Heng Wang, MD, PhD
TRANSLATING GENOMIC MEDICINE
BORN AND RAISED in China, Heng Wang, MD, PhD, never imagined he would become involved with the health care of an Amish community halfway around the world. After graduating from medical school, he was on track to spend his career in a research laboratory. Had it not been for his love of learning, sparked by his parents who were teachers, he might have remained in China. Instead, he pursued advanced training – first in Europe and then in America. Today, Dr. Wang is an internationally recognized expert on rare genetic diseases and Medical Director of DDC Clinic-Center for Special Needs Children in Middlefield, Ohio.

Located in the heart of Amish country, just 30 miles east of metropolitan Cleveland, DDC Clinic is a world-class medical home (as defined by the American Academy of Pediatrics) that offers family-centered specialized health care and education, along with pioneering research to unlock transformational medical information. Areas of research include brain development and seizure control, heart disease, stroke, vision impairments, obesity control, autism and neutropenia.

DDC Clinic is also home to a state-of-the-art CLIA-certified molecular diagnostics laboratory, where genetic testing for more than 50 rare genetic diseases is performed.

From Anhui, China, to Middlefield, Ohio

At the age of 20, Dr. Wang was one of the youngest doctors in China when he graduated from Anhui Medical College in 1983. Soon after, he became involved in laboratory research and, in 1986, obtained an MS in Nutrition followed by a PhD in Biochemistry from the University of Liege in Belgium six years later.

The lure of a postdoctoral fellowship in Nutrition and Gastroenterology at Baylor College of Medicine in Texas drew Dr. Wang to the United States. Afterwards, he decided to pursue residency training in Pediatrics. He was 36 years old.

“I was doing a lot of basic science — animal studies, cell cultures, etc.,” says...
Dr. Wang, whose 15 years of research up to that point in time had been documented in more than 30 national and international peer-reviewed journal articles. “But my interest was always in the translational side of medicine and how we could apply what we were learning to human beings.”

As fate would have it, towards the end of his residency Dr. Wang happened to see a recruitment ad for DDC Clinic in a pediatric journal. DDC was searching for a medical director to build a center of excellence for patient care and research for Amish children with rare genetic disorders.

“I actually had to look up ‘Amish’ in my Chinese-English dictionary to find out what it was,” says Dr. Wang. “The families suffering with some of these conditions often know more about them than the medical community. The potential research opportunity and the challenge of rare diseases really intrigued me.”

Today, 12 years later, Dr. Wang has developed expertise in more than 70 rare genetic disorders, some of which were never before described in the literature. Three have been identified and named by him and his DDC colleagues: GM3 synthase deficiency, an extremely rare neurological disorder which affects brain development; TMCO1 defect syndrome, which affects cell growth and cancer treatment; and SAMS Association, which increases the risk of aneurysms and early-onset stroke. These findings have been published in several professional journals including Science, Nature Genetics and PNAS.

Currently, Dr. Wang has 68 published studies to his credit. He has also received many national and international awards, including the prestigious Community Health Care Crystal Award from Johnson & Johnson, a Special Achievement Award from the American Academy of Pediatrics, and the Pan Asian American Chamber of Commerce Excellence Award in Science and Community Service. His paradigm-changing work has also been featured on national public radio and TV and in leading newspapers from coast to coast, including the New York Times, Boston Globe, Los Angeles Times and more.

**DDC Clinic and Molecular Diagnostics Lab — a Dream Come True**

The idea for DDC originated with an Amish family whose four children all suffered from the same devastating genetic disorder. Unable to find answers at major medical centers, they teamed up with four other families to take action – for their children and for future generations of children.

“DDC Clinic was a dream for everyone there for almost three years,” Dr. Wang explains. “(When I joined in 2002) it became my dream, too.”

Before DDC Clinic constructed clinical space, Dr. Wang provided care via house calls – more than 400 in his first year alone. In 2003, with the help of community support and matching grant funds from the Robert Wood Johnson Foundation, the Clinic was able to convert a 1,200-square-foot ranch home into a medical facility.

Six years later, when the Clinic outgrew this space, a brand new 10,000 square foot Gold LEED certified building was constructed – not only for patient care, education and research, but also for an expanded molecular diagnostics laboratory. Baozhong Xin, PhD, was recruited to build the lab and advance research at DDC. Later, he was also charged with obtaining the CLIA-certification required by Medicaid, BCMH and other health insurance providers to offer services to physicians outside the Clinic’s walls.

A post-doctoral fellow in the Cancer Biology and Cancer Genetics Program at Case Western Reserve University, Dr. Xin received his medical degree at Beijing Medical University and his PhD in Molecular Biology from the University of Hong Kong. While at Case, he collaborated with Dr. Wang on research projects. When asked to join the DDC team in 2005, he welcomed the opportunity.
“Everything we are working on helps disease diagnosis, education and patient care,” says Dr. Xin. “From these practices, we can learn more and use it to help others in need – both locally and worldwide.”

DDC Clinic now serves over 700 patients from 32 states and four foreign countries. “We want to get the word out that these genetic conditions do not affect the Amish only; anyone can be affected. We feel that the molecular diagnostics lab is certainly the way to go in order to serve more children and families in need,” says Dr. Wang.

Indeed, Dr. Wang and Dr. Xin have leveraged their expertise through DDC’s lab and its enhanced capabilities, improving patient diagnosis rates from 22 percent in 2002 to 70 percent today. Since two thirds of genetic disorders are treatable – especially with early diagnosis – they are improving patients’ lives, and sometimes even saving them, as well.

High Tech Lab in a Low Tech Town

In the past nine years, DDC’s lab has developed more than 50 assays for rare genetic diseases, some of which are offered nowhere else in the world. Tests include both full gene analysis and targeted mutation analysis. Multiple gene panels, providing diagnostic tools not readily available to most physicians, are also being developed there.

According to Dr. Wang, DDC’s lab was the first clinical genetics lab in Ohio to offer both platforms of FDA-cleared high-tech in vitro diagnostic (IVD) tools: a high definition chromosomal microarray analysis (CMA), and next generation sequencing (NGS) systems.

CMA allows testing for a wide range of genetic disorders with a single test. Far more sensitive than older methods of chromosomal analysis, CMA is now recommended by the American College of Medical Genetics as the “first tier” test for genetically-linked cognitive disabilities. DDC Clinic utilizes the CytoScan HD platform, with 2.6 million probes for detecting chromosomal abnormalities.

The DDC team’s experience with these high end systems and their many years of research and diagnostics expertise, along with their quick turn-around of test results (days, instead of weeks) have attracted the attention of physicians and scientists from across the U.S. and from Canada, Australia, Europe, Asia and South Africa, as well.

Dr. Wang says the next step toward helping even more patients is to foster new relationships with other institutions. “We really take our inspiration from local families. These families want to help their own children, but they also want to help others through their own participation in research. Likewise, we want to serve people here in our own backyard, but we also want to serve a wider group of people. We know that we are more likely to be able to do this by partnering with major medical institutions.”

Locally, DDC Clinic is working closely with Akron Children’s Hospital, Case Western Reserve University School of Medicine, and University Hospitals of Cleveland. They have also established collaborations with National Institutes of Health, Johns Hopkins University School of Medicine, Oklahoma Medical Research Foundation, UCLA, Wake Forest University School of Medicine and institutions in Belgium, France and China.

“We want to enhance the quality of life for people with special needs caused by rare genetic disorders – no matter where they live” says Dr. Wang. “And by growing collaborations, we vastly leverage our collective impacts.”

For more information about DDC Clinic for Special Needs Children and its Molecular Diagnostics Lab, visit www.ddclinic.org/laboratory or call 440-632-1668.

Located in the heart of Amish country, just 30 miles east of metropolitan Cleveland, DDC Clinic offers family-centered specialized health care and education, pioneering research to unlock transformational medical information, and diagnostic testing for rare genetic diseases.