2025, Issue 1

MSK News

MEMORIAL SLOAN KETTERING CANCER CENTER

Thriving

How MSK helps patients like Derrick navigate life with cancer.

ALSO INSIDE

Memorial Sloan Kettering Cancer Center

Dear MSK Community,

More people than ever before can expect to survive cancer.

According to the National Cancer Institute, there are more than 18 million cancer survivors in the United States, and nearly half have lived 10 years or more. Cancer that spreads to other organs remains a challenging diagnosis. But in 2025, an estimated 700,000 people are living with the six most common forms of metastatic cancer and their numbers are expected to continue growing.

MSK is a leader in developing new insights and treatments for cancer that save lives and reduce suffering.

We are just as committed to helping people with cancer live healthier, more satisfying lives during and after treatment. So that people don't just survive cancer — they thrive.

This issue of *MSK News* is devoted to our pioneering efforts to establish evidence-based guidance that empowers patients with actions they can take to feel more in control of their lives during and after cancer treatment.

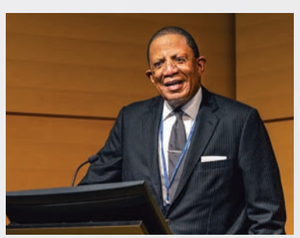
We explore:

- The connection between food and cancer, including the facts about sugar, fiber, and alcohol, as well as a new study examining how a plant-based diet may help prevent a form of blood cancer.
- The latest research into the role of exercise, including a clinical trial involving newly diagnosed prostate cancer patients that tested prescribed exercise in much the same way a new drug is investigated.
- The recommended integrative medicine techniques such as mediation, acupuncture, and yoga.
- The financial concerns of people with cancer, and how they can manage the need to continue working with cancer.

At MSK, these complements to the lifesaving therapies we provide play a vital role in our commitment to care for the whole person, in every way we can. As you will see, we bring the same world-class scientific rigor to these efforts as we do to our discovery science and clinical investigations.

All of these efforts — both to control cancer and to help patients feel more in control of their lives — depend on the generosity of the MSK Giving Community. In 2025, we are marking the first full year of "The MSK Campaign: Leading Science. Changing Lives." The campaign's goal is to ensure that our doctors and scientists will have the resources needed to create new treatments, turning MSK's legacy of innovation into impact.

You will see that impact right now in the lives of the people in this issue. Their stories are inspiring and informative, with hopeful lessons for anyone coping with cancer.



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President and Chief Executive Officer

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To learn how the MSK Giving community is supporting a better future for cancer care, scan here.

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Food for Thought

Revealing the connection between what we eat and cancer

If you or a loved one is facing cancer, you may wish you could regain some sense of control when so much feels beyond your power.

You may wonder what you can or should eat. Comfort food? Healthy food? How much does it matter?

The effort at Memorial Sloan Kettering Cancer Center (MSK) to answer these deeply personal questions stretches from the laboratory to the exam room to kitchens and dinner tables. Along the way, we are researching diet with the same rigor used to investigate new therapies, with innovative clinical trials that are uncovering new insights into our dietary habits and health.

Fat Cells and Cancer

One key to understanding the complicated relationship between what we eat and cancer is the humble fat cell.

While many people who develop cancer are at a healthy weight, there is growing awareness of the association between obesity and a higher risk of cancer.

"There are at least 13 types of cancer, including breast, prostate, endometrial, colorectal, and others that we know are linked to obesity," says Neil Iyengar, MD, a breast cancer oncologist at MSK and a nationally recognized expert on the relationship of obesity, metabolic health, and cancer.

"Separate from obesity," Dr. Iyengar adds, "having higher levels of body fat is associated with an increased risk of several forms of cancer."

It turns out that fat cells are not as sluggish as people may think. "Fat is dynamic — it doesn't just sit there," explains Dr. Iyengar. "It can become dysfunctional, resulting in inflammation, which increases the risk of developing cancer. Many of the cancers linked to obesity are in organs that are embedded in pads of fat."

Fat cells can also influence the entire body. "People with dysfunctional fat tissue often have altered levels of hormones, such as insulin and estrogen," says Dr. Iyengar. "These changes can damage DNA and lead to several kinds of cancers, including some blood cancers, such as multiple myeloma."

What Should People Eat After a Cancer Diagnosis?

Urvi Shah, MD, is an MSK specialist caring for patients with multiple myeloma, which is a cancer of white blood cells called the plasma cells. She explains that many people who develop the disease first have what is called a precursor condition, meaning a precancerous stage that may or may not progress to full-blown cancer.

These precursor conditions are without symptoms and known as MGUS (monoclonal gammopathy of undetermined significance) and smoldering multiple myeloma (SMM).

"People who are overweight or obese have twice the risk of these precursor conditions progressing to full-blown myeloma," Dr. Shah says. "This presents an opportunity to see if a clinical trial that gives people with MGUS a new pattern of eating could help them lose weight and slow or stop the possible progression of the disease."

Dr. Shah feels deep empathy for her patients who have been diagnosed with MGUS. "Standard practice is just observation. You tell someone: You have a precancerous state, but there's nothing you can do. Just watch and wait to see if you get cancer. Of course, patients don't like that and may develop anxiety."

Dr. Shah also empathizes with patients who wonder what they should be eating. She herself was diagnosed with a blood cancer called Hodgkin lymphoma during her first year as a hematology-oncology fellow.

"We don't really get taught in medical school what we should or should not eat after a cancer diagnosis," Dr. Shah says. "But as a patient, I realized it was a natural question. Patients really want to feel empowered to do something for their own health."

Spurred by her own cancer journey, Dr. Shah decided to research nutrition and cancer. Previous studies suggested that an eating pattern focused on high-fiber unprocessed plant foods would be most beneficial. "These studies evaluate data generated from large populations," she explains. "But there had been no interventional study where we ask people to change their dietary habits and evaluate outcomes. MGUS provided an opportunity to study this and help patients."

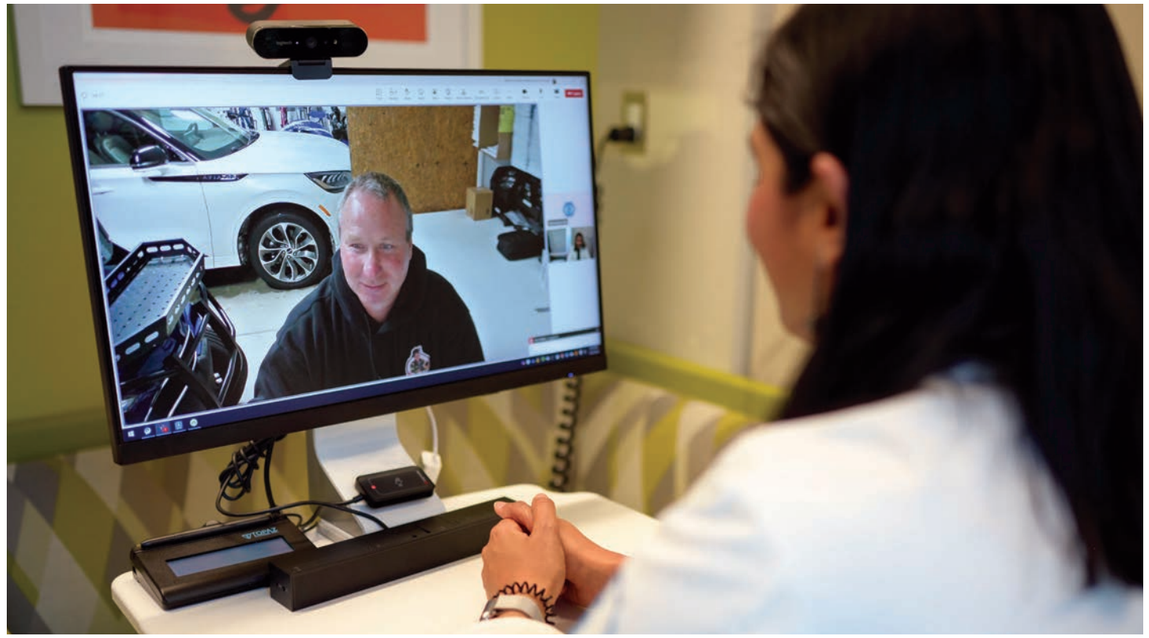
A Clinical Trial To Test Food

She designed a clinical trial called Nutrivention, which began as a pilot with 20 patients and has since expanded to multiple trials.

Dr. Shah's novel clinical trial also had special features.

"First, we contracted with a food company to deliver food directly to people's homes for three months — food that is high in fiber and focuses on beans, whole grains, vegetables, fruits, and minimally processed plant-based food. Second, we told people to eat as much

Dr. Urvi Shah decided to research the link between nutrition and cancer after she was diagnosed with a blood cancer. She realized she hadn't been taught in medical school what patients should eat to help recover their health.



Dr. Shah conducts a video visit with William Walters, who says taking part in Dr. Shah's clinical trial changed his eating habits and improved his health dramatically.

> **"Having higher levels of body fat is associated with an increased risk of several forms of cancer."**
>
> —Neil Iyengar, MD

as they want of these high-fiber foods. We didn't ask them to count or restrict calories. We provided coaching for six months and monitored them for a year."

Helping a First Responder

William Walters joined Dr. Shah's clinical trial in early 2022, after being diagnosed with MGUS during a medical exam as he was retiring from the New York Fire Department because of a chronic injury.

"I kind of went crazy," he recalls, "I was only 39, and my wife and I had three young children. Suddenly I find out I have a condition that usually affects people in their 70s and can progress to cancer. I researched clinical trials for MGUS and Dr. Shah's was the only one I could find."

William describes himself as eating like a typical fireman: "It was red meat seven days a week, and the only vegetable I ever ate was a potato." But, he says, "Dr. Shah completely made sense when she told me that they were studying a high-fiber plant-based diet to see if it would help to quiet down the cells that had the potential to turn into full-blown myeloma."

With food delivery on the trial lasting three months, William says he found his groove around the two-month mark.

William Walters served as a New York City firefighter.

"I started to really like eating this way, based only on plants," he says. "Now there are tofu dishes I love, even though I didn't like it at the beginning. In fact, my wife made a vegan lasagna, and it was amazing — the best thing I've eaten since I started this diet."

This new pattern of eating improved his health dramatically. "I dropped a lot of weight and many of my blood numbers got better," he says.

And the benefits went even further. "I had been on antidepressants after I retired, but the diet made me feel good enough to stop. My grandfather and father both had serious heart problems early in life. But my cardiovascular markers improved dramatically."

Dr. Shah reported similar improvements for other participants on the trial when she announced results in December 2024 at the annual meeting of the American Society of Hematology, the country's largest conference for blood cancers.

Over the course of a year, the trial found that participants lost weight, enjoyed better quality of life, improved metabolic markers such as cholesterol and insulin, and saw an improvement in biomarkers that measure the health of the immune system and microbiome. Two participants saw their progressing disease stabilize, as measured by MGUS biomarkers.

"This is the first study of its kind to show that a high-fiber plant-based intervention improves biomarkers and for some patients may delay progression from MGUS or SMM to multiple myeloma," says Dr. Shah.

Breast Cancer Patients and a Surprising Side Effect

MSK researchers are also breaking ground with studies focused on the diet of breast cancer patients.

It may come as a surprise to learn that "most people experience weight gain following breast cancer diagnosis," says **breast medical oncologist Sherry Shen, MD**. "This can cause anxiety about body image," she says, and there can also be health consequences of serious weight gain, including increased risk of cancer recurrence as well as cardiovascular disease.

Dr. Sherry Shen treats people with breast cancer and conducts research on how diet and other lifestyle interventions can improve patient health.

A selection of the plant-based food sent to participants in Dr. Shah's Nutrivention clinical trial. The meals were delivered by the company Plantable, which also provided nutrition coaching. (Photo courtesy of Plantable)

Dr. Shen explains that chemotherapy and hormone therapy can put patients into menopause, altering their metabolism, and "we need to give steroids and lots of fluids, which can induce weight gain."

But patients should never forgo lifesaving treatments because they are worried about gaining weight, says Dr. Iyengar. "Interventions such as weight-loss programs can work with therapies but cannot replace them — people need to be clear about that."

Drs. Shen and Iyengar and their MSK colleagues are trying a variety of approaches to help people maintain healthy body weight during breast cancer treatment and afterward, when hormonal therapies can last for a decade.

One approach, led by Dr. Shen, uses the mobile app Noom. The app was provided to 31 patients with early-stage breast cancer. "They could use it to talk with support groups and coaches, log the food they eat, and access information about health and diet."

After six months with the program, "people lost an average of 5.6% of their body weight, which is quite high and can improve breast cancer outcomes," says Dr. Shen.

A separate trial used an approach more like Dr. Shah's, delivering plant-based meals directly to patients alongside personal exercise training. This more intensive intervention saw an average weight loss of 14% of body weight.

Dr. Shen and Dr. Iyengar also conducted an analysis of 75 breast cancer patients who took the weight-loss drugs often grouped together as GLP-1 agonists that include Ozempic and Wegovy.

"These patients were taking the drugs because of diabetes, not for weight loss," explains Dr. Shen. "But they averaged around 5% weight loss over the period we analyzed, which is very encouraging for overall health and breast cancer outcomes, although much larger, controlled studies need to be done."

Recipe for Success

For William Walters, MSK's expertise on the relationship between diet and cancer has proven life changing.

"I'm going to continue eating this way forever," he says. "I've had full confidence in Dr. Shah from the first time I sat down with her. And what she's shown me has put me, my wife, and our children at ease. For anyone facing what I did, there is just no reason not to give it a try, to help you and your family." •

Dr. Iyengar's research is supported by the MSK donor community, including the **Breast Cancer Research Foundation.**

FIBER

It Does a Body Good

Should you be eating more fiber to help prevent cancer? And how much do you really need to reduce your risk?

It could be time for a fiber tune-up of your diet. Most American adults get only half the recommended daily dose, according to the Centers for Disease Control and Prevention (CDC).

Clinical dietitian-nutritionist Cara Anselmo, MS, RDN, is an expert in breast cancer nutrition and is a certified specialist in obesity and weight management.

"Eating more fiber is often overlooked as one of the healthiest things we can do for ourselves," Anselmo says.

Fiber not only improves heart health, reduces diabetes risk, and aids in weight control, it may reduce the risk of several common cancers such as colorectal cancer.

How Does Fiber Reduce the Risk of Colorectal Cancer?

Dietary fiber has long been linked to a lower risk of certain types of cancer, particularly colorectal cancer. Colon cancer rates are increasing among young adults. Because less than 10% of adults are getting enough fiber, scientists think the two may be connected.

One of the main ways that fiber helps to protect against colon cancer, according to Anselmo, is by fostering a healthy population of bacteria in the colon, known as the microbiome. Fiber remains in the colon after other components of the food become absorbed in the body.

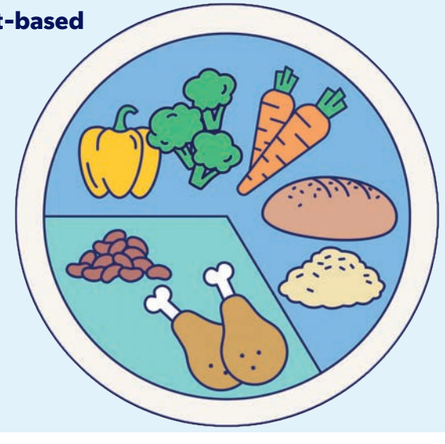
"When fiber is fermented by the bacteria in our colon," says Anselmo, "it produces metabolites, which reduce inflammation and protect the colon cells from becoming cancerous." These metabolites can also activate our immune system and increase our anti-cancer immunity.

Fiber also has several other effects that improve our metabolic health, which indirectly lowers the risk of several cancers. For example, fiber can increase the speed at which food passes through our gut, which can lower absorption and exposure time to less healthy foods we may have consumed. Fiber can also lower cholesterol levels.

Make your plate plant-based

Focus on filling 2/3 of your plate with colorful plants:
- Fruits
- Leafy vegetables
- Whole grains
- Root vegetables

Add lean protein to fill up 1/3 of your plate:
- Eggs
- Chicken
- Tofu
- Fish and shellfish
- Beans



What Is a High-Fiber Diet?

A high-fiber diet means you eat foods that are rich in this type of carbohydrate, found mainly in plant foods such as fruits, vegetables, whole grains, beans, and legumes. Consuming more than 25 to 30 grams of fiber per day is generally considered to be a high-fiber diet.

What Are the Kinds of Fiber?

There are two main types of dietary fiber — soluble and insoluble. Both types of fiber are healthy and can lower cancer risk.

Soluble fiber attracts water into the intestines and becomes a gel. It can help lower blood sugar and cholesterol levels. Foods higher in soluble fiber include:
- Apples
- Bananas
- Beans
- Berries
- Citrus fruits
- Oats
- Peas

Insoluble fiber doesn't dissolve in the stomach. It can help move food through your digestive system and bulk up stool to help prevent constipation. Foods higher in insoluble fiber include:
- Whole grain foods
- Some vegetables
- Nuts and seeds

How Much Fiber Do You Need?

The MSK registered dietitian-nutritionist team recommends that most people aim for 25 grams of fiber per day. "Consume the bulk of your fiber from whole foods like whole grains, vegetables, and fruit," advises Anselmo. Fiber-supplemented products are not likely to be harmful and may have some benefits but aren't ultimately as healthful as whole-food sources. She also suggests adding fiber gradually, through simple changes such as switching white breads and pastas to whole grain or whole wheat sources.

Anselmo also says that it is important to stay well hydrated when increasing dietary fiber intake in order to minimize potential symptoms such as bloating and abdominal discomfort as your gastrointestinal tract adapts to new changes. She also stresses that patients should always ask their cancer care team if they should follow any special diet before, during, or after treatment.

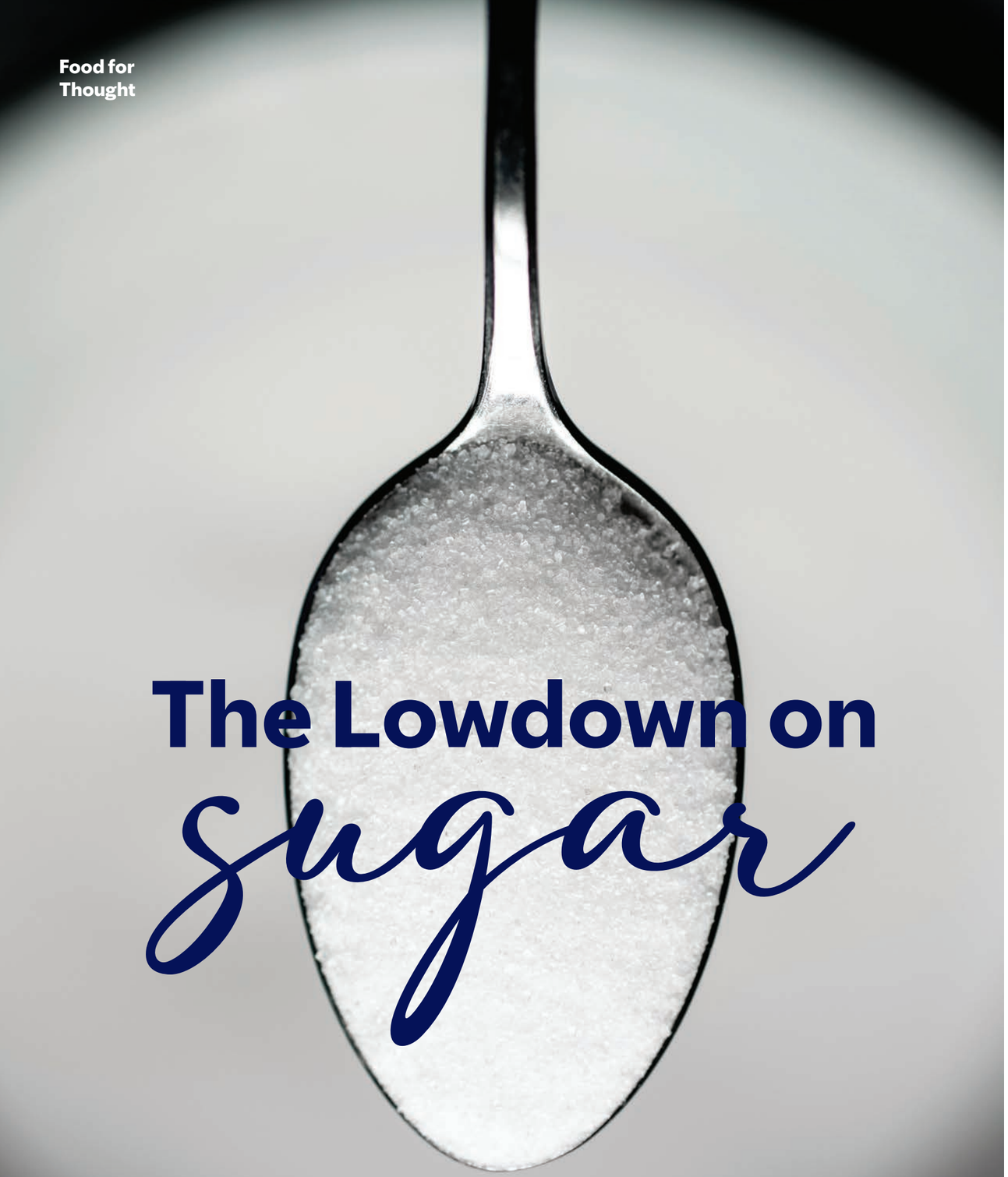
How Is MSK Researching the Role of Fiber and Cancer?

Studies are underway to help determine a person's optimal dose of fiber to prevent cancer, based on their biology, genetics, and lifestyle.

MSK is also investigating which bacteria are involved in fermenting fiber into the metabolites that protect against various cancers, including breast, skin, prostate, colon, and rectal cancer. If scientists can identify a specific bacterial signature, other interventions such as bacterial transplants may work to reduce cancer risks.

Finally, there are ongoing studies testing whether fiber intake and certain probiotic compounds might enhance the effectiveness of chemotherapy and immunotherapy. •

> **"Eating more fiber is often overlooked as one of the healthiest things we can do for ourselves."**
>
> —Cara Anselmo, MS, RDN



The Lowdown on *sugar*

The internet is full of misrepresentations and half-truths that lead many people to incorrectly believe that sugar directly causes cancer — or even that cancer can be treated by cutting off sugar to "starve" it.

Santosha Vardhana, MD, PhD, is a physician-scientist who treats people with lymphoma and studies how cells use nutrients. Christina Stella and Cara Anselmo are registered dietitian-nutritionists at Memorial Sloan Kettering Cancer Center (MSK).

They explain the real science of sugar and cancer.

Does eating sugar cause cancer?

Dr. Vardhana: There is a clear link between obesity and several forms of cancer. And eating too much refined sugar in highly processed foods can lead in the long term to health issues, including obesity, that put you at higher risk of cancer.

But if you starve yourself of sugar, will you strongly reduce your risk of cancer? The short answer is no.

Cancer happens because a cell in your body grows out of control with no guidance from your DNA, like a car that just keeps speeding up. Environmental factors like diet can play a role. But more commonly, cancer is caused by known carcinogens such as ultraviolet light, radiation, smoking, or alcohol. And sometimes it's just bad luck, essentially — there isn't always a specific cause. So you could never starve your body enough to prevent it from developing cancer.

Cara Anselmo: A related thing we hear from people, including those in treatment, is that because fruit has fructose — a kind of sugar — they should avoid eating fresh fruit. That is a myth we want to dispel. Eating a plant-forward diet that incorporates fruits and vegetables in their whole-food form, in practical portions, is actually a smart way to reduce the risk of cancer developing or recurring.

If you are diagnosed with cancer, can you treat it by not eating sugar?

Dr. Vardhana: No. Cancer does consume sugar. But people often misinterpret what that means.

Cancer will eat sugar if it's around. But cancer will eat anything in your body: protein, fat, even dead cancer cells. If you try to starve cancer of one thing, such as sugar, it will eat something else. Your body will always lose a race to starve cancer because cancer is programmed to grow without stopping no matter the conditions.

People also need to understand that because cancer is such a serious disease, the therapies to treat it need to be powerful. Harsh starvation diets are more likely to have bad effects on the treatments you need rather than hurting the cancer.

Nobody is saying you should eat to excess or go to McDonald's for every meal. But you should eat sensibly to keep your body as fit and strong as possible.

What does healthy eating look like during cancer treatment?

Dr. Vardhana: We're at the very infancy of figuring that out. I urge my patients to eat a Mediterranean diet, meaning whole fruits and vegetables, lean proteins, and carbs that are complex, because the body has to put in some work to break them down. That means limiting ultraprocessed foods.

Christina Stella: As dietitians, we're very focused on the needs of each individual. Some people find eating and drinking so challenging during treatment because of side effects such as nausea and fatigue that we will take two chocolate chip cookies over nothing at all.

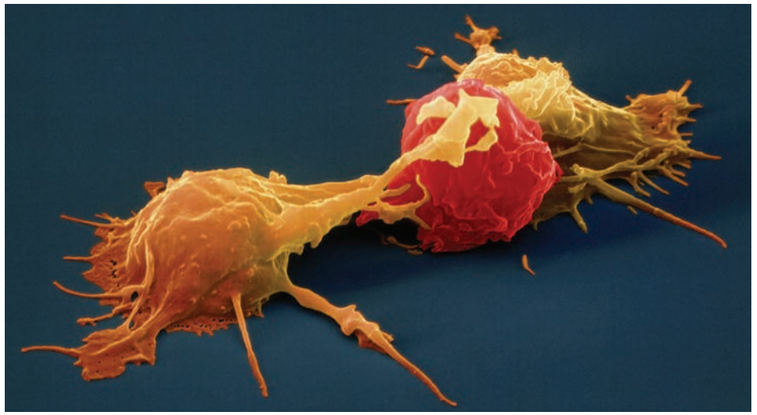
In other cases, a low-fiber diet might be appropriate for people who experience gastrointestinal problems during treatments like immunotherapy. Nutritional needs can also change during treatment. That is why it can be so helpful to work with a dietitian.

Cara Anselmo: I work with many women with breast cancer, and a common side effect of some treatments is weight gain. That surprises many patients who expect that chemo and radiation will make them lose weight.

We work together to identify areas where they can modify their eating habits. One source of added calories might be sweetened drinks like soda. If they drink one a day, can we figure out how to get that to once a week? Or can we limit how often they eat baked goods or other sweet snacks? We're also mindful that emotions play a big role in eating, particularly during cancer therapy. That's normal and nothing to be ashamed of. •

Dr. Vardhana is a Josie Robertson Investigator.

How Fasting May SUPERCHARGE the Immune System to Better Fight Cancer



This colorized image from a scanning electron microscope shows two human natural killer cells (yellow) attacking a cancer cell (pink). Credit: Eye of Science / Science Source

More than a dozen types of cancer are sensitive to obesity, which can cause inflammation that damages cells, increased hormone levels, and other changes. So it makes sense for researchers to explore whether fasting to lower body fat and improve metabolism might improve outcomes in cancer.

Now laboratory researchers at Memorial Sloan Kettering Cancer Center (MSK) and their collaborators have found another potential benefit to fasting: supercharging the immune system's "natural killer" cells. (Natural killer cells, or NK cells for short, are a type of white blood cell that can kill abnormal or damaged cells, such as cancer cells.)

Fasting can reprogram the metabolism of natural killer cells, the team found in a study of mice. Those reprogrammed cells are better able to survive in the harsh environment in and around tumors. Their cancer-fighting ability is stronger, too.

The research, which was published in *Immunity* — one of the top immunology journals — explains how natural killer cells get reprogrammed during periods of fasting. The researchers are optimistic that what they're learning in animal models could one day help make immunotherapies more effective in people.

"Tumors are very hungry," says immunologist **Joseph Sun, PhD**, the study's senior author. "They use up essential nutrients, resulting in a hostile, nutrient-starved environment that is harmful to most immune cells. What we show here is that fasting reprograms these natural killer cells to better survive in this suppressive environment."

What Are Natural Killer Cells?

Natural killer cells get their name because they can destroy a threat without having encountered it before — unlike other immune cells, called T cells, which require prior exposure to a specific threat in order to target it.

In general, the more NK cells that are present within a tumor, the better the prognosis is for the patient.

How Fasting Reprograms and Redistributes NK Cells

For the study, mice with cancer were denied food for 24 hours twice a week and then allowed to eat freely in between fasts. While the mice did not lose weight, the fasting had a profound effect on their natural killer immune cells.

Just as happens in humans, fasted mice saw a drop in their glucose levels and a rise in free fatty acids, which are lipids released by fat cells.

"During each of these fasting cycles, NK cells learned to use these fatty acids as an alternative fuel source to glucose," says study first author **Rebecca Delconte, PhD**, a postdoctoral fellow in the Sun Lab. "This really improves their response against cancer and helps them survive in the harsh environment around the tumor."

Fasting also led NK cells to travel to and interact with different parts of the body in an intriguing way, the researchers observed.

Many of the NK cells travel into the bone marrow, where they are reprogrammed to develop a more powerful response against cancer. Meanwhile, NK cells that travel to the spleen undergo a separate reprogramming, making them better able to use lipids as a fuel source.

"With both of these mechanisms put together, we find that NK cells within the tumor are pre-primed to better rally the immune system," Dr. Delconte says. "They're more able to survive in the tumor environment, and their power is strengthened against cancer cells."

Potential To Improve Cancer Treatments

There are several potential opportunities to advance the mouse-model research toward treating patients in the clinic, the researchers say.

First, clinical trials are already beginning to study the safety and effectiveness of fasting in combination with standard existing treatments. Another avenue would be to identify drugs that could target the underlying mechanisms — without requiring patients to fast. Third, NK cells might be able to be put into a fasted state outside of the body and then be administered back to patients to improve treatment effects.

Right now, however, more clinical data is still needed about the effects of fasting for people with cancer, MSK experts say.

There are many different types of fasting, and some might be helpful while others might be harmful. Patients should speak with their doctors about what's safe and healthy for their individual situation. •

Dr. Joseph Sun, an investigator at MSK's Sloan Kettering Institute, and postdoctoral fellow Dr. Rebecca Delconte led a laboratory study to investigate how fasting changes the immune response against cancer.

A New Cancer Therapy: EXERCISE

Dr. Jessica Scott researches how exercise can prevent the decline in fitness often caused by cancer treatments. It may even change the biology of the cancer itself.

Cancer patients may be surprised to learn they share something in common with astronauts in outer space.

It turns out that lying in bed and floating in zero gravity take a similar toll on the body, says Jessica Scott, PhD. She knows because she was a NASA scientist before joining the **Exercise Oncology Program at Memorial Sloan Kettering Cancer Center (MSK)**.

"Astronauts have a lot of the same symptoms as cancer patients — being inactive and weightless can hurt fitness in a way similar to receiving a cancer treatment like chemotherapy," Dr. Scott says. "Astronauts even get something called 'space fog,' which is similar to what people with cancer call 'chemo brain.'"

When Dr. Scott saw how exercise can counteract the damage in space to the heart, brain, and muscles, she wanted to apply those lessons to benefit the millions of people with cancer.

She came to MSK in 2017 to work with Lee Jones, PhD, who had established the Exercise Oncology Program.

"MSK is a leader in precision medicine, and that's exactly what we are trying to apply to exercise — a type of precision medicine," Dr. Scott says.

The team conducts rigorous and innovative research investigating the effects of exercise to offset treatment side effects and to control cancer. They work closely with MSK's Healthy Living Program.

Reducing the Toll of Cancer and Its Treatment

Contrary to popular belief, the best way for patients feeling depleted to recover is not necessarily to stay in bed.

"It's now clear that exercise has major benefits for people being treated for cancer as well as for cancer survivors," says **MSK exercise physiologist Kylie Rowed**. "In addition to improving physical and mental health, it can help minimize the long-term effects of cancer treatments such as chemotherapy and radiation."

The benefits can be dramatic. For example, MSK research showed that people who endure three months of chemotherapy had a 15% decline in fitness levels within three to six months of treatment — equal to a decade of aging. But exercising just three times a week significantly reduced that steep decline.

Dr. Scott was a NASA scientist before joining MSK.

Recently, the Exercise Oncology Program has taken the research a step further, conducting studies that shed light on whether exercise can affect cancer survival and recurrence and help new cancer drug therapies work better.

There is even tantalizing evidence that exercise might change the biology of the cancer itself, slowing its growth.

A First-of-Its-Kind Clinical Trial

In July 2024, Dr. Jones's team published results in *JAMA Oncology* from a groundbreaking clinical trial suggesting that specific amounts of exercise before surgery among men with early-stage prostate cancer can meaningfully improve two key biomarkers associated with better outcomes.

"To our knowledge, this is the first clinical trial to research the optimal amount of exercise therapy for people with any kind of cancer diagnosis," Dr. Jones says.

Previous research, including MSK's, had shown that exercise was associated with a lower risk of prostate cancer progressing, and that men who report exercising regularly have a lower risk of dying from the cancer. But as all scientists know, correlation is not causation.

The true test is "treating" patients with controlled amounts of exercise therapy prescribed in the same way drugs are tested and prescribed — in specific "doses" administered over specific periods.

Researchers wanted to know: What is the most exercise people could reasonably be expected to do? Does the exercise have any biological effect on the tumor itself? And perhaps most important: How much exercise is enough?

To find out, the researchers studied 53 men scheduled to undergo surgery for prostate cancer at MSK. This allowed them to examine the tumor at two different points: when the tumor was biopsied at diagnosis and again at the time of surgery — usually about four weeks later. That provided a four-week window to test the effects of exercise alone, when none of the patients had undergone any treatments such as radiation or chemotherapy.

Participating in Research From Home

To make it as convenient as possible, the team found a way for most parts of the study to be done at home. They delivered a study kit that included a treadmill, an iPad loaded with apps, a smartwatch, a continuous glucose monitor, a blood pressure cuff, and a digital scale.

All exercise sessions consisted of walking on a treadmill while being monitored via Zoom by an exercise physiologist.

Each participant was assigned one of the following "doses" of exercise:

- 90 minutes per week
- 150 minutes per week
- 225 minutes per week
- 300 minutes per week
- 375 minutes per week
- 450 minutes per week

Robert Blumber was diagnosed in 2020 and scheduled for surgery several weeks later by **urologic surgeon Vincent Laudone, MD**.

After his prostate cancer diagnosis, Robert Blumber took part in an MSK trial testing whether exercise could affect cancer-related biomarkers.

Exercise physiologist Kylie Rowed says exercise can improve mental health and minimize effects of cancer treatments such as chemotherapy and radiation.

“It’s now clear that exercise has major benefits for people being treated for cancer as well as for cancer survivors.”

—Kylie Rowed, MSK exercise physiologist

“When they proposed the clinical trial to me, I thought it was a great idea, and my wife, who is a nurse, was eager for me to participate,” he says. “It took my mind off the upcoming surgery. I really benefited from focusing on my physical well-being and doing things like checking my blood pressure every day.”

He also enjoyed talking to other participants on the Zoom session. “There were three or four others who were on a similar schedule, and we kind of became friends during that time, despite never meeting in person.”

Biological Changes

The team measured two biomarkers associated with how well people did after a prostate cancer diagnosis: Ki-67 — a protein found only in cells that are dividing — and PSA, or prostate specific antigen, a well-established biomarker for prostate cancer risk and progression

The results were eye-opening. After exercise, the biomarkers either decreased or remained stable. (Remember, the men were not receiving other treatment.) Interestingly, there seemed to be a sweet spot: Most of the benefit was achieved with 225 minutes (3 hours and 45 minutes) of exercise a week. More than that amount had no greater impact on biomarkers.

“This was a key finding because it challenges the notion that ‘more is always better’ when it comes to exercise,” Dr. Scott says.

While encouraging, these results don’t prove exercise will improve someone’s cancer prognosis.

The researchers were looking only to see if exercise had an impact on the tumor, in the form of a biological signal over the short term. Determining if exercise leads to longer survival or better outcomes will require longer and larger clinical trials.

There is already a phase 2 clinical trial underway using the 225-minute dose level to better understand how exercise can impact prostate cancer progression. Similar trials are expected for other solid tumor cancers, including looking at whether cancers that have specific genetic mutations respond differently to exercise.

Establishing Exercise as Essential for Cancer Treatment and Prevention

“The hope is that people can be referred to an exercise physiologist who can give them a personalized prescription tailored to their physiology, tumor characteristics, and overall situation — much in the same way cancer drugs are personalized,” Dr. Scott says.

In the meantime, patients say exercising improves their overall well-being.

“I think the sense of control the exercise gave me was very important at a time when I was feeling somewhat helpless,” Robert says. “As a cancer patient, it was something 100% under my power that could help my recovery.” •

Dr. Jones’ research is supported by the MSK donor community, including **AKTIV Against Cancer**.

Making It Work

One November morning in 2021, Derrick Edwin woke with pain in his side — as a triathlete in peak condition, he knew something was off. “Two months before, I had completed an Ironman — that’s a 2.4-mile swim, 112 miles on the bike, followed by a full marathon — and I felt great crossing the finish line. I told my wife, AnnaMarie: ‘I know my body. I think I need to go the emergency room.’”

Derrick with his wife, AnnaMarie — like so many caregivers, she has often struggled to find support at work.

"My bosses have been incredible, but I know that's not the norm."

—Derrick Edwin

Imaging scans soon revealed what would turn out to be stage 4 colon cancer. He was just 43 years old. "It was shocking," he says. "The world stood still for 20 minutes while I tried to figure out what to do." Derrick's next step was calling Memorial Sloan Kettering Cancer Center (MSK) at the recommendation of his coach. "I got diagnosed in the ER on Long Island around 11 in the morning and was at MSK in Manhattan by 5. When things finally calmed down and I was able to think, I realized I had to contact my employer."

For most of us, work is fundamental to our lives. Whether it's a job we love or what we do to sustain ourselves (or both), work offers us financial security, access to health insurance, and a sense of purpose and belonging — if we're lucky.

In fact, the fear of losing a job because of a cancer diagnosis can be as overwhelming as the fear of dying. One in two cancer patients report being afraid to share their diagnosis with employers, according to research from **Working With Cancer**, a global initiative co-founded by the Publicis Foundation and MSK that encourages companies to pledge job security and cancer benefits for employees and their caregivers.

Derrick, a manager for the in-house advertising studio of a global tech and telecommunications company, has continued to work through three-plus years of treatment — including surgeries, chemotherapy, and immunotherapy — and has gone on to win recognition and awards. "My bosses have been incredible," he says — offering time off for treatment and making him feel secure in his role. "That's allowed me to focus on my cancer and on my treatment, so those weren't stressors. My employer has been amazingly supportive, but I know that's not the norm."

Derrick witnessed the impact of uncertainty at work through AnnaMarie — who as his primary caregiver struggled to find support at her job — and through his friendship with another patient at MSK. "He was a good, good man," says Derrick, "and we got to be close. He was so sick, but he was going to work and still trying to get the job done, and he was getting beaten up by his bosses, who were completely not understanding his situation. He kept losing jobs. It was an eye-opening experience for me. Watching his struggles at work, I started realizing how lucky I was."

A Matter of Survival

Being able to work, and finding support there, has a significant impact on patient outcomes, and likely even on overall survival rates, says **Victoria Blinder, MD, a breast medical oncologist at MSK** who leads several research studies for the **Immigrant Health and Cancer Disparities Service**. "If you have a job and can maintain an income stream and access to benefits, you're more likely to have access to the medication you need and to live longer."

Early on in her practice, Dr. Blinder found that her patients were struggling to return to work and that there were few resources available to help them navigate those challenges. "We realized this was a place where we could potentially intervene to improve patient outcomes dramatically."

In 2018, Dr. Blinder and her colleagues developed **TEAMWork (Talking to Employers And Medical staff about Work)**, an app available in English and Spanish designed to help breast cancer patients negotiate with their employers for accommodations. Based on the success of that trial, they expanded to **WE-ACT** — an app for patients working with advanced or metastatic cancer — and the **MSK Program for Cancer and Work**, a pilot program that pairs patients with a navigator who screens them for occupational and physical therapy needs and helps them identify and pursue potentially helpful work accommodations.

In MSK's **Center for Young Onset Colorectal and Gastrointestinal Cancers**, most patients, like Derrick, are in their 30s and 40s — and many are living with cancer as a chronic illness. That's a paradigm shift, says **MSK social worker Hadley Maya**. People with advanced cancer are continuing to work for many years, sometimes decades — and it introduces a complicated kind of uncertainty for employers. What does it mean to work with cancer over the course of a lifetime?

"It's such a fragile point from a career and financial perspective," for younger patients, says Maya. "They haven't necessarily had time to generate savings and they're in the middle of building their careers. Many of them have young children at home as well as aging parents who rely on them for practical and financial support. They hold on so tightly to their jobs because they mean so much to them from a financial and health insurance perspective. And for many, work is also a big part of their identity, something that gives them a sense of purpose and social connection."

Even before treatment begins, cancer patients must weigh the risks of transparency — sharing the news of a serious illness with their employer — against the risks of isolation if they choose to keep their diagnosis private.

For the individual and their family, a cancer diagnosis is like an earthquake or other natural disaster, says **MSK social worker Jacob Maier**, who works with newly diagnosed patients through **MSK Direct**, one of the nation's largest employer cancer benefits programs, offered by more than 275 employers and unions. "People are in shock — and in that state of shock, they still have to make several practical decisions, including how much to share with their employer and with colleagues."

The Future of Cancer Benefits

Unsurprisingly, research shows that patients who feel supported at work during cancer treatment are much more likely to be working for that same employer two years after they finish their treatment. That support also positively affects the loyalty of their colleagues — engagement and morale go up across the board. "Being in a work environment where you see that your friend or colleague is cared for and is accommodated during their moment of need, that's going to make you feel good about the place where you're working," says Dr. Blinder.

Derrick says he can understand why employers struggle with how to accommodate employees going through weeks, months, or even years of cancer treatment. "I understand it as a bottom-line issue — I can understand a business owner feeling they're not getting enough from an employee. But if your employer is giving you a hard time on top of cancer and telling you you're going to lose work while you're going through your treatment, it's crushing to the soul."

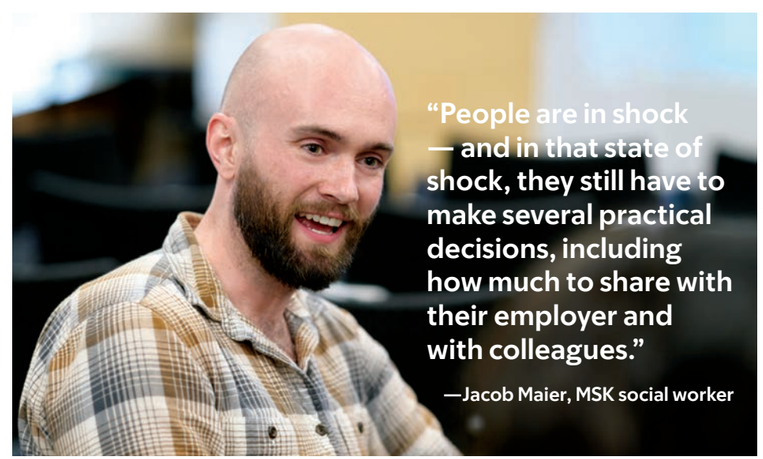
Cancer is expected to rise by 50% by 2050, according to the Centers for Disease Control and Prevention (CDC), with the most significant increases hitting younger people in the prime of their working lives. Employers will have to find ways to keep pace with a workforce increasingly shaped by cancer.

"I want to work," says Derrick. "Work is normal. The cancer world is going to be a part of my life forever, but for eight hours a day, work allows me to put it off to the side and focus on what I get paid to do, which also makes it possible for me to afford my house, my life. Here I am dealing with cancer, but I can still work my craft to the best of my ability and get recognized for it. That's amazing." •

The Center for Young Onset Colorectal and Gastrointestinal Cancers is supported by the MSK donor community, including **Molly and Bill Ford through the Screaming Comet Foundation and the Frechette Family Foundation.**

MSK Direct is supported by the MSK donor community, including **Antidote Health Foundation for Cure of Cancer**.

The Immigrant Health and Cancer Disparities Service is supported by the MSK donor community, including **The Ralph Lauren Corporate Foundation**.



Cancer's Other Side Effect:
FINANCIAL TOXICITY

It was hard enough for Stephanie Soto-Vega to get the news that her breast cancer had spread to her hip bones and spine.

Then came another blow: Her insurance company wouldn't cover the medication to keep the cancer under control. It cost $15,000 a month. "I was really worried," remembers Stephanie, who had a new baby named Luna. "I saw the price and thought, 'How am I going to afford this?' It was impossible."

Stephanie is like so many patients who experience side effects beyond the toxicity of treatments: They face a situation some experts have dubbed "financial toxicity." Even when someone has insurance, a slide into a deep hole of debt can be triggered by co-payments and lost income from missing work. Many patients struggle to meet basic needs like housing, food, and transportation.

It's especially a problem for the growing number of younger people with cancer, like Stephanie, who are earlier in their careers and are less likely to have significant savings.

According to a recent study of patients conducted at Memorial Sloan Kettering Cancer Center (MSK), more than half of people under 40 with cancer experience financial toxicity. About one in four are unable to afford at least one basic need.

It's a problem MSK has been actively addressing head-on for all age groups, with the help of nurses, doctors, social workers, pharmacists, the patient financial services team, and generous donors. In addition, **MSK's Immigrant Health and Cancer Disparities Service** and **Office of Health Equity** work to connect patients with resources both inside and outside MSK.

"We see financial toxicity as something we have the power and capacity to help patients overcome, just as we help them with other side effects from treatment," says nurse **Bayley Sharma, MS, RN**, who is part of **MSK's Affordability Task Force**.

As members of MSK's Affordability Task Force, nurses Amy Caramore (left) and Bayley Sharma (right) worked with strategic initiatives manager Lana Vega (center) to create a survey to screen patients for financial toxicity.

Helping Patients Find Resources for Financial Support

Stephanie, now 36, was more fortunate than many people with cancer. Her employer, the New York Metropolitan Transportation Authority (MTA), has generous policies for fully paid medical leave.

After her cancer came back, her boss set up a GoFundMe page, which helped with some expenses not covered by insurance — including acupuncture co-payments, therapeutic massage for her bone pain, and taking rideshares to her appointments.

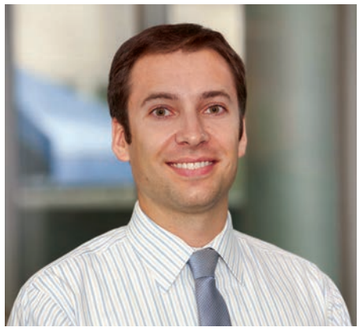
Although grateful, she and her husband, Eduardo, were embarrassed. And they couldn't imagine asking for more money to cover her medical expenses. "I didn't want everyone to know," she says. "I didn't want to be treated differently."

MSK teams are sensitive to the fact that every patient's comfort level is different when it comes to asking for help.

"Some people are very open and may lean on their support network for help,

Stephanie with her husband, Eduardo, and 4-year-old daughter, Luna. She was seven weeks pregnant the first time she was diagnosed with breast cancer. She started chemotherapy just a few weeks later.

Stephanie marks the end of radiation therapy after her cancer recurrence.



“Sometimes it feels easier to share these challenges with a healthcare professional.”

—David Sarfati, MSSW

but others might be more private or feel embarrassed or nervous to ask their support system for help,” says **MSK social work manager David Sarfati, MSSW**. “Sometimes it feels easier to share these challenges with a healthcare professional.”

Nurses are often the first to identify people experiencing financial hardship, whether or not patients raise these issues on their own.

As representatives of MSK’s Affordability Task Force, nurse Sharma and nurse **Amy Caramore, BSN, RN**, partnered with **Lana Vega, MHA, in Strategy and Innovation** to create a survey to make screening for financial hardship routine. “Once we know there’s a problem, or a potential problem, we owe it to every single patient to do everything in our power to prevent it from happening,” Sharma says.

When Stephanie’s insurance company denied coverage for the expensive drug that she needed, her doctor, **breast medical oncologist Victoria Blinder, MD**, appealed again and again. Refusing to take no for an answer, Dr. Blinder referred Stephanie to MSK’s patient financial services team, which has special expertise in fighting to get patients what they need. They contacted the drug manufacturer directly and were successful in finding a financially workable solution.

“That was a huge relief for me,” Stephanie says.

How Financial Toxicity Impacts Survival

The financial effects of cancer also can have devastating effects on cancer outcomes.

“Financial hardship is a critical cause of health disparities,” says Dr. Blinder, who has conducted research on this topic. “Prior research has shown that cost considerations lead some patients to miss scheduled treatment appointments or take less than the prescribed dose of medication at home. This probably explains why cancer patients who have severe financial hardship don’t live as long as patients who are more financially secure.”

And then there’s the paradox of better cancer treatments.

“Due to advances in cancer treatment, many patients with metastatic cancer can now live for a very long time,” Dr. Blinder says. “But for many of these patients, their treatment is never finished. This can lead to higher long-term costs and longer periods of decreased earning. We need to find a new framework for supporting these patients, including helping them financially.”

Stephanie, who must remain on treatment since her cancer has spread, is worried. Already, she has had to change medications once since her cancer recurrence. MSK’s team again stepped in to work directly with the manufacturer.

Fortunately, Stephanie’s employer has accommodated her needs and enabled her to work from home. But she has used up her fully paid medical leave, so any future time off will be at reduced pay.

For Stephanie, the financial care above and beyond the cancer treatment has made all the difference for her family. “I’ve always felt like Dr. Blinder and the whole team would do anything for us,” she says. •

MSK’s Immigrant Health and Cancer Disparities Service is supported by **The Ralph Lauren Corporate Foundation.**

Health Equity initiatives are supported by **Arbour Way Foundation/Wolpow Family** and **Jamie Nicholls** and **Fran Biondi**.

The Patient Financial Assistance Program is supported by **Raj and Indra Nooyi**.

How Pauline Larkin Found Her Stride Again

When 51-year-old Pauline Larkin was diagnosed with ovarian cancer in January 2024, she wasn’t sure she would ever lace up her running shoes again.

It all started a few days after finishing the 2023 TCS New York City Marathon, when she felt cramps and bloating. Maybe she went too hard in the race, she thought. Or maybe it was the beginning of menopause. It turned out to be two masses on her ovaries. “I felt like I was watching a car crash in slow motion,” she says.

Pauline went to MSK right away. After surgery and as she prepared for chemotherapy, she couldn’t stop thinking about what it would be like to conquer the marathon again after everything she’d been through. She was determined to make something positive out of her diagnosis. She asked her surgeon **Vance Broach, MD**, for advice.

As it happened, Dr. Broach and several of his colleagues were planning to run the marathon with **Fred’s Team**, the official running program of MSK, to raise money for ovarian cancer research. He gave her medical clearance to start training, as long she took it slow and listened to her body. They decided that if all went well, they’d race together.

Pauline decided to run after every chemo session, starting with three miles. Step by step, she increased her distance and on the last day of treatment, she ran five miles from MSK all the way to her home in Brooklyn.

Some days, she wasn’t sure she could do it. Her muscles felt like they had stopped working. Her bones felt stretched and stepped-on at the same time. But she stayed motivated by the goal of running the marathon with her doctors.

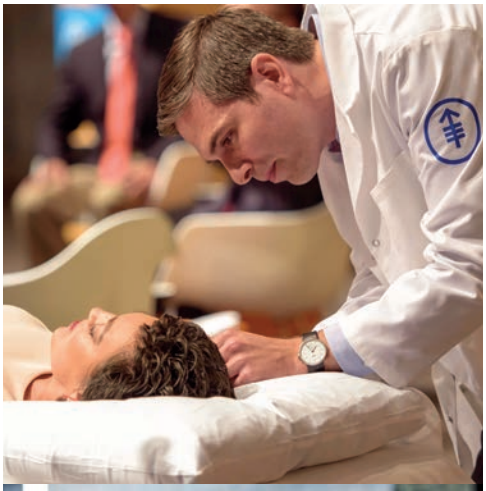
“I wanted my baldness and my Fred’s Team T-shirt to capture attention so people could see a different image of chemotherapy than they expected,” she says.

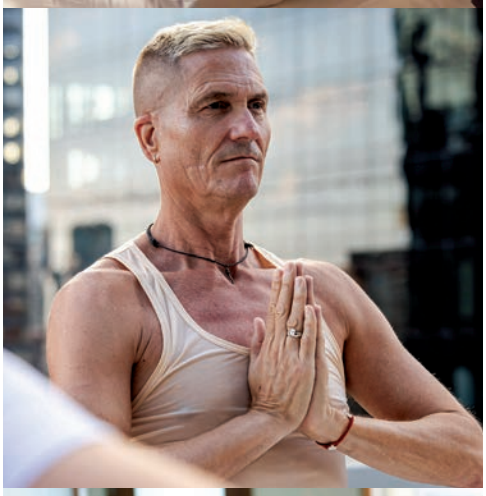
Pauline kept at it, and by race day, she was ready. On November 3, 2024, she crossed the finish line alongside Dr. Broach and **GYN Oncology Fellows Aaron Praiss, MD, and Maureen Byrne, MD, MSCR**. Together, **Team Ovary** raised nearly $100,000 — and every dollar went directly to ovarian cancer research at MSK. Pauline was one of 110 former and current MSK patients running with Fred’s Team to fund research and help imagine a world without cancer.

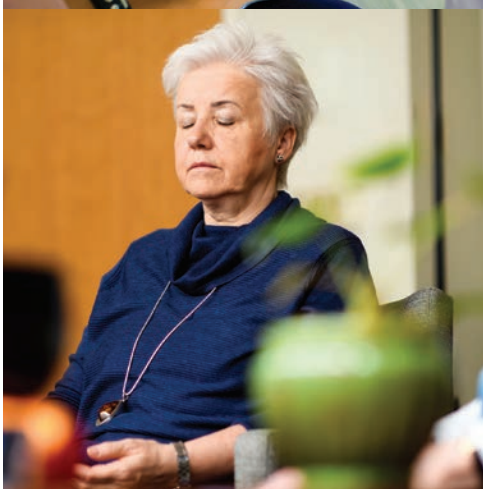
“I’m proud to support MSK and run with the people who saved my life,” she says. “You bet I’m planning to lace up again for the marathon this fall.”

To learn more about Fred’s Team, visit **fredsteam.org**. •

From left: Dr. Broach, Pauline, and Dr. Byrne at the finish line of the 2024 TCS New York City Marathon







MSK Recommends

A cancer diagnosis can feel like the ground has shifted beneath you, throwing your life into a cycle of appointments, treatments, and scans.

It's common to feel waves of uncertainty or even disconnection from your own body. MSK's Integrative Medicine Service empowers patients with evidence-based recommendations that fit seamlessly into your care plan — offering reliable alternatives to unproven trends.

Here is some of what MSK recommends to help you find strength and hope.

Avoid alcohol
Growing evidence suggests it increases your risk of at least seven common cancers.

Mind-body therapies
Focused on the connection between the mind and body to improve well-being, they can reduce stress, help manage pain, and promote relaxation.

Acupuncture and acupressure
These ancient Chinese medicine practices have been proved to relieve common symptoms like neuropathy, pain, nausea, and sleep disturbances.

Yoga
A practice that originated in India thousands of years ago, it has been shown to improve strength, mood, and quality of life for cancer patients.

Meditation
Practiced regularly, meditation can reduce stress and depression. The most-researched form is mindfulness-based stress reduction (MBSR), typically offered as an eight-week program.

Music therapy
No musical background or experience is required. A trained therapist guides you with music that can help improve brain health, coordination, creativity, resiliency, and connections with your loved ones.

MSK's About Herbs
This database is available to help you determine the value of taking herbs, vitamins, and other supplements. Always discuss with your doctor whether they might interact with your cancer medicines and are worth the expense.

If you would like to learn more about any of the topics above, scan here.

Memorial Sloan Kettering Cancer Center