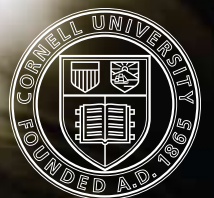


Human ECOLOGY

Health and Public Policy

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Helps Smokers Quit** page 14



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Cornell's College of Human Ecology publishes this magazine to illustrate how its programs address complex societal issues to improve the human condition. This mission of human improvement is accomplished through faculty initiatives in research, outreach, and teaching—with an emphasis on an ecological perspective, collaborative projects, and multidisciplinary curricula within and across five academic units: the Department of Design and Environmental Analysis; the Department of Fiber Science & Apparel Design; the Department of Human Development; the Department of Policy Analysis and Management; and the Division of Nutritional Sciences, a unit shared with the College of Agriculture and Life Sciences. The college includes the Family Life Development Center and the Bronfenbrenner Life Course Center.

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What's

Cover: New research from Human Ecology shows that smokers who see ads for smoking-cessation products are more likely to quit.

Above: This state-of-the-art Biotek Synergy 2 plate reader is used by Ling Qi in his research on the link between obesity and type II diabetes.

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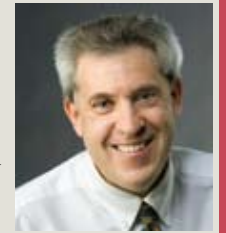
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An undulating chair, a vibrating mouse, and a movable monitor: Alan Hedge takes a serious look at the newfangled workstations designed to prevent repetitive motion injuries.

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Human Health and Public Policy

The College of Human Ecology takes a distinct approach to understanding and addressing some of the greatest challenges we face today. Our research, outreach, and academics are organized around solving problems in the real world. Interdisciplinary collaborations are the rule, not the exception. And nearly everything we do supports efforts to advance human health.

This unique model is what lured me away from my earlier career at the Federal Trade Commission. Human Ecology offered a place to create and share knowledge, a spirit of innovation, and a shared commitment to making a difference in the world.

In the pages of this magazine, you will see these aspects of Human Ecology illuminated. The stories all center on human health and public policy, highlighting how researchers and extension professionals are shaping dialogue, understanding, and practice in fields ranging from chronic pain among the elderly to workplace ergonomics to smoking cessation to health care reform and more.

It is an honor to be serving as interim dean of the College of Human Ecology, and I am happy to invite you to explore these stories about our work.

Sincerely,

Alan D. Mathios
Interim Dean
College of Human Ecology

Dean Mathios has been at Cornell since 1992. He is the former associate chair and director of undergraduate studies for the Department of Policy Analysis and Management and was a senior associate dean for the college. He has been the recipient of numerous teaching and advising awards, including the SUNY Chancellor's Award for Excellence in Teaching.

Mathios is co-editor of the Journal of Consumer Policy and serves on the editorial boards of the Journal of Consumer Affairs and the Journal of Public Policy and Marketing. He spent six years at the Federal Trade Commission as a senior staff economist in the Division of Economic Policy Analysis.

inside.

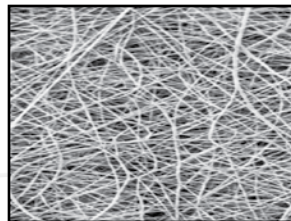


Advertisements, Public Policy, and Public Health

Human Ecology researchers have determined that exposure to ads for smoking-cessation products encourages smokers to quit—even if they don't buy the products. Now, the experts are looking at the policy implications.

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Electrospinning Form with Function

Fiber scientists are engineering clothing to protect farmworkers, first responders, and military personnel. They are also producing nanofibers to detect and degrade indoor pollutants to safeguard us all.

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Diet for a Healthy Planet Includes Dairy and a Little Meat

A low-fat vegetarian diet is very efficient in terms of how much land is needed to support it. But adding some dairy products and a limited amount of meat may actually increase this efficiency, Cornell researchers suggest.

This deduction stems from the findings of their new study, which concludes that if everyone in New York State followed a low-fat vegetarian diet, the state could directly support almost 50 percent more people, or about 32 percent of its population, agriculturally. With today's high-meat, high-dairy diet, the state is able to support directly only 22 percent of its population, say the researchers.

The study, which was published in the journal *Renewable Agriculture and Food Systems*, is the first to examine the land requirements of complete diets. The researchers compared 42 diets with the same number of calories and a core of grains, fruits, vegetables, and dairy products (using only foods that can be produced in New York), but with varying amounts of meat (from none to 13.4 ounces daily) and fat (from 20 to 45 percent of calories) to determine each diet's "agricultural land footprint."

They found a fivefold difference between the two extremes.

"A person following a low-fat vegetarian diet, for example, will need less than half (0.44) an acre per person per year to produce their food," says

Christian Peters, M.S. '02, Ph.D. '07, a Cornell postdoctoral associate in crop and soil sciences and lead author of the research. "A high-fat diet with a lot of meat, on the other hand, needs 2.11 acres."

"Surprisingly, however, a vegetarian diet is not necessarily the most efficient in terms of land use," Peters says.

The reason is that fruits, vegetables, and grains must be grown on high-quality cropland, he explains. Meat and dairy products from ruminant animals are supported by lower-quality, but more widely available, land that can support pasture and hay. A large pool of such land is available in New York because for sustainable use, most farmland requires a crop rotation with such perennial crops as pasture and hay.

Thus, although vegetarian diets in New York may require less land per person, they use more high-valued land. "It appears that while meat increases land-use requirements, diets including modest amounts of meat can feed more people than some higher-fat vegetarian diets," Peters says.

"The key to conserving land and other resources with our diets is to limit the amount of meat we eat and for farmers to rely more on grazing and forages to feed their livestock," says Jennifer Wilkins, senior extension associate in nutritional sciences who specializes in the connection between local food systems and health and co-authored the study with Gary Fick, Cornell professor of crop and soil sciences.

"Consumers need to be aware that foods differ not only in

their nutrient content but in the amount of resources required to produce, process, package, and transport them."

Wilkins continues, "Ever since the federal government issued the first Dietary Guidelines for Americans, they have reflected the current understanding of the relationship between diet and health and the emerging science around the prevention of chronic disease. The environmental implications of food choices are currently not part of the U.S. Dietary Guidelines or the new MyPyramid, but they could be. Since both physical exercise and food safety are now considered appropriate components of national dietary guidance, there is precedence for the federal government to include non-nutrient considerations such as environmental impacts of food choices."

According to the U.S. Department of Agriculture, the average American ate approximately 5.8 ounces of meat and eggs a day in 2005.

"In order to reach the efficiency in land use of moderate-fat, vegetarian diets, our study suggests that New Yorkers would need to limit their annual meat and egg intake to about 2 cooked ounces a day," Peters says.

SUSAN LANG



Jennifer Wilkins

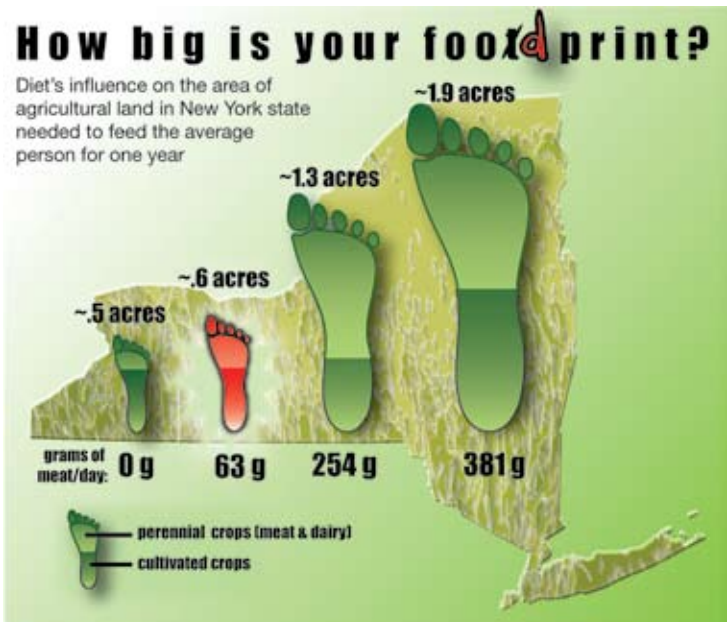


ILLUSTRATION BY STEVE ROKITKA/UNIVERSITY COMMUNICATIONS

Although a moderate-fat plant-based diet with a little meat and dairy (red footprint) uses more land than the all-vegetarian diet (far left footprint), it feeds more people because it uses more pasture land, which is widely available.



Making Medical Research Available to More New Yorkers

In a major new effort to translate medical research into practical and accessible treatment, Weill Cornell Medical College (WCRC) will lead a new Clinical and Translational Science Center, creating a network for biomedical collaboration on Manhattan's Upper East Side. The center will be funded through a \$49 million Clinical and Translational Science Award from the National Institutes of Health, the largest federal grant ever awarded to WCRC.

The center will comprise a diverse group of collaborating institutions, including Cornell's College of Human Ecology, Memorial Sloan-Kettering Cancer Center, Hospital for Special Surgery, and Hunter College. In addition, Cornell University Cooperative Extension–New York City (CUCE-NYC) will lead extensive outreach efforts in the city.

"There is a pressing need for broad-based multidisciplinary collaborations that can fulfill the incredible promise of recent research advances in areas like genetics and bioinformatics, and efficiently translate them into real-world interventions that benefit the community," says Cornell president David Skorton, who is a professor of internal medicine and pediatrics at WCRC.

Alan Mathios, interim dean of Human Ecology and professor of policy

analysis and management, notes: "The selection of Cornell for this center recognizes the university's excellence in both science and service, and furthers the integration of Cornell's research and outreach missions. At the College of Human Ecology, we're very proud to have a role in facilitating important research that will have a real impact in people's lives, and we are excited about another collaboration that brings together Cornell's expertise across disciplines."

Innovations that result from the new center will be made widely available through national steering committees, says Julianne Imperato-McGinley, the center's principal investigator and program director. "Together with our collaborator institutions, we will work toward moving translational research from bench to bedside to community. Furthermore, in a process of circular innovation, lessons learned in the community will then be the basis for new research efforts."

William Trochim, director of the Cornell Office for Research on Evaluation and professor of policy analysis and management in Human Ecology, will lead the evaluation of projects for the center.

Cooperative Extension will work with community groups across New York City in such areas as facilitating clinical trials, working with physician

groups to design small research projects around health issues, and increasing the availability and amount of health-related information to city residents, said Don Tobias, CUCE-NYC executive director.

"Nothing of this kind of scale, this penetration level has been done before," Tobias adds. "This is indicative of what a lot of us have been talking about in terms of increasing the level of collaboration between the Ithaca campus and the New York City campus, and it's also indicative of what we've been very interested in accomplishing in terms of the land-grant mission and how it intersects with the medical school's role in the city."

Neighboring institutions will be contributing significantly to the initiative, which will target the full range of clinical areas, including cancer, diabetes, AIDS, cardiovascular disease, women's health, reproductive medicine, geriatrics, psychiatry, obesity, Alzheimer's disease, kidney disease, multiple sclerosis, neuromuscular disorders, trauma, and burns.



Cornell President David Skorton

LAUREN GOLD

Academic researchers bridge the gap in practice with older people suffering with chronic pain.

Research for a New Age

BY SHARON TREGASKIS

Between 50 and 80 million Americans—as much as 25 percent of the U.S. population—suffer from chronic pain, a condition associated with osteoarthritis, fibromyalgia, and rheumatoid arthritis that disproportionately afflicts the elderly. Beyond the psychological costs related to reduced quality of life, chronic pain compromises physical independence, social integration, and economic function. The American Pain Society estimates the total bill for extreme discomfort and beyond in the U.S.—including lost productivity and medical expenses—at \$100 billion annually. Congress has declared the years 2000–2010 the “Decade of Pain Control and Research,” and in 2005, both the House and Senate considered legislation to promote translation of research on pain into the delivery of improved health care services.



Much of the problem with pain in America boils down to inadequate, ineffective treatment. As the Baby Boom generation hits retirement age and the American population shifts into high gear to accommodate a surging demand for geriatric health care and services, reliable, evidence-based treatments to address chronic pain will become increasingly imperative. And for those suffering debilitating pain, it's just not an option to wait years—and sometimes decades—for researchers to investigate the issue and for their findings to influence the day-to-day practice of physicians, social workers, senior citizen centers, and policymakers nationwide.

“The conventional approaches to implementing pain programs in clinical settings have not been terribly successful,” says Dr. Cary Reid, associate professor of medicine and director of the office of geriatric research in the Division of Geriatrics and Gerontology at Weill Cornell Medical College, who investigates the epidemiology and treatment of chronic pain among the elderly. “New models are needed.” Dr. Reid is also a member of the graduate field of Human Development on Cornell's Ithaca campus. >>>



In October 2006, the Cornell Institute for Translational Research on Aging—a collaboration of faculty members from the College of Human Ecology, Weill Cornell Medical College, and the Psychiatric Division of the Cornell Institute for Geriatric Psychiatry in Westchester—sponsored “Taking Community Action Against Pain: Translating Research on Chronic Pain among Older Adults,” a one-day conference for researchers, policy makers, and practitioners. The goal: stimulate dialogue and facilitate the formation of research partnerships among academics and community groups.

“Community-based research is the critical step you have to have to make basic social and behavioral science translatable into practice,” says Human Ecology’s Elaine

Wethington, professor of human development and CITRA co-director. “I’m totally convinced,” she declares.

Founded in 2003, CITRA—one of four Edward R. Roybal Centers for Translational Research on Aging nationwide—has led the charge to develop research models that bridge the

“It’s been a really great experience for the human services community in New York City,” Jellinek says. “CITRA is a resource the community didn’t have before. That’s a big deal. They’re not just asking to use the agencies as a living laboratory, but they’re giving back, too.”

Community-based participatory research comes with a unique set of logistical challenges—from convincing community partners of the importance of randomized, controlled experimental designs to managing the many relationships necessary to complete a study. Already, CITRA has developed a network of 265 senior centers and other elder service agencies in metro New York willing to partner with

researchers and has established a community advisory committee that consults with investigators exploring what research questions to pursue. A companion database maintained by CITRA staff details the gerontological interests of several dozen faculty members in colleges across the Ithaca campus.

Igal Jellinek serves as executive director of the Council of Senior Centers and Services of New York City, that 265-agency network in New York. Members include the

city’s Meals on Wheels, local chapters of the Alzheimer’s Association, and myriad senior centers scattered throughout the city’s five boroughs, comprising neighborhood, ethnic, and religious groups. With Jellinek as a liaison to member groups, CITRA researchers have access to a rich array of community connections.

Already, Jellinek says, the council’s members are seeing the benefits. When Meals on Wheels approached city administrators about raising prices to match inflation, something that hadn’t happened since 1999, CITRA researchers helped with data analysis. CITRA facilitated a community meeting with social service agencies, Cornell nutritionists, and other researchers and ultimately suggested a price increase of just 35 cents per meal. When city officials agreed to the boost, the net effect on the bottom line for Meals on Wheels funding came to \$4 million.

“Using CITRA’s expertise to do our public policy and advocacy has been a residual and synergetic effect,” Jellinek says, “something we didn’t expect initially.”

More recently, council members have recognized the need for customer service training for front-line staff at the city’s social care centers, which provide support for families in crisis. “If you’re in social day care, the most important person is not the director, it’s the person who answers the phone,” Jellinek points out. “Customer service is really important,” he says. CITRA helped broker initial contacts between Jellinek and Cornell’s Hotel School. Now they’re in the early stages of collecting information from council members about their needs and identifying sources to fund research and training on hospitality and customer relations elements relevant to the council members.

“It’s been a really great experience for the human services community in New York City,” Jellinek says. “CITRA is a resource the community didn’t have before. That’s a big deal.

alzheimer’s  association®

gap between academics and practitioners. Much of that work has focused on community-based participatory research, a model that integrates the insights and concerns of practitioners with the rigorous, evidence-based approach of academic investigators across multiple disciplines. Such collaborations stretch from the articulation of research questions to the design of experiments, the collection of data, and the dissemination of findings.

“As a physician, I approach a problem in a certain way,” says Reid, Weill Cornell’s Silbermann Family Clinical Scholar in Geriatric Palliative Care and a CITRA researcher. “To be able to collaborate with highly trained social scientists allows me to ask more interesting questions and obtain more interesting answers.”

Real-World Context

Gerontologist Karl Pillemer, a professor of human development in Human Ecology and CITRA co-director, credits Urie Bronfenbrenner’s influence for the institute’s dedication to analyzing interventions in a real-world context. “Even if you develop what you think is the greatest program in the real world, you still have to test it in typical community settings,” says Pillemer, who for 10 years was director of the Cornell Gerontology Research Institute, CITRA’s precursor. “If researchers and community agencies work together in a true partnership, it’s possible to design programs that are likely to be used and bring real-world experience into implementation. The idea is that ultimately uptake and receptiveness should increase if practitioners are partners in the process.”



They're not just asking to use the agencies as a living laboratory, but they're giving back, too."

For tenure-track academics, concerns over the extensive timeline for designing a community-based participatory research study and then collecting and analyzing the data can pose a significant disincentive. Perhaps worse for a junior faculty member early on the tenure track, publishing the results can take far longer than with laboratory-based studies. Wethington and Pillemer credit generous funding and solid staff support for their successes thus far.

"The senior investigators of CITRA are committed to supporting junior investigators and helping them publish," Wethington says. "We sponsor monthly work-in-progress meetings to assist with papers and grant proposals to continue the work they start through CITRA. We offer assistance at every step of the proposal and publication process. Thus far, we have been successful mentoring junior investigators."

Farther Reach

To lower the specific hurdles of community-based participatory research facing academics, CITRA also supports a dynamic infrastructure to ease researchers through the community-based participatory research process, providing grants for pilot studies, mentorship of younger researchers, and methodological and technical assistance. This summer, Pillemer partnered with faculty in Cornell's School of Industrial and Labor Relations and nursing home operators and union leaders in metro New York to study how electronic medical information technology affects resident care and to investigate its influence on resident outcomes, including pain and medication use.

This fall, psychologist Anthony Ong, an assistant professor of human development in the college, launched a study of the relationship between chronic pain and emotional well-being in collaboration with Pillemer, Wethington, and Reid, supported by CITRA funding. (See the accompanying article on Ong's research.)

"At the broadest level, we are interested in the good that may come from very difficult experiences," Ong says. "What are the conditions and individual characteristics that differentiate those who grow and deepen their experience of social connectedness and positive emotions during times of challenge and adversity from those who do not? In short, we believe that positive human health is about engagement in living, of which pain and struggle are inevitable parts."

Such studies simply wouldn't be possible if Ithaca-based researchers had to rely on the smaller, local population of aging people and services, Wethington says. "Number one, you can't get the racial diversity," says the medical

>>>



Anthony Ong tries to find what's right with people.

Doctor Positive Will See You Now

BY ROGER SEGELKEN

Sometimes when Anthony Ong, a new faculty member in the Department of Human Development, is traveling, strangers will ask what he does for a living.

"I'm a psychologist," he replies.

"So maybe you can tell what's wrong with me?" strangers typically ask.

Even if the assistant professor of human development (and a faculty affiliate in the Bronfenbrenner Life Course Center and the Cornell Institute for Translational Research on Aging) were a clinical psychologist or a psychiatrist (which he is not), he wouldn't even venture a guess. Ong, who is embarking on a new set of experiments—to learn how emotional states of mind influence physical and

mental well-being—is more interested in what's right with people.

Adapting to Stress

Why, Ong wonders, do some people facing terrible stresses—excruciating pain from cancer, for instance—keep looking to the sunny side of life? And why do others flinch at the approach of yet another unbearable stressor, wallow in self-pity, and accept a dreadful fate?

It may have something to do with the complex interplay between our positive and negative emotions. "Our ability to feel contradictory emotions such as happiness and grief, as well as anger and gratitude may reveal a deeper truth about ourselves—our human capacity

for resilience in the face of life's adversities," Ong suggests.

Ong offers new insights into how positive and negative emotions can influence health and illness and demonstrates the wide applicability of this perspective in various domains across the lifespan. His research has appeared in journals such as *Child Development*, *Journal of Adolescence*, *Journal of Personality and Social Psychology*, *Journal of Gerontology: Psychological Sciences*, and *Psychology and Aging*.

Cheerful and in his 30s, Ong says he got into this line of work "to learn how to age gracefully." He asks his experimental participants to keep diaries: some diarists in his studies >>>

sociologist, “and number two, we need large numbers of participants for many studies, more than we could recruit in Tompkins County alone. The CITRA research network in New York City offers investigators a critical resource.”

Beyond easing the work of Ithaca-based researchers, the 265-agency CITRA network provides researchers from any institution access to a community of seniors and caregivers interested in contributing to—and benefiting from—primary social sciences and medical research. Already, CITRA researchers have investigated social support and depression; extreme social isolation, self-neglect, and health outcomes; family relationships as sources of support and stress; practitioner-patient communication to promote improved health; measurements of social integration and isolation; and social integration and isolation in minority populations.

Weill Cornell geriatrician Arun Rao has used CITRA funding and support to partner with the United Hindu Cultural Council’s Senior Center and its executive director, Chan Jamoona, to understand the role of faith and practice on end-of-life preferences and plans among older Hindus in Queens, N.Y. The Center for Home Care Policy and Research, the research arm of the Visiting Nurse Service of New York, has partnered with CITRA to explore techniques for pain management in geriatric populations receiving home care and strategies for increasing the completion of advanced care directives in ethnic minority populations.

Experimental Rigor, Competing Needs

Despite the vast potential of community-based participatory research, critics have raised concerns about experimental rigor



Weill Cornell Medical College

at the University of Notre Dame have been chronicling their emotional states for 10 years and are now 55 years old. Entries in their diaries are not random musings; rather, participants are asked to respond to standard questions at the same time each day. One self-assessment to gauge social connectedness asks diarists about the accuracy of a statement like: “I know that I can trust my friends, and they know they can trust me.”

The Healthy Side of Normal

Diarists experiencing negative emotions might report their feelings with words such as afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, or upset. In contrast, daily positive emotions are characterized by adjectives such as active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, or strong.

People who report feeling distressed and determined in the

same day—or guilty and proud—aren’t nuts, Ong emphasizes. They’re probably on the healthy side of normal because they have achieved what some psychologists call a state of mindfulness. They have the ability to be aware of their present surroundings and emotions in a nonjudgmental fashion, Ong explains. “Mindful individuals can reconcile and even embrace contradictory emotions in all of their complexity.”

Ong believes that people in a healthy state of mindfulness—recognizing that life is a bowl of cherries but that pits can break your teeth—can willfully choose to focus on their positive emotions. And maybe even expedite their healing. Or at least ease their pain.

“It’s not an easy thing to do,” Ong admits. “People living with chronic stressors, such as pain, never know when it will hit. It’s one of the toughest kind of stresses around and one of life’s great challenges, which is why we’re interested in people’s

emotional states at times like that.” Although human beings often feel they must put their needs for happiness aside when they are coping with stress, Ong believes the ability to move forward and sustain a life with quality may depend on doing just the opposite. “It may be in the context of significant life challenges that our true capacity to experience joy, love, and gratitude is most dramatically manifested,” Ong argues.

Be Well, Get Better

Working with Dr. Cary Reid, the internationally renowned expert in pain management and geriatric palliative care at Weill Cornell Medical College, Ong is asking volunteers to document what’s on their mind. He’s looking for some very special people who can meet painful adversity with resiliency, positive emotion, and even humor. He hopes, ultimately, to discover the biological mechanisms that underlie

and the competing needs and values of academics and community groups. “It’s viewed by many as ‘light’ science and there’s justness in that criticism,” Reid says. “It’s still a young kind of research endeavor and therefore in need of additional evaluation in terms of its real value. There are ways to increase its rigor and that’s what I think makes it interesting.”

CITRA researchers spent close to a year tackling the issue of experimental rigor with current members of the agency network, helping community organizations understand why researchers insist on randomized, controlled study designs.

“We’ve done a lot of education with our community partners about why having a control group is critical to

“As a physician, I approach a problem in a certain way,” says Reid, Weill Cornell’s Silbermann Family Clinical Scholar in Geriatric Palliative Care and a CITRA researcher. “To be able to collaborate with highly trained social scientists allows me to ask more interesting questions and obtain more interesting answers.”

success of a program, why certain things they think are extremely helpful aren’t necessarily supported by scientific evidence,” Pillemer says. “We have a lot of open dialogue about that. We stick to our guns—we’re there to share the scientific evidence base and do things that are scientifically credible, as well as in line with their interests.”

Pillemer and Wethington—with CITRA co-directors Dr. Mark Lachs, co-chief of the Division of Geriatrics and Gerontology at Weill Cornell and director of Cornell’s Center for Aging Research and Clinical Care; and Martha Bruce, associate research professor of sociology in psychiatry at the Westchester Division—have set their sights on detailing the extent and limits of community-based participatory research’s methodological value and eliminating the hurdles that can put off some researchers.

“These translational centers are about identifying the barriers and piloting ways to get across them,” Wethington says, “documenting how we did it, so others can follow.” ● ● ●

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some brave souls’ capacity to thrive, flourish, be well, and get better—and how emotions can influence biological processes.

Next door to his Martha Van Rensselaer Hall office, Ong’s graduate research assistants are preparing state-of-mind questions for other, elderly volunteers who do not suffer chronic pain or physical stress—but who are in for a surprise or two. Ong and his research assistants are beginning data collection on a series of laboratory studies with older adults, which is being funded by the National Institute of Aging. Being asked, unexpectedly, to do something that most people find stressful—such as giving a speech with little preparation—can raise the blood pressure and heart rate and boost indicators of anxiety, such as cortisol in saliva. They also might feel a little distressed and jittery.

Into this context of stress, Ong and his assistants will try to induce a state of positive affect—perhaps by showing a funny movie clip or by giving participants an unexpected,

noncontingent gift (e.g., a bag of candies)—and measure their emotional and physiological responses. (Are their heart rate, blood pressure, and cortisol returning to normal? Are they feeling excited in a good way?) Older adults who are induced to feel positive affect should overcome stresses more effectively, Ong expects, and he’s eager to see if he is right.

His Ithaca experiments are designed in consultation with Alice M. Isen, professor of psychology in Cornell’s Johnson Graduate School of Management and College of Arts and Sciences who conducted some of the pioneering experiments in positive affect and its beneficial effects. “One of the reasons I came to Cornell was the exciting opportunity to work with and learn from the cadre of notable experts in the field of adult development and aging and the field of positive psychology,” Ong says. “I think the cross-fertilization of ideas between these two disciplines represents one of the promising directions for future scientific research.”

“Not Bad” Is Not Enough

Ong hopes to move the definition of geriatric health and well-being beyond the neutral—not feeling bad—to a mindful mix of positive and not-so-positive emotional states. Elderly patients, he says, won’t get past neutral by demanding: “Doc, just get rid of what’s wrong with me!” He hopes his studies will improve the understanding of what is right with some people—the ones who persevere with the power of positive emotions and take an affirmative role in their healing.

Perhaps the next time he is traveling, Professor Ong can advise querying strangers: “Figure out what you do that makes you feel great . . . and do more of it.” ● ● ●

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A chair that undulates, a mouse that vibrates, a monitor that moves: Alan Hedge, international authority on office ergonomics, takes a serious look at the newfangled workstations designed to prevent repetitive motion injuries.

Ergonomic Expert Keeps Pace with Computer Challenges

BY METTA WINTER

A

Alan Hedge gets requests from companies all the time. Common among them are ones like this: “What kind of chair can I buy for my people that costs about \$300?”

Such a question represents a false economy, the foolhardiness of which Hedge, a professor of design and environmental analysis who is an international authority on the behavioral science of ergonomics, inveighs against. He backs up his stance with three decades of scientific inquiry.

“The difference between a not very good chair and a really good chair is about another \$300,” Hedge explains. “Compared to a single injury—one carpal tunnel syndrome case can cost upward of \$100,000—that investment is trivial.”

Since the inception of the computer revolution, Hedge has applied the same rigor to designing and conducting experiments with people as he would were he observing any living species. His goals are twofold: to define what are the healthiest and most productive conditions for people to live and work in; and to use what is known about the human body, and its capabilities, to design the most effective equipment and work environments.

“When I first started out, my colleagues, who were focusing on the dangers of working in mining, oil drilling, and agriculture, couldn’t understand what I would find interesting about the comparatively comfortable environment of the office,” recalls Hedge, who trained first as a zoologist and then >>>

“I point out to companies that they wouldn’t expect everybody to wear the same uniform, to wear the same shoes, or to drive the same car. So why would they expect them to sit in the same chair behind the same desk?” says Hedge.

as a psychologist specializing in ergonomics.

Turns out he was prescient when it came to the dramatic shift in the types of compensatory injuries to come. A paper Hedge published in 1982 was among the first references in the literature of a demonstrable connection between computer use, gender, and adverse health effects.

“Today,” he points out, “as fewer people in the developed countries work in heavy industry, one-third to one-half of all compensatory injuries are repetitive motion injuries associated with office-type work.”

“Everything we do can be summed up in the phrase: good ergonomics is great economics,” Hedge says. “More than 90 percent of a company’s costs are people costs, so making small investments in improving the workplace—like very good chairs—pays huge dividends.”

The same trend holds true for back injuries, which account for one-third of all workplace injuries. A decade ago most of these were associated with heavy lifting. Today most jobs requiring heavy lifting have been eliminated but the incidence of back problems has not plummeted, as one would expect, because now more and more people are sitting for longer periods of time and none are getting younger.

The younger and younger onset of computer use makes the current rate of compensatory damage claims the canary in the coal mine. There is typically a 10- to 15-year latency before injuries start to develop, Hedge has found. In the early 1990s he gathered data from a well-known national information provider that showed the average age of workers reporting carpal tunnel syndrome was late 30s to early 40s. When he contacted the company again last year, the age of onset had dropped to an average age of 25.

“Now kids are using computers at age two, so by the time they enter the workforce they’ll already be primed for injuries,” Hedge says. “This is very serious because an injury can become life changing; carpal tunnel, for example, is not curable. They’ll have to manage this chronic condition for the rest of their lives.”

Hedge is seeing signs that vulner-

ability to unsafe computer use is beginning to show up even earlier. In an informal survey he made of Cornell undergraduates, one-third reported having problems. In response, Hedge posted CUergoPods—audio and video podcasts on his CUergo web site—to instruct students on how to use laptop and desktop computers safely. The web site (<http://ergo.human.cornell.edu>) presents information from research studies and class work by students and faculty in the Cornell Human Factors and Ergonomics Research Group (CHFERN). CHFERN focuses on ways to enhance usability by improving the

ergonomic design of hardware, software, and workplaces.

Hedge came to the College of Human Ecology 20 years ago from Aston University in Birmingham, England, where he’d spent the previous decade conducting studies and publishing the results—among them a groundbreaking 1983 paper in which he was one of the first scientists to show an association between the workplace environment (including the equipment) and productivity and health.

What sets CHFERN apart from other ergonomics research groups around the world (more research is being conducted in this field abroad than here in the U.S.) are the methods Hedge uses and his focus on design concepts rather than products.

Vibrating Mouse

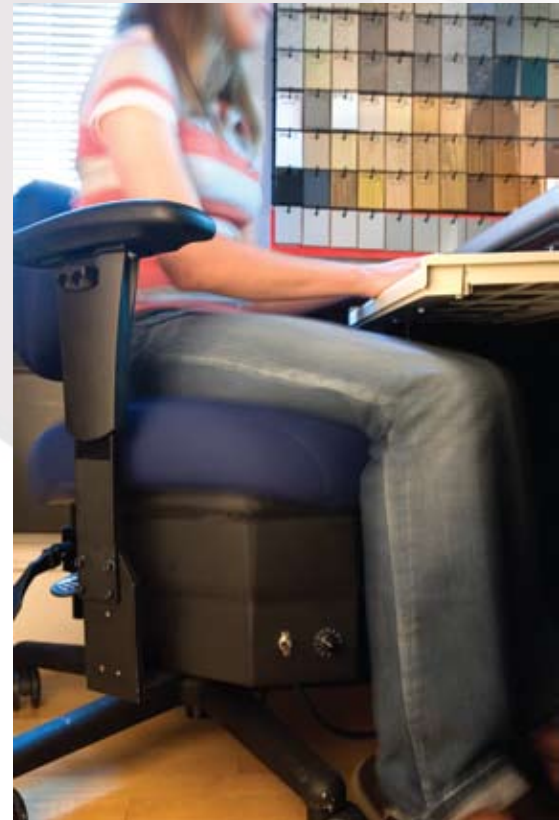
Hedge and his graduate student Christopher Moe recently studied a vibrating mouse, manufactured in the Netherlands by Hoverstop B.V. It wasn’t the mouse, per se, that intrigued them but rather the potential benefit of a device to halt the rise in upper extremity musculoskeletal disorders being seen now in computer users.

“If you keep a muscle in tension over time—as we’ve seen when people grip the mouse and hold onto it even when

not using it for cursor control—you’re going to increase the likelihood you’ll injure the structures associated with those muscles,” Hedge explains. “The idea here is that the vibration will signal the person to take their hand off and there will be a benefit to that.”

What they found, however, is that while subjects did remove their hands more often than with a conventional mouse, few placed it in a position (resting in the lap, for example) that would actually relieve muscle strain. (Moving the hand to the keyboard, as many did, didn’t help either.) The most unexpected finding, however, was the marked increase in unsupported hand hovering. When signaled by the vibration, subjects let go and held their hand just above the mouse.

“This position is potentially more detrimental to users’ health because of a potential increase in static muscle activity required to hover the hand,” Hedge notes in the discussion section of the paper.



To reduce static load on intervertebral discs from prolonged sitting, the seat of this prototype chair makes a continuous wavelike motion; Hedge’s research shows that the rotary dynamic seat shows promise.

What sets the Cornell Human Factors and Ergonomics Research Group apart from ergonomics research groups around the world are the methods Hedge uses and his focus on design concepts rather than products.

Because Hedge's goal is to improve the well-being and productivity of workers, his studies go beyond, say, merely counting the number of times a subject removes their hand or measuring the muscle activity in the superficial flexors and finding a "5 percent change."

"That's the way a lot of research papers are written and you read them and you go, 'And that means?' We get a complete picture of what people actually do, which is often not captured in conventional ergonomics research. And we look for the consequences to comfort and productivity," he says.

Hedge notes that in the world of engineering design, the assumption is made that if something is built, people will know the right way to use it. But his career's worth of work has shown that education is needed for people to use tools properly.

"You can't just pull the mouse out of the box and assume that because something vibrates, people will know what to do with their hands," he says.

This study, published under the title, "Effects of a Vibrating Mouse on Computer Users' Work Behaviors and Performance," was presented at the Human Factors and Ergonomics Society 51st Annual Meeting held in Baltimore in October 2007.

Undulating Chairs

Two other studies were presented at the October conference: one, a study on a prototype of a new chair design called, "Effects of a Dynamic Seat Pan on Torso Movement, Back Comfort, and Task Performance"; and the other, a field study titled, "Effects of a Flat Panel Monitor Arm on Comfort, Posture, and Preference in an Architectural Practice."

The study involving the chair addresses the same risk factor as the study on the vibrating mouse—static load on muscles. In this case, the load is on the intervertebral discs due to

prolonged sitting. Other researchers had previously noted that workers often have difficulty remembering to shift their posture while working, let alone to get up and walk around now and then. Hedge and his graduate student Erin Lawler asked: What if the seat of the chair moved, which would automatically cause a person's body to make small continuous adjustments using different muscle groups? The intended end result would be movement without having to think to do it.

Hedge's subjects sat on a chair in which the seat made a continuous sinusoidal (wavelike) movement at a rate they could adjust. Would this interrupt concentration or make the person feel motion sick or otherwise uncomfortable? Most important, would it alleviate back pain for people whose pain increases when they are seated?

The findings regarding each of these specific questions were mixed, but overall Hedge concluded that the movable seat was a concept with promise, particularly for individuals with back problems. He ends the paper by stating: "Long-term research is warranted to understand the true physiological effects of using a rotary dynamic seat."

This kind of recommendation for further research on a novel idea can have a huge impact commercially in terms of design and products, as was the case with Hedge's seminal work on keyboard trays when he studied innovative approaches for computer input. These ranged from voice control to vertical keyboards and a chair that incorporated a split keyboard into its arms.

Movable Arms for Monitors

The third study—on monitor arms, a popular commercially available product—also produced unanticipated findings. In this case, a change in social behavior and in workplace design occurred. The field study was conducted in an architectural practice in Manhattan. The question Hedge and his graduate student Katie Boothroyd asked was: How would suspending a flat panel computer monitor on a movable arm affect people's comfort, posture, and preference?

The test subjects unanimously liked the monitor arm because it allowed them to optimally position their LCD screen.

In addition, suspending the monitor freed up prime real estate on the desktop, allowing documents to be placed in front of the body rather than on the side.

"So we saw fewer complaints about neck problems and fewer complaints overall about the workstation because people had more space," Hedge says. Usable space on the desktop has implications, too, for a more space-efficient workstation design in which desks could be more shallow.

The big surprise came when Hedge observed the way that the screen's mobility eased working in groups. Frequently architects need to show drawings to groups of their colleagues; with the monitor on the desktop, people had to crowd around, hunch over, and squint at the screen. With the arm, people could sit in a circle, and the screen could be moved in front of one person, then the next. The same held true for accounts staff who could turn their screen around to show figures to a person sitting across their desk.

"This simple change has many potential benefits associated with it," Hedge concludes.

These studies are designed with control groups and all the other protocols that produce reliable findings. Hedge wants companies to have sensible policies for ergonomics in the workplace and for Cornell to be the resource they trust for giving them impartial information.

"Everything we do can be summed up in the phrase: good ergonomics is great economics," Hedge says. "More than 90 percent of a company's costs are people costs, so making small investments in improving the workplace—like very good chairs—pays huge dividends." ● ● ●

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Human Ecology researchers have determined that exposure to ads for smoking-cessation products encourages smokers to quit—even if they don't buy the products. Now, the experts are looking at the policy implications.

Advertisements, Public Policy, and Public Health

BY CAROLE STONE

Do advertisements for nicotine patches, chewing gums, inhalants, and other smoking-cessation products make people want to quit?

“We were able to show that when people see advertisements for products to help them stop smoking, they are more likely to try to quit, and to quit successfully,” says Professor Alan Mathios of the Department of Policy Analysis and Management. Mathios is co-principal investigator of a study of nicotine-related advertising, “Private Profits and Public Health: Does Advertising of Smoking-Cessation Products Encourage Smokers to Quit?” And surprisingly, many of those people who quit do not even purchase the advertised products. “We think there may be important ‘spillover effects’ from advertising,” says Mathios, who has also served as interim dean of the College of Human Ecology since July.

“The spillover effect is that people see the ads and think, ‘I ought to quit smoking, and I can do it even without a pharmaceutical aid,’” explains Donald Kenkel, an economist who is one of four researchers in the Department of Policy Analysis and Management who collaborated on this study. The others are Rosemary Avery and Dean Lillard. “The advertisement encourages a person to quit smoking, and that is a societal benefit,” Kenkel adds.

The research was published in the *Journal of Political Economy* this August, and it was featured that month on National Public Radio, among other media. It won best conference paper at the 2007 American Marketing Association’s Public Policy and Marketing Conference in Washington, D.C., in May. >>>





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Figuring Out the Role of Advertisements

Kenkel points out that the research addresses a longstanding controversy about what ads do. “Some people think that ads only divide up a market into shares. When McDonald’s and Burger King, for example, advertise against one another, maybe it’s only the market share that’s important to them—how many people they can attract to their restaurant and not to their competitor’s,” he says. “On the other hand, maybe these ad campaigns instead increase the total number of people who patronize fast-food restaurants.” Figuring out which effect dominates is tricky, and it probably varies from market to market, Kenkel surmises.

“We found that advertising can expand the size of a market—by increasing the number of people who are trying to quit smoking,” Kenkel says.

To establish a chain of logic to deduce causality, the social scientists behind the study examined people’s smoking habits, the magazines they read, and the number of ads in those magazines.

“The key variable we created is the number of ads people were exposed to because of the magazines they read,” Mathios says. “By knowing who has been exposed to advertising, we are confident that we are close to getting to the causal impact of

advertising.” The researchers treat the variation in exposure like a natural experiment on the impact of advertising. “It’s very interesting that, for example, *Time* and *Newsweek*, two popular newsweekly magazines, have different numbers of ads for cessation products. So you can compare the quit rates of people who read *Time* to those who read *Newsweek*.”

“We could have surveyed people and asked them, ‘Do you smoke?’ ‘Have you ever used nicotine gum?’ ‘Do you remember seeing ads for the product?’ ‘Do

you recollect seeing those ads and thinking that you should stop smoking?’ That’s not what we did,” Kenkel notes.

“People’s memories are often distorted, and we wanted to rely on something more objective.”

The team calculated that if the smoking-cessation product industry increased its average annual spending on magazine

advertising by about \$2.6 million or 10 percent, the average smoker would see 2.1 more ads each year; according to the researchers’ calculations, this would translate to about 80,000 additional quits each year.

The study, initially funded by the National Institutes of Health’s National Cancer Institute, was designed to document tobacco advertising and smoking-cessation ads in magazines, and the impact of exposure to those ads on individuals’

decisions to smoke or to quit. Pharmaceutical advertising was also documented when Merck Co. Foundation became a sponsor. Additional funding was provided by the Robert Wood Johnson Foundation.

Nicotine Replacements Were Rx at First

The first nicotine-replacement product—

nicotine-laced chewing gum—was approved by the U.S. Food and Drug Administration (FDA) as a prescription drug in 1984. SmithKline Beecham later marketed the gum, which it called “Nicorette.”

The nicotine patch was developed in the early 1980s and approved by the FDA as a prescription product in 1991. A Johnson & Johnson subsidiary marketed it as “Nicotrol,” and SmithKline Beecham sold it as “Nicoderm.”

In 1996, the FDA did away with the prescription requirement for the gum and the patch and approved their direct sale to consumers “over the counter.” With this change in status came a change in advertising requirements.

OTC Status Affects Amount of Ads

In a related study, the Human Ecology research team also found that the change in a product’s status—from prescription-only (Rx) to over-the-counter (OTC)—has a significant impact on the advertising of the product and the subsequent flow of information to readers. This study was published in the *Journal of Regulatory Economics*.

Rx-only products require a fine-print disclosure that includes all counter-indications and possible adverse effects, similar to the disclosure and warnings listed in the *Physicians Desk Reference*. Once a product is approved for OTC sales, the extensive fine-print counter-indications are no longer required. As a result, manufacturers save a significant amount of money, and they tend to reinvest that money in a different kind of more appealing advertising, the authors note.

“We demonstrated that there were more advertisements after these drugs were given over-the-counter status, and that means a stronger flow of images to consumers,” Avery says.

Mathios adds, “What’s exciting about this research is the empirical demonstration that when tobacco-cessation products went from being available by prescription only to over the counter, manufacturers bought more advertising space and, therefore, there were more advertising messages in the media.

“Taken together with our evidence that the ads help people quit, this suggests that when the U.S. Food and Drug Administration regulates a product, such as a nicotine-replacement product, as prescription-only, it may actually have



hindered reaching the goal of a smoke-free America,” he says.

The team’s study of the advertising of nicotine products chronicles 20 years of magazine advertisements and correlates this to market research on habits such as smoking.

A Bizarre Regulatory World

“It is ironic that when smoking-cessation products were categorized as prescription drugs, it was easier to advertise cigarettes than it was to advertise these products,” Kenkel points out.

“Until the FDA weighs the advantage of these pharmaceuticals versus the harm of cigarettes, we will continue to live in a bizarre regulatory world,” says Kenkel, whose expertise is in health economics and public sector economics. Most of his research is on the economics of disease prevention and health promotion and cost-benefit analysis of public policies, especially policies that affect health.

Mathios, who worked at the Federal Trade Commission, where he served as a senior staff economist in the Division of Economic Policy Analysis for six years comments, “The FDA only asks, ‘Is a particular product safe and is it effective?’ They don’t ask, ‘What will people do if this product is safe but inaccessible?’ We hesitate to tell them how to regulate products, because we are not medical doctors. But we think they need to consider these questions in a larger context.”

Health Advantages vs. Medical Risks

The group’s research findings may have implications for the way the FDA reviews products in general.

Some smoking-cessation products are psychotropic: Zyban, for example, was originally developed as the antidepressant Wellbutrin, the trade name for the drug bupropion. When researchers noted that some of those taking the drug quit or reduced their smoking, Glaxo Wellcome began clinically testing it as an aid for smoking cessation. The FDA approved Zyban as a smoking-cessation aid in May 1997, by Rx-only because it is also an antidepressant drug.

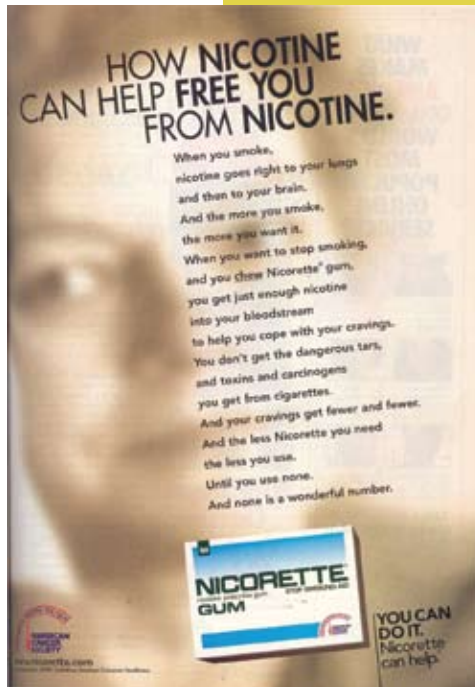
In 2006 the FDA approved Chantix, a nicotinic acetylcholine receptor agonist marketed by Pfizer. The product stops nicotine addiction in the brain—and is a different form of medicine from a nicotine delivery device by gum, patch, inhaler, or spray. (The nicotine inhaler and nicotine spray are FDA approved, but by Rx only.)

While product regulation usually is considered a medical and public health issue—and to a great extent it is—there are also economic issues that impact public health, the authors say. And if your objective is to see people quit smoking, then heavily regulating smoking-cessation products while only lightly regulating cigarettes does not make sense.

They suggest, for example, that like smoking-cessation product ads, ads for Statin drugs, which reduce cholesterol levels, may have important ‘spillover’ benefits. Direct-to-consumer advertising often leads a patient to visit a doctor to discuss an advertised product. But instead of writing a prescription for a Statin drug to lower cholesterol, if the

Project Archives Magazine Ads— Turns to TV Next

For the past six years, the researchers and their student assistants have been examining 20 years of advertising, from 1985 to 2005, in 27 of the most-read American magazines. In the process, they created the Smoking-Cessation Advertisements (SCADS) archive.



Professor Rosemary Avery trained undergraduates, who in turn trained other undergraduates, to be research assistants. At any one time there were between nine and 21 students at work on the project.

All the print advertisements for smoking-cessation products, tobacco products, and smoking-related Public Service Advertisements that appeared in those 20 years were included in the archive. Working in a lab in Martha Van Rensselaer Hall on the Cornell campus, student teams made more than 86,000 digital images of advertisements from magazines. The SCADS archive occupies 1 terabyte (one trillion bytes) of computer memory.

Matthew Eisenberg '09, who manages teams of undergraduate researchers, says, “I found myself thinking about this project all the time, and I’ve learned two main skills: how to deal with vast amounts of data while paying attention to minute details and how to manage people.”

With print ads complete, the researchers have turned to examining and archiving television ads.

“Last summer, I spent 40 hours a week for three straight weeks watching Public Service Announcements about smoking,” Eisenberg says. “They’re full of horrible images, like people speaking in a raspy voice and smoking through a hole in their throat. I watched ads like that back-to-back. I don’t know what they’ll mean to other people, but I can tell you one thing: they certainly had an effect on me!”

doctor follows medical practice guidelines, he or she will recommend changes in diet and exercise first to promote good health, the authors argue.

“Our modest take-away message is that the FDA ought to regulate products on a case-by-case basis,” Kenkel says. “They ought to think harder about their decisions and how these affect the advertising of new products. There are costs and benefits of advertising, and in the case of smoking-cessation products and some other pharmaceuticals, the benefits of advertising are very high.” ● ● ●

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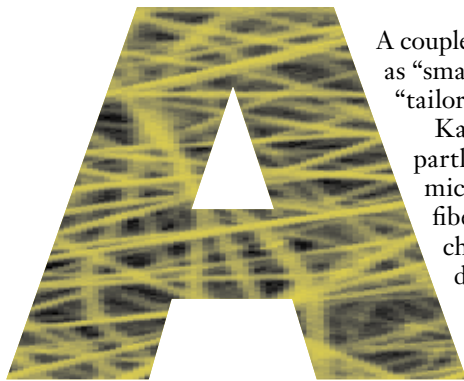
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Fiber scientists are engineering clothing to protect farmworkers, first responders, and military personnel. They are even producing nanofibers that can detect and degrade indoor pollutants to safeguard us all.

Electrospinning Form with Function

BY CLARE ULRICH



A couple of decades ago, if someone complimented your clothing as “smart,” you’d be considered fashionable. Today, “smart” and “tailored” take on entirely different meanings.

Kay Obendorf, professor of fiber science & apparel design, is partly responsible for these semantic changes. She uses electron microscopy and spectroscopy to analyze the surface chemistry of fibers she’s engineering into clothing that offers protection against chemical and biological hazards. Some of the fibers are tailored to detect specific environmental hazards, and some may be smart enough to decontaminate themselves.

Protecting Agricultural Workers

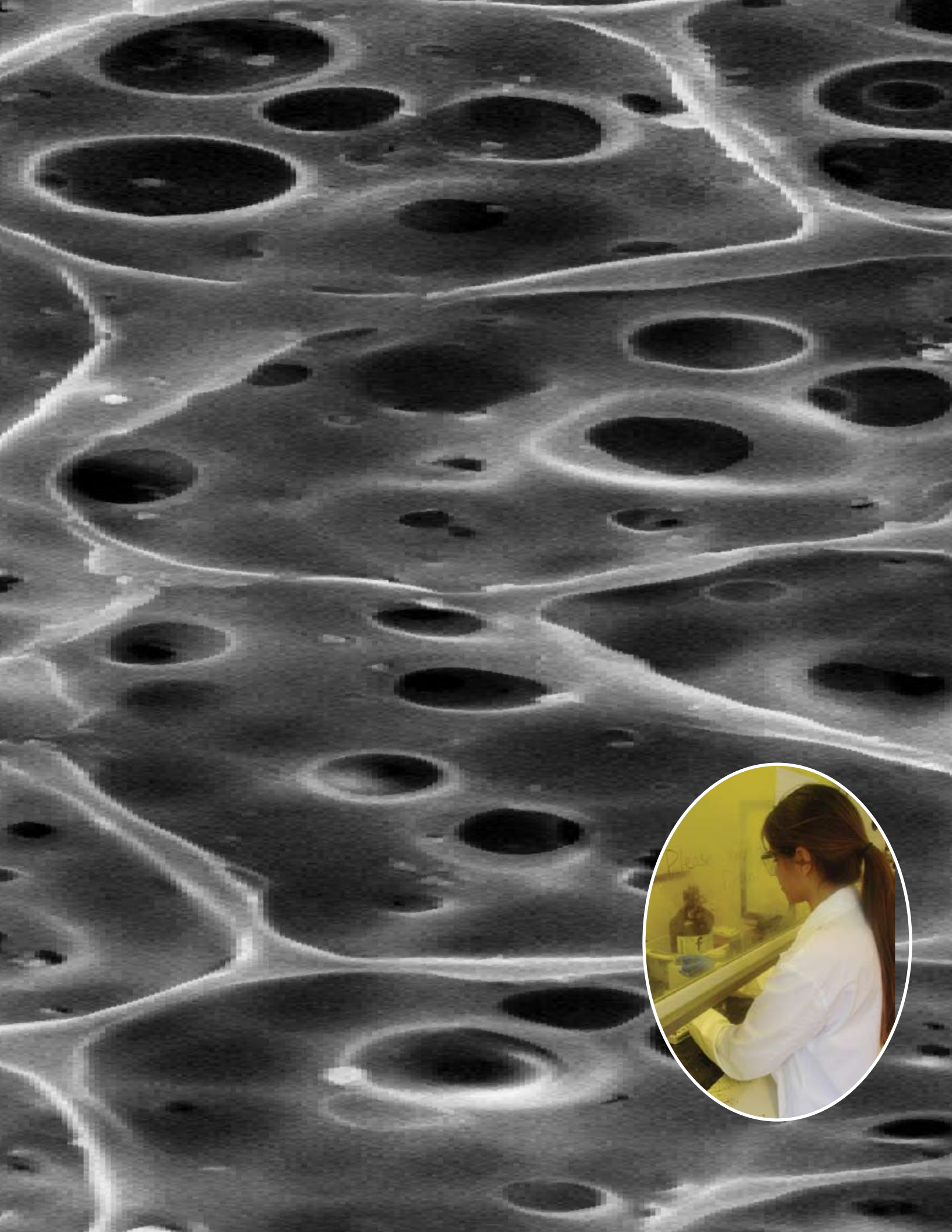
Obendorf’s interest in protective clothing coincided with her concern about pesticide exposure among agricultural workers, who number about 1.3 billion worldwide, including 3.3 million people in the United States. Agriculture is ranked as one of the three most hazardous industries in both developing and industrialized countries. According to the Pan American Health Organization, a regional office of the World Health Organization, an estimated 3 percent of exposed agricultural workers suffer from an episode of acute pesticide poisoning every year. That could mean as many as 39 million people. When it doesn’t kill, pesticide poisoning can produce irreversible tissue damage; chronic respiratory, gastrointestinal, allergic, and neurological symptoms; damage to the immune system; reproductive disorders; cancer; and much more—all of which are preventable.

“More than 900 pesticides were actively registered with the U.S. Environmental Protection Agency in 2005,” says Obendorf.

“These are sold in the form of 19,350 products or formulations.”

In addition to the challenges presented by that variety of hazardous chemicals, Obendorf and her research team face particular obstacles in designing protective clothing for agricultural workers who work outdoors, often in hot, humid conditions. They need comfortable clothing that offers breathability. What this means in terms of fabric construction, Obendorf explains, is that the structure of the fabric needs to have open spaces, or pores, to facilitate air flow. But those same spaces let contaminants penetrate through the fabric. >>>

Polyurethane membrane surface; inset: Anna Molina working in Professor Frey’s lab

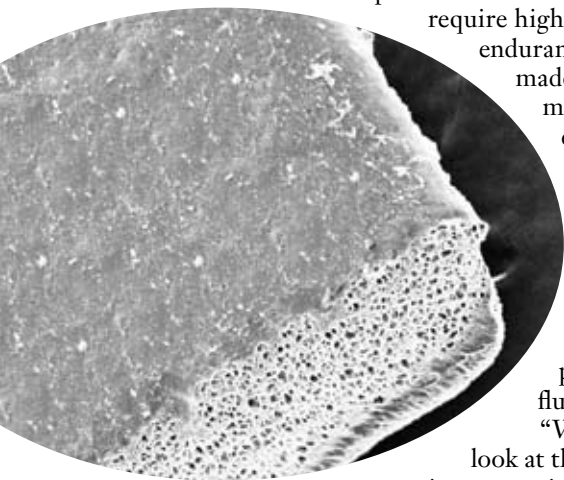


“One of the first things we did was try to find inexpensive ways that agriculture workers could increase protection,” Obendorf says. “That starts with the selection of the textile. Here you get into factors like the weight of the fabric, the closeness of the weave, and how the textile absorbs the pesticide. Then we looked at how the pesticide on the contaminated textile gets transferred to the skin and how much of it actually goes through the skin.”

Obendorf found a promising avenue of investigation in the microporous (small pore size between 0.01 to 1.5 micrometers in diameter) quality of nonwovens, textiles that are made from webs of fibers rather than a weave.

Safeguarding First Responders, Military

Clothing made of monolithic materials is currently being used to protect emergency responders or military personnel, who are at high risk of exposure to extremely hazardous gases and chemicals, but these nonporous materials offer no breathability. To achieve comfort, these materials are often used in a suit that combines a respirator, an air system, and a cooling vest. For first responders and military personnel who risk exposure to less-toxic materials and who require higher agility and



Cross-section of membrane-like web of extremely fine fibers

endurance, protective clothing made of microporous membranes can be considered. With this goal in mind, Obendorf’s team launched an exploration of a family of microporous membranes made of polymers other than fluorocarbon.

“We took another hard look at the features that would give a material both comfort and protection,” Obendorf recounts. “It really comes back to pore size. Pore sizes smaller than can be attained by conventional nonwoven and woven textiles are necessary to provide the level of chemical and biological protection required for first responders, medical

personnel, and chemical workers. Polymer films with micropores or fibrous webs made with nanofibers can provide the desired range of pore sizes. So we decided to try our hand at electrospinning.”

Electrospinning is an effective technique for producing fibers with tiny diameters, says Obendorf. She describes the end product of electrospinning as “an ultrathin membrane-like web of extremely fine fibers with very small pore size.”

The technique has a lot to offer, including the simplicity of making fibers with a small apparatus that sits on a table in a lab and doesn’t require an elaborate manufacturing process. Unlike conventional fiber-forming methods that rely on mechanical forces, electrospinning uses electrical forces. When high voltage is applied to a droplet of a polymer, a thin jet of the liquid polymer is pulled with it toward a grounded target. The resulting fibers, nanometers in diameter and continuous in length, can be collected into a metal plate. The tiny diameter of the fibers gives them a high surface area, low volume, and high porosity that enable them to capture more

contaminants. A study Obendorf conducted with former graduate student Seungsin Lee found that when one gram per square meter of electrospun fibers was added to a nonwoven fabric, pesticide penetration of the fabric decreased significantly.

One new avenue of research Obendorf mentions is spraying electrospun fibers directly onto three-dimensional forms so that the thickness of the fiber web could be varied at different locations on a garment, offering zones of protection where needed. Layering electrospun nonwovens has proved successful at achieving a level of air permeability and water vapor transmission comparable to typical, woven, work clothing.

In addition to controlling the physical structures of the materials, scientists can engineer the surface chemistry of a fabric. Recently, Obendorf’s lab successfully grafted a hydrophilic material on a hydrophobic membrane to create a novel microporous polyurethane membrane with tiny pores that open and close in response to moisture stimuli. These hold great promise for protecting medical workers from bloodborne pathogens such as hepatitis B, hepatitis C, and HIV. They have also found that when one of the N-halamine family of disinfectants is added to electrospun nylon membranes, the modified fibers exhibit significant antimicrobial properties. The same N-halamines will also decompose some classes of pesticides.

“If you can decompose the pesticide when it hits the textile, then you will increase protection,” Obendorf says. “One of the biggest issues in doing this is to make sure you are not making things that are equally or more toxic. And, with nanoscale fibers, cleaning them for reuse is a challenge.”

Purifying Indoor Air

Most people don’t know that the U.S. Environmental Protection Agency (EPA) ranks indoor air pollution among the top five environmental risks to public health. EPA studies show that the levels of many airborne pollutants may actually be two to five times, and as much as 100 times, higher indoors than outdoors, and that 80 to 90 percent of human exposure to pesticides occurs indoors. Also, the U.S. Occupational Safety and Health Administration estimates that approximately one out of three Americans working in nonindustrial buildings such as offices, schools, and hospitals are exposed to poor indoor air quality in their workplaces—excluding the influence of tobacco smoke.

For more than 15 years, the College of Human Ecology’s Department of Fiber Science & Apparel Design (formerly called Textiles and Apparel) has collaborated with the Department of Design and Environmental Analysis to study how indoor air quality can be adversely affected by an array of contaminants, including volatile organic compounds (VOCs) emitted by common household cleaning products, paints, and pesticides. A recent study of 41 households in central New York State conducted by Obendorf and Ann Lemley, of Fiber Science & Apparel Design, and Alan Hedge, of Design and Environmental Analysis, showed that carpeting, curtains, and other fabrics used in built environments collect and hold indoor air contaminants, and available filtration systems are not effective in controlling them.

Although this is not good news, it has led fiber scientists in the college to consider putting the adsorbent properties of textiles to use in purifying, rather than polluting, the air. Postdoc Dionysios Vynias, a fiber scientist from the University of Manchester, United Kingdom, has been working closely

with Margaret Frey, the Lois and Mel Tukman Assistant Professor of Fiber Science & Apparel Design, and two student interns on developing and testing nanofibers that can be embedded into conventional textiles and used as highly sensitive filters. Incorporated into wall coverings, upholstery, draperies, canopies, or office partitions, these filters would fit unobtrusively into a variety of indoor settings.

“When you go to an office or you’re on an airplane, you are usually exposed to a number of VOCs such as toluene or chloroform,” explains Vynias. “Air pollution caused by industries and exhaust from cars sicken many people living in cities. Our purpose is to improve people’s lives and to make sure that all employees work in a safe environment.”

Vynias has been investigating electrospinning as a method for creating passive air-purifying textiles. In addition to high surface area, low volume, and high porosity, electrospun fibers also appear to retain an electrical charge from the electrospinning process that enables them to attract particles from the air via electrostatic attraction.

Additional functionality can be added to the electrospun fibers by incorporating active ingredients into the spinning solution. For example, Frey’s team found that adding biotin (vitamin B7) to electrospun fibers enabled the fibers to absorb proteins, antibodies, and biohazardous compounds at more than five times the efficiency of plain woven fabrics. Obendorf and Lee report that adding electrospun fibers to a nonwoven fabric significantly decreased pesticide penetration of the fabric. Textiles have also been developed that can neutralize and even detoxify contaminants. Recent research in the field has also produced fabrics that can recharge their biocidal properties as well as decontaminate themselves.

Capturing and Degrading VOCs

Last summer, Shirron LeShure, a spring 2007 graduate from Tuskegee University, and Anna Molina, a junior from the University of Puerto Rico, received grants through Cornell’s Center for Materials Research to assist Vynias.

“I was responsible for electrospinning submicron nanoscale fibers using cellulose acetate as a polymer, decorating the fibers with silver nanoparticles or nanoscale metal oxides, and seeing whether these would act as catalysts in capturing and degrading VOCs,” explains LeShure. “We would then incorporate the fibers into a filter to enhance its ability to capture and degrade harmful fumes or bacteria in the air.”

Once the fibers were spun, Molina helped test them in a real-time measurement system Vynias designed and built to observe how particular fibers were altered by exposure to various VOCs. The data gave the team a good idea of what worked and which modifications they needed to make.

“After we expose the fibers to the VOCs in real time, we extract whatever is in the fiber and analyze it through gas chromatography-mass spectrometry to quantitate the VOCs that were captured,” Molina explains. “I also used Fourier Transform Infrared spectroscopy to identify chemicals on the surface of the fiber. Then I would modify the surface of the fibers to see which parameters affect the way the fibers capture the VOCs.” The team has recently embedded colorimetric sensors into the nanofibers that enable them to change colors in the presence of a particular contaminant as a visual alert.

Vynias points out that not only are he and his team trying to capture airborne toxins, they are also trying to decompose and convert them to nontoxic substances like carbon dioxide and water. He has experimented with N-halamines, as Obendorf has done, and he has had success irradiating certain

chemicals and metal oxides with ultraviolet light during the electrospinning process. All the experiments take place under very controlled conditions, and he admits there’s still much to do before anything can be commercialized.

But LeShure is hopeful for future applications: “Having fibers all around you in curtains and seating and clothing that would take these essentially horrible molecules and particles out of the air and degrade them would keep people from spreading germs and disease. And, if you can do this without using any more energy than you put into it or without expelling exhaust or harmful chemicals into the atmosphere, then that’s monumental.” ● ● ●

Fiber Science Then and Now

Scientists in the College of Human Ecology have long contributed to the design and use of new materials to meet human needs. Research on textile performance blossomed after World War II, when polymer science was applied to the creation of new fibers, fabrics, and finishes. Faculty members such as Evelyn Stout (on the Human Ecology faculty 1953–1973) broke new ground testing the flammability of children’s sleepwear; her findings prompted investigations of those fabrics and product labeling. Susan Watkins (1967–1999) studied protective clothing as a portable environment for athletes, firefighters, and coal miners; her students were among the first to design functional clothing for astronauts. Innovative disposable clothing designed by apparel designer Elsie Frost McMurray (1942–1972) has protected many a child engaged in messy nursery school activities.

Fast forward to last May when Olivia Ong ’07 showcased a dress she designed that was treated with electrostatically charged nanoparticles to prevent colds and flu and a jacket that can destroy noxious gases. Although current manufacturing costs would run about \$10,000 per square yard of this nanotreated cotton, human need may eventually make even this exotic-sounding product affordable.

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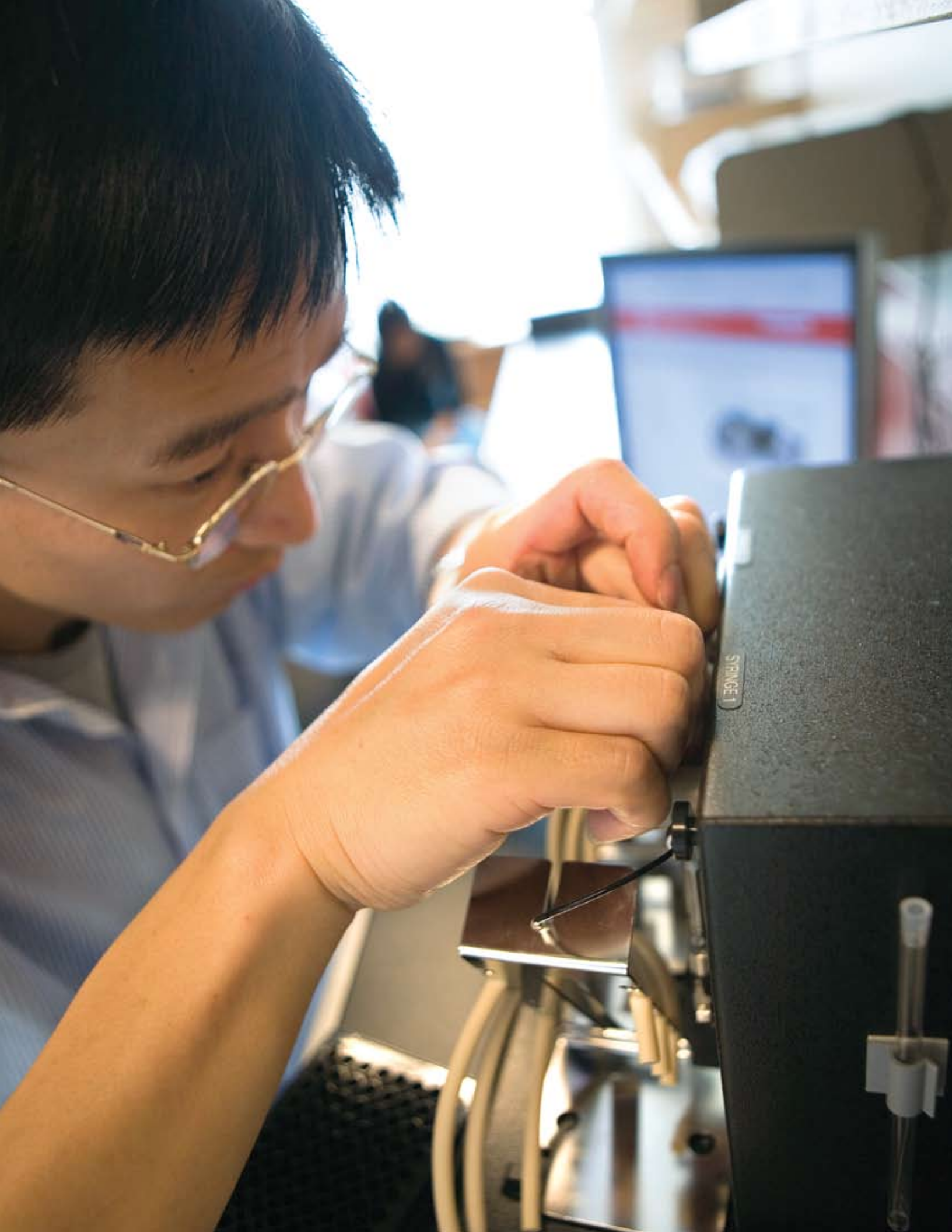
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CLARE ULRICH

Olivia Ong '07 with two garments treated with metallic nanoparticles



Ling Qi Wants to Break the Link between Obesity and Type II Diabetes

BY METTA WINTER

Obesity and type II diabetes are inextricably linked. Biochemist and geneticist Ling Qi would like to break that connection. Finding just the right gene could do it.

In Qi's post-doctoral research at the Salk Institute for Biological Studies in La Jolla, Cal., he used techniques with mice including gene knock-out (removing a single gene from the genome) and transgenics (adding a new gene) to study obesity and diabetes. In his research, some of the mice became obese on a Western-diet regimen while others did not. In other cases, some developed diabetes after gaining weight on a Western diet while others did not. The question is: why?

Qi, who joined Human Ecology's faculty in the Division of Nutritional Sciences this past summer, is trying to find the answer. In his own laboratory, he is looking at two aspects that could potentially have great impact on obesity and diabetes: endoplasmic-reticulum (ER) stress response and the inflammation status of fat tissues.

Diabetes occurs when there is a malfunction of certain molecules in the signaling pathway, an event Qi finds fascinating.

"In the case of ER stress response, there's a DNA-binding protein that drives gene expression in cells; it's a key element for cells to respond to environmental cues—in this case to glucose changes," he explains.

Little is known about this protein, so Qi and the members of his lab (two post-doctoral fellows and a technician, who is a recent Cornell undergraduate) are seeking to learn more.

The studies in inflammation status prove promising, because it is now recognized that fat is a lot more than a storage depot for energy; it is an active organ that secretes hormones, many of which affect obesity and insulin sensitivity. In the *Science* paper he published in 2006 and a manuscript he recently submitted, Qi describes how he demonstrated that altering fat cell function changes obesity and insulin sensitivity.

"Fat tissue has become the center of the metabolic control. If you change the fat mass, you will likely see the changes in insulin sensitivity of the whole system," Qi says.

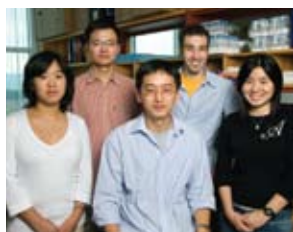
When fat cells become bigger, immune cells infiltrate into the fat tissues. Qi wants to know what the functions of these macrophages are and what signals the recruitment of these macrophages.

Such studies are so fundamental that they could one day reveal the origins of obesity and diabetes.

"Ling is an outstanding scientist whose work has already appeared in *Science* and *Nature*—top journals for basic science," says Patrick Stover, director of the Division of Nutritional Sciences. "At the same time, he relates well to people out in the community trying to address the problem of childhood and adult obesity in New York State. There are few scientists who are both experts in their discipline and have a broad appreciation for the public health significance of their work."

For his part, Qi is pleased and excited to have joined the faculty of the Division of Nutritional Sciences. He had five offers and chose the division because, he says, "of the warmth of the place" and the breadth and strength of expertise found here covering every aspect of nutrition.

"It is crucial to understand the mechanism underlying the etiology of obesity and diabetes to develop well-targeted, efficient pharmacological interventions," Qi explains. "Working on genetic control of obesity and diabetes is very challenging but quite rewarding and pretty cool. This division has a lot to offer, and I feel so honored to become a part of it." ● ● ●



At left: Ling Qi adjusts the Biotek Synergy 2 plate reader in his lab. Above, top to bottom: Qi is surrounded by his lab members (left to right) Hui Chen, Haibo Sha, Josh Fenn, and Anna Zenno; test tubes hold reagents; and samples of DNA and RNA.

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What's

Designing Space for Dementia Patients and Visitors to Enhance Communication

Even if the remains of breakfast are still visible at assisted-living facilities when visitors come to call, questions like “So what are they feeding you here?” can frustrate residents who struggle with dementia and short-term memory loss.

Those painfully awkward moments—as well-meaning visitors try to stimulate conversation but get a blank stare in return—might be eased by two faculty members in Design and Environmental Analysis, Franklin Becker and Paul Eshelman, who are developing a new family visit program using a combination of design and digital images intended to make family visits more rewarding for both family members and Alzheimer’s residents.

By creating a more private “conversation corner” in which residents can sit with their family members and view and discuss large, high-quality digital images of significant personal meaning for the resident but with less visual and auditory intrusions than typically occur in residential commons areas, Becker and Eshelman are hoping to make it easier to stimulate memories of people, places, and events that become a basis for comfortable conversation.

With family members’ voluntary consent, residents and their family members will participate in family visits using the specially designed conversation corner. Family members will be asked to help select meaningful images. These will be digitized by the researchers and then used during the visit to stimulate conversation. Prior to the visit, the researchers will discuss with family members ways they might use the digital images to trigger memories and conversation most effectively.

The research will measure several possible outcomes of the overall family visit program. These include the extent to which family members found the visit rewarding, the length of the visit, and the amount of conversation and nonverbal behaviors such as smiling, nodding, etc. from the Alzheimer’s resident. The researchers will also explore how the process of selecting images, in itself, affected family members; and whether and how they use the images themselves at home or outside of the structured

research visits. Finally, staff members will be asked to report on whether the Alzheimer’s resident’s behavior or communication showed any changes following the “conversational corner” visit.

Noting that the study will take place at Longview in Ithaca, Becker and Eshelman explain, “By creating a program that combines the design of a conversational space that is intimate, quiet, and private with a structured use of personally meaningful images from the resident’s past life, we hope to create a space where the residents no longer need to rely on their short-term memories, nor where family members struggle to find something to talk about that will engage their parent or spouse.” Visitations, they hope, can become more frequent, longer, and more emotionally satisfying for all parties.

ROGER SEGELKEN



New

Health Care Reform



Richard Burkhauser

There is a national movement building at the state level for health care reform. Many proposals contain elements that would require employers to provide health insurance to workers or pay a fine that would compensate the state for medical costs paid for the uninsured. Such “pay or play” proposals were introduced in 28 states during 2006; 19 states considered similar legislation in 2005. None of these proposals has successfully weathered the legislative and judicial process, except for a Massachusetts

bill, which contains a “pay or play” component that will go into effect this year.

Questions remain, however, about the economic consequences of these “pay or play” proposals. In September, Richard Burkhauser and Kosali Simon, both members of the Human Ecology faculty in the Department of Policy Analysis and Management, helped to coordinate and lead a half-day symposium in conjunction with the Employment Policies Institute in Washington, D.C.

“Healthcare Reform: The Economics of ‘Pay or Play’ Employer Mandates” included a distinguished group of economists and policy analysts for a public policy discussion of the intended and unintended consequences of these mandates, including:

Katherine Baicker, Harvard University
Jonathan Gruber, MIT
Helen Levy, University of Michigan
Jared Bernstein, Economic Policy Institute
Linda Blumberg, The Urban Institute
Elise Gould, Economic Policy Institute
Mark Pauly, University of Pennsylvania



Kosali Simon

The symposium was well attended by policy makers, legislative staff, researchers, media, opinion leaders, and association professionals. A video of the proceedings can be viewed online at www.epionline.org/hc_symposium.cfm.

Department Is Now Fiber Science & Apparel Design

The Department of Textiles and Apparel is now the Department of Fiber Science & Apparel Design.

“Our new name is a more accurate reflection of what we do: outstanding instruction, research, and outreach in fiber science and apparel design,” says Ann Lemley, chair of the department.

The Department of Fiber Science & Apparel Design is the only one of its kind in the Ivy League and offers the only Ph.D. in apparel design in the United States; it also offers a Ph.D. in fiber science.

“Aesthetic, functional, historical, cultural, and social/economic considerations all inform our apparel design research, which is unique in its focus on design, including the development of innovative, cutting-edge technologies for use in the apparel industry and the exploration of fashion as a phenomenon affecting social- and self-identity,” says Lemley. “The study of the physical, chemical, biological, and engineering properties of new fibrous materials underpins our research in fiber science; the development and applications of these materials are at the frontier of fiber science.”

In addition, the department’s outreach to industry, consumers, and youth “has an immediate impact on human health and the environment and a lasting impact on the materials, manufacturing, and management models used in the global marketplace,” Lemley says.



Student scholarship recipients set up for the Second Barbara L. Kuhlman, Inc. Fiber Arts and Wearable Art Exhibition in the East Wing Gallery in Martha Van Rensselaer Hall this past September. Heber Sanchez '09 puts finishing touches on his pleated golden silk lamé gown, inspired by pleating maverick Issey Miyake and couturier Roberto Cappucci, and intended to look like a steel structure that is “both minimal and elaborate and contrived and organic.” It took three months of research and 85 hours to construct the dress.

Human ECOLOGY

NOTE:

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of two issues of
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During World War I, the price of milk went up—from 2 cents a quart to 3 cents, as a result of the rapid rise in costs for feed and labor. Many lower-income families were giving their children tea and coffee instead of milk. In 1918 a national Milk and Dairy Farm Exposition was organized, with Cornell president Jacob Gould Schurman serving as chairman of the organizing committee. Flora Rose and Martha Van Rensselaer, the co-directors of the Department of Home Economics at Cornell, were instrumental in getting the faculty and staff to assist with efforts to publicize the value of milk for children. In the photos here, a milk bar was stationed at the ball grounds in Rochester during “Milk Week.” Babe Ruth drank milk and held a small boy while he had some milk, too.

Courtesy of the Division of Rare and Manuscript Collections, Cornell University Library