

The search for new options for patients with lung cancer

We're working to bring the hope of advanced medicine to more patients.

By [Elizabeth Dougherty](#) | Jun 21, 2021

"She was the picture of health," recalls Andrea Myers, a cancer physician and scientist at Novartis. Seven years ago, Myers' young and fit former medical school classmate was diagnosed – inexplicably – with lung cancer. She died two years later.

A lung cancer diagnosis often comes as a shock. The disease tends to progress silently, with few symptoms. For most people it is not discovered until it has already advanced. At this point, the disease is very difficult to treat. Fewer than 20% of patients survive more than five years.

Innovative medicines have helped, but lung cancer remains the No. 1 cause of death from cancer worldwide.

We're pursuing the challenge on four fronts. First, Novartis is developing experimental therapies that block cancer growth in ways previously thought to be impossible. Second, we're learning more about ways to coax the body's immune system to fight lung cancer. Third, we're developing an understanding of the relationship between [chronic inflammation](#) and tumor growth and progression. Last, we are exploring the potential for [advanced nuclear medicine](#) to help patients with lung cancer. We are working on all of these projects because we believe that advances in medicine could significantly extend the survival of lung cancer patients and give them hope for a brighter future.



Trees have been called the lungs of the Earth. They take in carbon dioxide and release oxygen, the same as human lungs but in reverse. They also have the same beautiful branching features. But most important, they are essential for life. Images courtesy Shutterstock, modified by PJ Kaszas.

Worldwide, lung cancer is responsible for 1.8 million lives lost each year. More broadly, in the US, one of every four lives lost is due to cancer, a rate exceeded only by heart disease.

Anyone can get lung cancer. The risk goes up for smokers. Vaping has also been linked to lung cancer in studies in mice. Air pollution, which is rapidly returning to pre-pandemic levels, also ups risk. Around 20% of lung cancer cases occur in people who never smoked.

"For patients, the question is almost always why me? Why did this happen?" says Myers, who oversees clinical trials of novel approaches to lung cancer therapy at Novartis. "As physicians, we're asking for additional options. What more can I do to help this patient based on the science?"

It's a bold bet to move forward on so many fronts, but the need is great.

Andrea Myers

From hopeless to hopeful

Fifty years ago, doctors searching for lung cancer therapies entertained the thought that there might never be effective therapies for this disease. Over the coming three decades, however, researchers developed chemotherapies – drugs that typically target cells that rapidly divide – that transformed lung cancer into a treatable disease.

These medicines act broadly in the body and can take a toll on the quality of patients' lives, so researchers continued the search for therapies. They got traction when advances in molecular biology gave them the power to learn which gene mutations, errors in the genetic code that cause faulty cellular behaviors, were driving cancer growth. This knowledge gave scientists an idea. What if they could block the molecular drivers of cancer?

In 2005, that idea turned into reality. The US Food and Drug Administration approved the first targeted medicine for lung cancer. It specifically targeted a molecule in tumor cells responsible for the growth of the cancer rather than broadly targeting cell growth, so patients had far fewer side effects.

“It was amazing to see the incredible impact these new medicines were having on patients' lives,” says Alice Shaw, who cared for lung cancer patients during the advent of targeted therapies and now leads the early-stage development of new cancer medicines at Novartis.

There are now many approved targeted therapies for non-small-cell lung cancer. But only patients with specific biological markers in their cancer cells will benefit, so scientists have been devoted to discovering more targeted therapies.



For those who learn they have lung cancer, getting the right treatment relies on getting a complete diagnosis. A lung cancer diagnosis (blue) is just the beginning. Doctors can order a test that will determine which gene mutations play a role in driving an individual's cancer. Here, different colors represent different test results. The results of this test, called a biomarker test, can help physicians personalize treatment for patients by matching individuals to the most appropriate treatment, such as a targeted therapy or combination of therapies. Image by PJ Kaszas, animated by Alain Fiechter.

Advances in targeted therapies

That quest hasn't always been easy. For example, scientists have known about a protein called KRAS for decades. It is believed to act in cells as a revolving door for signals that encourage cells to divide.

Mutations that jam that door open result in unchecked cell growth – a hallmark of cancer. Medicines that jam it closed have long eluded drug hunters.

Recently, however, researchers at Novartis and other companies have discovered experimental drugs with the potential to block “undruggable” proteins like KRAS and another, called SHP2, which may also influence that same revolving door.

If these therapies prove to be effective in clinical trials, they could open up new possibilities for many lung cancer patients. They could also help patients with other hard-to-treat cancers, such as pancreatic cancer.

Tapping into the body's own defenses

More recently, medicines called immuno-oncology therapies have also shown promise in lung cancer. These medicines aim to unlock the potential of the body's immune system to attack the cancer.

They work by unmasking the cancer in ways that enable the foot soldiers of the immune system to find tumor cells and attack. Doctors initially hoped that these medicines could help all patients. But in practice, “not all patients benefit,” says Myers.

Researchers are learning more about how to match patients to immunotherapies. “Really deep science is going into understanding which patients respond and which do not,” says Myers.

Dialing down inflammation

Yet another area of inquiry was originally conceived of in the late 1800s based on observations of cancer cells under a microscope. The 19th century scientist Rudolf Virchow thought that inflammation might fan the flames of cancer.

Over the past several years, evidence has been mounting to suggest that his hypothesis has merit. If inflammation has the potential to fuel the flames of cancer, perhaps a deep understanding of this relationship could open avenues for addressing the disease. Novartis is committed to exploring this possibility in the hope that it could eventually help patients with lung cancer and other forms of cancer.

We are also exploring the potential for advanced nuclear medicine to help patients with lung cancer. Novartis is investing in this advanced form of nuclear medicine because it believes it has the potential to become a foundational pillar of cancer therapy.

“It’s a bold bet to move forward on so many fronts, but the need is great,” says Myers. “We need to connect what we’re learning to drive forward science that helps us find new medicines.”

Novartis is pursuing different approaches to help patients with #lungcancer.

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