Each fall, the School of Nursing devotes one issue of *Carolina Nursing* to sharing with you the stories of important research being conducted by our distinguished faculty and outstanding students. In this Research Chronicle issue, we are pleased to highlight community-based studies — studies in which faculty are collaborating with community partners — churches, cultural centers and public health agencies — and studies in which faculty are reaching out to individuals throughout North Carolina. As you will see, our researchers are taking innovative new approaches to bringing illness management and health promotion into the daily lives of patients. And, faculty continue to dedicate themselves to sharing their advances in nursing knowledge with practitioners.

In this issue, we’ve presented just a few of the studies being carried out by faculty every day here at the School. Please take a moment to look at the map on page 26. As you will see, faculty research is conducted in over 70 counties in the state.

Research at Carolina is an integral part of the University, as well as our School’s tri-fold mission of excellence in teaching, research and service. In addition to the stories of our community-based research, we hope you also enjoy learning about the honors projects of our undergraduate students and the important work being done in our Biobehavioral Laboratory, as well as the numerous research activities of the past year.

Sincerely,

Linda R. Cronenwett, PhD, RN, FAAN
Dean
RESEARCH CHRONICLE EDITION

2 Learning the Ropes of Research
4 Managing Chronic Illness Conference
5 Safeguarding Researchers and Subjects
6 Nursing Research in the Community: Developing Partnerships
7 At Home with HIV
10 A Computer Consultation for Urinary Incontinence
12 Preventing Diabetes in Siler City
13 Spreading the Word of Health in Pittsboro
14 Preventing HIV in the Latino Community
15 Living Healthy with Chronic Disease
16 The Biobehavioral Laboratory Comes into Its Own
16 The BBL in Brief
17 The BBL and Student Research
19 Building, Creating, Learning, Supporting, Teaching, Doing
22 New Research Faculty Address Growing Health Concerns
23 Faculty Research Activity, 1999-2000
23 Faculty Research Grants and Contracts
25 Educational and Professional Grants and Fellowships
26 Publications
30 Editorial Review Activities
31 Grant Review Activities
32 Doctoral Student and Post-Doctoral Fellow Activities

On the cover: Graduate students Gregory Simpson and Mona Bingham (foreground) and Margaret Clayton at work in the Biobehavioral Laboratory.
Learning the Ropes of Research
Senior projects lead to honors

By Jim Vickers

Each year, more than a dozen School of Nursing seniors take advantage of an opportunity to work closely with a faculty mentor to conduct their own research studies or to write a scholarly paper on a subject of their choice. They are the students who have the necessary grade point average and who possess the energy and determination to complete the demanding requirements of the School of Nursing honors program, administered by associate professor Beverly Foster, director of undergraduate programs.

Once those who choose to conduct research decide on their topic, their labor begins in earnest. They have to receive approval from the School of Nursing Institutional Review Board before they can conduct any type of research involving human subjects, and they have to learn how to prepare questionnaires, surveys, interviews and other instruments they will use in collecting their data.

Among the 15 students who participated in the 1999-2000 honors program, Eric Wolak of New Bern, North Carolina, is typical of the student who enters the program with a far more general idea of the research they intend to pursue. To gather ideas for possible research topics, she went on-line to review the expertise of School of Nursing faculty and discovered that she shared an interest with assistant professor Julie Barroso. “I initially approached her because I wanted to do a study of cancer patients,” Randall explains, “but she happened to be a lot more involved with HIV patients. So my topic was initially her idea.”

Barroso was conducting research on symptom management and coping with HIV/AIDS. On Randall’s behalf, she approached a half dozen of her subjects who had not sought adequate health care and asked if they would be willing to participate in Randall’s study “Delayed Pursuit of Health Care Among HIV-Positive Gay Men Enrolled in a Longitudinal Research Study.” Four of them agreed.

Two honors participants chose projects that did not involve original research. Crystal Crinkley Ringer wrote a more traditional research paper on Vietnamese culture as it relates to health care: “Toward Understanding Vietnam: Its People, Their Culture and Health Care.” Catherine Wade selected videotapes that her mentor, assistant professor Suzanne Thoyre, had made of preterm infants feeding. She created a website that assists caregiving nurses and parents in understanding the feeding behaviors of preterms for the purpose of helping parents anticipate and overcome problems.

In working with Wade, Thoyre acknowledges a pleasant reversal of the archetypical professor/student relationship— “She allowed me to get my research to parents.”

For the students, the learning process also involved dealing with unexpected difficulties. In her attempt to recruit participants for a focus group of lesbians suffering chronic illness, Trina Harrison could locate only one person willing to volunteer for a telephone interview. Lyn Rodgers had to limit her planned study severely when only one of 11 elderly patients she screened met her criteria for her study “The Trajectory of Functional Independence in Hospitalized Elders.” Once he began reviewing the charts of burn patients, Eric Wolak discovered that the process “took a lot longer than I thought it would.”

The students also discovered that preliminary findings can alter the process itself. In Megan Randall’s experience with HIV-positive men, what she expected to be a single round of interviews became several. “I had to listen to the tapes of my interviews and read the transcriptions and over and over again—and over and over again. I developed a lot more questions about what they had said before, and I had to call a lot of them back and ask them to clarify. Those interviews were rewarding because the subjects real-
ized that we were really interested and that we didn’t want to draw any conclusions about them without hearing their views.”

In the end, Randall found that gathering data from the interviews was the most enjoyable part of the entire research experience. “It really gave me an appreciation for that particular population,” she said.

Once the data have been collected and analyzed and findings solidified, for the majority of students the most arduous part of the process remains—writing the paper or making the presentation to a gathering of friends, fellow students, family, faculty, administrators and visitors.

For Wolak, the most difficult part of the project was meeting the standard he and Dalton set for the final paper. He recalls, “The other papers I had written were distillation of facts, but this one had to go through a process: basically, ‘This is my idea. This is how I did it. This is what I showed.’ So it was more than just facts, it was a kind of evolution of what I was interested in and what I did and what I found.”

For Randall the hardest part was the presentation. “I had been so immersed in it,” she says, “and I knew that my advisor was too, but I wasn’t confident that other people would understand it—or even be interested in it.”

Between the writing and the presentations, mentors may nominate their students to receive “Highest Honors,” following which an undergraduate faculty panel conducts a blind review of each nominated paper. The panel members judge each paper for evidence of independent, abstract, analytical and critical thinking but know neither who the student is, who the mentor is, nor how other members are evaluating the paper. The panel awarded Highest Honors to Megan Randall, Jennifer Squires and Catherine Wade.

Last May, the anxiety preceding the Carrington Hall presentations was perceptible, almost palpable. However, all seven of the platform presentations held the attention of the audience, and they along with all eight of the poster presenters attracted viewers, comments and questions aplenty, prompting confident responses from the students as the apprehension faded fast.

With the year of their initiation into genuine research and scholarship behind them, the Honors Students of the class of 2000 are universally happy that they participated, and they recommend that their qualified successors participate—with an occasional caveat.

“This would recommend it,” Eric Wolak declares, “not just to anyone but to someone who is really interested in the Honors Program and is really interested in a specific field.”

Megan Randall has no reservations: “I recommend it because I was able to form an identity for myself outside of the classroom and kind of gain a new perspective on nursing and on research. I think overall, it just enhances everything about your senior year. But the best thing is the relationship that I have now with Dr. Barroso and with other faculty that happened to be interested in the work I was doing. That’s the main thing I gained from it.”

Both Randall and Wolak have taken positions in the UNC Hospitals where they will continue to work with the populations that they studied in their honors projects. Wolak attributes his being hired at least partially to the favorable impressions the nurse managers in the Burn Center developed toward him as he was conducting his research. And while neither of them at the present anticipates becoming a career researcher, both of them graduated with a greatly elevated respect for nursing research as a result of their activities.  📄
Managing Chronic Illness Conference
The CRCI brings research and practice closer together

By Jim Vickers

Before she became dean of the School of Nursing, Linda Cronenwett was slated to become a member of the administrative management of the SON’s Center for Research on Chronic Illness (CRCI). The CRCI is one of only nine such centers in the United States, and is funded by the National Institute of Nursing Research (part of the National Institutes of Health). As a final contribution to the Center, Cronenwett assisted the CRCI faculty in setting up a rather unusual conference: one that sought to bring researchers and practitioners together in the exchange of ideas. “Managing Chronic Illness: Challenges and Opportunities” was held on March 29, 2000, on the University of North Carolina at Chapel Hill campus.

The conference objectives were to bring together a multidisciplinary group of practitioners and researchers to identify high-priority areas for current and future research, to describe research projects that are meaningful and feasible for current clinical practice and to increase the interchange of ideas between clinicians and researchers. More than 60 academic researchers and clinical practitioners, largely from the Research Triangle area, attended the day-long meeting.

Keynote speaker Carmen Hooker Buell spoke at length of her experiences as a caregiver; first for her father during the six years before he succumbed to Parkinson’s Disease in 1994 and then for the last six months of the life of her husband, UNC-Chapel Hill Chancellor Michael Hooker, who died on June 29, 1999, from non-Hodgkin’s lymphoma.

In a morning panel discussion, four practicing clinicians (Suzie Wilson, a nurse from UNC Hospital’s Infectious Disease Clinic, Peggy Yarborough, a pharmacist from the Wilson Community Health Center, Ann Thompson, a social worker from Wake Dialysis, and Dr. Melanie Mintzer, Assistant Professor in the UNC Medical School Department of Family Medicine) identified issues they would like researchers to address. The four noted the need for research in the areas of managing patients with multiple illnesses; expanding research to include subjects of all ages, races and sizes; closing the gap between what researchers describe as healthy behaviors and the behaviors clinicians actually encounter; studying the highly complex nature of HIV treatment regimens in terms of the variety of dosages and costs; recognizing the necessity of patients to alter every aspect of life in adapting to a chronic illness; and addressing the inadequate remuneration caregivers receive considering the amount of time they spend to truly partner with chronically ill patients.

An afternoon panel concentrated on challenges to administrators who work with organizations and communities. Quinton Baker, then executive director of the Center for the Advancement of Community Based Public Health, stressed the importance of respecting the individual. Ralph LaForge, managing director of the Duke University Lipid Clinic and the Disease Management Preceptorship Program, examined currently popular disease management strategies that have not lived up to expectations. Dr. Warren Newton, chair of the UNC Medical School Department of Family Medicine, suggested ways to redesign health care systems so that they might better deal with chronically ill patients.

The vast majority of those attending remained to participate in an hour-long discussion led by Newton. CRCI Project Coordinator and assistant professor Jennifer Leeman took notes on a giant pad as researchers and clinicians reported what they had learned from each other and what they hoped to learn from each other in the future. She ended with a list of forty topics ranging from caregivers and patients benefiting from the internet to the value of preventive interventions to differences in the way people define quality of life. The conference planners were thoroughly satisfied with what they had achieved, primarily because they had brought practitioners and researchers together in intense, respectful discussions that should have lasting value, both to the School of Nursing and to the quality of care delivered wherever the influence of the School reaches, which is now around the globe.

Professor Joanne Harrell, director of CRCI, appraised the conference: “What was most exciting to me was being able to see the clinicians posing questions and suggesting potential research problems to the investigators... The clinicians were able to give immediate feedback to the researchers, which made for some very lively discussions.”

Professor Joanne Harrell
By Jim Vickers

Federal legislation requires all agencies or institutions that conduct behavioral or biomedical research involving human subjects to maintain an Institutional Review Board (IRB) that examines applications for and the conduct of all federally funded research projects. The IRB must have at least five members diverse in gender, culture, and race. At least one member must be a community representative and one a non-scientifically affiliated representative, and the IRB must contain members with special expertise to assist in the review of studies involving vulnerable populations.

In July, associate professor Mary Lynn became Chair of the School of Nursing Institutional Review Board (IRB), replacing associate professor Carolyn Cooper.

During her 18-month tenure, Cooper clarified and streamlined documents and forms, put all pertinent IRB matter on-line for quick download, and initiated modifications of the IRB-approval and oversight procedures in order to help both the board and individual researchers ensure that they meet all federal requirements and keep paperwork up to date. Her tenure, however, covered a period during which the Office for Protection from Research Risks, the federal agency overseeing local IRB’s, curbed research temporarily at several major research institutions and itself underwent sweeping modification to become the Office for Human Research Protections (OHRP), based in Washington, DC, within the office of the Secretary of Health and Human Services.

Therefore, Lynn began her duties at a time when SON research and research proposals are undergoing particularly close scrutiny, but she comes to her new office with both a practical and a theoretical knowledge of IRB procedures gained from some 15 years of continuous research activities, beginning with a series of small postdoctoral grants from the University of Arizona and advancing appreciably following her arrival at the SON in 1991.

“The reasons I decided to accept the chair’s job,” Lynn relates, “are that I want to be more involved in the research mission of the school and that the person in this role works with researchers to make sure that they are doing their work in the best possible way to meet their obligations. And I knew I would learn a lot!”

In recognizing the immense responsibility of heading the IRB, she notes that a firm determination to follow procedures correctly at each step should prevent major problems from occurring. When the fall semester began, the OHRP was still applying new guidelines. While experienced researchers and project managers know the guidelines well, research assistants and others may be less well versed, and therein lie potential problems in guarding against any possible threat to human subjects.

In summarizing her new responsibilities, Lynn concludes, “I think it’s an issue of vigilance, persistence, and obviously education. It has always been being conscientious of the fundamental requirements—and then monitoring them. I’m certain we will make sure that everything is being done that’s supposed to be done.”

Well into the first of Lynn’s three-year tenure, no significant problems have arisen. She credits much of the smooth passage to the groundwork laid by Cooper, to the seriousness with which IRB board members treat their duties, and to a knowledgeable and cooperative faculty. Her own expert’s knowledge allied with a robust sense of humor and a bountiful supply of energy contribute significantly, promising the IRB and the SON an extended period of confident and capable leadership.

Mary Lynn and the IRB

Safeguarding Research

“I think it’s an issue of vigilance, persistence, and obviously education.... “I’m certain we will make sure that everything is being done that’s supposed to be done.”
Across North Carolina, SON faculty research impacts the health of people in their homes, churches and communities. In the following pages, Carolina Nursing focuses on six community-based studies, in various stages of completion, that are helping to make a difference.

by Lisa Mincey Ware
In 1996, new treatment regimens were proving successful in prolonging the lives of people with HIV. Antiretroviral drugs, or drugs that slow the replication of the virus, offered new hope that the disease could be controlled, if not cured. As more and more patients showed improvement from the drugs, physicians and researchers became optimistic that HIV had become a chronic, rather than terminal, disease.

Margaret Miles, a professor of children’s health at the SON, watched carefully as the new treatments developed. From 1993-96, she had studied children born to HIV-positive women to determine if they were at risk for health and developmental problems due to their mother’s diminished capacity to care for them. During the course of her research, she realized that the mothers took good care of their children—at a cost to their own health. “The mothers were very good about bringing their babies into a clinic to make sure they did not have HIV,” said Miles. However, in caring for their children, the women often did not seek medical attention for themselves.

Miles knew that women in her study—mostly young, single, and African-American—were desperately in need of information that could help them cope with their diagnosis and learn how to prevent and manage the health care problems associated with HIV. Helping them manage HIV as a chronic illness, along with more consistent health care visits, might extend the length and quality of their lives—allowing them more time and energy to parent their children.

Miles assembled an interdisciplinary research team that included SON colleague Diane Holditch-Davis (who had also participated in the children’s study) and members of the School of Medicine at UNC-Chapel Hill. With a small grant from the Center for Research on Chronic Illness at the SON, Miles’s team developed a program to send carefully trained nurses into the women’s homes with information and counseling. Banking on the women’s desire to live for their children, if not themselves, Miles aimed her program at women who had children of their own or who were the primary caretakers of a family member’s children. She developed six modules, or lessons, that addressed topics such as understanding HIV, preventing and managing opportunistic infection and coping with sadness and depression. The nurses would deliver the modules in six one-hour visits over the

(continued on page 8)
Inside the trailer, the woman whom Donna and Beth have come to see is in her mid-thirties, with carefully braided hair. Her clothing is faded and tattered from wear, but perfectly cleaned and immaculately pressed—down to the creases in her sleeves and pant legs. The woman’s children are at school, so the nurses can speak freely about HIV without fear of revealing her secret diagnosis. Seated close together at a scarred table, they turn the pages of a colorful notebook. Donna makes a list of the numerous drugs the woman is taking, copying labels from the pill bottles. The woman knows that the drugs will help her to stay healthy, but the nurses discover she is taking them only when she doesn’t feel well. Donna carefully explains how the drugs work and the importance of taking them as prescribed.
group or a control group. Miles needed a control group so that she could accurately compare the health of the women who had received the in-depth HIV information and counseling against that of the control group (who received standard information through their healthcare providers) once the program was completed.

During 12 weeks of visits, the nurses learned that fear of stigma complicated the women’s abilities to cope with HIV, especially those who lived in small rural communities. The fear was so strong that some of the women kept their diagnosis secret from community and church members, friends and even family. “The women observed how the people around them talked about HIV,” said Miles. “They’d go to church and hear sermons about the disease or hear friends say things about how they wouldn’t sit next to anyone with AIDS.” In exchange for maintaining the appearance of a normal life, these women bore their burden alone.

Harris recalls one woman in particular who chose to keep her diagnosis secret: “She would not tell her best friend about her illness,” said Harris. “Because her friend worked in a nursing home where there were several patients with HIV. And this friend would come over [to Harris’s patient’s home] and say that she wouldn’t have anything to do with ‘those people.’”

Talking around HIV became second-nature to the nurses, who were careful to deliver the information in a manner that respected the women’s need for privacy. “We knew that we would have to be very careful not to reveal their HIV status to anyone in the home that didn’t already know,” said Miles. “So, we developed strategies to assess who within the home knew and who didn’t. If we couldn’t tell, we would not use the term HIV or talk about anything that would expose them.”

Stigma also affected the women’s adherence to the drug regimen, which required a strict schedule in order to maximize the levels of the drugs in the bloodstream. For some women, fear of discovery was more important to them than the benefit of taking the medication. “One woman worked on a factory line. She wouldn’t take her medications because that meant stopping the line,” said Harris. “Because then everybody’s going to want to know, ‘What kind of medicine is it? What’s wrong with you?’” Harris helped the woman find medication combinations that could be taken without disrupting her work schedule.

Healthcare workers often reinforced the stigma, Miles notes. Her team heard from many women that their diagnosis had been revealed during a clinic visit at which a friend or family member was present. They also spoke about the callous treatment they endured in emergency rooms and clinics in rural areas. “They were treated like some woman with HIV, rather than the individual they were,” said Miles.

In spite of the barriers of stigma, the nurses managed to make headway against suspicion, denial and fear. Over time, the women appeared to make important changes in their lives. One woman enrolled her family in counseling so that they could learn to cope with her disease together. Another patient got her driver’s license for the first time in her life. Hope began to return. “One woman in her early 40s, with a five year-old son, said to me that she’d always wanted to be a nurse,” said Black. “I said, ‘Why can’t you?’ and she said, ‘Because I’ve got HIV.’ I told her, ‘There’s no reason you can’t do this if it’s what you want.’”

Within six months after the conclusion of the study, the woman received her general equivalency diploma and enrolled in a nursing assistant’s training course at a local community college.

Although evidence that the program helped the women was anecdotal, when the study concluded in 1999, the women participating in the control group were given the information on HIV. “We thought that what we were doing was important, and we thought that it was not moral to keep that information from the other women,” said Black. Miles’s team continues to analyze the results of the impact of the program on the women’s mental and physical health. They expect to have the final results in November 2000.

As the visit comes to an end, Beth turns the discussion toward an African proverb that is printed in the end of the day’s lesson. “Nothing will conquer my powerful spirit.” The three talk about what the proverb means and how its message relates to the woman’s life and her disease. Over an hour has passed. Donna, who will come alone on the next visit, schedules the date and time. Gathering their things, the nurses prepare to leave.

Walking them the few steps toward the front door, the woman pauses to embrace the nurses. “You know,” she says. “I am so glad you came to see me.”
A Computer Consultation for Urinary Incontinence

She’s got star power. Whether she’s walking, coughing, or sipping coffee, she’s hard to ignore. It doesn’t hurt that she’s bright pink. “I’ve named her Babs,” says DeeDee Boyington. “Babs the Bladder.”

Babs, the animated bladder, is a leading lady in a computer program designed to teach women about urinary incontinence. Boyington, an assistant professor of health care systems/policy/informatics, began developing the program in 1999. In January 2001, she plans to test her program, and Babs, in community settings in Orange and Durham (N.C.) Counties. Eventually, Babs may star on the Web.

Urinary incontinence, a condition in which the bladder leaks urine involuntarily, is experienced by 25% of healthy women 60 and older. The leaking occurs in one of two ways: in stress incontinence, the pelvic or sphincter muscles are weakened, causing the bladder to leak when a woman coughs, runs, bends over, sneezes or laughs. In urge incontinence, certain actions or behaviors trigger the uncontrollable urge to urinate—such as placing a key in the front door or the sound of running water. Regardless of the type of incontinence a woman experiences (some experience a mixture of the two), the effects can be devastating. “It’s embarrassing,” says Boyington. “I’ve experience a mixture of the two), the effects can be devastating. “It’s embarrassing,” says Boyington. “I’ve...

Boyington wants women to know that there are other options available to them. Simple behavior modification techniques, in which the bladder is “re-trained” to hold urine for longer and longer periods of time, work well for women with urge incontinence. For women with stress incontinence, pelvic floor muscle or Kegel exercises strengthen the muscles that support the bladder. Reducing caffeine, which promotes water loss within the body and irritates the bladder, is also helpful.

But Boyington points out that these strategies, which can be very effective in some women, may not work in all cases. “I’m not necessarily saying that this will cure the condition, but it can improve it.”
The important thing for women to realize, she says, is that these techniques should be tried before resorting to drugs or surgery. “These are first-line treatment strategies, because they carry no risks. If they don’t work, then go on to surgery or the pharmacological agent,” she said. “Whereas if you have surgery first, that’s pretty major. The older you get, the less you want that.”

Letting women know about these alternatives has been a challenge. Because incontinence is embarrassing, many women don’t tell their healthcare providers that they have the problem. And for women who do broach the subject during an exam, it may be dismissed as a natural consequence of aging, childbirth or obesity.

That’s where Boyington comes in. She thinks that computers may be the best way to provide private, one-on-one information about the symptoms and treatment of incontinence to women who are uncomfortable discussing it with a healthcare provider. With computer programming assistance from a graduate student in the School of Information and Library Science at Carolina, her program will be designed to simulate a visit to an on-screen nurse, complete with a digital waiting room containing brochures and fact sheets. During the “consultation,” the woman will answer questions about her frequency of urination, and whether leaking happens during physical activity or as the result of a sight or sound. The computer will then categorize her symptoms as either stress, urge or mixed incontinence, as well as frequency, urgency or nocturia.

(Women with frequency empty their bladders more than eight times a day, which is the number of times normal adults urinate. Nocturia is a condition in which a person gets up more than twice in one night to urinate.)

After the symptoms are identified, the woman is provided with detailed information and strategies that match her particular condition, interspersed with graphics, sounds, and . . . Babs. “I want to use Babs to get some points across,” says Boyington. “In one piece of animation, Babs coughs and urine leaks out. In another, she’s drinking coffee.”

To test her program, Boyington will recruit women aged 55 and up who are experiencing some form of urinary incontinence, frequency or nocturia. The women will test Boyington’s program in community settings such as community centers, resident homes for elders and beauty shops. She will also recruit a control group of women who will be given computer instruction on topics other than incontinence, so that Boyington can determine if the group given incontinence information shows greater improvement in their symptoms. Eventually, if her program is helpful in reducing the women’s incontinence, Boyington wants to make it available to a larger community via the Internet.

“There are hundreds of websites out there on urinary incontinence,” says Boyington. “But this one will provide tailored information in a unique way.”

---

**Image Description:**

- **Image 1:** A woman is standing in front of a building with a sign that reads “School of Nursing.”
- **Image 2:** A woman is looking at a computer screen with an animation on it.
Preventing diabetes in Siler City

“In the mid-90s, new research began to suggest that it might be possible to stop diabetes before it started. “Prevention is the cutting edge of diabetes care,” said Anne Skelly, an assistant professor of adult health in the SON. “Five years ago, no one was talking about it. It was all about finding the cure. But as new drugs were developed and researchers learned more and more about the pathophysiology of the body, prevention began to seem possible.”

Type II diabetes, a condition in which the body fails to manufacture enough insulin or properly use it, typically strikes adults who are age 45 or older, sedentary and obese, or with a family history of the illness. It differs from Type 1 diabetes, which is found in children whose bodies do not make insulin at all. The body uses insulin as a conduit to deliver glucose to the cells. Without insulin, cells aren’t “fed” by glucose and become unable to produce energy. People with Type I diabetes must have daily insulin injections, whereas those with Type II diabetes can, in many cases, control their disease through a change in lifestyle—losing weight, exercising, and eating right. It seems logical that if taking care of the body could control the disease, the same principles could be applied to preventing it.

But there’s the rub, says Skelly. “Changing someone’s lifestyle is very hard,” she said. “In order to do it, you have to learn what those lifestyles are, as well as how much the person already knows about the disease and what he or she believes.”

Type II diabetes strikes a disproportionately large number of African-Americans and Latinos, who are two times more likely to get the disease than European Americans. Skelly is focusing her prevention efforts on these two ethnic populations, of which North Carolina has large numbers. She will also study working-poor European Americans. Her first challenge, and what her study seeks to address, will be how to go about getting the information into the hands of people who, although at risk, are not yet suffering from the disease. Her second challenge, and an equally important research concern, will be identifying and developing the kind of information that will convince people from the three different cultures to change their lives. Partnering with the Center for Urban and Regional Studies and the Department of Geography, both at UNC-Chapel Hill, as well as SON colleague Mickey Dougherty, Skelly will use a $790,000 grant received from the National Institute of Nursing Research to answer those questions.

Beginning her research last spring, Skelly identified Siler City, North Carolina, as a likely location for her study. Over the past decade, an influx of immigrants has, by some estimates, swelled the small Chatham County town’s Latino population to nearly 40% of its roughly 6,000 residents. The immigrants, mostly from Mexico, are drawn to the town’s two poultry plants, where jobs for the unskilled are plentiful. Siler City also has a large African-American population, as well as working-poor European Americans. With her location identified, Skelly is now turning her attention to recruiting members of these ethnic groups for her study.

“We’ve started a community reconnaissance to do an in-depth canvas of the neighborhoods. We drive around and map the neighborhoods. We look at the conditions of the housing, we look at what resources are there.” She will also work with community groups serving her three populations to identify community leaders who can guide her team about where to recruit African-Americans, Latinos and European Americans for her study. Skelly also plans to visit churches within the community.

Eventually, Skelly hopes to recruit 120 people, 40 in each ethnic group, for her study. To discover the best way to tailor prevention information to her audience, Skelly will conduct structured, in-depth interviews with each person about their knowledge and beliefs about diabetes. She will talk with men and women between the ages of 30 and 60, in equal numbers. “Their beliefs about diabetes are even more important than what they know about it,” says Skelly. “I can tell you that diabetes can be prevented, but if you’ve seen your grandmother lose her legs to the disease, and you know that you could be next—are you really going to believe that?”

Once Skelly knows where her study participants go within their communities, prevention information can be made available to the larger community—in the locations where at-risk people are the most likely to see it.
Spreading the word of health in Pittsboro

On Sundays in Pittsboro, a small Chatham County town, the churches are filled with worshippers listening to their pastor or preacher, deacon or elder, priest or reverend asking them to go out into the community and spread the word of the Lord. But at seven African-American churches in town, the congregations are also spreading the word of health.

At least, that’s what Julie Fleury hopes they’re doing. And next year, when her PACT study concludes, she’ll know for sure. PACT, or Partnership for an Active Pittsboro, is a program developed by Fleury, an associate professor of adult health at the SON. The program is funded by a $350,000 grant from the American Heart Association and has two goals: to promote cardiovascular health among African-Americans in Pittsboro and to empower participants to develop sustainable resources to continue promoting cardiovascular health within their community. Fleury, along with SON colleagues Barbara Bunker, Laura Lauffer and Meg Dean, developed programs with congregants in churches, which are central to the African-American community and culture as a gathering place.

Through focus groups, Fleury and Bunker learned that the members of the churches were finding it difficult to establish an exercise routine. “Some said that they didn’t have child care,” said Fleury. “Or they worked hard all day and there’s not a lot of time, or they work two jobs and just didn’t see how they could fit exercise into their day.” Some said that there just wasn’t a place to exercise. “Pittsboro is a rural community—there aren’t a lot of resources,” said Fleury. But, she says, all of the focus group participants expressed a desire to be active.

Working within the churches to establish health committees and to support lay health advisors (church members who agree to act as leaders during the study and after its conclusion), Fleury assisted the committees in developing walking programs in their respective churches—with groups meeting to walk together on different days or nights of the week. At least four days per week, Fleury and her PACT team members walk with church members so that they can assist the group leaders and help keep members motivated to continue the program. They also give the walkers information to make it easier to adhere to a regular exercise schedule. “We focus on things like goal identification,” said Fleury. “How do you create and achieve goals? How do you support your goal and also support others?” Fleury’s team also teaches the walkers how to find resources in their community to assist them in staying active. If specific resources are unavailable, they talk about how to develop them.

Of the church members who are walking, Fleury will track the progress of 100 to see if there are reductions in weight, blood pressure, cholesterol, blood glucose levels and the percentage of body fat, as well as increases in desire to exercise and an awareness of community resources for exercise. So far, the walking program appears to be a success. “Folks are increasing their distance every week,” says Fleury. “It’s really neat to see them say things like, ‘Let’s go around again,’ Or, ‘Let’s increase by five minutes.’”

To measure her program’s impact within the community, her team will conduct phone interviews with 240 randomly-selected African-Americans. “We’ll ask them if they see any changes within the community, such as folks working together to promote physical activity and physical activity resources,” said Fleury. “We’ll also ask if they’re more aware of things in their environment that could facilitate physical activity.” If the congregation members have indeed been spreading the word of health, then the larger African-American community will be taking steps toward creating support and lasting resources for physical activity. “We’re hoping that by the end of the study, we’ll be talking to people who say ‘I’m more aware of resources to get and stay active, and my community has been influenced.’”

In the meantime, Fleury and her team members have been spending much of their time in Pittsboro. “Since May, I think we’ve spent every weekend there,” said Fleury. But it’s been time well spent, she adds. “It’s a little different than handing out a questionnaire for people to fill out and then that’s the end of the relationship. They’re becoming a part of our lives, if not vice versa. I’d like to think, in some ways, we’ve become a part of that community.”

“We’re hoping that by the end of the study, we’ll be talking to people who say ‘I’m more aware of resources to get and stay active, and my community has been influenced.’” —Julie Fleury
Preventing HIV in the Latino Community

In this country, Latinos account for 17% of AIDS cases, while making up only 9% of the overall population. Researchers speculate that one reason for the high rate of the disease may be inadequate access to health care and AIDS-related information.

In North Carolina, most of the Latino population earn low incomes and do not have health insurance. Their only access to medical attention and information is through public or community health centers. According to Chris McQuiston, an assistant professor of community health at the SON, Latino men often work six days a week, perhaps at two different jobs, so they visit healthcare centers only when something is seriously wrong.

Language is also a barrier to Latinos receiving information about AIDS from traditional channels. “Most of the recently immigrated Latinos, at least in this state, don’t speak English,” says McQuiston. “So, media campaigns affect them less. Also, a lot of the written material, if it is written in Spanish, is poorly translated or not written at an appropriate level.” Well-meaning healthcare professionals and AIDS-awareness groups often fail to realize that providing materials in Spanish is not enough, says McQuiston. “Typically, a literal translation may not transfer concepts between the languages. Also, the educational levels of Latinos are really quite varied. So, to reach people with limited education, these materials probably need to be written at a third-grade level, as well as contain pictures.”

Differences in cultural perceptions of sex also make it difficult for Latinos to learn about HIV and its prevention, says McQuiston. Men and women do not typically talk about sex. If they do, they may only discuss the use of condoms in relation to birth control, not disease prevention. Also, as in any group where education levels are low, regardless of culture, myths about HIV transmission are common among less-educated Latinos. “In addition to sexual transmission, some believe that you can get HIV casually…from toilet seats, from cups, silverware,” said McQuiston.

In 1997, McQuiston received a grant from the National Institute of Nursing Research to identify and train natural helpers within the Durham Latino community to be Lay Health Advisors (LHAs)—non-professionals trained to provide health care information—and deliver material on HIV and AIDS to recent immigrants through their social networks. She defined natural helpers as the people to whom members of the community naturally turned for support or assistance. She targeted recent immigrants, specifically, because their language skills and lack of acculturation within the community placed them at the highest risk for the disease. McQuiston called the project Protiendo Nuestra Familias (Protect Our Families), because of the strong cultural value of the family among Latinos. She recruited natural helpers throughout the community, as well as through El Centro Hispano (The Hispanic Center), located in Durham.

Along with her research team, McQuiston spent many months preparing to train the LHAs—and became a fixture at El Centro Hispano. “We developed our curriculum based on what we observed and what we heard from community members,” she said. “In addition to identifying health beliefs at the interpersonal level, we also explored the individual’s desire to change. That is, to use condoms, avoid high-risk behaviors or go for HIV testing.” But McQuiston’s team couldn’t simply walk in and start asking questions. They worked at or attended community events such as Latino Health Fairs, yard sales and religious celebrations. Over time, they became trusted friends to the Hispanics in the community.

After sharing the information in her program with members of the community for feedback, McQuiston’s team began the training. Every Saturday morning for seven weeks, McQuiston met with a group of 18 Hispanic men and women ranging in age from 19-39 and with all levels of education—one had never been to school at all, while others had high school diplomas and one had a college degree. The group learned about their roles as LHAs in the community, as well as the transmission and prevention of HIV and other STDs, testing resources, protection options and cultural values and roles. McQuiston’s team also provided each LHA with a brightly-colored reference manual, written in Spanish, with pictures and simple words set in large type.

As the LHAs learned from McQuiston’s team, the team also learned from them. “We wanted to know if they were working as LHAs in the community,” said McQuiston, “So we interviewed them three months out [after the training] and seven months out, and all of them are in the community, getting the word out about HIV.”

The skills learned by the LHAs will benefit them as individuals, as well as benefit the community members they teach, says McQuiston. Two of the LHAs—a male cook and a young mother who does not work outside the home—assisted in the training of a second LHA group, which was formed after demand for the first training proved high. Their facilitation skills will be useful to El Centro Hispano, and to the community. “The training replicates itself,” said McQuiston. “We’re working on community capacity-building, too. We’ll train the people and, hopefully, they’ll do other things at El Centro because now they have this expertise.”
Living healthy with chronic disease

“To impact chronic disease,” says Jean Goeppinger, “we have to be where people live, work, play and have the disease. Working with them during the hour they come to the physician or nurse practitioner once a month is usually not enough. It fails to appreciate their home environment, their work environment, their community.”

Goeppinger, a professor of community health at the SON, believes that understanding the needs of the patient begins with listening to those needs. The Craven County Health Department agrees. This spring, it began a partnership with Goeppinger to take the first steps toward initiating a program for African Americans who, as a group, experience disproportionately high rates of chronic disease. With a $10,000 grant from the Center for Chronic Illness at the SON, Goeppinger and her partners will adapt a program developed by Stanford University researchers. Making the program relevant for African Americans, instead of the European Americans and Asian Americans for whom it was originally designed, is where the listening comes in.

The Chronic Disease Self-Management Program (CDSMP) teaches patients a variety of healthy living skills designed to improve overall physical and mental health and reduce trips to hospitals and outpatient clinics. Participants, who suffer from heart disease, lung disease, arthritis or stroke, learn techniques to manage symptoms such as pain and fatigue. They also learn the benefits of exercise for strength and endurance, the appropriate use of medications, how to communicate effectively with family members and medical professionals, healthy eating and evaluating new treatment options.

Goeppinger’s adaptation of the CDSMP will begin with focus groups in which participants (African Americans living in and around New Bern, North Carolina) will be asked about their symptoms and the specific strategies they use to manage them. Goeppinger will co-lead the focus groups along with respected leaders from the African-American community. “To make this work for them, I have to listen to how they take account of their lives,” said Goeppinger. “How they live each day, and how they live it as modified by their illness.”

With arthritis, said Goeppinger, pain is the biggest issue. In the Stanford version of the CDSMP, patients are given advice on how to relieve pain. One of the many options is to use meditation in order to take the mind off of the pain. However, in African-American communities, Goeppinger notes, prayer is another relevant method of focusing the mind. “Depending on what I hear in the focus groups, I may need to also include an option such as, ‘Draw on your faith to get you through.’”

Goeppinger’s team will recruit focus group participants from a variety of places in Craven County. Once the program is adapted to an African-American population, she will apply for larger grants to study the possibility of administering the program across the state and to expand the program to other traditionally underserved minorities, such as Native Americans. “Most people with chronic disease need more than they get in the brief encounter with their healthcare provider,” said Goeppinger. However, she cautioned, the program is not a substitute for disease-specific information. “A diabetic needs to know more than what’s offered in this program,” she said. “They need to attend diabetes-specific patient education classes.”

But the program offers more than information, which, though important, is less effective if the patient isn’t given the opportunity to put the information into practice, said Goeppinger. Once the CDSMP is adapted for minority patients, it will also offer them an environment in which to put the information to use. “Information is one need, but it’s not the only need,” she added. “They need a chance to practice strategies for managing their illness, to try out the skills between visits to a healthcare provider and to report back and say, ‘Well, this worked. And this didn’t.’”

Living healthy with chronic disease
Since April, students, faculty and staff all over Carrington Hall have been distracted by the noise of construction on the ground floor of the building. But for Dr. Virginia Neelon, Associate Professor at the SON and director of the Biobehavioral Laboratory (BBL), the banging and clanking make beautiful music. The clamor signifies the realization of an idea in planning for over ten years: an addition to the BBL that will provide the necessary space to advance the quantity and quality of faculty and student research. To find out more about how the BBL fits into the work of the SON, Carolina Nursing talked with Neelon (see below). On page 19, read more about the work of the BBL and faculty research.

THE BBL IN BRIEF
A conversation with Dr. Virginia Neelon

CN: Tell us why we have a Biobehavioral Laboratory

VN: In the 1980s, when I joined the SON full-time, nursing science had evolved to the point that we needed to find ways to help faculty and graduate students measure physiological or biological responses to illness. Making those measurements would help nurses understand the problems and symptoms their patients had and whether or not what they did to alleviate those problems and symptoms was working.

CN: What do you use to measure illness?

VN: Because nurses often work outside the hospital structure, in homes and in community centers and nursing homes, they need to be able to measure response to illness in a minimally invasive way. We build and adapt instruments that can be used almost anywhere to answer the questions that our researchers are asking.

CN: What kind of instruments?

VN: Well for instance, let’s say you want to know how a patient is doing physically. One of the key things to look at is the blood oxygen level. So the first instrument we bought for the lab was an oximeter—an instrument that estimates the amount of oxygen in the blood by passing a light through a part of the body. You can put these instruments on fingers, tape them to the feet of premature infants, put them on the scalp. They are not quite as accurate as measuring oxygen in...
It's crucial that we obtain or develop instruments that can travel and that don't add a burden to the person who is being tested because more and more of the things we do are done to frail individuals—old or young or with some kind of persistent illness. And as our faculty and student investigators get more sophisticated in their studies, we get more sophisticated in how they could combine psychological and physiological measurements.

CN: So the object is to have instruments that are not only minimally invasive, but mobile, too?

VN: Yes, because most of our equipment is used outside the lab. When we get a new instrument, we learn how to use it, then we evaluate and test the instrument on a normal subject in the lab. Only then are we ready to help investigators go out with it—to study children in school or to do sleep studies in a nursing home. Our equipment goes where the investigator goes to look at the problems he or she needs to look at. It's crucial that we obtain or develop instruments that can travel and that don't add a burden to the person who is being tested because more and more of the things we do are done to frail individuals—old or young or with some kind of persistent illness. And as our faculty and student investigators get more sophisticated in their studies, we get more sophisticated in how they could combine psychological and physiological measurements.

CN: Can you give an example of such sophisticated measures?

VN: We can now measure stress by measuring the level of cortisol [a hormone that increases with stress] in saliva. This lets us recognize and describe how people react to certain kinds of stresses. We have wrist-watch-like devices that measure movement and so can monitor activity levels during sleep. We started out using simple measures of blood pressure and respiration, but now we can actually sit in the lab and monitor and record the respiratory activity of someone sleeping at home. To do this, we use a sensor that fits under the back; each time the person breathes, the information is fed into a computer, sent to us via the Web, and we get a waveform that tells us every time they inhaled and exhaled. When the sensor was first developed by Dr. Barbara Waag Carlson, it was as big as an air mattress, but with the help of Dr. Henry Hsiao in the Bioengineering Department, it's down to a small pad.

CN: It sounds like sleep is a focus of the lab.

VN: Sleep studies have been really expanding. Another area of interest is teaching patients how to manage or reverse some kind of problem, like urinary incontinence.

CN: Is the increased focus on these areas one reason to add space to the Biobehavioral Lab?

VN: Both of those kinds of studies require the ability to evaluate (continued on page 18)
people and to evaluate the interventions in a controlled setting. We needed space for a controlled nursing intervention lab, where we could look at sleep over long periods of time or, in the case of incontinence, where we could develop new ways to measure the effect of biofeedback training.

**CN: And you couldn’t do that in the current BBL?**

VN: No. One minute, we’d be cleaning off the lab prep area to collect saliva or blood samples, or bringing in samples collected in the field for preprocessing; next minute, we’d have faculty there doing an exercise study.

**CN: And so you decided to expand?**

VN: We actually knew we needed to expand when the lab was first started. In 1990, we drew up plans and proposals for a new space. All were either rejected, or revised, or not funded. But Dean Freund and Dr. Funk, Associate Dean for Research, had made a real commitment to the lab, and we tried again after each proposal failed. It takes tremendous support from leadership—commitment not just to space, but to the faculty endeavors based on the lab. Three years ago, we finally got approval for the current plan, which calls for an addition to the south side of the building, in an existing courtyard. This will allow access to the lab from the outside for people who participate in sleep studies and need to come into the building after hours.

**CN: How will the new space change the BBL?**

VN: In the new lab, we’ll be able to monitor two individuals (adults or children) during sleep, either continuously or intermittently over a few days. There will be two sleep rooms, one flexible enough to handle wheelchairs. The rooms are set up so that we can record multiple physiological and video signals from outside the room. When no sleep studies are going on, the rooms can be used as a nursing intervention area to look at various problems. We will also have, for the first time, a real biological lab to help researchers prep, store and freeze samples, and even do some analysis of the samples.

**CN: So with the new lab in place, what do the next five years bold for the BBL?**

VN: Well, besides the fact that the new space will have the capability to actually test and evaluate new kinds of instruments, we have new areas to develop. For example, we need to develop markers that will allow us to decide who are the people who will best benefit from an intervention. This has been a struggle for nursing, because our tendency has been to develop an intervention and use it on everybody regardless of whether it fits or not. We need to look at why certain people experience acute exacerbations of chronic illness, and others don’t. We need to say, “What is the difference?” “Is it the way we give medications?” “Is it the way the patients take medications?” “Is it other events in their lives?” There are many things that nurses who work closely with chronically ill patients can begin to identify that will determine when someone is beginning an acute episode. Then we may be able to show patients themselves how to stop an acute process before it starts.

**CN: So the research focus is on assisting the practicing nurse?**

VN: Absolutely. There’s been a tremendous gap between nursing research and its application at the bedside. We need to develop simple measures that would allow nurses to say, “Was what I did at the bedside, any help?” And that would let not just nurses, but caretakers and families and the patients themselves say, “I’m doing better.” Or, “I need to do this differently.” In this day of financial restraints, good nursing is tremendously important. If you can show hospitals and the public that you can get out of the hospital faster, walk better, have less residual effect of your stroke, then they will support keeping nurses at the bedside where they need to be. We have the information and the science; we just need to make the science visible.

**CN: Where will the new genome research fit into the SON?**

VN: There’s still a big jump from genes to gene therapy. But the School is already saying, “What do genes and the genome mean for nursing?” The BBL will be working with the faculty and the administration to develop a curriculum to address how this will affect us. We are already involved to some degree, as when we talk about who is suffering acute exacerbations of chronic illness and who isn’t. Understanding how a group of children, by their genetic profiles, are more vulnerable to certain kinds of problems in adulthood will allow us to focus exercise or behavioral modification or diet interventions on those individuals. I think we’re in a very exciting age. I think the critical thing to do is to translate our knowledge into applications for patients and nurses.
Accounting for simple human error is one of the more challenging aspects for researchers, who never really know if their data are 100% accurate.

Jean Kincade wants to eliminate some of the guesswork in her research on the effect of biofeedback on urinary incontinence in women. Her study will involve teaching women pelvic floor muscle exercises (commonly known as Kegel exercises) to strengthen the muscles supporting the bladder—which will decrease or eliminate episodes of involuntary leaking. The exercises, which involve contracting and holding certain muscles and not others, can be done improperly by women who aren’t carefully trained. So even women who diligently perform the exercises may fail to see a difference in incontinence. To address that concern, Kincade’s study uses electrodes placed on the lower abdomen and perineum so that the women can see whether or not they’re squeezing properly. This biofeedback will allow them to visualize whether they’re getting the benefit of the exercises or not. Once they learn to perform the exercises correctly in the nurse practitioner’s office, they’ll be sent home to try them on their own, three times a day, in sets of 15. At least, that’s what they’re supposed to do.

“One of the important things when you teach pelvic floor muscle exercises is that the women actually practice them,” said Kincade. “Because it’s not going to help them if they don’t practice.” In the past, says Kincade, the only way to know if the women were doing the exercises was to have them keep a diary. And, Kincade knew, the diaries weren’t always kept accurately. She wanted something that she could send home with the women that would record when they were doing the exercises. Kincade turned to the Biobehavioral Laboratory (BBL) for help.

Brant Nix, lab manager and bioengineering technician, along with Dr. Barbara Waag Carlson, a faculty member in the BBL, developed an ingenious little box that not only measures the date and time that the women are doing the exercises, but will also capture the time when each individual contraction starts and stops. To get the full benefit of the exercises, the women must not only squeeze the correct muscles, they must also hold the contractions and then rest. When the woman begins a contract-
tion, she pushes the button on the top of the box. When she releases the contraction, she releases the button, making it possible for Kincade to also measure duration of the exercise. All of the data are stored in a tiny computer chip, which is powered by a watch battery. From time to time during the study, the women will take the device to their visit with a nurse practitioner, who will download the data from the box onto a computer.

For the first time, Kincade will actually be able to measure the relationship between adherence to the exercise regimen and improvement in continence. “Before, if a group of subjects didn’t do as well as we expected, you didn’t know whether it was because the exercises weren’t working or because they didn’t practice them,” said Kincade. “Whereas with this, when she knows there’s going to be a date and time each time she pushes the button…how the family supports the child.” Leaving practice to pursue her PhD at the SON, Docherty thought that knowing more about the stress experienced by children undergoing chemotherapy would help nurses care for them during treatment. For her dissertation, Docherty studied three children undergoing chemotherapy treatment for cancer in order to measure the symptoms they experienced, the severity of their symptoms and how they reacted to them.

Measuring their symptoms required a variety of methods. Every day, for three months following their diagnosis, Docherty was with the children at home or in the hospital, measuring their response to the drugs that were fighting their disease. Using questionnaires and interviews, Docherty collected data on whether or not they suffered nausea and vomiting, retching, mood, fatigue, worry, stress and pain. The children also filled out a symptom diary and the “oucher,” a pain scale designed for kids. In addition to these instruments, Docherty used a biobehavioral method to measure stress—she took saliva samples from the children twice each day so that she could measure cortisol, a hormone that increases in the body during times of stress. “The cortisol measurement turned out to be really important,” said Docherty. “One boy, in all his interviews, would say, ‘Oh no, I’m fine; I’m not bothered by the chemo.’ He didn’t want anybody to worry about him; he was really concerned for his mother.” The boy reported low levels of stress and effects of symptoms, Docherty said, but the cortisol tests revealed something else. “His cortisol levels were really high. So, physiologically, he was experiencing stress, but verbally and in paper and pencil tests, he didn’t.”

The BBL assisted Docherty both in teaching her how to use the cortisol measure and in analyzing the data. “Dr. Neelon and Dr. Waag Carlson had measured saliva samples in different ways and in different populations, but they’d never used it in children before,” said Docherty. “So when I said I was interested in using this way of looking at stress they said, ‘Well, let’s look at what ways are out there for kids.’ They also assisted Docherty in measuring the children’s sleep. “They set me up with Actigraphs, which are watches the children wear while they’re sleeping, and it gives me a measure of how efficient their sleep is.” Restful sleep, or non-REM sleep, is important for all children because growth hormones are secreted then, said Docherty. “I was interested to see if, when these kids are in treatment, their sleep alters.”

Docherty, who is now an assistant professor of children’s health at the SON, is continuing her studies on symptom distress and children now that she’s on the faculty. Her dissertation research told her that oncology nurses need to keep a careful eye on children at all points of cancer treatment—that the children they expect to do well may do worse as treatment progresses, and vice versa: “I had one child whose distress grew worse over time—it had a lot to do with what was going on in her home and social life,” said Docherty. “Whereas I saw the opposite in the other two kids—they had high levels of stress at the beginning of treatment, which went down over time.”

The "Smart" Bottle

Every year, over 400,000 children are born prematurely—before the normal 40 weeks of gestation. Sue Thoyre is working with some of these tiny patients, who are also some of the most vulnerable. By the time Thoyre sees them, they have spent days or weeks in a neonatal intensive care unit, receiving care as their tiny organs and systems struggle to support a body that should still be in the safety of the womb. Once their life-threatening conditions are addressed, these children remain at risk for a host of short- and long-term health problems, some of which, Thoyre believes, may be related to difficulties experienced during feeding. “They tend not to coordinate sucking and swallowing with breathing,” says
Thoyre. “So they’ll stop breathing while they’re sucking and swallowing, and it’s enough of a pause to make their oxygen levels drop.”

Thoyre wants to know what role reduced oxygen, or hypoxia, plays in causing some premature infants to develop malnutrition, lung and neurodevelopment problems, or to experience delays in growth and immune system development. “We know that when oxygen drops, the blood flow to the brain changes,” said Thoyre. “And whether that has an effect on neurodevelopment at a time when there’s a lot of neurodevelopment going on, we’re unsure. And we know that eating is a frequently recurring event throughout the day, and we want to avoid oxygen drops because we don’t feel that they’re positive for the infants. But research to make any direct link with this small drop isn’t there.”

To unravel the mystery between feeding and oxygen loss, as well as to determine which infants were vulnerable for feeding difficulties, Thoyre needed data that had never been captured before. “I went to the BBL and said, ‘I want to collect their breathing patterns,’” said Thoyre. “I wanted to know when they took a breath during feeding and when they didn’t take a breath. And I wanted to know their oxygen levels, and I also wanted to measure what feeding strategies the feeder was implementing.”

BBL consultant Dr. Henry Hsiao, an associate professor in the biomedical engineering department at UNC-Chapel Hill, assisted Thoyre in the development of an ingenious device to measure the baby’s breathing—the “smart” bottle. “We put a little monitor right on the bottle rim and, when the bottle is in the mouth, it measures breathing,” said Thoyre. Two small sensors measure carbon dioxide in the baby’s exhalation, while another sensor measures the change in air temperature when the baby inhales and exhales. Both measurements, carbon dioxide and temperature, are collected on a waveform that can be read by Thoyre to determine how often the child is breathing during feeding. The data from the bottle is linked to an oximeter on the infant’s foot, which measures the amount of oxygen in the blood, as well as a microphone placed on the neck, to listen to amplified sucking, swallowing and breathing. The BBL also helped develop the neck monitor, says Thoyre. “They took a pediatric-sized stethoscope and made it even smaller, so it’s a small disk. They put a microphone in the tubing, and it rests flat against the baby’s neck.”

All of this sophisticated equipment will help Thoyre establish evidence to prove what neonatal nurses have known for years: “Nurses always say babies get tired and that they ‘mis-time’ their ‘swallow.’ But, we don’t know a lot about how that interferes with breathing.” Eventually, nurses and even mothers at home may be using Thoyre’s bottle, which is currently being reviewed for patent possibilities. “We are exploring adding additional features. One would be a light that would go off if the baby hasn’t had a breath for five seconds,” said Thoyre. The bottle could then be removed from the mouth to cue the infant to breathe.

All of Thoyre’s data, as well as the smart bottle, would not be possible without the help of the BBL. “They have been very innovative. I can just tell them something I need, and they say ‘Oh, well make you something that can tell you that,’” she says. “They have expertise with many kinds of equipment—and they teach us to use it. I think that’s really pretty great.”
This fall, the School of Nursing welcomes Joyce Rasin, PhD, RN, and Cheryl Jones, PhD, RN, to the faculty. Both professors have research interests that address growing healthcare concerns in North Carolina, as well as the country as a whole.

Cheryl Jones’s appointment as an associate professor of health care systems/policy/informatics and advanced practice area coordinator for health care systems began on July 1. She will help the SON examine its health systems curriculum to ensure that it meets the needs of both students and potential employers. This fall, she will also teach a graduate level course, “Leadership in Organizations.”

Jones comes to the SON from the Agency for Healthcare Research and Quality in Rockville, Maryland—an organization devoted to issues related to patient safety, quality and policy-making within the healthcare system. Jones took a research leave from the school of nursing at the University of Virginia in 1998 in order to participate in an AHRQ study on the correlation between nursing staffing levels and adverse outcomes. The study is still underway. Jones’s research background and interests focus on the relationship between the practice environment, the nursing workforce and patient outcomes. Recent figures estimate that, due to the aging nurse workforce, the supply of qualified nurses will be 20% below national demand by 2020. An expert on the nursing shortage, Jones plans to focus on nursing turnover and retention during her appointment at the School.

Joyce Rasin comes to the SON from the school of nursing at Oregon Health Sciences University. Her appointment as an associate professor of gerontology also began on July 1. Rasin will teach undergraduate community health courses, as well as work with the state Area Health Education Center (AHEC) system to address continuing education needs.

Rasin’s research interests focus on older adults living in community-based long-term care. Her past research has focused on healthcare providers in these settings and determining their educational and support needs. Most community-based assisted-living care providers are paraprofessionals with limited training and resources. As America’s population of “baby-boomers” reaches retirement age, the number of people age 65+ is expected to climb to 70 million by 2030—more than double their number in 1998. In North Carolina, the number of adults age 65+ is projected to rise from 927,586 in 1996 to 1,634,691 in 2020—an increase of 76.2%. Rasin anticipates the number of assisted care facilities for elders will increase proportionally, and her research focus will turn toward developing interventions to link paraprofessionals with professional nurse consultation and to develop peer support.
Faculty Research Grants and Contracts 1999-2000

BIOBEHAVIORAL MEASUREMENT


CHRONIC ILLNESS

Preventing and Managing Chronic Illness


Preventing Chronic Illness


PREVENTING CHRONIC ILLNESS IN CHILDREN


SEXUALLY TRANSMITTED DISEASE/HIV


Managing Chronic Illness & Conditions


ARTHRITIS


Faculty Research Opportunity Grant, School of Nursing, The University of North Carolina at Chapel Hill, 1999-2000.

CANCER


CARDIOVASCULAR DISEASE


CYSTIC FIBROSIS


Christian, B., Principal Investigator; D’Auria, J., Co-Investigator; Betch-Bogart, G., & Belyea, M., Co-Investigators. Holditch-Davis, D., Senior Research Consultant. Building Life Skills in
Miles, M. and Barroso, J. HIV/AIDS.

DIABETES

Skelly, A., Principal Investigator; Holditch-Davis, D., Co-Investigator; Dunn, P. Co-Investigator. Improving Health Outcomes for Older African American Women With Type 2 Diabetes Mellitus. Sigma Theta Tau/American Association of Diabetes Educators, 1999.


HIV/AIDS


END OF LIFE


RESEARCH SYNTHESIS AND DISSEMINATION

Funk, S., Principal Investigator; Tornquist, E., Co-Principal Investigator. Key Aspects of Preventing and Managing Chronic Illness. Agency for Health Care Policy and Research. 1998-2000.


THERMOREGULATION


END OF LIFE

### Education and Professional Grants and Fellowships 1999-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Grant Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998–2001</td>
<td>University of North Carolina at Chapel Hill.</td>
</tr>
</tbody>
</table>

### Annual Level of Extramural Research Funding 1995-2000

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Direct Plus Indirect Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996–1997</td>
<td>$3,597,794</td>
</tr>
<tr>
<td>1997–1998</td>
<td>$4,250,993</td>
</tr>
<tr>
<td>1998–1999</td>
<td>$4,905,066</td>
</tr>
<tr>
<td>1999–2000</td>
<td>$5,514,650</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995–1996</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>1996–1997</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>1997–1998</td>
<td>$5,500,000</td>
</tr>
<tr>
<td>1998–1999</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>1999–2000</td>
<td>$5,500,000</td>
</tr>
</tbody>
</table>
Major Research Projects: Study Sites  
July 1999- June 2000

- Assessment of Biological and Social Risk in Preterm Infants
- Biomarkers Associated with HIV-Related Fatigue
- The Brain and Exercise Assessment Trial (BEAT)
- Building Life Skills in Children with Cystic Fibrosis
- Cardiovascular Health in Children (CHIC III)
- Caregiving Transitions: Decision-Making in Rural African American Communities
- Cerebral Oxygenation During Sleep in Older Adults
- Clinical Outcome: Patients’ Perception of Nursing Care
- Community Intervention to Promote Cardiovascular Health in Rural African Americans
- Culture Specific HIV Interventions for Mexican Americans
- Elder Abuse: A Screening Protocol
- Fatigue in People with HIV Infection
- Energy Expenditure of Physical Activities in Youth (EEPAY)
- Exercise Intervention for Adolescents with Cystic Fibrosis
- HIV Symptom Management with African American Mothers (CARENET)
- Improving Health Outcomes for Older African American Women With Type 2 Diabetes
- Managing Uncertainty in Advanced Prostate Cancer
- Managing Uncertainty in Older Breast Cancer Survivors
- Managing Uncertainty: Self-Help in Breast Cancer
- Motivation in Maintenance of Physical Activity
- Pilot Intervention for Depressive Symptoms in Low-Income Mothers
- Parental Role Attainment with Medically Fragile Infants (PRAM)
- Physiologic Oxy-Date during Premise Infant Feeding
- Prolegonce Nuestra Comunidad: Un Programa para La Prevencion del VIH/SIDA
- Role of Self-Knowledge, Psychosocial Adjustment and Physiological States in Women with CHD
- Reducing Discomfort in Frail Hospitazated Elders
- Sleep, Sleepiness, and Alertness in Children with Juvenile Rheumatoid Arthritis
- Symptom-Focused Diabetes Care for Rural African American Elders
- Talking Cognitive-Behavioral Treatment for Cancer Pain
- Testing Interventions Directed Toward STI/HIV Risk Reduction for Incarcerated Women
- Validation of a Self-Report Instrument for Measurement of Physical Activity
- Wake Women’s Project: Efficacy of Biofeedback to Treat UI in Women

[Map of Carolina highlighting study sites]


**Bunker, Barbara, Associate Professor**


**Carlson, John, Research Associate Professor**


**Christian, Becky, Associate Professor**


**D'Auria, Jennifer, Associate Professor & Director of Master's Programs**


**Davis, Leslie, Clinical Instructor**


**Davis, Virginia Gayle, Associate Professor**


**Dieckmann, Janna, Assistant Professor**


Eaves, Yvonne D., Assistant Professor


**Fishel, Anne, Professor & Division Chair**


**Fleury, Julie, Associate Professor**


**Fogel, Catherine, Professor**


Germno, Barbara, Associate Professor


Goepplinger, Jean, Professor

Halloran, Edward, Associate Professor


Harrell, Joanne, Professor


Henderson, Martha, Clinical Assistant Professor

Holditch-Davis, Diane, Professor & Director of Doctoral and Postdoctoral Programs


Hudson, Margaret, Associate Professor

Kaufman, Jane, Clinical Assistant Professor


Kincade, Jean, Research Associate Professor


Kjervik, Diane, Professor


Labyak, Susan, Assistant Professor


Lowdermilk, Deitra, Clinical Professor

**Editorial Review Activities 1999-2000**

Angel, Bonnie, Clinical Associate Professor  
Member, Editorial Board, *Journal of Community Science*, UNC-CH

Ayldett, Lydia A., Research Assistant Professor  
Member, Editorial Board, *Physical and Occupational Therapy in Pediatrics*

Barroso, Julie, Assistant Professor  
Reviewer, *Nursing Research*  
Reviewer, *Western Journal of Nursing Research*  
Reviewer, *Clinical Nursing Research*

Beeber, Linda, Professor  
Member, Editorial Board, *Nursing Outlook*  
Member, Editorial Board, *Research in Nursing & Health*

Bye, Margaret G., Clinical Assistant Professor and AHEC Liaison  
Member, Editorial Board, *Journal of Continuing Education in Nursing*  
Member, Editorial Board, *Nursing Matters*

Carlson, Barbara Waag, Research Assistant Professor  
Reviewer, *Physiological Measurement*  
Reviewer, *Pediatric Nursing*

Cooper, Mary Carolyn, Clinical Associate Professor  
Reviewer, *RN*

Cronenwett, Linda, Professor and Dean  
Member, Editorial Board, *Journal of Nursing Measurement*

Dalton, Jo Ann, Professor & Division Chair  
Member, Editorial Board, *Journal of Palliative Medicine*  
Reviewer, *Journal of Advanced Nursing*  
Reviewer, *American Journal of Nursing*  
Reviewer, *Fireside Retreat*  
Reviewer, Graphic Education Corporation, Columbia, MO

Davis, Leslie, Clinical Instructor  
Reviewer, Registered Nurse Refresher Program, Modules for Department of Continuing Education, UNC-CH

Dieckmann, Janna, Assistant Professor  
Reviewer, *Home Healthcare Nurse*

Dougherty, Molly C., Frances Hill Fox Distinguished Professor  
Editor, *Nursing Research*  
Member, Editorial Board, *International Urogynecology Journal*

Durham, Carol E., Clinical Associate Professor  
Reviewer, Delmar Publishers, Inc.

Eaves, Yvonne D., Assistant Professor  
Reviewer, *Nursing Research*

Englehardt, Sheila, Clinical Associate Professor  
Associate Editor, *Administration — On-line Journal of Nursing Informatics*  
Member, Editorial board, *Credentialing Newsletter, American Nurses Credentialing Center*

Fischel, Anne, Professor and Division Chair  
Reviewer, *Journal of the American Psychiatric Nurses Association*

Fleury, Julie, Associate Professor  
Member, Editorial Board, *Journal of Cardiovascular Nursing*  
Member, Editorial Board, *Research in Nursing & Health*  
Member, Editorial Board, *Journal of Nursing Measurement*  
Reviewer, *American Journal of Critical Care*  
Reviewer, *Heart & Lung*  
Reviewer, *Psychotherapy and Psychosomatics*  
Abstract Reviewer, *American Heart Association, Annual Scientific Sessions*  
Abstract Reviewer, *American Heart Association, Conference on Cardiovascular Disease Epidemiology and Prevention*

Fogel, Catherine, Professor  
Reviewer, *Journal of Advanced Nursing*  
Reviewer, *Journal of Obstetric, Gynecologic, and Neonatal Nursing*  
Reviewer, *Western Journal of Nursing Research*

Foster, Beverly, Clinical Associate Professor & Director of Undergraduate Programs  
Reviewer, *Public Health Nursing*  
Reviewer, *Blackwell Scientific Publications*

Funk, Sandra, Professor and Associate Dean for Research  
Reviewer, *Research in Nursing & Health*  
Reviewer, *Journal of Rural Health*

Germino, Barbara, Associate Professor  
Member, Editorial Board, *Cancer Nursing*  
Member, Editorial Board, *Journal of Psychosocial Oncology*  
Reviewer, *Journal of Family Nursing*  
Reviewer, *Cancer Practice*

Goepfinger, Jean, Professor  
Reviewer, *Qualitative Health Research*  
Reviewer, *International Quarterly of Community Health Education*  
Reviewer, *American Journal of Public Health*

Harrell, Joane, Professor  
Reviewer, *Advances in Nursing Sciences*  
Reviewer, *Clinical Nursing Research*  
Reviewer, *Image: Journal of Nursing Scholarship*  
Reviewer, *Journal of Adolescent Health*  
Reviewer, *Nursing Research*  
Reviewer, *Pediatrics*  
Reviewer, *Western Journal of Nursing Research*  
Abstract Reviewer, *Sigma Theta Tau International*

Hogelein, Carol, Associate Professor  
Member, Editorial Board, *Journal of Advanced Nursing*  
Member, Editorial Board, *Journal of Applied Gerontology*  
Reviewer, *Journal of Gerontology: Social Sciences*  
Reviewer, *Research in Nursing and Health*  
Reviewer, *Scholarly Inquiry for Nursing Practice*  
Reviewer, *Journal of the American Geriatrics Society*

Holditch-Davis, Diane, Professor & Director of Doctoral and Postdoctoral Programs  
Member, Editorial Board, *Journal of Obstetric, Gynecologic, and Neonatal Nursing*  
Member, Editorial Board, *Neonatal Network*  
Reviewer, *Journal of Reproductive and Infant Psychology*  
Reviewer, *Developmental Psychology*  
Reviewer, *Qualitative Health Research*  
Reviewer, *Nursing Research*  
Reviewer, *Journal of Advanced Nursing*  
Reviewer, *Journal of Obstetric, Gynecologic, and Neonatal Nursing*  
Reviewer, *Southern Online Journal of Nursing Research*  
Reviewer, *Research in Nursing and Health*  
Reviewer, W.B. Saunders  
Abstract Reviewer, *Southern Nursing Research Society*

Hudson, Margaret, Associate Professor  
Consulting Editor and Reviewer, *Journal of Elder Abuse & Neglect*  
Reviewer, *Journal of the American Medical Women’s Association*  
Reviewer, *The Gerontologist*  
Reviewer, Addison-Wesley  
Reviewer, *Brady Corporation*  
Reviewer, *Duke University Press*  
Reviewer, J.B. Lippincott Company  
Reviewer, *Springhouse Corporation*

Kincade, Jean, Research Associate Professor  
Reviewer, *Health Services Research*  
Reviewer, *Rural Health*  
Reviewer, *Public Health Reports*  
Reviewer, *Research on Aging*  
Reviewer, *The Gerontologist*  
Reviewer, *The American Journal of Public Health*  
Reviewer, *International Journal of Aging and Human Development*  
Reviewer, *Journal of Gerontology: Social Sciences*

Kjervik, Diane, Professor  
Editor in Chief, *Journal of Nursing Law*  
Member, Board of Review, *Issues in Mental Health Nursing*  
Member, Editorial Board, *Journal of Nursing Law*  
Reviewer, *Nursing Inquiry*  
Reviewer, *American Journal of Alzheimer’s Disease*  
Reviewer, *Journal of Advanced Nursing*  
Reviewer, *Image: Journal of Nursing Scholarship*  
Reviewer, *Nursing Outlook*  
Reviewer, J.B. Lippincott Company  
Reviewer, *PA Davis Co.*
Grant Review Activities 1999-2000

**Bye, Margaret G., Clinical Assistant Professor and AHEC Liaison**
Reviewer, NC AHEC Program Nursing Grants: Educational Mobility, RN Refresher Program, New Clinical Site Development, 1999-2000

**Dalton, Jo Ann, Professor and Division Chair**

**Dougherty, Molly C., Frances Hill Fox Distinguished Professor**
Member, Nursing Research Study Section, Center for Scientific Review, National Institutes of Health, 1997-present

**Fleury, Julie, Associate Professor**
Reviewer, National Committee on Epidemiology, Prevention and Behavioral Medicine, American Heart Association, 1999-2002

**Germino, Barbara, Associate Professor**
Member, Study Section, Oncology Nursing Society/Oncology Nursing Foundation Grants, 1997-2000

**Holditch-Davis, Diane, Professor & Director of Doctoral and Postdoctoral Programs**
Collateral Reviewer, Sigma Theta Tau International Research Grants Program, 1991-present

**Hudson, Margaret, Associate Professor**
External Faculty Reviewer, Research Scholar & Fellow Program, John A. Hartford Foundation Institute for Geriatric Nursing, 1999-2001

**Lynn, Mary, Associate Professor**
Reviewer (ad hoc), American Association of Spinal Cord Injury Nurses, 1993-present
Reviewer (ad hoc), Alberta Foundation for Nursing Research, 1991-present
Reviewer, Council for Graduate Education for Administration in Nursing (CGEAN), 2000
Reviewer (ad hoc), Spinal Cord Injury Research Foundation, 1994-present
Reviewer (ad hoc), Paralyzed Veterans’ of America, Spinal Cord Research Foundation, 1994-present
Reviewer, American Association of Spinal Cord Injury Psychologists and Social Workers, 1997-present

**Miles, Margaret S., Professor**
Reviewer, AIDS and Related Research-8 Study Section, Center for Scientific Review, National Institutes of Health, 1997-present

**Mishel, Merle, Kenan Professor**
Consulting Editor, Annuals of Behavioral Medicine
Reviewer, Health Psychology
Reviewer, Research in Nursing and Health
Reviewer, Western Journal of Nursing Research
Reviewer, Heart & Lung
Reviewer, Scandinavian Journal of Caring Science
Reviewer, Scholarly Inquiry for Nursing Practice

**Neelon, Virginia, Associate Professor**
Reviewer, ANNA Journal
Reviewer, American Journal of Pharmaceutical Education
Reviewer, American Journal of Nursing
Reviewer, Journal of Applied Gerontology
Reviewer, Journal of General Internal Medicine
Reviewer, Addison Wesley and Company
Reviewer, Saunders Company

**Pierce, Susan, Associate Professor**
Reviewer, Sigma Theta Tau Online Case Study Program
Reviewer, Journal of Professional Nursing
Reviewer, Journal of Advanced Nursing

**Rasch, Randolph, Clinical Assistant Professor**
Member, Editorial Board, Trends in Nursing, Cortex Communications, Inc.

**Rowsey, Pamela Johnson, Assistant Professor**
Reviewer, Physiology and Behavior Journal
Reviewer, Southern Nursing Research Society (On-line Journal)

**Sandelowski, Margarete, Professor**
North American Editor, Nursing Inquiry
Associate Editor, Health Care For Women International
Assistant Editor, Research in Nursing & Health; Editor and Contributor, “Focus on Research Methodology;” Research in Nursing & Health
Member, Editorial Board, Field Methods
Member, Editorial Board, Qualitative Health Research
Member, Editorial Board, Advances in Nursing Science
Reviewer, Canadian Journal of Nursing Research
Reviewer, Journal of Nutrition Education
Reviewer, Qualitative Sociology
Reviewer, Nursing History Review
Reviewer, Sage Publications
Reviewer, University of Pennsylvania Press

**Skelly, Anne, Assistant Professor**
Editor, Continuing Education Department, The Diabetes Educator
Reviewer, Diabetes Care
Reviewer, Sage Publications
Reviewer, E.A. Davis
Reviewer, C.V. Mosby, Inc.
Abstract Reviewer, American Diabetes Association, 60th Annual Meeting and Scientific Sessions

**Thoyre, Suzanne, Assistant Professor**
Reviewer, American Journal of Maternal Child Nursing
Reviewer, Journal of Obstetric, Gynecologic, and Neonatal Nursing

**Milio, Nancy, Professor**
CDC Grant Review Panel on Prevention Research Centers, 1999
Reviewer (ad hoc), Alzheimer’s Association, Research Grants Program, 2000

**Miller, Judith, Associate Professor**
Member, Grant Review Committee, Exploratory Projects, Institute on Aging, UNC-CH, 2000

**Pierce, Susan, Associate Professor**
Reviewer, North Carolina Center for Nursing, Retention Grants, 1993-present

**Rowsey, Pamela Johnson, Assistant Professor**
Member, Grant Review Committee, American Nurses Foundation, 2000-2003

**Sandelowski, Margarete, Professor**
Reviewer, Alzheimer’s Research Alliance of Oregon, 1999
Initial Review Group, National Institute of Nursing Research, National Institutes of Health, 1999-2003
GRANTS

Bailey, Jr., D., Principal Investigator; Mishel, M., Sponsor. Uncertainty and Watchful Waiting with Prostate Cancer. Research Award, Oncology Nursing Society, 1997-2000.

Bailey, Jr., D., Principal Investigator; Mishel, M., Necnov, V., Sponsor. Uncertainty and Watchful Waiting with Prostate Cancer. Research Award, University of North Carolina Institute on Aging, 1999.


Bailey, D. Jr., Principal Investigator; Miller, J., Faculty Advisor; Integration of Advanced Gerontological Nursing Knowledge Care to Men with Prostate Cancer. Integration of Advanced Knowledge in Direct Clinical Relevance into Undergraduate Nursing Education, School of Nursing, the University of North Carolina at Chapel Hill, 2000.

Beckman, J., Principal Investigator; Milio, N., Sponsor. The Effectiveness of Nursing Practice Patterns in Acute Care Nursing Units. North Carolina Nurses Association District 11, 1999-2000.


Postdoctoral Fellows


INSTITUTIONAL NRSA AWARD RECIPIENTS

Predoctoral Students


PUBLICATIONS


