

# CYSTIC FIBROSIS CENTER NEWS

## The 'Bubble Test'

BY JEFF WINE, PHD

To provide a rapid and precise assessment of how well certain cystic fibrosis drugs work, my colleagues and I have developed a new method that measures how fast bubbles of sweat form under an oil layer on the skin. Results suggest that small amounts of CFTR function can lead to large improvements in health. (CFTR stands for "cystic fibrosis transmembrane conductance regulator," which is a genetic protein involved in the transport of chloride ions across cell membranes)

Two drugs developed by Vertex in collaboration with the CF Foundation have caused great excitement in the CF community. Unlike all prior CF therapies, these drugs target CFTR directly. One of them, ivacaftor (Kalydeco®) has been approved by the FDA for certain mutations, and CF subjects who have these mutations show profound clinical improvements when taking ivacaftor. A second drug called lumacaftor partially corrects the F508del mutation, and its combination with ivacaftor might benefit most people with CF. Thus, an immediate goal is to learn how well this combination therapy works, and then to follow up with even more effective CFTR-directed therapies.

Human CF cells grown in the laboratory respond quickly when treated with the Vertex drugs, but drugs often work differently in the body, so human trials are essential. Even when drugs are safe and effective, the clinical benefits they confer, such as decreased lung infections and weight gain, may take a long time to show up and be masked by exacerbations. On the other hand, long-term benefits of CF drugs are often greatest when started early in healthier people, but healthy individuals are often excluded from trials because it takes years to demonstrate a clinical improvement in them.

If it is difficult to prove that drugs work, it is even more challenging to determine their optimal dosage. With present procedures, it can take months or years and many subjects before dosage is optimized. Another problem is that a medicine that makes CFTR

The new sweat bubble assay provides a much improved level of precision and sensitivity by optically measuring C- and M-sweat in individually identified sweat glands.

work better might initially cause adverse effects, perhaps by mobilizing impacted bacterial-laden mucus that disseminates pathogens within the airways.

Clearly, better methods to rapidly and directly measure CFTR function in humans could help make clinical trials faster and more efficient. Currently, the only test that can do this is the standard 'sweat-test,' which measures the amount of chloride in sweat. This test has many advantages. It is quick and easy, and provides a more direct measure of CFTR function than do other measures such as lung function, which is heavily influenced by infection and inflammation. Thus, the sweat test is an essential component of any clinical trial of a CFTR-directed therapeutic.

However, the sweat chloride test also has limitations. It is based on salt absorption by the sweat duct, a unique organ in which CFTR may operate somewhat differently than it does elsewhere. Also, the sweat test becomes progressively less sensitive as CFTR function improves. Its best range is at the very lowest levels of CFTR function. It is not well-suited for discriminating among different CFTR-directed therapies or dosage levels.

On balance, the sweat chloride test has more good features than bad, but is a single test that gives a single number (although it is usually repeated on both arms to give an average value). Scientists (and the FDA) feel more confident when they can base decisions on multiple tests, because if different test measures agree, it increases the chance that effects are real.

With so many lives, years of

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*Our Center's mission is to excel in cystic fibrosis care, to be partners with those we care for, and to be leaders in the discovery process that will produce the cure for cystic fibrosis.*

## The Bubble Test story continued from page 1

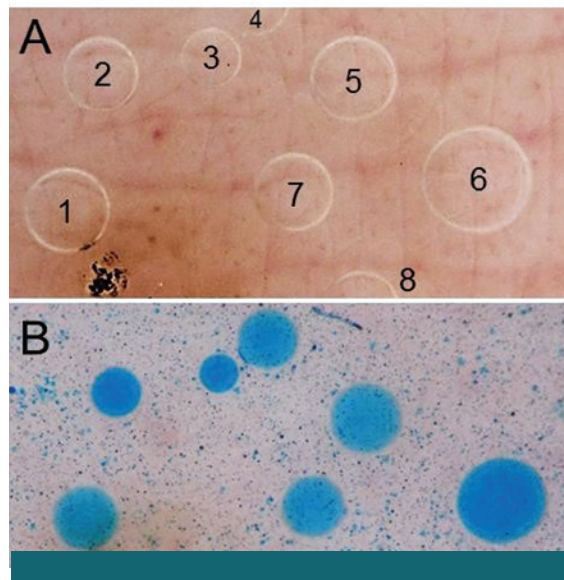
effort and research dollars at stake, there is a pressing need for a new bioassay that shares the rapidity and directness of the sweat chloride test but complements it in ways that alleviate its shortcomings. To meet that need, Cystic Fibrosis Foundation Therapeutics (CFFT) established a consortium in 2007 to develop new, sweat-based bioassays that could complement the standard sweat test. Using CFFT funding, my colleagues and I at Stanford have developed the sweat bubble bioassay to measure CFTR function in vivo. It also uses the sweat gland, but it focuses on CFTR's role in sweat secretion.

The new bioassay looks at bubbles of sweat (hence the name) that form in an oil layer within a reservoir on the skin. Sweating is stimulated by chemicals injected just under the skin. Thirty years ago, the dermatologist Kenzo Sato discovered two types of sweating that could be stimulated with different chemicals. One of them, which we call (M-sweat), is normal in people with CF. Remarkably, the other one, which we call C-sweat is absent in CF. Several years after Sato's discovery, my laboratory modified the method to control for individual differences in M-sweating and used it to show that CF carriers (mainly parents of people with CF) had C-sweat rates that were one half of normal controls.

At the time of this work, the CFTR gene hadn't yet been discovered, but when it was, it soon became clear that C-sweat is CFTR-dependent. With a properly calibrated assay it provides a linear readout of CFTR function: 100 percent for healthy controls, 50 percent for carriers, 0 percent for most CF subjects.

The new sweat bubble assay provides a much-improved level of precision and sensitivity by optically measuring C- and M-sweat in individually identified sweat glands. Because each identified gland is treated as a unit of analysis that can be returned to repeatedly, and because for each subject we measure about 50 glands at once in a simple, one-hour test, the bubble assay presently provides an accurate, complementary method for measuring CFTR function in humans.

The assay is still in development, but we used the present version to measure the effects of oral dosing with ivacaftor on CF subjects carrying G551D or R117H-5T mutations. We measured 32-143 individually identified glands in each of 8 CF subjects. A healthy control was also tested 4 times (51 glands). Without ivacaftor,



*Sweat bubble assay for CFTR function. Bubbles of sweat form under an oil layer inside a small reservoir on the subject's arm. A. Clear bubbles of sweat were produced by injected chemicals that stimulate sweating by a mechanism that doesn't require CFTR. This kind of sweating is still produced in CF subjects. B. Blue bubbles were produced by a chemical that produces sweat via a mechanism that requires CFTR. (They are blue because we put a dye into the oil.) We identify each gland (numbered 1-8 here) and then compare the size of the clear and blue bubbles for each gland to assess how much CFTR function a person has. This example is from a healthy control. If a person has CF, no blue bubbles are produced. For CF carriers, the blue bubbles are about half as large. Only a small portion of the field is shown: the full field is about half the size of a dime and has about 50 glands. The test produces sweat just in this little patch of skin.*

caftor, CF glands produced M-sweat repeatedly, but only 1/593 glands produced C-sweat. By contrast, all tested subjects (113/342 glands) produced C-sweat in the (+) ivacaftor condition. The bubble test requires correction for a tiny amount of sweat that is lost from each gland before it reaches the skin surface, where we measure it. This loss, normally trivial, becomes significant at very low sweat rates. We used various strategies to reduce this effect and corrected for the remaining losses with information from cellular physiology and molecular biology. The corrected data gave estimates of CFTR function with ivacaftor treatment at = 1.6 percent to 7.7 percent of the normal average.

The results suggest that significant clinical benefit can be produced by restoring low levels of CFTR function. This is a pleasant surprise, because it lowers the bar for effective treatments. Like all scientific results it needs to be repeated. If confirmed, we need to understand how small amounts of CFTR function confer disproportionate benefits.

The new bubble bioassay has many powerful features, but one limitation at present lies in the small number of control subjects. We found large variation C-sweat values among control subjects and among CF carriers, even when controlling for M-sweat rates. Repeat testing gives us confidence that these are real differences in C-sweat among healthy subjects. One hypothesis for the difference is that even healthy people have different levels of functional CFTR. If that can be established, it will improve our understanding of how much CFTR function is needed for health.

My colleagues and I will soon be recruiting subjects to help us test this hypothesis. For this work we are mainly interested in testing subjects who don't have CF. This is a great opportunity for friends and relatives to help the CF effort by participating directly in CF research.

### *Additional reading (these articles are freely available online).*

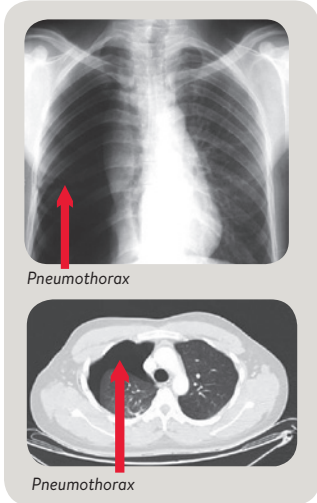
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## Cystic Fibrosis and Pneumothorax

BY PAUL MOHABIR, MD

**A** pneumothorax (PTx) is an abnormal accumulation of air in the pleural space, which separates the lung from the chest wall. This collection of air can significantly interfere with normal breathing.



There are two types of pneumothorax. A primary PTx is spontaneous and occurs without cause in individuals without an underlying lung disease. A secondary PTx occurs in patients with an underlying lung disease.

Signs and symptoms are variable. They can range from mild chest discomfort and shortness of breath to profound chest pain with severe shortness of breath and even respiratory failure and cardiac arrest. Patients can also be clammy, feverish, have a rapid heart rate (tachycardic), be out of breath, and have a bluish

color to their lips and fingers reflecting low oxygen levels. On exam, these patients can have high respiratory rates and diminished breath sounds when using the stethoscope. In some cases, a PTx can be asymptomatic and found incidentally on a routine chest X-ray.

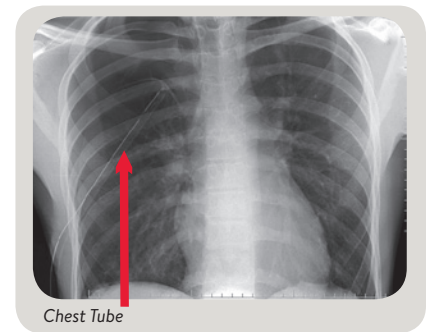
The diagnosis can be confirmed by chest X-ray, CT-scan of lungs, and sometimes solely from the physical examination.

Spontaneous PTx affects greater than 20,000 patients per year in the United States. In CF patients, it is proposed that chronic lung inflammation contributes to chronic obstruction and eventual over-distension of the alveoli, which are the smallest lung units. With this continued process, the alveoli can potentially rup-

ture allowing for air to move from the lungs onto the pleural space resulting in a PTx.

Statistically, 3.4 percent of all CF patients will experience at least one PTx in their lifetime and greater than 18 percent will have more than 1 episode. The mean age of the first PTx is 21.9 years and the majority (72.4 percent) of patients with their first PTx are above the age of 18. Risk factors associated with PTx: Pseudomonas, Aspergillus, FEV1 less than 30 percent predicted, pancreatic insufficiency, ABPA, and receiving tube feeds. Unfortunately, there is a 30 percent mortality within the first year after the first PTx and a higher two-year mortality in patients with FEV1 less than 30 percent predicted.

The treatment involves placing a tube into the pleural space to remove the accumulated air. The goal is to allow the ruptured alveoli to heal by sealing themselves off. In certain circumstances the PTx might not resolve and ultimately require a



surgical intervention to resolve the problem. Patients should also be considered for early referral to a lung transplantation center if FEV less than 50 percent with their first PTx or recurrent PTx irrespective of FEV1.

Overall, pneumothorax is not uncommon in CF patients but can be a serious problem if left untreated. Understanding the disease and signs and symptoms is crucial to early evaluation and treatment. Patients are recommended to present to the emergency room and call your CF center if a PTx is suspected. Additionally, for severe symptoms, please call 911.

## CF Parent Advisory Council News

SIRI VAETH, MSW

**T**he Parent Advisory Council continues to work in partnership with the Cystic Fibrosis Care Team to improve communication and care. In recent months the group has focused significant attention on infection control policies within the clinic and hospital as they relate to patients with cystic fibrosis (CF).

Are CF Clinic and hospital policies that address CF cross-infection risks universally applied throughout other clinics that treat cystic fibrosis patients, including ENT, endocrinology, and gastroenterology? If CF clinic policy directs every care provider entering the room of a CF patient to wear a mask, gown and gloves to prevent cross-infection, should other clinics with high numbers of CF patients follow the same infection control procedures? Those with CF who are in-patient at Lucile Packard Children's Hospital are kept in isolation rooms with contact and droplet precautions, though a high volume of care providers cycle through their rooms each day. Does everyone wear a mask, gown and gloves?

What if they are not touching the patient? What about parents and visitors? Should they follow the same precautions? The Advisory Council is working with the CF care team and the infection control department to share family input as relevant policies are reviewed and updated.

The Council has also addressed issues faced by families whose children have cystic fibrosis related diabetes (CFRD), and is exploring ways to better meet the needs of the center's Spanish-speaking families. Many parents are unable to participate on the advisory council but have specific issues that they would like to see addressed, including support for children with gastrostomy tubes, and resources for newly diagnosed families. The council seeks to expand participation through topic-focused meetings and Skype participation. Please email Siri Vaeth, Lead Parent at [svaeth@lpch.org](mailto:svaeth@lpch.org) with your issues and ideas.



# High Calorie Meal-Time Make-Over

BY JULIE MATEL, RD

One of the challenges of living with cystic fibrosis is consuming enough calories to meet growth and weight gain goals. People with CF need 20 to 50 percent more calories than people without CF. For active teens and adults this can be as many as 3000 to 5000 calories: whereas someone without CF might require 2000 calories per day. Why so many calories? People with CF may not absorb all of the calories from their food, even when taking enzymes with all meals and snacks. People with CF may need more calories to breathe and to fight infections. Getting enough calories can feel like an insurmountable task for people with CF. Below are some tips that may help.

## BE AN INFORMED CONSUMER

- **Read labels** when you shop find the brand with the highest amount of calories per serving. For example, one brand of ice cream may have as many as 300 calories per ½ cup serving versus 130 calories per serving in another brand!

## BE CONSISTENT

- **Avoid skipping meals.** Missing breakfast, for example can leave you short calories for the day.
- **Aim for three meals plus two to three snacks per day.** Eating multiple times during the day makes it more likely to get the nutrition and calories you need.
- **Bed-time snack.** Make this a routine. Choose comfort foods such as whole milk and cookies or granola with full-fat yogurt as a snack to look forward to before bed.

## MAKE YOUR CALORIES COUNT

- **Choose calorie dense foods** at meal and snack times.
- **Avoid beverages between meals and snacks**, such as juice or soda. These can hinder appetites. Consume water between meals and snacks instead.
- **Look for creative ways to add calories.** Below are some high calorie ideas:
  - Trail mix in place of chips
  - Muffins or croissants instead of plain bread
  - Whole milk or half-and-half in place of low-fat milk
  - Add cheese or guacamole to burgers and sandwiches
  - Add crumbled bacon to rice, soup, pasta, eggs, or sandwiches
  - Include a milkshake or smoothie each day as a snack
  - Add peanut butter or whole-fat yogurt to fruits
  - Sprinkle chocolate chips or chocolate syrup on pancakes, waffles, ice cream, and pudding
  - Add sour cream to casseroles, vegetables, potatoes, and soups

## WHAT DOES 4000 CALORIES LOOK LIKE?

BREAKFAST:	Calories
1 ½ cups of orange juice .....	165
1 cup granola .....	500
1 large banana .....	130
2 cups whole milk.....	300
LUNCH:	
1 croissant.....	330
1 6.5 oz. can tuna .....	200
2 T mayonnaise .....	180
Tomato/lettuce .....	50
1 can lentil soup .....	360
1 ½ cups apple juice .....	200
AFTERNOON SNACK:	
1/2 cup of trail mix .....	280
DINNER:	
2 cups spaghetti.....	400
1 cup pasta sauce .....	300
Mixed vegetables 1 ½ c.....	75
w/ ¼ cup parmesan cheese .....	120
1 slice wheat bread w/butter .....	145
1 ½ cups whole milk.....	225
BED TIME SNACK:	
3 chocolate chip cookies.....	300
1 ½ cups whole milk.....	225
TOTAL:	4485 CALORIES



# Cystic Fibrosis Education Day 2014

BY COLLEEN DUNN, CCRC

We had our 14th annual cystic fibrosis education day on March 1, 2014, and are glad to report that it was a huge success. It was well attended; over 90 people enjoyed the venue and there were numerous people who streamed the event live.

The day began with **Scott Donaldson, MD**, from the University North Carolina, Chapel Hill, speaking about cystic fibrosis biology, measuring function of the cystic fibrosis transmembrane conductance regulator (CFTR) protein, and how researchers are trying to fix it. He discussed which CFTR functions are essential within the body and where researchers are focusing their efforts. His talk provided great information and hope for all CF patients.

**Tracey Stoll, RN**, provided an excellent overview of practical infection control measures in the hospital and at home.

**Meg Dvork, adult social worker**, gave an update on the adult support programs that are available. Interested people can send an email to Cathy Hernandez (cathyh1@stanford.edu), who will pass your email address along to Meg.

**Cassie Everson, research coordinator**, gave a talk on the research participant's role in clinical research; why people do research, and what the responsibilities are of the team and the participant. If you are interested in participating in research you may contact Colleen Dunn at (650) 736-0388.

**Brian Eddy** spoke about the adult advisory council (ACFAC) and Siri Vaeth represented the parent council. Each speaker stressed the very important collaboration that happens with the perspective clinical teams. Both councils are actively looking for new members.

**Carlos Milla, MD**, presented the State of the CF Center at Stanford. He presented Stanford data including: nutrition, pulmonary function, microbiology, and more. The reports include Stanford data, the top center's data, and the national averages in detail.

There was also a very interesting talk addressing the microbiome found in healthy people. **David Cornfield, MD**, discussed his work

and the possibility that microorganisms found in the lung may actually have a beneficial effect on overall pulmonary health.

Both Cystic Fibrosis Foundation and Cystic Fibrosis Research Institute provided an update on their programs.

The pediatric afternoon session featured: **Mary Helmers, RN (pediatric nurse coordinator)**, providing an update on the pediatric program. **Sruthi Veeravalli, MSW** (new pediatric social worker) introduced herself and spoke about her ideas for her new role. **Tom McPherson**, from the EPIC medical record team shared some very useful information regarding the "My Chart" application which will go live soon. **Kristin Shelton, RRT (pediatric respiratory therapist)**, spoke about airway clearance and the reason why good pulmonary hygiene is necessary. The session ended with **Jacqueline Zirbes, NP (pediatric newborn coordinator)** and **Julie Matel, RD (pediatric nutritionist)**. They presented data on the advances made in the nutritional health of cystic fibrosis newborns since the implementation of the California newborn screening program.

The adult session was moderated by **Paul Mohabir, MD**, and featured four great talks by the adult team: **Cammie Washowich, NP (adult CF provider)** gave an interesting talk on osteoporosis and cystic fibrosis. **Elika Rad, NP (adult CF provider)** discussed the current thinking and treatment protocols that have been developed for the treatment of non-tuberculosis mycobacterium. This is an organism that we are seeing more of in our clinical practice, although the numbers remain quite low. **Lara Felton, RD (adult CF nutritionist)** discussed nutritional support and its role in the overall care of CF patients. Lastly, **Kapil Patel, MD, (adult lung transplant specialist)** addressed the latest information regarding CF and lung transplantation.

We are already planning next year's event which will be held on **March 7, 2015** at the Frances C. Arrillaga Alumni Center. The conference center is located at 326 Galvez St., Stanford, CA 94305. If you would like to be placed on our mailing address for an invitation, please contact Cathy Hernandez at cathyh1@stanford.edu or (650) 724-3474.

## Stanford Adult Cystic Fibrosis Advisory Council

BY BRIAN EDDY



The Adult Cystic Fibrosis Advisory council is going through a very exciting time.

From a membership perspective, we have added several new members who are adding new ideas and energy to the council.

We are working on several new projects, working with both the Stanford CF clinic and Joan Forte-Scott, the Administrative Director of Patient and Community Engagement at Stanford. The most active project has been working with a Stanford

development team to improve the usefulness and value of the MyHealth website, tailoring it to better fit the needs of the CF community.

For more information about the council please visit our website: <http://cfcenter.stanford.edu/acfac/>

## Adult CF Center Update BY ELIKA RAD, MSN, RN, NP-C

### Farewell:

In 2008 **Kathy Gesley, RN**, joined the Adult CF program and was instrumental in transitioning the adult patients from Lucile Packard Children's Hospital to Stanford University Medical Center. As a dedicated Nurse Coordinator, Kathy knew all of our patients in detail without the need to look at notes or a computer screen. She spent endless hours advocating for patients with insurance companies, pharmacies, laboratories, and outside hospitals. She also led Clinical Quality Improvement projects for our center, helped the Adult Center pass our first 5-year review, and made sure that the whole team was accountable for patient outcomes. She was everyone's right-hand (and at times our second brain). Kathy decided to pursue other career goals in December of 2013. This is a great loss to our team but we wish Kathy the best of luck in her future endeavors. Jennifer Cannon, NP will be assuming Kathy's duties.

**Lara Felton, RD:** After finishing her Masters in Business Administration (MBA), Lara received a fantastic opportunity in the tech world and decided to leave her role in clinical patient care at Stanford to pursue her new calling. Lara first joined our team in 2008 as a shy new graduate dietitian. We had the fortunate opportunity to see her grow over the years into an expert in the field of CF and a valuable member of our team. She was not only a dietitian to our patients but was, at times, their counselor and coach. Lara was instrumental in the clinical improvement of many of our adult patients. We will not only miss Lara's expertise but also her ever-present good cheer. Here's wishing Lara the very best of luck and greatest success in all future endeavors!

- **Staff Changes:** There have been a few staffing changes on the Adult CF team and we appreciate your patience through this season of flux. Please help us welcome the new additions to our team.
- **Flu Season:** The 2013-14 flu season was especially tough on our Adult CF population with multiple cases of H1N1 Influenza resulting in prolonged and, at times, severe exacerbations. Please be sure to stay ahead of the game by getting a timely flu vaccine prior to the start of the upcoming flu season (October 2014).
- **Respiratory Therapy Update:** A big thanks to Gauri Pendharkar, RCP, who covered CF clinic and all patient care needs during Carol Power's absence.
- **Healthcare administration:** The new mandated healthcare administration through Obama Care may result in changes to your coverage. Please be sure to keep us in the loop of any difficulties you may be experiencing with your coverage. As always

we are here to help navigate your care to prevent delays in your treatment and medication refills.

- **Annual Labs:** To ensure that annual labs are completed in a timely manner the expected due date is between the months of January and April of each year. If you get blood work at Stanford, you do not need a clinic appointment or paperwork – you may simply show up at the main laboratory (M-F 6 AM to 9 PM) or a hospital draw station. If you do not have a diagnosis of diabetes, you will also need fasting blood work (oral glucose tolerance test). Check with your coordinator if you are not certain which labs are needed or to coordinate completion of these tests at a local laboratory.

- **Medication Refills:** Daily medication refills are done through your electronic medical record via Pharmacy Sure-Scripts requests or patient inquiry. If your pharmacy continues to use a fax refill request you may experience a delay in receiving medications. Please use My Health online to request refills, or leave a message with Jennifer Cannon. Please ask your pharmacies to send refill requests electronically when possible.

- **Communication with your CF Provider:** In order to improve communication and response times, we are available via phone call or MyHealth messaging. Please do not email any provider with sick calls or clinical questions as emails may not be secure and the appropriate provider may not receive your message in a timely manner. For ALL daytime (8 AM to 5 PM) questions (sick calls, medication, insurance), please call the Adult CF Coordinator at (650) 498-6840 or send a message through MyHealth. Do NOT use MyHealth for weekend urgent questions. For appointments, including changing/cancellation, please call Dulce Moreno at (650) 736-5400. Calls to the Chest Clinic/Call Center should be made only if you are running late to an appointment at (650) 725-7061. Any after-hours calls will need to go through the operator at (650) 723-4000. Ask for the Pulmonary Fellow on call.

- **Clinical Improvement:** Erika Rad, NP, will continue her role as Clinical Improvement Strategist for the Adult program to lead the development of patient care protocols/guidelines and to facilitate efficiency measures to improve your patient care experience. We encourage your open communication through participation in Meg Dvorak's monthly support group as well as the Stanford Adult Cystic Fibrosis Advisory Council (ACFAC). For any issues regarding Chest Clinic operations, please contact the new clinic manager, Linda Green, RN.



### New Staff Members:

**Jennifer Cannon, MS, NP-C** Originally from the east coast, Jennifer recently relocated to California and is absolutely loving it! After completing her Master's work at Columbia University in New York City, she started her career as a Nurse Practitioner in community medicine. Her most recent position was located in the Tri-Valley where she worked in women's health. Jennifer is very excited to transition into the coordinator position with Stanford's incredible CF team, and looks forward to meeting all of the CF patients in the upcoming months.



New Staff Members continued from page 6



**Michelle Stroebe MS, RD**, is the new adult cystic fibrosis dietitian, and she is absolutely thrilled to have been chosen for the position. She received her graduate degree in Nutritional Science from San Jose State University, and completed her Dietetic Internship at Stanford Hospitals & Clinics. Prior to taking over the CF service, Michelle worked with a wide-range of patients, in both in- and out-patient settings, to optimize their nutrition status and help them meet their nutritional goals. Michelle is extremely excited about the opportunity to work with such a wonderful team and patient population. She particularly loves working with cystic fibrosis patients because of the important role nutrition plays in their overall care and well-being. In her free time, Michelle enjoys cooking and baking, modifying recipes to be more healthful, as well as hiking, running and rock climbing.

## Stanford and Copenhagen: A Collaboration! BY KAREN ABRAHAMSEN

I am a fifth year medical student from University of Copenhagen in Denmark.

I joined the Stanford Cystic Fibrosis Center in January 2014 as a part of my research year. This research program is a collaboration between University of Copenhagen, Rigshospitalet Denmark, California Pacific Medical Center Research Institute, and the CF center at Stanford Children's Health, with Associate Professor Carlos Milla, MD, as my primary mentor.

The opportunities when you study medicine are diverse. I have always wanted to use my education in an international perspective. I first explored this during my clinical stay at Concord Hospital in Sydney Australia. The stay was very rewarding, and I immediately knew that I would go abroad again if I had the opportunity. The reason I chose to have "a research year" is that I find research to be an integral part of a physician's education. Research is a prerequisite for acquiring new, valuable knowledge. Health science is a field that is constantly developing and transforming, so it is important to always be up to date. Furthermore, studying at Stanford University has given me a unique opportunity to share knowledge internationally between medical institutions, which is very important when dealing with rare diseases like cystic fibrosis.

My current research project is "Pharmacokinetic assessment of tobramycin dosing in children with cystic fibrosis". It is a retrospective cohort study, which means that I am going through data that has already been collected from 2008 through 2014. The aim of the study is to describe the clinical outcomes of children treated with tobramycin (aminoglycoside) with dosing guided by a pharmacokinetic assessment (how a medicine is processed within the body).

The background of the study is that most of the mortality and morbidity in CF are due to the pulmonary manifestations of the disease. Chronic infections with recurrent exacerbations produce significant morbidity in CF children. *Pseudomonas aeruginosa* is a predominant organism in this. At Lucille Packard Children's Hospital Stanford, the standard treatment of *Pseudomonas* exacerbations consists of combination antibiotic therapy with aminoglycosides and beta-lactams, so-called combination therapy.



Aminoglycoside therapy remains a necessity for CF patients. But the optimal aminoglycoside dosing management for exacerbations in children with CF still remains unclear. Hopefully this study will provide valuable information on whether the pharmacokinetic approach is beneficial. So far the data indicate that children treated following this paradigm have improved lung functions at discharge. However, most of the children are on many other medications,

and the association between pharmacokinetics and clinical outcome needs to be further investigated. The next step will be to compare the data from the CF center at Stanford with data from The Pediatric Pulmonary Department at Rigshospitalet in Denmark.

It is a great experience to be a part of the team at a large leading CF center. People in different professions are collaborating on providing the patients the best treatment possible. Everyone shares the same goal, whether it being through research or directly through clinical care. From day one people at the CF center have been friendly and helpful. The CF center has been an exciting and inspiring place to work. People are smart, ambitious and hard-working. Meanwhile there is still room for jokes, baby showers and birthdays. I will definitely be taking more than a research experience with me when I leave the CF center in July to finish my medical degree in Denmark.

CF Center at Stanford  
770 Welch Road, Suite 350  
Palo Alto, CA 94304

## Pediatric CF Center Update

BY MARY HELMERS, RN

It has been almost a year since our move to 770 Welch Rd, and we hope that you are all happy with the new clinic. If you have any suggestions, concerns, or comments regarding the new clinic, please feel free to give us your feedback when you are in clinic or via email: [mhelmers@lpch.org](mailto:mhelmers@lpch.org) (Mary Helmers, RN, CF Nurse Coordinator) or [ebeken@lpch.org](mailto:ebeken@lpch.org) (Liz Beken, RN, CF Clinic Nurse)

We have a new Electronic Medical Record called EPIC that started on May 5th. The front desk staff will ask to take your photo to attach to your chart and you can sign up for My Chart. If you have any questions, feel free to ask us!

Reminder: Wear your mask We have new turquoise colored masks that we are asking all CF patients to wear. They are being handed out at the front desk. These masks have smaller filters which allow for more protection when walking outside during all the construction. We would like all patients to wear them to and from all clinics/hospital and when you walk outside the medical center. They should fit snugly around the nose and mouth. If you have not received the new mask, please ask for one.

### CURRENT RESEARCH STUDIES

Be a part of the cure for CF! Volunteer for a clinical trial today. To learn more, visit <http://cfcenter.stanford.edu>, contact our research coordinators, or talk to your physician. The following trials are currently underway:

- E-ICE, study of Pulmonary Exacerbation utilizing home FEV1 monitoring
- KaloBios (IV Anti Pseudomonas antibody study)
- N30 study – enrolling late Summer 2014
- PTC study – Enrolling this Summer for Stop mutations
- Electro Flo vs. G5 device study
- Vertex 661 study ( for F508/F508 patients, looking at video endoscopy)

### CYSTIC FIBROSIS CENTER AT STANFORD

**Pediatric Providers at Packard Children's:** Carlos Milla, MD, Pediatric CF Center Director; Sumit Bhargava, MD; My My Buu, MD; Carol Conrad, MD; David Cornfield, MD; Richard Moss, MD; Terry Robinson, MD; Nanci Yuan, MD; and Jacquelyn Zirbes, DNP, RN, CPNP.

Clinic Scheduling.....	(650) 724-4788
Clinic and Prescription Refill.....	FAX (650) 497-8791
Erica Oliva, Patient Services Coordinator .....	(650) 498-2655
Mary Helmers, Nurse Coordinator .....	(650) 736-1359
Liz Beken, CF Clinic Nurse.....	(650) 736-1359
Kristin Shelton, Respiratory Therapist .....	(650) 724-0206
Julie Matel, Nutritionist, Dietitian .....	(650) 736-2128
Sruthi Veeravalli, Social Work .....	(650) 736-1905
Jacquelyn Zirbes, Newborn Screening Coordinator.....	(650) 721-1132

#### FOR URGENT ISSUES:

Monday-Friday, 8 am to 4 pm, contact RN Coordinator (650) 736-1359  
All other times, for children's needs, call (650) 497-8000 (Packard Children's main number)

#### ADULT PROVIDERS AT STANFORD:

**Paul Mohabir, MD - Adult CF Center Director; David Weill, MD; Gundeep Dhillon, MD; Camille Washowich, MSN, RN, ACNP; Erika Rad, MSN, RN, NP-C, Kelly Johnson MSN, RN, NP-C, Susan Lukan MSN, RN, NP-C, Laura Starr MSN, RN, NP-C**

Clinic Scheduling – Dulce Moreno.....	(650) 736-5400
Adult Clinic Fax/Refill Requests.....	(650) 723-3106
Nurse Coordinator – Jennifer Cannon, NP.....	(650) 498-6840
Respiratory Therapist – Carol Power .....	(650) 736-8892
Registered Dietitian, Michelle Strobe.....	(650) 721-6666
Social Work, Meg Dvorak.....	(650) 518-9976
Chest Clinic – USE ONLY IF RUNNING LATE FOR VISIT... (650) 725-7061	

#### URGENT ISSUES:

Mon-Fri, 8 am to 5 pm: Call Nurse Coordinator, Jennifer Cannon, NP  
Mon-Sun, 5 pm to 7 am: (650) 723-4000, and ask for the Pulmonary Fellow on-call  
Sat-Sun, 7 am to 5 pm: (650) 723-4000 and ask for the Adult CF Ghost Pager

#### RESEARCH:

Colleen Dunn, Zoe Davies, Cassie Everson (650) 736-0388

**Visit our website at <http://cfcenter.stanford.edu> for more information about our CF center.**