CONDITION

Radiation reaction

A radiation reaction is tissue irritation or damage caused by radiotherapy or another significant radiation exposure.

WHAT IT IS
Tissue inflammation or damage caused by ionising radiation

BODY SYSTEM
Skin or organs within the treated area

MAIN SYMPTOMS
Redness, soreness, peeling, fatigue

WHAT CAUSES IT
Radiation damage to healthy cells

HOW IT IS DIAGNOSED
Treatment history, symptom timing, and examination

MAIN TREATMENT
Supportive skin and symptom care

CAN IT BE CURED?
Sometimes - acute effects often resolve

IS IT AN EMERGENCY?
Sometimes - trouble breathing or heavy bleeding

LONG-TERM OUTLOOK
Most acute reactions heal; late damage may persist

Overview

A radiation reaction is a change in healthy tissue caused by ionising radiation. It most often happens as a side effect of radiotherapy used to treat cancer. The reaction usually affects the part of the body in or close to the treatment area.

Radiation can damage cancer cells, but nearby healthy cells may also be affected. Healthy tissue can often repair this damage. Symptoms develop when damage temporarily happens faster than the tissue can repair itself or when healing causes lasting changes.

Radiation reactions may be described as acute or late . Acute reactions begin during treatment or in the following weeks. Skin soreness, mouth irritation, bowel changes, and fatigue are examples. Late reactions develop months or years later and may include firm tissue, narrowing of an organ, fragile blood vessels, or reduced organ function.

The type and severity of a reaction depend on the treatment area, radiation dose and schedule, other treatments, and your general health. Having a reaction does not show whether radiotherapy is working.

This article focuses on reactions caused by planned radiotherapy. It is not the same as acute radiation syndrome, sometimes called radiation sickness, which follows a large whole-body exposure over a short time.

Symptoms

Skin changes are among the most visible radiation reactions. Skin within the treatment area may become pink, red, darker, itchy, dry, warm, or tender. It can peel. A stronger reaction may cause moist, weeping areas, especially in skin folds or places exposed to rubbing.

Hair may thin or fall out only in the treated area. Regrowth depends on the radiation dose and the part of the body treated.

Other symptoms are specific to the treatment area:

Fatigue is also common. It may build gradually and can continue for a time after treatment ends.

Late reactions are different from ordinary short-term soreness. Tissue may become thicker, tighter, or less flexible because of scarring called fibrosis . Small blood vessels may become fragile. Depending on the area, this can cause persistent dryness, swelling, bowel or bladder problems, breathing symptoms, or restricted movement.

New symptoms after radiotherapy are not always caused by radiation. Infection, medication effects, cancer, and unrelated conditions can produce similar symptoms.

- Head or neck treatment may cause a sore mouth, dry mouth, swallowing difficulty, taste changes, or a hoarse voice
- Chest treatment may cause discomfort when swallowing, cough, or shortness of breath
- Abdominal or pelvic treatment may cause nausea, diarrhoea, cramps, urinary irritation, or rectal bleeding
- Brain treatment may cause headache, nausea, tiredness, or temporary worsening of neurological symptoms

Causes and risk factors

Radiotherapy uses high-energy radiation to damage the genetic material inside cancer cells.

Healthy cells in the treatment path receive some radiation too. Fast-renewing tissues, including skin, the mouth lining, and the bowel lining, are especially likely to develop an acute reaction.

Late reactions involve slower changes to blood vessels, connective tissue, and organ cells. Healing may produce excess scar tissue, reduce blood supply, or make tissue less elastic.

The chance and severity of a reaction are influenced by:

Modern planning techniques limit radiation reaching healthy tissue, but they cannot always prevent a reaction.

Rarely, a medicine can trigger inflammation in an area treated with radiation in the past. This is called radiation recall . It may happen days, months, or longer after radiotherapy and should be assessed by the cancer team.

- The total radiation dose and how it is divided between sessions
- The size and location of the treated area
- Previous radiation to the same area
- Chemotherapy or certain other cancer medicines given near radiotherapy
- Surgery, infection, or existing tissue damage in the area
- Health conditions that affect circulation or healing
- Smoking, which can reduce tissue oxygen and delay healing

Diagnosis

There is no single test that confirms every radiation reaction. Diagnosis usually comes from the location and appearance of symptoms, when they started, and the details of previous radiotherapy.

Your healthcare team may examine the skin, mouth, lungs, abdomen, or treated area. They will also consider whether an infection, blood clot, medicine, cancer-related problem, or another condition could explain the symptoms.

Further tests depend on the body area and symptoms. These may include blood tests, a swab from broken skin, lung function tests, scans, or endoscopy. Endoscopy uses a thin camera to examine an organ such as the bowel. A biopsy, which removes a small tissue sample, is sometimes needed when the cause remains uncertain.

Tell the person examining you where and when you received radiotherapy, even if it was years ago.

Treatment and management

Treatment is based on the tissue affected and how severe the reaction is. Mild acute reactions are often managed while radiotherapy continues. Do not stop attending treatment or change your schedule without speaking to the radiotherapy team.

For a skin reaction, care may include gentle washing, an unperfumed moisturiser, pain relief, or a prescribed corticosteroid cream to reduce inflammation. Open or weeping skin may need a non-stick dressing and wound care. Antibiotics like amoxicillin or doxycycline are used when there is evidence of a bacterial infection, not for inflammation alone.

Check before applying a new cream, powder, oil, dressing, or adhesive to the treatment area. Some products can irritate damaged skin or interfere with treatment preparation.

Treatment for reactions inside the body is symptom-specific. It may include medicines for nausea, diarrhoea, pain, bladder irritation, or inflammation. Mouth care and nutritional support can help when eating or swallowing is difficult. Breathing symptoms may need scans and anti-inflammatory treatment after other causes have been considered.

A severe reaction may require a short treatment pause, but this decision belongs to the radiotherapy team because interruptions can affect the treatment plan.

Late reactions are often managed rather than fully reversed. Physiotherapy may help tight tissue or reduced movement. Specialist wound care, medicines, procedures to control bleeding, or treatment for swelling may be appropriate. Hyperbaric oxygen, which involves breathing oxygen in a pressurised chamber, is considered for selected types of delayed tissue injury; it is not routine for every reaction.

Complications

Most acute reactions settle, but broken skin or damaged body linings can occasionally become infected. Pain, dehydration, poor nutrition, or weight loss may develop if mouth, throat, or bowel symptoms make eating and drinking difficult.

Late complications depend on the area treated. Possible problems include persistent fibrosis, narrowing of the bowel or oesophagus, fragile blood vessels that bleed, bone weakness, lymphoedema, lung inflammation or scarring, and reduced function of an affected organ.

A second cancer within a previously treated area is a possible but uncommon long-term effect of radiation. It usually develops years later. The expected benefit of necessary radiotherapy is weighed against this risk before treatment.

Prevention

Radiation reactions cannot always be prevented. Radiotherapy must deliver enough radiation to the target, and some nearby healthy tissue may be exposed.

The treatment team reduces risk through careful planning, accurate positioning, shielding where appropriate, and selecting a suitable dose schedule. Tell the team about previous radiotherapy, medicines, skin conditions, and problems affecting healing.

During treatment, follow the skin-care instructions provided by your radiotherapy service. Advice commonly includes washing gently, avoiding rubbing, wearing loose clothing, and protecting the area from strong sun. Avoid very hot or cold packs on treated skin because reduced sensation can make injury easier.

Stopping smoking can support circulation and tissue healing. Adequate food and fluids may also help you cope with treatment, especially when your mouth, throat, or bowel is affected. Ask for early support if symptoms make eating or drinking difficult.

Living with it and what to expect

Acute reactions often begin after several radiotherapy sessions rather than immediately. They may continue to worsen for a week or two after the final session because the biological effects of radiation continue. Many then improve over the following weeks as healthy cells recover.

Skin colour or texture changes can last longer than soreness. Hair may regrow, although it can be thinner or permanently absent after higher-dose treatment. Fatigue may improve gradually over weeks or months rather than disappearing as soon as treatment finishes.

Late reactions can first appear months or years later. Some remain stable, while others change slowly. Persistent symptoms do not necessarily mean that cancer has returned, but they should be assessed rather than assumed to be radiation damage.

Keep a record of where and when you received radiotherapy. This can help future healthcare professionals interpret symptoms and plan surgery, wound care, or additional cancer treatment.

Follow-up after radiotherapy is routine. It may include checks on healing, cancer response, and late effects. Between appointments, report symptoms that are new, worsening, or interfering with sleep, eating, movement, breathing, or daily activities.

When to get medical help

Contact your radiotherapy or cancer team promptly if the treated area becomes increasingly painful, swollen, weeping, blistered, or foul-smelling. Fever, pus, spreading redness, inability to keep fluids down, worsening diarrhoea, or difficulty swallowing also need timely advice.

Arrange medical assessment for a new cough, breathlessness, bleeding, persistent pain, or changes in bladder or bowel function after radiotherapy. These symptoms may have several causes and should not automatically be attributed to treatment.

Seek emergency help for:

Routine dryness, mild redness, tiredness, or slowly improving soreness can usually be discussed with the treatment team during normal service hours.

- Severe or rapidly worsening trouble breathing
- Heavy or uncontrolled bleeding
- Fainting, new confusion, or difficulty waking
- Sudden weakness, loss of speech, or a seizure
- Signs of a severe allergic reaction, such as facial swelling with breathing difficulty

Common questions

Is a radiation reaction the same as radiation sickness?

No. A local radiation reaction usually affects tissue in a planned radiotherapy field. Acute radiation syndrome follows a very large exposure involving much or all of the body and is a different medical emergency.

How long does a radiation reaction last?

Many acute reactions improve within weeks after treatment, although fatigue and skin changes can last longer. Late reactions may persist or first appear years later. The course is influenced by the treated body area and the type of tissue damage.

Does a strong reaction mean radiotherapy is working better?

No. The severity of side effects does not reliably show how well the cancer is responding. People can benefit from radiotherapy with mild, moderate, or more noticeable reactions.

Can radiotherapy continue if my skin is sore?

Often it can. The team may add skin care, dressings, or pain relief and monitor the area closely. Severe reactions sometimes require a treatment change or pause, but you should not make

that decision without the radiotherapy team.

Is a radiation skin reaction contagious?

No. Radiation dermatitis cannot spread to another person. Unless you have received a treatment involving a radioactive source that requires special precautions, external-beam radiotherapy does not make you radioactive.

Can a reaction return after it has healed?

Late tissue effects can develop in the same area months or years later. Rarely, certain medicines trigger radiation recall, causing renewed inflammation in a previously treated area. A returning rash or new symptom should be assessed.

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