



### **How does radiation therapy work?**

Radiation, at levels thousands of times the amount used to produce a chest X-ray, kills cells. Both normal and cancer cells are affected, but radiation treatment is designed to maximize tumor effect and minimize normal tissue effect. Maximizing tumor effect is one reason that radiation treatments are given as a series of many small doses rather than a few large doses.

### **What are the benefits of radiation therapy and when is it used?**

Radiation therapy is used to treat localized disease. It can be used in the management of cancers that cannot be treated successfully by surgery or chemotherapy alone. Typically, it is employed following surgery when there are tumor cells remaining after excision, either because of the nature of tumor growth, or because complete surgical removal would involve a very extensive procedure involving vital structures. In some instances, radiation therapy may be employed before surgery or chemotherapy in an attempt to shrink down a tumor to a more manageable size. Radiation therapy can offer, in some instances, permanent control of a tumor.

Even when a cure is not possible, radiation therapy can still bring some relief. Shrinking a large tumor with radiation therapy may improve a pet's quality of life by reducing pressure, bleeding, or pain. This is called *palliative* treatment.

### **Are there risks involved?**

There are some risks involved with any type of cancer treatment. In addition to cancer cells, some normal cells will also be killed by the radiation. Some side effects may be apparent because of normal cells being killed (e.g. "radiation dermatitis"). Usually these side effects are outweighed by the benefits of killing cancer cells.

In addition, radiation therapy requires the animal to be perfectly still during treatment. Thus, anesthesia is necessary for each treatment. There is always a very slight risk associated with anesthesia. Although rare, these risks include allergic reaction to anesthetics, heart, lung, liver, or kidney problems, airway obstruction, and vomiting which may result in stricture or aspiration and pneumonia. These risks are potentially life threatening.

### **How is the therapy given?**

A linear accelerator directs a radiation beam toward the cancer and some normal tissues around it. The equipment is in many ways similar to equipment used for standard X-rays, except that the energy of the radiation beam is much higher and the exposure times are much longer. Sometimes CT or MRI images are used with a computerized treatment planning system to more carefully target a tumor and avoid critical normal structures near the tumor.

### **Is radiation therapy ever used in combination with chemotherapy or surgery?**

Yes. In situations where it is unlikely that any one method of cancer treatment will be effective, such as large or aggressive tumors, radiation therapy can be combined with surgery or chemotherapy. In some situations a combination of all three types of treatment may be recommended.



### **How long does the entire treatment last, and what is the treatment schedule?**

Radiation therapy is given in a series of treatments that encompass several weeks. This schedule helps protect normal tissue by spreading out the total dose of radiation. The treatment area is designed to include all of the cancer and as little normal tissue as possible. The total dose used and the number of treatments depends on many factors. These factors include the size and location of the cancer (i.e. which normal tissues will be within the treatment area), the general health of your pet, and the type of cancer present. The most important consideration is the total amount of radiation that can be administered to a patient without compromising the ability of healthy tissue to heal. The treatment area will be marked with ink to enable the treatment to be directed to the same area every time. Please maintain the marks as directed.

At Ryan Veterinary Hospital, most patients receive treatments on a Monday-Friday schedule for a total of 16-21 treatments over a course of approximately 1 month. There are some exceptions to this generalization, which will be discussed with you if it applies to your pet. Weekends are reserved as a rest period during which normal tissues have an opportunity to recover from the treatment. At times, more extensive rest periods are required. Patients may stay in the hospital from Monday through Friday, or come in for each treatment. Outpatient treatments take approximately 2 hours. Because of the anesthesia required, outpatients should not be feed after 8pm the night before treatments, but water may be provided throughout the night. Pets may be sleepy for several hours following each treatment.

### **What are the side effects of treatment?**

During treatment the oncologist will monitor the effect of the radiation on the cancer as well as on normal tissue. Most side effects that occur during radiation therapy, although unpleasant, are usually not serious, and are almost always limited to the area being treated. Many animals develop skin changes in the area being treated. A redness of the skin may develop near the end of, or after, radiation therapy. This may progress to a dry or moist skin reaction, which resembles a severe sunburn or blistering rash. This "radiation dermatitis" may cause your pet to rub or scratch, but it is important you try to keep your pet from doing this. Your veterinarian may prescribe medication and/or physical means to prevent rubbing and scratching. Hair loss in the treated area is common and may persist for some time, but regrowth occurs in many patients. The color of the regrowing hair and skin in the treated area are likely to change.

It is unusual for animals to become nauseated and have vomiting/diarrhea as a result of radiation therapy. This will usually only occur if large portions of the abdomen are irradiated. Side effects involving other tissues that may be within the radiation treatment area (such as the eye, mucous membranes, and bone) will be discussed with you on an individual basis. The time from first appearance of acute side effects (i.e. those that happen in the immediate treatment period) until their resolution is usually 3-4 weeks. Chronic side effects, when they occur, develop gradually over months to years. This includes fibrosis (scar tissue formation) and decreased ability to heal a wound or bone fracture. There is also a very small risk of a secondary cancer within the radiation site many years after treatment is administered.

### **What happens after the treatment is over?**

It is important for your veterinarian to examine your pet periodically after radiation therapy. This will allow normal tissue side effects to be monitored, and the effect of the radiation on the tumor to be evaluated. Specific follow-up schedules vary with each patient, but always include a visit 2-4 weeks after the completion of radiation. It is the goal of radiation therapy to completely eradicate the cancer. In some pets this happens and no evidence of the tumor persists. In other pets the tumor may never completely disappear, but growth is stopped and the tumor is essentially controlled. The specific results to be expected depend on many factors. Details on the likelihood of success will be provided to you on an individual basis by the oncology service.