Supportive Care
A Treatment Guide for MANAGING SIDE EFFECTS

WHERE INFORMATION EQUALS HOPE

CONTENT REVIEWED BY A DISTINGUISHED MEDICAL ADVISORY BOARD
Fears about the side effects from cancer treatment can add to the stress of a cancer diagnosis. This fear often comes from a belief that the discomfort of side effects cannot be relieved, but that’s not true. Many advances have been made to help prevent and manage the most common treatment-related side effects, which is important because if you feel better, you’re more likely to complete your treatment as planned. In addition, learning the facts about potential treatment-related side effects can help you better cope with them.

Side effect differences

The side effects of cancer treatment can vary. Not all people will have the same side effects, even if they have the same type of cancer and cancer treatment. Whether a side effect occurs depends on many factors, including your age, your overall health, your specific cancer and your treatment plan.

Side effects can vary in level of severity. Some are a minor inconvenience, while others may cause discomfort, pain and/or emotional distress. Occasionally, a serious side effect may require immediate medical attention. However, there are often ways to relieve the discomfort of most treatment-related side effects and prevent them from becoming severe.

Side effects can also differ in timing. Those that occur during treatment are called short-term (or acute) side effects, and they usually disappear when treatment ends. In contrast, long-term side effects may not completely disappear until months or years after treatment ends. A third category is called late effects. These occur less frequently than short-term or long-term effects, and they do not occur during treatment; rather, they occur at least six months after treatment ends.

Perhaps the biggest way in which side effects differ depends on the type of cancer treatment that triggers them. Surgery, radiation, chemotherapy, hormone therapy and targeted therapy are all associated with different side effects. Many people with cancer receive a combination of treatments, which may increase the possibility of side effects.

Types of cancer treatment and their side effects

Sometimes, one treatment option is clearly the best choice. But at other times, two or more treatment options may offer similar outcomes. Your doctor will talk to you about the treatment options that are best for your particular type of cancer. Each type of treatment is associated with different potential side effects, so it’s important to ask questions (see box) and learn all you can. Knowledge will help you make an informed choice about which treatment option to pursue.

Surgery

When possible, surgery is done to remove the cancerous tumor and surrounding lymph nodes (to see if the cancer has spread to the nodes). The side effects of surgery may be short-term or long-term and vary according to the area of the body where the surgery was done (Table 1, page 2). Most people have some level of pain after surgery and will usually need to limit activities for the first few days or weeks following the procedure. People recover at different rates depending on their age, general health and the location of the tumor. In addition, surgery may cause scars, affect your bodily functions and change your body’s appearance; you may also experience tissue swelling around or near the site of surgery. These changes may affect your body image and emotional well-being.

Radiation therapy

With radiation therapy, beams of radiation are delivered from a machine to the part of your body where the tumor is located. The radiation shrinks the tumor by destroying cancer cells. Much care is taken to ensure the radiation is precisely delivered to the tumor to avoid damaging nearby normal cells. However, normal cells in the pathway to the tumor may be affected. More specifically, the skin and underlying tissues in the area being treated may become sensitive. This sensitivity is short-term and usually resolves gradually within two months after treatment stops. There may be short-term or long-term swelling or scarring of the tissues in the area, and the scarred tissues may become firm or contracted. Other side effects vary according to the part of the body being treated and may be short-term, long-term or occur late after treatment (Table 1, page 2).

Chemotherapy

Chemotherapy involves the use of very strong drugs that kill cancer cells throughout the body. However, these drugs can also damage normal, healthy cells, thereby causing side effects. The normal cells most often affected by chemotherapy drugs are the blood-forming cells in the bone marrow, the hair follicles and the cells lining the inside of the mouth and the digestive tract. Many side effects are short-term (Table 1, page 2), but problems with thinking, remembering and understanding (known as cognitive dysfunction; see page 17 for more information) may be long-term. Some drugs have also been associated with late effects.

Hormonal therapy

Hormonal therapy has multiple applications, including slowing or stopping the growth of prostate cancer in men and preventing the recurrence of some types of breast cancer in women. Hormonal therapy acts by decreasing the amount of hormones made naturally in the body. For men, hormonal therapy decreases the level of testosterone; for women, it decreases the levels of estrogen and pro-

QUESTIONS TO ASK YOUR DOCTOR WHEN DISCUSSING TREATMENT OPTIONS

- What are the possible side effects of each of my treatment options?
- How common are these side effects?
- When are these side effects most likely to occur?
- How do the benefits of the recommended treatment options compare with the risks?
- How long will each of the side effects probably last?
- Is there a way to decrease the possibility that these side effects will occur?
- Are there medications available to relieve or prevent these side effects?
- How will I be monitored for long-term side effects, such as heart problems?
- When should I contact a member of my health care team about a side effect?
- Whom should I call?
gesterone, causing side effects similar to the symptoms of menopause. Although the side effects of hormonal therapy in both men and women usually disappear when treatment ends, hormonal therapy is typically given for a long time. This means that a side effect may be experienced for many months or years.

**Targeted therapy**
Targeted therapy is the use of drugs or biologic substances that stop or slow cancer growth by interfering with specific molecules in the body that contribute to cancer cell creation. Because targeted therapy is designed to attack specific cells, it's less harmful to normal cells than traditional chemotherapy. However, some side effects may still occur (Table 1). As with hormone therapy, targeted therapy may continue for a long time, so even short-term effects may be present for many months. Targeted therapy is the newest approach to treating cancer, and its late effects are not yet fully understood.

**Importance of learning about side effects**
It's impossible to predict exactly how cancer treatment will affect you, but talking with your health care team can better prepare you for what may happen. This guide provides overviews of some of the most common cancer treatment-related side effects and includes resources to help you find even more information. Learn as much as you can about the side effects that may affect you. Knowing what to expect and learning how to prevent or manage side effects can help you feel in control and ensure that you have the best chance for your treatment to be effective.

### TABLE 1 | MOST COMMON SIDE EFFECTS BASED ON TYPE OF TREATMENT

<table>
<thead>
<tr>
<th>Type of treatment</th>
<th>Short-term side effects</th>
<th>Long-term side effects</th>
<th>Late effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surgery</strong> (depending on the site of surgery)</td>
<td>Pain</td>
<td>Scars</td>
<td>Lymphedema</td>
</tr>
<tr>
<td></td>
<td>Limited mobility and/or activities</td>
<td>Impaired wound healing</td>
<td>Phantom limb sensation</td>
</tr>
<tr>
<td></td>
<td>Slow digestion</td>
<td>Change in function</td>
<td>(if part of limb is removed)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative body image</td>
<td></td>
</tr>
<tr>
<td><strong>Radiation therapy</strong> (depending on the site of radiation)</td>
<td>Skin sensitivity (redness, dryness, peeling, itchiness)</td>
<td>Fatigue</td>
<td>Problems with thinking and/or memory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anemia</td>
<td>(if brain is radiated)</td>
</tr>
<tr>
<td></td>
<td>Hair loss (in the area of the body being treated)</td>
<td>Fatigue</td>
<td>Loss of motion in joints</td>
</tr>
<tr>
<td></td>
<td>Nausea and vomiting (if abdomen is radiated)</td>
<td>Dry mouth</td>
<td>(if limb or joint is radiated)</td>
</tr>
<tr>
<td></td>
<td>Mouth sores (if head or neck is radiated)</td>
<td>Loss of or changes in taste</td>
<td>Infertility (if pelvis is radiated)</td>
</tr>
<tr>
<td></td>
<td>Headache (if head is radiated)</td>
<td>(if head or neck is radiated)</td>
<td>Caverns and tooth decay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(if jaw is radiated)</td>
</tr>
<tr>
<td><strong>Chemotherapy</strong></td>
<td>Nausea and vomiting</td>
<td>Fatigue</td>
<td>Lymphedema</td>
</tr>
<tr>
<td></td>
<td>Neutropenia (which increases risk of infection)</td>
<td>Menopausal symptoms (in women)</td>
<td>Cataracts</td>
</tr>
<tr>
<td></td>
<td>Anemia</td>
<td>Peripheral neuropathy (nerve problems)</td>
<td>Infertility</td>
</tr>
<tr>
<td></td>
<td>Fatigue</td>
<td>Cognitive dysfunction (forgetfulness or trouble concentrating)</td>
<td>Abnormal liver function</td>
</tr>
<tr>
<td></td>
<td>Changes in appetite</td>
<td>Cardiomyopathy (heart problems)</td>
<td>Osteoporosis</td>
</tr>
<tr>
<td></td>
<td>Hair loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mouth sores</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skin and nail changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hormone therapy</strong></td>
<td>Men:</td>
<td>Women:</td>
<td>Women:</td>
</tr>
<tr>
<td></td>
<td>Hot flashes</td>
<td>Hot flashes</td>
<td>Uterine cancer</td>
</tr>
<tr>
<td></td>
<td>Constipation or diarrhea</td>
<td>Vaginal discharge and irritation</td>
<td>Osteopenia (bone loss)</td>
</tr>
<tr>
<td></td>
<td>Nausea</td>
<td>Joint pain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dizziness, headache</td>
<td>Muscle aches</td>
<td></td>
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<tr>
<td></td>
<td>Trouble sleeping</td>
<td>Headache</td>
<td></td>
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<tr>
<td></td>
<td>Impotency, decreased sex drive</td>
<td>Depression</td>
<td></td>
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<tr>
<td></td>
<td>Weight gain</td>
<td>Increased risk of bone fracture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fatigue</td>
<td>Increased risk of blood clot</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Mood disorders</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low libido</td>
<td></td>
</tr>
<tr>
<td><strong>Targeted biologic therapy</strong></td>
<td>Acne-like rash</td>
<td>Mouth sores</td>
<td>Increased risk of blood clot</td>
</tr>
<tr>
<td></td>
<td>Increased risk of infection</td>
<td>Anorexia</td>
<td>Neutropenia (which increases risk of infection)</td>
</tr>
<tr>
<td></td>
<td>Flu-like syndrome</td>
<td>Increased risk of blood clot</td>
<td>Fatigue</td>
</tr>
<tr>
<td></td>
<td>Dry, itchy skin</td>
<td>Growth of eyelashes</td>
<td>High blood pressure</td>
</tr>
<tr>
<td></td>
<td>Nausea and vomiting</td>
<td>Discomfort or tearing in eyes</td>
<td>Cardiomyopathy (heart problems)</td>
</tr>
<tr>
<td></td>
<td>Slow-growing, brittle hair</td>
<td>Fatigue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diarrhea or constipation</td>
<td>Cardiomyopathy (heart problems)</td>
<td></td>
</tr>
</tbody>
</table>

*Hormone therapy is typically given for a long period of time, so short-term side effects may also last for a long period of time.*
Reading prescriptions and medication information can sometimes feel like trying to understand a foreign language. But with a few tips, you can start to read around the “medical speak” and pull out the information that’s important for you to know. However, if you’re still left with questions about the drugs you’ve been prescribed, you should not hesitate to talk to your doctor or pharmacist.

Types of medications

Three main types of medications exist: brand-name medications, generic medications and biosimilar medications. Brand-name medications have been developed and marketed by a pharmaceutical company, a process that can take many years. Brand-name medications are protected by patents, meaning the medication can be produced and sold only by the company that holds the patent for as long as 20 years. As the patents for brand-name drugs near their expiration dates, however, other drug manufacturers can apply to the FDA for permission to make and sell generic versions of the drugs.

Generic medications are chemically equivalent copies of brand-name medications. Their pharmacological effects (dosage, intended use, side effects, etc.) are exactly the same as their brand-name counterparts, but they’re often cheaper because the development costs are so much lower. In addition, multiple companies can produce generic versions of the same drug, which drives down the price even further. While generic medications may look different in size, shape and color and have different inactive ingredients, the FDA requires them to have the same quality and performance as brand-name drugs.

Like generics, biosimilar medications (sometimes called “follow-on biologics”) are produced after the patent on the original drug expires and are also usually more cost-effective (up to 30 percent less expensive). However, unlike generic drugs that copy drugs made from chemicals, biosimilars copy drugs made from living cells, so they may differ slightly from their brand-name counterparts in purity and strength. This is because the processes used to create them vary; also, exact copies are impossible because no two cell lines are identical. These small differences—in the cell line and in manufacturing—can cause different responses in patients. This means two similar biologic drugs can potentially cause different side effects. However, these drugs are still considered to have a very similar clinical effect to their brand-name originals, and they are still required to go through an FDA approval process.

Talk to your doctor to learn more about each of these types of medications and all of your treatment options, as well as any side effects you might encounter.

Reading package inserts

A package insert is available for every prescription medication approved by the FDA. It contains information from the drug manufacturer about the drug and is usually long and difficult to understand. However, every package insert follows a standard format and includes the same categories (see sidebar), so after learning what to look for, you can begin to find and comprehend the key information.

The package insert will begin with a section called “Highlights of Prescribing Information,” which summarizes the most important information you need to know to use the drug safely and effectively. If you only have a few minutes to read over the package insert, you should focus on this section. In it, you’ll learn the drug’s brand name, generic name and initial year of FDA approval. If any potentially serious or life-threatening warnings or side effects are associated with the drug, you’ll then see them listed in the “Boxed Warning.” Following the Boxed Warning, you’ll usually find:

- The uses (indications) for which the drug has been approved
- The recommended dosages of the drug
- Advice about whether to take the drug with food or other medications
- The form (tablet, liquid, ointment, powder, etc.) and dosage strength of the drug
- Contraindications (symptoms or conditions, such as allergies or diabetes, that make taking the drug inadvisable)
- The most common and/or potentially serious side effects of the drug
- Other medications that may interact poorly if taken at the same time as the drug
- The drug’s safety and effectiveness in various population groups (nursing or pregnant mothers, geriatric patients and pediatric patients)

At the conclusion of the Highlights of Prescribing Information section, you’ll find a table of contents to help you navigate through the remaining content. Other information you can find in the package insert includes:
- Class of medication in which the drug falls
- Color of the drug
- Chemical name of the drug
- A list of the inactive ingredients
- How the drug is processed and eliminated from your body
- Whether you should keep the drug refrigerated
- Results of clinical trials in which the drug was used
- Actions you should take in the event of a drug overdose
- A phone number and website you can use to report any suspected adverse reactions
- Information your doctor is supposed to discuss with you

It’s a good idea to review the package insert in its entirety before taking any medication and again if your health changes.
Pain is a leading fear for many people with cancer, but cancer doesn't have to mean pain. You are entitled to having your doctor committed to relieving the pain you may experience as a result of cancer and its treatments, and one who also makes sure that any side effects from attempts at pain control are acceptable to you. So, if you don’t already have someone like that on your health care team, ask for a referral to a pain specialist. Improved pain control can lead to improved survival, so the more in check you and your doctor can keep your pain, the better your overall outlook.

What causes cancer pain?
For many people, cancer pain can come from the cancer itself. As a tumor spreads, it can press on an internal organ, bone or joint, creating pressure that leads to pain. A tumor can also cause pain by damaging nearby tissues and nerves as it grows into them, and by producing chemicals that disrupt the balance of that area of the body.

While cancer treatments can be beneficial, they can sometimes cause pain as well. For example, if you have surgery to treat your cancer, you may experience pain as your body heals and recovers from the procedure. Chemotherapy and radiation therapy can also cause pain by damaging healthy cells, which can result in painful side effects, such as a burning sensation, mouth sores, diarrhea, nerve damage and more. You should not avoid these treatments because they may cause pain. Rather, you should keep an open dialogue with your doctor about any pain you experience so it can be controlled.

Who is at risk for cancer pain?
Because both cancer and its treatment can cause pain, most cancer patients are at risk for experiencing some type of pain. However, numerous management techniques are available to help you find relief.

When does cancer pain occur?
The timing of cancer pain largely depends on the type:
- **Acute pain** usually comes from injury or damage to bodily tissues. It tends to happen immediately as a direct result of a trauma – surgery, for example – so the cause is typically easy to identify. Standard pain medication is often an effective treatment.
- **Chronic pain**, also called persistent pain, lasts long after the bodily injury heals and can be more resistant to medical treatments. Chronic pain can be very taxing on both your body and your emotional state. However, using the various treatment options available today, it can be effectively managed in the vast majority of people.
- **Breakthrough pain** includes severe flares of pain that “break through” regular pain medications. Sometimes these flares are related to an event, such as coughing, and sometimes they’re sudden and unpredictable. These outbreaks can be mild to severe and can last for up to an hour a few times a day. Breakthrough pain can often be managed using various techniques.

How is cancer pain managed?
The options for managing cancer pain are numerous, and it can be helpful to think of them as tools in a toolbox. Sometimes just one tool can fix the problem, but at other times the whole toolbox will be required. In addition, you’ll sometimes need to use tools in a particular sequence, while sometimes you may need to jump back and forth between tools.

The following descriptions of various pain relief techniques are meant to provide you with a general overview of what’s available. That way, if your doctor doesn’t mention one or more of them as options for your care, you’ll be equipped to ask whether they might be right for you.

**Pharmacotherapy** is the treatment of cancer pain through the administration of medications, including non-opioid, opioid, adjuvant and topical analgesics.
- Non-opioid analgesics are often available over-the-counter and include aspirin, ibuprofen (Advil, Motrin, others), acetaminophen (Tylenol, others), etc.
- Opioid analgesics require a prescription and help decrease both the perception of pain and the reaction to pain. Codeine, oxycodone and morphine are all examples of opioid analgesics.
- Adjuvant analgesics, including certain antidepressants and anticonvulsants, aren’t primarily designed to control pain, but they can sometimes be used for this pur-
pose, especially in cases where damaged nerve cells result in neuropathic pain. • Topical analgesics are either sprayed on or rubbed into the skin, directly over the painful area. They may cause less severe side effects than other analgesics because they’re not ingested. • Percutaneous pain techniques refer to procedures that access inner organs and tissues by puncturing the skin with a needle. They include ablative techniques, nerve blocks, kyphoplasty, vertebroplasty and sacroplasty. • Ablative techniques include various procedures used to turn off nerves that signal pain, thereby providing pain relief. • Nerve blocks usually involve injecting a pain-killing medication around certain nerves that send pain signals to your brain. • Kyphoplasty, vertebroplasty and sacroplasty are all procedures in which bone cement is injected into the spine or sacrum to stabilize the area and relieve pain. • Neurosurgical approaches to pain relief seek to lessen pain at its source—in the neural pathways and processing centers of the spine and brain. Recent innovations have opened up more neurosurgical options than were available in the past, including electrical stimulation, which can “jam” pain pathways and block pain, as well as intracranial and spinal ablation, which can turn off specific brain and spinal cord fibers that include pain-carrying nerves. These are sometimes referred to as “nerve blocks.” • Intrathecal drug delivery, also called a “pain pump,” sends pain medication directly to your spinal cord using a small pump that’s surgically placed in the abdominal wall. Because the medication goes directly to your spinal cord rather than first traveling through your entire system, it’s effective in much lower doses than oral medications and without the usual side effects. • Supportive oncology usually involves a team of doctors who can help relieve cancer pain through palliative surgery, radiation therapy and chemotherapy. Palliative radiation and chemotherapy can shrink a tumor that is causing pain, and palliative surgery can be done to remove part or all of such a tumor, stabilize the spine and keep organs functioning, thereby reducing pain. Radiation therapy may also relieve pain caused by bone metastases (the spread of cancer to bone), and nerve blocks may also be used. • Physiatry, or physical medicine and rehabilitation, helps relieve pain through customized therapy programs designed to enhance mobility, overcome disabilities and avoid painful activities when cancer or its treatments have affected how you move and function. Anti-inflammatory injections are also a part of this technique. • Alternative and complementary strategies include yoga, acupuncture, reflexology, massage therapy, aromatherapy, art therapy, music therapy and animal therapy. While these strategies may not single-handedly solve cancer pain, they do have a role in pain management. • Psycho-behavioral strategies involve activities such as deep relaxation and meditation. They are useful in calming psychological symptoms, such as anxiety and depression, which often accompany cancer pain and can get in the way of its treatment. Keep in mind that certain risks and benefits are associated with all types of pain relief techniques, so always review them with your health care team before beginning any type of regimen. When should I talk to my doctor about cancer pain? Cancer pain is sometimes undertreated because many patients are reluctant to discuss it. Ask about pain management right from the start, and continually alert your doctor at the first sign of significant pain. A pain diary (see sidebar) can help you monitor your pain, know what to report and decide when to call your doctor. Pain relief works best when it’s done proactively rather than reactively, and ideally, pain should be addressed long before it becomes an emergency. In addition, if you’re having unacceptable side effects from pain medications, efforts can be made to employ different strategies to both get you the necessary pain relief and avoid unacceptable side effects.
Many people with cancer experience one or more types of sleep problems. The most common sleep problems among cancer patients are insomnia (the inability to fall asleep or stay asleep), disruption of the wake-sleep cycle and excessive sleepiness.

What causes sleep problems?
Several factors can impact sleep. Chemotherapy and radiation can disrupt the body’s chemical balance, which can affect how well you sleep, and changes in hormone levels caused by gynecologic surgery, chemotherapy or hormonal therapy may cause sleep to be interrupted.

However, sleep problems are more often related to other side effects of cancer treatment rather than to the treatment itself. For example, wakefulness is a possible side effect of some antiemetics (medications to control nausea) and corticosteroids (such as prednisone and dexamethasone). In contrast, opioids and other pain medications may cause excessive sleepiness. Napping and prolonged rest during the day because of fatigue or pain medications can disrupt the wake-sleep cycle and make it difficult to fall asleep at bedtime. Many other factors unrelated to cancer treatment can also cause sleep problems in people with cancer, including anxiety about having cancer and concerns about cancer treatment options.

Who is at risk for sleep problems?
Sleep problems can affect anyone, but certain groups of people may have a higher risk. For example, people who have surgery often have trouble sleeping in the hospital because of pain, noise and treatment schedules. This is especially true for older patients in an intensive care setting. Women who have surgery for gynecologic cancer are also likely to have their sleep disrupted because of hot flashes or night sweats. For people suffering from sleep apnea, the condition may worsen during cancer treatment.

When do sleep problems occur?
Sleep problems can strike at any point in the treatment cycle. They may occur early, as is the case when people can’t sleep immediately after surgery because of pain and the unfamiliar hospital setting. Sleep may also be more troublesome on actual treatment days due to stress and immediate physical side effects. Many people with cancer say they’re still coping with sleep problems for several months after treatment stops.

How are sleep problems managed?
Making some simple changes in your daily habits may help you sleep better (Table 1). In more severe cases, your doctor may review and change the medications you’re taking if drug interactions or their side effects are contributing to your sleep problems. Your doctor may also recommend a medication to help you sleep. In addition to sleep medications such as zolpidem (Ambien), other medications may help people fall asleep:
- antihistamines, such as diphenhydramine (Benadryl) and hydroxyzine (Vistaril)
- benzodiazepines, such as diazepam (Valium) and temazepam (Restoril)
- antidepressants, such as trazadone (Oleptro) and mirtazapine (Remeron)
- melatonin

Medications prescribed to promote sleep should be taken only for a short time (less than two weeks) so you do not become dependent on them.

When should I talk to my doctor about sleep problems?
Tell your doctor if you have sleep problems on a few occasions. It’s important to manage sleep problems early, as your body needs proper rest to tolerate treatment and heal. Ask your doctor before taking any over-the-counter sleep aids, as these may interact with other medications you take.

### Table 1: Daily Habits to Help You Sleep Better

<table>
<thead>
<tr>
<th>Habit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set a routine for sleeping and waking.</td>
<td>Going to bed at the same time each night and waking up at the same time each morning can help make it easier to fall and stay asleep.</td>
</tr>
<tr>
<td>Limit daytime napping.</td>
<td>If daytime naps are essential, limit them to 20 to 30 minutes, and avoid napping in the late afternoon or early evening.</td>
</tr>
<tr>
<td>Get daily exercise.</td>
<td>Exercising during the day will help you sleep at night, but avoid exercising within two hours of bedtime, as it may keep you awake.</td>
</tr>
<tr>
<td>Avoid large meals before bedtime.</td>
<td>Eating a large meal or spicy or sugary foods within four to six hours before bedtime can keep you awake.</td>
</tr>
<tr>
<td>Limit caffeine and alcohol.</td>
<td>Avoid drinking beverages with caffeine (coffee, soda, tea) during the late afternoon and evening, as they may make it difficult to fall asleep. Also avoid drinking alcohol within four to six hours before bedtime; while it may make you sleepy at first, it may ultimately disrupt your sleep.</td>
</tr>
<tr>
<td>Drink warm milk or herbal tea.</td>
<td>Either of these beverages may help you get to sleep.</td>
</tr>
<tr>
<td>Reserve your bed for sleeping.</td>
<td>If your bed is a place for other activities, such as watching television, talking on the phone, reading or eating, you may have more difficulty sleeping in it.</td>
</tr>
<tr>
<td>Create a restful environment in your bedroom.</td>
<td>Turn off or dim the lights, eliminate noise, set a comfortable temperature, and make sure your bedding and pillows are fresh and clean.</td>
</tr>
<tr>
<td>Avoid lying in bed for a long time without sleeping.</td>
<td>If you cannot get to sleep within about 15 minutes, get up and go into another room until you feel sleepy, and then return to bed.</td>
</tr>
</tbody>
</table>

### Additional Resources
- American Cancer Society: [www.cancer.org](http://www.cancer.org)
- American Society of Clinical Oncology (patient website): [www.cancer.net](http://www.cancer.net)
- National Cancer Institute: [www.cancer.gov](http://www.cancer.gov)
People with cancer often experience fatigue, and they describe it using a variety of words, including “exhausted,” “weak” and “worn out.” However it’s described, the fatigue related to cancer and its treatment is different from the fatigue that healthy individuals occasionally feel. It usually lasts longer, is more severe and is unrelated by sleep. Managing fatigue is an essential part of your health care, so be sure to talk to your doctor about your fatigue.

What causes fatigue?
Several factors may cause cancer-related fatigue, including the cancer itself. Cancer can alter your hormones, weaken your muscles and trigger other changes in your body, which all may lead to fatigue. Various types of treatments can also contribute, primarily because the body needs extra energy to repair the healthy tissues damaged during treatment.

In addition, other treatment side effects (such as pain, nausea and vomiting) can cause or worsen fatigue, and certain medications to relieve those side effects can lead to fatigue as well—as can the interaction of two or more medications. Another common contributor to fatigue is anemia, a low level of red blood cells. (See page 18 for a more complete discussion of anemia.) Depression, stress, poor nutrition, other medical conditions, changes in your sleep/wake cycles, and reduced activity may also cause or worsen fatigue.

Who is at risk for fatigue?
Almost everyone treated for cancer experiences fatigue at some point, regardless of the type of cancer they have or the type of treatment they receive. How fatigue will affect you depends on several factors, including your age, general health, types of treatment, and your normal level of activity.

When does fatigue occur?
Fatigue can strike at any time, but the type of treatment you receive plays a large role in when it occurs. If you’re having surgery, the effects of anesthesia, the use of strong pain relievers, and the limitations placed on your activity can make you feel tired and weak for a few days to a few weeks after surgery.

If you’re receiving chemotherapy, you’ll probably feel the most tired about two hours after each treatment. Fatigue typically peaks within a few days following the beginning of a chemotherapy cycle and then gradually gets better until the next treatment cycle begins. Radiation therapy takes longer to produce fatigue; a feeling of being tired and weak usually starts a few weeks after treatment begins and gradually diminishes after treatment ends.

Fatigue may be fairly constant or may occur from time to time. Some people feel less tired once treatment stops, and others may feel tired for several more months.

How is fatigue managed?
Managing fatigue largely depends on the cause. For example, if your doctor determines that a certain drug or drug interaction is causing your fatigue, you may need to change or stop taking those drugs or supplements. However, if the cause is unclear, you may need to try something more general, such as increasing your activity level. While most people think more rest will help, the opposite is actually true; regular exercise (such as walking or riding a bike) is the best way to help manage and reduce symptoms of fatigue. The techniques listed in Table 1 may also help.

If your fatigue is severe, your doctor may prescribe a psychostimulant drug, such as modafinil (Provigil), armodafinil (Nuvigil), methylphenidate (multiple brand names) or dextroamphetamine (Adderall, Dexedrine), for a short period of time. These drugs can help improve your alertness and raise your energy during the day, while also decreasing fatigue. In addition, they can counteract the drowsiness caused by some opioids.

If you plan to work during treatment, talk to your supervisor before your treatment starts about the possibility of fatigue and ways you can handle it, such as taking time off or rescheduling important tasks for times when fatigue may be at its lowest.

Also, ask about a referral to a cancer rehabilitation facility – before treatment if possible – to learn about proven techniques that may reduce the effects of fatigue.

When should I talk to my doctor about fatigue?
Describe your fatigue at every office visit, and call your doctor immediately if you have any of the following symptoms:

• Confusion
• Dizziness or loss of balance
• Extreme tiredness that forces you to stay in bed for more than 24 hours
• Fatigue that has gotten worse or a sudden decrease in energy level
• Feeling of breathlessness (being out of breath) or of a racing heart after mild activity

### TABLE 1 | WAYS TO MANAGE FATIGUE RELATED TO CANCER TREATMENT

<table>
<thead>
<tr>
<th>Conserve energy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Set priorities for activities and do only what’s most important.</td>
</tr>
<tr>
<td>• Schedule important activities for times of the day when you have the most energy.</td>
</tr>
<tr>
<td>• Sit down when washing or grooming.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Balance activity and rest.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Participate in regular physical activity, such as walking, yoga or bike riding.</td>
</tr>
<tr>
<td>• Take frequent rest periods or naps, but limit each nap to 45 minutes.</td>
</tr>
<tr>
<td>• Get eight hours of sleep each night.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engage in activities that provide relaxation or distraction from fatigue.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Perform deep-breathing exercises.</td>
</tr>
<tr>
<td>• Use imagery techniques.</td>
</tr>
<tr>
<td>• Read, listen to music and play games.</td>
</tr>
<tr>
<td>• Pray or meditate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consider alternative therapies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Getting a massage may help you relax.</td>
</tr>
<tr>
<td>• Ask your doctor if acupuncture or acupressure may be right for you.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seek relief from other symptoms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ask your doctor for help managing symptoms that may contribute to fatigue, such as pain, nausea, vomiting and depression.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintain adequate nutrition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Eat a well-balanced diet to help promote healing and restore your energy.</td>
</tr>
</tbody>
</table>

ADDITIONAL RESOURCES

CancerSymptoms.org: www.cancersymptoms.org
Why Fatigue from Cancer Treatment Occurs
National Comprehensive Cancer Network: www.nccn.org
Fighting Cancer Fatigue
While actually different from each other, nausea and vomiting are often experienced together. Nausea is the unpleasant sensation of feeling the need to vomit, or throw up, and is often described as an “upset stomach” or “queasy.” Vomiting occurs when the stomach muscles contract and push the stomach contents up through the mouth.

Although nausea and vomiting occur in most people receiving cancer treatment, some people experience only mild symptoms, while others have more severe cases. Whether mild or severe, nausea and vomiting are unpleasant, usually cause distress, and can limit activities. These side effects can also worsen other symptoms, such as pain, insomnia, cognitive dysfunction, fatigue and anorexia.

If vomiting is not controlled and becomes severe, it can lead to dehydration and a lack of essential fluids and minerals in your body. Most importantly, severe nausea and vomiting can interrupt your cancer treatment plan, so it’s crucial to keep these two under control.

**What causes nausea and vomiting?**

Nausea and vomiting are the result of a series of reactions between your stomach and your brain. These reactions start when either chemotherapy or radiation therapy damages the cells lining the inside of the stomach. The cells send signals to a vomiting center in your brain, which then sends signals to trigger nausea and vomiting. Chemotherapy may also trigger the vomiting center directly.

The most common cause of nausea and vomiting is chemotherapy, and some chemotherapy drugs are more likely than others to cause these symptoms. Chemotherapy drugs that cause nausea and vomiting in more than 90 percent of people are classified as having a high likelihood, and drugs that cause these symptoms in 30 to 90 percent of people are classified as having a moderate likelihood (Table 1). It’s important to note that these likelihoods were estimated among people who did not receive any preventive treatments. Plus, other factors, such as the dose used, how often the drug is given, and how the drug is given (intravenously or orally), also play a role in the likelihood of nausea and vomiting occurring.

Radiation therapy can cause nausea and vomiting as well, especially in people who receive total-body or upper-abdominal radiation. The likelihood depends on the tissues being radiated and the dose schedule of the treatment. Nausea and vomiting are also side effects of many medications, especially strong pain medications, such as opioids.

**Who is at risk for nausea and vomiting?**

If your treatment plan includes chemotherapy, radiation therapy or both, you will likely experience nausea and vomiting at some point. Personal characteristics may also increase your risk, as these side effects are more likely to occur in women, people younger than 50, people who are anxious, and people who have had motion sickness.

**When do nausea and vomiting occur?**

Nausea and vomiting related to chemotherapy are described as either acute or delayed, depending on when they first occur (Table 2).

---

**TABLE 1**

<p>| CHEMOTHERAPY DRUGS WITH RISKS OF CAUSING NAUSEA AND VOMITING WHEN NO ANTIEMETIC DRUG IS GIVEN* |</p>
<table>
<thead>
<tr>
<th>Drug name</th>
<th>High risk</th>
<th>Moderate risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>aldesleukin (Proleukin)</td>
<td>High doses</td>
<td>Moderate risk</td>
</tr>
<tr>
<td>altretamine (Hexalen)</td>
<td>All doses</td>
<td>High doses</td>
</tr>
<tr>
<td>amifostine (Ethinyl)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>arsenic trioxide (Trisenox)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>azacitidine (Vidaza)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>busulfan (Busulfex, Myleran)</td>
<td>All doses</td>
<td>High doses</td>
</tr>
<tr>
<td>carboplatin</td>
<td>All doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>carmustine (BCNU, Gliadel)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>cisplatin</td>
<td>Moderate to high doses</td>
<td>High doses</td>
</tr>
<tr>
<td>cyclophosphamide</td>
<td>Moderate to high doses</td>
<td>High doses</td>
</tr>
<tr>
<td>cytarabine (Cytosar, DepoCyt)</td>
<td>Moderate to high doses</td>
<td>Low doses</td>
</tr>
<tr>
<td>dacarbazine (DTIC)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>dactinomycin (Cosmegen)</td>
<td>All doses</td>
<td>Low doses</td>
</tr>
<tr>
<td>daunorubicin (Cerubidine, DaunoXome)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>doxorubicin (Doxil)</td>
<td>Moderate to high doses</td>
<td>Low doses</td>
</tr>
<tr>
<td>epirubicin (Ellence)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>idarubicin (Idamycin)</td>
<td>Moderate to high doses</td>
<td>Low doses</td>
</tr>
<tr>
<td>ifosfamide (Ifex)</td>
<td>Moderate to high doses</td>
<td>Low doses</td>
</tr>
<tr>
<td>imatinib (Gleevec), oral</td>
<td>All doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>irinotecan (Camptosar)</td>
<td>All doses</td>
<td>High doses</td>
</tr>
<tr>
<td>lomustine (CeeNU)</td>
<td>All doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>melphalan (Alkeran)</td>
<td>High doses (IV)</td>
<td>All doses</td>
</tr>
<tr>
<td>methotrexate (Otrexup, Trexall)</td>
<td>High doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>oxaliplatin (Eloxatin)</td>
<td>All doses</td>
<td>High doses</td>
</tr>
<tr>
<td>procarbazine (Matulane), oral</td>
<td>All doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>streptozocin (Zanosar)</td>
<td>All doses</td>
<td>Moderate to high doses</td>
</tr>
<tr>
<td>temozolomide (Temodar), oral</td>
<td>All doses</td>
<td>Moderate to high doses</td>
</tr>
</tbody>
</table>

*Drugs with high risk cause nausea and vomiting in more than 90 percent of people treated when no antiemetic is given; drugs with moderate risk cause nausea and vomiting in 30 to 90 percent of people when no antiemetic is given.

---

**CALL YOUR DOCTOR IMMEDIATELY IF YOU:**

- Have more than three episodes of vomiting per hour for at least three hours
- Notice blood in the material vomited
- Notice a coffee grounds appearance of the material vomited
- Are unable to consume more than four cups of fluid or ice chips in 24 hours or are unable to eat any solid foods for more than two days
- Cannot keep your medications down
- Become weak or dizzy
They may also be described as anticipatory, which means they occur before a dose of chemotherapy is given. If you experience anticipatory symptoms, it usually means you’ve had severe nausea and vomiting during a previous experience with chemotherapy.

Nausea and vomiting related to opioids usually occur within a few hours of a dose. Over time (usually three to seven days), you can develop tolerance to an opioid, which means that the drug will no longer cause nausea and vomiting.

How are nausea and vomiting managed?

Prevention is the key to managing nausea and vomiting, as these symptoms are easier to prevent than to control once they’ve started. Recent advances have led to the development of new drugs, called antiemetics, which can help prevent and control nausea and vomiting. The list of available antiemetic drugs has grown over the past few years (Table 3). Some are best for mild nausea and vomiting, and others are appropriate for more severe symptoms. Similarly, some antiemtics are effective for acute symptoms, and others work best for delayed symptoms. Most antiemetic drugs can be given as either a pill or an intravenous injection. While both forms are equally effective, intravenous antiemetic drugs usually act more quickly.

Your doctor will prescribe antiemetic drugs on the basis of the chemotherapy drug(s) you will receive. Often, a combination of antiemetics is the best approach, especially if you are to receive a chemotherapy drug with a high likelihood of causing nausea and vomiting. In these situations, you will probably take the antiemtic drugs before your chemotherapy starts and at specific intervals after your treatment for as long as the risk of vomiting is expected. For example, if the chemotherapy drug is associated with acute nausea and vomiting, you will be prescribed to take an antiemetic drug for 24 hours. If the drug is associated with delayed nausea and vomiting, you will need to take an antiemtic for three to seven days. For antiemetic drugs to be effective, they must be taken “around the clock” at the prescribed intervals and not on an “as needed” basis.

Prevention of nausea and vomiting related to radiation therapy follows a similar approach. If total-body or upper-abdominal radiation is part of your treatment plan, your doctor will prescribe an antiemetic drug for you to take before your scheduled treatment and for a period of time after treatment. Because nausea and vomiting are not as common after the use of opioids as after chemotherapy or radiation, antiemetic drugs are usually prescribed only after opioid-induced nausea and vomiting have occurred.

It’s important to let your doctor know if you’re still experiencing nausea and vomiting even after taking an antiemetic as prescribed. This type of nausea and vomiting is known as “breakthrough,” and you may need a different antiemetic drug or an increased dose in order to control these symptoms.

To help further protect yourself from nausea and vomiting, you may want to supplement your antiemetic treatment with some non-drug approaches. Some people have been helped by such strategies as progressive muscle relaxation, massage therapy, music therapy, biofeedback, meditation, guided imagery and self-hypnosis. And several recent studies have shown that both acupressure and acupuncture are particularly effective as complementary therapies for nausea and vomiting. Some changes to your eating habits may also be helpful:

- Eat several small meals throughout the day rather than three big meals.
- Try eating a light meal a few hours before your scheduled treatment.
- Drink plenty of fluids in small amounts throughout the day.
- Avoid unpleasant odors, as they can trigger nausea.
- Rest after eating, but don’t lie flat.

When should I talk to my doctor about nausea and vomiting?

Before starting treatment, talk to your doctor about the potential for your planned treatment to cause nausea and vomiting, and ask if anything can be done to prevent these side effects. During your treatment, call your doctor’s office if you experience nausea and vomiting, even if you’re taking an antiemetic drug as prescribed.

### Table 2: Timing of Nausea and Vomiting Related to Chemotherapy

<table>
<thead>
<tr>
<th>Type of nausea and vomiting</th>
<th>Time of first occurrence</th>
<th>Time of worst vomiting</th>
<th>Time of resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>Minutes to hours after the drug is given</td>
<td>Five to six hours</td>
<td>Within 24 hours</td>
</tr>
<tr>
<td>Delayed*</td>
<td>More than 24 hours after drug is given</td>
<td>48 to 72 hours</td>
<td>Three to seven days</td>
</tr>
</tbody>
</table>

*Delayed nausea and vomiting occur most often with cisplatin, carboplatin, cyclophosphamide and doxorubicin.

### Table 3: Drugs to Prevent and Control Nausea and Vomiting

<table>
<thead>
<tr>
<th>Drug Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>aprepitant, fosaprepitant (Emend)</td>
</tr>
<tr>
<td>dexamethasone (Maxidex, Ozurdex)</td>
</tr>
<tr>
<td>dolasetron (Anzemet)</td>
</tr>
<tr>
<td>dronabinol (Marinol)</td>
</tr>
<tr>
<td>granisetron (Sancuso)</td>
</tr>
<tr>
<td>haloperidol (Haldol)</td>
</tr>
<tr>
<td>lorazepam (Ativan)</td>
</tr>
<tr>
<td>metoclopramide (Metozolv, Reglan)</td>
</tr>
<tr>
<td>nabilone (Cesamet)</td>
</tr>
<tr>
<td>olanzapine (Zyprexa)</td>
</tr>
<tr>
<td>ondansetron (Zofran, Zuplenz)</td>
</tr>
<tr>
<td>palonosetron (Aloxi)</td>
</tr>
<tr>
<td>prochlorperazine (Compro, Procomp)</td>
</tr>
<tr>
<td>promethazine (Prometheghan)</td>
</tr>
</tbody>
</table>

### Additional Resources

American Cancer Society: [www.cancer.org](http://www.cancer.org)

Nausea and Vomiting

American Society of Clinical Oncology (patient website): [www.cancer.net](http://www.cancer.net)

Preventing Vomiting Caused by Cancer Treatment

National Cancer Institute: [www.cancer.gov](http://www.cancer.gov)

Nausea and Vomiting (PDQ)
**FERTILITY ISSUES**  /Take control of your reproductive health

** Parenthood is an integral part of life that many individuals, including cancer patients, envision for themselves. However, for women, cancer treatments can unfortunately cause temporary or permanent infertility (the inability to start or maintain a pregnancy), and for men, aggressive cancer treatment can cause gonadal (or reproductive organ) failure. For both genders, fertility options become much more limited after treatments start, so it’s wise to talk to your doctor about safeguarding your fertility before you begin any type of treatment.**

**What causes fertility issues?**
Several factors can impact fertility, including your age and gender, your cancer type and location, your treatment plan, and your body’s response to treatment.

Your endocrine system – including the thyroid, pituitary gland, adrenal gland, ovaries and testes – releases hormones that control fertility. When cancer or cancer treatments damage one of these organs or glands, fertility issues can occur.

If your doctor recommends surgery, be aware that damage to or the removal of any of your reproductive organs will have fertility implications. If radiation therapy is recommended, your fertility may also be affected, especially if the radiation will target the area surrounding your reproductive organs, including your abdomen, pelvic and lower spine.

Several chemotherapy drugs have been linked to fertility issues as well, including cisplatin, cyclophosphamide, chlorambucil (Leukeran), busulfan (BuIufex, Myleran), procarbazine (Matulane), carmustine (BiCNU), lomustine (CeeNU), mechloethamine (Mustargen) and melphalan (Alkeran). It’s also not safe for you or your partner to become pregnant while either of you are taking hormone therapy drugs, including selective estrogen receptor modulators (SERMs), luteinizing hormone-releasing hormone (LHRH) analogs, and aromatase inhibitors (AIs).

**How are fertility issues managed?**
To date, only limited options are available for fertility preservation in men. The most commonly used is sperm banking. Women have a few more options (Table 1); however, many of them are still experimental.

If your cancer treatment plan poses a risk to your fertility, it’s important to think about how significant parenting is to you. Consider whether you want children, and think about your feelings regarding adoption. Also consider whether donor sperm or embryos are options, and whether you would be agreeable with using assisted reproductive technologies. If you’re in a relationship, make sure you consider your partner’s feelings on these issues as well.

**When should I talk to my doctor about fertility issues?**
Talk to your doctor as soon as possible about all of your fertility options and life goals, and don’t make any snap decisions, as they may affect your parenting options for the rest of your life. Also, inquire about a possible referral to a doctor who specializes in fertility preservation.

**QUESTIONs TO ASk YOUR DOCTOR ABOUT FERTILITY**
- Will the recommended cancer treatments affect my fertility?
- What are my fertility preservation options?
- How will I know whether I’m fertile after treatment?
- How long should I wait after treatment before trying to become pregnant?
- Will my cancer treatment pose any potential risks to my future children?
- Can you recommend a fertility specialist?

**TABLE 1  WOMEN’S FERTILITY PRESERVATION AND PARENTHOOD OPTIONS**

<table>
<thead>
<tr>
<th>Before treatment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg freezing: Freezing unfertilized eggs.</td>
<td></td>
</tr>
<tr>
<td>Embryo freezing (cryopreservation): Fertilizing your eggs with sperm in a lab through in vitro fertilization (IVF) and then freezing the created embryos.</td>
<td></td>
</tr>
<tr>
<td>Ovarian tissue freezing: Freezing tissues containing stem cells from part or all of one ovary; requires less wait time than other options.</td>
<td></td>
</tr>
<tr>
<td>Ovarian transposition: Having your ovaries surgically moved higher into your abdomen and out of the radiation field to minimize exposure and damage.</td>
<td></td>
</tr>
<tr>
<td>Radical trachelectomy: For cervical cancer patients, the cervix is removed and the uterus is preserved.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>During treatment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovarian shielding: Placing external shields over the site of your ovaries during radiation therapy to minimize exposure and damage.</td>
<td></td>
</tr>
<tr>
<td>Ovarian suppression: Taking a medication that causes the ovaries to temporarily shut down during chemotherapy.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>After treatment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Donor eggs / donor embryos</td>
<td></td>
</tr>
<tr>
<td>Surrogacy or gestational carrier (having another woman carry your baby): A surrogate gives her egg and is the genetic mother of the baby; a gestational carrier accepts an embryo (does not give her egg) and has no genetic relationship to the baby.</td>
<td></td>
</tr>
<tr>
<td>Adoption</td>
<td></td>
</tr>
<tr>
<td>Natural conception</td>
<td></td>
</tr>
<tr>
<td>Assisted reproductive technologies: Different fertility treatments that your doctor can use to help you get pregnant.</td>
<td></td>
</tr>
<tr>
<td>Freezing eggs using frozen eggs</td>
<td></td>
</tr>
<tr>
<td>Freezing embryos using frozen embryos</td>
<td></td>
</tr>
<tr>
<td>Freezing ovarian tissue using frozen ovarian tissue</td>
<td></td>
</tr>
</tbody>
</table>

**Who is at risk for fertility issues?**
Men and women who receive certain chemotherapy drugs, have radiation to their abdominal and/or pelvic areas, or have surgery to remove any of their reproductive organs have the highest risk for fertility issues. Older women also have an increased risk; in general, women who receive treatment before they turn 30 have a better chance of remaining fertile than older women.

**When do fertility issues occur?**
Fertility issues often arise as soon as treatment begins. The effects of chemotherapy or radiation therapy on the ovaries or testicles may be reversible, with function returning gradually a few months after treatment ends. In contrast, loss of function – and therefore loss of fertility – is permanent when these organs are surgically removed.

**ADDITIONAL RESOURCES**
- Alliance for Fertility Preservation: [http://fertilitypreservationalliance.org](http://fertilitypreservationalliance.org)
- Fertile Hope: [www.fertilehope.org](http://www.fertilehope.org)
- RESOLVE: The National Infertility Association: [www.resolve.org](http://www.resolve.org)
- Save My Fertility: [www.savemyfertility.org](http://www.savemyfertility.org)
Lymphedema is an excess of fluid in your body tissues that causes abnormal swelling in an arm, leg or another part of the body. The amount of swelling can range from a mild increase to an extreme enlargement that interferes with the motion or function of the affected area. Due to improvements in surgical and radiation therapy techniques, lymphedema has become less common over the past few years, but it’s still something you should discuss with your doctor.

What causes lymphedema?
Lymphedema occurs when lymph (a clear fluid that carries infection-fighting cells) cannot flow normally because of damage to – or removal of – lymph nodes or vessels. The reasons why some people develop lymphedema and others don’t remain unknown.

Who is at risk for lymphedema?
Lymphedema is most likely to occur in people who have surgery that involves removing lymph nodes from the underarm, groin, pelvis or neck; the more lymph nodes removed, the greater the risk for lymphedema. The area of the body affected by lymphedema depends on which lymph nodes are removed:
- Arm swelling: removal of axillary (underarm) lymph nodes during surgery for breast cancer
- Leg swelling: removal of pelvic or groin lymph nodes during surgery for uterine, ovarian or prostate cancer
- Chin/face swelling: removal of neck lymph nodes during surgery for head and neck cancer

People who receive radiation therapy in an area near a collection of lymph nodes may also be affected by lymphedema, but it’s less likely than among those treated with surgery. The risk of lymphedema is highest for women who have surgery and radiation therapy for breast cancer.

When does lymphedema occur?
Lymphedema can develop a few weeks to several years after cancer treatment. Swelling in the surgical area may occur in the first few days after surgery, but this swelling is different from lymphedema and will usually resolve in six to 12 weeks.

How is lymphedema managed?
Infection prevention is an important part of lymphedema management because infections trigger your body to make more lymph. If the lymph nodes and/or vessels are damaged, the excess fluid has nowhere to go.

The most common technique to help increase the flow of lymph is to wear a compression garment (a specially made tight sleeve or stocking) or to wrap the arm or leg in bandages. Your doctor may also suggest that you see a physical therapist or a lymphedema specialist to teach you gentle exercises that can help pump lymph fluid out of the affected limb. For some people, a special massage technique called manual lymph drainage may help lymph fluid flow out of the arm or leg. Another technique to increase the flow of lymph is called pneumatic compression, and it involves a compression sleeve with an attached pump that intermittently inflates the sleeve, putting pressure on the limb. Occasionally, a mild diuretic may be prescribed to lower the tissue fluids in your body.

Lymphedema management also focuses on ways to minimize swelling and control discomfort. Following simple rules, such as only wearing loose-fitting clothing and jewelry on the affected side, carrying your handbag or backpack on the unaffected side, keeping your legs uncrossed while seated, and avoiding socks or stockings with tight bands, can all help. In addition, it’s important to keep blood from pooling in the affected limb, so avoid applying heat to it, swinging it quickly in circles or letting it hang down for extended periods. Also, whenever possible, elevate the affected limb to a point higher than the heart, and if you have lymphedema in an arm, avoid any injections (blood draws or vaccines) and blood pressure measurements in that arm.

When should I talk to my doctor about lymphedema?
Talk to your doctor about the possibility of lymphedema when discussing the risks and benefits of surgery or radiation therapy. Early treatment of lymphedema can help control swelling and discomfort, so it’s also important to call your doctor’s office if signs of lymphedema persist for one to two weeks. These signs include:
- Swelling in the breast, chest, shoulder, arm, hand, leg or foot
- A feeling of fullness or heaviness in an extremity or affected area
- Changes in how the skin in an area looks (red) or feels (tight and hard)
- New aching or discomfort in an area
- Less movement or flexibility in nearby joints (shoulder, hand, wrist, hip or knee)
- Difficulty fitting your arm into a jacket or shirt
- For women, a difference in how your bra fits
- Tightness of jewelry on your hand or wrist

ADDITIONAL RESOURCES
American Cancer Society: www.cancer.gov
Lymphedema: What Every Woman with Breast Cancer Should Know
Understanding Lymphedema for Cancers Other than Breast Cancer
BreastCancer.org: www.breastcancer.org
Lymphedema
Lymphatic Research Foundation: www.lymphaticresearch.org
National Cancer Institute: www.cancer.gov
Lymphedema (PDQ)
National Lymphedema Network: www.lymphnet.org
Hair loss, also called alopecia, affects many people receiving chemotherapy, radiation therapy or other cancer treatments. Hair loss may occur anywhere on the body, including the head, eyelashes, eyebrows, armpits, pubic area, arms and legs.

What causes alopecia?
Many cancer treatments work by rapidly dividing cancer cells. Because cells in the hair follicles also divide rapidly, they too may be damaged by these treatments. Typically, chemotherapy causes hair loss on the head and body, while radiation causes hair loss only in the area being treated. However, not all people treated for cancer will lose their hair in this fashion or at all, even when they take the same drug or have the same treatment.

Who is at risk for alopecia?
Alopecia occurs most commonly among people receiving chemotherapy and/or radiation therapy. Some immunotherapy and targeted therapy drugs may also cause hair loss.

When does alopecia occur?
Hair loss from chemotherapy often starts about seven to 10 days after treatment begins and worsens within one to two months. While some drugs, such as cyclophosphamide, docetaxel (Docetrex, Taxotere) and paclitaxel (Abraxane), are associated with persistent hair loss, most hair loss is temporary; your hair will likely start to grow back four to six weeks after treatment stops. Hair loss from radiation ultimately depends on the body location being treated; however, the hair loss may be permanent.

How is alopecia managed?
It’s difficult to prevent hair loss caused by chemotherapy. However, one technique, called “scalp cooling” or “cold cap therapy,” has been effective in preventing hair loss in as many as 80 to 90 percent of people receiving chemotherapy. With this treatment, you wear a cap filled with cold, soft gel packs before, during and after chemotherapy for a total of eight hours. The cold temperature reduces blood flow to the head, which means the drugs don’t reach the hair follicles to destroy those cells. Cancer recurrence in the scalp after using the cold cap is extremely rare. It’s important to note, however, that this method doesn’t work with all chemotherapy drugs, and the caps aren’t covered by insurance.

If cold cap therapy is not an option for you, being gentle with your hair may help reduce the severity of your hair loss and improve the regrowth of your hair (see sidebar). Taking 2.5 mg (2,500 mcg) of biotin (vitamin B7) every day and applying 2- or 5-percent minoxidil (Rogaine, Theroxidil) to your scalp twice daily may also help reduce the duration of hair loss. Be aware, though, that this may cause hair to grow in undesirable areas.

TIPS ON WIGS

- Buy the wig before treatment begins or at the beginning of treatment so you can better match your hair color and texture.
- Ask if the wig can be adjusted; your wig size can shrink as you lose hair.
- Consider buying two wigs, one for everyday use and one for special occasions.
- If you can’t afford a custom wig, buy a standard (less expensive) wig and have it professionally styled.
- Get a prescription from your doctor for the wig because it is often covered by health insurance. The prescription must state “skull prosthesis for hair loss caused by cancer treatment.”
- Try on several different wigs to find one you really like.
- Contact your local branch of the American Cancer Society to learn about free wigs that have been donated by patients after they have completed treatment.

ADDITIONAL RESOURCES

Look Good...Feel Better:
http://lookgoodfeelbetter.org
National Cancer Institute: www.cancer.gov
Managing Chemotherapy Side Effects: Alopecia (Hair Loss)
Managing Radiation Therapy Side Effects: What to Do About Hair Loss
The Rapunzel Project: www.rapunzelproject.org
Tender Loving Care: www.tlcdirect.org

Ultimately, managing hair loss is a matter of preference. Because hair tends to fall out unevenly, some people choose to preemptively cut their hair short or shave their head completely. Others choose to wear a wig. If you decide to get a wig, consider several factors (see sidebar). Wearing a scarf, hat or other type of head covering is also a choice. Your scalp may be tender from treatment (especially radiation therapy to the head), and a head covering can help protect it from cold and sunlight. If you choose not to wear a head covering, make sure to use sunscreen on your scalp while you’re outside.

If your scalp becomes itchy, your doctor can prescribe a topical corticosteroid as a shampoo, foam or liquid.

When should I talk to my doctor about alopecia?
Talk to your doctor about the possibility of hair loss when discussing treatments. Although it can be challenging, the condition is often temporary and not life-threatening.
Side Effects Didn’t Keep Survivor Out of the Spotlight

Approaching age 50, Sharon Snowden-Hake is happy, healthy and enjoying life. The breast cancer she fought in her late 20s and early 30s – and the brunt of the associated side effects – are firmly behind her, and she now has a renewed sense of appreciation for her work and family. Sharon enjoys tutoring her niece and nephews, singing, dancing and working out; among her favorite exercises are yoga, walking and weightlifting.

I have always been a go-getter and goal-oriented. After graduating from journalism school, I began an exciting career in modeling, acting, television hosting, public speaking and reporting. My work has taken me around the world, and I’ve been fortunate to work with several well-known companies, including Hallmark, Anheuser-Busch and Walmart.

One “client” I never anticipated adding to that list was cancer. But at 29 years old, I received the shocking news that I had Stage II invasive ductal carcinoma in my right breast. I was overwhelmed with frustration, and because so much of my profession was based on my appearance, I wondered if I’d have to start a new career. My health came first, though, so after getting a second opinion, I dove into my treatments, which included a lumpectomy, four rounds of chemotherapy with the drugs doxorubicin (Adriamycin) and methotrexate, and radiation.

The treatments sent my cancer into remission, but two years later, it came back in the same breast. This time I underwent six rounds of chemotherapy with the MCFUD drug combination, followed by hyperthermia treatment, more chemotherapy and, finally, internal radiation. Due to the nature of my work, my breast reconstruction was very important. I opted for a TRAM flap. The surgery was long and hard, and they had to take skin from both my stomach and my back. Fortunately, I healed more quickly than I was told; most likely because I had continued to exercise up to that point.

For me, the hardest part of the process wasn’t the treatment itself; it was realizing I couldn’t immediately go after everything I wanted due to various side effects. I was at a higher risk for infection, and I had to be hospitalized for awhile after developing a staph infection that stemmed from my catheter. I later got a bad infection in my finger while learning to play electric guitar, which I had decided to do when I got sick, and at times my blood count would drop so low that my doctors would prohibit me from working or being around groups of people.

There were definitely moments in which I felt like everything had been taken from me, and my stress was compounded because so much of my work depended on my appearance. If I just took things one day at a time, though, I knew I’d eventually get back to my busy, productive self. I continued to work out and go out with my girlfriends when I felt up to it, and to keep myself in the game, I learned to camouflage my scars, use a prosthesis and find great wigs.

My wigs and prosthesis even led to some positive and funny experiences. For instance, after working a fashion show, two people approached me to compliment my hair. Little did they know I was actually bald at the time and wearing a wig! I also landed a modeling job for a health and fitness advertisement when I was right in the middle of chemotherapy treatment. There I was, jumping around in a wig and a leotard when I was in the worst health of my life, but it made me happy to know I could still be productive.

My mom, dad and sisters were with me at every step; in fact, my mom put her life on hold for me, and my friends stepped up in a big way, too. From accompanying me to appointments and checking on me daily to traveling long distances for visits and enlisting an entire church to pray for me, I couldn’t have done it without them. I also think getting cancer at such an early age gave me the opportunity to see the value in life and what I have to offer; I don’t know if many people get that chance until they’re older. I’ve been volunteering for the Bloch Cancer Hotline one day a week for the past 13 years, and I’m a co-chair of Art Bra, which raises money to help uninsured and underinsured cancer patients. It feels great to give back and help others.

As a cancer survivor, I feel a sense of strength and appreciate the beauty of everyone I have in my life. While my right arm doesn’t quite have the mobility it used to and I still have a hard time sleeping on one side, I’m in the best overall shape of my life. I’m very thankful!
**NEUTROPENIA / Manage higher risk of infection**

*neutrophil is a type of white*  
*blood cell that plays an important role in preventing infections throughout your body. Normally, neutrophils make up 50 to 70 percent of your white blood cells. But when the number of neutrophils in your bloodstream drops to an abnormally low level, a condition known as neutropenia occurs. Neutropenia increases your risk for infection and makes it more difficult for infections to resolve if bacteria do enter your body. The lower your neutrophil count, the greater your risk for infection.*

**What causes neutropenia?**  
Many types of cancer treatments are designed to attack rapidly dividing cancer cells. Because white blood cells also grow and divide quickly, they may also be damaged by chemotherapy, radiation and biologic therapy (immunotherapy), which can lead to neutropenia. Other factors, including your overall health, also may contribute to neutropenia.

**Who is at risk for neutropenia?**  
Neutropenia is most likely to occur in people receiving a combination of radiation and chemotherapy, but it’s also common in those who receive either treatment alone. Recipients of bone marrow transplants are likely to develop neutropenia as well. While many people treated for cancer are affected by neutropenia, most never get an infection.

**How is neutropenia managed?**  
Neutropenia is an expected side effect of several treatments and cannot be prevented. Therefore, it’s important to reduce your risk for infection. The most effective way to prevent infection is frequent handwashing, but you can also take several other preventive measures (Table 1).

**When does neutropenia occur?**  
When neutropenia is caused by chemotherapy, the neutrophil count usually begins to drop about a week after the start of each treatment cycle and reaches its lowest point (called the nadir) between seven and 14 days after treatment. The number of neutrophils in your bloodstream will then begin to rise, and it may take three to four weeks for your neutrophil count to return to normal. Your count must be normal before you can receive your next chemotherapy treatment.

When neutropenia is caused by biologic therapy or radiation, the dose and frequency of the treatment determine when the neutrophil count rises and falls.

**When should I talk to my doctor about neutropenia?**  
Ask your doctor whether your treatment may increase your risk for neutropenia.

**Table 1: Ways to prevent infection**

| Practice excellent personal hygiene. | Wash your hands frequently, especially before eating and after using the bathroom.  
Do not cut or pick at your cuticles. Instead, use a cuticle cream.  
Brush your teeth after each meal and at bedtime.  
Use an alcohol-free, antiseptic mouthwash daily.  
Use a deodorant rather than an antiperspirant.  
Use a water-soluble lubricant during sexual intercourse and perform good hygiene immediately following intercourse. |
|---|---|
| Avoid situations that might increase your risk for infection. | Avoid people with colds or other infections, as well as people who live with others who have a cold or infection.  
Avoid contact with anyone who has recently been vaccinated, including infants and children.  
Avoid crowds as much as possible. When necessary, go out at off-peak times.  
Avoid public transportation. When necessary, use it during off-peak times.  
Do not handle animal waste, including cat litter and fish tank water. |
| Use extra precaution to reduce your chance of injury. | Always wear shoes.  
Protect your hands. Wear gloves when doing dishes or gardening.  
Prevent constipation.  
Wear sunscreen with a sun protection factor (SPF) of at least 15.  
Use an electric razor rather than a blade razor.  
Ask your oncologist before receiving any vaccines, including the flu vaccine. |

**CALL YOUR DOCTOR IMMEDIATELY IF YOU:**

- Fever (100.5 °F or higher), chills and sweating
- Flu-like symptoms (body aches, general fatigue) with or without fever
- Cough, shortness of breath and painful breathing
- Sore throat or sores in your mouth
- Redness, pain or swelling on any area of your skin
- Pus or drainage from an open cut or sore
- Diarrhea (loose or liquid stools)
- Pain or burning during urination

In addition, your doctor will closely monitor your white blood cell count throughout your cancer treatment. Precautions or treatments will be started as soon as they’re necessary. If your neutrophil count is extremely low, your doctor may delay your next treatment until it has increased. In the meantime, he or she will likely have you follow “neutropenic precautions,” which are extra measures to prevent infection:

- Taking your temperature four times each day
- Not eating uncooked foods
- Staying away from fresh flowers, plants and gardening
- Avoiding enemas, rectal suppositories and rectal thermometers
- Delaying dental work

Certain growth factors may also help people with an extremely low neutrophil count. These growth factors are special proteins that can stimulate the bone marrow to produce more white blood cells. The growth factors used most often are pegfilgrastim (Neulasta) and filgrastim (Neupogen).

In patients who have a high risk for infection, prophylactic (preventive) antibiotics or antifungal medications may be used. If an infection develops, antibiotics are usually administered immediately because cancer-related infections can be emergencies.

**When should I talk to my doctor about neutropenia?**  
Ask your doctor whether your treatment may put you at risk for developing neutropenia.■
Diarrhea is the passing of loose or watery stools three or more times a day, which may cause abdominal cramps, rectal pain and/or discomfort. When mild, diarrhea is an inconvenience, but left untreated it can lead to serious problems, such as dehydration, loss of important nutrients, weight loss and fatigue.

What causes diarrhea?
Diarrhea can be caused by several factors, including increased contractions of the intestinal muscle layer or damage to the rapidly dividing cells that line the intestines, rendering them unable to absorb liquids.

Who is at risk for diarrhea?
Diarrhea is most likely to affect people who have intestinal surgery, who receive abdominal radiation, or who receive certain chemotherapy drugs, especially fluorouracil, capecitabine and irinotecan. In addition, diarrhea often affects people who undergo a bone marrow transplant, and mild cases can occur in people taking targeted therapy drugs.

Antibiotic-associated diarrhea can be serious and even life-threatening. Virtually any antibiotic can cause diarrhea, but those that most commonly do are ampicillin (Unasyn), clindamycin (multiple brand names) and those in the cephalosporin drug class.

When does diarrhea occur?
Cancer treatment-related diarrhea is a short-term side effect that typically begins within the first few days after treatment starts and usually resolves within a few weeks after treatment stops. However, diarrhea caused by bone marrow transplantation may last for a week to a few months after the end of treatment.

How is diarrhea managed?
Dietary changes can help prevent or lessen diarrhea (Table 1). Once diarrhea occurs, following a diet of strictly clear liquids may help the lining of your intestines heal. Clear liquids include water, cranberry juice, ginger ale, clear broth, popsicles, decaffeinated tea and Jell-O.

As diarrhea begins to improve, you can slowly add solid foods back into your diet, starting with low-fiber foods, such as white rice and boiled potatoes. Avoid foods that can make diarrhea worse, including dairy products; spicy, greasy or fried foods; raw fruits or vegetables; or high-fiber foods (whole-wheat breads, granola and bran cereals).

When you have diarrhea, your body loses fluids and important minerals, so it’s important to drink plenty of clear liquids to help replenish the lost supply. You should also eat foods high in potassium (e.g., spinach, soybeans, beans, dried apricots), as this important mineral is often lost during diarrhea.

In addition, over-the-counter medicines and fiber supplements are available to control diarrhea, but be sure to talk to your doctor before taking anything, as he or she may give you instructions that differ from those on the drug label. If your diarrhea is severe, your doctor may also prescribe other medications or temporarily stop treatment with chemotherapy or targeted therapy and restart it when your diarrhea is controlled.

Severe diarrhea may cause rectal discomfort. To help soothe your rectal area, clean the external skin with warm water and soap after bowel movements, soak in a warm bath, or use a water-repellent cream.

When should I talk to my doctor about diarrhea?
Discussing diarrhea may seem embarrassing, but it’s important to control diarrhea to avoid complications. Talk to your doctor if your diarrhea does not improve with over-the-counter medicines, especially if you’ve recently been taking antibiotics. Also call your doctor if you have symptoms of severe dehydration, such as dizziness or fainting.

### TABLE 1 | WAYS TO PREVENT DIARRHEA

| Drink six to eight glasses of fluid per day. | Examples: water, sports drinks, broth |
| Avoid beverages with alcohol or caffeine. | Examples: beer, wine, soda, coffee, black tea |
| Eat bland, low-fiber foods. | Examples: boiled white rice, cheese, boiled chicken, mashed potatoes |
| Eat foods high in protein, calories and potassium that are easy to digest. | Examples: cottage cheese, eggs, baked potatoes, cooked cereals, bananas, pasta, white toast, applesauce, apricots, crackers, pretzels, smooth peanut butter |
| Eat more frequently but in smaller amounts. | Example: five to six small meals per day rather than three large meals |
| Avoid foods that are very high in fat. | Examples: fried or greasy foods, cream-based sauces |
| Avoid fluids and foods that can irritate the digestive tract. | Examples: caffeine (soda, coffee, tea), alcohol, milk or milk products, chocolate, dried fruits, beans, popcorn, spicy foods |
| Avoid very hot and cold beverages. | Examples: ice cream shakes, ice water, hot chocolate, hot coffee |

**CALL YOUR DOCTOR IMMEDIATELY IF YOU:**
- Have six or more loose bowel movements per day for more than two consecutive days
- Notice blood in the stool, around the anal area, on the toilet paper or in the toilet bowl
- Cannot urinate for at least 12 hours
- Have signs of a fever
- Lose five pounds or more after the diarrhea starts
- Have a swollen and/or painful abdomen
- Feel dizzy or light-headed when moving to a standing position

### ADDITIONAL RESOURCES

- American Society of Clinical Oncology (patient website): www.cancer.net/Diarrhea
- Cancer Support Community: www.cancersupportcommunity.org/Diarrhea
- National Cancer Institute: www.cancer.gov/MediCare/ChemotherapySideEffects/Diarrhea
- Radiation Therapy Side Effects Sheets: Diarrhea
Depression is a disorder consisting primarily of a depressed mood and a loss of interest or pleasure in normal activities. More complex than feeling sad or hopeless, a diagnosis of depression requires that you felt at least five of the following symptoms every day for at least two weeks:

- Persistent sad, anxious, or numb feeling
- Loss of interest or pleasure in hobbies and activities you once enjoyed
- Feelings of hopelessness
- Feelings of guilt, worthlessness, or helplessness
- Fatigue and loss of energy
- Difficulty concentrating, remembering, or making decisions
- Sleep problems
- Changes in appetite and/or weight
- Thoughts of death, suicide, or suicide attempts
- Restlessness and irritability
- Social withdrawal
- Repeated episodes of crying

Diagnosing depression in people with cancer is challenging because many of these symptoms are also side effects of cancer and/or its treatments. Many people with cancer who have depression do not talk to their doctors about it because they think depression is “expected.” But that isn’t true. Depression can and should be treated.

What causes depression?

For many cancer patients, depression is a psychological reaction to the cancer experience as a whole. However, it may also occur as a reaction to multiple side effects of cancer and its treatments. Studies have shown that depression (or mood changes) is a possible side effect of some chemotherapy drugs and other anti-cancer agents—particularly interferons and steroids. As a side effect of medications or the result of lowered hormone levels, depression is a physical reaction resulting from chemical imbalances in the brain. Specifically, the levels of serotonin and norepinephrine (mood-regulating chemicals) decrease.

Who is at risk for depression?

Cancer patients who take chemotherapy drugs or receive treatment that results in low levels of hormones (such as removal or damage to the ovaries or testicles) are most likely to be affected. People with a history of depression or alcohol or drug abuse (before the cancer diagnosis) are also at a heightened risk. In addition, the more unrelieved cancer-related symptoms you have, the greater your risk. Uncontrolled pain is one of the primary contributors to depression.

When does depression occur?

Depression can occur at any time during cancer treatment, but it’s most likely to occur during times of unrelieved side effects.

How is depression managed?

If symptoms other than cancer or its treatments appear to be the cause of your depression, treatment to alleviate those symptoms is a priority. Milder forms of depression may be alleviated by counseling alone (without medications), while moderate or severe depression is typically managed with a combination of psychological treatment and medications (antidepressants). Psychological treatment may include individual psychotherapy, which explores emotional issues that contribute to depression, and/or cognitive-behavioral therapy, which helps change negative thought patterns and behaviors. Cancer support groups might also be helpful, as well as a range of complementary therapies, such as meditation and art therapy.

Many antidepressants are available. The antidepressants most often used for people with cancer belong to a class known as selective serotonin reuptake inhibitors (SSRIs). This class includes drugs such as:

- citalopram (Celexa)
- duloxetine (Cymbalta)
- escitalopram (Lexapro)
- fluoxetine (Prozac, Sarafem)
- fluoxetine, olanzapine combination (Symbyax)
- paroxetine (Brisdelle, Paxil, Pexeva)
- sertraline (Zoloft)

Tricyclic antidepressants may be used as well, but they generally have more side effects than SSRIs. This class of drugs includes amitriptyline, clomipramine (Anafranil), desipramine (Norpramin), imipramine (Tofranil) and nortriptyline (Aventyl, Pamelor).

Another class of drugs, known as psycho-stimulants, has also shown some promise in the treatment of depression when given alone or in combination with a different type of antidepressant drug. Psychostimulant drugs include modafinil (Provigil), armodafinil (Nuvigil), methylphenidate (Daytrana) and dextroamphetamine (Dexedrine).

Each antidepressant drug has different side effects, which can usually be managed by adjusting the dose or switching the medication. Your doctor will work with you to find the antidepressant that works the best with the least amount of side effects. Antidepressants do not take effect right away and may take two to six weeks before becoming effective. Some antidepressants shouldn’t be taken with certain hormonal therapy drugs, so talk to your doctor about potential drug interactions.

Exercise, massage therapy, music therapy, stress-relieving strategies (such as deep-breathing exercises and guided imagery) and support from family and friends can help you better cope with daily life and perhaps reduce your risk for depression. Psychotherapists or psychologists who specialize in clinical depression may be recommended as well. While some insurance companies will cover these types of consultations, the nurse navigator or social worker at your treatment center may also be able to refer you to a psychotherapist who has agreed to see patients for free.

When should I talk to my doctor about depression?

Talk to your doctor about your risk of becoming depressed as a side effect of your prescribed cancer treatment. Call your doctor’s office if you have five or more symptoms of depression that last for two weeks.
People undergoing treatment for cancer often feel like they can’t think clearly. They may find it difficult to pay attention, have trouble remembering details such as names, dates and telephone numbers, and have memory lapses in the middle of tasks or conversations. Many describe the overall feeling as a “mental fog.”

These symptoms all represent cognitive dysfunction, which has become popularly known as “chemo brain” because of the original belief that it was a side effect of only chemotherapy. Research has shown that cognitive dysfunction related to cancer treatment is real and affects attention, concentration, short-term memory, language skills, organizational ability and arithmetic skills. These problems are usually subtle, but they can sometimes be troublesome or, at the very least, frustrating.

What causes cognitive dysfunction?
While the precise causes are not clearly understood, it’s thought to be the result of damage to healthy cells from treatment. Studies have shown that in some people, the parts of the brain that deal with memory and planning are smaller after chemotherapy. In addition, several cancer treatments can cause anemia and fatigue, both of which may also result in cognitive dysfunction—especially the ability to pay attention. In addition to treatment causes, stress and other anxiety from your diagnosis and treatment may also contribute to these symptoms.

Who is at risk for cognitive dysfunction?
Although cognitive dysfunction is most closely associated with chemotherapy, it can also occur in people who receive other types of cancer treatment, including radiation therapy to the head and neck, immunotherapy (interferon or interleukin) and hormone therapy (anti-estrogen drugs or androgen-deprivation therapy). People who take medications such as opioids (for pain), corticosteroids or drugs for nausea and vomiting may also experience cognitive impairment as a side effect.

When does cognitive dysfunction occur?
If your cognitive dysfunction is related to immunotherapy, chemotherapy, radiation therapy or hormone therapy, it can occur during your treatment, but it often will not occur until months or years after you stop treatment. Conversely, if your cognitive dysfunction is related to other medications, it usually will occur while you’re taking the medications and then go away after you stop. How long cognitive dysfunction lasts varies from person to person.

How is cognitive dysfunction managed?
A physical exam and/or blood tests can help your doctor determine whether your cognitive dysfunction is being caused by cancer treatment or something else, such as anemia, unmanaged symptoms or a chemical imbalance in your blood. If another cause is found, your doctor can prescribe an appropriate treatment. If no underlying cause is present, he or she will likely suggest simple measures to help you cope with the changes and improve your mental processing (Table 1).

If your cognitive dysfunction worsens over time or continues for many months after your cancer treatment stops, additional treatment options may be available. For instance, a drug commonly used to treat Alzheimer’s disease – donepezil hydrochloride (Aricept) – has been effective for some people with cognitive dysfunction, as have stimulant drugs such as methylphenidate (Ritalin). Occupational therapy or vocational rehabilitation may also be useful to help you improve the skills you need for daily living or for performing your job. Cognitive (neuropsychologic) rehabilitation and cognitive training may also help you improve your cognitive skills and learn ways to cope with your cognitive deficits.

When should I talk to my doctor about cognitive dysfunction?
Before beginning cancer treatment, ask your doctor whether your specific treatment plan will put you at risk for developing cognitive dysfunction. During treatment, tell your doctor when you first notice signs of cognitive dysfunction. He or she can then test you for any correctable underlying causes, track your dysfunction, and prescribe treatment and/or rehabilitation as necessary.

### TABLE 1 | WAYS TO COPE WITH COGNITIVE DYSFUNCTION

| **Use a calendar or daily planner to keep all your important information in one place.** |
| **Exercise your brain to strengthen your mental ability.** |
| **Get physical exercise to improve your mental alertness.** |
| **Establish healthy habits to help keep your mind and emotions healthy.** |
| **Track memory and attention problems to help you determine when you are most affected.** |
| **Don’t try to multi-task.** |
| **Ask for support.** |

- Write down all appointments, activities, medication schedules, important dates (birthdays and anniversaries), “to do” lists, phone numbers, addresses, names of movies you want to see, books you want to read and anything else you don’t want to forget.
- Do crossword puzzles (or other word or number games), work on jigsaw puzzles, play card games, learn a new hobby, play a musical instrument or learn a new language.
- Walk, swim, bike, do aerobics, practice yoga, garden—whatever you enjoy.
- Get proper sleep, eat a balanced diet and use humor to cope with your forgetfulness.
- Write down the time of day, the situation and any medications associated with your cognitive problems.
- Focus on one thing at a time.
- Tell your friends and family members that you’re having cognitive problems, and ask them to repeat information or write it down.
Anemia is a condition in which the number of red blood cells in your bloodstream is abnormally low. Red blood cells contain an iron protein called hemoglobin, which carries oxygen, so anemia may prevent body tissues from receiving enough oxygen.

Anemia can cause many symptoms, most often fatigue and weakness. Other signs of anemia may include:
- Fast heartbeat
- Shortness of breath
- Dizziness
- Feeling chilled
- Chest pain
- Swelling in the hands and/or feet
- Pale skin

These symptoms usually occur gradually and get worse as the hemoglobin level gets lower. Among people with cancer, mild anemia is usually defined as a hemoglobin level of 10.0 to 11.0 gm/dL; lower levels are considered moderate or severe.

What causes anemia?
Like cancer cells, red blood cells divide and grow rapidly and thus may be damaged by chemotherapy and radiation therapy. Some chemotherapy drugs and radiation treatments can also interrupt processes in the bone marrow, where new red blood cells are made. In addition, chemotherapy drugs with platinum (such as cisplatin and carboplatin) may damage the kidney tissues that help produce erythropoietin (a hormone that helps new red blood cells to grow), and bleeding during surgery may cause anemia if red blood cells were lost more quickly than they could be made.

Who is at risk for anemia?
People who receive platinum chemotherapy drugs are more likely than others to develop anemia as are people who undergo radiation therapy directed at certain bones rich in bone marrow (such as the pelvis and sternum). Anemia is most likely to occur in people who receive both types of treatment. Some immunotherapy drugs, such as interleukin-2, may also cause anemia, and people who have had an extensive surgery with a large amount of blood loss may experience a decrease in their hemoglobin level.

When does anemia occur?
Anemia related to blood loss during surgery occurs within hours or days after the operation, and anemia related to chemotherapy or radiation can occur at any time during treatment. Anemia is usually corrected within one to two weeks after treatment ends, although some cases may linger.

How is anemia managed?
Your doctor will periodically measure your hemoglobin level during your cancer treatment. If it’s too low, he or she may delay treatment until it increases. Several techniques can be used to increase your hemoglobin level and alleviate symptoms of anemia, including increasing the iron and folic acid in your body, giving a blood transfusion, and, less often, treating with growth factors. Managing anemia may also include dealing with fatigue (see page 7).

Increasing the amount of iron in your body may help correct your anemia. Try eating iron-rich foods, such as green, leafy vegetables; dried fruit; seafood, chicken and beef; eggs; and nuts. Your doctor may also suggest an over-the-counter iron supplement, but you should not take one without instruction.

Blood transfusions are usually done if your hemoglobin level is very low, and your doctor will decide what level is most appropriate to treat for your individual case. A transfusion can increase your hemoglobin level quickly but can include some risks. The most common is a transfusion reaction, which is usually minor but can be more serious. This type of reaction can occur when transfused blood is not compatible with the body’s blood. Improved screening methods of donated blood have made it extremely rare for a blood transfusion to cause an infection with hepatitis B or human immunodeficiency virus (HIV).

Growth factors, which are drugs that stimulate the production of new red blood cells, can reduce the need for blood transfusions. However, these drugs are not appropriate for everyone because they’ve been associated with serious risks. Your doctor will talk to you about whether the benefits of these drugs outweigh the risks.

When should I talk to my doctor about anemia?
Talk to your doctor about your risk for anemia when you discuss treatment options. Specifically, ask about the likelihood of anemia with the types of chemotherapy your doctor plans to prescribe or the risk of severe bleeding during a planned surgery. Call your doctor if you feel extremely tired and weak at any point during your treatment period, even after following suggestions about conserving energy.

ADDITIONAL RESOURCES
American Cancer Society: www.cancer.org
Anemia in People with Cancer
American Society of Clinical Oncology (patient website): www.cancer.net
Managing Side Effects: Anemia
National Cancer Institute: www.cancer.gov
Managing Chemotherapy Side Effects: Anemia
Strong bones are an important part of your overall health and are especially important for people with cancer. Loss of bone mass is common as you age, but it can also be accelerated by cancer and its treatment.

What causes bone loss?
Loss of bone mass or bone density occurs when bone cells that help rebuild bones (called osteoblasts) don’t get replaced as quickly as those that naturally break down bones (called osteoclasts). This causes the bones to become thin and porous, which increases your risk for pain, disability, and fractured or broken bones.

Bone cancer and other cancers that have metastasized (spread) to the bone can lead to bone loss, as can many types of cancer treatments. For instance, radiation therapy to the pelvic region can cause bone loss and increase the risk for pelvic and hip fractures, especially for women older than 65. Some chemotherapy drugs decrease your body’s calcium level, which can also lead to bone loss, and other medications, such as corticosteroids and synthetic thyroid hormone agents, have been found to increase the risk for osteoporosis. Hormonal therapy is another major factor in bone loss, because it lowers estrogen levels in women and testosterone levels in men, which are important for optimal bone density.

Who is at risk for bone loss?
In general, women have a higher risk for bone loss than men. A family history of bone loss, being 65 or older and having a low body weight can also compromise bone health. In addition, people with bone cancer or cancer that has spread to the bone, or who receive any of the previously mentioned cancer treatments, have a greater chance for bone loss. The cancer treatments with the highest potential risk for bone loss are hormone therapy drugs for estrogen receptor (ER)-positive and/or progesterone receptor (PR)-positive breast cancers in women and androgen-deprivation therapy drugs for men with prostate cancer. If your doctor prescribes hormone or androgen-deprivation therapy, be sure to ask about your risk for bone loss and ways to prevent it.

When does bone loss occur?
Because bone loss occurs naturally – not just as a result of cancer and its treatment – it can happen at any time. Your doctor may order a bone density scan before your cancer treatment begins. Doing so will provide a baseline measurement that can later be compared with measurements taken during and after treatment. Most often, bone mass is measured with a bone density scan called a dual-energy X-ray absorptiometry (DEXA) scan.

How can bone loss be managed?
It’s important to take action against bone loss before it starts. If a DEXA scan shows early signs of bone loss, your doctor may prescribe a bone-modifying agent. These work by slowing the rate of bone loss, decreasing new bone damage and promoting bone healing.

Many bone-modifying agents belong to a class of drugs known as bisphosphonates. The most commonly used bisphosphonates are zoledronic acid (Reclast, Zometa) and pamidronate (Aredia), and both of these drugs are given through a vein in the arm. Other bisphosphonate drugs include risendronate (Actonel, Atelvia), alendronate (Binosto, Fosamax) and ibandronate (Boniva), which are taken by mouth. Denosumab (Prolia, Xgeva) is a newer type of bone-modifying agent and is approved for people with cancer-related bone loss at a high risk for fractures. While bone-modifying agents can help reduce pain and bone complications, they are linked with a rare but serious side effect called osteonecrosis of the jaw. Experts recommend that you visit your dentist to ensure your teeth and gums are healthy before you start treatment with any bone-modifying agent.

In addition to these agents, your doctor may also suggest physical therapy, which can enhance your quality of life by helping to manage pain, decreasing your risk for bone fractures, and increasing mobility and safety. Physical therapy usually consists of stretching, balance and stability exercises.

When should I talk to my doctor about bone loss?
Talk to your doctor about your risk for bone loss when discussing treatment options, and keep an open dialogue about bone health throughout the duration of your cancer treatment period.

Additional Resources

- Bone and Cancer Foundation: www.boneandcancerfoundation.org
- CancerCare: www.cancercare.org
- Bone Health
- National Osteoporosis Foundation: www.nof.org
The loss of appetite, or the lack of desire to eat because of how you feel overall, is known as anorexia, which is different from the eating disorder known as anorexia nervosa. Loss of appetite is one of the most challenging symptoms for cancer patients and their families.

What causes anorexia?
Anorexia is usually caused by the side effects of cancer treatment, including nausea and vomiting, mouth sores, pain, fatigue, diarrhea, constipation and/or taste changes. These symptoms affect your overall well-being and desire to eat.

In addition, surgery, especially surgery of the digestive system or the head and neck area, can cause anorexia, as can radiation therapy and chemotherapy.

Who is at risk for anorexia?
Anyone whose cancer treatment affects their digestive system or causes severe side effects is at risk for anorexia. Those receiving the cancer treatment drugs cisplatin, cyclophosphamide, doxorubicin (Doxil), fluorouracil, paclitaxel (Abraxane) or vincristine are most likely to experience taste changes (such as a bitter or metallic taste) that can affect the desire to eat and lead to anorexia. In addition, people whose cancer is advanced have an increased risk for anorexia.

When does anorexia occur?
The timing of anorexia varies widely. The loss of appetite may occur mostly on treatment days or may persist throughout treatment. Appetite usually returns to normal one to two weeks after treatment has ended, but sometimes the loss of appetite may persist long after the end of treatment.

How is anorexia managed?
The focus of managing anorexia is to treat the symptoms causing it. For example, controlling nausea and vomiting can improve appetite; treating mouth sores can make it more comfortable to eat; and taking pain medication 30 to 60 minutes before a meal may improve your desire to eat. In addition, modifying your eating habits can help you ensure adequate nutrition and avoid weight loss (Table 1).

Several cookbooks are available for people with cancer (see box). Your doctor may also suggest that you see a dietician or nutritionist to help you select foods that provide good nutrition and are easy to eat.

Physical activity can help stimulate your appetite, and drugs that enhance appetite, such as megestrol acetate (Megace) and corticosteroids (dexamethasone), are also available. These drugs have side effects, however, so your doctor will help you decide whether an appetite enhancer is appropriate for you.

When should I talk to my doctor about anorexia?
Talk to your doctor about changes in your appetite and other symptoms you have that may make it difficult to eat. Also tell your doctor if you’ve lost five or more pounds since the beginning of treatment.

**TABLE 1** | **EATING HABITS TO IMPROVE APPETITE AND MAINTAIN NUTRITION**

<table>
<thead>
<tr>
<th>Habit</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat high-calorie, soft foods</td>
<td>Casseroles, stews, macaroni and cheese, creamy soups, eggs, pancakes, waffles, French toast, mashed potatoes, pasta dishes, pudding and ice cream.</td>
</tr>
<tr>
<td>Drink high-calorie beverages</td>
<td>Juices, milk, malted milk, cocoa, shakes, smoothies, breakfast drinks and nutritional supplement beverages (e.g., Ensure, Boost).</td>
</tr>
<tr>
<td>Keep high-calorie snacks readily available.</td>
<td>Have them nearby at home and take them with you when you run errands. Peanut butter, cheese, ice cream, pudding, nuts, trail mix, breakfast bars, cereal, yogurt, cottage cheese and hard-boiled eggs.</td>
</tr>
<tr>
<td>Opt for more frequent smaller meals</td>
<td>Eat five to six small meals throughout the day rather than three large meals.</td>
</tr>
<tr>
<td>Eat when you have the most hunger</td>
<td>Schedule your “main” meal of the day for when your appetite is best and you are able to eat the most.</td>
</tr>
<tr>
<td>Plan your meals and vary your foods to enhance taste.</td>
<td>Plan meals that include your favorite foods. Increase the use of seasonings, and vary the odors and textures of foods. Use acidic foods (such as lemon wedges, pickles and olives) to stimulate your taste buds.</td>
</tr>
<tr>
<td>Make mealtime pleasant.</td>
<td>Create a pleasant setting for mealtimes and make them relaxed and unhurried. Have meals with family and friends. Go to a restaurant for a change of pace.</td>
</tr>
<tr>
<td>Eat high-calorie, nutritious foods first at mealtimes.</td>
<td>Start with the protein (meat, eggs, beans, etc.), follow with the starches (potatoes, pasta, etc.) and end with vegetables. Limit your fluid intake during meals to mere sips to prevent beverages from making you feel full.</td>
</tr>
</tbody>
</table>

**COOKBOOKS FOR PEOPLE WITH CANCER**

- **Betty Crocker’s Living with Cancer Cookbook: Easy Recipes and Tips through Treatment and Beyond**
  - By Linda Carson, Elyse Cohen and Kris Ghosh
  - Wiley, John & Sons Inc., 2002

- **Eating Well Through Cancer: Easy Recipes & Recommendations During & After Treatment**
  - By Holly Clegg and Gerald Miletiello, MD
  - Holly Clegg, 2006

- **One Bite at a Time: Nourishing Recipes for Cancer Survivors and Their Friends, Edition 2**
  - By Rebecca Katz, with Mat Edelson
  - Ten Speed Press, 2008

- **What to Eat During Cancer Treatment: 100 Great-Tasting, Family-Friendly Recipes to Help You Cope**
  - By Jeannie Besser, Sheri Knecht, Kristina Ratley and Michele Szafranski

**ADDITIONAL RESOURCES**

- **American Society of Clinical Oncology (patient website):** www.cancer.net
  - Nutrition Recommendations During and After Cancer Treatment
  - Weight Loss

- **National Cancer Institute:** www.cancer.gov
  - Nutrition in Cancer Care (PDQ)
  - Eating Hints: Before, During and After Cancer Treatment
Calcium, in normal levels, strengthens the bones and teeth, helps the blood clot, and helps the heart, nerves and muscles function. While most calcium is found in the bones, some is found in the blood. Hypercalcemia is a condition in which there is too much calcium in the blood. The kidneys, bones and hormones (parathyroid and calcitriol) regulate the amount of calcium in the blood, and if any of these regulatory agents go awry, hypercalcemia can result.

Hypercalcemia is the most common life-threatening side effect of cancer, affecting 10 to 20 percent of adult patients. Hypercalcemia affects the entire body, and if left untreated, it can result in a coma or even death. Therefore, catching and treating it early is vital.

What causes hypercalcemia?
Certain types of cancer can cause hypercalcemia by interrupting normal kidney function and causing the kidneys to filter extra calcium back into the blood instead of passing it out of the body via urine. Various hormone therapies and biologic therapies (including interleukins, growth factors and tumor necrosis factors) used to treat cancer can also cause hypercalcemia by disrupting the body’s calcium-regulating hormones. In addition, general inactivity can cause hypercalcemia because when bones aren’t used, they release calcium into the blood.

Who is at risk for hypercalcemia?
People with certain types of advanced-stage cancers, including breast cancer, lung cancer, multiple myeloma, lymphoma and other blood cancers, are at an increased risk for developing hypercalcemia, as are cancer patients treated with certain hormone or biologic therapies. People with hyperthyroidism (an overactive thyroid), hyperparathyroidism (an overproduction of the parathyroid hormone), kidney failure, inherited kidney conditions and/or inherited metabolic conditions also have a greater chance for hypercalcemia. Additionally, people who are inactive for a long period of time or who have excessive vitamin D levels may be at an increased risk.

When does hypercalcemia occur?
When hypercalcemia occurs largely depends on the cause. Cancer-related hypercalcemia can develop at any point before or during treatment. It typically resolves as the cancer is treated; however, if your cancer is very advanced, it may not be possible to permanently control your hypercalcemia.

Hypercalcemia caused by cancer treatment usually begins to develop soon after the treatment starts. Blood calcium levels will often return to normal within a few days after the hypercalcemia is detected and managed.

How is hypercalcemia managed?
Hypercalcemia can range from mild to severe. Patients with mild hypercalcemia (no symptoms) are typically treated by receiving extra fluids, usually intravenously (through an IV), and are encouraged to become more active. Patients with moderate to severe hypercalcemia are typically treated using one of more of the following approaches:

- Replacing lost fluids
- Increasing activity
- Receiving treatment for the cancer that’s causing the hypercalcemia
- Receiving medications, such as bisphosphonates, to stop the breakdown of bone, which will in turn stop the release of calcium into the blood
- Receiving steroid medications
- Receiving medications to control fever, nausea and vomiting
- Beginning dialysis (in patients with kidney failure)

You may be hospitalized for one or more days during treatment for hypercalcemia. The treatment is considered successful if it alleviates your symptoms and decreases your blood’s calcium level. Once your calcium level is normalized, your doctor will continue to collect urine and blood samples to monitor your status.

When should I talk to my doctor about hypercalcemia?
When you’re diagnosed, ask your doctor if your specific cancer type is likely to cause hypercalcemia. Similarly, ask your doctor if any elements of your treatment plan will increase your risk for hypercalcemia. Throughout treatment, you should also tell your doctor if you experience any of the common symptoms of hypercalcemia so management can begin right away.

TIPS FOR PREVENTING HYPERCALCEMIA

- Drink as many fluids as your doctor recommends to flush out excess calcium.
- Ask your doctor about increasing your salt intake to encourage your kidneys to excrete more salt and calcium.
- Keep fevers, nausea and vomiting in check because they can lead to dehydration.
- Remain active to keep your bones in motion.
- Talk to your doctor about the medications you’re taking, as some may make hypercalcemia worse.

ADDITIONAL RESOURCES
American Society of Clinical Oncology (patient website): www.cancer.net
Hypercalcemia
National Cancer Institute: www.cancer.gov
Hypercalcemia
MOUTH SORES

Mouth sores, also known as oral mucositis, are small cuts or sores that form in the mucosa, which is the lining of the inside of your mouth. Mouth sores can affect your gums, tongue, roof of the mouth and/or lips. They often begin as areas of mild pain or burning and develop into white patches that may become large red lesions.

Severe mouth sores can make it difficult to talk, eat or swallow, and the pain can have far-reaching effects on your nutritional status when the discomfort prevents you from eating. If the results are life-threatening, you may require a feeding tube. Also, an infection may develop if bacteria enter the open sores. For these reasons, it’s important to openly discuss mouth sores with your doctor.

What causes mouth sores?
The cells of the mucosa divide rapidly, as do cancer cells. So when chemotherapy and radiation are administered to attack cancer cells, they may also attack the cells of the mucous membrane and lead to mouth sores.

Who is at risk for mouth sores?
Mouth sores are most likely to occur in people treated with radiation to the head and neck area or who receive certain chemotherapy drugs. People who receive high-dose chemotherapy with a bone marrow transplant are also at high risk for mouth sores.

When do mouth sores occur?
Chemotherapy-related mouth sores usually develop within a few days after treatment begins and heal within two to four weeks after chemotherapy ends. Mouth sores caused by radiation usually develop two to three weeks after the start of treatment, and it may take four to six weeks for them to heal.

How do mouth sores occur?
Mouth sores develop when the chemotherapy drugs reach the mucous membranes in the mouth. The drugs can damage cells in the mouth, leading to inflammation and infection.

MOUTH SORES ASSOCIATED WITH CHEMOTHERAPY

- Aldeleukin (Proleukin)
- Alemtuzumab (Campath)
- Carboplatin
- Cetuximab (Erbitux)
- Cyclophosphamide (Cytoxan)
- Cytarabine (Cytosar-U, DepoCyt)
- Daunorubicin (Cerubidine, DaunoXome)
- Docetaxel (Docofrez, Taxotere)
- Doxorubicin (Doxil)
- Epirubicin (Ellence)
- Etoposide (Etopophos)
- Everolimus (Afinitor, Zortress)
- Fluorouracil (Carac, Efudex, Fluoroplex)
- Gemcitabine (Gemzar)
- Hydroxyurea (Droxia, Hydrea)
- Idarubicin (Idamycin)
- Irinotecan (Camptosar)
- Lomustine (CeeNU)
- Mechlorethamine (Mustargen, Valchlor)
- Melphalan (Alkeran)
- Methotrexate (Otrexup, Trexall)
- Mitomycin (Mitosol)
- Mitoxantone
- Oxaliplatin (Eloxatin)
- Paclitaxel (Abraxane, Taxol)
- Pentostatin (Nipent)
- Procarbazine (Matulane)
- Thiopeta
- Topotecan (Hycamtin)
- Vinblastine
- Vincristine (Marqibo)

MEDICATIONS ASSOCIATED WITH MOUTH SORES

- Mechlorethamine (Mustargen, Valchlor)
- Etoposide (Etopophos)
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WAYS TO PREVENT AND MANAGE MOUTH SORES

TABLE 1

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<th>Pain relief</th>
<th>Dietary habits</th>
<th>Avoidances</th>
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<td>Suck on ice chips.</td>
<td>Do not eat hot, spicy, greasy, fried, coarse or rough-textured foods.</td>
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<td>Check your mouth twice each day with a small flashlight and tongue blade.</td>
<td>Apply topical, local anesthetic solutions or jellies, such as lidocaine.</td>
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<td>Clean your mouth and teeth gently with a soft toothbrush, cotton swab or mouth swab.</td>
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<td>Rinse your mouth with salt or baking soda.</td>
<td>Rinse with medicated mouthwashes (dexamethasone, nystatin) to decrease inflammation and yeast infections.</td>
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<td>Use gentle mouthwashes regularly; your doctor will let you know which ones are good for you.</td>
<td>Use topical corticosteroids (dexamethasone solution, triamcinolone 0.1 percent in Orabase) on irritated areas on the tongue, mouth or lips.</td>
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WAYS TO PREVENT AND MANAGE MOUTH SORES

ROUTINE ORAL CARE

- Regularly remove and clean your dentures.
- Check your mouth twice each day with a small flashlight and tongue blade.
- Clean your mouth and teeth gently with a soft toothbrush, cotton swab or mouth swab.
- Rinse your mouth with salt or baking soda.
- Use gentle mouthwashes regularly; your doctor will let you know which ones are good for you.
- Keep your lips moist with K-Y jelly or lip balm; do not use Vaseline.

PAIN RELIEF

- Suck on ice chips.
- Apply topical, local anesthetic solutions or jellies, such as lidocaine.
- Use oral analgesia or intravenous analgesia with opioids as prescribed by your doctor.
- Rinse with medicated mouthwashes (dexamethasone, nystatin) to decrease inflammation and yeast infections.
- Use topical corticosteroids (dexamethasone solution, triamcinolone 0.1 percent in Orabase) on irritated areas on the tongue, mouth or lips.

DIETARY HABITS

- Drink a large amount of fluids (aim for two to three quarts per day) and use a straw to avoid irritating mouth sores while drinking.
- Eat high-protein and high-calorie foods so you don’t have to eat as much.
- Eat foods at room temperature or slightly warm.

AVOIDANCES

- Do not eat hot, spicy, greasy, fried, coarse or rough-textured foods.
- Do not consume very hot or very cold beverages and foods.
- Steer clear of citric juices or foods containing acid, such as tomatoes, oranges and lemons.
- Avoid all alcoholic beverages and tobacco products.
- Do not use liquid medications containing alcohol, such as some cough medicines, if they are not essential.

How are mouth sores managed?
The best way to manage mouth sores is to prevent them from developing. Taking good care of your teeth and gums is essential, so you should brush your teeth and floss several times a day. If you’re receiving chemotherapy, you may also want to suck on ice chips during the first half-hour of your treatment. This will reduce the likelihood of mouth sores because the cold limits the amount of the drug that reaches your mouth.

If mouth sores do develop, your doctor may suggest rinsing your mouth with special solutions or prescribe a medication that coats the lining of your mouth. Topical pain medications are an option as well. Additional ways in which you can prevent and manage mouth sores are summarized in Table 1.

When should I talk to my doctor about mouth sores?
Talk to your doctor about the risk of mouth sores for the type of treatment you’ll receive. Call your doctor when you first notice any type of sore in your mouth. The sooner you treat mouth sores, the better chance you have of preventing them from becoming severe.

ADDITIONAL RESOURCES

American Cancer Society: www.cancer.org

Cancer Symptoms.org: www.cancersymptoms.org

Typical Symptoms of Mucositis From Cancer Treatment

Chemocare.com: www.chemocare.com

Mouth Sores due to Chemotherapy
The skin is the largest organ in the body, and it has many functions, including protecting your body from sunlight and infectious germs, allowing feelings of touch, and regulating your body temperature. The skin has three layers: the epidermis, dermis and hypodermis, which is a layer of fatty tissue (Figure 1). Each layer has a different function, thickness and strength.

Skin reactions to cancer treatments are common, and symptoms commonly include redness, dryness, itchiness, tightness, rashes, growths, blisters, swelling, darkening and sensitivity. These reactions are often uncomfortable and may be embarrassing when they appear in visible areas. While skin reactions are usually mild to moderate, they can become severe if they're not treated early.

### What causes skin reactions?

Chemotherapy, radiation therapy and targeted therapy can all cause skin reactions. Chemotherapy destroys rapidly dividing cancer cells, but it may also damage normal cells that divide rapidly, including blood cells and cells in your mouth, nails, hair and skin.

Radiation absorbed by the skin during radiation therapy may also trigger skin reactions, and targeted therapy drugs may cause skin reactions by blocking specific molecules in cancer cells. Because these molecules are also important for the normal growth of skin cells, blocking them can lead to skin reactions.

### Who is at risk for skin reactions?

People treated with radiation and/or targeted therapy are most likely to have skin reactions. A skin rash resembling acne develops in about 90 percent of people taking a targeted therapy drug known as an epidermal growth factor receptor (EGFR) inhibitor. People taking certain chemotherapy drugs also have an increased risk for skin photosensitivity, which is an inflammation of the skin caused by the combination of sunlight and certain medications or substances.

### When do skin reactions occur?

Skin reactions caused by radiation therapy often begin about two to three weeks after the first treatment and typically resolve within a few weeks after treatment ends; in some cases, the treated skin may stay darker than it was before. With targeted therapy and chemotherapy, reactions most often start within the first few weeks after taking the drug and resolve about one month after treatment stops.

### How can skin reactions be managed?

Skin reactions caused by radiation are usually minor and do not require treatment. Reactions caused by targeted therapy drugs, however, can range from mild to severe. Small rashes that are not uncomfortable or infected usually don't require treatment. If the rash spreads and causes itchiness or pain, your doctor may prescribe a mild corticosteroid cream (hydrocortisone) or an antibiotic gel (clindamycin gel). In addition, severe rashes are usually treated with an oral antibiotic and perhaps an oral corticosteroid.

The acne-like rashes caused by targeted therapy drugs can also be treated with topical and oral antibiotics and corticosteroids. However, it's important that you don't use medicines to treat acne, such as topical retinoids, because these may dry or irritate the skin even more. If your rash is severe, your doctor may reduce the dose of the targeted therapy drug or temporarily stop treatment, restarting it if the rash gets better within two weeks.

If your doctor indicates that photosensitivity could be a side effect of your chemotherapy, you should use a sunscreen with a sun protection factor (SPF) of at least 15 and wear protective clothing when you go out into sunlight. If your skin is already red and painful, your doctor may prescribe a topical corticosteroid and recommend anti-inflammatory medications, such as ibuprofen or naproxen.

### When should I talk to my doctor about skin reactions?

Talk to your doctor about the possibility of skin reactions before you begin treatment. Later, tell your doctor about any skin reactions as soon as they appear.

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**FIGURE 1 | ANATOMY OF THE SKIN**

- Epidermis
- Dermis
- Hypodermis
- Fatty tissue
- Blood vessels
- Connective tissue
- Sweat gland
- Hair follicle

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Peripheral neuropathy is a disorder of the peripheral nerves, which are the nerves outside the brain and spinal cord. Peripheral nerves control the sensations and movements of the arms and legs as well as some involuntary functions, such as digestion and breathing. Symptoms of peripheral neuropathy typically begin at a point on the sensory nerve fibers that are farthest from the center of your body (i.e., your fingers and toes) and gradually affect your hands and feet. Symptoms include:

- Numbness and tingling (“pins and needles”)
- Decreased sensation of hot and cold
- Unpleasant sensations when touched
- Muscle weakness and cramping
- Balance problems
- Pain (usually a burning or electric shock-like feeling)

These symptoms may make it difficult to carry out normal activities, such as buttoning your clothes, picking up small items and writing. Muscle weakness and balance problems may also cause an unsteady gait or difficulty with walking.

What causes peripheral neuropathy?
Peripheral neuropathy is the result of damage to peripheral nerves, caused by either radiation or the effects of chemicals in chemotherapy or targeted therapy drugs. Damage to nerves may also occur during surgery.

Who is at risk for peripheral neuropathy?
Some chemotherapy drugs are more likely than others to cause peripheral neuropathy. People who receive a chemotherapy drug containing platinum (such as cisplatin, carboplatin or oxaliplatin [Eloxatin]) in combination with a taxane drug (such as docetaxel [Docfrez, Taxotere] or paclitaxel [Abraxane, Taxol]) have an increased risk, as do people taking bortezomib (Velcade), thalidomide (Thalomid), vincristine (Marqibo), vinorelbine (Navelbine) and vinblastine.

Peripheral neuropathy is also more likely in people who have had surgery in which sensory nerves were damaged or affected by scarring. In addition, radiation to an area near sensory nerves may cause peripheral neuropathy, but this happens less often today because of advances in radiation delivery.

When does peripheral neuropathy occur?
Peripheral neuropathy caused by chemotherapy or targeted therapy drugs can be either acute (short-term) or chronic (long-term).
- Acute peripheral neuropathy usually begins during or shortly after the drug is given and most often goes away on its own after several days.
- Chronic peripheral neuropathy may arise weeks or months after treatment has ended and is sometimes irreversible.

Whether peripheral neuropathy is acute or chronic depends on many factors, including the combinations of drugs and the total dose of a drug given over time. Symptoms of neuropathy caused by radiation therapy may not occur until months or years after treatment has ended.

How is peripheral neuropathy managed?
Peripheral neuropathy may be managed in a variety of ways. In some cases, a substance known as a chemoprotective agent may be given prior to or with a chemotherapy drug that’s likely to cause peripheral neuropathy. Chemoprotective agents such as glutamine, amifostine and vitamin E may help prevent nerve damage in some people but not others; your doctor will help determine what’s appropriate for your individual situation.

Stretching exercises can help decrease the pain related to peripheral neuropathy, especially in the morning. Moving your hands and feet in all directions before you get out of bed may be helpful, and strengthening your muscles with isometric exercises (holding a muscle in a flexed position for a period of time) can help you maintain balance and walk normally. Your doctor may suggest that you see a physical or occupational therapist to help you learn strengthening exercises and find ways to carry out everyday tasks with less discomfort.

Medications can also help relieve pain. Options include corticosteroids, which must be used only for a short time; topical medications, such as a lidocaine patch, to numb the painful area; and opioids for severe pain.

In small doses, antidepressant drugs, such as amitriptyline and nortriptyline (Pamelor), and anticonvulsant drugs, such as gabapentin (Gralise, Neurontin), topiramate (Topamax, Trokendi XR), pregabalin (Lyrica), carbamazepine (Carbatrol, Epitol, Equetro, Tegretol, Teril) and phenytoin (Dilantin), have also been found to relieve pain.

Other strategies that may help relieve pain are massage, acupuncture and transcutaneous electrical nerve stimulation (TENS). TENS machines transmit a gentle electrical current into areas of pain and stimulate the release of endorphins, the body’s natural painkillers.

If these measures fail to relieve your discomfort or if the neuropathy becomes severe, your doctor will most likely change your cancer treatment.

When should I talk to my doctor about peripheral neuropathy?
Ask your doctor whether your treatment plan will put you at risk for peripheral neuropathy. Also, call your doctor’s office when you first experience symptoms of peripheral neuropathy because early treatment offers the best chance of managing this side effect.
ADVOCACY & FINANCIAL RESOURCES

Cancer education
Academy of Oncology Nurse Navigators ........................................ www.aonnonline.org
Alex’s Lemonade Stand Foundation for Childhood Cancer ............ www.alexslemonade.org
American Cancer Society ................................................................. www.cancer.org
American Society of Clinical Oncology (patient website) .............. www.cancer.net
Association of Community Cancer Centers ................................. www.acc-cancer.org
CANCER101 .......................................................... www.cancer101.org
CancerCare .......................................................... www.cancercare.org
CancerGuide ........................................................................... www.cancerguide.org
The Cancer Project .............................................................. www.cancerproject.org
CancerQuest .............................................................. www.cancerquest.org
The Center for Cancer Support & Education .................................. www.centerforcancer.org
Centers for Disease Control and Prevention ................................ www.cdc.gov
The Gathering Place ............................................................ www.touchedyoucancer.org
GetPalliativeCare.org ........................................................... www.getpalliativecare.org
Global Resource for Advancing Cancer Education ....................... www.cancergrace.org
The Hope Light Foundation ...................................................... www.hopelightproject.com
LIVESTRONG Foundation ...................................................... www.livestrong.org
National Cancer Institute ......................................................... www.cancer.gov
National Comprehensive Cancer Network ................................ www.nccn.org
OncoLink .............................................................. www.oncolink.org
PearlPoint Cancer Support ....................................................... www.pearlpoint.org
Pine Street Foundation .......................................................... www.pinestreetfoundation.org
R.A. Bloch Cancer Foundation Inc ............................................. www.blochcancer.org
Scott Hamilton CARES Initiative ............................................. www.scottcares.org
Union for International Cancer Control ...................................... www.uicc.org
Wellness Place ............................................................. www.wellnessplace.org

Caregivers & support
4th Angel Mentoring Program ................................................... www.4thangel.org
American Self-Help Group Clearinghouse ................................ www.selfhelpgroups.org
Bloc Cancer Hotline ........................................................... www.blochcancer.org
Buddy Kemp Caring House ..................................................... www.presbyterian.org/buddykemp
CANCER101 ........................................................................ www.cancer101.org
Cancer Action .............................................................. www.canceractiononline.org
Cancer and Careers ............................................................. www.cancerandcareers.org
CancerCare .............................................................. www.cancercare.org
Cancer Connection ............................................................. www.thecancerconnection.org
Cancer Hope Network .......................................................... www.cancerhopepartners.org
Cancer Information and Counseling Line ................................... 800-252-3777
Cancer Really Sucks! .............................................................. www.cancerrealllysucks.org
Cancer Support Community .................................................... www.cancersupportcommunity.org
Cancer Support Community Open to Options counselling program ........................................ 888-793-9555
Cancer Survivors Network ...................................................... http://cancer.org
Cancer Survivors On Line ....................................................... www.cancersurvivors.org
Cancer Wellness Center ........................................................ www.cancerwellness.org
Caregiver Action Network ...................................................... http://caregiveraction.org
CaringBridge ............................................................... www.caringbridge.org
The Center for Cancer Support & Education ................................ www.centerforcancer.org
Center to Advance Palliative Care ............................................ www.capc.org
The Children’s Treehouse Foundation ...................................... www.childrens-treehouse.org
Cleaning for a Reason ........................................................... www.cleaningforearason.org
Cuddle My Kids ............................................................... www.cuddlemykids.org
Family Caregiver Alliance ...................................................... www.caregiver.org
Fighting Chance ............................................................... www.fightingchance.org
Friend for Life Cancer Support Network ................................ www.friend4life.org
The Gathering Place ........................................................... www.touch4cancer.org
Guam Cancer Care ........................................................... http://guamcancercare.org
Guide Posts of Strength Inc.................................................. www.cancerpos.org
The Hope Light Foundation ..................................................... www.hopelightproject.com
Imerman Angels .................................................................... www.imermanangels.org
The LGBT Cancer Project – Out With Cancer ......................... www.lgbtcancer.org
LIVESTRONG Foundation ...................................................... www.livestrong.org
LivingWell Cancer Resource Center ....................................... www.livingwellinc.org
Lotus Helping Hands ........................................................... www.lotushelpinghands.com
MyLifeLine.org Cancer Foundation ........................................ www.mylifeline.org
The Patient Partner Project ..................................................... www.thepatientpartnerproject.org
PearlPoint Cancer Support ..................................................... www.pearlpoint.org
SHARE Caregiver Circle for Family and Friends ................................... www.sharecancersupport.org/share-new/support_for_partners_and_caregivers
Strike Out Cancer ............................................................... www.strikeoutcancer.com
Turning Point .......................................................................... www.turningpointcancer.org
Well SpARK (Cancer Support Center) ....................................... www.wellspake.org
Wonders & Worries ............................................................. www.wondersandworries.org

Chemotherapy
Chemocare.com ........................................................................ www.chemocare.com
The Chemotherapy Foundation .............................................. www.chemotherapyfoundation.com

Complementary programs & alternative medicine
The Annie Appleseed Project .................................................... www.annieappleseedproject.org
Believe Big ............................................................................. www.believebig.org
The Cancer Project .............................................................. www.cancerproject.org
The Center for Mind-Body Medicine ......................................... www.cmbm.org
Exceptional Cancer Patients .................................................. www.ecap-online.org
Kansas City Healing Touch ..................................................... www.kansascityhealingtouch.org
National Center for Complementary and Alternative Medicine ........ www.nccam.nih.gov
Society for Oncology Massage ............................................... www.s4om.org
Stewart’s Caring Place: Cancer Wellness Center ...................... www.stewarts_caringplace.org
Touch, Caring and Cancer ...................................................... www.partnersinhealing.net

Fertility & cancer
Alliance for Fertility Preservation ............................................ http://fertilitypreservationalliance.org
Fertile Hope ................................................................. www.fertilehope.org
LIVESTRONG Foundation ...................................................... www.livestrong.org
RESOLVE: The National Infertility Association ......................... www.resolve.org
Save My Fertility ..................................................................... www.savemyfertility.org

Financial assistance
American Cancer Society ......................................................... www.cancer.org
American Kidney Fund ......................................................... www.kidneyfund.org
BenefitsCheckUp ................................................................. www.benefitscheckup.org
Bringing Hope Home ........................................................... www.bringinghopehome.org
CancerCare ................................................................. www.cancercare.org
Cancer Financial Assistance Coalition ....................................... www.cancerfac.org
The CHAIN Fund ................................................................. www.thechainfund.com
HealthWell Foundation ......................................................... www.healthwellfoundation.org
LIVESTRONG Foundation ...................................................... www.livestrong.org
Medicare ............................................................................. www.medicare.gov
Native American Cancer Research ......................................... www.natamcancer.org
NeedyMeds ................................................................. www.needymeds.com
Partnership for Prescription Assistance .................................. www.pparx.org
Patient Access Network Foundation ....................................... www.pafoundation.org
Patient Advocate Foundation ............................................... www.patientadvocate.org
Patient Services Inc ............................................................ www.patientservicesinc.org
RxAssist .............................................................................. www.rxassist.org
RxHope ................................................................................ www.rxhope.com
Social Security Administration ............................................. www.ssa.gov
The Social Security and Disability Resource Center ................ www.ssdrc.org
State Health Insurance Assistance Program ......................... www.shiptalk.org
Stupid Cancer ................................................................. www.stupidcancer.com

Mental health services
American Psychosocial Oncology Society Helpline .................... 888-276-7443

Pain management
American Chronic Pain Association ........................................ www.theacpa.org
Cancer Pain Research Consortium ......................................... admin@cancerpainresearchconsortium.org
LIVESTRONG Foundation ...................................................... www.livestrong.org
National Foundation for the Treatment of Pain ......................... www.nh.org
Pain from Cancer .................................................................... www.painfromcancer.org
U.S. Pain Foundation ........................................................... http://uspainfoundation.org
Teva Oncology, a top 10 oncology company in the US,*1 offers multiple therapies for hematologic malignancies and has an approved product for supportive cancer care.

Our diverse pipeline of compounds and biologics holds great promise for future therapies in hematologic malignancies, solid tumors, and supportive care. By combining our global heritage with therapeutic innovation, we provide more treatment choices for patients with cancer.

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*Excluding supportive care.
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