Asthma’s Inner World
Researchers follow the disease’s roots not to the lungs, but to the gut.
Mother, Child, PCBs

Expectant mothers often experience equal parts joy and anxiety as they count down the months to baby’s arrival. The concern: Are they doing everything possible during pregnancy to ensure the long-term health of their child?

A researcher and an expectant mom in 2003, Tatiana Prowell volunteered for a study on pregnant women, and relished the opportunity to see her baby developing so much that she signed up twice more, during two subsequent pregnancies.

She continues to stay involved through follow-up questionnaires about her three children’s development and personalities. “Those are the things I’m going to be most interested in long term,” she says. “The relationship between something I did or didn’t do, or something that happened or didn’t happen during my pregnancy, and will that affect my kids’ outcomes long term? It’s so fascinating.”

Those studies were among an ongoing series that Janet DiPietro, PhD, associate dean for Research at the Bloomberg School, and her team have been carrying out since 1991. She was then one of the first researchers to simultaneously measure both maternal and fetal indicators like heart rate and motor activity. Interested in documenting normal development before birth, DiPietro has measured the same core indicators on 11 cohorts of 950 total mother-fetus pairs, and continues to follow the development of the resulting children. That data set—unique in the field—allows DiPietro’s team to explore the real-time interactions between the “intrauterine milieu” and the fetuses’ activities, and track later development against that early information.

In a February 2013 article in the *Journal of Exposure Science and Environmental Epidemiology*, DiPietro unearthed some fascinating (and worrisome) findings about chemicals like PCBs and DDT, which have been banned for more than 30 years but do not break down easily. They therefore can accumulate in fat in our bodies mainly through pesticide residues in food. The study shows a link between pregnant women’s higher levels of these organochlorines and more frequent and vigorous movements in the fetuses they carry. At the same time, the accompanying heart rate acceleration typically indicating the baby is doing well is not always present.

What that increased activity means is hard to say. No one knows how much fetal movement is optimum, and there is wide variation between fetuses. So movement is viewed more as part of a developing temperament. While one study has suggested a link with attention deficit hyperactivity disorder, DiPietro cautions that too little informa-
tion is available to make this leap. However, since motor activity and heart rate offer insight into a fetus’s development, the findings are concerning,” she says.

“All I can say from the study is that motor activity is affected,” DiPietro says. “And since spontaneous motor activity is generated by the brain, that means the nervous system and brain are affected by exposures. What the implications are after birth is really unknown.”

She adds: “I think it might indicate that it alters the trajectory of development for that child.”

In DiPietro’s research space in the Johns Hopkins Hospital, the standard protocol begins with a brief ultrasound, but instead of focusing on anatomy, the team looks for fetal behaviors—sucking, for example—as well as measuring amniotic fluid and fetal heart rate. Meanwhile, the mom’s heart rate and skin conductance (an indicator of emotionality) are also evaluated.

In the recent pilot study, DiPietro’s team found organochlorines in all 50 Baltimore-area women participating. There were slightly higher levels among women of higher socioeconomic status. That the levels were associated with fetal movement and heart rate does not indicate the need for any specific medical intervention, DiPietro says, but does suggest a public health application of her body of work on normative fetal behavior.

“My feeling is the fetus is the canary in the coal mine, and if something is altering fetal behavior, the chances it’s doing so by affecting the nervous system are pretty high, and we should pay attention,” DiPietro says.

DiPietro’s research is widely noted for the way it frames the important questions in developmental and health research, and for providing quantitative insight into the fetal environment and which components affect developmental trajectories, says William Fifer, PhD, professor of Psychiatry and Pediatrics at Columbia University and associate director of the Sackler Institute of Developmental Psychobiology.

This study, he adds, provides a crucial window into the developing brain. “These results are going to help us focus our investigative lenses in important new directions … to help tease apart exactly how exposure is affecting brain behavior development,” Fifer says.

For DiPietro, the next step is a larger version of the same study, which will allow her team to examine different mixtures of contaminants and explore the interactions between them.

—Rachel Wallach

Globally, more than three million newborns die each year, many succumbing in the first week of life to bacterial infections such as sepsis, pneumonia and meningitis.

In high-income countries, maternal screening and early diagnosis have been highly effective in reducing neonatal infection deaths. However, in many developing countries little is understood about infection risk factors and methods of transmission.

Fetuses whose mothers have higher levels of PCBs, DDT and other organochlorines have more frequent and vigorous movements. Exposure to such chemicals might alter “the trajectory of the child’s development.”

Sommer Scholar alumna Grace Chan, MD, PhD ’13, MPH ’06, and colleagues have filled in some gaps. According to the study, published in PLOS Medicine in August, newborns of infected mothers were six times more likely to acquire an infection compared to infants whose mothers were infection-free. Infants born to mothers with bacterial colonization (in the reproductive tract) were nine times more likely to become infected.

Investigators from the Bloomberg School and Brigham and Women’s Hospital analyzed 83 studies published between 1960 and March 2013 on maternal infection and neonatal infection, only seven of which were from areas with high neonatal mortality.

Researchers point to the need for further studies in developing countries to determine whether interventions that target high-risk pregnant women—those with infections and colonization—can reduce neonatal infection rates.

“Often, by the time a newborn is identified as sick, it’s too late to treat them,” says Chan, a former associate in International Health now at Harvard. “We need better diagnostics that are fast, cheap and highly sensitive, and we need to reach these newborns sooner.”

—Jackie Powder
Two Takes on Lyme

Almost 40 years after Lyme disease emerged, scientists are still unraveling the mysteries of Borrelia burgdorferi, the tick-borne bacterium that causes the illness. The pathogen, which is tricky to cultivate in laboratory settings, uses a huge array of defenses to protect itself against the human immune system.

A fuller blueprint of B. burgdorferi might bring some relief to the roughly 25,000 Americans who are diagnosed with Lyme disease each year. (The disease is also a global problem, with a particularly high incidence in Eastern Europe.) When left unchecked, the infection can cause joint inflammation, cardiomyopathy and facial paralysis. Now two Bloomberg School scientists believe they have found important new avenues for understanding the disease, and in May they each received grants from the Lyme Research Alliance to support their work.

Ying Zhang, MD, PhD, a professor of Molecular Microbiology and Immunology, has a hunch that pyrazinamide—a drug that has been used for more than 60 years to treat tuberculosis—might have some effect against Lyme disease. “It’s a very curious drug, but an amazing drug,” Zhang says. “Most antibiotics work only against bacteria that are growing, but pyrazinamide works against ‘persister’ tuberculosis bacteria that are in a dormant, non-growing state.”

That’s an uncontroversial statement when applied to tuberculosis—but Lyme disease is a different story. The very idea that B. burgdorferi might have a “persister” form is hotly debated. Many scholars and practitioners insist that Lyme can always be treated with a relatively short course of antibiotics. The practice guidelines of the Infectious Diseases Society of America, for example, declare that there is no evidence that anyone has suffered significant chronic B. burgdorferi infection after the standard treatment. But some scholars and patient advocacy groups disagree, asserting that even after standard antibiotic treatment, B. burgdorferi can persist in a difficult-to-detect form, causing chronic neurological problems.

Zhang is in the latter camp. He suspects that under certain conditions, B. burgdorferi might change to an unusual form known as L-forms, one type of heterogeneous persisters. In the L-form state, bacteria lack cell walls—a major target of most commonly used antibiotics. Pyrazinamide, however, targets different sites (energy production and protein degradation) in the cell, and Zhang’s lab has demonstrated that the drug is uniquely effective against tuberculosis bacteria that have transitioned into a dormant “persister” state and are tolerant to most antibiotics.

Might pyrazinamide (or a similar compound) have the same kind of power against Lyme disease? That is what Zhang hopes to learn in the next several years. His lab’s early studies have been promising. He and his colleagues have already found that the active form of pyrazinamide—pyrazinoic acid—has some effect against B. burgdorferi in vitro. Now they are preparing to test the drug’s power against B. burgdorferi in mice.

Zhang and his team also will test hundreds of different medicinal compounds to see if they have any in vitro effectiveness against the dormant form of the bacterium.

Valeria Culotta, PhD, a professor of Biochemistry and Molecular Biology, is following a different strategy. Her lab has been using biochemical and spectroscopic methods to study the unusual ways in which B. burgdorferi metabolizes metals.

Most microorganisms need to acquire iron for survival, but scientists discovered several years ago that B. burgdorferi is almost uniquely indifferent to iron levels. (That property leaves it invulnerable to one of the body’s basic immune responses, which involves starving pathogens of iron.) Culotta and her colleagues recently discovered a possible explanation for how B. burgdorferi functions with such indifference to iron: It has an extremely strong capacity to take up manganese, an element that, like iron, can be used to power bacterial enzymes.

Culotta hopes that this insight might someday lead to new molecular targets for anti-Lyme medications. In the meantime, however, Culotta cautions that Lyme patients should not try to starve themselves of manganese. “This organism has such a high capacity for taking up manganese that even if you removed it from your diet, it would still find an adequate amount,” she says.

The drug therapies that might emerge would target the unique metallo-enzymes that bind with manganese, Culotta says. “We still have a great deal to learn about this organism,” she says. “I’m hopeful about new therapies, but they would come way down the line.”

—David Glenn
Untangling the MERS Outbreak

Trish Perl had just picked up a colleague at the Baltimore train station when her cell phone rang. Saudi Arabia’s deputy minister of health was on the line.

He wanted to know if Perl, MD, MSc, senior epidemiologist for the Johns Hopkins Health System, could travel to Saudi Arabia to assist with an investigation of a hospital-based MERS (Middle East respiratory syndrome coronavirus) outbreak.

Perl, who holds joint appointments in Medicine and Epidemiology, arrived four days later, on May 11, and working with colleagues from Toronto’s Mount Sinai Hospital and the University of Colorado, Denver, assembled a who-what-when-and-where database to determine how the virus spread through four hospitals in eastern Saudi Arabia, infecting 23 people and killing 15, between April 1 and May 23.

Back in Baltimore, Perl and colleagues worked with Epidemiology associate professor Derek Cummings, PhD, to untangle the disparate data strands and reconstruct the transmission network of the first large MERS cluster since the virus was identified in September 2012.

The resulting report, published June 19 in the online *New England Journal of Medicine*, produced early answers to fundamental questions about MERS, which has now infected 114 people and killed 54, with most cases in the Middle East. MERS has also been confirmed in Europe and Tunisia.

Investigators into the Saudi Arabia outbreak determined that the infection spread easily within hospitals, from person to person in dialysis facilities, intensive care units and inpatient wards, and in transport between hospitals.

“I think that one of the most important things to come out of this is that we’re dealing with a coronavirus infection that’s very similar to SARS,” says Perl, referring to severe acute respiratory syndrome, which caused more than 750 deaths in a 2003 epidemic.

The findings emerged from the close collaboration between Cummings and his on-the-ground investigators in Saudi Arabia, with the two camps communicating daily.

Perl and her colleagues dug into hospital patient records and ministry of health reports to collect the details—room numbers, bed assignments, patient/health care worker interactions—that Cummings required to track the outbreak through space and time.

“The tricky part is figuring out the specifics on where people were and who they could have interacted with,” says Cummings. With the data in hand, he was able to calculate an incubation period of 5.2 days and a serial interval [the time between cases in a transmission chain] of 7.6 days. The information is critical to establish protective measures in a disease outbreak, including quarantine guidelines.

Perl has briefed the CDC on the Saudi Arabia investigation and continues to monitor MERS developments globally.

With the exception of the Saudi Arabia outbreak, MERS cases have tended to be sporadic in nature, and a WHO committee ruled in July that MERS is not a global health emergency. At this point, says Perl, it’s unclear why MERS has not spread widely in the general population.

Much about the virus remains unknown—including the extent of transmission in communities and whether seasonal variations affect the virus’s ability to spread—and vigilance is necessary, according to Perl and Cummings. A virus can “sputter along in fits and starts,” before it becomes a significant disease risk, says Cummings.

“With any of these novel pathogens that are emerging, our resources are much better spent to stop them at the earliest stages,” he says. “If they start to spread widely, then you have a much larger task ahead.”

—Jackie Powder

Get into the field. Use data to set policy. In his engaging new book, Dean Emeritus Alfred Sommer draws on his life in public health to share key lessons with the next generation.

*(JHU Press, 2013.)*
In the ongoing battle between man and microbe, the antibiotic vancomycin is a last line of defense, the drug to turn to when few others will work.

The existence of a vancomycin-resistant strain of enterococci (VRE), therefore, spreads fear among hospital administrators. An outbreak of this “superbug” in one facility quickly can become a problem for other hospitals.

“A VRE outbreak is a horror show for a hospital,” says Bruce Y. Lee, MD, MBA, an associate professor in International Health. “Infections can be very stubborn, taking weeks, months or even years to eliminate.”

Lee’s team developed a sophisticated computer model that demonstrates how VRE can spread across a county and calls for new approaches to VRE management. The results were published in the August 2013 issue of the American Journal of Infection Control.

“The culprit behind VRE spread may be how frequently two facilities share patients, not how close they are geographically,” Lee says. “This makes it difficult to track the original source of an outbreak.”

Lee’s analysis drew upon real patient data from 29 hospitals in Orange County, California. His study shows that a mere 10 percent increase in VRE at a single hospital can produce a nearly 3 percent increase in every hospital countywide. There are an estimated 20,000 to 85,000 cases of VRE infection each year in U.S. hospitals.

Hospitals and health care facilities often transfer patients for reasons that range from specialized care to insurance considerations. Lee’s study even took into account patients discharged at one facility before being readmitted by another. More than half of the patient transfers in his study fell in this largely overlooked category.

The researchers found additionally that in an outbreak, infection control specialists declare victory too soon, cutting short important control measures—such as heightened surveillance, contact isolation and better cleaning—that could halt the cascade of the infection surging through a region. “The health care community needs to realize how hospitals are interconnected via sharing patients and, in the event of an outbreak, to expand vigilance and control efforts much wider and for potentially longer periods of time,” Lee says.

One easily overlooked weapon against VRE is better inter-hospital communication, he says. Currently, hospitals know too little about the facilities they share patients with, and region-wide computer databases do not exist. Incentive programs for cooperation could help, as well.

“VRE control is every hospital’s concern. As long as one hospital in your region is struggling with VRE control, your hospital is at risk,” Lee says.

While Lee was at the University of Pittsburgh, he established a collaborative team at the Pittsburgh Supercomputing Center and University of California, Irvine, to develop the computational modeling software platform known as Regional Healthcare Ecosystem Analyst (RHEA). RHEA simulates health care facilities in a region and patients flowing among them and surrounding communities, allowing researchers to infect virtual patients with VRE.

“While this sort of computational modeling is fundamental in finance, meteorology and other fields, it is relatively new in public health,” says Lee, who joined the School’s International Vaccine Access Center in July as director of Operations Research.

“Improving the way health care products and services are administered can improve the lives of millions of people.”

—andrew myers
In Liquor Lyrics, Singers Know Jack

From that tear in Hank Williams’ beer to the tiny bubbles in Don Ho’s wine, the mention of alcohol has long been a staple of popular song.

In recent years, however, songs have shifted from mentioning beer, wine or whiskey to naming specific brands of alcohol.

In a new study that systematically measures mentions of alcohol brands in song lyrics, researchers at the Bloomberg School and Boston University have demonstrated how pervasive the relationship is.

The study, published online in *Substance Use & Misuse* in August, examined 718 songs in genres ranging from urban and pop to country and rock between 2009 to 2011. It found that just four names accounted for more than half of all mentions of specific brands in song: Patrón tequila, Hennessy cognac, Grey Goose vodka, and Jack Daniel’s whiskey.

In 2009, for instance, the popular singer Ke$ha sang of Jack Daniel’s in her chart-topping single, “TiK ToK”: “Brush ma teeth with a bottle of Jack / ’Cuz when I leave for the night I ain’t comin’ back.”

“The predominance of so few brands suggests a potential deeper relationship between marketers, the performers and the young audiences of popular music,” says David Jernigan, PhD, director of the School’s Center on Alcohol Marketing and Youth (CAMY) and an associate professor of Health, Behavior and Society. “This relationship needs closer examination by public health researchers.”

The study mentioned by name examples of direct sponsorship of music by alcohol manufacturers, including a Jack Daniel’s party at the 2011 Nashville Songwriters Association International and a $100 million marketing deal between Sean “Diddy” Combs and Diageo, maker of Ciroc vodka.

The researchers also found that the overwhelming majority of alcohol references, branded or otherwise, were positive. Only two of the songs in the study referenced negative consequences of alcohol use. According to the CDC, alcohol kills some 4,700 people under the age of 21 in the U.S. each year.

“Like product placements in the movies, alcohol brands are showing up in popular songs associated with lifestyles that glorify drinking. It is now common practice that, even when not directly promoting their brands, companies monitor and tacitly endorse how their brands are portrayed,” says Michael Siegel, MD, MPH, a professor at Boston University, referencing a practice known by those in marketing circles as “brand safety.”

Jernigan adds: “More study is clearly needed into the consequences of such exposure for youth drinking behavior, but if it is influencing kids to drink, then we in public health will have to reduce or mitigate the effects.”

—Andrew Myers
Imagine a room full of 100 middle-aged and older Americans. How could you predict which of them will be hospitalized or enter a nursing home within the next two years?

You might ask them about well-known risks like heart disease or diabetes. Do they smoke or is their household income relatively low? But you might not think to ask how well they sleep.

Poor sleep quality is a powerful predictor of health care utilization among Americans aged 55 and older, above and beyond whatever other risk factors they might carry, according to a recent analysis by Bloomberg School researchers and others. Older Americans who report having two or more symptoms of insomnia have 46 percent greater odds of being hospitalized during the subsequent two years than people with no insomnia symptoms.

Many studies over the last two decades have found that roughly half of older Americans sleep poorly, says Christopher N. Kaufmann, a Mental Health doctoral student. But older patients may not recognize the role sleep plays in their overall health, and may underreport sleep difficulties when they speak with their doctors.

For the paper published online in May in the Journals of Gerontology Series A: Medical Sciences, Kaufmann and his colleagues drew on data concerning more than 14,000 older Americans tracked by the Health and Retirement Study, a federally financed longitudinal study.

When asked about their sleep quality in 2006, 41 percent of the participants reported at least one symptom of insomnia. When asked two years later about their recent use of health services, the participants with poorer sleep quality were significantly more likely to report having been hospitalized, using home health care services or having entered a nursing home.

The pattern remained significant for hospitalization and home health care use even after Kaufmann and his colleagues controlled for demographic factors and for histories of cancer, diabetes, heart attack, hypertension, osteoarthritis or stroke.

“Treating sleep disturbances might be a way of not only promoting health but decreasing health expenditures as our population ages,” says Adam P. Spira, PhD, a Mental Health assistant professor and senior author on the study. (Other authors include Ramin Mojtabai, a Mental Health associate professor, and postdoc Sarah L. Canham, as well as researchers from three other universities.)

Spira has led several studies of insomnia among older adults, including research in which participants wear wrist devices that can provide objective data about sleep quality.

Curing insomnia is, of course, easier said than done. Several organizations have recently raised warnings about certain medications that are often prescribed to improve older adults’ sleep. Those medications too often cause drowsiness and light-headedness, raising the risk of falls and hip fractures. For his dissertation, Kaufmann plans to analyze data from a large, nationally representative pool in order to gain a deeper understanding of those safety risks.

Spira, for his part, hopes that more health providers will be trained in non-pharmacological strategies for improving older patients’ sleep, including models of cognitive-behavioral therapy that have proven effective among older adults.

One such technique is sleep-restriction therapy, in which patients go to bed and rise at scheduled times, and spend no other time in bed. “Older people who develop chronic insomnia often try to compensate by spending lots of time in bed,” Spira says. “But they end up dissociating sleep from their beds. If you restrict people’s time in bed to the time they’re able to sleep, you can start to build much healthier sleep patterns.”

—David Glenn
Putting Health Behind Bars

Gabe Eber, a staff attorney with the ACLU’s National Prison Project, pulls a report from his files.

The inmate, an older man suffering from diabetes and hypertension, was admitted to a Mississippi prison infirmary in a weak and confused state. In his medical record, Eber says, the prison doctor described the man as manipulative and likely malingering. After six days of worsening health, he was transferred to a hospital where he was treated for a myocardial infarction, dehydration and renal failure. He died two weeks later.

“The patient’s death wasn’t even documented in his medical record,” says Eber, JD, MPH ’02, who recently made a temporary move from the courtroom to the classroom to join the teaching team of the weeklong Health in Prisons course, which debuted this year in the School’s Summer Institutes.

Eber, who helps to prepare class action suits to improve medical and mental health services for prisoners, sees some of the worst health care in the U.S.

“Putting people in a closed stressful environment and ignoring their health needs is a recipe for death and, frankly, death through great suffering,” he says. “Imagine being in a cell, denied your insulin, and as a diabetic, knowing exactly what’s going to happen to you.”

For Eber and course organizers—faculty Gilbert Burnham, MD, PhD, MS, and Leonard Rubenstein, JD, LLM—prison health care is a public health crisis that has been ignored for too long.

“We’re talking about a population with very limited autonomy and high exposure to risks being cared for in a fragmented and disorganized system,” says Burnham, International Health professor and co-director of the Center for Refugee and Disaster Response.

The Geneva-based International Committee for the Red Cross (ICRC), which collaborates with Burnham on the Health Emergencies in Large Populations (HELP) courses, approached him with the idea of developing a course about providing health care in prisons for professionals in the corrections field and for public health professionals interested in working in this field.

He and Rubenstein, a senior scientist at the Center for Public Health and Human Rights and faculty member at the Johns Hopkins Berman Institute of Bioethics, hope that the course is a first step in raising awareness of the issue in the public health community. They say that the class is the first of its kind in a school of public health.

The challenges are urgent and daunting—especially in U.S. prisons and jails, which hold 2.2 million prisoners and detainees, more than 20 percent of the global prison population: caring for an aging prison population with complex health conditions, chronic disease management, mental health diagnoses, inconsistent health care standards, massive overcrowding and health concerns in connection with solitary confinement and hunger strikes.

Rubenstein and Burnham say that the problems demand public health expertise—surveillance, data collection and analysis, and monitoring and evaluation—to develop health protocols and policy reforms, and address serious medical ethics issues.

The course attracted 19 students from 10 countries and examined prison health from domestic and international perspectives. Instructors included medical and legal experts in prison health care from the ICRC, Hong Kong, Finland, Germany, India, Canada, Israel, Switzerland and the U.S.

Discussions of foreign prison systems revealed fundamental differences with the U.S. in the provision of health services.

Instructors from Israel and Switzerland explained that unlike the U.S. model, prison health care workers in their countries report to government health officials, not corrections supervisors. This clear separation of roles helps to avoid ethically questionable situations that often arise in U.S. prisons concerning the force-feeding of hunger strikers and solitary confinement cases.

“Medical participation in force feeding undermines the doctor/patient relationship and involves health professionals as adjuncts to security officials who want to end what amount to political protests,” says Rubenstein. “Medical care for hunger strikers should be based on … independent medical judgment and respect for patient autonomy.”

While the Health in Prisons course was developed primarily as a continuing education course for corrections health care professionals, organizers hope to soon adapt the class for the MPH curriculum. Long term, they envision a professional track in prison health as part of a degree program.

“Improving health in prisons in the U.S. and the world calls for the same levels of expertise and resources and commitment that the public health community dedicates to other issues,” says Eber.

—Jackie Powder
Growing up in India, a country where drug manufacturing plays a prominent role in the national economy, MPH/MBA student Gaurvika Nayyar had long been fascinated by the pharmaceutical industry. As a recent NIH research fellow, she focused on the emergence of drug-resistant malaria parasites in Southeast Asia. But it wasn’t until she read a paper about counterfeit medicines—a report that included the death of a child—that Nayyar and her colleagues found that 15 percent of the antimalarials from sub-Saharan Africa that failed chemical analysis had low levels of an active ingredient, while 34 percent of those from Southeast Asia contained no active ingredient at all.

Poor-quality drugs prolong illness, cause unnecessary deaths and impose a heavy economic burden on developing countries by raising health care costs and eroding productivity. They also damage the credibility of health care systems, which can in turn compromise vital public health initiatives like vaccination programs. Moreover, by exposing parasites to inadequate doses of the drugs that are meant to kill them, poor-quality antimalarials threaten to drive selection of resistant strains. That is especially worrisome since Plasmodium falciparum, the parasite species responsible for the bulk of malaria-related deaths, has already shown resistance to artemisinin-based drugs on the Thai-Cambodia border. The WHO currently recommends artemisinin-based combination therapy for P. falciparum malaria, and there are few alternatives on the horizon.

Nayyar, who is the director of Global Network for Access to Medicines, a student group affiliated with the Bloomberg School’s Center for Drug Safety and Effectiveness and the Department of International Health, recommends a multipronged approach to the problem. It includes educating the public and identifying technologies that can help developing countries test for poor-quality medicines. Above all, she argues for a better global regulatory framework—one that would replace the existing hodgepodge of definitions and regulations that allows counterfeiters and purveyors of substandard medications to evade prosecution. She and her colleagues would like to see counterfeiting designated a crime against humanity, and they are working on a paper to promote an international treaty or convention that would crack down on poor-quality antimalarials worldwide.

Grand as those policy goals might be, however, Nayyar hasn’t lost sight of the basic human tragedy that first caught her attention. “As we’re talking about this,” she says, “people are dying.”

—Alexander Gelfand
A Better Test for Schisto

Diagnosing intestinal schistosomiasis is tough business.

Identifying an infection of the parasitic worm requires collection, transport and examination of stool that must be immersed in formaldehyde to prevent decomposition in the intense heat common in counties where the parasite is most prevalent. Even then, it is not unknown for a sample bottle full of gases from decomposing feces to explode in a lab researcher’s hand.

The two most common tests for the disease, known as Kato-Katz (KK) and circulating cathodic antigen (CCA), are plagued by inaccuracies and false results. Needless to say, public health officials have yearned for an alternative.

In a July article in the American Journal of Tropical Medicine and Hygiene, a team of Bloomberg School researchers has demonstrated a polymerase chain reaction (PCR) genetic test to detect worm DNA in patient urine. The PCR test has proven not only vastly more accurate than earlier tests, but it makes handling of specimens much easier and safer, as well.

“This is the first time PCR has been used to diagnose parasitic diseases in urine that were previously only detectable in feces,” says postdoc Nilanjan Lodh, PhD, first author of the paper. “PCR allows us to test without collecting stool.”

In comparing all three diagnostic techniques, the researchers discovered that KK and CCA often led to less-than-optimal results, especially in low-level infections. More than half of the individuals who tested negative by KK and CCA were, in fact, found to be positive by PCR, an indication of PCR’s high sensitivity to infections.

“For health officials, PCR’s sensitivity and specificity are pretty impressive, but as one who has done arduous fecal tests in the field, I can tell you, from personal experience, that the sample stability issue is a big deal,” says Clive Shiff, PhD, an associate professor of Molecular Microbiology and Immunology, who directed the study. “Urine does not decompose like feces and is much easier to collect and transport,” he says.

Current collection methods require long drives to test locations, disseminating sample bottles, returning the next day to retrieve them, immersing each sample in formaldehyde, and delivering them to the lab.

“Collection takes time, and gasoline in Zambia runs about $2 a liter. With urine sampling, you can collect and return in a single trip. If you add in the cost of the KK and CCA tests, PCR starts to look very cost competitive even at a relatively expensive 50 cents per test,” Shiff says.

Next, the researchers are seeking funding to test a less-expensive PCR method known as loop–mediated isothermal amplification (LAMP) that can be powered by a 12-volt car battery. LAMP could be used in rural areas where electric power is absent or intermittent.

—Andrew Myers

In Memoriam

Ruth H. Singer, MD, MPH ’72, a retired physician and Maryland state health administrator who also worked in HIV/AIDS treatment at a community health center, died May 27, 2013, at age 69. A longtime supporter of the School and former president of the Society of Alumni, she chaired the Health in Asia colloquium in 1993, the first international meeting of the Society of Alumni in Seoul, South Korea.

Richard H. Morrow Jr., MD, MPH, an International Health professor since 1991 and a pioneer in the field of health systems in developing countries, died August 17, 2013. He was 81. Formerly a professor at the Harvard School of Public Health and a director of Tropical Disease Research and Training at WHO, Morrow was widely known as an expert in quality assurance, epidemiologic methods for field trials and disease burden measures.

Frederick L. Brancati, MD, MHS ’92, an internationally recognized expert on the epidemiology and prevention of type 2 diabetes, died May 14, 2013. He was 53. Brancati, whose research changed the understanding of type 2 diabetes, joined the Johns Hopkins School of Medicine faculty in 1992 and later became the director of the Division of General Internal Medicine. He was named a Johns Hopkins University Distinguished Service Professor of Medicine in 2012.