Matching the Treatment to the Tumor  
page 43  

profiles in ADVOCACY  
page 45  

Molecular Testing in Lung Cancer  
page 46  

JILL'S LEGACY  
page 48  

More at: cancerconnect.com  
The statistics may be familiar: lung cancer is the leading cause of cancer death among both men and women in the United States. Lung cancer kills more people than breast cancer, prostate cancer, and colorectal cancer combined.

The past few years, however, have brought some exciting new approaches to managing non–small cell lung cancer (NSCLC). NSCLC is the most common type of lung cancer, and it’s become increasingly apparent that specific characteristics of the cancer can have a profound effect on the behavior of the cancer and its response to certain treatments. These characteristics include not only the particular type of cell involved but also the genetic makeup of the cancer.

THE ALK GENE AND XALKORI
The targeted drug Xalkori \(^{(1)}\) (crizotinib) hit the headlines in 2010. The drug benefits a relatively small subset of patients with NSCLC, but for these patients the response rates have been impressive.

Up to 7 percent of non–small cell lung cancers have an abnormal version of the anaplastic lymphoma kinase (ALK) gene. These ALK abnormalities are most common among non-smokers and contribute to the growth of cancer cells.

Xalkori targets the protein produced by the abnormal ALK gene. A study published in the New England Journal of Medicine in 2010 reported that among patients with advanced, ALK-positive NSCLC, more than half experienced tumor shrinkage after treatment with Xalkori.\(^{(2)}\) The accumulating evidence was enough to convince the US Food and Drug Administration (FDA) to approve the drug in August 2011 for the treatment of advanced NSCLC that tests positive for the ALK gene abnormality. Xalkori was approved under the FDA’s accelerated approval program. This program allows patients early access to promising drugs, but the company that produces the drug will need to conduct additional studies to confirm a benefit.

More recently, researchers evaluated overall survival in NSCLC patients who participated in one of the Xalkori clinical trials.\(^{(3)}\) Overall survival was longer in the study participants (all of whom had been treated with Xalkori) than in a comparison group of ALK-positive patients who had not been treated with Xalkori.
A companion diagnostic test was approved at the same time as Xalkori. The test identifies ALK abnormalities in a sample of tumor tissue and provides information about which patients are candidates for Xalkori. Patients who test negative and learn that they are not candidates for Xalkori can choose other treatments that are more likely to be effective for their particular cancer. Use of the ALK test may not be necessary for all patients, however. Some NSCLC patients (such as those with squamous cell NSCLC) are unlikely to have an ALK abnormality and may not need to be tested.

**EGFR GENE MUTATIONS**

EGFR—which stands for epidermal growth factor receptor—contributes to the growth of several types of cancer. Drugs that block the activity of EGFR can slow cancer growth. EGFR-targeted drugs that have been shown to benefit selected patients with NSCLC are Tarceva® (erlotinib) and Iressa® (gefitinib). These drugs belong to a class of drugs known as tyrosine kinase inhibitors (TKIs). The drugs enter the cell and interfere with EGFR from within.

Tarceva is currently approved for the treatment of advanced NSCLC after initial treatment has failed or as maintenance therapy after chemotherapy. Iressa is restricted in the United States, available only to patients who have previously shown a response to the drug.

Although these drugs are not currently approved for the initial treatment of NSCLC, studies in newly diagnosed patients suggest that mutations in the EGFR gene improve the cancer’s responsiveness to Tarceva and Iressa. Among people with NSCLC, EGFR mutations are most common in people of Asian ethnicity, women, never-smokers, and those with a type of lung cancer known as adenocarcinoma. Among US patients with adenocarcinoma of the lung, approximately 15 percent have an EGFR mutation.4

A study known as IPASS illustrates how treatment response can vary by EGFR mutation status. The study, conducted in East Asia, enrolled patients with advanced adenocarcinoma of the lung.5 Study participants were treated with either Iressa or combination chemotherapy. Among patients with an EGFR mutation, Iressa delayed cancer progression to a greater extent than chemotherapy. In contrast, among people without an EGFR mutation, Iressa resulted in worse outcomes than chemotherapy.

In response to the accumulating data, the American Society of Clinical Oncology released a statement in April 2011 about the importance of EGFR mutation testing when considering Tarceva or Iressa for the initial treatment of NSCLC.4 The results of the test can provide information about whether chemotherapy is likely to be the most effective first approach or whether an
EGFR-targeted TKI is an option. For patients who are candidates for Tarceva or Iressa, these drugs appear to be both more effective and better tolerated than combination chemotherapy.

Testing for EGFR mutations may not be recommended for all patients with NSCLC. As is the case for ALK gene abnormalities, some groups of patients—such as those with squamous cell NSCLC—are less likely than others to have an EGFR mutation.6

WHAT ABOUT LUNG CANCER SCREENING?

For diseases such as breast cancer, colorectal cancer, and cervical cancer, early detection through the screening of asymptomatic individuals has contributed to decreased rates of death from these cancers. Understandably, there has also been a great deal of interest in whether lung cancer screening with tests such as chest X-rays or computed tomography (CT) scans could reduce lung cancer mortality.

Results from two large lung cancer screening trials were published in 2011. The National Lung Screening Trial (NLST) compared low-dose CT with chest X-ray among more than 53,000 current and former heavy smokers.7 There were 20 percent fewer lung cancer deaths among people screened with CT than among those screened with chest X-ray, suggesting that low-dose CT screening can reduce lung cancer mortality among people at high risk of the disease. The Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial compared screening with annual chest X-rays with no screening. The numbers of lung cancer deaths in the two groups were similar, suggesting that chest X-rays are not effective for lung cancer screening.8

Although the results of the NLST were promising, groups such as the American Cancer Society have not yet made official recommendations about CT screening for lung cancer. The results from this and other trials will need to be closely reviewed to determine how often and for whom screening may be appropriate. Identifying the optimal screening strategy—as well as the groups of people most likely to benefit—is important because screening does carry some risks. False-positive test results, for example, can lead to unnecessary additional workup.

Profiles in Advocacy

Lung Cancer Alliance advocates are passionate about raising awareness of lung cancer.

Lung Cancer Alliance (LCA) is dedicated to “reversing decades of stigma and neglection by empowering those with or at risk for the disease, elevating awareness, and changing health policy.” To that end the Washington, DC–based organization works to engage advocates across the country to raise awareness of the disease and its related issues and to help create positive change. Kay Cofrancesco, director of advocacy relations at LCA, says that the organization works diligently to educate prospective advocates about the value of advocacy work: “Lung Cancer Alliance has information on our website and at all of our events to engage both men and women in advocacy. In addition, we host an annual Capitol Forum here in DC. We invite advocates and volunteers from across the country to come to Washington, DC, where we teach them how to talk to their elected officials and the media. We teach them about becoming effective advocates and how to use their voices for the entire lung cancer community.”

The following stories represent just a few of the many advocates working around the country on behalf of LCA and the lung cancer community.

Diane Legg

Diagnosed with non–small cell lung cancer in 2004 at the age of 42, Diane Legg was shocked to learn that former and never-smokers were susceptible to the disease. An active, otherwise healthy mother of three, Diane had never considered herself at risk of lung cancer. “I thought only longtime heavy smokers got the disease,” she says. “I had no idea that never-smokers or former smokers were getting lung cancer. I was completely ignorant of how prevalent this disease was and how dismal the survival rates were.”

Having learned much more about the disease and its impact during her own treatment and recovery, Diane has become a passionate advocate, determined...
What is molecular testing, and why is it important for people with lung cancer?
Previously thought of as one singular disease, lung cancer is now known to comprise many different subtypes based on the genetic characteristics of each tumor. There are several different molecular drivers of lung cancer, which can be determined by testing tumor samples.

Through molecular testing of lung cancer tumors, doctors can determine whether there are identifiable genetic mutations or alterations driving the cancer, which may enable them to better understand each patient’s individual cancer and determine an appropriate treatment plan. Increasingly, the cancer field is moving away from a one-size-fits-all approach to one that targets specific genetic abnormalities.

Where can I get tested?
Molecular testing is available at many cancer centers and diagnostic labs across the country. For more information talk with your doctor.

How much does testing cost? Does insurance cover it?
The cost of molecular testing varies depending on the test. There are a variety of tests available. Insurance may cover part or all of the cost of molecular testing. Speak with your doctor about which tests may be appropriate for you.

How will the results of testing affect my treatment plan?
Some drugs have been developed to treat specific lung cancer subtypes. Some are FDA-approved, whereas others are currently under investigation. Both the presence and the absence of specific biomarkers may be taken into consideration when determining an appropriate treatment plan, including participation in a clinical trial.

What questions should I ask my doctor about molecular testing?
- Can you explain the benefits and the risks of molecular testing?
- What genetic changes may be driving my lung cancer?
- Am I a candidate for molecular testing?
- Can you use an existing tissue sample for my molecular testing?
- How would learning about my molecular profile affect my treatment plan?
- What if I don’t have any identifiable biomarkers? Would that affect my treatment plan?

*Lung Cancer Profiles is a collaboration among Pfizer Oncology and Bonnie J. Addario Lung Cancer Foundation, Lung Cancer Alliance, Lung Cancer Foundation of America, LUNGevity, the National Lung Cancer Partnership, and Uniting Against Lung Cancer.
PREVENTION IS STILL KEY

In spite of important progress in the treatment of lung cancer, outcomes remain poor for many patients. This highlights the key role that prevention must play in this disease.

Although lung cancer does occur in people who have never smoked, avoidance of tobacco smoke is the best thing we can do to reduce our risk. And if you currently smoke, it’s not too late to quit. Smoking cessation reduces your risk of developing lung cancer.

Finally, consider testing your home for radon, a radioactive gas produced by the decay of naturally occurring uranium in soil and water. In the United States, radon is the leading cause of lung cancer in nonsmokers and the second-leading cause of lung cancer overall. Do-it-yourself radon test kits are available at many hardware stores, and testing can also be performed by a professional. If the test identifies high radon levels, steps to reduce radon include increasing ventilation under floors and sealing gaps and cracks in floors.

REFERENCES

Profiles in Advocacy

to educate others and raise awareness of the disease. Here, Diane describes the role that advocacy plays in her own story and why she encourages other survivors to become active advocates:

I believe it can be very powerful to share your story. Lung cancer can be a very lonely disease due to the stigma it carries. After being diagnosed with lung cancer and learning the statistics, I was stunned by the lack of research that had been done, the lack of progress relative to screening and survival rates, and the lack of understanding by the general public, medical community, and government about the disease itself. Due to the lack of survivors, lung cancer also has few to advocate for it. We need people to share their stories to educate others about the disease and start getting funding to reverse the statistics and the stigma.

Those who have been touched by lung cancer quickly realize that not all cancers receive equal funding and attention. Those cancers with the largest number of grassroots advocates have received ever-increasing amounts of both public and private funding for early detection and research, accounting for steady increases in survival rates.

Sadly, few women know that lung cancer is more deadly than breast cancer. Almost twice as many women die of lung cancer than breast cancer each year. Nor do many women know that lung cancer is increasing in non-smoking women at alarming rates. An estimated 30,000 people who never smoked or were never exposed to significant smoke died of lung cancer in 2007—and nearly two-thirds of them were women. The biggest increase has been among non-smoking women under age 50.

Six years ago, I started working with Lung Cancer Alliance, the only national nonprofit organization dedicated solely to patient support and advocacy for people living with lung cancer and those at risk of the disease. Currently, I am co-chair of the New England Chapter of LCA, where we are working with other advocates to bring awareness and legislative changes on both the state and federal levels. I am committed to speaking out about the devastation that lung cancer is having on our families today and to raising awareness in order to change the face of this disease.
Jillian Costello was, by all accounts, an inspiring and passionate young woman. A star student at the University of California, Berkeley, Jill—as she was known to friends and family—was also a competitive athlete, serving as coxswain of the university’s varsity eight-crew boat, and a student leader within the school’s Greek system. Her passion and commitment to each of her endeavors—and to her friends and family—defined her.

It was a similar passion and dedication that would mark her battle with lung cancer. Jill was a nonsmoker with no family history of the disease when she was diagnosed with Stage IV lung cancer at age 21. As she faced treatment, Jill confronted the grim statistics and the stigma associated with the disease: a 15.5 percent survival rate, which has not improved in more than 40 years; a lack of funding and awareness when compared with other major cancer types; and a widespread perception that lung cancer is a disease of smokers and the elderly.

In the face of these discouraging facts, Jill was determined to effect positive change. Still pushing through the coursework required for graduation and her commitment to the crew team—not to mention a rigorous treatment schedule that included chemotherapy and radiation—Jill embraced another challenging role: cancer advocate. Hired as director of communications and awareness for the Bonnie J. Addario Lung Cancer Foundation (BJALCF), Jill worked tirelessly to launch Jog for Jill, a 5K walk/run on the UC Berkeley campus that raised more than $46,000 for research and awareness funding, and to reach out to media outlets and pharmaceutical companies about the dire need for increased attention to lung cancer.

Jill’s college roommate and close friend, K.C. Oakley, remembers the way Jill’s grace and fortitude were evident through this difficult time, as she fought her own battle and took on the larger role of advocacy.

“Jill’s conditions were tougher than one could ever expect or imagine,” K.C. says, “and, as her roommate, I saw her struggle to get out of bed every day. I knew she was always tired from chemotherapy and radiation, but even with her deteriorating body her love for life and the people around her helped her break through with endless smiles.”

Sadly, Jill’s journey ended far too quickly. She passed away on June 24, 2010, a year after her initial diagnosis. Now, inspired by her legacy of courage, action, and passion, a committed group comprising many of Jill’s closest friends and other young adults affected by the lung cancer diagnosis of a loved one has come together to ensure that Jill’s advocacy efforts and brilliant spirit will continue to make a difference.

“Jill left us with a clear message: to beat lung cancer,” says Darby Anderson, one of Jill’s closest friends, who now serves on the board of Jill’s...
In 2006 I started Shine a Light on Lung Cancer Vigil in Boston to honor and remember those who have been touched by the disease and to raise awareness. This year there will be more than 60 vigils in more than 30 states and in two countries to shine a light on lung cancer and bring it out of the shadows.

Because of the stigma and the blame associated with lung cancer, the investment in research and early detection has been delayed and underfunded relative to its public health impact. This underfunding is greatly responsible for the dismal 15.5 percent five-year survival rate. Lung cancer, the most underfunded of all major cancers, has few survivors to advocate for changes in public health policies that have led to decades of neglect. This is why it is so important to tell our stories—we need to change this and we need to change it now!
Karen encourages other lung cancer survivors to do all they can to maintain wellness and to pay close attention to their bodies. “Keep your body as healthy as possible to face all that needs to be done,” she says. “Exercise, drink lots of water, and listen to your body—if something doesn’t feel right, look into it and don’t be shy. The body is amazing, and you can do it!”

Faith, Family, and Friends

One young survivor describes the resources that have seen her through.

Montessa Lee was 28 years old when she was diagnosed with small cell lung cancer in December 2006 after two misdiagnoses. At the time, the special education teacher from Silver Spring, Maryland, was healthy and active, having never encountered a health challenge more serious than seasonal allergies.

Now she found herself facing cancer treatment at a time when most of her peers were focused on careers, relationships, and family. For Montessa, whose family lived in North Carolina, the experience illuminated what was of real value in her life and showed her what she could truly count on.

Turning to her faith and to loved ones, she found strength to cope. “I turned to the only thing that
could bring me through that storm: my relationship with God,” Montessa says. “I joined a cancer support ministry at my church, which I am still a part of today.” In addition, she found support in family, who traveled back and forth from North Carolina to offer support, and in friends who truly came through for her.

Learning whom she could really count on and what she was capable of, Montessa says, has been transformative. “I have learned how to truly value life and friendships. I found out what makes a true friend—one who will be with you through thick and thin—and I have learned that I was stronger than I ever thought I was.”

Montessa says that she hopes newly diagnosed patients will learn to reach out for support when they need it and learn the value of becoming their own best advocate.

In addition to calling on that strength to aid in her own recovery, Montessa now channels her resources to make a difference for others affected by lung cancer. “When I look at the survival rates of this disease, I believe that I am still here for a reason. I am assured that my life has a purpose on this earth: I am alive today to give this disease a voice and tell my story.” To that end Montessa works with the National Lung Cancer Partnership to raise funds and awareness of the disease.

Having recently celebrated five years of survivorship, Montessa says that she hopes newly diagnosed patients will learn to reach out for support when they need it and learn the value of becoming their own best advocate. “Don’t have too much pride to ask for help,” she says. “Seek support from local cancer centers, websites, and support or church groups. Seek out advice about who are the best doctors that specialize in your particular cancer. Last but not least, be your own patient advocate: know the side effects of medications, know your treatment cycles, know the names of your chemotherapy drugs, know the latest findings for your cancer, inquire about clinical trials, and always ask questions.”

Jenny White was diagnosed with lung cancer in October 2010 at age 49. A never-smoker with no major risk factors for the disease, Jenny underwent surgery to have the Stage 1A tumor removed and has since been cancer-free. Because she was diagnosed so early and had such effective treatment, Jenny struggled initially to consider herself a “survivor.” “I did not feel like I had earned the right,” she says. “As someone said, I had the ‘Cinderella of lung cancer stories.’”

In time Jenny has come to realize that her early diagnosis and good prognosis mean that she can offer her voice on behalf of the many whose stories did not have such a fairy-tale ending. “I finally came to terms with the title when I realized how amazingly blessed I was to have had my lung cancer diagnosed so early,” she says. “After realizing the magnitude of my early diagnosis, I decided to be a voice for those diagnosed too late.”

Now Jenny is working with Lung Cancer Alliance to help raise awareness and funding for the disease. Having hosted Nashville’s first Shine a Light on Lung Cancer Vigil this past fall (an annual LCA event), Jenny continues to advocate through her role as chairman of both the first-ever State Lung Cancer Committee for Tennessee and the Lung Cancer Committee for Middle Tennessee through the Tennessee Cancer Coalition and the Tennessee Comprehensive Cancer Control Plan.

In all of her advocacy efforts, Jenny is motivated by a deep-seated desire to make a difference for those affected by lung cancer, and she urges others to look within for the fire to create change. “For me,” she says, “the most important component of advocacy work is finding your passion. Changing minds and moving others to action will be challenging. Staying true to your passion will keep you focused and motivated.”
5 Things All Women Should Know About Lung Cancer

Lung cancer is sometimes referred to as the “invisible” cancer. Its impact may not often be discussed; but it is often felt. This disease takes more American lives each year than breast, colon, and prostate cancers combined. One in 16 women will develop lung cancer in her lifetime, and anyone can get it. Do you know the facts you need to protect yourself and your family?

1. LUNG CANCER TAKES NEARLY TWICE AS MANY U.S. WOMEN’S LIVES AS BREAST CANCER.¹
   In a nationwide survey conducted by the National Lung Cancer Partnership, 83 percent of women did not know that lung cancer takes more lives than breast cancer.² Lung cancer will claim about 30,000 more lives than breast cancer this year. In fact, lung cancer takes the lives of more women each year than breast, ovarian, and uterine cancers combined.¹
   Lung cancer is sometimes thought of as a man’s disease. However, of the 215,000 cases of lung cancer diagnosed in the U.S. each year, nearly 100,300 (close to 50 percent) are in women. Over 71,030 women die from lung cancer annually, accounting for 26 percent of cancer deaths among women.¹
   One of the reasons this cancer is so deadly is because by the time symptoms are noticeable, the disease has often spread. The five-year survival rate for lung cancer is only 16 percent, compared to an 89 percent five-year survival rate for breast cancer.¹,³ A major reason for this is that lung cancer is more likely to be diagnosed at a later stage than many other types of cancers.¹ Symptoms often don’t become noticeable until the cancer has grown or spread beyond the point where it can be removed surgically.

2. SMOKING IS THE NUMBER ONE CAUSE OF LUNG CANCER; BUT IT IS NOT THE ONLY CAUSE.
   Some women are under the false impression that if they don’t smoke, or they don’t live in a home with someone else who smokes, they are safe from lung cancer.
   While it’s true the greatest risk factors for lung cancer are smoking-related, there are other causes of the disease. The second most common cause of lung cancer is radon, an odorless, colorless natural gas.⁴ Other risk factors include: lung scarring from tuberculosis and occupational or environmental exposure to secondhand smoke, air pollution, radiation, arsenic, asbestos and some organic chemicals.¹ In some cases, no obvious risk factor is found.

If you have been affected by lung cancer and would like to get involved in the movement to defeat it, visit www.NationalLungCancerPartnership.org.

By Joan Schiller, MD
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Distinguished Chair in Cancer Research, University of Texas Southwestern Medical Center, President, National Lung Cancer Partnership
Our mission is to decrease deaths due to lung cancer founded by doctors and researchers working together with survivors and advocates to increase lung cancer awareness and research funding. Our mission is to decrease deaths due to lung cancer and to help patients live longer and better through research, awareness, and advocacy.

LUNG CANCER RESEARCH IS SIGNIFICANTLY UNDERFUNDED.

In 2010, the National Cancer Institute and the Department of Defense spent approximately $1,888 per lung cancer death compared to $19,419 per breast cancer death, $11,871 per prostate cancer death, and $5,263 per colorectal cancer death. The only way we are going to make a considerable impact on the survival rates is by funding research to find new ways to detect, diagnose, and treat the disease.

YOU CAN REDUCE YOUR RISK.

- If you smoke, get the help you need to quit (state quit lines can be accessed at www.naquitline.org or by calling 1-800-QUIT-NOW).
- If you live in an area with high levels of radon coming from the bedrock (see www.epa.gov/radon), the surgeon general recommends having your house tested for radon exposure. If radon levels are too high, a device can be installed to reduce them.
- Eat a well-balanced diet and exercise. These activities help reduce the risk of all cancers.
- If you smoke now or smoked in the past, or have a family history of lung cancer, consider speaking to your doctor about screening tests that may be available to you. Lung cancer is most treatable when it is detected early.

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