

Radiation therapy is delivered via a series of beams that are focused on the tumor and a margin of normal tissue surrounding the tumor. The radiation will cause damage to both the tumor cells and normal cells within the radiation field. Tissues outside of the radiation field are not affected. Fortunately, normal tissues have the ability to recover from the radiation damage much more effectively than can tumor cells. In addition, radiation therapy preferentially kills rapidly growing cells, and tumors are typically rapidly growing. Radiation therapy is used when the benefits of controlling the tumor significantly outweigh the risk of side effects. Every effort is made to limit the amount of normal tissues included in the radiation field, while still ensuring that the entire tumor, including microscopic extensions, is being treated.

Radiation damage can occur in any tissue. However, the more rapidly dividing and growing a tissue is, the sooner radiation damage is evident in that tissue. As a result, radiation side effects can be divided into early occurring (acute), and late occurring (chronic) side effects. Early side effects tend to be mild to moderate, and are self-limiting with simple supportive care. Chronic side effects are gradually progressive over time and usually cause minimal problems.

Early side effects start to develop after the second to third week of treatment, continue to worsen for about a week after the treatment is completed, and then steadily improve. Tissues that are affected include the skin, mucous membranes, and lining of the gastrointestinal tract.

In the skin, "radiation dermatitis" is similar to sunburn. Symptoms include hair loss, mild to moderate reddening of the skin, and dry flaking to moist oozing. Areas of the body prone to rubbing and moisture (such as skin folds between the toes, groin, armpit, and perineum, and areas around the eyes and mouth) will show side-effects a little earlier and take a little longer to heal than areas of the body that can be kept dry and free from rubbing. The single most important factor in helping radiation dermatitis to heal is preventing your dog or cat from rubbing, licking, or scratching at the treatment site. Elizabethan collars, bandages, supervised activity, and other methods are all used to keep your pet from traumatizing the affected area. Topical cleansing solution is used to keep the area clean and free of crusting. This can be applied as a flush, compress or soak. Following cleansing, a topical medication is used to prevent infection and promote healing. Pain medications are dispensed and used as needed, and oral antibiotics are prescribed when indicated. As the skin heals, it may become either under- or over-pigmented. Hair regrowth is typically sparse, soft, and white, and some areas may remain bald.

Late side effects are slowly progressive and cumulative over time and can take many months to years to become evident. These effects typically cause minimal problems, and rarely require treatment. The blood vessels and connective tissues gradually become scarred over time, resulting in stiffness, either thickening or thinning of the tissues, and a decreased ability to recover from injury. If radiated tissue sustains an injury such as a wound or fracture, it will heal more slowly than would the normal surrounding tissues. There is a small risk of developing a non-healing wound, which can be difficult to manage either conservatively or with surgical intervention. There is also a very small risk of developing a secondary cancer within the radiated tissues many years after treatment.