August 2024

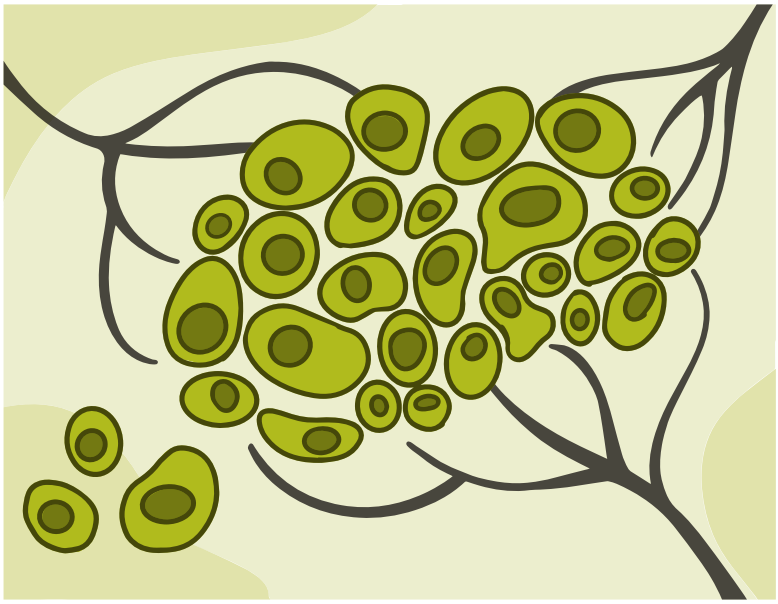
NIH News in Health

National Institutes of Health · Department of Health and Human Services · newsinhealth.nih.gov

When Cancer Spreads

Improving Treatments for Metastasis

A cancer diagnosis can be scary. Some cancers can be cured if caught early. Treatments like surgery, radiation, and chemotherapy can destroy many early-stage cancers. But cancer can be difficult to treat when caught later on, after it spreads.



Cancer cells are sneaky and stubborn. They are hard to stop from growing and spreading. Cancer cells can also break away from their original location and settle in other parts of the body.

When this happens, it's called metastatic cancer, or metastasis. This is sometimes called stage 4 or stage IV cancer. When cancer migrates to other organs, it can disrupt their function and cause life-threatening problems.

Metastatic cancer is serious and hard to treat. In fact, most cancer-related deaths (about 90%) are caused by metastatic cancer and not the original tumor, called the primary tumor.

Researchers have been working to better understand how metastasis occurs so they can find new ways to prevent or treat it. Thanks to medical advances, some people can live for many years with metastatic cancer when it is well-controlled.

Adapting to New Locations •

Cancer cells can spread to almost any part of the body. The liver, lung, and bones are the most common places. Different types of cancer tend to spread to certain locations. For instance, pancreatic and colon cancer commonly spread to the liver. Breast cancer and a type of skin cancer called melanoma can spread to the brain.

Metastatic cancer is considered to be the same type of cancer as the original tumor, even though it has moved to a new place.

"It can sometimes be confusing. Breast cancer that spreads to bone is still considered to be breast cancer and not bone cancer," says Dr. Rosandra Kaplan, a physician and cancer researcher at NIH. "So a patient with cancer may have bone pain or feel a lump somewhere else. But it doesn't mean there's a new primary cancer. It's most often the original cancer. But it has figured out how to escape and grow in a new place."

Researchers have been scrutinizing how cancer cells do this. Once cells break away from the original tumor, they can squeeze into blood vessels and travel to other sites. At this point, escaping cells are usually destroyed by the body's **immune system**.

But sometimes our own body helps hide or protect the tumor cells. If any cells survive, they can take root in a new location. The cells can form a growing clump that prompts new blood vessels to grow. This blood supply then helps the metastatic tumor to thrive.

Cancer cells have to undergo many changes to survive in a new part of the body. They keep some features of the original tumor cells.

"But we are learning that as cancers become metastatic, they become very different from the primary tumors they started off as," explains Dr. Karuna Ganesh, a physician scientist at Memorial

continued on page 2

Definitions

Immune System
The system that protects your body from invading viruses, bacteria, and other microscopic threats.

continued from page 1

Sloan Kettering Cancer Center. "Once these cancers spread, they become really hard to treat."

The treatments used to shrink the original tumor become much less effective in the cancer that spreads. Ganesh and colleagues have been studying the complex changes that occur when cancer cells adapt to new environments. They've found that the invading tumor cells can easily turn different genes off and on. This helps them adapt to new places and resist treatment.

"We've found that there's a crosstalk between the tumor cells and the surrounding cells. The cancer cells can reprogram the surrounding cells to support them," Ganesh says. "By understanding this crosstalk, we can manipulate those interactions to better control the cancer cells."

Revving Up Defenses • In recent decades, scientists have uncovered new ways to use the body's own immune system to fight cancer. This is called immunotherapy. One type, called immune checkpoint inhibitors, is now widely used. It can extend the lives of many patients with metastatic cancer.

"Tumor cells are good at hiding from the immune system. They do this by displaying proteins that send the signal: 'Do not attack me,'" explains Dr. Christine Nadeau, an NIH expert on metastasis. "Immune checkpoint inhibitor drugs block those protein signals." This "unmasks" the cancer cells so immune cells can destroy them.

Immune checkpoint inhibitors can treat patients who have metastatic melanoma and some types of kidney, lung, head, and neck cancers. Although these drugs can be effective, they don't work for everyone. And they can have harsh side effects. Researchers are developing artificial intelligence tools to help doctors identify who will most likely benefit from these drugs. That way, patients who won't be helped can receive different treatments.

Another type of immunotherapy is called cell-based therapy. It essentially uses a person's own immune cells as drugs. "Cell therapies involve removing some of the patient's immune cells and then altering them so they can work even better against their cancer," Kaplan says. The enhanced immune cells can be grown in large batches and injected back into the patient's bloodstream.

One type of cell therapy, called CAR T-cell therapy, has been used for years to treat some blood cancers, like leukemia. In early 2024, the U.S. Food and Drug Administration approved the first cell-based therapy for treating a solid tumor. It's used to treat metastatic melanoma. Recent clinical trials at NIH have used other types of cell therapy to treat people who have metastatic cancer of the colon or breast.

"Cell therapy may become a real game-changer for many patients with metastatic cancer," Kaplan says. She is now leading a first-in-human clinical trial to see if another type of immune cell therapy, called GEMys, can keep cancer from spreading.

Coping With Metastatic Cancer • "A diagnosis of metastatic cancer can be overwhelming," Nadeau says. "But treatment options continue to improve. There are reasons to be hopeful."

The goal of treating metastatic cancer is usually to stop or control its growth to extend the person's lifespan. Other treatments are designed to relieve symptoms and improve quality of life. This type of treatment is called palliative care. It can be given at any point during cancer treatment. Learn more at go.nih.gov/NIHNiHJul24Cancer.

"Joining advocacy or support groups for your particular cancer can also help," Nadeau adds. "These groups include people who have been through similar treatments. They understand the challenges."

To learn more about coping with cancer, visit www.cancer.gov/about-cancer/coping. ■

Wise Choices

Recognizing Metastatic Cancers

Symptoms often depend on the size and location of metastatic tumors. Common signs include:

- Pain.
- Fatigue.
- Fractures, when cancer has spread to bone.
- Headache, seizures, or dizziness, when cancer has spread to the brain.
- Shortness of breath, when cancer has spread to the lung.
- Jaundice (yellowish skin or eyes) or swelling in the belly, when cancer has spread to the liver.

Web Links

For more about metastasic cancer, see "Links" in the online article: newsinhealth.nih.gov/2024/08/when-cancer-spreads

NIH News in Health

ISSN 2375-6993 (Print) **ISSN 1556-3898** (Online)

Editor Harrison Wein, Ph.D.

Managing Editor Tianna Hicklin, Ph.D.

Graphics Alan Defibaugh (illustrations), Bryan Ewsichek (original design), Tianna Hicklin (layout)

Contributors Vicki Contie, Kristine Duru, and Sharon Reynolds

newsinhealth.nih.gov

National Institutes of Health
NIH...Turning Discovery Into Health®

Office of Communications & Public Liaison
Building 31, Room 5B52
Bethesda, MD 20892-2094
email: nihnewsinhealth@od.nih.gov
phone: 301-451-8224

Sound Check

Tracking Voice, Speech, and Breathing for Health

Speaking, singing, and making other sounds require many parts of your body to work together. Your brain thinks of ideas. Your lungs move air in and out. Your vocal cords vibrate. Your mouth and nose help shape sound.

"Our whole body participates in the production of voice, speech, and breathing. So we can get a lot of information about our health from them," says Dr. Yael Bensoussan, a voice researcher at the University of South Florida.

Many conditions can impact the various body parts involved in sound production. These include depression, Parkinson's disease, **dementia**, lung problems, and even cancer. Measuring voice, speech, and breathing patterns could help diagnose health problems.

Researchers are testing ways to use apps and other tools to let people measure such information at home. For example, a recent study showed that a computer program could identify patients with Parkinson's disease by their breathing patterns during sleep.

"Voice, speech, and breathing are easy to access, inexpensive, and non-invasive to measure," Bensoussan says. "For example, for a test for lung function, you currently have to go to a hospital and blow into a machine. Then you need someone to analyze that test. Just recording your voice or breathing sounds on your phone would be a lot cheaper and easier."

Speech pattern analysis has shown promise for diagnosing impairments in memory or thinking abilities, and mental health conditions like depression. The way people speak, the tone of voice, and even the words used can all change when someone develops depression, explains Dr. Gari Clifford, a biomedical engineer at Emory University and Georgia Institute of Technology.

Clifford's team is trying to use speech patterns and facial expression changes to catch depression early in people with dementia. They are now testing their technology in certain tablet and smartphone apps to track changes in people's daily health. This could help doctors see the effects of depression treatments in real time and change them quickly if needed. It could also provide early warning that someone's health is declining.

Other NIH-funded research teams are testing speech analysis to screen for additional mental health problems, like anxiety. They're also looking at speech patterns to help diagnose diseases like amyotrophic lateral sclerosis (ALS) early.

Bensoussan's team is building the world's largest collection of voice and speech samples related to health information. They're including people from a wide range of backgrounds and health conditions. They hope this will aid researchers in building new tools for diagnosis.

Voice and speech analysis tools will eventually have to take people's whole health into account, just like a doctor would, Bensoussan says.

"Multiple different diseases can cause the same voice changes. For example, for a hoarse voice, someone with cancer of the throat and someone with laryngitis can sound exactly the same," she explains.

You can't yet talk into your phone and get a full health report. But Bensoussan encourages people to pay attention to changes in their voice and speech. "If you have a voice change for more than two to three weeks, it may indicate an issue with your health," she says. See the Wise Choices box for signs to look for. ■

Definitions

Dementia
Loss of thinking, memory, and reasoning skills that seriously affects your ability to carry out daily activities.

Wise Choices

Pay Attention to Your Voice

Talk with your doctor if you notice changes in your voice, speech, or breath lasting over a few weeks:

- Hoarseness or a raspy quality to your voice.
- Changes in the pitch of your voice (how low or high it is).
- Your throat feeling raw, achy or strained.
- Difficulty talking.
- Repeatedly feeling the need to clear your throat.
- A cough that doesn't go away.
- Problems thinking of the words you want to use or putting words in the right order.

Web Links

For more about voice and speech analysis, see "Links" in the online article: newsinhealth.nih.gov/2024/08/sound-check

Health Capsules

For links to more information, please visit our website and see these stories online.

Lasting Protection From Peanut Allergy

Peanut allergy is one of the most common food allergies. It often begins in childhood and usually lasts for life. Symptoms include hives, lip swelling, and trouble breathing. It can even be deadly.

Several years ago, an NIH-funded study found that kids who began eating foods with peanuts as infants were less likely to become allergic to them. By age 5, their risk of peanut allergy had dropped by 81% compared to kids who had avoided peanuts. Most of the peanut-eating kids stayed allergy-free up to age 6.

In a new follow-up study, researchers asked how long this protection could last. They tracked about 500 of the original study participants up to about age 13. They found that only one child in the peanut-eating group had developed a new peanut allergy.

Overall, less than 5% of the peanut-eating kids were allergic at age 13. For comparison, about 15% of the peanut-avoiding kids were allergic. Early and regular exposure to peanuts in childhood had reduced teens' peanut allergy risk by 71%.

The results show that beginning to eat peanut products in infancy can have lasting benefits. But parents should talk with a doctor first. A doctor can test to make sure the child is not already allergic.

"If widely implemented, this safe, simple strategy could prevent tens of thousands of cases of peanut allergy in the United States each year," says Dr. Jeanne Marrazzo, director of NIH's National Institute of Allergy and Infectious Diseases.

Scaly Skin: About Psoriasis

Psoriasis is a long-lasting skin disease. Patches of skin become scaly and inflamed. Psoriasis usually affects the scalp, elbows, and knees. But it can also appear on other parts of the body.

Anyone can develop psoriasis. It arises when the body's disease defense system becomes overactive. This triggers skin cells to multiply too fast.

Symptoms can vary based on the type of psoriasis. Some people develop thick patches of red skin with silvery-white scales. Others have dry, cracked skin or thick, uneven nails. Symptoms can flare up for a few weeks or months before easing.

The underlying cause of psoriasis is not fully understood. But genes and the environment likely play a role. Many affected people have a family history of the disease. Infections, smoking, certain medicines, and obesity can increase the chances of psoriasis.

Treatment depends on the type of psoriasis. For mild psoriasis, ointments and creams often help. For moderate to severe psoriasis, doctors may prescribe pills or injections. Some doctors recommend phototherapy for large affected areas. This involves shining ultraviolet light on distressed skin.

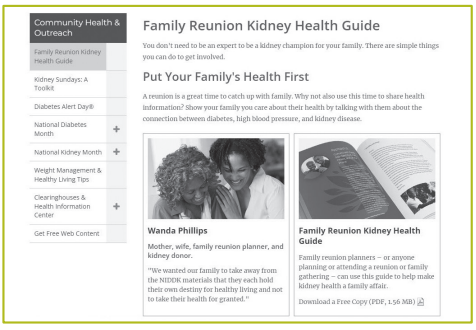
Psoriasis can greatly affect your daily life. But you can take steps to control symptoms. Managing triggers like stress and avoiding skin injuries can help. Learn more at www.niams.nih.gov/health-topics/psoriasis.

Featured Website

Family Reunion Kidney Health Guide

go.nih.gov/NIHNiHAug24Kidney

Visiting family this summer? Use the time to share key health information. Get tips for encouraging discussions about the importance of kidney health. Learn about the links between diabetes, high blood pressure, and kidney disease. And get ideas for connecting with loved ones to inspire healthy behaviors.



How to get *NIH News in Health*

Subscribe for free!

Visit **newsinhealth.nih.gov**

Subscribe

Get it in print.

Contact us (see page two) to get print copies free of charge by mail for display in offices, libraries, or clinics within the U.S.

READ SHARE RECYCLE