to gain an audience with Thich Nhat Hanh, a renowned Vietnamese Buddhist living in exile in France. He has already corresponded with the exiled Buddhist, who has written numerous books, through the monk's publisher. Nhat Hanh also holds retreats which are generally open to anyone interested enough to apply, Topmiller says.

With the insights Topmiller has already gained, he is optimistic that the Buddhists will remain a vibrant force for religious freedom and perhaps even for the normalization of relations between Vietnam and the United States.

For Herring, the strong work of his graduate students over the years brings special satisfaction, and he credits his students from 30 years ago for initially sparking him to begin his search for answers about the war. "I was initially nudged into this direction by students' questions about Vietnam," he says, "by their curiosity. Their interest stimulated my own curiosity about the war, and I began to dig." ♦

Substance Use and Abuse:

Can a Marker Be Found to Tag At-Risk Teens?

by Jeff Worley

The Reagan administration's "Just Say No" to alcohol and drugs campaign picked up steam as the 1980s clicked by, but the '90s so far, to belabor a metaphor, have been a slick, uphill stretch of bad track. In the past five years, dozens of national and local surveys of adolescent drug and alcohol use have revealed that more and more teens, instead of just saying "no" when it comes to alcohol and drugs, are saying "thanks."

According to one National Institute on Drug Abuse study, of 18,000 eighth graders at 160 public and private schools around the country 7.2 percent of them acknowledged smoking marijuana in 1992, up 15 percent from the previous year. "While the number of eighth graders using marijuana is not yet very large, the proportional changes are big, which means these young people may be in the vanguard of a reversal of previously improving conditions," says Lloyd Johnston, principal investigator of a University of Michigan study on teen substance use. The study, begun in 1975, is the nation's oldest survey of drug use among teenagers.

And it could very well be that the situation is worse than the statistics say it is. Thomas Cash, head of the Drug Enforcement Administration office in Miami, one of the largest in the agency's system, says that drug use among adolescents was almost certainly rising at a faster rate than indicated by the Michigan study because "it does not reflect the habits of school drop-outs who in the past have been much heavier drug users."

There has clearly been, in the '90s, an attitude shift among teenagers about drug use. Current findings from the Michigan study reveal that the 50,000 junior and senior high school students surveyed last year were much less concerned about the ill effects of drug use than juniors and seniors in earlier years. In a less scientific survey at four New York City high schools, all of the several dozen students interviewed said that pot-smoking is widespread, and perceived as a harmless distraction.

In a recent study at the University of Kentucky, three researchers are working to understand why adolescents use drugs. Catherine Martin, principal investigator in this study,

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Photograph by Lee Thomas



Catherine Martin's work on adolescent substance abuse is focused on the connection between hormones and risky behavior of teens.

is focusing on the connection between hormone levels in teens and their propensity toward impulsive behavior, including use of various substances. "We know that a number of things escalate in the adolescent years, including sexual behavior, drug use, depression and suicide," says Martin, an associate professor of psychiatry at the medical center. "And we also know that hormones change. One thing we wanted to find out in this study is the connection between hormone levels and drug use." Previous researchers, Martin points out, have found that nicotine and alcohol use are correlated with testosterone levels, but few studies have investigated other possible hormone triggers.

Co-investigator Arch Mainous is looking at another facet of the issue. Mainous, an assistant professor in family practice at the medical center, is interested in various social factors that may or may not lead to substance use by teens. "Does it matter whether a 15-year-old lives in a town of 3,000 people as opposed to a large metropolitan area?" Mainous asks. "What about access to alcohol—the fact that a teenager lives in a dry county? What difference does religion make in the formula?

We're interested in all of these factors."

Mary Vore, a professor of pharmacology, is the other researcher involved. Vore, also a co-PI on the project, has been instrumental in overseeing the blood analysis. "As part of our study, we took 20 cc of blood from each student who participated and packed it in refrigerated containers," Vore says. The blood was analyzed in Tom Curry's lab back at UK; Curry is a UK associate professor of obstetrics and gynecology.

Martin and Mainous surveyed students at two Kentucky high schools, one in Barbourville (3,300 population) and one in Covington (50,000 population). One hundred sixty students at the schools participated—81 females and 79 males. Each student completed a questionnaire that contained over 130 items, and members of the study team took blood samples from the participants for hormone evaluations. The questionnaire focused on drug, alcohol and nicotine use, depression, impulsivity, suicide and sexual activity.

"We got tremendous cooperation from the counselors and administration at both schools,"

"The professional pitcher with the tin of snuff in his back pocket is setting an example whether he intends to or not."

A teenager's decision to drink alcohol or not, it turned out, wasn't nearly as connected to whether the teenager lived in a rural dry county or an urban wet county as it was determined by the individual's religious beliefs and feelings of unmet needs.

says Martin, "which isn't always the case with studies like this." The students, who had to get parental consent forms signed, were paid for their participation.

"Very few studies have tried to correlate hormonal levels to psychological characteristics and high-risk behaviors such as suicide attempts and unprotected sexual activity," Martin says, "although there's clearly evidence for hormonal changes of puberty correlating with depression, impulsivity, and risky behavior." Some adolescents, she says, are simply better equipped to handle developmental changes than others. "The problem is that for a lot of teenagers, though, these changes are stressful and the stress may be compounded with drug use and other high-risk actions."

Martin reports several "unexpected findings" that relate to the female hormones estradiol and FSH (follicle stimulating hormone). Estradiol is a hormone that stimulates the development of female sex characteristics. FSH is a hormone on the pituitary gland that stimulates ovulation.

"In previous studies relatively high levels of estradiol and FSH have been associated with depression and impulsivity in females," Martin says, "but this is the first study to report the association of these hormones with alcohol use in females. We found a significant correlation. Interestingly, we also found a powerful correlation between FSH and suicidal impulses in males and a negative correlation in males between FSH and marijuana use." Martin explains that although FSH is thought of primarily as a female hormone, males have small amounts of the hormone just as females have very low amounts of testosterone.

Other significant findings came from correlating students' responses with two other hormones—LH and progesterone. LH is short for "luteinizing hormone," which is related to a female's menstrual cycle and the male's development of tissue in the testes. Progesterone, in females, functions to prepare the wall of the uterus for the fertilized egg. "We were surprised to find a negative correlation between LH and sexual behavior in males," says Martin, "and our findings with progester-

Survey Indicates Continuing Problem with Youths and Substance Abuse

In the University of Michigan's 19th annual survey of American high school seniors and their third annual survey of eighth and 10th graders, the scientists report a sharp rise in marijuana use throughout the country at all three grade levels, as well as an increase in the use of stimulants, LSD, and inhalants. They also note an increase in smoking in all three grades. A few of the many other findings determined by the survey include:

- The use of inhalants (like glue, solvents, and aerosols) rose at all three levels and are more likely to be used in the earlier grade levels, investigators note. The researchers say, "We don't think that young people fully understand the dangers of inhalants, perhaps because most of the substances inhaled are common household products; but they definitely can be lethal."

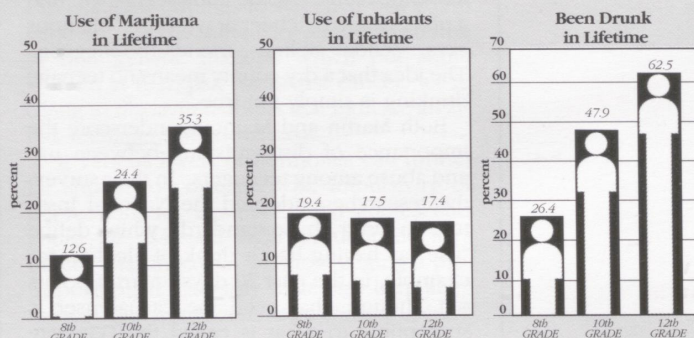
- The legal drugs, alcohol and cigarettes, are still the most widely used at all grade levels. Two-thirds of the eighth graders and nearly nine-tenths of the 12th graders have tried

alcohol. Episodes of heavy drinking, the researchers note, are also common.

- The study distinguished three major racial/ethnic groups (white, black, and Hispanic) in their analysis. The researchers report that "in general, and contrary to conventional wisdom, black students report the lowest rates of use for virtually all drugs, licit and illicit, and this is true at all three grade levels included in the survey."

The groups studied for the survey in 1993 included 15,500 students in 128 schools for the 10th graders, 18,800 students in 159 schools for the eighth graders, and approximately 17,000 seniors in schools nationwide. The survey is carried out annually by the University of Michigan's Institute for Social Research.

Source: A report prepared for the Executive Office of the President, Office of National Drug Control Policy. The report was prepared by Dr. Richard Clayton, University of Kentucky, and The Ann Arbor Group. The report is titled "Increase in Use of Selected Drugs: Monitoring the Future Study of 8th, 10th, and 12th Graders/Meeting of the Ann Arbor Group, April 26-27, 1994."



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"In the same way research is trying to find genetic markers which put some women at high risk for breast cancer, we're trying to discover markers that indicate an at-risk teenager."

one were very unexpected." The researchers found that a relatively high level of progesterone in males was associated with a high number of suicide attempts, while a high level of progesterone in females correlated with relatively few attempts.

"What we're looking for," says Martin, "are various predictors that might put an adolescent at risk. We could call them bio-

logical vulnerabilities—catalysts toward impulsive or destructive behavior."

Martin and Mainous share an interest not only in the connection between hormones and impulsive behavior, but also between adolescents' needs and how they attempt to fulfill these needs. "If you were to start with the premise, for example, that testosterone relates to alcohol but then include a further variable—accessibility of alcohol or lack of access—what then?" Mainous says.

The question of availability of alcohol led the researchers to what Mainous calls, "the most surprising finding in their research." A teenager's decision to drink alcohol or not, it turned out, wasn't nearly as connected to whether he lived in a rural dry county or an urban wet county as it was determined by his religious beliefs and feeling of unmet needs. The variable of "difficult access" to alcohol, Mainous adds, turns out to be important only for some teens. "Some adolescents will find a place to get their beer or whiskey," Mainous says. "Older siblings, friends, bootleggers. The idea that a dry county means no teenage drinking is simply not true."

Both Martin and Mainous underscore the importance of distinguishing between use and abuse among teenagers. In their survey, the researchers adopted the National Institute on Drug Abuse standards, which define "use" as having had a drink of alcohol, for example, in the past 30 days. Martin points out, though, that even the casual user is susceptible to what is called the Gateway Theory. "Though there may not be highly

dangerous activities associated with, for instance, smoking pot once a week, there is evidence that each time you decide to use drugs you take a higher risk of going to a higher level of drug use. So we don't want to trivialize any use, including nicotine and alcohol. Even though it may be normative behavior, that doesn't mean it's perfectly benign or of no consequence."

Statistical evidence for the Gateway Theory can be seen in an article on adolescent substance abuse by John Wodarski, Janice B. Waddles Research Professor at the State University of New York at Buffalo. He points out that current drug users ages 12-17 also tend to be "polyusers" of drugs. Citing national NIDA statistics from the late 1980s, Wodarski says that of those who smoke cigarettes, 74 percent also drink alcohol, 47 percent use marijuana, and nine percent use cocaine. Among those who drink alcohol, 37 percent also use marijuana and five percent use cocaine. Among those who use marijuana, 60 percent smoke cigarettes, 84 percent drink alcohol, and 12 percent use cocaine.

Although not focusing on polydrug use, Mainous, Martin and others, in an article soon to be published in the journal *Adolescence*, present the results of a substance use survey of 823 students at Simon Kenton High School in northern Kentucky. The students responded to a questionnaire that focused on fulfillment of adolescent needs, depression, and current substance use. Twenty-six percent of the respondents said they smoked cigarettes, 11 percent indicated use of snuff, and 10 percent said they chewed tobacco. Forty-four percent had drunk alcohol in the past 30 days, while 19 percent said they'd never had a drink of beer, wine or liquor. Fourteen percent had used marijuana or hashish in the past 30 days and 71 percent said they'd never used either drug. Cocaine use was very low: 94 percent said they'd never used the drug and only three percent said they had used cocaine in the past 30 days.

"In focusing on adolescent need," says Mainous, "we're taking a slightly different approach to try to determine the level of substance abuse. The bottom line is, we're adding our findings to the substantial bank of



Arch Mainous, a social psychologist at UK, is interested in various social factors that influence adolescents to smoke cigarettes, use drugs and drink alcohol.

information on the reasons why adolescents use various illicit substances."

Though there may be a "hormonal trigger" or a specific unfulfilled need that causes a teen to drink or smoke marijuana, Mainous says that it would be naive and simple-minded to conclude that there's only one cause. "A number of social factors obviously have to be considered," he says. "There's already been a lot of good research on such things as peer influence, the role of parents, and the images television serves up."

The debate continues whether television programs lead teens to emulate behavior that they see, though various substance abuse researchers have pointed their finger in that direction. Last December Lloyd Johnston of the ongoing Michigan study attributed increases of adolescent drug use to constant reminders in music and film that using drugs is acceptable, a "glamorizing" of drugs by the entertainment industry. (Carole Robinson, a senior vice president at MTV, said that while she could not speak for the entire industry, the music video network had "very strict standards," guidelines that did not "promote, glamorize or show as socially acceptable the use of illegal drugs or the abuse of legal drugs.")

Martin believes that role models are ex-

tremely important for teens and do influence their behavior. She points to another study she and Mainous made of athletes and substance abuse in which athletes were found to be less likely to drink alcohol, smoke cigarettes or marijuana, or to use "hard drugs." They were more likely, however, than non-athletes to chew tobacco and use snuff. "Various social learning theories have shown that the reason for this is that the younger athletes are emulating professional role models," Mainous says. "The professional pitcher with the tin of snuff in his back pocket is setting an example whether he intends to or not."

Martin and Mainous hope that practitioners can use their findings to screen at-risk youth early on. "In the same way research is trying to find genetic markers which put some women at high risk for breast cancer, we're trying to discover markers that indicate an at-risk teenager," Mainous says.

"If various levels of hormones can further be shown to correlate with impulsivity or depression, for example, then adolescents could be assessed right in their doctor's office," Martin says. "Acknowledging a predisposition at that early stage may help keep the teenager from becoming a chronic user." ♦

KERA

by Angela Jones

The seventh graders eagerly file into math class, take a seat at one of the tables and begin inspecting the calculators they will use for the day's lesson. In the midst of minimal chatter among 13-year-olds, one student walks to Mrs. McLaughlin's desk, picks up the roll sheet and checks to see if anyone is missing.

Kathy McLaughlin, carefully surveying her students as they settle down for instruction, leans over and whispers to me, "Watch how they immediately take responsibility."

When the bell rings (a melodious chime that has replaced the hammer-clang bell of the old days) at 12:35, all 20 students are craned over their project charts ready to continue the experiment they began the day before.

A Super Pinky Ball, a pink rubber ball about the size of a golf ball, is the focus of inquiry: Is there a correlation between the height from which the ball is dropped and the height to which it bounces?

With a measuring rule, a ball and a graphing calculator (a computer that converts data into a graph), each of the six groups is armed to tackle the problem. And, essentially, the problem is all they have been given. The rest is up to them.

"Each group decides separately how they will go about solving the problem. How many trials they want to run, whether to measure in inches or centimeters and how to interpret their data," says McLaughlin, who teaches math at the School for the Creative and Performing Arts (SCAPA) in Lexington.

To a casual observer, these kids look like they're having too much fun to be learning. They hear only a few opening remarks from their teacher at the beginning of class and then are "let loose" to mull over their assignment. Students



Photo by Lee Thomas

Hands-on, Peer Learning Leading Students into the 21st Century

Students in Kathy McLaughlin's 7th grade math class work on a physics problem: What is the correlation between the height from which a rubber ball is dropped and the height to which it bounces? McLaughlin teaches at the School for the Creative and Performing Arts in Lexington.

are out of their seats, walking around, talking and bouncing balls.

McLaughlin's math class is a model of what KERA, the Kentucky Education Reform Act, has been shooting for since it was state mandated in 1990: a revolutionary approach to teaching that emphasizes hands-on and group learning, subjective evaluation and comprehensive integration of all sorts of knowledge and discoveries about the world. From schedule restructuring to curricula overhaul, KERA has attempted to completely revamp the state's education system.

Since the Kentucky Supreme Court ruled the state's system of school governance and finance unconstitutional, the entire K-12 system of public schools has been radically changed. The future of Kentucky's children has become a national experiment in itself, as educators and administrators have started from scratch to attempt one of the most daring state-wide education reforms ever.

At a glance, KERA's goals for new curricula (only one of several aspects of the restructuring) don't seem that revolutionary: to provide each child the opportunity to acquire basic communication skills, understanding of governmental processes, and knowledge to make economic, social and political choices. But how these goals manifest themselves in a classroom like McLaughlin's reveal the mammoth undertaking for teachers and their students.

There are no more desks or assigned seats and only a corner of the chalkboard is used for writing homework assignments. And the conversation is primarily among students, McLaughlin respectfully keeping her distance, walking around the classroom as they work. She interrupts a group only once to politely offer, "Can I be an observer?"

"Five years ago this kind of experiment would be allowed only in a science class, the one discipline that offered any hands-on activities," McLaughlin says. "But kids are literally doing math now, applying it to real-life situations they encounter in their world."

Rather than completing pages of computation problems from workbooks, students are inspecting three-dimensional hexagons to understand parts of a whole. Under KERA reform, students are expected to *experience* mathematics: they not only understand mathematical concepts but also apply math and communicate it using mathematical expressions.

Macy Andrews, 12, who has attended SCAPA since fourth grade, says the integration of all subjects in each class makes sense. "I love it. I really like math and art, and can do both in the same class. These aren't separate subjects. It all entwines—it's awesome."

For McLaughlin, who has taught for almost 20 years, the transition from traditional teaching has been challenging but worth it. "I still have to catch myself to not say 'no' to students when they attempt to solve a problem differently from me. The role of teacher has really changed," she says.

Because the assessment has shifted from standardized testing to a more contextualized approach, teachers are spending long hours every week observing children, reading journals and taking anecdotal notes on the progress of students. Less time is spent on formal instruction and more on observation and paperwork.

"You're really more of a guide and it's hard for some teachers to let go of that authoritarian role. One of the reasons I think people enjoy teaching is that role of imparting knowledge. But you can't just go sit at your desk now. You constantly have to be walking around, watching," McLaughlin says.

McLaughlin is one of the 49 coaches selected for the Kentucky Middle Grades Mathematics Teacher Network, a grant-funded project designed to train math teachers of grades 5-8 in a more real-world approach that stresses manipulative activities and technology. The three-year project is one of several initiatives to provide training for all teachers interested in learning new techniques in instruction.

But this kind of training in all subject areas is optional for teachers. The way KERA is designed, middle and high schools are required only to participate in annual state-wide tests. How they go about teaching children the material is left to them. Some schools, like SCAPA, have taken the ball and have run with it; others have been slow to change.

At the high-school level changes have been less obvious; few high schools have made the drastic transitions that have occurred at the primary level. But there are several plans suggested by reformists that would transform high-school education into a more authentic learning experience with practical application for students.

As part of a grant project funded by the Kentucky Department of Education, 67 high schools are running trial implementations to test what suggestions might work for their schools, says Rosetta Sandidge, an assistant professor of education at UK who is conducting research on KERA reform at the high-school level with educators from across the state.

One suggestion was that schools require an individual graduation plan composed of a program of study reflecting the student's interest and meeting college or vocational school requirements. The students would compile a portfolio that would include internship experience, writing samples, extra-curricular activities, job training and experience, and a resume. Other suggestions include block or modified block scheduling which would extend the length of class periods and a culminating project — senior year presentation with a research component and an oral presentation before a review panel. In addition, students would have to pass an exit

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Connie Bridge, director of UK's Institute on Education Reform, says that although support for reform remains strong, many teachers are still having problems finding enough time to plan their classes and assess students.

assessment, where a school counselor and teachers review a student's record to verify that he or she has met KERA learning goals.

Sandridge is observing three schools in central Kentucky to determine the extent to which these schools are implementing reforms. For example, one school has created a 30-minute class period for a teacher-guided assistance program. The purpose is to have a teacher assigned to individual students to serve as an advisor from freshman year to graduation. The only criticism from teachers is a lack of time.

"Even though the program is time consuming, teachers indicate they are more familiar with the students' work and problems, and can better serve as a guide for their specific educational needs," Sandridge says.

Early Grades Have Experienced the Greatest Changes

With the state mandate to consolidate at least two ages together in the K-3 levels, changes at the primary level are apparent in every classroom across the state. Now two or more teachers often tag-team a class, the rooms are divided into learning centers rather

than rows of desks, and children from ages five to eight may be grouped together. Teachers who have taught one grade for their entire career now have to work with a multi-age group, a point of contention for some who are not convinced this approach is the best way to teach.

Barbara Evans, a primary teacher at Picadome Elementary School in Lexington, admits she was really skeptical of the reform when her principal encouraged her to start the training. "Everybody was suspicious. I was really scared of what the restructuring was going to do to my job and was even considering retiring early," says Evans, who had taught first graders for about 20 years.

Picadome was one of eight primary schools that received a \$2,000 grant from the state to fund several field trips staff members made to progressive school programs in other states. Evans says she changed her mind when she visited a primary school in China Grove, North Carolina, that had implemented multi-age grouping and hands-on teaching. "It was *their* classroom. The students made decisions about how the class would go and their excitement about learning was so endearing. I remembered how rewarding teaching could be," she says.

Evans' earlier doubts have been echoed by several primary teachers in Kentucky since the first signs of restructuring surfaced. Using herself as an example, Evans attributes some teachers' hesitancy to a general fear of change. "There is so much freedom for the kids now and seemingly less power held by the teacher. That's a big change, and teachers who have been teaching the same way for 25 years have a hard time adjusting," Evans says.

Primary teachers surveyed in the first two years of the reform were overwhelmingly supportive of implementing the ungraded program into their schools. More than 6,000 teachers responded to the survey, conducted by the University of Louisville. Although the support among teachers for reform still exists, their general complaint, five years later, still remains: increased work load and lack of time to appropriately assess students.

"Teachers are still having a major problem

ODYSSEY

ODYSSEY

To a casual observer, these kids look like they're having too much fun to be learning.

finding enough time to plan. This is an evolutionary process and there are still some holes in how KERA is working," says Connie Bridge, director of UK's Institute on Education Reform. The institute serves as a liaison between teachers and educators and the state education department and conducts research to study the implementation of KERA and to evaluate its effect.

The state has attempted to compensate for some of the extra work by increasing salaries in the poorer districts with low tax bases, Bridge says. Each district is given \$25 per student for staff development, an increase from just \$1 before KERA was implemented.

"Every teacher isn't going to see an increase, say those from the more privileged districts, but the idea is to equalize opportunities across the state," Bridge says.

The new primary program emphasizes students learning as they are ready, using activities based on how children learn best. Research shows that children learn by using all five of their senses, by moving around and watching others. The environment reflects that philosophy with several different work stations for different subjects. During the school day children rotate around the room to the various areas that all involve manipulative and writing exercises.

"There is no doubt that there is more work involved in this kind of set up," says Tammy Johnson, Evans' teaching partner at Picadome. The two teachers share a class of six- and seven-year-olds who work in the same groups regardless of their ability.

Johnson, who has taught pre-school and first and second graders for 13 years, agrees the new assessment is more time-consuming but better enables her to meet each student's needs. "Having students for a couple of years and watching them develop through their writing and individual counseling really lends insight to how each child learns best," she says. Including classroom observation, anecdotal reports and weekly individual conferences, Johnson estimates she spends an additional 20 hours a week outside of class to assess student progress and plan appropriate instruction to meet their needs.

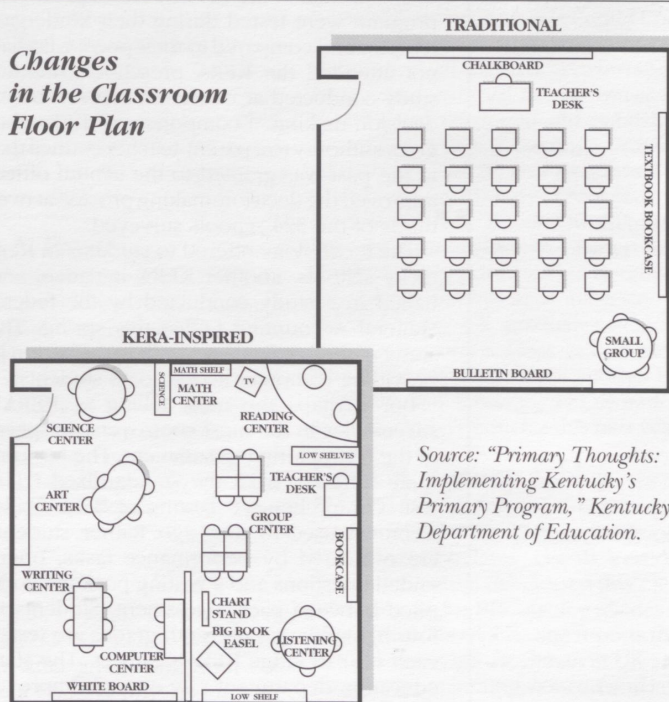
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Highlights of KERA Impact

- The gap between per-pupil spending in the poorest districts and the wealthiest districts has been cut in half, from \$1,468 in 1989-90 to \$745 in 1993-94.
- The average teacher's salary has increased by 27 percent since 1989-90, although teachers' salaries in Kentucky still lag over \$2,000 behind the national average.
- Eighty-four percent of eligible 3- and 4-year-olds received pre-school services through KERA, Head Start, and Pace partnerships in 1993-94, and the children who have participated in KERA preschool programs are closing the gap in school achievement between themselves and their peers, many of whom come from homes of higher income.
- The Extended School Services program, put in place by KERA, served 106,000 students in 1993-94 with 79 percent of these students improving course grades by at least one letter in a primary subject area.
- Eighty percent of the 500 schools that received rewards for improved test scores were primary schools where KERA-mandated changes have been most extensive.

Source: Kentucky Journal article, "While First Four Years of KERA Marked by Success, Several Aspects of Reform Face Challenges," by Dr. Connie Bridge, March 1995

Changes in the Classroom Floor Plan



Source: "Primary Thoughts: Implementing Kentucky's Primary Program," Kentucky Department of Education.

The future of Kentucky's children has become a national experiment in itself, as educators and administrators have started from scratch to attempt one of the most daring state-wide education reforms ever.

Has KERA Been Successful?

Depending on the source, headlines have told the story of KERA's public acceptance or rejection since its implementation. Some critics have said the state did not appropriately plan for implementing a reform as colossal as KERA. Others have praised reformists for the already far-reaching improvements that have changed their children's education. And various studies have attempted to reflect some sort of definitive answer to whether education reform has been successful.

One study showed primary students who participated in the preschool program performed better on developmental tests than their peers who had not attended preschool. Conducted jointly by UK's College of Education and College of Human Environmental Sciences, the study looked at 1,283 children in 36 districts representing all geographic regions of the state. The study began during the 1991-92 school year when children who had been enrolled in the 1990-91 KERA preschool program were tested during their kindergarten year and compared to their peers who had not attended the KERA preschool. Another study conducted at UK found that site-based decision-making, a component of KERA that gives authority to a parent-teacher council that in the past was granted to the central office, improved the decision-making process at two-thirds of the 324 schools surveyed.

The technology offered to students in Kentucky schools, another KERA initiative, was hailed in a study conducted by the federal General Accounting Office this spring. The study ranked the state seventh in the nation in providing computer access to its students.

But perhaps the most telling of KERA's success lies in the most controversial aspects of the restructuring: assessment. The tests are quite different from the standardized CTBS test (Comprehensive Testing of Basic Skills) Kentucky used 10 years ago. Rather, students are evaluated by performance tasks, open-ended questions and a writing portfolio compiled between each assessment. Students in fourth, eighth and eleventh grades are tested each year to judge KERA's impact. The state education department saw enough improvement in student scores to award \$25.5 million

to 480 schools that had increased their scores.

Some skeptics, however, think the new assessment does not accurately measure what students are learning and that the state's reward system is a little premature. The non-profit Kentucky Institute for Education Research released a review of the testing system, suggesting the state refrain from giving rewards until it can prove the tests more reliable.

"They did not have evidence that the system was ready for high-stakes decision-making," said Roger Pankratz, executive director of the institute. The group commissioned the study with Western Michigan University.

The study asserted that the performance assessments are very expensive and time consuming and tend to narrow what can be reliably measured. But overall, the study found Kentucky a clear leader in the development of educational performance tests, which pushed instruction in an educationally sound direction in the state's schools.

"The reason for changing the assessment had to do with changing the way teachers teach because they will teach in a way that will help their students score better. Revisions need to be made but we don't want to forget that the reason we designed a new series of tests was that the old ones tended to narrow instruction," Bridge says.

With more emphasis on application of basic skills, Bridge says children are expected to know more than memorized facts and that the students are capable of achieving that higher level of learning.

"Anyone who has doubts that these kids are learning needs to visit the classrooms. This kind of assessment, testing in a variety of ways, is much more complex than the standardized testing and has encouraged teachers to teach in ways that help," Bridge says. ♦

HONORABLE MENTION

Impact and Achievements of UK Graduate Program Alumni

compiled and edited
by Susan Hodgetts Stempel

James E. Rogers

B.S., *Business and Economics*, '70, J.D., '74, has recently been named vice chairman and president of the Cinergy Corporation, a holding company for two Midwest utilities. Ironically, he has spent much of his past career as a lawyer, at one time fighting the utility industry on behalf of consumers. As reported in an article on Rogers in *The New York Times*, "What he lacks in knowledge of generators and transmission lines, though, he more than makes up in strategic savvy...He is out to lead the charge as the industry changes—and simultaneously jockey for position in the new world he is sure is coming." Cinergy, created by the recent merger of Cincinnati Gas and Electric and PSI Energy, is now the nation's 13th largest utility, serving 1.3 million electric customers. The Birmingham, Alabama, native is fond of scuba diving, hiking, skiing and biking in his spare time.

Carrie W. Rinker-Schaeffer

Ph.D., *Biochemistry*, '92, is an assistant professor and director of urological research at the University of Chicago Pritzker School of Medicine. The Atwater, Ohio, native worked at UK under Prof. Robert E. Rhoads in biochemistry on a research project funded by the National Institutes of Health and the Council for Tobacco Research. After earning her Ph.D., Rinker-Schaeffer was a Special Program of Research Excellence Fellow at Johns Hopkins School of Medicine. She says her most significant achievement to



Carrie W. Rinker-Schaeffer

date "must be having an absolutely ideal job. I love the work that I am doing and feel extremely fortunate to be working in a great department at an outstanding university." Rinker-Schaeffer is working to develop a molecular map of metastasis-suppressor genes for both prostate and breast cancers. The researcher has already received numerous awards, including the Edwin-Beer Award from the New York Academy of Medicine in 1995, and the Sigma Xi Award for Outstanding Research at the University of Kentucky in 1992.

Patricia A. Payne

M.S., *Business and Economics*, '83, is a senior vice president with NationsBank and the regional executive of the firm's north metro Atlanta area. Recently featured in *Ebony* Magazine, Payne oversees sales and service delivery in 27 full-service banking centers and six personal banking centers throughout retirement communities in Georgia. She is a native of Tryon, North Carolina.

Rufus H. Ritchie

B.S., '47, M.S., *Physics*, '49, a native of Blue Diamond, Kentucky, continued his studies after graduating from UK. He earned a Ph.D. in physics from the

University of Tennessee, an M.S. from Cambridge University in Cambridge, England, in 1975, and in 1992 he was the recipient of the "Doctor Honoris Causa" degree from the Universidad del Pais Vasco, Spain. Now residing in Oak Ridge, Tennessee, Ritchie is a senior corporate fellow and professor of physics at Oak Ridge National Laboratory at the University of Tennessee. During his studies at UK, he worked with Prof. Clyde Crawley in the physics department on a theoretical study of the conduction of heat. Ritchie has authored over 250 publications in physics and radiation physics.

Louard Edward Egbert (Lee)

D.M.A., *Music*, '75, has served as director of choral activities at Colorado State and has led his choirs on many European tours. For the past five years he has been the conductor and musical director of Arvada Center Chorale. He has authored various publications of choral octavo (arrangements and editions of the music of Gallus), and produced and published two cassette disk recordings—*Christmas at CSU, Vol. IV*, and *Fanfares and Carols*, a CD jointly recorded by Denver's Aries Brass Quintet and Egbert's Arvada Chorale. Egbert says that he is "very proud to be a Kentucky graduate." He says he is interested in helping other UK graduates achieve and that he took a great deal of pleasure in the appointment of another UK graduate, Jeff Johnson, as Colorado's all-state choir conductor this past year.

Linda M. Ramsey Ashley

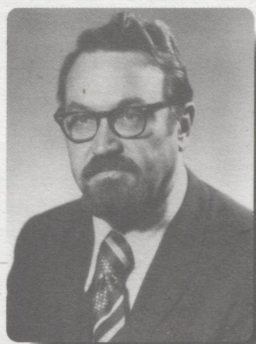
M.S.L.S., *Library Science*, '78, is corporate librarian for BIS Strategic Decisions in Norwell, Maryland. The Mt. Vernon, Kentucky, native developed this electronic library for BIS. Ashley resides in Marshfield, Maryland. She reports that her son Davis is a freshman at UK and plays in the marching, concert and jazz bands.

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Edward R. Hermann

B.S.C.E., '42, C.E., Civil Engineering, '53, is a native of Newport, Kentucky, now residing in Winnetka, Illinois. Hermann is a professor emeritus consultant at the University of Illinois and a principal consultant for Hermann Associates in Winnetka. As a student at UK, he worked with Prof. R.E. Shaver. After graduating from UK, Hermann earned the first doctor of



Edward R. Hermann

philosophy degree in environmental health from the University of Texas. He notes that this was accomplished "in two years, eight months, while supporting my wife, five to seven children, two dogs and myself." He cites his development of design criteria for waste stabilization ponds as his most significant engineering accomplishment. He says the development of a procedure with one of his students for estimating absolute thresholds of human hearing and the presentation of data for six puretone audiometric test frequencies is his most important scientific accomplishment. He also was founding president of the board of directors of the Bayshore Municipal Utility District in Harris County, Texas. Of his time at UK, Hermann recalls that he lived in Room 202 of Kinkead Hall, which was then a men's dorm, just two floors below the offices where *Odyssey* is published.

Roger Aubrey Bullard

*M.A., Ancient Languages and Literature, '59, is now a retired professor of religion and philosophy at Barton College in Wilson, North Carolina. After graduating from UK, he earned a B.D. from the Southeastern Baptist Theological Seminary in 1962 and a Ph.D. from Vanderbilt in 1965. At UK he was the recipient of a Haggin Scholarship. Bullard cites his most important career accomplishment as serving on the translation committee that translated the Old Testament and Deuterocanonical/Apocryphal books of today's English version of *The Bible*. He authored "Messiah: The Gospel according to Handel's Oratorio" and has served as associate editor on two biblical dictionaries.*

Carol Bryant (formerly Carol Lindemberger)

*B.S., '70, M.A., Anthropology, '70, M.S., Allied Health, '84, Ph.D., '90, is an assistant professor in the Department of Community and Family Health at the University of South Florida. According to a recent article in the *St. Petersburg Times*, in her six years at USF, Bryant has made her department a national leader in social marketing. Bryant's current research focuses on local women, infant, and children programs which provide nutrition and health education to low-income, at-risk women. Among the recognitions Bryant has received is the College of Public Health's Distinguished Teaching Award for 1994.*



Carol Bryant

William C. Loomis

M.S., Physics, '61, is vice president of defensive missile systems for Lockheed Missiles and Space Company, Inc. in Sunnyvale, California. In this capacity he is responsible for the development of all Lockheed ballistic missile defense systems including, he reports, "the development of the first defensive missile system to intercept an Inter-Continental Ballistic Missile (ICBM)." Currently, he is developing, under contract to the U.S. Army, the Theater High Altitude Defense System, which is a new version of the Patriot System that defended Saudi Arabia and Israel during the recent Gulf War. Originally from Matherville, Illinois, Loomis now resides in Los Gatos, California. As a student at UK, he worked as a research assistant in the physics department with Prof. Fletcher Gabbard on neutron cross-section experiments. Following his time at UK, Loomis earned an M.S. in management from the Sloan Program at Stanford University in 1973.

Margaret Adams Hazlette

M.S.W., Social Work, '91, is a school social worker and child guidance specialist in the Jessamine County Public Schools in Nicholasville, Kentucky. The Paintsville native is serving her second term as president of the Kentucky School Social Workers Association, an affiliation, she says, that has allowed her to advance the practice of social work in the schools.

Irving Millman

M.S., Microbiology, '51, was inducted in 1994 into the Inventor's Hall of Fame for his work on hepatitis B. A retired member of the Fox Chase Cancer Center in Philadelphia, Millman says his work at Fox Chase led to the first hepatitis B vaccine and serological tests for the disease. Patents were

HONORABLE MENTION

issued on both. Prior to his affiliation with Fox Chase in 1967, Millman was on the faculty of Northwestern Medical School in Chicago, Illinois, and associated with Armour Pharmaceuticals, the Public Health Research Institute of the City of New York, Inc., and the Merck Institute for Therapeutic Research. He remains an adjunct professor of microbiology and immunology at Hahneman Medical College and Hospital in Philadelphia. After graduating from UK, he earned a Ph.D. from Northwestern in 1954. Millman makes his home in Willowgrove, Pennsylvania.

Dennis R. Swager

B.S., M.S., Geology, '78, is the owner and president of Team Energy, Inc. and Swager and Associates, Ltd., both located in Lawrenceville, Illinois. Originally from Henderson, Kentucky, Swager made a major career change in 1991 when he resigned his position as geological manager with Marathon Oil Company and "started from scratch" two corporations. Swager and Associates, Ltd. is an oil and gas consulting firm which provides professional geologic and engineering advice to the oil and gas-producing/exploration community. His other company, Team Energy, Inc., is, he says, "a small, but growing oil and gas exploration/production company." Among his other accomplishments, he cites having "a great family—my wife Ella Catherine VanBussum Swager and our two children, Emily Ann and Melissa Gail."

Karen Sue White Biliter

M.A., English, '69, was recently honored at the 30th Annual Conference on Programs for Exceptional Children for her 25 years of service to children with disabilities. Originally from Freeburn, Kentucky, Biliter resides in Majestic, Kentucky. She has taught at

the elementary, secondary and college levels and worked in the Owen, Bourbon and Pike County school systems. Biliter has also worked with students who are considered gifted and talented. At present, she is serving as a regional instructor in the Pike County Performing Arts Program, as well as serving as the school's Governor's Cup Coach and on the County Schools Superintendent's Advisory Council.



Stanley Jsa

Stanley Jsa

M.S.E., Engineering, '75, heads and is the sole owner of Intersteel, Inc., a Louisville company involved in steel fabrication and general contracting. The company grew from an initial investment by Jsa of \$30,000 to a firm which has 60 employees and nearly \$10 million in sales. Customers include government agencies such as the U.S. Army Corps of Engineers and the Veterans Affairs Medical Center, as well as major corporations, including Dow Corning and E.I. du Pont de Nemours & Co., Inc. Jsa, a native of Taiwan, arrived in the U.S. and came to Kentucky in 1973 to attend UK graduate school. He has been a Kentuckian ever since. Recently

featured in *The Courier-Journal*, Jsa's firm is described as one that Fortune 500 companies hire because they know the company can be counted on. Jsa is also an avid fan of UK basketball.

Linda Wise McNay

M.B.A., Business, '79, is executive director of the Emory Challenge Fund at Emory University in Atlanta. The Georgetown, Kentucky, native went on to Georgia State University after completing her M.B.A. at UK and earned a Ph.D. in 1989. She notes that she obtained her Ph.D. in four years while working full-time and that when she passed her comprehensive exams, her first son was four weeks old. During her 15-year career in educational fund-raising, she has raised over \$50 million for institutions of higher learning.



Linda Wise McNay

Ebenezer R. Vedamuthu

M.S., Animal Science, '62, is chief research microbiologist for Quest International-Bioproductions Group in Sarasota, Florida. Originally from Madras, India, Vedamuthu was a Haggin Fellow at UK, working with Professors

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W.E. Glenn and T. R. Freeman in animal sciences. He says he "greatly appreciates the opportunity I was given to work in the UK Dairy Plant. This hands-on experience helped me in 'trouble shooting' for my present employer." He also credits the Haggin Fellowship as an important factor in launching him in his chosen career. Vedamuthu earned a Ph.D. in microbiology from Oregon State University in 1965. His research has led to the issue of 12 U.S. patents, as well as patents in Europe. He was recognized in 1993 as the first recipient of the International Dairy Foods Association Awards, administered by the American Dairy Science Association. In addition, he has published 60 scientific papers in professional journals. Vedamuthu makes his home now in Bradenton, Florida.

John Robert Barton

M.S., Biological Sciences, '85, M.D., Medicine, '85, is director of Maternal-Fetal Medicine at Central Baptist Hospital in Lexington. The Lexington native worked with Professor W.S. Cohen while completing his master's degree in biological sciences at UK. He continues as an active researcher, particularly in areas of pregnancy complications such as preeclampsia and recurrent acute fatty liver of pregnancy.

Patricia Ann Melrose

M.S., '81, Ph.D., Veterinary Science, '83, is an associate professor in the Department of Anatomy and Cell Biology and an adjunct associate professor in veterinary physiology and veterinarian microbiology at Louisiana State University School of Veterinary Medicine. As recipient of scholarships and fellowships from the Veterinary Medicine Association and the Grayson Foundation, Melrose worked with Professors Bob Douglas

and Robert Loy during her studies at UK. She has published extensively and has served as major professor to a number of graduate students, taught courses for approximately 400 veterinary medical students, and directs the Ph.D. graduate program of her department at LSU.

Bill Cunningham

J.D., Law, '69, has published a new book, *Castle*, which, according to *The Courier-Journal*, chronicles the history of life-and-death struggles, humor, and courage inside Kentucky's only maximum-security prison. As a youngster, Cunningham grew up almost in the shadow of Kentucky State Penitentiary at Eddyville and later worked as a lawyer defending or prosecuting many of its inmates. The title for his book comes from the prison trustees who peddled their prison-made goods outside the stone structure they called "the castle." After earning his law degree from UK, Cunningham became a public defender and now is circuit judge for Lyon, Livingston, Caldwell and Trigg counties. Described as an "established author and respected historian," Cunningham profiles in his book many of the inmates who have died in the prison's electric chair.

Cheryl Phipps

M.A., Vocational Education, '69, is superintendent of the Licking County Board of Mental Retardation and Developmental Disabilities in Newark, Ohio. Phipps is also the first woman twice elected president of the Ohio Superintendents of County Boards of Mental Retardation and Developmental Disabilities. She is currently president of United Way and received the YWCA Woman of Achievement Award. The Hopkinsville native resides in Pataskala, Ohio.



Cheryl Phipps

Alumni of any of UK's graduate programs are invited to complete the information form on pages 21-22 and send it to us. We will share as many of your responses as possible in future issues of *Odyssey*.

Information for *Odyssey Magazine*

Outstanding Accomplishments of our Graduate School Alumni

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If your name was different at the time of your graduation, please indicate that name as well: _____

Address: _____

Phone: (Office) _____ (Home) _____ (Fax) _____

Hometown: _____

Undergraduate degree and year conferred: _____

Name of institution granting your **undergraduate** degree: _____

Year your UK **graduate** degree awarded: _____

Degree: _____ UK College: _____

UK Department: _____

Additional Graduate Degrees

Degree: _____ Institution: _____

Year Awarded: _____

Degree: _____ Institution: _____

Year Awarded: _____

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Name of Company/Institution: _____

Location: _____

Career Highlights: _____

UK Background

Were you a fellowship recipient? ☐ Yes ☐ No A scholarship recipient? ☐ Yes ☐ No

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If yes, please complete the following:

Name of faculty member(s) with whom you worked: _____

Department(s): _____

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Agency, if any, that funded the research: _____

(include additional pages if needed)

-over-

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What do you consider your most significant achievement to date?
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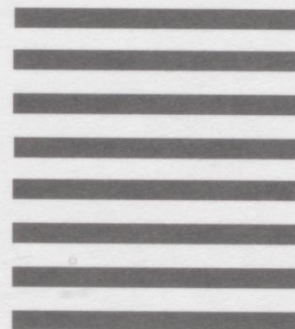


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The Black Box Called Pain

by Sheila H. Hume

Patty McBrayer has come to appreciate the little things in life. The 26-year-old Rockholds, Kentucky, wife and mother of two suffers from idiopathic pancreatitis, an intensely painful inflammation of the pancreas with no apparent cause. A flare-up can send McBrayer to bed for days or weeks at a time, immobilized with pain and unrelenting nausea. Unable to eat, "even the smell of food makes me sick," says McBrayer, whose disease caused her to lose 60 pounds.

These days, however, McBrayer is not only eating, she's delighting in being pain-free enough to cook a simple meal for her family. She's doing so by using a medical device reminiscent of a '90s *Bionic Woman*.

From all appearances, the unit fastened to McBrayer's waist looks like a slightly oversized Walkman. Yet instead of music, the mechanism provides a continuous flow of the pain-relieving narcotic morphine through a tiny, plastic catheter implanted into the epidural space in McBrayer's lower back. As the drug gradually makes its way into the cerebral spinal fluid, it blunts the receptors that relay the sensation of pain to the brain.

On a bad day, when the pain is particularly intense, McBrayer can push a button on the unit to give herself an extra dose of the medication. The implanted catheter is not painful, and because only a minute amount of the narcotic enters her spinal fluid at any one time, some of the common side effects of long-term analgesics, including drowsiness, are lessened.*

Doctors at the University of Kentucky hospital, where McBrayer received the device, are hoping that this approach will not only alleviate her pain but also have the therapeutic effect of reducing the frequency of flare-ups. In the meantime, a home health nurse visits McBrayer once a week to refill the device. The most painful part of that, McBrayer says with a laugh, is removing the bandage that holds the catheter in place.

A Cultural and Medical Revolution

The high-tech apparatus giving Patty McBrayer a chance at normalcy is known as a permanent epidural catheter. While epidural pain relief has been used for decades in childbirth and, more recently, in some types of major surgery, its use as an implantable, portable device in the treatment of chronic pain highlights the medical, technological and cultural transformation occurring in pain management today.

Traditionally considered an unpleasant but necessary consequence of aging, injury or illness, and an unavoidable by-product of surgery, pain has been an under-recognized, poorly understood phenomenon in a society which places high regard on the stoic "stiff upper lip," say proponents of more aggressive pain management. For its part, modern medicine has proliferated such thinking by

If pain is a black box—as those who study and struggle to uncover pain's highly individual mysteries describe it—then conquering it may require nothing less than an all-fronts, multifaceted assault.

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Dorothy Brockopp, a nurse researcher at the UK Medical Center, and her husband Gene Brockopp, administrative director of the Pain Management Center, have both focused their work on patient attitudes about pain.

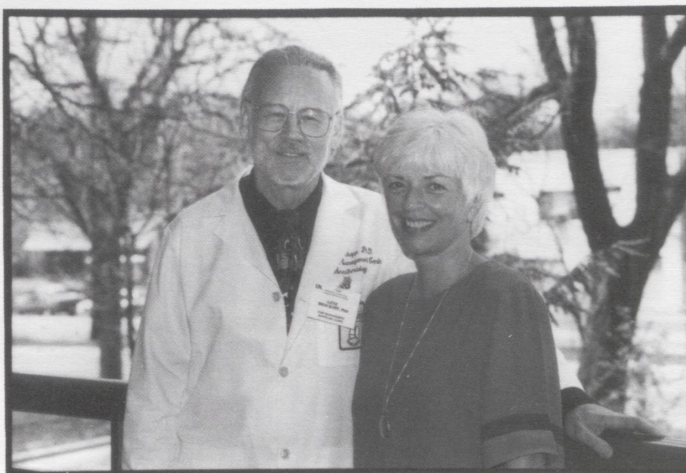


Photo by Duane Headworth



Photo by Lee Thomas

Thomas Foster, director of the UK Center for Pharmaceutical Science and Technology, holds an early model of a patient-controlled drug-delivery system called Patient-Controlled Anesthesia (PCA). Foster says that this device is now "an antique," since a PCA system the size of a wristwatch is now currently available.

clinging to deeply rooted fears concerning patient overdosing or, worse yet, addiction, states Dorothy Brockopp, a nurse researcher at the UK Medical Center who studies both clinician and patient attitudes about pain (see sidebar on professionals' attitudes).

In truth, says Brockopp, much national research has found that less than one percent of post-operative patients become addicted to their pain medication. For patients receiving long-term analgesics for chronic conditions or cancer pain, dependency occurs, but not in the illicit sense. "Patients become physically dependent, just as a diabetic is dependent on insulin, or a heart patient on digitalis. With proper management, pain medication can greatly improve quality of life," says Ada Jacox, Independent Foundation Chair in Health Policy at the Johns Hopkins University School of Nursing.

Jacox co-chaired the nationwide panel which developed landmark pain management guidelines for the Agency for Health Care Policy and Research in 1992 and 1994. The interdisciplinary panel of doctors, nurses and researchers spent two years compiling data on

existing scientific research on pain practices and management. Based on those findings, the panel developed a two-volume set of guidelines which offers step-by-step protocols on addressing acute and chronic pain in hospital and outpatient settings (the panel also wrote a version for patients). With over two-and-a-half million of the guidelines distributed in a half dozen languages, these health standards have brought worldwide attention to the need for better understanding and coordination of acute and chronic pain treatment by clinicians, says Jacox. Additionally, an estimated two dozen U.S. hospitals have incorporated pain-management initiatives into their ongoing quality-assurance programs.

For the consumer, notes panel co-chair Dan Carr, Saltonstall professor of pain research at Tufts University School of Medicine in Boston, the guidelines, "raised the level of consciousness about their options for treatment. For the clinicians who were already involved in efforts to improve pain management, this validated and accelerated their efforts."

One pain research study, among the more than 15,000 cited in the guidelines, found that post-operative pain medication was effective in only one-half of the approximately 23.3 million operations performed in the U.S. in 1989. Other studies indicate that as many as 33 percent of patients who have surgery have moderate to severe post-operative pain. "With all the attention the guidelines have received, we continue to see studies that say post-operative pain is not being managed well," says Jacox. And furthermore, despite the availability of safe and effective analgesics, 25 to 30 percent of cancer patients experience pain considered "very severe," according to the panel's research data. Under-treatment of cancer pain has prompted The World Health Organization to label pain control in this area "a problem of international scope."

At the center, "mastery" over pain typically involves a blend of medical, pharmacological and non-pharmacological treatments.

Pain as a Subjective Experience

Historically, much of medicine's "opioiphobia" about pain stems from the one-size-fits-all approach to management, explains Thomas Foster, director of the UK Center for Pharmaceutical Science and Technology. Pivotal research conducted by Foster and his colleagues in pharmacy, surgery and anesthesiology at UK in the late '70s and early '80s contributed to a growing body of evidence that pain was very much a subjective phenomenon which varied widely among individuals in its interpretation and intensity. The notion that each of us experiences pain differently raised more than a few eyebrows, Foster recalls, because it challenged the long-held clinical practice of fixed dosing, or giving pain medication based on a set of predetermined criteria such as patient size and weight, as well as length of time between administration.

The UK research, supported over a period of years by the Mark Foundation, Baxter Health Care, and others, provided evidence that ongoing, sustained dosing—giving medication before the cycle of pain comes full circle and the patient was once again in discomfort—offers the most effective method of pain control.

Armed with this benchmark research, Foster, along with Ward Griffin, former chairman of surgery, and Ballard Wright, former chairman of anesthesi-

ology, worked with Abbott Laboratories, The 3-M Company, Baxter Health Care and Bard Electrosystems to develop this new dosing strategy and the equipment to administer it. In 1980, UK introduced the country's first commercially marketed patient-controlled drug-delivery system, known as Patient-Controlled Anesthesia (PCA). The device—now produced by some 30 different manufacturers worldwide — commonly employs an infusion pump, integrated with a timing device run by a microprocessor chip, which allows patients to self-administer small doses of narcotics intravenously.

Nearly 15 years after the UK team introduced PCA as "customized" pain control, its efficacy is widely documented. Post-operative benefits have been shown to include superior pain relief with less medication, and therefore less sedation; less time spent in intensive care and fewer post-operative complications; and earlier patient mobility. When used as part of a pain-management plan for chronic conditions such as cancer, arthritis, or a debilitating injury, PCAs have been shown

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William Witt, director of UK's Pain Management Center, with attending physician and assistant professor of anesthesiology Flo Melio. Melio came to UK last July from the University of Florida.



Photo by Lee Thomas

Keith Javery, medical director of the Pain Management Center, says the center's biggest challenge is providing optimal care for patients in Appalachia, who must travel long distances to come to UK. The center treats about 100 people from Appalachia each week, Javery says.

Photo by Lee Thomas



"The individual's outlook on life is crucial to pain management. We tell patients, 'We may not be able to end the pain, but suffering is optional.'"

to reduce frequency of hospitalization as well as improve overall quality of life.

Notes Dan Carr of Tufts, patient-controlled anesthesia was "enormously influential" in putting pain control in the hands of the patient. "The release of the technology came at a time when patients were asking for more involvement and control over their care. PCA synergized that movement with the technology to accomplish it safely."

The UK team's benchmark also set the stage for advancements in pain management which

continue through the present, according to William Witt, director of UK's Pain Management Center (see sidebar on PCA wristwatches).

One such example, notes Witt, is the combining of PCA with epidural administration. Epidural's quicker access to the spinal cord via the cerebral spinal fluid, combined with PCA's ability to allow patients to "call the shots," is allowing patients like Patty McBrayer to be pain free as well as mobile. The technology has had a profound effect on reducing human suffering, while simultaneously reshaping the whole field of anesthesiology, says Witt. "Many procedures that used to guarantee several days in the ICU because they were so painful we can now do in a limited hospital or

outpatient setting. That represents a tremendous change in the way anesthesiologists work, is immensely appealing to the patient and, in my opinion, is an essential requirement in a growing managed-care environment," he says.

Meanwhile, UK continues to examine the efficacy of epidurals for post-operative pain in a large-scale study involving over 6,000 patients. Says Witt: "We expect the study will reinforce what's already suggested in the literature—that epidurals shorten hospital stays, reduce post-operative complications, and get patients back on their feet faster."

Waging the Battle

The interdisciplinary effort of Foster, Griffin and Wright continues today at the university. The clinical and scientific expertise of departments and specialties as diverse as anesthesiology, behavioral and rehabilitative medicine, pharmacy, and nursing provide patients with a holistic approach to pain management. If pain is a black box—as those who study and struggle to uncover pain's highly individual mysteries describe it—then conquering it may require nothing less than an all-fronts, multifaceted assault.

By the time most patients get to the UK Pain Management Center, they're anything but happy campers. "They've been through many, many procedures, medications and therapies," says Witt. "They're frustrated and angry, and for some it comes as a shock that while we may be able to identify the source of pain, we may not be able to eliminate that pain."

That contemporary medicine, with all its high-tech procedures, gadgets and pharmacopoeia, can minimize but not necessarily "cure" pain, is the first hurdle patients must surmount, Witt explains. Next comes the acceptance that it is ultimately the patient who will determine how much pain is experienced, depending on how well he or she is able to master it.

At the center, "mastery" over pain typically involves a blend of medical, pharmacological and non-pharmacological treatments. The latter may include focused attention (hypnosis),

biofeedback, stress management, relaxation and imagery, transcutaneous electrical nerve (TENS) stimulation (electrical stimulation of selected muscle groups), as well as application of cognitive-behavioral theory. "This is an exceptional place where medical and non-medical treatments function together and where both acknowledge that the mind and body are one," says Gene Brockopp, behavioral psychologist and administrative director of the Pain Management Center. "The individual's outlook on life is crucial to pain management. We tell patients, 'We may not be able to end the pain, but suffering is optional.'"

Brockopp had extensive experience in developing pain-management programs in hospital settings when Witt invited him to come to Lexington to help develop the UK center in 1987. When he arrived, Brockopp found practitioners actively but separately pursuing pain management. Today, anesthesiologists, surgeons, psychologists, nurses, physical therapists and social workers work together in a one-stop, multidisciplinary, outpatient setting where 60 chronic pain and cancer pain cases are evaluated and 650 patients treated each month. On the inpatient side, an acute pain management team, headed by Medical Director Thomas Young, consults an average of 250 patients monthly. Recognizing the need for specific training in this area, UK recently established one of the country's first pain-management fellowships. On the nursing side, inpatient pain is now monitored 24 hours a day by one of five specially trained nurses. "Patients are now able to be assessed and treated for pain around the clock," notes Barbara Vandervere, administrative director of the acute-pain team.

Managing Pain with Novel Drugs

Directing the pain center's medical research is Medical Director Keith Javery, whose interests include the use of novel drug therapies in pain management. One ongoing UK study is evaluating the use of ketamine, a drug commonly used in general anesthesia, for use in PCA pumps. According to Javery, "We're

Pain Control in a Wristwatch

Imagine controlling pain as easily as checking your wristwatch. In a timely leap forward in the battle against pain, researchers at the University of Kentucky designed one of the world's smallest patient-controlled anesthesia (PCA) devices, operated by a wristwatch mechanism.

"The idea was to design a simple alternative to the more complicated, cumbersome PCA equipment which limited patient mobility," says Thomas Foster, who led the UK pharmacy research team that developed the device in conjunction with engineers at Baxter-Travenol Laboratories, Inc. in 1986. "We wanted something totally disposable, cheap, easy to use and simple to operate," Foster says. "We came up with the idea of the wristwatch."



Marketed as the Travenol Infusor, the device uses a special infusor to deliver the proper drug dosage to the patient. A drug solution is injected into the infusor, inflating a special balloon reservoir. As the balloon slowly deflates, the pressure forces the solution through a flow restrictor tube to the wristwatch-like module. The patient presses a button on top of the module which releases a small amount of the drug through a plastic tube into the patient's vein. The device is designed in such a way to allow the patient to administer only one dose of medication every six minutes.

With no electronics or bulky equipment, "It's a low-tech solution to the high-tech problem of pain control," says Foster, director of the UK Center for Pharmaceutical Science and Technology.

Travenol began commercial distribution of the infusor in 1987 for use in post-operative and chronic pain relief and today the device is marketed worldwide.

Currently, Foster is consulting with an undisclosed manufacturer on a second-generation wristwatch device. This one, he says, will be a completely self-contained unit, capable of delivering measured drug doses by use of a mechanism similar to a painless transdermal patch, rather than an IV line. "It's at least a few years away from being marketed," Foster explains, adding that dosing and "day-in-and-day-out dependability" are still being addressed in the laboratory.

Other PCA research, he adds, is looking at drug administration by using ultrasonic delivery (mixing up drug molecules at a high enough rate to penetrate the skin) and iontophoresis—transmitting drugs through the skin through very mild electrical current. Though they may sound futuristic, Foster predicts even these devices are only years away from commercial application.

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"An individual in pain is an individual who is not fully involved in life. If you define health as more than the absence of disease or pain, you must do more to relieve that pain."

finding that when used in very low doses with acute pain patients, including post-operative patients, ketamine significantly increases efficacy and potency while allowing the patient to use less pain medication. And less medication means fewer side effects."

Another study, being conducted in conjunction with Bowman Gray School of Medicine in South Carolina, is using the anti-hypertensive drug clonidine in the treatment of the elusive pain syndromes, including the rare but destructive reflex sympathetic dystrophy (RSD). With RSD, Javery explains, the patient experiences intense residual pain months, even years, after an injury is healed, even though there is no pathological basis for the pain. "We found that when given in the epidural space, clonidine has properties that decrease some of the pain signals, as well as some of the sympathetic outflow which is responsible for perpetuating the pain in RSD," he says. The big plus, adds Javery, is that clonidine is a non-narcotic and so has none of the side effects commonly associated with those drugs. In another study, involving primates, Javery is looking at the pharmacokinetics of epidurally administered steroids in the treatment of ruptured or bulging discs. "By giving the steroids in the epidural space—in close proximity to the site of the rupture—we're hoping they can have a greater effect." Adds Javery, "If you look in *Physicians Desk Reference*, none of these drugs is prescribed for pain; however, we're finding promising applications in the treatment of various types of pain, including neuropathic."

The Emotional Layers of Pain

Both the pain center and its sister department, physical medicine and rehabilitation, put a high premium on psychotherapeutic intervention in the management of chronic pain. According to Dwight Auvenshine, director of behavioral psychology for the physical medicine and rehabilitation clinic, the duration and intensity of pain a patient experiences often has a lot to do with the state of his or her personal life. "One of the biggest contributors to chronic pain is a dysfunctional family life. This is especially true of people

In Search of a New "Attitude" Toward Pain Control

The biggest obstacle to effective pain management is not technology but rather the clinicians who administer it. This is a strong statement when applied to a profession dedicated to relieving human pain and suffering. Yet, according to Dorothy Brockopp, an RN and researcher at the University of Kentucky Hospital and associate professor in the College of Nursing, professionals' attitudes can and do play a significant role in how well patients' pain is controlled.

Brockopp, along with her colleagues in nursing, anesthesiology, medicine and psychology, have conducted a number of studies which examine doctors' and nurses' cultural and professional attitudes about pain, as well as their knowledge of effective pain-management techniques in hospitals. They have also looked at how well patients themselves perceive pain and its treatment. While the overall picture is improving, change is slow, she says.

In a recent study funded by the May Day Foundation, Brockopp, along with RNs Sherry Warden and Janet Carpenter, Gene Brockopp, and John Wilson, were interested in determining if a three-day, comprehensive training program in pain management at the UK hospital could provide them with information about the barriers to changes related to pain management in six rural Eastern Kentucky hospitals. "The idea was to enter into a dialogue with these practitioners to determine what was happening at their hospitals, what wasn't happening, and what were the barriers to change," says Dorothy Brockopp.

Six months after the UK program, researchers followed up with the clinicians at their own hospitals. What they found was that better knowledge of pain management did not necessarily translate into better practice. A number of barriers were identified. Of biggest concern to the UK researchers were uncompromising attitudes. "Fears and concerns about the legal-political ramifications of prescribing narcotics was evident," says Warden. Physicians told the UK team they were reluctant to write orders for opiates, "for fear that they would be reprimanded or even come before

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the licensing board." Also, even in an acute-care setting, there was still the notion among both doctors and nurses that patients were "faking," Warden adds.

Access to pain control was also a problem. "Some of the hospitals didn't have the equipment to allow for a particular type of pain management, such as patient-controlled analgesia," Warden says. "Or the pumps are available but they are locked away in pharmacy departments."

Clinicians who took part in the study also cited lack of support from hospital administration and a high turnover rate among their own staff as obstacles to appropriate pain management. Nurses, meanwhile, expressed frustration that, despite their increased knowledge about pain control, they were unable to influence the practices of physicians who ultimately prescribed the medications.

"We wrote the May Day grant to try to understand why change is so difficult in the area of pain management. We are fairly certain that traditional kinds of education have little real impact," says Dorothy Brockopp. "My concern is that you can teach people about pain management, but if they have negative attitudes—if they believe, for example that pain is of value, that pain is an insignificant part of the process—you won't change attitudes." Among the hospitals sampled, "pain management was not a priority; however, some positive changes are occurring," Brockopp adds.

Another UK study, which was published in the *Journal of Gerontological Nursing*, examined knowledge levels regarding pain management of post-operative elderly patients among a group of practicing registered nurses and senior-year nursing students. According to Warden, the study found "serious knowledge gaps" among both nursing groups. Among its findings: More than half of students and RNs thought the elderly did not experience as much pain as other age groups, and that they should not be verbally assessed for pain if they appeared confused. Moreover, more than half of the RNs and students said they did not perceive post-operative pain as unhealthy or dangerous. "It is disconcerting

to note that both groups did not appear to understand some basic tenets of pain management," note the researchers in their findings. "The results of this study supports earlier findings that nurses do not understand the effective use of narcotics in relation to pain management."

On the brighter side, a study involving first-year medical students at UK found attitudes can be shaped, at least in the short term. Behavioral psychologists John Wilson and Gene Brockopp exposed first-year med students to a brief clinical and basic science seminar on pain, and then followed up with the students five months later. Attitudes measured at the five-month juncture showed "increased complexity, greater emphasis that pain is real and not imaginary, and stronger belief that working with pain patients is rewarding," says Wilson. In an editorial prefacing publication of the study in the journal *Pain*, Mitchell Max, of the Pain Research Clinic, National Institutes of Health, wrote that, "The fragile enthusiasm created in a first-year course will wither if the student does not feel competent to handle the challenges of pain patients in the clinical years."

Meanwhile, Wilson argues that simply giving medical students book knowledge about pain is not enough. "We believe a curriculum on pain should include not only factual material about pain but also educational experiences that reinforce facts and help students form positive attitudes toward patients in pain. Initiation of the pain curriculum early in medical education may be crucial."



Photo by Lee Thomas

RN Sherry Warden was part of a team of UK researchers who conducted a three-day pain-management training program for physicians in six rural Eastern Kentucky hospitals.

with histories of abuse, including physical, sexual, and mental abuse. As these issues are resolved, we see a patient having less investment in pain. The pain doesn't go away, but he or she is better able to manage it," Auvenshine says. And patients with chronic pain are often depressed as they grapple with loss of self-esteem and identity. "For a man who has always been the bread winner, a long-term disability can be a devastating blow to his self-image," says Auvenshine. "For that patient, we may work on cognitive restructuring, the concept that he is still a good human being with meaning and worth apart from his physical body. We teach him to divest himself of the pain."

When Ronnie Givens severely injured both legs in a motorcycle accident in 1975, he never expected the pain to last 20 years. Even after his left leg was amputated in 1984, Givens experienced a burning "phantom pain" that limited a thriving apartment rental business in Eastern Kentucky, and turned him into a couch potato. Over the last several years, Givens drank his way through the pain, blunting the nagging ache with liquor. Between the alcohol and prescription morphine he was taking, "I was told I was headed for chemical suicide," he recalls. When he wound up in the UK pain center one day last fall, Gene Brockopp leveled an ultimatum: without rehabilitation for the drinking, there could be no serious attempt at lasting pain management. Two weeks in rehab taught Givens an important concept. "I learned my problem wasn't drinking, but pain. If I got the pain under control, I could stop drinking." On October 2, 1994, at age 52, Givens gave up the booze and signed up for a pain-management protocol that included a permanent epidural catheter as well as ongoing psychotherapy. "With the pump I can be pain free," Givens says while awaiting his implantation surgery. "For me it's the last straw."

Where—and How—Does It Hurt?

Research being conducted by UK clinical psychologist T. Andrew Pearson, in the Department of Physical Medicine and Rehabilitation, suggests that patients not only per-

ceive their pain differently, but benefit from different types of therapies. Based on ongoing interviews and assessments, Pearson has categorized patients into different treatment groups, depending on their perception of pain. One group focuses primarily on the physical intensity of the pain ("It just plain hurts all the time"), while another group focuses on the psychological distress which accompanies the pain ("I feel like less of a man").

Pearson found that the physical pain perceivers tend to benefit most from therapies that get them to exercise cognitive or hypnotic techniques, such as hypnotic analgesia (convincing the mind that the body is receiving analgesics). Those who focus on psychological distress do better with therapies that encourage them to concentrate on mental and physical relaxation, such as cognitive meditation or hypnotic-guided imagery.

"We're beginning to develop clear clinical evidence that pain is much more than a physical stimulation," says Pearson, "and that it must absolutely include the mental perception of both the pain and its consequences. Therefore, physical treatment of pain should also include appropriate psychological treatment of pain."

Learning to Cope

Debbie Cole might describe herself as an "emotional" pain perceiver. Several years ago, faced with a diagnosis of chronic lower back pain, the Cynthiana, Kentucky, resident and owner and trainer of Arabian horses was devastated. Suddenly no longer able to ride, Cole was equally limited at her job as a certified medical assistant. "I could barely sit or stand for more than 10 minutes at a time," she says. Meanwhile, routine activities such as grocery shopping or vacuuming became insurmountable.

Several months into the pain, Cole began receiving nerve root blocks at the UK rehabilitation medicine clinic. The anesthetic injections provided temporary relief, but after receiving 16 shots in the space of two months, "I realized I had to do more," Cole recalls. Psychotherapy helped her peel back the lay-

ers of distress in her life that were exacerbating—if not causing—the elusive pain. In time, she quit a stressful job she didn't like (serendipitously getting hired at UK's rehabilitation clinic), learned to find "a new beauty" in her Arabians that didn't require riding, and began delegating the housework to a willing husband. She even got rid of her high heels and replaced them with less fashionable but more comfortable flat shoes. In other words, says Cole, "I learned to cope."

As a patient of the rehab clinic, Cole learned relaxation and deep-breathing techniques, exercises she was later able to teach to her patients. Even now that her pain is nearly in check, Cole remains aware of the careful balance of emotional and physical factors that keep it that way. The lifestyle changes are now an accepted part of her routine, as are the subtle exercises she practices each day, moments when she allows herself to identify tense muscles and then consciously relax them. These "body inventories," she explains, are a constant reminder of how stress can accumulate—as well as be controlled—throughout the course of a day. "I've learned so much about myself in the last few years," she says. "I learned you can't give into the pain. It may never go away, but you can control it."

A Global Approach to Pain Prevention

When it comes to chronic pain such as Debbie Cole's, prevention may eventually play a bigger role than post-injury management. Witt notes a trend already in progress where managed care plans are dictating on-site company programs where the focus is on prevention and education to prevent chronic pain and disability throughout the employee's lifetime. "The effort will be on intervening before the injury occurs and, if it should still occur, offering treatment with short-term, measurable outcomes that stress cost-effectiveness and an expedient return to work," says Witt. The latter will require not only a more sophisticated health-care industry focused on wellness rather than disease, but also a more advanced level of training and understanding by clinicians in how to manage existing pain. An example, Witt says, is opiate

maintenance—the use of short- or long-term narcotics—in chronic pain rehabilitation. "From a functional and cost standpoint, opiate maintenance is proving to be very effective and efficient." At issue, however, is the ability to educate people along a broad continuum—from society, to clinicians, to the patient in pain—that proper opiate use will not cause addiction, but instead play a key role in recovery. "An individual in pain is an individual who is not fully involved in life. If you define health as more than the absence of disease or pain, you must do more to relieve that pain."

The Body's Natural Pain Killers

Pain relief has become a high-tech enterprise in the last 20 years, with the introduction of sophisticated devices for dispensing quick-acting drugs through a push of a button. Pain control in the future, however, may rely more on the innate abilities of the human body, rather than drugs, according to Foster.

"If you've ever experienced a 'runner's high,' or the feeling you get during any sort of prolonged aerobic activity, you've experienced the body's hormonal peptides—endorphins and enkephalins—at work," says Foster. "Science is looking at ways to identify and reproduce these hormones synthetically and introduce them to the body in microscopic amounts for pain control." But it will probably be years before we pop an endorphin pill for a migraine or get a shot of enkephalin for back pain, adds Foster, who notes that the center has conducted very limited research on enkephalin-like drugs in the past.

Even if scientists are capable of reproducing the substances, they will have to learn when, how and how much of the synthesized hormones to administer, since they can be highly toxic. "These are potent biochemicals which the body releases in a mysteriously timed and orchestrated manner. Scientists have yet to figure out exactly how," Foster says. ♦

KIOSK

Tobacco: Branching Out

A vaccine to save chickens from a disease that attacks their nervous system. A hypoallergenic, high-protein infant formula. Deodorant. Sunscreen. What do all these have in common?

Tobacco. Standing tall and green and ready to "benefit mankind in more than 30 ways," says John Diana, is the often-maligned tobacco plant.

More uses for the tobacco plant is now the primary focus of UK's Tobacco and Health Research Institute, which Diana has headed since 1988. Previously, the institute's priority was smoking and health issues.

Those 30 by-products of tobacco, which include serum albumin used in blood transfusions, cellulosic residue to enhance the fiber in manufactured foods, cellulose for paper making, and antibodies to combat diseases, aren't idle speculation. They're already being produced in laboratories or field experiments, with genetically engineered tobacco plants, Diana says.

So what's the catch? Why don't tobacco farmers just give up the fight against anti-smoking folks and switch to pharmaceutical products which are also moneymakers? Because there are well-established industries already producing those products, says UK biochemist George Wagner, who has been working to genetically engineer the tobacco plant for the past five years.

While the tobacco plant has been tricked into producing components of the hepatitis B vaccine, Wagner says, there's already a huge, well-established industry

making cultures using microorganisms instead of plants. The tobacco plant can produce protein, but it can't compete with soy protein, for example, because there are thousands and thousands of pounds already available, he explains.

Then there's sclureol, a compound used in perfumes and deodorants to make them last longer on the skin. The tobacco plant now produces sclureol commercially. But, Wagner says, it's not in the best tobacco in terms of large yields. Large yields of sclureol come from the clare sage plant. Researchers are working, however, to get the genes responsible for the sclureol compound into the right tobacco plant, Wagner says.

But even with these hurdles to overcome, putting extended uses for tobacco on the front burner has taken some of the political heat off the institute. "I'll put it to you succinctly," the affable Diana says, as he leans forward clasping his hands. "The institute is in a precarious position with the tobacco and health issue. If the institute publishes something pro-tobacco, then anti-tobacco interests criticize us by saying that science has no credibility. If the institute publishes something that is anti-tobacco, then the tobacco people criticize us by saying we're not doing anything for them." By changing the direction of the institute to extended uses, Diana says, anti-tobacco people shouldn't take issue as strongly because they've been saying all along that farmers ought to be growing another crop or using tobacco some other way. "And the tobacco farmer would be interested because there is the potential for commercialization of a crop he's been growing," Diana adds. Also, he says, some tobacco farmers aren't comfortable with the health



issue and would welcome extended uses for their crop.

The term "extended" rather than "alternative" uses is preferred, Diana and Wagner say, because the conventional way tobacco has been used for 400 years isn't going to change. But, says Wagner, since tobacco is the most easily genetically manipulated plant in the world, the plant has wonderful potential.

In Germany the tobacco plant is producing a unique enzyme used in paper processing, Diana says, which has the potential to be very profitable. An acre of tobacco could produce 2,000 pounds of the malaria vaccine, earning the farmer about \$10,000.

"The tobacco plant is a living molecular laboratory," he says, with more known about it than any other plant. Standing six- to seven-feet tall, untopped, it also is a "big plant" with a lot of biomass, so it can produce large yields, he says.

But diversity is important. Fifty acres of those big burley tobacco plants all producing the same

thing, antibodies, for example, could flood the market, Wagner says. Instead, he envisions success with extended uses for tobacco resulting from farm cooperatives producing plants for a variety of products.

It would be a "green factory," more plant beds, more harvests, and no tobacco stripping. "In the process of curing tobacco, many of the proteins, the enzymes, are broken down," Wagner says. Pharmaceuticals and proteins would be extracted from green and possibly smaller plants.

"Cured tobacco has an advantage in that it will keep until next year, while a green leaf carrying an antibody might have to be harvested before it spoils,"

Wagner says. Like farmers with machines that extract butterfat from milk before it goes to market, Wagner says tobacco farmers might have to extract pharmaceutical products from green plants on the farm.

With anti-smoking forces and increases in foreign tobacco putting the squeeze on the U.S. farmer, extended uses for the plant may be the next frontier for burley growers. The key is for scientists to start finding products unique in the tobacco plant or challenge an established market with a cheaper product, Diana and Wagner say.

—Carole Siler

UK College of Medicine Ranked #3 in the Nation

Ranking consistently as one of the top 10 schools in the country, the University of Kentucky College of Medicine has had no difficulty attracting applicants from around the world.

But last March UK's medical program got a boost that may mean a little more paperwork. The school was ranked No. 3 in *U.S. News & World Report*, UK's highest ranking ever.

"Just this year we've already seen an increase in applicants to 2,300 for only 95 positions," says Dean Emery Wilson.

UK tied for third with Michigan State University on the list of best primary-care schools, consisting of the 62 schools with the highest

Here are the top five medical schools in the country in research and primary-care training, as ranked by *U.S. News & World Report*:

Primary Care

1. University of Washington
2. University of California at Davis
3. University of Kentucky
3. (tie) Michigan State University
5. University of Iowa

Research

1. Harvard University
2. Johns Hopkins University
3. Yale University
4. Duke University
5. Washington University (Mo.)

proportion of graduates between 1987 and 1989 entering primary care —pediatrics, general internal medicine and family practice.

Under the research and primary care categories, medical schools were ranked according to the following criteria: student selectivity, faculty resources, reputation, research activity, primary care rate and overall rank. UK's rate of graduates placed into primary care internships was 54 percent. This is

UK's fifth consecutive year to make the top 10 list of the magazine, ranking eighth last year in the comprehensive category, which has been replaced by the primary-care category.

"We are just proud to continue the kind of education that earns such recognition. It's quite an honor," Wilson says.

The medical school rankings appeared in the March 20th issue of *U.S. News & World Report* as part of its "America's Best Graduate Schools" survey. The University of Washington was rated the best primary-care medical school.

—Angela Jones

Older Drivers Have Better Safety Record Than Younger Drivers

"Older drivers are getting better over time and younger drivers are getting worse. That's a scary thought," says UK civil engineer John Deacon in reference to findings from a study he did on the influence of age on driving ability. Professors Deacon and Nikiforos Stamatiadis, also in the civil engineering department, analyzed Michigan state auto accident reports for 1978 through 1988, which indicate the driver chiefly responsible for the accident. At the time this study was conducted last fall, Michigan was one of the few states to code its accident reports in this way, though the practice is becoming more common now in other states. The accident-causing drivers were analyzed by age groups in three-to-five-year categories, from 16-19 on up to 80 and over.

Comparing the safety record of the 1988 age groups with the

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records of the same age groups revealed the older drivers' improvement. Those aged 65-69 in 1988 caused 10 percent fewer accidents than those 65-69 in 1983, and 15 percent fewer than drivers of those ages in 1978. Drivers who were 60 to 64 in 1988 had records nine percent better than similarly aged drivers in 1983 and almost 13 percent better than those in 1978. In addition, the researchers found that younger drivers with limited experience tend to take more risks while driving and therefore cause more accidents.

Professor Stamatiadis recently conducted a similar study in Kentucky which is due for publication in the *Journal of Applied Gerontology* this summer. "The results of the Kentucky study are very similar to the Michigan findings," says Stamatiadis. He mentions that he has received several calls from insurance companies that wish to use the information found in this study. Stamatiadis also believes that the information is useful to the Department of Motor Vehicles in forming guidelines for licensing and other programs.

The researchers disagree with the idea that a safer driving environment, such as better roads and lighting, completely explains the improvement, because the relative safety record of younger drivers deteriorated during this period despite the improved driving environment. Their explanation is that more of today's elderly drivers grew up in the automobile age and acquired greater driving experience than did earlier cohorts.

Sanders-Brown contributed some funding to this study.

—Kimberly Neel



Sylvia Daunert

Photo by Lee Thomas

Sylvia Daunert Receives Fourth Federal Grant in Past Year

Sylvia Daunert, a UK assistant professor of chemistry and faculty associate of the membrane sciences center, got a phone call recently with good news that, for her, has become almost routine. The news: Daunert has been awarded a \$218,000 National Science Foundation award to help support her research. In the past year, she had already received awards from the National Institutes of Health, the Department of Energy, the National Aeronautics and Space Administration and the NSF, awards totaling approximately \$1.3 million.

The NSF grant, called the Faculty Early Development (NSF-Career) Award, is given to junior faculty members and reflects "the holistic development of the faculty member by emphasizing research and education," according to Henry Blount, a program director at NSF.

"Being awarded four federal grants in one year (she has a fifth one from NSF awarded earlier) is an extraordinary accomplishment, a tribute to her research in chemistry and membrane sciences," says Allan Butterfield, director of UK's Center of Membrane Sciences. "Her colleagues are very happy for her success."

Has Daunert, originally from

Barcelona, Spain, gotten to the point where she's blasé about such good news?

"No, no, not at all," she says. "In fact, if I had received only one grant in the past year, I would have chosen this NSF award; it's very nice recognition."

Daunert plans to use the money to support her graduate students, buy some biochemicals, research supplies, and some equipment. First on her list is a fiber optic set-up with bioluminescence detection, a device that will allow her to continue her research on the development of biosensors that use bacteria as a sensing agent.

"Picture a firefly glowing in the dark," Daunert explains. "I use a type of bacteria to do the same thing—they glow when they come in contact with specific heavy metal pollutants." The intensity of the glow corresponds to the amount of the pollutant present. Daunert says that such research can lead to new methods of environmental monitoring of pollutants.

With the expansion of our readership there may be some readers who receive two copies of Odyssey. If so, please pass the extra copy on to a friend and notify us of the duplication by calling 606-257-8297. Thank you!

UPDATE

Revolutionizing Aerosol Science— Drop by Drop

by Angela Jones

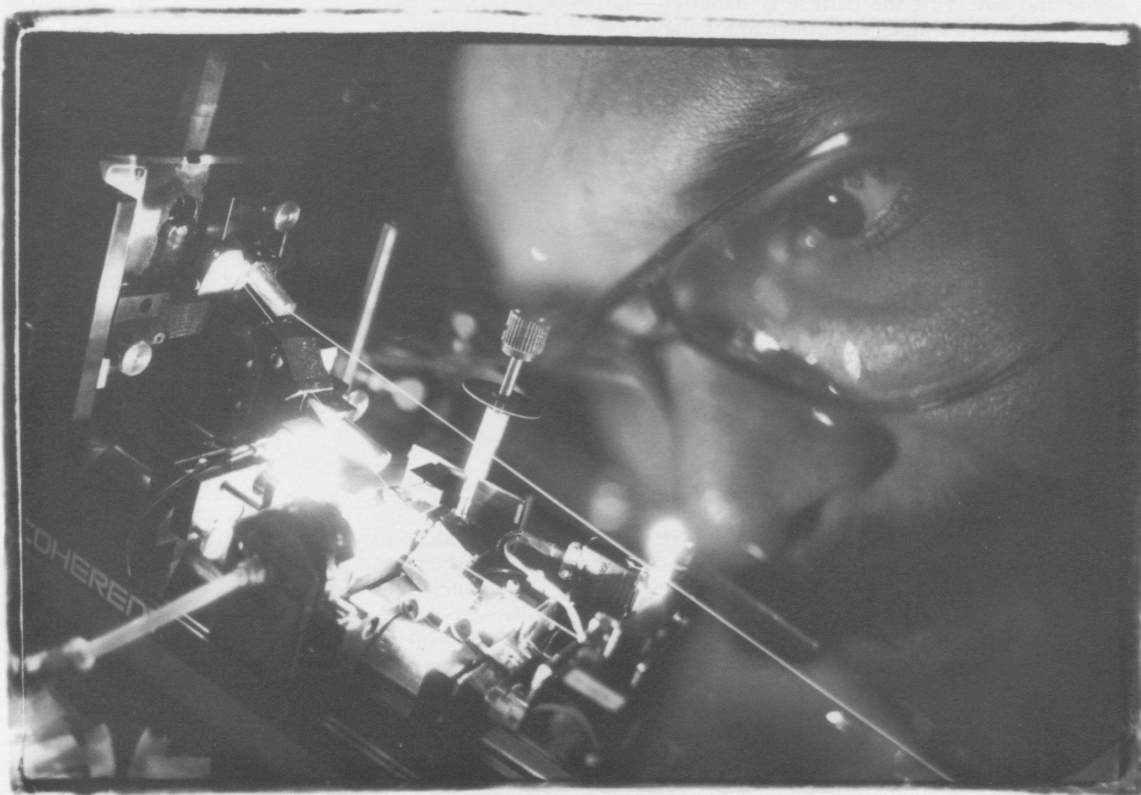


Photo by Lee Thomas

*Asit Ray, a pioneer in the field of aerosols research, studies a rain of particles in a laser-scattering device.
Ray's research was featured in the Summer 1987 issue of Odyssey.*

Picture a drop of water. Now go smaller—1,000 times smaller. This is the microscopic level where Asit Ray works, studying the properties of aerosol particles to determine their basic behavior. For Ray, there's clearly something to gain by thinking small.

Eight years ago when his research was featured in *Odyssey*, Ray had developed a laser-based device that isolates microscopic droplets and determines their physical and chemical properties. A combination of electrodynamic balancing and

laser scattering, the device has revolutionized a field that, from the sound of it, some might mistake for the study of spray cans.

The particles Ray studies are in an intermediate stage in a vapor to liquid or vapor to solid phase change. They are typically between .01-25 microns in diameter (a human hair is approximately 200 microns). An example of a particle in this transitional stage is the formation of

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rain. Aerosol systems are also found in air pollution and in the formation of cigarette smoke and paint pigments.

Until recently, all of Ray's experiments were limited to the observation of a single particle suspended in a controlled environment. To "see" the particles, Ray, a professor in chemical and materials engineering, relies on the scattering light of a laser beam (called elastic scattering) that hits the particle to determine its shape and size. First the particle is stabilized—suspended without vibrations—by isolating it with an electrodynamic balance inside a vacuum chamber, where the environment is precisely controlled within 0.1 degree C. The particle is charged and then placed in an electrical field to be exposed to the laser beam. The chemical composition is then deduced by the color of the scattered laser rays.

But because of the time involved in the suspension of a particle, and data collection, single particle systems are not suitable for the fast processes that occur inside these droplets. Since the chemical reactions in these particles occur within microseconds and are a little difficult to keep up with, Ray has devised a method of observing the evolution of a microdroplet to better understand the split-second reactions occurring inside them. Ray generates a linear array of droplets using a modified vibrating orifice aerosol generator, an opening from which a steady stream is forced at a constant volumetric flow rate from a continual vibration.

Adapting the same laser device, Ray utilizes a vibrating mechanism to generate 100,000 identical drops per second falling in a stream. He then adjusts the viewing chamber to see each stage of the drop, allowing Ray to observe instantaneous reactions for several minutes.

"All of the drops are going through the same history so I can analyze every drop in one particular stage as though it were the same drop," Ray says.

Ray is working to distill these reactions that occur in micron-sized particles to nano-sized particles (a nanometer is only one thousandth of a micron) to increase the rate of the reactions. For industries such as electronics or computers, this would mean better quality materials that operate more efficiently.

"The properties of these two sizes of particles are very different. You want the particles in a material to be identical," Ray says. "There is currently no technology for controlling particle size and composition." Basic materials for industrial products now are comprised of submicron particles, which are only half of a micron in size and are considerably larger than nanometer particles.

In addition, Ray is isolating, or "microcapsulating," these particles in different liquids and gases to learn more about their internal properties. How one particle transfers water, for instance, from outside to inside through the shell, can lend insight to what kind of gases comprise the particle.

"Before, we could not say what was occurring inside these tiny particles, but now we can look at isolated regions and see what molecules are closer to the surface as well as those at the core," Ray says.

These findings, Ray says, are a part of a process to understand larger systems. "So many things are happening at the microscopic level that we are just beginning to discover to see the larger picture." ♦

On Becoming a Contributor to *Odyssey* Magazine

Helping Keep Kentuckians Informed About Research and Science

Odyssey is published because the university feels that your support and understanding of the importance of UK research activities are critical—now perhaps more than ever.

Odyssey is not just a magazine—it is a resource which serves as the basis for some very important outreach activities. The articles appearing in *Odyssey* are rewritten—in a briefer format—for a newspaper column titled “UK Science & You.” This column is sent to every newspaper in Kentucky and is a regular feature of many of the weekly papers. Through these columns we can reach a potential audience of 1.4 million readers—letting them know of some of the advances that have been made through research, of opportunities for their children in research and science careers, and of particular programs where UK research has made life better for them and their families.

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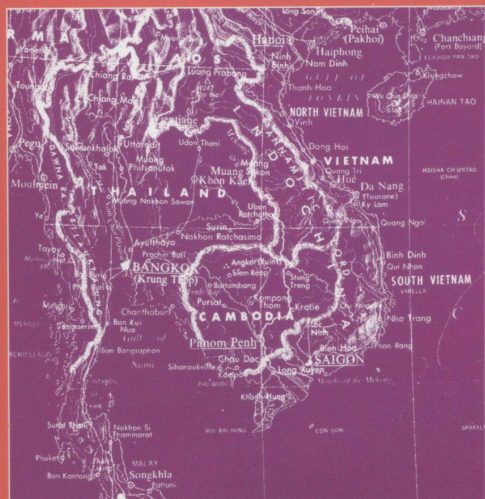
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