

Chemotherapy Safety and Extravasation

Check the IV site every time. Burning, swelling, or redness means stop the infusion right now.

THE ONE-LINE TRUTH

When chemotherapy leaks out of the vein into the tissue around it, some drugs can kill that tissue and leave a serious wound.

The chain — how it unfolds

1. The IV catheter slips out of the vein or the vein wall tears during chemotherapy infusion. — why: Catheters can shift when the patient moves their arm, or veins can rupture if they are fragile from age, prior chemotherapy, or repeated needle sticks. The plastic catheter is stiff and can poke through the delicate vein wall.
2. Chemotherapy flows into the tissue space (under the skin and around muscle) instead of into the bloodstream. — why: Once the catheter tip is outside the vein, every drop of chemo that flows through the IV line goes straight into the tissue. The tissue has no barrier to protect it, so the drug spreads through the space like water soaking into a sponge.
3. The chemotherapy touches living cells and immediately starts killing them, just like it kills cancer cells. — why: Vesicant chemotherapy drugs work by binding to DNA and stopping cells from dividing. They cannot tell the difference between a cancer cell and a healthy skin or muscle cell, so they kill whatever they touch.
4. Nerve endings in the tissue send pain signals, and the patient feels burning or stinging at the IV site. — why: The dying cells release chemicals that activate pain receptors. This is the earliest warning sign — often appearing within seconds — and it means the infusion must be stopped immediately.
5. Blood vessels in the area open wide and leak fluid, making the tissue swell and turn red. — why: The body senses an injury and sends more blood to the area to try to wash the poison away. Blood vessels become leaky so immune cells can get into the tissue to start cleaning up. This is the same response you see when you get a cut or burn.

6. The swelling squeezes the vein shut, so the IV stops working and you cannot draw blood back through it anymore. — why: The tissue space does not stretch much, so when it fills with fluid, the pressure builds up and collapses the vein. This is why loss of blood return is a red flag for extravasation — it means the pressure outside the vein is higher than the pressure inside it.
7. Over hours to days, the tissue that was touched by the chemotherapy dies and turns into a black or purple wound. — why: The cells cannot recover once their DNA is damaged by the chemo. Dead tissue loses its blood supply and turns dark, then breaks down into an open sore. Anthracyclines like doxorubicin can cause tissue death that spreads deeper over weeks because the drug stays in the tissue and keeps killing cells.
8. Without treatment, the wound gets bigger, deeper, and may get infected, sometimes requiring surgery to remove dead tissue and cover the area with a skin graft. — why: Dead tissue cannot heal on its own and becomes a breeding ground for bacteria. The body walls it off with scar tissue, but the wound will not close unless the dead tissue is cut out and healthy tissue is moved in to replace it.

Spot it — what you see, and why

- Swelling at the IV site: The chemotherapy medicine leaked out of the vein into the surrounding tissue, causing fluid to collect under the skin.
- Pain or burning at the IV site: The leaked chemotherapy irritates the tissue outside the vein, triggering pain nerves because the tissue is not meant to touch these strong medicines.
- Redness around the IV site: Blood vessels in the area widen and bring more blood to the injured tissue, making the skin look red as the body tries to respond to the chemical damage.
- Skin feels tight or stretched: Fluid and swelling push against the skin from below, stretching it like a balloon being filled with water.
- The IV drip slows down or stops: When medicine leaks into tissue instead of flowing through the vein, pressure builds up and blocks the fluid from moving forward smoothly.
- No blood return when the IV is checked: The IV catheter (the tiny tube inside the vein) has slipped out of the vein or the vein has collapsed, so blood cannot flow back through the tube.

Red flags — act now

- Swelling, pain, or burning at the IV site during or right after chemotherapy
- Skin turns pale, blanched, or develops blisters near the IV
- No blood flows back when the IV line is checked

- The IV pump alarm goes off or the drip suddenly slows or stops

Treat it — in this order

1. Stop the IV infusion immediately and do not remove the needle yet → Stops more chemotherapy from leaking into the tissue. This is the single most important step because every second the IV runs, more poison goes where it should not go and kills more cells.
2. Aspirate (gently pull back) as much fluid as possible through the IV needle before removing it → Removes some of the leaked chemotherapy from the tissue before it spreads deeper. This can lower the total amount of drug sitting in the tissue and reduce the size of the injury.
3. For anthracycline extravasation: give dexrazoxane IV within 6 hours (day 1: 1000 mg/m², day 2: 1000 mg/m², day 3: 500 mg/m²) and apply cold packs for 15–20 minutes four times daily → Dexrazoxane is an antidote that stops anthracyclines (like doxorubicin) from killing more tissue by blocking the chemical reaction that damages DNA inside cells. Cold packs slow down blood flow and keep the drug from spreading. This combination reduces the risk of tissue death (necrosis) (tissue death) and the need for surgery.
4. For vinca alkaloid or taxane extravasation: inject hyaluronidase (150–900 units total, divided into 5–6 small injections around the extravasation site) and apply warm packs for 15–20 minutes four times daily → Hyaluronidase is an enzyme that breaks down hyaluronic acid, the 'glue' holding tissue together. This lets the leaked chemotherapy spread out thin over a larger area instead of staying concentrated in one deadly pocket. Warmth increases blood flow so the body can carry the drug away faster. This reduces tissue death and ulcer formation.
5. Mark the border of the swelling and redness with a pen, take a photograph, and refer to a plastic surgeon within 24 hours → The pen mark and photograph show exactly how big the injury is right now, so the medical team can see if it grows over the next few days. The plastic surgeon examines the site and decides whether dead tissue needs to be cut out (debridement) or whether a skin graft will be needed later.

Your top priorities at the bedside

1. Stop the IV infusion immediately the moment extravasation is suspected, but leave the IV needle in place — why: Stopping the infusion prevents more chemotherapy drug from leaking into the tissue and causing more cell death, but keeping the needle in lets us pull back (aspirate) the leaked drug before it spreads deeper

2. Aspirate 3 to 5 milliliters of fluid back through the IV needle using a small syringe before removing the needle — why: Pulling back removes some of the leaked chemotherapy drug from the tissue before it kills more cells, which reduces the size and depth of the wound that will form
3. Photograph the extravasation site and mark the borders of swelling or redness with a pen, then measure the area in centimeters — why: Pictures and measurements create a baseline to track whether tissue damage is spreading or shrinking over the next hours and days, which tells us if treatment is working or if we need surgical consultation