CMTA
Charcot-Marie-Tooth Association

Help for Today, Hope for Tomorrow

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Now, more than ever, the Charcot-Marie-Tooth Association is providing the CMT community hope for tomorrow. The pace of its Strategy to Accelerate Research (STAR) quickened in 2016 as its global team of renowned scientists pushed forward with a structured, collaborative drug development program that includes the latest scientific and technological advances. CMTA partners in the pharmaceutical and biotechnology industries, along with the National Institutes of Health, have completed initial screening of millions of compounds at labs nationwide and secondary screening is ongoing.

In early 2017, STAR research progressed to the next level as the CMTA established, for the first time ever, a Clinical Expert Board charged with providing guidance and support to the CMTA's alliance partners, helping to assure the success of clinical trials.

Until now, treatment for those with Charcot-Marie-Tooth has been limited to therapeutic interventions, including bracing, physical therapy and surgery. Thanks to STAR, the hope for a drug treatment is poised to become a reality.

While the CMTA is pushing hard on drug discovery, it also offers community members help for today. The CMTA branches provide members education, support and services while Patient/Family Conferences offer a chance for members to get firsthand information from the clinicians and researchers who are fighting to cure their disease. Numerous publications are available, including the long-running CMTA Report and CMTeen, an online magazine by, for and about teenagers with CMT. The CMTA added Camp Footprint to its roster of services in 2016, a free, week-long sleepaway camp that allowed kids with CMT to meet and bond with their peers, many for the first time.

What is CMT ?

Charcot-Marie-Tooth (CMT) is the most commonly inherited peripheral neuropathy, estimated to affect one in every 2,500 people, more than 2.8 million people worldwide, without regard to age, gender or ethnicity. Identified in 1886 by three physicians—Jean-Martin Charcot, Pierre Marie and Howard Henry Tooth—CMT is a progressive disorder that slowly damages the nerve cells leading to a person's extremities. There is no way to predict how far or how fast the disease will progress, and the severity varies widely from person to person. Some are able to go about their lives with only moderate difficulty, while others require greater assistance. In rare cases, CMT can be fatal.

Signs and Symptoms of CMT

Early signs include frequent tripping or clumsiness, often accompanied by an abnormal burning sensation in the feet or hands. As the disorder progresses, symptoms may include:

- Weakness and loss of function in feet/legs or hands/arms
- Neuropathic pain
- Foot drop, poor balance and gait abnormalities
- Sensory loss or abnormal sensation
- Structural changes, such as high arches, hammertoes, claw fingers or toes, scoliosis, kyphosis or muscle loss

Inheritance Factors

Each child of a person affected with the dominant form of CMT has a 50-50 chance of inheriting the disease. People who carry the recessive CMT gene can also pass the disease on to their children or CMT can appear spontaneously in any family as a new mutation and then be passed on to future generations.

There Is No Known Cure for CMT

Although there is no known cure for CMT, common treatments include moderate exercise, physical and occupational therapy, bracing with custom-fitted orthoses and surgical intervention.

Diagnosis

In addition to family history and clinical features, electromyographic studies that measure the speed and strength of nerve conduction in the extremities are often performed to confirm a diagnosis of CMT. Genetic testing can also be done in order to identify a specific subtype of CMT. Once a subtype is identified in a family, other family members may have nerve conduction or genetic testing to determine if they are also affected.

The mission of the CMTA is to support the development of drugs to treat CMT, to improve the quality of life for those with CMT, to increase awareness about CMT, and, ultimately, to find a cure. Our vision is a world without CMT.

Meet the Charcot-Marie-Tooth Association

The staff and board of the CMTA all have CMT or loved ones with CMT. Quite literally, we feel your pain. That's why we're working as hard as we can to find treatments for CMT—to halt it in its tracks before it hobbles our children or disables our grandchildren. There's even research suggesting that nerves can be re-myelinated and that those of us who currently suffer from the disease may see some relief in our lifetimes. While we work hard for the future, we're also delivering the highest quality programs and services today. Before flipping ahead to learn more about STAR and how you can invest in a world without CMT, please take a moment to get to know us and find out what we're doing to make a difference in people's lives.

Overview

Founded in 1983, the CMTA is the leading source of information about CMT for more than 30,000 patients and families, supportive friends and medical professionals. The CMTA offers a variety of educational materials and conferences, coordinates more than 70 local CMTA branches nationwide, provides physician referrals and works closely with the clinical and research communities. The CMTA is also the leading financial sponsor of research within the CMT community, and it is the only CMT-specific patient advocacy organization in the United States strategically aligned with the National Institutes of Health Rare Disease Clinical Research Network (RDCRN).

Independent Rating and Review

In 2017, the CMTA earned a three-star rating from Charity Navigator, meaning that it exceeds or meets industry standards and performs as well as or better than most charities in its cause.The CMTA has also consistently been awarded the Independent Charities Seal of Excellence by the Independent Charities of America, an award given to organizations that annually meet the highest standards of public accountability, program performance and cost-effectiveness.

Gilles Bouchard
Interim CEO

Ori Bash
West Coast Regional Branch Manager

Michelle Hayes
Midwest Regional Branch Manager

Kim Magee
Director of Finance

Bethany Meloche
Director of Social Media

Susan Ruediger
Director of Development

Marcia Semmes
Director of Print Communications

Jeana Sweeney
Director of Community Services

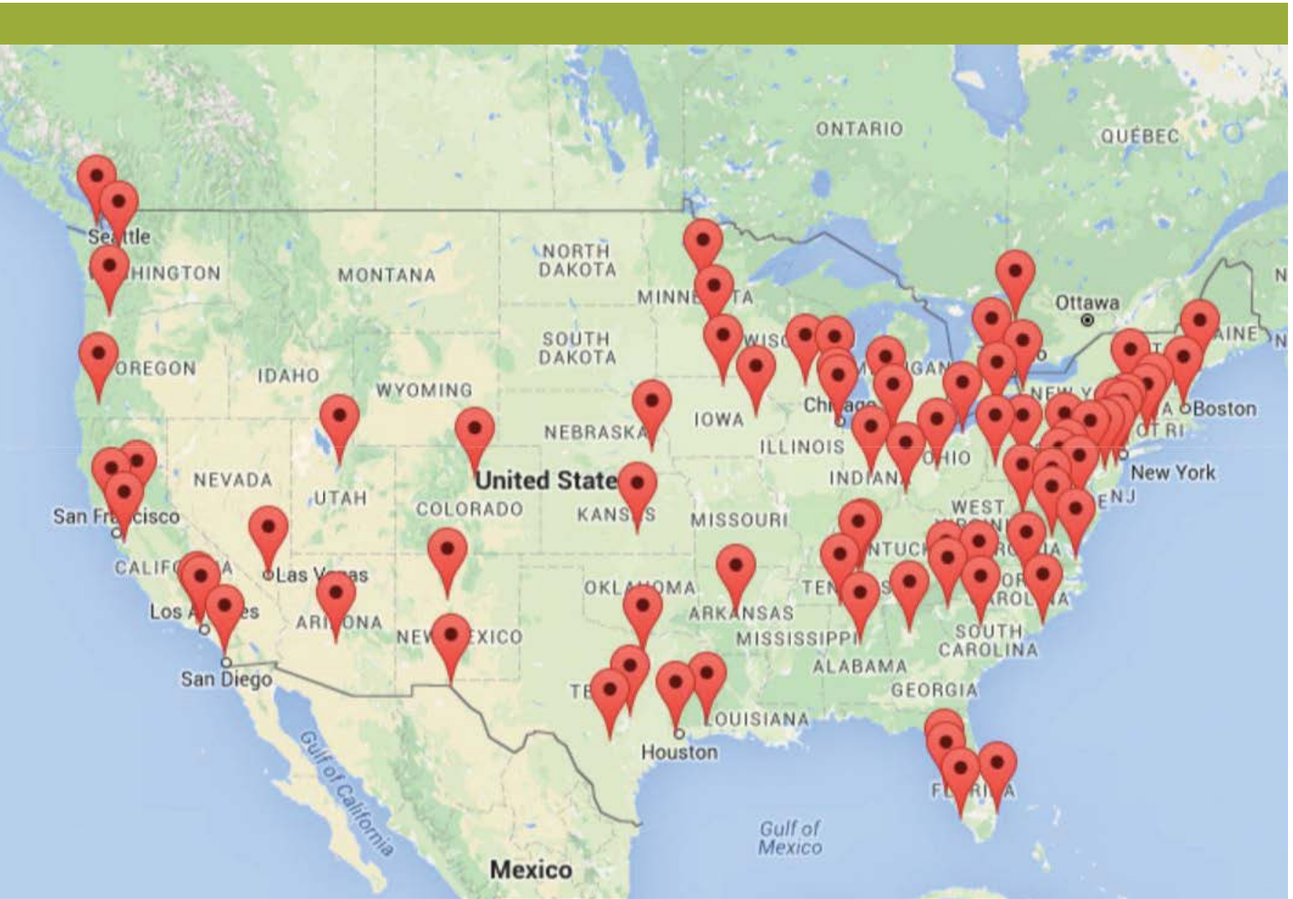
CMTA Branches

CMTA branches are the main touchpoint between the national organization and its members: The CMTA provides members education and support and members raise funds and awareness for the parent organization.

More than 70 branches in the United States and Canada provide help and hope to members who meet regularly to share their own personal experiences and hear from leading clinicians and scientists provided as guest speakers by the CMTA.

CMTers are a creative group when it comes to raising funds and awareness. During Awareness Month 2016, the letters CMT went up in lights on an office building in Portland, Maine, and a bridge in Johnstown, Pennsylvania, was bathed in orange and blue light. Branches held a total of 22 Walks, Cycles and Swims 4 CMT. More than 1,500 people nationwide came out to support and participate in these incredible events, raising $152,600 in September alone. In addition, 22 states proclaimed September CMT Awareness Month.

All in, CMTA branches contributed an astounding total of $812,895 to the CMTA and STAR in 2016.



The CMTA Clinical Centers of Excellence

Improving the quality of life for those with CMT is one of the CMTA's primary missions and one way we accomplish this mission is by sponsoring patient-centric, multidisciplinary CMT clinics, staffed by some of the highest quality CMT clinicians and researchers in the world. Through these CMTA-designated Centers of Excellence, children, adults and families affected by CMT can be assured of receiving comprehensive care by a team of CMT experts.

The Centers of Excellence will be even more important as the CMTA begins clinical trials for candidate therapies. The success of these trials will largely depend on how much we know about the "natural history" of CMT—how different types of CMT progress over time and whether novel medications are slowing the course of the disease. Much of that information will be supplied by the Centers of Excellence. The Centers roughly correspond to the 21 international sites that make up the NIH Inherited Neuropathies Consortium (INC)—a group of academic medical centers, patient support organizations and clinical research resources sponsored in part by the CMTA.

CMTA CENTER OF EXCELLENCE	CLINICAL DIRECTOR
Cedars-Sinai Medical Center (California)	Drs. Robert Baloh and Richard Lewis
Children's Hospital of Philadelphia (Philadelphia)	Dr. Sabrina Yum
Connecticut Children's Medical Center (Farmington, CT)	Dr. Gyala Acsadi
Harvard University (Massachusetts)	Drs. William David, Florian Eichler, Vera Fridman and David Chad
Johns Hopkins University (Baltimore)	Dr. Thomas Lloyd
Lucile Packard Children's Hospital at Stanford (Palo Alto)	Dr. John Day
Nemours Children's Hospital (Orlando)	Dr. Richard Finkel
Stanford Hospital (Stanford)	Dr. John Day
University of Iowa (Iowa City)	Drs. Michael Shy, Laurie Guttman and Nivedita Jerath
University of Miami (Florida)	Dr. Mario Saporta
University of Michigan (Michigan)	Dr. Sindhu Ramchamdren
University of Minnesota (Maple Grove)	Dr. David Walk
University of Pennsylvania (Philadelphia)	Dr. Steven Scherer
University of Rochester (New York)	Dr. David Herrmann
University of Texas Southwestern (Dallas)*	Drs. Susan Iannaccone and Diana Castro
University of Utah (Utah)	Dr. Nicholas Johnson
University of Washington (Seattle)	Dr. Michael Weiss and Dr. Leo Wang
Vanderbilt University (Nashville)	Dr. Jun Li
INTERNATIONAL	
The Children's Hospital (Sydney, Australia)	Dr. Joshua Burns
The Nat'l Hospital for Neurology & Neurosurgery, (London, England)	Drs. Mary Reilly and Francesco Muntoni
C. Besta Neurological Institute (Milan, Italy)	Dr. Davide Pareyson
University of Antwerp (Belgium)	Dr. Jonathan Baets

The Centers of Excellence are part of the Inherited Neuropathies Consortium (INC), which is funded by the CMTA, the MDA, and the National Institutes of Health. Worldwide, more than 8,575 patients with CMT have been enrolled in protocols and their data, de-identified to protect patient privacy, is housed in a common repository. As a result of this collaboration, a new CMT evaluation scale for children has been established, along with a new evaluation system for adults, and an infrastructure has been developed to perform natural history studies and clinical trials for CMT.

*UT Southwestern is not part of INC.

Board of Directors

The CMTA is governed by a voluntary Board of Directors whose members bring both professional competence and personal commitment to their task. These business owners, executives, doctors and lawyers oversee the organization's operations and strategy for promoting awareness, funding research and finding a cure. Because they are all affected by CMT, they are deeply committed to the organization and annually make significant financial contributions to ensure that it meets its goals.

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Former Chairman and CEO
Livescribe, Los Altos, CA

Gary Gasper (Treasurer)
Partner, Ernst & Young
Co-leader of the Washington Council
Ernst & Young, Washington, D.C.

Herb Beron (Secretary)
Financial Advisor
Florham Park, NJ

Stephen Blevit, Esq.
Partner, Sidley Austin, LLP
Los Angeles, CA

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Premiere Networks, a division of
Clear Channel Media + Entertainment
New York, NY

Steve O'Donnell
President, Steven F. O'Donnell Inc.
Elkridge, MD

Chris Ouellette
Vice President of Operations and Service, Alpha Analytical
Shelburne, VT

Elizabeth Ouellette
Civic Volunteer and Community Relations Expert, Los Altos, CA

Phyllis Sanders, Esq.
Partner, The Sanders Law Firm
Mineola, NY

Steven Scherer MD, PhD
Professor of Neurology
Perelman School of Medicine
University of Pennsylvania
Philadelphia, PA

Michael Shy, MD
Professor of Neurology
Co-Director of Neuromuscular Program, Co-Director of MDA Clinic
Director of the CMT Clinic
Carver College of Medicine
University of Iowa, Iowa City, Iowa

John Svaren, PhD
Associate Professor
Department of Comparative Biosciences, Waisman Center
University of Wisconsin-Madison
Madison, WI

Lawrence Wrabetz, MD
Professor of Neurology and Biochemistry Director, Hunter James Kelly Research Institute
University at Buffalo, Buffalo, NY

Special Advisors to the Board

Bruce Chizen
Former CEO, Adobe Systems

Patrick Livney
Former CEO, CMTA

The CMTA Advisory Board

Members of the CMTA Advisory Board bring both expertise and empathy to their positions, assisting people with CMT in dealing with some of the critical issues facing them, from finding the most suitable orthotics to the best balance exercises to tips on how to talk about CMT. They also write articles for The CMTA Report, participate in monthly webinars and assist CMTA members who have questions in areas in which they would be considered experts.

Jonah Berger – Business Owner, The Rhythm Within
Gregory Carter, MD, MS – Physiatrist
Bob DeRosa – Marketing/Creative Consultant
Katy Eichinger, PT, DPT, NCS – Physical Therapist
Tim Estilow, OTR/L – Occupational Therapist
Shawna Feely, MS, CGC – Genetic Counselor
Valery Hanks, OTR/L, C/NDT - Occupational Therapist
Sarah Kesty, MA – Special Educator
Sean McKale, CO, LO – Orthotist
Bethany Meloche – Youth Director
Tom Meloche – Consultant and writer
David Misener, BSc, CPO, MBA – Orthotist
Elizabeth Misener, PhD, LMSW – Social Worker
James Nussbaum, PT, PhD, SCS, EMT – Physical Therapist
Sabrina Paganoni, MD, PhD – Harvard Medical School Professor
Glenn Pfeffer, MD – Orthopedic Surgeon
Clark Semmes – Community Activist
Carly Siskind, MS, CGC – Genetic Counselor
Greg Stilwell, DPM – Board Certified Podiatrist
Amy Warfield, PT, DPT – Physical Therapist
David Tannenbaum, LCSW -Psychotherapist

The STAR Advisory Board

The CMTA's STAR Advisory Board comprises a Scientific Advisory Board, a Therapy Expert Board and a Clinical Expert Board.

The Scientific Expert Board provides scientific input for projects that are ongoing or proposed.

The members are:

John Svaren, PhD, Chair, University of Wisconsin
Frank Baas MD, PhD, University of Amsterdam, Netherland
Robert H. Baloh, MD, PhD, Cedars-Sinai Medical Center, LA
M. Laura Feltri, MD, University at Buffalo
Gabsang Lee, PhD, Johns Hopkins University, Baltimore
Jun Li, MD, PhD, Vanderbilt University, Nashville
Rudolph Martini, PhD, University of Würzburg, Germany
Albee Messing, VMD, PhD, University of Wisconsin
Klaus-Armin Nave, PhD, Max Planck Institute for Experimental Medicine, University of Göttingen, Germany
Brian Popko, MD, University of Chicago
Mario Saporta, MD, PhD, University of Miami
Steven S. Scherer, MD, PhD, University of Pennsylvania
Lawrence Wrabetz, MD, University at Buffalo
Stephan Züchner, MD, PhD, University of Miami

The Clinical Expert Board (CEB) provides expert guidance and support to the CMTA's alliance partners, helping to assure the success of clinical trials.

The members are:

Michael E. Shy, MD, CEB Chair, University of Iowa
Mary Reilly, MD, CEB Co-Chair, National Hospital London, England
Joshua Burns, PhD, University of Sydney, Australia
Richard Finkel, MD, Nemour's Children's Hospital Orlando, Florida
David Herrmann, MD
University of Rochester (New York)
Christopher Klein, MD
Mayo Clinic, Rochester, Minnesota
Michael McDermott, PhD, Consultant
University of Rochester Medical Center
Davide Pareyson, MD
Besta Institute, Milan, Italy
Steven S. Scherer, MD, PhD
University of Pennsylvania

The Therapy Expert Board is responsible for ensuring that each research project has translational value for the CMTA's STAR mission of developing therapeutics for CMT patients.

The members are:

Mark Scheideler, PhD, Chair
HumanFirst Therapeutics LLC
David Herrmann, MD
University of Rochester (New York)
Christopher Klein, MD
Mayo Clinic, Rochester, Minnesota
Lars J. Knutsen, PhD
Discovery Pharma Consulting LLC
Claes Wahlestedt, MD, PhD
University of Miami
Tage Honore, PhD
Aestus Therapeutics Inc.

In addition to funding research, the CMTA delivers high-quality education and awareness resources to the CMT community. We typically host two full-day Patient/Family Conferences annually, with additional half-day conferences nationwide. We publish educational materials for people living with CMT, for parents, for teens and for clinicians. We provide support, education and awareness through our 70 branches and our robust virtual presence. And we enlist partners whose services improve the quality of life for those with CMT. Members can access resources by calling 1-800-606-2682 or visiting www.cmtausa.org.

Education, Awareness & Community Services

PUBLICATIONS

- **The CMTA Report -** First published in 1987, our quarterly newsletter provides patient education and practical support.
- **CMTeen –** A quarterly online magazine by, for and about the 13- to 19-year-old members of the CMT community.
- **The CMT Guide to Orthotics -** Developed in partnership with the Lower Extremities Review specifically for individuals with CMT, this guide provides valuable information about orthotics and AFOs and is intended to educate the CMT community as well as practitioners who create and fit orthotics and AFOs.
- **Genetics of CMT -** An in-depth look at the genetics of CMT, including family history, genetic testing and reproductive options by Shawna Feely, certified genetics counselor and CMTA Advisory Board member.
- **Managing Neuropathic Pain -** CMTA Board Member Steven Scherer, MD, PhD, discusses the causes of neuropathic pain and provides detailed information about the medications used to treat it.

CMTA WEBINARS

Since Dr. Michael Shy presented "Everything You Wanted to Know About CMT and More" in September 2013, the CMTA has been scheduling webinars on a monthly basis. Presenters cover a wide variety of topics intended to inform and educate everyone about CMT, from foot problems to bracing to finding CMT's silver lining. Members have the opportunity to submit questions for speakers, watch live, or watch a recording at their leisure.

PATIENT/FAMILY CONFERENCES

The Charcot-Marie-Tooth Association is all about making connections—between patients and doctors, among the doctors and researchers who do the vital research on a treatment for CMT, and between patients and other patients. Nowhere is this more evident than in the Patient/Family Conferences the CMTA holds each year, often in collaboration with a CMT Center of Excellence or multidisciplinary CMT clinic. These all-day conferences allow people with CMT and their families to get up-to-date information on the CMTA's Strategy to Accelerate Research (STAR) from the scientists leading the effort to find treatments for CMT. They also feature presentations from local clinicians and health care providers on topics such as the causes and diagnosis of CMT, physical and occupational therapy, orthotics and bracing, orthopedic surgery, genetic counseling and more. Just as importantly, the Patient/Family Conferences allow people who have CMT to connect with other people who have CMT, some of them for the first time in their lives.

ONLINE EDUCATION AND SUPPORT

The CMTA also provides education and support through a robust online community. Our Facebook community has grown to more than 27,000 followers, who take part in a constant stream of conversation, posting hundreds of comments daily. In addition, the CMTA has more than 2,400 Twitter followers; more than 1,700 Pinterest followers; and more 500 LinkedIn professionals. And in an online Awareness Month campaign in September 2016, we created a fun #1in2500 Twibbon for people to upload to Facebook. The response was phenomenal. More than 2,300 people uploaded the Twibbon to create awareness on their social media pages!

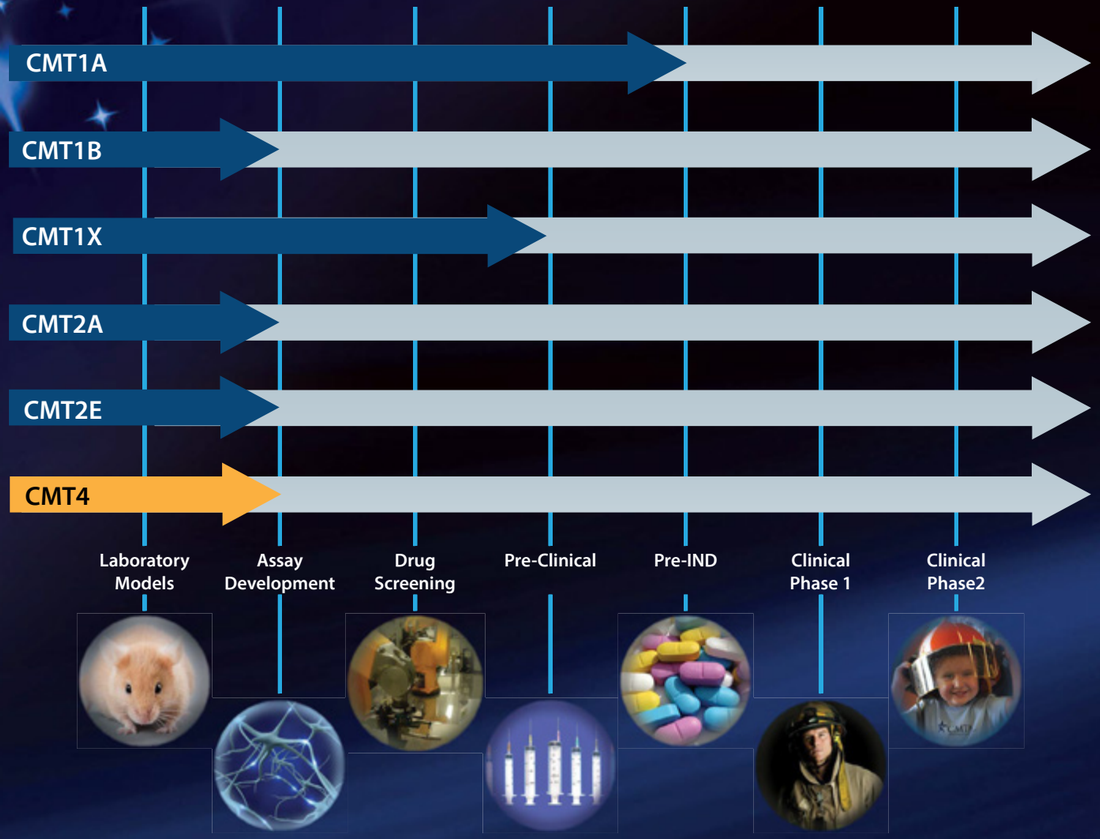
FIRST-EVER U.S. CAMP FOR KIDS WITH CMT

Forty campers and 25 staffers converged on Camp Kon-O-Kwee in August 2016 for the first-ever Camp Footprint, a free, five-day sleepaway camp for youth with CMT. For many campers, the experience was life-changing. This was just the beginning. The second annual Camp Footprint takes place August 14-18, 2017.

STAR

Strategy to Accelerate Research

The CMTA is aggressively fighting to find a pharmaceutical treatment, and, ultimately, a cure for all types of CMT. We are currently funding research for the types of CMT that affect approximately 90 percent of all people with CMT. The chart below shows the status of each of those projects.



In 2008, the CMTA launched STAR as a strategic research program to maximize breakthroughs in genetics and dramatically speed up the pace of CMT research. The opportunities associated with STAR stem from the fact that the causes of CMT have been pinpointed, leading to the identification of more than 90 specific gene defects. Many of these genetic mutations can be replicated in petri dishes and in animal models. The STAR approach involves:

1. Identifying the best researchers in the world to develop and execute plans in support of our strategy.
2. Measuring progress and funding the most successful projects.
3. Encouraging and facilitating active collaboration and sharing among our researchers.
4. Developing intellectual property to encourage partnerships with pharmaceutical companies that can potentially help fund future research.

The Strategy:

Creation of Cell Lines/Assays (Tests)

Our scientists replicate the CMT cells of mice/rats and place them in tiny dishes.

High Throughput Screening (HTS)

Then we robotically test hundreds of thousands of compounds (drugs) of interest on these cells to see how they react to the medications.

Animal Models

Parallel with the creation of cell-based assays and the HTS process, we create animal models with each disease type and test the most promising medications on them.

Alliance Partnerships

The CMTA works in collaboration with top pharmaceutical, biotech and governmental organizations.

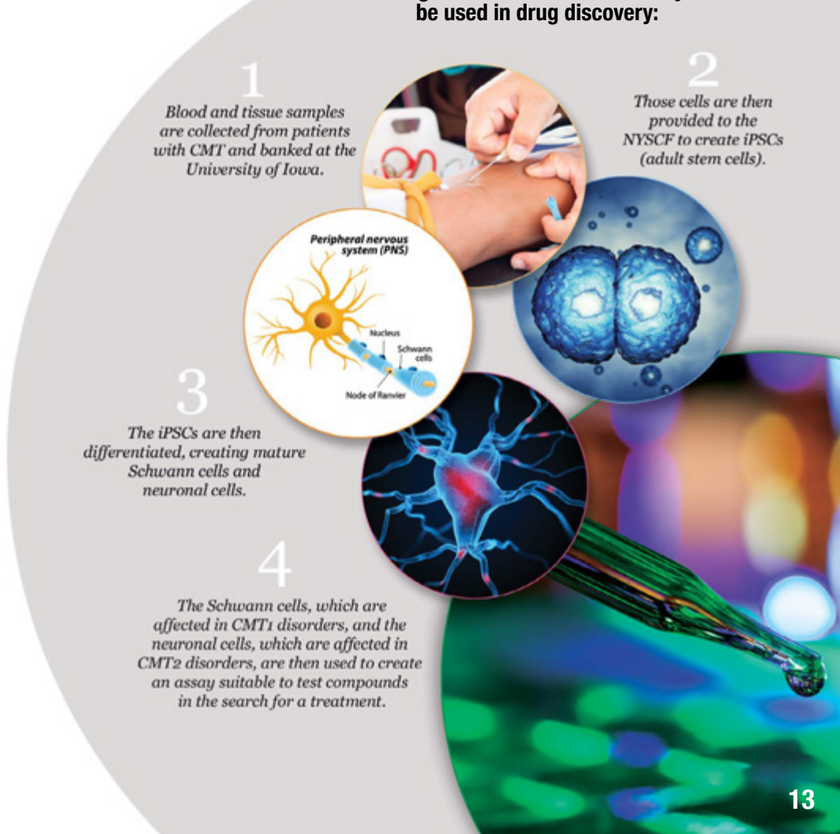
The Human Element: Skin Cells to Stem Cells

Realizing that testing on animal models does not always translate into cures for humans, the CMTA partnered with the New York Stem Cell Foundation (NYSCF), which transforms blood and tissue samples from people with CMT into human stem cells, which can then be turned into nerve cells and Schwann cells. Schwann cells make myelin, the protective layer covering the nerve fibers. Promising medications are then tested on the newly formed human nerve and Schwann cells.

Clinical Trials

Human clinical trials for promising therapies will take place at the CMTA-sponsored Centers of Excellence, which will provide the natural history of carefully evaluated patients. The CMTA's Clinical Expert Board is collaborating with scientists in the development of clinical biomarkers to measure candidate drugs' effects on the progress of the disease. We need to build our database of people with CMT to have successful clinical trials so it is critical that everyone in the CMT community join the CMT Patient Contact Registry (www.rarediseasesnetwork.org/cms/inc/registry).

STAR has developed a process of building human-based cellular asays to be used in drug discovery:



Type 1A
Samuel and Urijah Faulds, 3 and 6

STAR — CMT Type 1A

CMT Type 1A is caused by the duplication of the Peripheral Myelin Protein 22 (PMP22) gene, which leads to the demyelination of the peripheral nerves. Our partnership with Genzyme, a Sanofi company, resulted in screening their entire compound collection (almost 2 million compounds) and has identified some candidate compound series for treating CMT1A, which are being tested in a variety of secondary assays and animal models. In addition, both laboratory and animal models of CMT1A have been made available to additional CMTA alliance partners for testing of therapeutic compounds, and we hope to be able to share some of these promising data in the very near future. These models include a human stem cell model of CMT1A, made in collaboration with the NYSCF, which in addition to therapeutics testing, is being made available to the research community. Dr. Michael Shy is leading efforts, together with the members of our Clinical Expert Board (CEB), to develop the best outcome measures for clinical trials of CMT1A therapeutics.

Type 1B
Lia O'Sullivan, 6

STAR — CMT Type 1B

This CMT subtype is caused by mutations in Myelin Protein Zero (MPZ). Board members Dr. Michael Shy and Dr. Lawrence Wrabetz are collaborating with Dr. James Inglese at NIH to explore the unfolded protein response pathway, which plays a causative role in CMT1B. Studies of this pathway have yielded some candidate compounds for treatment, which have been shown to be effective in one model of CMT1B. We are developing studies to see if this approach will treat the three major clinical presentations of CMT1B. Another approach in development is to inhibit the immune response to the nerve damage that occurs in CMT1B.

Type 1X
William Stuhlmueller, 9

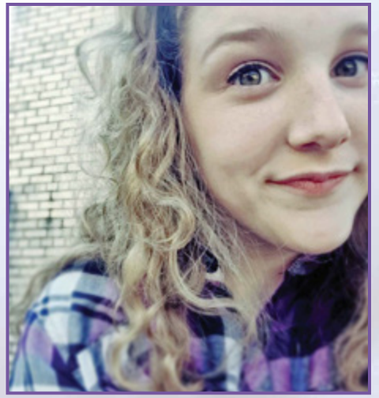
STAR — CMT Type 1X

Dr. Rudolph Martini at the University of Würzburg, Germany, has found that inhibiting the macrophages associated with inflammation has a very positive effect in a mouse model of CMT1X, which is caused by mutation of the GJB1 gene. Based on his studies, we are developing approaches to inhibit macrophages as a clinical treatment. In addition, the work of Dr. Kleopas Kleopa has shown the first example of a successful gene therapy in a CMT1X mouse model, and he is continuing these studies to optimize this novel type of therapy for not only CMT1X but also CMT4.

Type 2A
Tessa Pate, 7

STAR — CMT Type 2A

CMT2A is caused by dominant mutations in Mitofusin 2 (MFN2). The STAR team has developed two good rat models for CMT2A, which are being made available to the research community and represent an important tool to test potential new modulators of mitofusin activity. Stem cell models of CMT2A have also been developed for CMTA-sponsored research in the laboratory of Dr. Robert Baloh, Cedars-Sinai Medical Center.



Type 2E
Julia Beron, 17

STAR — CMT Type 2E

CMT2E is caused by dominant mutations in the neurofilament light protein (NEFL) gene. Mutations in NEFL cause CMT2E but other mutations in the same gene are associated with ALS, suggesting there may be a connection between them. One of the best mouse models of CMT2E, made by Dr. Ron Liem at Columbia University, has been extensively characterized by the CMTA and now represents an important model for therapeutics testing. Stem cells containing CMT2E mutations have been differentiated into motor neurons and used to create a test for therapies that prevent aggregations of neurofilaments seen in CMT2E.

Type 4
Paige Rodgers, 30

STAR — CMT Type 4

CMT4 is caused when both versions of an important gene required for healthy myelin (SH3TC2) are deficient. To restore function of these genes, the gene therapy approach described above for CMT1X is also being tried for CMT4C by Dr. Kleopa. If successful, these studies may highlight a novel approach that will be applicable to other forms of CMT4.

STAR
RESEARCH UPDATES

The STAR Consortium's work is broken down by disease area (CMT1A, CMT1B, CMTX, CMT2A, and CMT2E) and project teams consisting of academic labs and clinical centers, working together with alliance partners in team efforts.

The STAR program has been funded solely by the CMTA.

STAR *alliance partners*

The CMTA works with the pharmaceutical, biotechnology and research service industries, along with non-profit research organizations and the National Institutes of Health. These relationships are a critical part of its STAR initiative to rapidly deliver therapies to CMT patients. The CMTA's key alliance partners include:

PHARMACEUTICAL PARTNERS: In September 2014, the CMTA entered an alliance with Genzyme, a Sanofi company, to test their large libraries of molecules to identify those that dampen the known disease defect in CMT1A. A screening test capable of the automation required for this work was developed in a collaboration between the University of Wisconsin and the NIH. Following testing of close to 2 million molecules at Sanofi, a number of chemical classes have been identified that suppress the overexpression of PMP22, a key protein implicated in the causation of CMT1A. Candidates from these chemicals are being selected for testing in animal models of the disease in order to confirm functional improvements indicating recovery from disease symptoms. The aim of the joint CMTA-Genzyme team is to identify drug candidates that can advance to clinical trials in patients.

Foundation Partners: In December 2014, the CMTA announced a collaboration with the New York Stem Cell Foundation (NYSCF) Research Institute to make human stem cell lines that represent the genetic disease defect for a collection of CMT disorders. These cell lines were derived from patients with different CMT disorders and banked in a repository at the University of Iowa, then re-programmed by the NYSCF into induced Pluripotent Stem Cells (iPSCs). Skin cells obtained from iPSCs have the capability to further differentiate into many other cell types, much as a cell from an early stage of development. Gabsang Lee, PhD (Johns Hopkins Medical Center), working with iPSCs from CMT1A patients, has developed methods that transform them into cells possessing properties of a mature Schwann cell. Dr. Robert Baloh (Cedars-Sinai Medical Center) is working to create motor neurons from iPSCs derived from CMT2A patients. NYSCF has now successfully created iPSC lines for six different CMT disorders, and together with the CMTA is making them available for research.

Government Partners: The CMTA has a close working relationship at the National Institutes of Health with the National Center for Advancing Translational Sciences (NCATS), the National Institute of Neurological Disorders and Stroke (NINDS), and the NIH Office of Technology Transfer. This has led to sponsorship of several joint projects that aim to support CMTA alliance efforts. In addition, the NINDS provides funding and guidance to the Inherited Neuropathies Consortium, as does the CMTA. This consortium has assembled a large patient registry of CMT patients, is actively performing natural history studies of CMT diseases, and evaluates measurement tools that may be useful in monitoring disease progression. The NINDS also provides research support to many of the STAR investigator laboratories.

SERVICE PARTNERS

PsychoGenics is a leader in specialty preclinical contract research and drug discovery services, with a focus on neurodegenerative and psychiatric disorders. In 2013, the CMTA completed a master services agreement with PsychoGenics to provide biomarker and behavioral testing support to the STAR network. The company works closely with the CMTA to design and execute preclinical drug testing studies in CMT animal models, and to characterize animal models destined for use in CMTA research efforts.

Horizon Discovery is a translational genomics company that develops and supplies patient-relevant drug discovery and diagnostic research tools, including contract research services. Horizon Discovery has worked closely with STAR investigators to design and create several new rodent models of CMT, which are now entering into research and therapeutics discovery projects sponsored by the CMTA.

Charles River, a global provider of contract animal research services, is working with the CMTA to breed, cryopreserve and distribute rodent models of CMT that are used in the STAR alliance network.

The Jackson Laboratory is an independent, nonprofit organization focused on mammalian genetics research, and is currently working with the CMTA to breed and distribute specialized mouse models of CMT in support of its research project efforts.

Renovo Neural Inc. is a specialized preclinical research organization offering expert histology and electron microscopy services to the CMTA, for use in both the characterization of new animal models of CMT, and the evaluation of new therapeutics in support of its pharmaceutical alliances.

ARQ Genetics provides real-time polymerase chain reaction services for client sample analysis, supporting CMTA efforts to analyze gene expression in animal disease models of CMT, and measure changes in molecular markers as predictors of response to potential therapeutics.

The (INC)

Inherited Neuropathies Consortium

The Rare Diseases Clinical Research Network (RDCRN) is funded by the National Institutes of Health and the Office for Rare Diseases Research, the CMTA and the MDA. INC is a multi-center clinical research consortium within the RDCRN created to address the following issues pertaining to CMT:

- As we near clinical trials, a clinical scale that is sensitive enough to measure successful outcomes needs to be refined;
- Patients with different kinds of CMT must be analyzed in a uniform manner so that high-quality clinical data is available to investigators developing clinical trials or studying the pathogenesis of CMT in humans; and,
- Researchers will have to identify genetic modifiers that contribute to phenotypic variability in patients with identical CMT mutations, even within the same family.

The INC database is critically important to complement the progress and promise STAR holds for an eventual therapeutic and in June 2015 NIH announced $5 million in renewed funding for INC.

The establishment of an international patient registry by the INC will make it possible for researchers to find new treatments, create new studies, and work for the improvement of all those living with CMT. The CMTA, along with the Muscular Dystrophy Association, CMT United Kingdom, and TREAT NMD (European Neuromuscular Network), are the partnering patient advocacy groups within the INC.

The CMTA is well positioned to facilitate patient recruitment and involvement in cutting-edge research protocols. In addition, the CMTA's participation provides its national community with exclusive information and access to the latest research findings associated with clinical protocols and therapeutic developments.

International CMT Scientific Conferences

The CMTA was a founding sponsor and collaborator of the 1st International CMT Conference in 2003. The aim of the conference was to exchange new information and, equally important, to start novel collaborations and strengthen existing networks between European and North American research groups.
With a plenary lecture and other lectures covering clinical, diagnostic, and basic research issues of CMT neuropathies, the International CMT Consortium meetings have been held regularly since then.

The 6th International CMTR meeting took place in Venice, Italy, in September 2016. Scientists and clinicians from around the world came together to advance CMT research as a team, sharing and communicating ideas, discoveries and research findings.Scientists in this international network are each working on fundamental biological aspects of this disease. Leveraging and promoting this unique expertise in a collaborative manner is what sets the STAR program apart from any other CMT-related research effort.

The Charcot-Marie-Tooth Association isn't just funding the current generation of researchers. It is also building a bench of the finest investigators in the next generation. As part of that effort, the CMTA made 10 grants for travel to the CMT and Related Neuropathies (CMTR) meeting held in Venice in September.

Corporate Partners

Aetrex Worldwide, Inc.founded in 1946, is a global leader in pedorthic footwear and orthotics. It offers attractive shoes that feature extra depth and width to accommodate in-shoe orthotics or AFOs.

Allard, USA distributes the ToeOFF Family of carbon composite devices designed specifically to assist with foot drop, ankle instability and proximal neuromuscular weakness, all symptoms of CMT.

Balance Walking is an all-encompassing health and fitness program incorporating walking poles that can be done in as little as 15 minutes per day.

CosySoles makes microwave heated slippers that provide comforting warmth and the freedom to stay mobile to millions who suffer from cold and painful feet caused by peripheral neuropathy.

Foot Solutions is a leading international footwear retailer with more than 150 stores in 14 countries specializing in personalized assessments, stylish high performance footwear, custom-fitted, custom-crafted arch supports and accessories designed to help individuals live pain free.

GeneDx launched the Hereditary Neuropathy Panel, a genetic testing panel aimed specifically at testing for different types of CMT, in 2014. With 53 CMT-causing genes available in the Neuropathy Panel, GeneDx delivers an exact genetic diagnosis for 50-70 percent of people with symptoms of CMT.

Hanger Clinic has more than 1,300 clinicians specializing in the provision of orthotic and prosthetic solutions. Its teams annually deliver effective clinical systems, innovative technologies and outstanding customer service to more than 1 million patients at over 750 Hanger Clinic locations nationwide.

Invitae is a genetic testing company with a comprehensive panel for CMT, as well as autosomal dominant, autosomal recessive, X-linked and HNPP (Hereditary Neuropathy with Liability to Pressure Palsies) panels.

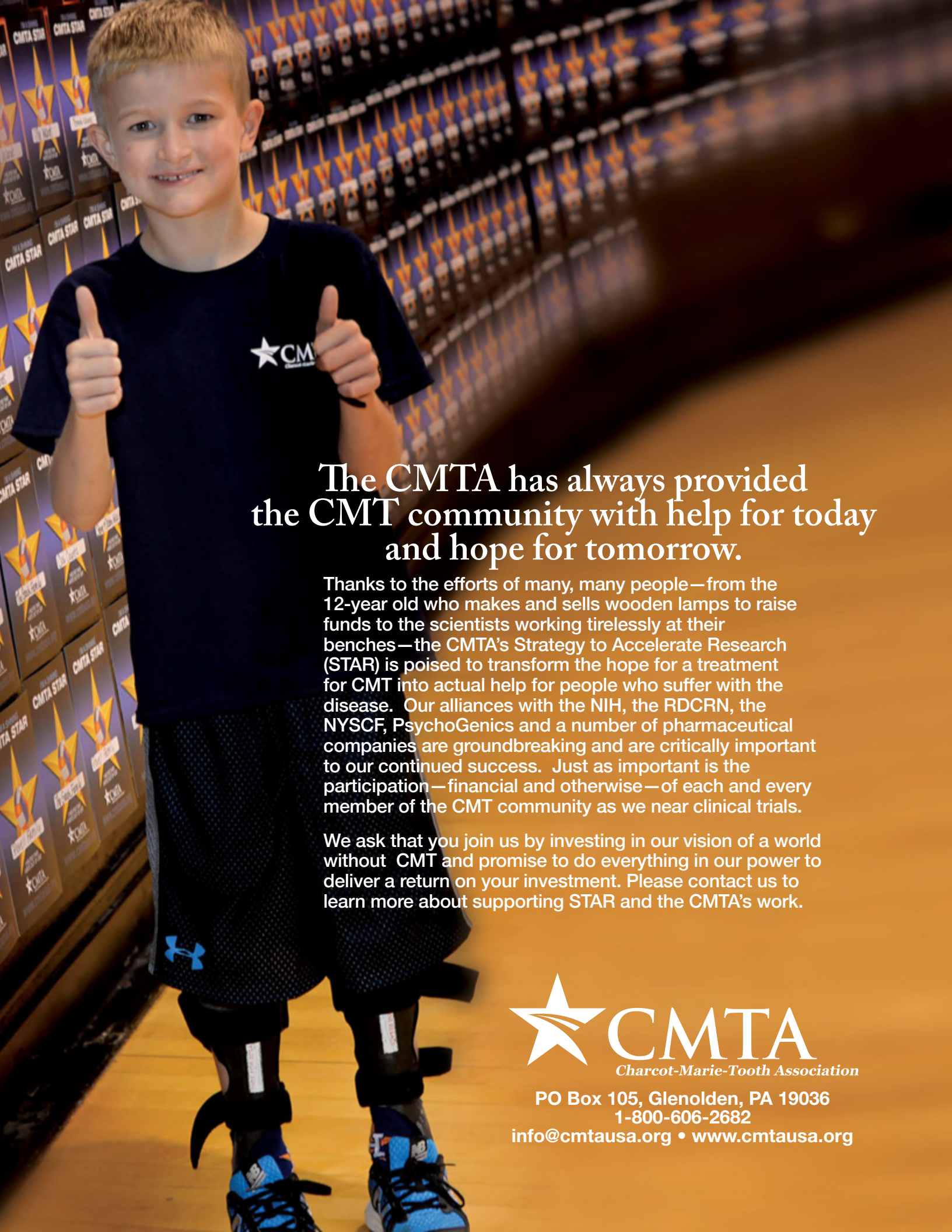
Kinetic Research is an orthotic/prosthetic technology company that specializes in the application of carbon fiber and advanced materials into highly functional orthopedic appliances for the lower leg.

Union & Fifth raises money for non-profits by selling donated, gently worn women's designer clothes.

Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has.

Margaret Mead

Community Members Taking Action



The CMTA has always provided the CMT community with help for today and hope for tomorrow.

Thanks to the efforts of many, many people—from the 12-year old who makes and sells wooden lamps to raise funds to the scientists working tirelessly at their benches—the CMTA's Strategy to Accelerate Research (STAR) is poised to transform the hope for a treatment for CMT into actual help for people who suffer with the disease. Our alliances with the NIH, the RDCRN, the NYSCF, PsychoGenics and a number of pharmaceutical companies are groundbreaking and are critically important to our continued success. Just as important is the participation—financial and otherwise—of each and every member of the CMT community as we near clinical trials.

We ask that you join us by investing in our vision of a world without CMT and promise to do everything in our power to deliver a return on your investment. Please contact us to learn more about supporting STAR and the CMTA's work.

CMTA

Charcot-Marie-Tooth Association

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