

Medical (In) Equality

Scientists
Work to Level
the Field for
Medical Care

From Shanghai to Kinshasa, humans have most of the same DNA. But in the matter of longevity and well-being, nurture—including such personal choices as the foods we eat and the amount of exercise we get—often trumps nature. Disparities researchers seek to untangle the relative power of social and environmental factors, including race, education, and income, from the influence of shared genetic predispositions, such as the APOE Alzheimer’s gene more common among African-Americans or the tendency toward Tay-Sachs disease among Ashkenazi Jews, to identify interventions that can boost longevity for all Americans.

From their vantage in Northern Manhattan, P&S investigators have a unique opportunity to identify and explain health disparities and develop interventions to boost the well-being of the people who call the medical center area home—especially the working-class Hispanic immigrants of Washington Heights, the denizens of Harlem’s vibrant African-American community, and the Caucasian residents of Northern Manhattan.

Perhaps the most ambitious of those projects, the multiethnic Washington Heights, Hamilton Heights, Inwood, Columbia Aging Project—WHICAP—is led by Richard Mayeux, MD, the Sergievsky Professor of Neurology, Psychiatry, and Epidemiology. Con-

tinuously funded by the NIH since 1989, WHICAP has enrolled more than 5,900 participants and collected some 40,000 biological samples, 1,300 MRI and 200 PET scans, and longitudinal data on cognitive performance, emotional health, independence in daily activities, blood pres-

sure, anthropometric measures, and cardiovascular status. On Aug. 1, the National Institute on Aging awarded another \$8.8 million to Dr. Mayeux and his collaborators to continue their work in the community.

Designed to investigate dementias related to stroke, Parkinson’s disease, and Alzheimer’s disease, WHICAP quantifies the rates of late onset Alzheimer’s disease, mild cognitive impairment, and age-related cognitive decline among the three major ethnic groups in the community. WHICAP investigators have authored scores of papers that untangle the relationships among age, sex, race and ethnicity, and clinical risk factors to guide prevention, clinical care, and future research. Their findings include the discovery—after controlling for an array of correlated factors—that African-American and Caribbean-American elders are at greater risk for Alzheimer’s and identification of a new gene associated with late-onset Alzheimer’s.

“Disparities research is intended to generate new knowledge that will help us improve health through prevention and treatment. Investigations of ethnic populations that have migrated across several cultures offer the opportunity to study groups for which genetic factors essentially remain the same but environmental and cultural forces undergo dramatic change,” says Dr. Mayeux. “At the same time, comparing groups residing in the same environment with similar socio-economic status and equal exposure to risk factors helps us uncover genetic factors responsible for all kinds of health conditions.”

Being located in Washington Heights, Dr. Mayeux says, has given researchers an extraordinary opportunity to contribute to new knowledge about the health of Hispanics of Caribbean descent. “Our local community is the most ethnically diverse in New York, home to the largest population of individuals from the Dominican Republic outside of the Dominican Republic, and we have long been dedicated to not only treating this population, but also partnering with them to understand how to improve the health of the community.”

The following pages profile four researchers who are studying disparities in diabetes, obesity, cardiovascular disease, and Alzheimer’s and other neurodegenerative diseases.



Richard Mayeux, MD

By Sharon Tregaskis | Photographs by Jörg Meyer



Implementation Science

Nathalie Moise

An African-American woman in her 60s who was hospitalized frequently for heart failure struggled to follow what doctors had prescribed to control her cardiovascular disease and depressive symptoms— aspirin, prescription medication, exercise, and diet changes—and she had limited social support. For her doctor, Nathalie Moise, MD, then a research fellow in Columbia’s Division of General Medicine while earning a master’s degree in public health at Columbia, the patient’s case crystallized a plan she had been thinking about for more than a decade: Identify barriers and scale implementation of

A model for depression treatment would have a care manager collaborate with the patient’s physician and a psychiatrist.

evidence-based guidelines in minority patient groups.

“In college, I was struck by how evidence-based guidelines are poorly disseminated in minority communities,” says Dr. Moise, whose first foray into research was as an undergraduate at Princeton University, where she designed and implemented a randomized, controlled trial to compare the effectiveness of four behavioral change

theories to boost breast cancer screening among African-American women. More than a decade later, Dr. Moise is assistant professor of medicine in Columbia’s Center for Behavioral Cardiovascular Health. She acknowledges that health care professionals still struggle to provide optimal care for minority patients. “While there were clear, evidence-based strategies for treating my patient’s disease,” she says, “it was difficult to implement them in real-world settings.”

African-American and Hispanic individuals, who are at greater risk for both depression and cardiovascular disease, need clarity about the relationships among gender, socioeconomic status, race, depression, and cardiovascular disease. “The barriers to implementing cardiovascular disease guidelines in my own clinic revolve around my patients’ mental illnesses, inadequate psychosocial resources, and uncertainty about their adherence,” says Dr. Moise, who sees patients at Columbia’s Associates in Internal Medicine Clinic and CoSMO, the free, student-run clinic for uninsured residents of Washington Heights. For someone struggling with depression and other chronic diseases, implementing a regimen of diet change and exercise—plus the daily handful of pills to control both conditions—can be especially challenging. From the vantage point of the treating physician, uneven adherence complicates the process of tailoring treatment over time.



Dr. Moise has conducted computer simulation analyses to assess how medication costs, adherence, and race influence the cost-effectiveness of hypertension guidelines, published recently in *Hypertension* and the *American Journal of Hypertension*. Last fall, Dr. Moise was awarded funds from the Columbia Provost’s Grants Program for Junior Faculty Who Contribute to the Diversity Goals of the University to conduct interviews of predominantly minority and Spanish-speaking patients with depression to better understand the barriers to care that they encounter. The insights Dr. Moise gains will inform a subsequent study to assess the effectiveness of an electronic, shared decision-making tool to engage minority patients in their own treatment. As the site primary investigator

for a multicenter grant from the National Heart, Lung, and Blood Institute, Dr. Moise is investigating the American Heart Association guideline that recommends depression screening in patients following stroke and heart attack. As a policy scholar with the New York State Office of Mental Health she is investigating a model for depression treatment in which a care manager collaborates with the patient’s physician and a psychiatrist; the model has been especially effective among minority populations but difficult to implement with patients and doctors. “To truly impact health disparities,” she says, “systems-level interventions in real-world settings will be just as integral as tailored, patient-level approaches. Involving minority patients as stakeholders in creating interventions is also key.”

A Clear Picture

José Luchsinger

Last fall, the National Institute on Aging awarded José Luchsinger, MD, associate professor of medicine, two five-year grants: \$3,238,671 to investigate diabetes status and brain amyloid in middle-aged Hispanics from Northern Manhattan and \$5,294,619 to pursue interdisciplinary research to understand the relationship among diabetes, cerebrovascular disease, and Alzheimer's disease.

He focuses on study participants of Hispanic origins, most of whom

are recruited from the Washington Heights neighborhood, because they are at higher risk for type 2 diabetes and dementia. His hypothesis is that diabetes can cause both Alzheimer's disease and stroke and that the memory impairment common among people with type 2 diabetes is actually the earliest symptom of that pathogenic process. Dr. Luchsinger and his collaborators hope to reveal the biochemical process underway and identify therapeutic targets or biomarkers to enhance

clinical care. "There are a lot of studies showing that the presence of diabetes is related to various forms of cognitive impairment, particularly Alzheimer's," says Dr. Luchsinger, who also has investigated the benefits of exercise and a Mediterranean diet to slow cognitive decline among different racial

"I'm looking at a group in their early 60s. That's the best time to see what's happening in the brain, instead of waiting until they already have dementia."

and ethnic groups. "Diabetes is also a very well known cause of vascular disease, which in the brain translates to strokes.

"In the clinic, doctors see memory impairment that worsens over time and diagnose Alzheimer's without really knowing for sure if the symptoms are caused by the presence of amyloid plaques and neurofibrillary tangles containing abnormal tau," he adds. The only definitive diagnosis of the disease, however, depends on autopsy. Emerging imaging techniques could allow the team to definitively reveal how diabetes corresponds to amyloid deposition and tau formation. "I'm very excited, because our imaging is going to be unique. Even if we find that diabetes has nothing to do with the amyloid, that will be very informative."

In addition to brain imaging, the team, which includes Adam Brickman, PhD, associate professor of neuropsychology in neurology, and Herman Moreno, MD, of SUNY Downstate Medical Center, also will use mouse models and clinical data from 200 Hispanic study participants to explore the hypothesis. "Traditionally, studies looking at this question have looked at older people, 70 or 75," says Dr. Luchsinger. "I'm looking at a group in their early 60s. This is important because we hope we're collecting our first observations before they actually manifest the dementia, or when they're just beginning to have a deficit. That's the best time to see what's happening in the brain, instead of waiting until they already have dementia."

By examining a broad range of data, the team hopes to elucidate some of the mechanisms explaining the contributions of diabetes, cerebrovascular disease, and Alzheimer's disease to dementia, which disproportionately affects minorities in Northern Manhattan. "Societies are getting older," says Dr. Luchsinger, "and there's some controversy as to whether AD rates are stable, getting worse, or getting better. Regardless, because we're living much longer and the older population is getting larger, we're absolutely going to have more numbers of people with dementia, which affects spouses, families, and children, and this problem is worse for minorities, who tend to have fewer resources to cope."



Giving Kids a Chance

Jennifer Woo Baidal

Jennifer Woo Baidal, MD, was a college freshman working as a teacher's assistant on the affluent West Side of Los Angeles when she came across a youngster distressed that his mother had forgotten his snack. Just then, a woman came dashing across the playground. "Here you are," she called, "I packed your favorite—bell peppers."

For Dr. Woo Baidal, raised in the lower-income, predominantly

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minority neighborhoods of LA's East Side, the difference from her own childhood was stark. "These kids knew the names of fruits and vegetables and they ate so much more healthfully," says Dr. Woo Baidal, assistant professor of pediatrics and director of pediatric weight management for the Division of Pediatric Gastroenterology, Hepatology, and Nutrition. "On the East Side, kids were eating highly processed foods for lunch—chicken nuggets, French fries—and ketchup was considered a vegetable."

National rates of obesity seem to have plateaued but remain historically high, and rates of overweight and obesity among

minorities show no signs of falling. In Washington Heights and Inwood, where Dr. Woo Baidal investigates strategies to promote healthy weight, 47 percent of children are overweight or obese. "At the root of obesity disparities are a lot of social determinants of health like socio-economic status and other inequities," she says. "I'm looking at the outcome and thinking about how we best leverage our health care system, institute better practices to really help patients who need it the most."

In a series of papers published earlier this year—co-authored with her mentor at Harvard, where she earned her MD and a master's of public health—Dr. Woo Baidal and her colleagues explore "the first 1,000 days," from conception through 24 months, a period that seems critical to modifying childhood obesity risk. The team recruited 49 low-income Hispanic women at a federal community health clinic and engaged them in a series of focus group conversations—in Spanish—between pregnancies through their children's second birthdays. To boost retention rates, the team provided stipends for travel and child care associated with the meetings and hired a bilingual facilitator. "It's always a consideration who's on the research staff," says Dr. Woo Baidal, "finding people from diverse backgrounds to connect with research participants."

With funding from Columbia's KL2 Career Development

program, the New York Obesity Nutrition Research Center, and the National Institute on Minority Health and Health Disparities, Dr. Woo Baidal currently serves as principal investigator on a suite of studies intent on developing non-invasive techniques to diagnose nonalcoholic fatty liver disease, which afflicts 40 percent to 70 percent of overweight and obese children and can lead to cirrhosis and even liver failure. The disease, which disproportionately affects Hispanic children, is not well

enough understood for scientists to explain why some who are merely overweight develop the disease while some obese individuals do not, says Dr. Woo Baidal. "If we can reduce the burden of obesity and fatty liver early in life, we can have a positive effect on everything that comes later by having a healthier workforce, reducing health care costs, and giving children from all backgrounds the chance to start out on the same foot," she says. "It's a social justice issue."



School Daze

Jennifer Manly

To quantify memory loss over time, investigators must be able to measure and compare individual function. Yet in a study with a diverse sample, participants' vocabulary, analytical skills, and spatial skills vary broadly—often directly reflecting their life experiences. And those experiences often reflect a person's race, culture, gender, and socio-economic status. So how is a disparities researcher intent on untangling the influence of nature and nurture to make sense of the data? "If cultural differences get in the way of a person's performance so much that we're not measuring anything to do with memory," says neuropsychologist Jennifer Manly, PhD, "the study's results will be misleading."

Dr. Manly has made it her mission to impose scientific rigor on data collection and analysis associated with cognitive assessments of African-American and Hispanic elders in studies of aging-related disparities in multiethnic populations. "Most of us who see diverse older adults are seeing a lot of different educational experiences and language competencies," says the associate professor of neuropsychology. "There's always a role of background and experience in terms of what you bring to cognitive testing."

In addition to collecting quantitative data on years of schooling and other demographic details from study participants, Dr. Manly chooses tests likely to reveal details

about cognitive function most relevant to the study hypothesis. The majority of older Hispanics recruited by P&S investigators in Washington Heights, for example, grew up in rural communities in the Dominican Republic. Many African-American elders living in the Northeast attended segregated schools in the South. "The things we think about are, 'Has this person held a pencil before? Have they drawn or copied something before? Does this person know the rules of scanning a multiple-choice array? Do they value—as the people do who developed this test—speed over accuracy? Have they ever seen this visual representation? How familiar are they with two-dimen-

"More time in the classroom as a kid and a lower student-teacher ratio translates into better cognitive function 70 years later."

sional line drawings to represent three-dimensional visual stimuli?"

In the past year, Dr. Manly has co-authored papers that explore the effect of the Mediterranean diet on brain structure and function, the relationship between type 2 diabetes and cognitive change, and the association of late-life depression with cognitive function and brain volume. In August 2015, *Journals of Gerontology*



published her work with a team of investigators from across the United States that concluded that quality of education appears to be more important than cerebrovascular risk factors in explaining differences in memory and executive function between white and African-American older adults. "More time in the classroom as a kid and a lower student-teacher ratio translates into better cognitive function 70 years later," says Dr. Manly, noting that Southern schools attended by African-American children a generation ago were open for fewer days each year because of lack of funding

and because kids were expected to work in the fields. "In general, the amount of money spent on the school system relates to better cognitive function for people who attended those schools."

A series of studies underway collects data on middle-aged study participants to reveal factors that may provide protection against disparities early in life. "This is a life-course process," says Dr. Manly. "We find links between cognitive impairment late in life and early childhood experiences, but a lot of things happen between those two points that could confer resilience or vulnerability." ❖