

## LUNG CANCER

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### What is the problem?

Lung cancer remains the **number-one cancer killer** in the United States, with one in every sixteen Americans expected to receive a diagnosis of lung cancer in their lifetime. It is estimated that lung cancer will cause more deaths in 2019 (142,670) than the three other most common cancers combined (colorectal cancer 51,020, breast cancer 42,260, and prostate cancer 31,620) – it accounts for 24% of all cancer deaths. Lung cancer kills almost twice as many women as breast cancer and more than twice as many men as prostate cancer.

It is estimated that more than 228,000 Americans will be diagnosed with lung cancer in 2019. **The low 5-year survival rates** for lung cancer (19%) is particularly striking when compared with the 5-year survival rates for prostate (98%), breast (90%), and colorectal (65%) cancers.

While progress is being made with new treatments, such as immunotherapy and targeted therapies, the statistics remain alarming, and robust funding for scientific research is necessary to provide continued hope for all those diagnosed with the disease. Public and private funding for diagnosis and treatment of the disease has lagged far behind that for the other major cancers; in fact, only 6% of federal funding for cancer is spent on lung cancer.

When lung cancer is found before it has spread beyond the lungs, the 5-year survival rate rises to 56%, dramatically better than the overall rate of 19%, so investment in early detection promises improvement in survival. However, 56% is still far from the 90-98% survival rate seen with localized colorectal, breast, and prostate cancers.

Additionally, the majority of available funds from the Tobacco Settlement cases were directed toward prevention through tobacco control and clean air initiatives. While all these are valuable for public health, they are not effective at increasing the survival rate of those with lung cancer. The fact that nearly 65% of those diagnosed with lung cancer today never smoked or are former smokers further highlights the need to expand beyond prevention and invest in earlier detection and more effective treatments.

**There is no universal early detection test used for lung cancer.** Symptoms generally do not appear until the disease is in late stages, when it is hardest to treat.

Finally, **stigma** plays a major role in the lung cancer experience. Research shows stigma appears to be experienced more by lung cancer patients than by other patient groups; and more by smokers

compared to nonsmokers. Many of those affected by the disease feel guilty or to blame for their disease and feel the need to conceal their condition. Fear and shame can also leave those affected feeling isolated and anxious. Stigma is clearly linked to disease-related distress and poor health outcomes.

This community is grossly underserved in the level of funding for, and awareness of, lung cancer – for too long, lung cancer has been in the shadows of the cancer space.

### **Whom does it affect?**

**Lung cancer can affect anyone** – regardless of age, gender, ethnicity, or smoking history; 65% of people diagnosed with lung cancer have either never smoked or are former smokers.

However, tobacco smoke is by far the most important risk factor for lung cancer. Harmful substances in smoke damage lung cells, cause mutations, and make the lungs more vulnerable to other cancer-causing environmental factors, such as asbestos and radon. Smoking cigarettes, pipes, or cigars can cause (or accelerate) lung cancer. Secondhand smoke—smoke from other people’s tobacco use—can even cause lung cancer in nonsmokers. The more and the longer a person is exposed to smoke, the greater the risk of lung cancer. It is best not to start smoking.

Even those who do smoke can significantly lower—although never eliminate even after many years of non-smoking—their risk of developing lung cancer by quitting. In addition, it is never too late to quit; there are health benefits, including longer survival and a lower likelihood of a recurrence of their lung cancer, even to those who don’t quit smoking until after a lung cancer diagnosis.

**Smoking isn’t the only cause of lung cancer.** Among other known causes are exposure to secondhand smoke, air pollution, radon, and other substances (including asbestos, arsenic, diesel exhaust, and some forms of silica and chromium); and radiation therapy to the chest. Radon causes about 15,000-22,000 lung cancer deaths each year, making it the second leading cause of lung cancer death. Studies also support the relationship between particle pollution and lung cancer.

Finally, personal or family history of lung cancer can also be a cause. People with an immediate family member—father, mother, brother, sister, son, or daughter—who has had lung cancer may be at slightly increased risk for developing lung cancer. This is particularly the case when more than one family member is or has been affected by the disease, and at an early age. The increased risk may be due to exposure to the same environmental risk factors, including tobacco smoke, or possibly, in rare cases, to an inherited mutation.

### **What are signs and symptoms of lung cancer?**

Lung cancer symptoms generally do not appear until the disease is in late stages, when it is hardest to treat. However, there are some signs and symptoms to look for. A tumor in your lung can block off an airway and interfere with breathing. This can cause shortness of breath, wheezing when you breathe, ache or pain in your chest, upper back, or shoulder that doesn’t go away, or may get worse with deep

breathing, and/or a hoarse voice. It can also cause a cough that gets worse/does not go away, frequent respiratory tract infections (such as pneumonia or bronchitis), or blood in a cough.

Lung cancer can also cause general physical changes, such as feeling unusually tired all the time or weight loss with no known cause. Sometimes, there will be a loss of appetite or trouble swallowing. It can also cause swelling in the face and/or veins in the neck.

As the cancer spreads, it may cause other symptoms as well, such as pain in the back or other bones or weakness in the arms and legs. If it spreads to the brain, it may cause headaches, seizures, or vision changes.

### **How is lung cancer detected?**

There is no universally used early detection for lung cancer. Currently, lung cancer is generally detected through a conventional chest X-ray, which often misses early-stage signs, or a high-resolution low-dose CT scan, which is more sensitive. However, current guidelines recommend these CT scans only to high-risk individuals. (While anyone can have the scan, insurance will not cover these scans for those outside the high-risk group.) Several innovative methods of early detection are currently being researched, such as blood tests or nasal swabs.

With 65% of those diagnosed with lung cancer today being never-smokers or former smokers (not all of whom will fit the high-risk definition), there needs to be expanded early detection methods and investment in prevention and more effective treatments.

Early detection, by low-dose CT screening, can decrease lung cancer mortality by 14%-20% among the high-risk population. Additional early detection and prevention could result in more people being diagnosed at earlier stages, increasing survival rates.

The ultimate goal is to develop a reliable and broadly available test for lung cancer that can catch the disease early even in people not considered high-risk.

### **How is lung cancer diagnosed?**

Many different tests are used to diagnose lung cancer and determine whether it has spread to other parts of the body. Some can also help to decide which treatments might work best. The steps and tests used in diagnosing lung cancer include medical history, imaging tests, laboratory tests, biopsies, and biomarker tests.

Imaging tests can be used to find out where the possible cancer is and whether it has spread, but they can never be used alone to make a diagnosis. Only a biopsy, in which a small amount of tissue is removed for examination, can provide a definite diagnosis of lung cancer, so, until biopsy results come back, a person does not know for sure whether he or she has lung cancer. Many other diseases, including other types of cancer, can cause masses to form in the lung.

There are several types of biopsies, such as bronchoscopy or thoracoscopy, that can help diagnose lung cancer. Depending on which method is used, the doctor can also determine whether the cancer has spread to lymph nodes or other organs.

## **What are side effects and how are they managed?**

Today, thanks to advances in research, specifically targeted therapies and immunotherapy, many patients are living their lives with the disease – working, parenting, and traveling.

However, these newer treatments, along with more conventional cancer therapies, often cause side effects. For example, chemotherapy works by killing fast-growing cancer cells. Because many healthy systems in the body also have fast-growing cells, cancer treatment can result in collateral damage to healthy cells and tissue. When enough collateral damage builds up, you are faced with unwanted side effects. Radiation causes side effects because it can damage the healthy cells in the area that is treated by the radiation.

Some side effects for chemotherapy include nausea and vomiting, diarrhea, constipation, tiredness, pain, loss of appetite, hair loss, skin and nail changes, numbness and tingling, and swelling. Some side effects for radiation include nausea and vomiting, diarrhea, tiredness, hair loss, and skin changes. Targeted therapies are designed to have fewer and less severe side effects, but side effects are still possible and can include nausea and vomiting, diarrhea, constipation, swelling of hands and feet, rash and other skin changes, and vision problems.

Some side effects are temporary, while others can be more long-term. It is possible to reduce the side effects of lung cancer treatment. Pulmonary rehabilitation, complementary therapies such as yoga, meditation, or massage, and palliative care are just some of the ways to help manage treatment side effects.

### **The bottom line:**

The past decade has brought extraordinary advancements for people affected by lung cancer. In fact, **more lung cancer treatments have been approved by the FDA in the last three years than in the last three decades.**

**Research is accelerating at a pace never seen before,** resulting in new treatment options for many patients, promising new ways to find the disease early (when it is most treatable), and new hope for people with lung cancer.

Advances in precision medicine (patients receiving the right treatment at the right time) are changing cancer outcomes. Lung cancer is leading the way in targeted therapies and immunotherapy, resulting in more people *living well* with lung cancer

This is an engaged and active community. Patients and their caregivers are creating action groups based on shared biomarkers. Some of these patient groups are fundraising for and supporting research to save their own lives

However, this community continues to be grossly underserved in the level of funding for, and awareness of, lung cancer. Stigma continues to negatively affect the lung cancer community, including those affected, their healthcare professionals, and researchers. Despite the impressive advancements, lung

cancer remains the number-one cancer killer in the United States, with one in every sixteen Americans expected to receive a diagnosis of lung cancer in their lifetime. There is still no universally used early detection test for lung cancer.

Lung cancer is no longer always a death sentence. Ultimately, early detection and precision medicine are the keys to long-term survival.

### Case examples

***Mary Ann Laverty:*** Like so many others, Mary Ann's lung cancer diagnosis came as a huge shock. She was a healthy, active flight attendant who loved to travel. She had recently won third place in the Masters National Bodybuilding Championships in the over-45 bikini category. In March 2017, on a flight from Phoenix to New York, a passenger's suitcase hit her on the head when he was trying to retrieve it from the overhead compartment. It knocked her out, and she was taken to the E.R. to determine whether she might have a concussion. After bloodwork, X-rays, and a scan, she was cleared for a concussion, but a 2.2 centimeter nodule was found in her lung. After a CT scan and a biopsy back in Phoenix, lung cancer was found. At first, lung cancer put everything else on hold. In the months following her diagnosis, she wanted to hide and did not want to talk about it. However, after initial treatment and time passed, she began to feel healthy enough to go back to work. She began to get back into a routine. She began training as a bodybuilder and celebrated her son's wedding. Now, when she is faced with difficulties with her job or in her daily life, she thinks: "You know what, you fought cancer, you can handle this."

***Yovanna Portillo:*** Yovanna's lung cancer was discovered by accident. In 2016, she was a healthy, active 25-year-old. In April, she was in a car accident, which landed her in the emergency room. She had scans to check for internal injuries. She did not have any broken bones, but they did discover a mass in her lung. The E.R. doctor advised her to see her primary care provider for a follow up. Her PCP referred her to a pulmonologist, but since the mass was located behind her heart, there was nothing she could do. The pulmonologist requested a PET scan and referred her to a thoracic surgeon. Yovanna had a CT-guided biopsy, which revealed that the mass was made up of cancerous cells. She was diagnosed with stage 1B mucinous adenocarcinoma. That July, she had surgery to remove the lower lobe of her left lung. Yovanna didn't realize the toll that surgery would take on her body. She thought she'd be back at work right away, but she had to learn to be kind to her body and give it time to heal. She has since run the Marine Corps Marathon in Washington, DC, in 2018.

***Rachael Drazan:*** Rachael was diagnosed on April 21, 2017, at the age of 31 with stage IV lung cancer. Rachael was in great physical shape with few or no symptoms. She was a former collegiate and Olympic-level athlete and in the military at the time of diagnosis. Because of a mutation in her tumor (EGFR), Rachael is able to benefit from targeted therapies. She is thankful for this because her goal is to keep the cancer at bay until research finds options to make lung cancer a chronic disease.

Additional case examples:

Watch our survivors tell their own stories [here](#).

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