People with cystic fibrosis (CF) are living longer and experience better quality of life, thanks in part to the efforts of the CF Foundation (CFF), treatment options and continuous research for a cure. People with CF can manage their disease by following a regular routine that includes airway clearance, medication, exercise and good nutrition.

The CFF was started in the early 1960s by CF families to help those challenged by CF to deal with the different aspects of the disease. As a result of its work, the CF Registry was started in 1966. The purpose of the Registry has been to help us better understand the disease and help improve the lives of people with CF. The CF Patient Registry collects information on the demographics and health status of patients who receive care in CFF-accredited Care Centers and agree to participate in the Registry. The information is collected at each center during regular clinic visits and hospitalizations and then submitted to Port CF electronically. There, the information is finalized and patients’ identities are removed at the end of the year. The Port CF team at the CFF then starts its work in analyzing the data: for each center and for all the centers combined. Each center’s data is summarized and compared to the combined centers data nationwide. Registry data is compiled and published in two data reports: The Patient Registry Annual Data Report and Highlights of the Patient Registry Data. Data from more than 28,000 people with CF are included in 2015 reports. That represents 90 percent of people with CF in the country.

The Patient Registry Annual Data Report provides a comprehensive look at Registry data with detailed information on a wide range of topics, including diagnosis, CF care guidelines, lung function, microbiology, nutrition, gastrointestinal and pulmonary therapies and transplantation. The report also measures the variation in clinical practices and health outcomes across the CF Care Center Network to help guide care teams in their work. This comprehensive report is shared with the care centers.

The Highlights of the Patient Registry Data report is a public document providing a summary of key data findings, including demographic information and health outcomes of those who agreed to share their data in the reporting year. The highlights include general information about people with CF from the combined centers data.

Nationally, CF Registry data has been used very effectively to improve CF care. It has helped us study the long-term effect of different medications to ensure they are safe and effective. It has facilitated our understanding of the different bacteria that CF patients exhibit. And, it has been instrumental in developing guidelines for all aspects of the CF disease. For example, we now have pulmonary disease, nutrition, and cystic fibrosis-related diabetes guidelines to follow. Over the years, the Registry helped us understand the progression of the disease, factors that predict pulmonary exacerbation, and reasons for improvement or deterioration of CF. Now, the CFF is trying to expand the benefits of the Registry by comparing its results to other countries’ registries. Also, the CFF is inviting the CF community, including people with CF and their families, to participate in quality

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Next Generation of CFTR-Modulating Drugs Shows Promise in Laboratory Tests
By Richard H. Simon, MD
Director, Adult Cystic Fibrosis Center

The discovery of ivacaftor and its proven benefits for CF patients with CFTR gating mutations has shown that medications have the potential to at least partially correct the underlying abnormalities that occur in cystic fibrosis. Unfortunately, fewer than 10 percent of patients with cystic fibrosis in the United States have mutations that respond well to ivacaftor when given alone. But seeing that success is possible, a number of pharmaceutical companies have been using the same strategy that was used to discover ivacaftor to find other drugs that might help a larger number of people with CF.

F508del (Delta F508) is the most common mutation, with approximately 90 percent of people with CF in the US having at least one copy. It is therefore quite appropriate that investigators have been looking hard for a treatment that will work on this common mutation. The first FDA-approved treatment designed to target patients with F508del is lumacaftor/ivacaftor (Orkambi). Although this drug worked well enough for the Federal Food Drug Administration to approve it, the magnitude of the improvement was less than many had hoped for. To enhance the benefits of lumacaftor/ivacaftor, the company that made the drug has been searching for additional chemicals that when added to lumacaftor/ivacaftor could further improve CFTR function. They now have at least two potential drugs that are moving through their clinical development programs. The drug that is furthest into clinical development is VX-152. When tested in the laboratory, the drug appears quite promising.

As a generalization, drugs that look good in laboratory tests may or may not have similar effects when given to patients. But in the case of CF, laboratory tests of drugs designed to improve the function of the mutant CFTR protein have been fairly predictive of the results seen when drugs are given to patients. These laboratory tests use cells genetically engineered to have different CFTR mutations. The amount of improvement in CFTR function caused by the potential drug can then be measured. For those medications that have already been studied in CF patients, the level of benefit in patients has correlated roughly with what was seen in the laboratory. The exciting recent observation is that cells with the F508del mutation when treated with the next generation of CFTR modulator drugs in addition to lumacaftor/ivacaftor show a level of improvement in the laboratory similar to what ivacaftor achieved for patients with gating mutations. The hope is that these drugs when tested in patients with cystic fibrosis will prove to be both safe and effective. Clinical trials of the first of these next-generation drugs are underway to find this out.

The CF Registry: Its History, Purpose and Value

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improvement efforts. An example of that is the Success with Therapies Consortium (STRC), which works on ways to improve collaboration between CF Centers and their patients and to find ways to improve adherence to medications.

In our center, the CF Registry data has been very helpful over the years. By reviewing our data and comparing it to national data, we have been able to initiate several quality improvement projects. One ongoing project, which started in 2010, involves BMI (Body Mass Index) information. As a result of our work, our BMI data is above the national average and close to the best 10 centers nationwide. We have also been working since 2008 to meet CFF-recommended guidelines that encourage patients to come to the CF Clinic four times a year. Another project is focused on improving pulmonary function testing. We are aiming to always improve our care and our Center data. At the end of the day, though, it is not about the numbers. It is all about our patients. If our data is better, our patients will be better.

In summary, the Patient Registry reports provide the community with an annual snapshot of the care received and health outcomes within the CFF Care Center Network. They also provide us with a longitudinal look at the data. The Registry has been an excellent tool for all of us in the Care Centers to help improve the lives and care for all people with CF.
Cystic Fibrosis Care Card
By Catherine Enochs, BSN, RN, AE-C
CF Nurse Coordinator

What is the CF Care Card?
The CF Care Card is a double-sided, business card-sized communica-
tion tool for patients and families. The card has information about recommended infection control practices when providers see CF patients. Patients and families show this card at check-in to hospital clinics and doctor’s offices at Michigan Medicine, so they can be easily identified as having CF and needing specific infection control precautions.

What is on the front of the card?
The front of the card provides directions to healthcare employees on proper Contact Precautions for CF patients, including cleaning after the patient leaves.

What is on the back of the card?
The back of the card provides the contact information for the U-M CF Center, the M-Line Number (a doctor-to-doctor consult phone number providing access to your CF doctor), and web links to the UM CF Center website and the CF Foundation website.

Will all clinics and hospital areas immediately follow the directions on the card?
Currently, all the U-M clinics and procedure areas are not fully set up to appropriately follow the guidelines. They will follow them as much as possible, when possible, but we recommend that CF patients wear a mask in all areas that cannot yet follow these recommendations. Your CF Center is working with Infection Prevention and Control at UMHS to implement CF Precautions throughout the health system in the near future.

Can I use it at offices not at Michigan Medicine?
Yes! We encourage use of it wherever you feel it is needed, however we cannot enforce or guarantee that every doctor’s office will be receptive.

Can I clean the card?
It is laminated for ease of wiping off with alcohol wipes when needed.

Why was the CF Care Card developed?
Our CF Family Advisory Board initiated discussions regarding clinics outside of the CF Center not following CF precautions. The UM CF Team attended the North American Cystic Fibrosis Conference and brought back information on what other CF centers have tried. This sparked the development of a communication tool to empower patients and families with information and resources for their healthcare providers.

How do I get a card?
Ask your nurse during your next CF clinic visit!

Staff Introductions

Kristin Keith, PT, started her career as an acute care therapist for CF patients. Now she is part of the adult outpatient cystic fibrosis team, helping patients with airway clearance, exercise and pain management.

Jourdan Stiffler, RN, BSN, started working in the Pediatric Pulmonary Clinic last summer. She previously cared for CF patients in the inpatient setting as well as adult gastrointestinal patients.

Linda Stuckey, PharmD, BCPS, who previously covered the inpatient medicine pulmonary service, recently started working in the Adult Cystic Fibrosis Clinic to optimize patient pharmaceutical care.

Katie Wait, RN, BSN, was most recently involved in peds trach/vent home care. She then transitioned back to hospital nursing, and is a member of Mott Children’s Hospital Pediatric Pulmonary team.

Deborah Long, LMSW, is the Adult CF Clinic’s mental health coordinator, and is primarily engaged in administering a new program to better identify and respond to the needs of patients with depression and anxiety.
New Pediatric Physical Therapy Initiative
By Chris Tapley, MS, PT
Physical Therapist

In pediatric physical therapy, we are happy to begin a new initiative with the outpatient cystic fibrosis clinic. In the past, we have been available for consultation in cystic fibrosis clinic on a limited basis. Beginning this year, and thanks to a grant provided by the CFF to support PT in clinics, we are going to be seeing all of our patients with cystic fibrosis at least once per year in clinic. In addition, we will be available for additional questions or consultations on most clinic days.

During our annual evaluation, we will be discussing each child’s current pulmonary hygiene regimen, assessing endurance and aerobic levels and assessing posture and participation in daily functional activities (school, sports, etc.). In addition, we will also review airway clearance techniques that we feel could be beneficial as well as new techniques available to your child as they get older. These may include use of devices such as the therapy vest, Acapella, Flutter, Aerobika, autogenic drainage, active cycles of breathing and exercises.

Following our evaluation, we will provide each child and family with an individualized home program for pulmonary hygiene and exercise. Our hope is to be able to serve as one more resource for our families for information on helping to keep your child healthy and manage their cystic fibrosis as they progress through childhood.

What Are Nasal Polyps?
By Lauren Bohm, MD
Pediatric Otolaryngologist

Nasal polyps are painless, non-cancerous, grape-like growths that occur in the nose or sinus cavities. They arise from the nasal mucosa as a result of chronic inflammation. The polyps tend to be multiple and occur on both sides of the nose. Occasionally, they may become so large that they protrude from the nostril or broaden the bridge of the nose.

Nasal polyps are common in people with cystic fibrosis, with most large studies reporting an incidence of 10–20 percent (range 6–67 percent). They often appear at an early age in children with CF. In fact, if a child less than 10 years of age develops nasal polyps, CF must be considered. Nasal polyps tend to increase with age, with 19 percent of CF children having polyps by age 6 and 45 percent by age 18. Polyps are also more prevalent in people with two copies of the most common F508del gene mutation. Finally, nasal polyps have been linked with higher rates of a particular bacteria in the lungs: Pseudomonas aeruginosa.

Symptoms of polyps include nasal blockage, loss of smell, decreased taste, runny nose, postnasal drip and chronic infections. The diagnosis is typically made by an otolaryngologist or ear, nose and throat (ENT) physician who may use a small endoscope to examine the inside of the nose in clinic. Occasionally, sinus imaging studies may also be recommended.

Conservative management with nasal saline irrigations and steroid sprays are the first line of treatment. Intranasal steroid sprays have been shown to reduce polyp size when used on a regular basis. Surgery is considered if symptoms persist despite conservative management techniques. Surgery typically consists of a polypectomy to remove the nasal polyps with or without a more extensive procedure to open the sinuses. Surgery has been proven to improve nasal symptoms and quality of life. However, polyp recurrence is common after surgery, so continued monitoring is recommended.
My Life with Cystic Fibrosis
By Aidan Carmack

Personal life
Within my life of dealing with cystic fibrosis, I have had many different emotions. Of course, when I was a kid, I didn’t think anything of my disease. I thought the whole world was happiness and rainbows. But, as I got older, I started to realize the impact of this disease. Sure, it gets annoying sometimes when I’m out with my friends and my mom has me come home and nebulize. Also, when I have frequent appointments, get different shots and PFTs, have to remember enzymes and medicine and, the worst, get admitted, because it wraps all that into one big bad burrito. But, what are we going to do? We’re all human, we all complain about many things. Cystic fibrosis is one more thing that you have to complain about. But, why waste your breath? You only have about 672,768,000 breaths in your lifetime. Why not use them on good things like your pets, friends and family? There is so much more than just CF in your life. I have had ups and downs. I am still having them. Mostly ups, where I’m just having fun and not even thinking about CF. But, every once in awhile, I get a little depressed thinking about it. That’s just a waste of time. So, rather than complaining and moping and getting all sad, get out there! Make a change for the future! Go tell everyone you know, “Hey! I have cystic fibrosis! And you need to donate money to help me and the other 70,000 people with CF!” If you think about it, 70,000 people have it out of about 7 billion on the planet. That’s one in every 100,000! So spread the word, get people to donate. By working together, we can make a change for the better and help find a cure!

Being an advocate
Spreading awareness is so important, because it helps raise money for the important research for a cure. I’ve advocated for a cure by talking at events. I made a presentation at my school and wrote a report about it. I always explain it to my friends, and I wear different cystic fibrosis apparel (Rock CF!). My family and several others host a walk every year, and last year we raised about $23,000. Imagine if each person in the US with CF (30,000) teamed up with two other people with CF (making that 10,000 groups) and raised about $15,000. That’d be $150 million a year!! That would be so amazing! So, if you are reading this, find some time and join a walk or think of ways to raise money and awareness. Only we can make a difference, if we want a difference to be made.

Advice
It’s hard enough as a 15 year old to deal with cystic fibrosis; you also have to deal with high school, the pressure of fitting in, friends, tests, homework, trying to “find your place” and what you’re going to do with the rest of your life. These are just the “icing on the cake” to a whole new range of different stressors, feelings and emotions. But don’t let it get to you! You need to take control of what’s going on. You only have this one life, so live it to its fullest potential. Sometimes it’s so hard to turn yourself around, but there is always a way. Even in your darkest moments, there is a light. Find someone you can trust and talk to…and go to them when you need them. Don’t ever give up, there is still so much to do. So go out and do it.”
Extra Salty: Raising Two Kids with Cystic Fibrosis
By Brandi Fenner

If you were to come into our house, you’d immediately see two vest therapy machines with two nebulizers right next to them in our living room. You’d also find a whole kitchen countertop dedicated to nebulizer cups, syringes, three medical binders and two baskets full of a week’s medication for each girl. In another area of our house, there are two filing cabinets designated for equipment, supplies and extra medications, and oh yeah, a tower of formula taller than my 3 year old. The girl’s bedrooms are next, where you’d find two IV poles with feeding pumps attached to them and the plastic drawers full of more syringes and tube feeding supplies. Finally, an extra refrigerator is located in the garage to house the cold medications, breathing treatments, more formula and, at times, IV antibiotics. This is our house. This is what our life “looks” like with two CF kiddos.

People are always so surprised when I tell them I have not one, but two, kids with cystic fibrosis. I am frequently asked how I am able deal with it all, let alone stay on track with the needs of each girl. Today I will share with you where I’m at—eight years and two CF kiddos into this diagnosis. The answer is not simple, nor did it happen overnight. I am still figuring things out as I go and accepting the life my girls have been given. It is truly a day-by-day journey. I will start by introducing you to two of the strongest, bravest and most beautiful people in my life.

My oldest daughter, Gracelyn, was diagnosed a little over a month after she was born. We had barely heard of CF and when she experienced failure to thrive, our world was rocked. Gracelyn is now 8 and very much thriving. It wasn’t always that way, however. Like most CF families, it took us some time to adjust and figure out her “normal”—as our doctor liked to call it. She was sick a lot in the beginning and ended up on IV antibiotics several times; eventually she had a feeding tube placed as well to help with weight. By the time she was 4, we had established a good health plan that was effective for her, and since then she has not been hospitalized for any lung infections.

At this point in our journey, I felt I had CF pretty figured out. I had all the routines in place for medications and breathing treatments, and life was becoming more regular. But then I had another baby girl, who also had CF, and once again our world was turned upside down.

Annabelle is my 3 year old: my youngest and most challenging CF kiddo yet. When she was born, I was a nervous wreck as all the ultrasounds I had during pregnancy indicated CF. I remember having her and breaking down, because I knew she was safer inside of me than out in the world where CF would show its colors and she’d have to fight on her own. Annabelle’s CF journey proved to be very different than Gracelyn’s and, because of that, I felt like I was learning CF all over again and re-living the pain and shock of the diagnosis. Annabelle ended up needing surgery on her bowels immediately after birth, and was in the NICU for over a month before she could come home. That NICU stay led to a series of breathing, eating and weight issues that are still being worked through three years later. Annabelle has been in the hospital several times since then, and often has lung infections. She has a feeding tube now, like Gracelyn, and absolutely cannot miss a breathing treatment or she will cough and wheeze for hours. Her health is fragile and can change overnight.

Both of my girls have very different presentations of cystic fibrosis. That, I’d say, is the most challenging part of having two kids with the same disease. One of my daughters is more textbook and the other is not. With Gracelyn, I will allow her to have a cough for a week or so before I call the doctor; it could be allergies, or a minor cold, or she could just be having an off day. Annabelle always coughs, so I have had to learn to listen for a “change” in her breathing and at that point I will call the doctor. Her little body won’t bounce back the way Gracelyn’s does.
I’m sharing this with you all because this is what having two kids with cystic fibrosis truly looks like on a deeper level than just what you see when you walk into our house. It’s organization from everything like equipment and medication storage for each girl, to planning our day around four breathing treatments and tube feeds and weekly therapy appointments. It’s setting routines for treatments and medications, and not swaying from them very often. Both of my girls do their breathing treatments in the same spot, at the same times followed by their medications and tube feeds, set and administered the same way EVERY SINGLE DAY. It’s staying prompt on little details like when medications need to be refilled or when appointments are coming up, and coordinating the girls’ appointments for the same day so we don’t have to make an extra trip. It’s educating our family, friends, co-workers and even other health specialists about each girl’s CF needs. It’s teaching them that while we give enzymes one way with Gracelyn, we do it a completely different way with Annabelle. And finally, it’s our normal. This life, while to most seems absurd and hectic and overwhelmingly crazy, is absolutely regular and nothing new to us.

Does having two kids with CF exhaust you? Yes. Is having two kids with CF challenging? Yes. Is it hard to keep up with all of the details and needs of both girls together and individually? Yes. Does it bother you that you have TWO kids with CF? No. Despite all that CF brings to our family that is very stressful, there is one thing I didn’t see it bringing, but am SO grateful for. If there is a blessing to having two kids with CF, this is it—they fight together every day. From breathing treatments and laughing as they make silly noises with their vests, to taking their medications and helping each other with the pills or pushing syringes into the feeding tube, to holding each other’s hand when they are scared of throat cultures or getting their blood drawn—they are in this together. They “get” each other in a way no one else ever will. I am so grateful they have each other to lean on and push each other to not give up. They don’t see it yet as they are little still, but their bond will carry and drive them for the rest of their lives. They will never been alone in this battle.

So this is our life with two CF kiddos. It’s a little extra loud in our house, a little more clustered with medical supplies, with a little busier calendar than most, and definitely a little saltier than usual! But our girls have taught us that life is more important than any of these things. It’s about who you have next to you, fighting your battle with you and holding your hand at the end of the day that matters.
As new and advanced therapies are developed to improve health for individuals with CF, the CF Foundation has expanded its focus to provide support around life balance and psychosocial health of those with CF and their families. This is important because mental health concerns can impact quality of life and the ability to care for oneself. It can also impact parents’ ability to care for the health of their child. As we shared in last year’s newsletter, the CF Foundation developed new guidelines in 2014 that recommend yearly mood and anxiety screening for all individuals with CF age 12 and up. They also recommend that parents are screened annually. These screenings include answering 18 questions about recent mood and anxiety symptoms. Those who screen positive for depression and anxiety are offered guidance from a mental health professional and referrals when needed.

In the first year of following the guidelines, the Michigan Pediatric CF Program screened about 1/3 of teenage patients and 1/3 of parents. We used this first year to develop a process that reduced the time and burden of screening as much as possible. We also completed a quality improvement project to get feedback from parents on the acceptability of mental health screening. In an anonymous rating, most parents “agreed” or “strongly agreed” that filling out the questionnaires was easy, quick, important and helpful and that we should continue to screen in the future.

During the second year of mental health screening, our goal is to screen everyone and make screening a routine part of CF care at Michigan. We also plan to offer new treatment options for patients with mood/anxiety or behavioral concerns. Finally, working with the Department of Pediatrics’ Division of Pediatric Psychology, we plan to distribute a quarterly wellness newsletter. It will provide practical information about ways to promote resiliency and quality of life in children diagnosed with challenging medical conditions.

If you have any questions about screening or concerns about you or your child’s mental health, please let us know the next time that you are in the CF Clinic. More information can be found at cff.org/New-Guidelines-Released-for-Screening-and-Treating-Depression-and-Anxiety.

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**Pediatric Mental Health Screenings**

By Jennifer Butcher, PhD
Pediatric Center Psychologist

As new and advanced therapies are developed to improve health for individuals with CF, the CF Foundation has expanded its focus to provide support around life balance and psychosocial health of those with CF and their families. This is important because mental health concerns can impact quality of life and the ability to care for oneself. It can also impact parents’ ability to care for the health of their child. As we shared in last year’s newsletter, the CF Foundation developed new guidelines in 2014 that recommend yearly mood and anxiety screening for all individuals with CF age 12 and up. They also recommend that parents are screened annually. These screenings include answering 18 questions about recent mood and anxiety symptoms. Those who screen positive for depression and anxiety are offered guidance from a mental health professional and referrals when needed.

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**Adult Mental Health Screenings**

By Deborah Long, LMSW
Mental Health Coordinator, Adult Cystic Fibrosis Clinic

The Adult CF Clinic is well into its first year of implementing the CF Foundation’s Mental Health Initiative! We began the mental health screenings for the adult CF clinic in September 2016. Patients are provided with two short screening questionnaires, the GAD7 (anxiety) and PHQ9 (depression), through the patient portal, MyChart. You have the opportunity to access and complete the questionnaires at your convenience from home a couple of days prior to scheduled clinic visits. If you choose not to exercise this option, our front desk staff can guide you through instructions to activate patient portals and access the questionnaires on iPads during check-in for clinic visits.

Completing the screening questionnaires via patient portals from home makes it possible for your CF physicians and social worker to access the scores in time to discuss the results and recommendations with you during your clinic visit. When those two options are not possible, paper questionnaires are provided and responses are manually entered into patient records by our medical assistants. So, you can see that timing is everything! We are always striving to make this process as efficient as possible for patients and providers to be able to best respond to the information you provide.

From September through December 2016, 37 percent (107) of the adult CF clinic patients completed their first annual screenings for depression and anxiety. The CF Foundation’s mental health committee guidelines indicate annual mental health screenings for all CF patients and re-screenings at other clinic visits based on individual results and clinical assessment. Our clinic screening results, thus far, reflect that 38 percent of CF patients experience mild to severe depression and 40 percent of CF patients experience mild to severe anxiety.

The highest frequency responses to questions on the GAD7 and PHQ9 indicate that symptoms of irritability, sleep problems and feeling lethargic are very common. Improving sleep hygiene is a good self-care measure that can help to manage those symptoms often related to depression and/or anxiety. Given the importance that sleep plays in the quality of emotional and physical health, we’ve included the following website link that provides some tips for getting better sleep:

http://depressiontoolkit.org/download/Sleep_facts_UMDC.pdf
TEAM UPDATES

Adult CF Center Team Activities
By Katie Hall, LMSW
Adult Cystic Fibrosis Center Coordinator

Adult Advisory Board
Our adult CF care team has partnered with several patients to form an advisory board for the care center. This group met for the first time in August, and has already been able to help guide different processes. As a care center, we are always striving to make improvements and, with the help of our advisory group, we can make sure we are implementing changes that will positively impact our patients and families. Our meetings occur via an online meeting platform called Blue Jeans, which enables us to interact with each other without any concerns of infection! We are looking to expand our group, and if you are interested in participating, please contact Katie Hall at aultkath@med.umich.edu.

North American Cystic Fibrosis Conference
The NACFC always provides an exciting opportunity to learn about different ideas that centers across the country are engaging in. An area of particular interest to me was the implementation of palliative care. Such care is often associated with the end of life, but that is a limiting definition. Palliative care can also refer to symptom management, which helps to decrease symptom burdens and improve quality of life. Our center has already begun working closely with Michigan Medicine’s palliative care team, and we are excited to continue our partnership with them, as well as to learn more about CF Foundation recommendations.

Great Strides 2017
FREQUENTLY ASKED QUESTIONS AND ANSWERS FROM YOUR GREAT STRIDES STAFF

What is Great Strides?
Great Strides is the Cystic Fibrosis Foundation’s largest national fundraising event. Each year, more than 125,000 people participate in hundreds of walks across the country to support the foundation’s mission to cure cystic fibrosis. Last year, the Michigan chapter’s Great Strides program raised an amazing $1.5 million!

Where can I walk?
Walks are held at nearly 500 locations nationwide and are open to the public. This year, we are holding 14 walks in Michigan alone! The walks take place statewide, so there are plenty of opportunities and ways to get involved.

Why should I walk?
Simply put, to make a difference in the lives of those living with cystic fibrosis. The funds raised from Great Strides help provide people with CF the opportunity to lead full, productive lives by supporting research and drug development, promoting individualized treatment and ensuring access to high-quality, specialized care.

Where do I start?
Visit fightcf.cff.org to register your team today and start recruiting family, friends, students and co-workers! Whether you are collecting money for a jeans day at work, selling home-grown flowers at your local CF Care Center or holding a bake sale at your school, every fundraising dollar counts!

We hope you’ll join in the excitement and get involved by walking with us in 2017!

This year, we’ll be walking toward a cure in:

| Ann Arbor | Fremont, OH | Lansing | Toledo, OH |
| Davison | Grand Haven | Mt. Pleasant | Petoskey |
| Metro Detroit | Grand Rapids | Muskegon |
| Findlay, OH | Hartland | Port Huron |
| Frankenmuth | Kalamazoo | Rochester |

For more information, or to register your team and begin fundraising, please visit cff.org/greatstrides or call the Michigan chapter serving Michigan and northwest Ohio at (248) 269-8759.
Almost 30 years ago, researchers discovered the CF gene. This discovery allowed them to explore defects in the gene, specifically the cystic fibrosis transmembrane regulator (CFTR) protein. We now know that the CFTR protein acts as a channel that pumps chloride, followed by water, out of the cell. If there is not enough water in the various tubes in the body (i.e., airways, bile ducts, intestines), the secretions get thick and sticky and create the problems that commonly occur in CF. Over 2,000 different changes, or mutations, of the CFTR gene can cause CF. Researchers are now able to group these mutations into 6 different classes (see chart on facing page). In general, class I, II and III mutations are considered more severe, with almost no functional CFTR, while classes IV, V and VI have varying levels of functioning CFTR.

Class I mutations change the production of the CFTR protein. A signal in the body that doesn’t allow the protein to be coded properly eventually leads to the absence of the protein in the body. This means that few or no usable CFTR chloride channels are produced.

Class II mutations cause the protein to move or fold in the wrong way. This means that the protein does not reach the cell surface and is not usable. The most common CF mutation, Delta F508, is in this category.

Class III mutations impact the regulation of the CFTR protein. In this case, the CFTR protein is made and reaches the cell membrane, but the channel does not open properly.

Class IV mutations affect the movement of chloride through the channel. This means that the CFTR protein is made and in the proper place, but not enough chloride gets through.

Class V mutations change the factors needed to make the protein, leading to less production of the CFTR protein. The protein that is made functions properly. Depending on the amount of protein made, these mutations can cause CF, or only congenital bilateral absence of the vas deferens (CBAVD).

Class VI mutations are rare. These mutations lead to CFTR protein being made and in the proper place, but the protein is less stable at the membrane, and therefore, there is not as much functional CFTR available.

The CF Foundation has several videos describing some of the mutation classes in greater detail. They are designed for patients and families, and are available at cff.org/What-is-CF/Genetics/CF-Mutations-Video-Series.

So why is it important for people with CF to know their genotype? We are now in a new era of CF research. Our new understanding of different mutation classes has led to the development of treatments that are specific to each mutation. To put it simply, if the problem is that we can’t turn on the protein, the researchers look for drugs that will activate the protein. If the protein doesn’t pump, researchers look for another factor that might turn on the chloride pump. Researchers are also exploring gene therapy, to treat all classes of mutations. This is personalized medicine at its finest, and in the past few years, there has been a tremendous amount of progress made in this area.

Two of the most exciting new therapies were developed for specific types of mutations, and are now available to patients. Vertex Pharmaceuticals, Inc, with funding from the CF Foundation, has developed ivacaftor (Kalydeco), which is known as a potentiator, meaning it is designed to allow the CFTR protein located at the cell membrane to open and function correctly. Ivacaftor is approved for use in people with class III and some class IV mutations.

Ivacaftor + lumacaftor (Orkambi) is the second drug developed by Vertex Pharmaceuticals, now available for people with two copies of the class II, Delta F508 mutation. This is the most common mutation in patients with CF. It helps to fix the defective CFTR protein, so that it can then get to the cell surface and insert into
the membrane, and then open and function properly. It is approved for patients 6 years and older, but is in trials with younger patients.

There are two new drugs currently in Phase III trials. Ataluren (Translarna) is a small molecule compound that works for people with nonsense or stop mutations. It helps to override the premature stop signal, and continue to produce an intact CFTR protein. It is being developed by PTC Therapeutics with funding from the CF Foundation.

Tezacaftor + ivacaftor is being developed by Vertex Pharmaceuticals for patients with one or two copies of Delta F508. It is designed to move the defective CFTR protein to its proper place in the membrane, and then open and function properly.

There are several other therapies in development ranging from preclinical trials to ongoing Phase II trials. For more information regarding the Drug Development Pipeline, see the CF Foundation website at cff.org/Trials/pipeline.

We hope that you are as excited about this new era of drug development as we are, and we encourage you to “know your genotype.” If you are unsure of your genotype, or if you have yet to be tested, feel free to ask your doctor or nurse, either at your next clinic visit or by calling the office. As always, we’re happy to help in any way we can.

Classes of CFTR Mutations

Cystic Fibrosis Center
Department of Pediatrics
C.S. Mott Children's Hospital
L2221 UH South
1500 E. Medical Center Dr.
Ann Arbor MI 48109-5212
734-764-4123
734-936-7635 (FAX)

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