Hallucinogen investigated as OCD treatment

By Tracie White

The first time psychiatrist Carolyn Rodriguez gave an infusion of ketamine to a patient with obsessive-compulsive disorder, she was nervous. After all, while ketamine is approved by the Federal Drug Administration as an anesthetic, it is also an illicit party drug. As an anesthetic, it is also an illicit party drug, the Federal Drug Administration as an

Researchers have found that a cancer therapy prompts a type of immune cell called a macrophage (illustrated above) to attack cancer.

Cancer therapy activates macrophages, prompting scientists to rethink how it works

By Christopher Vaughan

Scientists crowdsource data to pinpoint autism resource gaps in U.S.

By Erin Digitale

A new crowdsourcing tool aims to map all the locations in the world, beginning with the United States, where individuals with autism live to determine why, in studies, the drug has provided relief from symptoms.

Antibodies to the proteins PD-1 and PD-L1 have been shown to fight cancer by unleashing the body’s T cells, a type of immune cell. Now, researchers at the School of Medicine have shown that the therapy also fights cancer in a completely different way, by prompting immune cells called macrophages to engulf and devour cancer cells.

The finding may have important implications for improving and expanding the use of this cancer treatment, the researchers said.

A study describing the work, which was done in mice, was published online May 17 in *Nature*. The senior author is Irving Weissman, MD, professor of pathology and of developmental biology. The lead author is graduate student Sydney Gordon.

PD-1 is a cell receptor that plays an important role in protecting the body from an overactive immune system. T cells, which are immune cells that learn to detect and destroy damaged or diseased cells, can at times mistakenly attack healthy cells, producing autoimmune disorders like lupus or multiple sclerosis. PD-1 is what’s called an “immune checkpoint,” a protein receptor that tamps down highly active T cells so that they are less likely to attack healthy tissue.

**How cancer hijacks PD-1**

About 10 years ago, researchers discovered that cancer cells learn to use this immune safeguard for their own purposes. Tumor cells crank up the production of PD-L1 proteins, which are detected by the PD-1 receptor, inhibiting T cells from attacking them.

Scientists crowdsource data to pinpoint autism resource gaps in U.S.

The data also show that there are far fewer U.S. autism treatment centers than autism treatment centers than...
Counting down days to opening of expanded children’s hospital

By Samantha Dorman

Lucile Packard Children’s Hospital Stanford is counting down to the debut of its new pediatric and obstetric hospital, slated to open in December. With a mission to lead the way in family-centered care, the Packard Children’s expansion will more than double the size of the existing campus by linking the original hospital with a new main building, bringing the total hospital space to 844,000 square feet.

“This will be the nation’s most technologically advanced, environmentally sustainable and family-friendly hospital for children and expectant mothers,” said Christopher Dawes, chief executive officer of the Packard Children’s hospital in Northern California is at the center of the Stanford Children’s Health enterprise, which is the largest health care system in the Bay Area exclusively dedicated to pediatric and obstetric care.

The 521,000-square-foot addition to the hospital and surrounding 3.5 acres of green space and gardens were designed in partnership with patients, families and every level of hospital staff and faculty to ensure all areas of need were accounted for.

“When my mother founded this hospital, she envisioned a place where children and families could receive truly healing care,” said Susan Packard Orr. “She saw the power that nature has to heal and uplift. I’m proud that we have carried her vision forward, with world-class sustainability and holistic elements throughout the new hospital. Everything we do at this hospital will have an eye to ensuring that generations to come will be healthier.”

Fundraising campaign

Community support played a key role in making this growth possible. The “Breaking New Ground” campaign, which ran from 2007 to 2012 under the volunteer leadership of Anne Bass, Elizabeth Dunlevie and Orr, raised $262 million for the new building and grounds. Further funding will come from hospital income and operating services, public bond money and ongoing community support.

“The new facility in Palo Alto will add 149 patient beds and six state-of-the-art operating suites, with a design that allows room to grow as demand increases. In our 25 years, we’ve become leaders in providing the best care for children and expectant mothers. Keeping pace with the growing needs of our patients was the catalyst for this transformation,” said Dawes. “We’ll continue to build world-renowned programs as part of Stanford Medicine and advance research in every pediatric and obstetric specialty.”

Advanced technology

With 13 surgical suites, the new Packard Children’s will have more operating rooms than any children’s hospital in Northern California, reducing schedule delays and long waits when surgeries take longer than planned. A neuro-hybrid surgery suite — the only one of its kind in a California children’s hospital — will feature a state-of-the-art diagnostic MRI, direct access to angiography imaging equipment and a full operating room. The suite will enable surgeons to view updated images during surgery and reimage patients before closure of the surgical incision. For patient having a tumor removed, their surgical team will be better assured of the procedure’s success. Ultimately, this will reduce the number of procedures, which in turn will impact overall cost and the amount of time a young patient will spend under anesthesia.

A holistic approach

Planning for emerging technology was integral to the design for the new hospital.

“When planning and design began many years ago, we knew we had to leave room for ever-evolving technology,” said Dennis Lund, MD, chief medical officer. “So, we’ll have the most advanced capabilities available when we open later this year, with the ability to implement emerging technologies in the future.”

The new facility will also have a dedicated isotope radiation therapy room for cancer patients, as well as one of the nation’s only stand-alone combined PET/ MRI scanners dedicated to pediatric patients. The hybrid scanner combines the two modalities, positron emission tomography imaging and magnetic resonance imaging, into a single scan, allowing physicians to see how diseases are being in the body; monitor the effects of treatment and craft informed treatment plans to cater to the patient’s case.

Planning for the new Lucile Packard Children’s Hospital was done by HGA Architects and Engineers, and the building’s design by Perkins+Will, with a central theme of enabling a holistic approach to healing.

“From the beginning, the vision for expansion was founded not only in a mission to lead the way in children’s health, but also to nurture the whole family,” said Kelly Johnson, PhD, RN, vice president of patient care services and chief nursing officer. “Many of our patients require acute and chronic care, and the hospital becomes a second home for the entire family.”

Private patient rooms will be more spacious, with sleeping accommodations for two family members and amenities like laundry facilities and family kitchens on every floor. Special features that help make the space unique and kid-friendly include a large digital, interactive wall display for children and families to use for entertainment, education and communication, as well as a dedicated broadcast studio whereby children can create, record and edit video content that can be shared in patient rooms throughout the hospital.

Because Packard Children’s believes that a holistic approach to health leads to better health outcomes, nature is a virtual thread throughout the hospital’s campus. Surrounding the new building, 3.5 acres of gardens and green spaces will reflect the flora and topography of Northern California. The hospital’s Dunlevie Garden will feature educational and engaging sculptures for children to physically explore.

"We want to give families moments of relaxation, play and discovery, which are so important in the midst of illness and hospitalization,” explained Elizabeth Dunlevie, a longtime hospital supporter, board member and chair of the expansion’s design task force. “Through walking paths, whimsical sculptures and interactive artwork, children and parents can share time together in an outdoor play environment while still being in the hospital setting.”

Sustainable design

Inside the hospital, the signage and interior design will reflect California’s ecosystems. Each floor will feature overlooks with views of the landscape, and there will be a planter box in the window of every patient’s room to provide a connection to nature for everyone.

Packard Children’s will set the standard for sustainability in hospital design. Water conservation, renewable energy use, recycling programs, green housekeeping and local food offerings are all integral to the new Packard Children’s.

Water-efficient landscapes and collection systems are expected to save 800,000 gallons of water each year. By using equipment specifically designed to conserve, Packard Children’s expects to use 38 percent less water than comparable hospitals. By implementing energy innovations such as an external-shading system, the new building’s thermal energy consumption is expected to be 60 percent less than that of similarly sized hospitals in the region.

Transforming original building

The new building will allow for a transformational renovation of much of the existing hospital’s space, including the Johnson Center for Pregnancy and Newborn Services into mostly private obstetrics rooms. Some major programs will move and grow into the new, main building, including the Bass Center for Childhood Cancer and Blood Diseases, the Pediatric Transplant Center and the Betty Irene Moore Children’s Heart Center. Additionally, services previously shared with Stanford Hospital will now have a dedicated presence inside the children’s hospital, including trauma, care coordination lab, interventional radiology and patient food services.

Packard Children’s growth is connected with the advancement of adult care through the new Stanford Hospital, which is expected to open in 2018. The expansion of Lucile Packard Children’s Hospital will help us continue to improve the care we provide for children and pregnant women,” said Lloyd Minor, MD, dean of the Stanford School of Medicine. “The new hospital’s innovative technology, family-centered design and advanced sustainability features will further advance our academic mission and vision for precision health — enabling us to offer the highest levels of predictive, preventive and personalized care to all generations.”

“We are all working with focused dedication and excited anticipation as we move toward the opening of our new campus,” said Dawes. “Together, we are advancing a vision to heal humanity through science and compassion, one child and family at a time.”
The study, which got underway about four years ago, began somewhat uniquely as a collaboration between two labs that were studying two completely different diseases. At the time, the Nicolls lab, where Tian was, was studying pulmonary hypertension. The Nicolls lab was looking at ways to use pharmacological agents to reverse pulmonary hypertension progressing. T ransplant Program; and research assistants Eric Shuffle and Allen Tu. Shuffle and Tu are affiliated with both Stanford and VA Palo Alto.

Researchers at Georgia Institute of Technology, Virginia Commonwealth University, the University of Michigan Health System and the University of Illinois at Chicago are also co-authors.

Eiger BioPharmaceuticals has licensed intellectual property developed by Tian, Rockson, Jiang, Kim and Nicolls involving the targeting of LTB4 for the treatment of lymphedema. Stanford’s Department of Medicine supported the work.

The project kicked off with a survey, which was completed by 3,769 community members, including 42 percent of faculty members. Facilitators also interacted with 120 people, primarily faculty members but also some staff and other stakeholders, Minor said. In addition, Stanford Medicine’s survey committee received feedback on the current status of the organization, Minor said.

“When it comes to purpose, we rank significantly higher back on the current status of the organization, Minor said. In other words, the more, the merrier. “When it comes to purpose, we rank significantly higher.

The researchers found that the buildup of lymph fluid is actually a deployment within the tissue of the skin, not merely a "plumbing" problem within the lymphatic system, as previously thought. Working in the lab, scientists discovered that a naturally occurring inflammatory substance known as leukotriene B4, or LTD4, is elevated in both animal models of lymphedema and in humans with the disease, and that at elevated levels it causes tissue inflammation and impaired lymphatic function.

Further research in mice showed that by using pharmacological agents to target LTD4, scientists were able to induce lymphatic repair and reversal of the disease processes.

“There is currently no drug treatment for lymphedema,” Tian said. Based on results of the study, the drug bestatin, which is not approved for use in the United States but which has been used for decades in Japan to treat cancer, was found to work as an LTD4 inhibitor, with no side effects, she said.

Based on the research, bestatin (also known as abemine), is being tested in a clinical trial that started in May 2016 — known as ULTRA — as a treatment for secondary lymphedema, which occurs because of damage to the lymphatic system from surgery, radiation therapy, trauma or infection. Primary lymphedema, on the other hand, is hereditary.

The results of the research pertain to both types.

“I was in a privileged position of seeing two faculty conducting important research and recognizing the potential link in causality,” said Kevin Grimes, MD, associate professor of chemical and systems biology and co-founder of SPARK. “It occurred to me that both diseases affect vascular tissues and had strong inflammatory components.”

“When Amy Tian and I looked at the Statin’s requirements, Amy, it looks like it could be the same molecular process.”

“It was an arranged marriage between us that worked out great,” Tian said.

At the time, Rockson had been gunning to suspect that lymphedema was an inflamatory disease. This led to his team’s discovery that the anti-inflammatory drug ketoprofen successfully helped to relieve lymphedema symptoms, although it wasn’t a perfect drug; side effects were a concern, and it remained unknown how the drug worked at the molecular level.

Meanwhile, the Nicolls lab had discovered that LTD4 was part of the cycle of inflammation and injury that keeps pulmonary hypertension progressing. T ransplant Program; and research assistants Eric Shuffle and Allen Tu. Shuffle and Tu are affiliated with both Stanford and VA Palo Alto.

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The beyond the university” focus is relatively new, and aims to prompt thought about how Stanford can contribute to the local community, state, nation and world. Drell said. Joseph Woo, MD, professor and chair of cardiothoracic surgery, is the co-chair of that steering group.

The university is welcoming proposals and suggestions from everyone — from faculty to students, Drell said. One suggestion was to involve students or teams on the project’s website. Currently, cost is not being considered, she said. Also, submitting an idea does not mean it will be implemented. “We need to be trusted,” she said. In other words, the more, the merrier.

“We want the process to be collaborative and inclusive. “We have phenomenal individuals in our community.” The task is large, but exciting, she said. “What is the university we want to be in 20 years and how do we get there?”

Strategic planning efforts are launched at Stanford Medicine and the university.

By Becky Bach

Stanford Medicine and Stanford University are undergoing separation, but parallel, strategic planning processes. Lloyd Minor, MD, dean of the medical school, and Persis Drell, vice president of advancement and faculty and staff members at a town hall meeting on May 4.

Both efforts began this spring and will wrap up in early 2018.

“Along the way, there will be many opportunities and town hall meetings to engage directly in this process,” Minor said.

The Stanford Medicine project — which includes Stanford HealthCare, Lucile Packard Children’s Hospital at Stanford and Stanford School of Medicine — will cover all of the university’s three entities’ missions — research, education and patient care — but will also take a “deep dive” into several specific areas, such as the desired size of the clinical enterprise.

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The continuing pursuit of gender parity in academic medicine

By Kathy Zonana

Odette Orits was the only black woman in Stanford School of Medicine’s class of 1996. Upon graduation, she became Stanford’s sole full-time neurosurgeon resident.

“I don’t think I’ve ever been in a professional situation where I was the first, or the only,” said Harris, MD, now an associate professor of neurosurgery at Stanford, the associate chief of staff for rehabilitation at the Veterans Affairs Palo Alto Health Care System, and the director of brain injury programs at both institutions.

As a medical student, Harris had done research with Stanford neurosurgeon John Adler, MD, who likes to warn incoming residents about the grueling program they’re embarking on. “He was incredibly candid with me,” said Harris. “He made me think about me joining the residency, and he did that in a way not to freak me out or depress me, but he wanted me to have a very real perspective about what I was getting into and not be Pollyanna about it.” Harris said. “He was like, ‘Listen, I want you to have your guard up.’ It was good baggage to carry through residency, to know that I had to better and to do more.’

She knew she was joining a department that had recently been roiled by controversy. In 1991, Frances Conley, MD, the only woman on the neurosurgery faculty, was asked by the first female full professor of neurosurgery in the United States — who had submitted a letter of resignation after a colleague whose behavior she found demeaning was promoted to acting department chair. After a year of turmoil, the colleague’s appointment was reversed and Conley rescinded her resignation, but her revelations of the treatment she and others experienced at the hands of their male colleagues — from exclusion and segregation to being left out of educational meetings and unwanted touching — opened up a national conversation about women and sexism in academic medicine.

Five years later, Harris didn’t have much bandwidth to worry about whether she was entering an inhospitable environment, “I was very much aware of what had happened, but I think their priority was these first four or biggest concerns is, am I going to survive this residency? Are people going to think I’m capable? Are people going to think I’m smart? They didn’t think about that.” Even retrospectively, she considers Conley primarily as the inspirational pioneer whose legacy she inherited when she joined the Stanford faculty.

“Fran went through more bullshit than Odette,” said Adler, a professor emeritus of neurosurgery who considers Conley a mentor and has himself been a lifelong friend to Harris. “There was more hostility towards Fran. I know that Odette encountered individual animosity, but it wasn’t broad across-the-department hostility.

Today, Stanford’s neurosurgery faculty includes 13 women and 43 men in a variety of research and clinical specialties, not all of whom perform surgery. “Nowadays we just expect women to be in the operating room,” Adler said. “That’s right, and now, we only have a few women and we should have more. And eventually I want to see that.

Eventually is too long to wait,” said Hannah Valantine, MD, a cardiologist who served as the School of Medicine’s senior associate dean for diversity for many years and is now the chief diversity officer for scientific workforce diversity at the National Institutes of Health. At the current rate of change, without targeted interventions and changes, “I think it’s going to take more than 50 years before women in the United States achieve parity in academic medicine.

The argument for diversity in academic medicine has moved from “because it’s the right thing to do” to “because it’s the smart thing to do.” Valantine and others who have worked in academic medicine know that diversity is increasingly marshaling data in support of their cause: on the benefits of a diverse workforce; on how underrepresented women are in the professoriate and tend to spend their time. After all, they say, they’re scientists.

Beyond the pipeline

The gender disparity in academic medicine can no longer be attributed to the so-called pipeline problems: Women make up roughly half of U.S. medical students, and more than half of those receiving PhDs in the biomedical sciences. But they make up 22 percent of the tenured faculty at U.S. medical schools, according to 2013 data from the Association of American Medical Colleges. Their proportion declines as they rise in academic rank: Women are 44 percent of assistant professors — the junior faculty position that represents the first step toward tenure — but only 34 percent of associate professors and 21 percent of full professors. The only rank at which women outnumber men is that of instructor, a separate, non-tenure-track faculty line.

And while women are increasingly likely to serve in medical schools’ leadership, their numbers in key positions are still small. Nationwide, they make up just 15 percent of department chairs and 16 percent of medical school deans.

“What I hear a lot is, well, we just haven’t had women in the pipeline long enough to essentially trickle up,” said Diana Lautenberg, the director of women in science at the AAMC. “But if you look at it, women were 40 percent of medical students in 1993. Those women would be in their 50s now, and we don’t see anything even close to that percentage in the faculty ranks. So instead of looking at how to get women in the pipeline, because they’re already there, we’re trying to look at the climate and culture factors that push them out.”

Stanford’s School of Medicine has made a concerted effort in recent years to increase the diversity of its faculty, including its gender diversity. In 2013, the school exceeded the AAMC’s benchmarking data for female faculty: Women were 52 percent of associate professors, 41 percent of associate professors and 22 percent of full professors. The school had been below the national benchmarks a decade earlier, but in recent years has continued to increase; in 2016, they were 56, 44 and 26 percent, respectively.

Women are also rising in the leadership ranks: Today, 27 percent of the department leaders in the School of Medicine are chaired by women.

“We need to build a diverse scientific workforce so that we can serve the needs of our diverse society,” said Lloyd Minor, MD, dean of the School of Medicine. “At Stanford, we have the opportunity to be a beacon of excellence in diversity and inclusivity, just as we are a beacon of excellence in science and clinical care.”

Having a diverse faculty benefits the research, education and clinical missions of an academic medical center, said professor of pediatrics Yvonne (Bonnie) Maldonado, MD, Valantine’s successor as the senior associate dean for diversity and inclusion.

“From an academic standpoint, we want to attract the best people. We know that if there are obstacles to women, you can lose up to half of your talented workforce,” she said. With respect to clinical care, pa-
Several colleagues are completing a study on the reasons why faculty leave the School of Medicine. "The dean and the chair of the search committee were open to that argument, and we actually interviewed every single candidate as a group of women," they wrote. Their research found that women who were assistant professors were less likely to leave the School of Medicine than their male counterparts. "It's interesting when you get in there and find climates that are not supportive of gender equity," said the dean. "And that's not been the case at all. I've felt incredibly well-supported at Stanford." 

The effect of her larger-than-ordinary leadership team has been salutary. "Our people can see that there is a legacy in the next 30 years, I hope it's my grass-roots work," she says. "These are the threads, she says: academic medicine. "If I have a legacy, it's that people are thinking about the opportunity to be a beacon of excellence in diversity and inclusivity." 

"At Stanford, we have the opportunity to be a beacon of excellence in diversity and inclusivity."
Ketamine continues from page 1

Ketamine finds market as an off-label option for mental disorders

By Tracie White

Geurtis “Jerry” Rivas, a native of New York, was diagnosed with severe obsessive-compulsive disorder when he was 15. Obsessing with organizing and reorganizing the belongings in his bedroom — posters, comic books, videos — took over most of his day.

Forced by germ obsessions to compulsively wash and rinse his hands, he started wearing gloves all day to both protect him from the germs and stop him from washing his hands raw. Now, at 36, OCD symptoms continue to stop him from washing his hands raw. “I feel like, for the first time, I was able to function like a regular person,” he said.

Beginning more than a decade ago, Rivas has worked with the Institute of Health that showed ketamine-induced dramatic improvements in treatment-resistant depression. Ketamine research has "broken down ketamine might hold the secret to its rapid effect of ketamine on clinical depression," said Zarate. “The fact that these clinics exist is due to the desperation of patients,” said Rodriguez, who is currently researching the drug’s safety as a long-term treatment for OCD. "I've been suffering through my OCD symptoms for 60 years" he said. "I usually tell people to wait and see if the drug's effects are lasting. I have an open mind to be very safe," Feifel said, adding that the American Psychiatric Association recently issued safety guidelines on how to use ketamine clinically.

"There's a recognition that people like me and others are using the drug to treat patients now," he said. "There's an incredible need for something." The drug hasn't worked for everyone to the same benefit, but for many it's "been life-changing." I usually tell people to wait and see if the drug's effects are lasting. I have an open mind, but it might not be the only receptor bringing benefit." In May 2016, researchers from NIMH and the University of Maryland — Zarate among them — published a study showing that ketamine, a chemical byproduct, or metabolite, created as the body breaks down ketamine might hold the secret to its rapid antidepressant actions. This metabolite, hydroxyson-ketamine, reversed depression-like symptoms in mice without triggering any of the anesthetic, dissociative or addictive side effects associated with ketamine, Zarate said. "Ideally, we'd like to test hydroxyson-ketamine and possibly other drugs without ketamine pathways without ketamine-like side effects as possible alternatives to ketamine in OCD," Rodriguez said.

Rivas took part in a clinical trial to try ketamine as a treatment for OCD. The trial was run by Carolyn Rodriguez, MD, PhD, then a researcher at Columbia University and now an assistant professor of psychiatry and behavioral sciences at Stanford.

After the study, I was walking her to taxi to go home," Rodriguez said. "The side effects of the drug had worn off; she was back to her baseline. I asked what else she had done that could be contributing to her longest-lasting effect. She could do normal things but without the OCD symptoms. So just the fact that in a matter of hours you can disconnect from OCD makes me a believer."

"I just don't like the idea of people being in pain," said Rodriguez. "I want to see science translated into treatments now."
GapMap continued from page 1

tackling the tumors. In effect, the proteins are a “don’t kill me” signal to the immune system, the Stanford research team’s current study showed. Cancer patients are now being treated with antibodies that block the PD-1 receptor or latch onto its binding partner, PD-L1, to turn off this “don’t kill me” signal and attack the tumor.

“Using antibodies to PD-1 or PD-L1 is one of the major advances in cancer immunotherapy,” said Weissman, who is also the Virginia and D.K. Ludwig Professor of Clinical Investigation in Cancer Research, director of the Stanford Institute for Stem Cell Biology and Regenerative Medicine and director of the Ludwig Center for Gastrointestinal Stem Cell Research and Medicine at Stanford. “While most investors accept the idea that anti-PD-1 and PD-L1 antibodies work by taking the brakes off of the T-cell attack on cancer cells, we have shown that there is a second mechanism that is also involved.”

Weissman and his colleagues discovered that PD-1 activation also inhibits the anti-cancer activity of other immune cells called macrophages. “Macrophages that infiltrate tumors are induced to create the PD-1 receptor on their surface, and when PD-1 or PD-L1 is blocked with antibodies, it prompts those macrophage cells to attack the cancer,” Gordon said.

Similar to anti-CD47 antibody

This mechanism is similar to that of another antibody studied in the Weissman lab: the antibody that blocks the protein CD47. Weissman and his colleagues showed that using anti-CD47 antibodies prompted macrophages to destroy cancer cells. The approach is now the subject of clinical trials in human patients.

It’s unclear to what degree macrophages are responsible for the therapeutic success of the anti-PD-1 and anti-PD-L1 antibodies. The practical implications of the discovery could be important, the researchers said. “This could lead to novel therapies that are aimed at promoting either the T-cell component of the attack on cancer or promoting the macrophage component,” Gordon said.

Another implication is that antibodies to PD-1 or PD-L1 may be more potent and broadly effective than previously thought. “In order for T cells to attack cancer, the brakes off of the T-cell attack on cancer cells, we have shown that there is a second mechanism that is also involved,” Irving Weissman, senior author of the new study, says.

As it stands, there is a growing imbalance between the number of people who need autism care and the number of places that can provide care,” said the study’s senior author, Dennis Wall, PhD, associate professor of pediatrics and of biomedical medical science at Stanford. “It’s a geographic problem. We need to quantify, in real numbers, the geographic disconnect between people and treatment centers so that we can see where the gaps are.”

Children who are diagnosed quickly and receive early, intensive autism therapies fare better than those who do not, but parents who suspect that their child has autism often face months-long waits to see caregivers who can diagnose the websites of 840 autism treatment centers in the United States and 135 centers around the United Kingdom. These were placed onto geographic heat maps of the two countries. Autism prevalence in each state and region of the United States was estimated by assuming a rate of 1 case of autism per 50 people, and then using U.S. census data to generate a map estimating how many people with autism live. Data on people in the United Kingdom with autism is already publicly available.) Across the United States, 70 percent of people live within 30 miles of a diagnostic center, the study found. The average distance from an individual in the United States to the nearest diagnostic center is 50 miles, whereas people who have been diagnosed with autism live on average 20 miles from the nearest diagnostic center. Although the gap may partly reflect that people move closer to diagnostic centers after diagnosis, the researchers also think it reflects lower diagnosis rates among people in rural locations.

The latest version of GapMap functions as an interactive site accessible on any internet-connected device. It will help connect families with autism-based resources. In the future, Wall’s team will add more functionalities, such as layering the map with environmental factors to understand their impact on autism prevalence. GapMap also aims to create one of the largest databases that will enable families to connect to and participate in current autism research.

‘An important unmet need’

“Our findings highlight that there is an important unmet need with respect to individuals in resource-poor areas, where there is a significant lack of autism services,” Wall said. “As a consequence, we think they are getting diagnosed later and not reaching the care they need during the time when it matters most.”

Now, the researchers are asking families and caregivers to contribute to the database. Individuals with autism and their families can enter basic data about themselves into GapMap, such as their state, ZIP code, gender, birth date and autism diagnosis. They are also asked to answer a short list of questions about the degree to which the person with autism shows traits associated with the disorder. The data are stored in a secure, Health Insurance Portability and Accountability Act-compliant database. Participants have the option to receive notifications inviting them to take part in future research, and can see where other people with autism live. Autism experts can also contribute information about the services they provide.

Wall hopes the database will help build global online networks of families affected by autism, will inform them about resources in their areas and will clarify where more autism treatment centers should be located or where technology-based solutions can be invented to fill the void. “We really need to see where the imbalances are and how big they are as the first step to creating change in the health care system,” he said.

To visit GapMap, go to https://gapmap.stanford.edu.

Wall’s Stanford collaborators on the study are former software development intern Nikhila Albert, software developer Michael Du and clinical research coordinators Jena Daniels and Jessey Schaffner.

Wall is a member of Stanford’s Child Health Research Institute, which supported the research. The research was also supported by the Wallace H. Coulter Foundation, the Stanford Beckman Center for Molecular and Genetic Medicine, the Harwell Foundation and Spectrum, the Stanford Center for Clinical and Translational Research and Education, and Stanford’s Department of Pediatrics also supported the work.

PD-1 continued from page 1

needed. Across the country, the average demand for treatment is 18 times larger than the available supply of caregivers, the research showed. Prior studies have indicated that the number of children affected by the developmental disorder is still rising.

“There is a growing imbalance between the number of people who need autism care and the number of places that can provide care,” said the study’s senior author, Dennis Wall, PhD, associate professor of pediatrics and of biomedical medical science at Stanford. “It’s a geographic problem. We need to quantify, in real numbers, the geographic disconnect between people and treatment centers so that we can see where the gaps are.”

Children who are diagnosed quickly and receive early, intensive autism therapies fare better than those who do not, but parents who suspect that their child has autism often face months-long waits to see caregivers who can diagnose the
The practice of medicine would be so much simpler if humans came in only one sex — and until only recently, most doctors and researchers have behaved as if that were the case. Modern medicine is largely based on what works for men. Doctors are mostly men, new treatments are tested mainly on men, medical school teachers are mainly men. Even lab animals are largely male.

“Both sex and gender influence human health and disease,” said Janine Clayton, MD, the director of the National Institutes of Health’s Office of Research on Women’s Health, in the article leading off the theme package on sex and gender in medicine.

“It is increasingly clear that it is both an ethical and scientific imperative to conduct research and report on the results for both men and women,” she added.

One challenge for researchers is simply measuring gender, said Manza Stefanick, PhD, director of the Stanford Women and Sex Differences in Medicine Center. “It’s not as straightforward as most of us think.

“Sex is generally assigned at birth, based on external genitalia, after which a broad range of biological, particularly reproductive, sex differences are assumed. Individuals are then, usually, forced into a binary model of gender — with distinct masculine and feminine categories — when the possibilities are much broader and more expansive,” explained Stefanick, in the same article.

She is part of a team developing a way to place an individual’s gender on a continuum so it can be accurately correlated to health outcomes.

Also in the issue:

• A Q&A with Barbara Streisand about fighting to end discrimination against women in cardiovascular research and care.

• A story about the state of gender diversity among medical-school faculty and strategies to pick up the pace of change.

• An article describing research into the inherent differences in male and female brains.

• A feature about a transgender teen and the care he received at the new Stanford Children’s Health Pediatric and Adolescent Gender Clinic. A video about another transgender teen and his family accompanies the online version of the story.

The issue also includes a story about a researcher who invents “frugal science” tools, like an origami microscope that costs less than $1; and an excerpt from An American Sickness, a new book about the ills of U.S. health care, written by Elisabeth Rosenthal, MD, editor-in-chief of Kaiser Health News.

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