

DDC Clinic Seeks Second Physician

DDC Clinic is pleased to announce that, through the generous support of our donors, we are recruiting a much-needed second physician.

We are most grateful to The Catherine L. and Edward A. Lozick Foundation, The Cleveland Foundation and The Elisabeth Severance Prentiss Foundation for supporting our Second Physician Scientist Fund and for helping us to achieve this important goal.

Why We Need a Second Physician

Our patient base, research capabilities and professional collaborations have grown steadily over the years. Since hiring our first and only physician and medical director, Dr. Heng Wang, in 2002, the number of patient families we have served has grown to nearly 1,000. By providing diagnostics, consultations and medical education to other physicians, clinics, hospitals and research centers across the country and around the world, we have impacted thousands more.

We have developed expertise in dozens of rare genetic disorders, some of which were never before described in medical literature. Research findings on our understanding and treatment of these disorders have been published in prestigious journals. Over the last 12 years, Dr. Wang and our laboratory's research and technical director, Dr. Baozhong Xin, have collaborated with regional, national and international institutions on more than 40 peer-reviewed publications.



Dr. Heng Wang has been our sole physician since 2002.

The clinic's growth and expanding collaborations have created opportunities for new discoveries, treatments and cures. With a second physician, we can further our practice of translational medicine, taking what is learned in our research and applying it to new therapies and treatments, advancing the highly personalized medical care that is at the core of our mission.

Our nationwide search is underway and we hope to welcome a second physician to our clinic later this year.

View the full job description at ddclclinic.org.

Research Collaboration Receives International Recognition

An ongoing research collaboration born of DDC Clinic's discovery of the gene responsible for TMC01 Defect Syndrome has recently received international recognition.

Discovery of TMC01 as a disease-causing gene was first reported by DDC Clinic in the journal ***Proceedings of the National Academy of Sciences (PNAS)*** in 2010. Affecting a small number of families in both Amish and non-Amish populations, TMC01 Defect Syndrome is characterized by unusual facial appearance, skeletal abnormalities and significant developmental delays.

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About DDC Clinic



DDC Clinic – Center for Special Needs Children is a non-profit primary care and research facility serving patients with complex medical needs. Located in Middlefield, Ohio, we have been recognized internationally for our state-of-the-art genetic research impacting broad-based health concerns such as heart disease, cancer and neurological disorders.

Our mission is to enhance the quality of life for people with special needs caused by rare genetic disorders. Founded in 1998 by five local Amish families committed to helping tomorrow's special children, we now serve nearly 1,000 patient families in 30 states and several foreign countries.

Our clinic is a unique collaboration of the Amish and non-Amish communities, dedicated doctors and researchers all working together to find answers for parents and treatments for children. The clinic was built on the 'medical home' concept defined by the American Academy of Pediatrics. We provide comprehensive and personalized medical care for special children with over 70 different rare conditions.

Our in-house certified clinical genetics laboratory provides rapid, high quality and affordable testing. We conduct patient centered research – always seeking faster diagnoses, better understanding and improved treatments for our children.

We offer personalized education and support services for patient families. No family is ever turned away based on ability to pay.

DDC Clinic is a gathering place; a place of love, compassion and caring; a place where people take the time to listen and share; a place of faith and hope.

Research Collaboration > from page 1

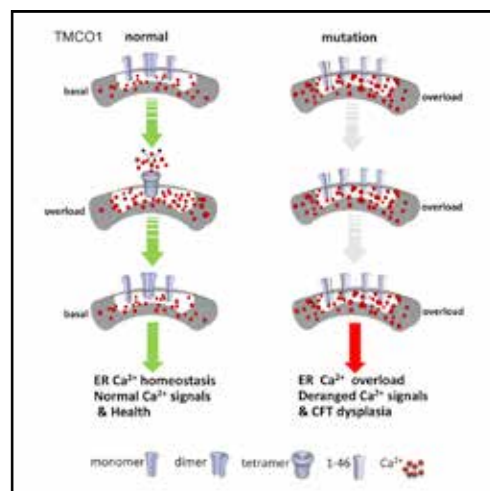
Earlier diagnoses of affected families opened the door to a new field of research, as little was known about the TMCO1 gene's role and function in the body. Functional studies began as a collaboration with Dr. Aimin Zhou's laboratory at Cleveland State University. Expected outcomes were to better understand how the disease develops and help improve future therapeutic strategies.

Over the last couple of years, DDC Clinic's continued research efforts have proven fruitful. Our collaborations with research teams at the Chinese Academy of Sciences in Beijing, China, along with Dr. Zhou's team in Cleveland, led to the implementation of molecular and cellular, biochemical, animal modeling, and imaging studies, which resulted in significant breakthroughs.

Research Findings

Much of the most recent collaborative research has focused on calcium ion channels, which are known to be a critical control mechanism of many cellular functions including gene transcription and cell life cycles. Calcium ion flow must be maintained in a steady-state; interruption of calcium ion balance in our cells has been implicated in a number of severe diseases.

What we found is that TMCO1 is an endoplasmic reticulum (ER) transmembrane protein that actively prevents Ca^{2+} stores from overflowing, acting as a "Ca²⁺ load-activated Ca²⁺ channel." Patients affected by TMCO1 Defect Syndrome were found to have calcium ion



Normal and abnormal calcium ion channel flow.

channels that are overloaded. The significance of this research was first shared in the journal *Cell* in late 2016.

With increased understanding of the gene's function, the next step was to implement animal modeling; disrupting the TMCO1 gene in mouse cells. Subsequent imaging studies of the affected mice revealed that they had similar abnormalities as those of DDC Clinic patients affected by the syndrome, including abnormal skull and skeletal features.

This ten-year research effort has helped bring diagnoses to families and improved our ability to provide treatment to children affected by TMCO1 Defect Syndrome. The research has also made some very significant contributions to the understanding of important fundamental biological processes and will help leverage further discoveries for years to come.

To read the full article on TMCO1, visit ddclinic.org.

Understanding Genetics

Hereditary Hemochromatosis: An Iron Overload Disorder

Hemochromatosis, an iron overload disorder, causes the body to absorb too much iron from the diet. The excess iron is stored in the body's tissues and organs, including the heart, liver, pancreas, skin and joints. Because affected individuals cannot increase the excretion of this iron, excess can build up, damaging tissues and organs.

Several genes play important roles in regulating the absorption, transport and storage of iron throughout our bodies. A mutation in one of these genes can negatively impact iron absorption during digestion, causing excess iron to move to and build up in other parts of the body.

Over a period of years, accumulation in these tissues and organs disrupts their normal functions. Early symptoms are often nonspecific and may include joint pain, abdominal pain and fatigue. Later symptoms can include liver disease, diabetes, heart rhythm abnormalities and arthritis.

A Not So Rare Condition

Although there are several types of hereditary hemochromatosis, the vast majority are *Type 1* which is caused by changes in the *HFE* gene. In fact, Type 1 hemochromatosis is one of the most common genetic disorders in the United States, affecting an estimated one million people. It most often affects people of Northern European descent, including, but by no means exclusive to, the Amish population.

The presence of a mutation in the *HFE* gene does not mean an individual will definitely develop an iron overload condition, but it does mean they are at an increased risk. Family history is also an important factor. Those with a close relative with the condition have a greater chance of being affected. For example, an individual who inherits one copy from each parent of a common mutation in the *HFE* gene (known as C282Y) is at the greatest risk; about 60% of these individuals will be affected. It's important to note that parents of affected individuals each carry one copy of the mutated gene but do not show signs and symptoms of the disorder themselves.

Diagnoses and Treatment

Because of the absence or vagueness of symptoms in the first few decades of life, many individuals affected by Type 1 hereditary hemochromatosis go undiagnosed. Early symptoms such as stiff joints and fatigue may be due to a number of conditions other than hemochromatosis, and many people with the disorder have few signs or symptoms other than elevated levels of iron in their blood. Men typically develop the more

significant symptoms, those associated with organ and tissue damage, between the ages of 40 and 60, while women usually do so after menopause.

In the undiagnosed patient affected by hemochromatosis, symptoms such as vague joint pain and fatigue earlier in life may well have been the signs of developing arthritic joints and impaired pancreatic functioning. As the damage progresses, so does the need for joint replacement and treatment for diabetes later in life. Liver and heart failure are also significant risks.

Higher risk individuals – those with affected relatives and families from populations known to be at increased risk – should consider consulting their physician about genetic testing for hemochromatosis. Although there is no cure, earlier diagnoses can help physicians significantly ameliorate the impact of the condition later in life. Phlebotomy, or removal of blood similar to blood donation, is a relatively simple treatment that can be an effective measure to help reduce excess iron from the body and significantly improve the quality of life for affected patients.

“We have known for some time now that the prevalence of hip replacements is disproportionately high in the Geauga Amish community, and more recently, we have also found a high incidence of undiagnosed hemochromatosis,” says Dr. Heng Wang, DDC Clinic Medical Director. “We are currently investigating if these two observations are connected. What we do know is with earlier diagnosis and treatment of those with hemochromatosis, many hip replacements can potentially be avoided.”

DDC Clinic Lab Develops New Amish Panel

DDC Clinic's Molecular Diagnostics Laboratory has developed a rare disease panel capable of simultaneously testing for 146 rare conditions found in the Amish population.

The new panel will enable physicians serving Amish families to more efficiently diagnose patients with rare genetic disorders, leading to earlier treatments, improved health outcomes and less burdensome medical costs.

All too often, investigating genetic disorders in Amish patients begins when a patient's disorder has already progressed significantly. The new panel will aid in early diagnosis and intervention, which can help to prevent the progression of devastating genetic diseases and life-threatening health complications.



Dr. Baozhong Xin at work in our lab.

The Amish rare disease panel will serve physicians and patients in a number of important ways:

Improve the diagnostic capabilities of physicians serving the Amish community.

Many physicians across the country have little to no experience with disorders that affect the Amish population and little access to the affordable tests needed to detect them. Children often go undiagnosed at great cost to their health. The new panel will give physicians access to the tools they need for effective diagnoses, reducing the needless suffering and long hospital stays that Amish families often endure while waiting for an answer.

Supplement state newborn screenings.

Standard newborn screening panels in most states don't test for many diseases commonly found in the Amish community which can affect the health and development of an infant. When performed as a supplement to state newborn screenings, the new panel can detect and provide early diagnosis of rare diseases, allowing treatment to begin sooner. The new panel will be offered initially to Northeast Ohio Amish families, after which it will be made available to other Amish communities around the country.

Provide carrier testing for adults.

The new panel will offer accurate, affordable genetic testing for Amish adults, providing information on their predisposition to genetic disorders and identifying if they're carriers for diseases which could get passed on to their children.

The new Amish panel will be available later this year. If you would like more information on genetic testing for you or a family member, please contact DDC Clinic at 440-632-1668.

DDC Clinic wishes to thank The Lake-Geauga Fund of The Cleveland Foundation and the Char and Chuck Fowler Family Foundation for providing support for the development of the Amish rare disease panel. We also wish to thank the Ohio Developmental Disabilities Council for their early support in the development of tests included in the expanded panel.

Genetic Counselor Opportunity

We want to say goodbye to Chris Wensel, who served as DDC Clinic's genetic counselor for three years. Chris has left to pursue another career opportunity. We appreciate her hard work and dedication. Thank you, Chris, for a job well done, and we wish you success in your new endeavor.

Our Molecular Diagnostics Laboratory is currently seeking a genetic counselor to provide genetic testing consultations and education services to patients, families and healthcare providers.

View the full job description at ddcclinic.org.

International Presentations



Dr. Wang spoke at the Stroke Science Summit in Beijing.

Beijing Presentation

Dr. Wang, DDC Clinic Medical Director, traveled to Beijing, China this past February to be one of the keynote speakers at the Stroke Science Summit in Beijing, China. The other three keynote speakers were Dr. Jonathan Rosand from Harvard Medical School, Dr. Tabassome Simon from France and Dr. David Spence from Canada.

In his lecture, *Precision Medicine at Work – From Gene Discovery to Disease Treatment, From Amish to Chinese*, Dr. Wang spoke of what we learned from our discovery of SAMS Association, our recent breakthroughs, and our clinic's treatment of the disease. From examining a rare genetic disease, SAMS Association, to looking at a broad-based health problem, stroke, Dr. Wang's unique presentation was one of the conference highlights.

Interestingly, Dr. Wang's pager went off just as he approached the podium to give his presentation. One of his patients from Middlefield needed an adjustment in seizure medication. The audience was impressed by our clinic's commitment to our patients and our professional contributions to medical research.

After the Stroke Science Summit, Dr. Wang was invited to serve on the Academic Committee of the Chinese National Stroke Registry.

Singapore, Malaysia and Hong Kong

Early last year, Dr. Wang was invited by Fonterra Co-operative Group of New Zealand to present the preliminary results of our clinical trial of oral ganglioside supplements in children with ganglioside synthase deficiency to the Annum Advisory Board in Singapore.

Following his Singapore presentation, Dr. Wang traveled to Kuala Lumpur, Malaysia and Hong Kong to give several more lectures to physicians about the critical role of gangliosides in early child development and the other important work carried out at DDC Clinic.

Recent Grant Awards

Thank you to the following visionary donors for their support of our Second Physician Scientist Fund.

The Catherine L. and Edward A. Lozick Foundation
For their \$180,000 three-year challenge grant.

The Cleveland Foundation
For their \$135,000 two-year grant award.

The Elisabeth Severance Prentiss Foundation
For their \$100,000 three-year grant award.

The Ortino Family Foundation
For their \$10,000 grant award.

DDC Clinic is grateful for the generous support from the following friends.

The Fred A. Lennon Charitable Trust
For their \$60,000 grant award for the purchase of new laboratory equipment.

Ohio Developmental Disabilities Council
For their \$50,000 grant award in continued support of the Amish Community Project.

The Char and Chuck Fowler Family Foundation
For their \$50,000 award to assist in the development, piloting and expansion of an Amish rare disease panel.

Bessie Benner Metzenbaum Fund
For their \$15,000 award for general operating support and their ongoing commitment to our mission and program services.

The Lake-Geauga Fund of the Cleveland Foundation
For their \$9,300 award to assist in the development of an Amish rare disease panel.

Anonymous Donor
For their \$5,800 award in support of nutrition and patient assistance programs.

Anonymous Donor
For their \$5,000 award for general operating support.

William and Margaret Clark Charitable Gift Fund
For their \$3,000 award for general operating support.

Christ Child Society
For their \$2,000 award in support of patient assistance programs.

We wish to thank all who contributed to our 2017 year-end annual appeal. We raised a total of \$104,264, of which \$40,940 came from individuals in support of our Second Physician Scientist Fund.

DDC Clinic Welcomes Sunshine Training Center

DDC Clinic is looking forward to having a new next-door neighbor, the Sunshine Training Center, a workplace for special needs Amish adults. Construction of the new facility is expected to begin in late spring, and the center plans to open its doors in the fall of this year.



The mission of the Sunshine Training Center is to offer opportunities to Amish adults with developmental disabilities to work, serve and participate in their community according to their desires and the desires of their families. Work and life experiences will be tailored to each adult's abilities.



DDC Clinic and the Sunshine Training Center worked together to acquire the six acres of property for the training center's construction. Well-suited as neighbors, the two non-profit organizations have complementary missions; many of the adults who will attend the Sunshine Training Center are also DDC Clinic patients.

"Offering adult services was always something that our founders envisioned," says Blake Andres, DDC Clinic executive director. "Being able to partner with Sunshine Training Center, a community-based organization with a mission very similar to ours, enables us to move closer to that vision and better serve the community."

Although its facility isn't built yet, the Sunshine Training Center is already successfully piloting a program in a shop adjacent to the family home of one of its board members. Eighteen special needs adults are currently participating in the program, happy and proud to bring home a paycheck to their families. Plans are to transition to the Sunshine Training Center's new facility in the fall.

Community Groups

MOM'S COFFEE BREAK

We invite mothers of special needs children to our Mom's Coffee Break get-togethers, where you can visit with other mothers, share information and enjoy a little time to relax with each other.

The mothers' group meets at DDC Clinic on the second Wednesday of every month. Coffee is provided, and you may bring a light snack if you wish. Babysitting is not available, but you're welcome to bring your preschooler with you.

Upcoming dates for Mom's Coffee Break are:

- Wednesday, April 11 (10 am – noon)
- Wednesday, May 9 (10 am – noon)

The Mom's Coffee Break group will not meet during the summer months when children are out of school, but the group will resume in the fall.

Holmes County Trip

The Mom's Coffee Break Group will take a day trip to Holmes County on Wednesday, May 2. The trip includes a visit to New Leaf Center, a clinic for special needs children in Mt. Eaton, followed by lunch and shopping.

Transportation will be provided, leaving Middlefield at 9 a.m. and returning at 5 p.m. Please bring money for lunch and shopping. Please call Anna Miller at 440-693-4629 by Wednesday, April 18 if you would like to go.

DDC CLINIC QUILTING AND CRAFT CLUB

The ladies of the DDC Clinic Quilting and Craft Club invite any interested ladies from the community to bring a lunch and join them on the first Wednesday of each month from 9 a.m. to 1 p.m. at DDC Clinic.



The Quilting and Craft Club works on a variety of projects, focusing mostly on creating hand-stitched quilts ranging from crib size to king size. The group donates at least three quilts every year to benefit auctions. The ladies also sew together six-inch squares for comforter tops which are sent overseas to help the needy through Christian Aid Ministries.

Now in its seventh year, the group enjoys working together and spending time visiting. What started years ago with just a handful of ladies has now grown to 15-25 at each meeting, and the group always looks forward to welcoming new faces.

Children's Immunization Program

Childhood vaccinations are important to preventing disease and maintaining good health.

You can get your children vaccinated at no-cost at DDC Clinic through the Vaccines for Children Program (VFC) which helps ensure that all children have a better chance of getting their recommended vaccinations on schedule.

Our clinic has given free immunizations through the VFC program since 2009. Last year alone, we gave 1,347 vaccinations to 570 children.

Vaccines available through the VFC program are those recommended by the Advisory Committee on Immunization Practices (ACIP). These vaccines protect babies, young children and adolescents from 16 diseases.

To make an appointment for your children to be immunized, please call DDC Clinic at 440-632-1668. Appointments are available between 9:15 a.m. and 4 p.m. on the second and fourth Wednesday of every month.



DDC Clinic Calendars On Sale

It's not too late to purchase your 2018 DDC Clinic fundraiser calendar and help special needs children.



Your \$100 calendar purchase includes a mail-in raffle ticket, good for your chance to win a prize valued at \$500 - \$1,000. Each month in 2018, we'll draw a different winner who may choose from a selection of prizes including a Maytag Wringer washer, DeWalt 20-volt 5-tool combo kit, Bernina sewing machine, Weber propane grill and more.

To purchase your calendar and raffle ticket, please call DDC Clinic at 440-632-1668.

Our January raffle winner was Susie Mae Erb from Orwell, and our February winner was Marcia Kuhns from Middlefield.

2018 Benefit Auctions

Our friends in several Amish and Mennonite communities will once again hold benefit auctions in support of DDC Clinic's mission to help special children. The 2018 auction dates are set, so please mark your calendars and plan on joining us.

12th Annual Shiloh Mennonite Community Benefit Auction
Saturday, July 14 | Shiloh, OH

6th Annual Spartansburg Benefit Auction
Friday, August 10 | Spartansburg, PA

18th Annual Geauga Benefit Auction
Saturday, October 13 | Middlefield, OH

Guardianship Meeting – July 10

DDC Clinic has been working with Geauga County Probate Judge Tim Grendell and his staff to hold informational meetings and court hearings for families in the community that have questions about guardianship of their adult children. You must have guardianship of your special needs child once they turn 18 years old. Our next informational meeting will be at DDC Clinic on Tuesday, July 10 at 5:30 p.m. **To register or for more information, call Patti Gallagher at 440-632-1668.**



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ddclinic.org

Enhancing the quality of life for people with special needs caused by rare genetic disorders.

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JOIN US FOR OUR



Patchwork Benefit

SATURDAY, APRIL 14 • 5:30 P.M.

There's still time to purchase your tickets to our Patchwork Benefit and help support our mission.

Enjoy a special evening celebrating the achievements and continued progress of DDC Clinic with food, drinks, live music, auctions and a special program about our clinic's work.

Your support helps us to provide life-changing diagnoses and treatments to children affected by rare genetic disorders.

For tickets, call 440-632-1668 or go to ddclinic.org.

