

# Advances in Veterinary Radiation Therapy



## Targeting Tumors and Improving Patient Comfort

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### KEYWORDS

- Veterinary radiation therapy • Intensity-modulated radiation therapy
- Stereotactic radiation therapy • Image-guided radiation therapy

### KEY POINTS

- Newer technology, such as intensity-modulated radiation therapy (IMRT), can dramatically decrease acute radiation side effects, making patients much more comfortable during and after treatment.
- Stereotactic radiation therapy (SRT) for definitive treatment can be delivered in 1 to 5 fractions, with minimal radiation-associated effects.
- Image-guided radiation therapy can be used to direct treatment in locations previously not amenable to radiation therapy.
- Traditional fractionated radiation therapy remains the most commonly available type of radiation therapy in veterinary medicine and is the standard of care for many tumors. Improved pain management plans help improve patient comfort.

### INTRODUCTION

A remarkable transformation has occurred over the past 20 years in the management of human cancers (**Fig. 1**). The ability to diagnose, stage, and monitor disease has been enhanced by advances in imaging, including positron emission tomography-computed tomography (PET-CT). Advances in radiation planning and dose delivery, including intensity-modulated radiation therapy (IMRT), allows dose to be “painted” onto the tumor while sparing surrounding normal tissues. IMRT has improved tumor control for many types of cancer in people, including prostate cancer and head and neck cancers, while vastly decreasing radiation-associated side effects. Stereotactic radiation therapy (SRT), which can be delivered via gamma knife, cyber knife, or linear

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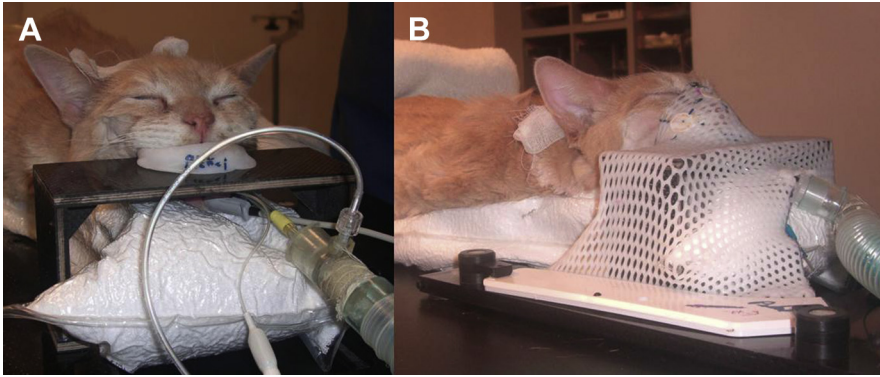
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**Fig. 1.** (A) Cat positioned with a vacu-lock pillow and bite block that is pegged into a carbon fiber platform that is indexed to the CT and radiation therapy couches. (B) An acrylic face mask is secured over the face and platform.

accelerators with image guidance, has surged into cancer care. Definitive treatment with SRT can be delivered in 1 to 5 treatments for some types of cancers. Now these technologies are available in veterinary medicine. This article discusses the role of these advancements in the treatment of veterinary patients with cancer and reviews more traditional radiation treatment.

#### **RADIATION ONCOLOGY IN VETERINARY MEDICINE: PAST TO PRESENT**

Life expectancy for pet animals has increased, and cancer is primarily a disease of aging populations. As such, the prevalence of cancer in pet animals is increasing, and cancer is thought to be the leading cause of death in older dogs. With the increased interest from clients and veterinarians in the diagnosis and treatment of pet animals with cancer, veterinary oncology has become a vital discipline. Stephen Withrow and other early oncologists were instrumental in changing prevailing attitudes about treating pets with cancer.<sup>1</sup> Veterinary medical oncology was conferred specialty status within the American College of Veterinary Internal medicine in 1988, and there are currently more than 370 diplomates, who are trained in the diagnosis, staging, and management of cancer, including chemotherapy treatment. Oncologic surgery is now a recognized subspecialty in the American College of Veterinary Surgeons, requiring an additional year of fellowship training directed specifically at cancer treatment. In 1994, veterinary radiation oncology was recognized as a specialty within the American College of Veterinary Radiology. Currently there are more than 90 board-certified radiation oncologists, and more than 60 facilities in the United States and Canada. Radiation oncology also is available in Europe, Asia, and South America. Integration of surgical oncology, medical oncology, and radiation oncology provides optimal treatment outcome, regardless of species.

Surprisingly, despite limited availability, radiation therapy was the first commonly reported therapy for animal patients with cancer. Reports describing the treatment of canine cancers were published soon after the discovery of radiation by Roentgen.<sup>2,3</sup> Alois Pommer, a veterinarian from Austria, investigated normal tissue responses in the 1930s, and then reported outcomes from systematic treatment of more than 1000 animals.<sup>4,5</sup> His publications were outcome based and provided information regarding tumor control and adverse radiation effects. He developed the first commonly used veterinary protocol, 4 Gy delivered on Monday, Wednesday, and

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