

State of the Art Veterinary Oncology

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VOLUME 37 • NUMBER 6 • NOVEMBER 2007

Preface

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Ruthanne Chun

Communicating with Oncology Clients

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Ruthanne Chun and Laura D. Garrett

Empathic, honest, and consistent communications that establish realistic goals and focus on quality of life (during and after therapy) for pets with cancer provide the basis of an excellent client-veterinarian relationship. From this foundation, a client can team up with his or her veterinarian to make the best possible decisions for the pet and for himself or herself regarding care for the companion animal.

Comparative Oncology Today

1023

Melissa C. Paoloni and Chand Khanna

The value of comparative oncology has been increasingly recognized in the field of cancer research, including the identification of cancer-associated genes; the study of environmental risk factors, tumor biology, and progression; and, perhaps most importantly, the evaluation of novel cancer therapeutics. The fruits of this effort are expected to be the creation of better and more specific drugs to benefit veterinary and human patients who have cancer. The state of the comparative oncology field is outlined in this article, with an emphasis on cancer in dogs.

Cancer Clinical Trials: Development and Implementation

1033

David M. Vail

Although much of the current standard of care in veterinary oncology is based on retrospective studies or transference from the human literature, a new era of clinical trial awareness brought on by new consortia and cooperative investigative groups is beginning to change this limitation. The use of controlled, randomized, blind multicenter trials testing new cytotoxics and cytostatic agents is now becoming the norm rather than the exception. Ultimately, advanced clinical trial design applied to companion animal populations should advance veterinary-based practice and inform future human clinical trials that may follow.

Advanced Imaging for Veterinary Cancer Patients

1059

Amy K. LeBlanc and Gregory B. Daniel

This article presents an update on the recent advances made in veterinary advanced imaging specifically with regard to cross-sectional

modalities (CT and MRI) and nuclear medicine (positron emission tomography [PET] and PET/CT). A brief summary of technical improvements and a review of recent literature are included to provide an overview of the progress made in this important element of the practicing veterinary oncologist's repertoire. An in-depth summary of PET is also included to introduce the technical aspects and potential clinical and research applications of this novel imaging modality in veterinary medicine.

Chemotherapy: New Uses for Old Drugs

1079

Anthony J. Mutsaers

Using chemotherapy drugs as antiangiogenic agents is a new use for drugs that have been around for a long time. The favorable toxicity profile and reduced cost make low-dose continuous "metronomic" chemotherapy trials appealing, but there is still much to be learned. Challenges ahead include determination of the optimal tumor types, drugs, doses, schedules, and response monitoring (end points). The measurement of angiogenic growth factors and inhibitors and of circulating endothelial progenitor cells or their precursors represents promising strategies in these areas.

The Role of Bisphosphonates in the Management of Patients That Have Cancer

1091

Timothy M. Fan

Bisphosphonates are pharmacologic agents widely used in people for managing pathologic bone resorptive conditions. Based on their physicochemical properties, bisphosphonates concentrate within areas of active bone remodeling and induce osteoclast apoptosis. Appropriate use of bisphosphonates for treating companion animals requires a thorough understanding of how bisphosphonates exert their biologic effects. This review article highlights general properties of bisphosphonates, including their pharmacology, mechanisms of action, adverse side effects, anticancer mechanisms, surrogate markers for assessing response, and potential clinical utility for treating dogs and cats diagnosed with malignant skeletal tumors.

Anticancer Vaccines

1111

Philip J. Bergman

With the tools of molecular biology and a greater understanding of mechanisms to harness the immune system, effective tumor immunotherapy is becoming a reality. This new class of therapeutics offers a more targeted, and therefore precise, approach to the treatment of cancer. The recent conditional licensure of a xenogeneic DNA vaccine for advanced canine malignant melanoma strongly suggests that immunotherapy can play an

extremely important role alongside the classic cancer treatment triad components of surgery, radiation therapy, and chemotherapy.

The Role of Small Molecule Inhibitors for Veterinary Patients

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Cheryl A. London

Advances in molecular biology over the past several years have permitted a much more detailed understanding of cellular dysfunction at the biochemical level in cancer cells. This has resulted in the identification of novel targets for therapeutic intervention, including proteins that regulate signal transduction, gene expression, and protein turnover. In many instances, small molecules are used to disrupt the function of these targets, often through competitive inhibition of ATP binding or the prevention of necessary protein-protein interactions. Future challenges lie in identifying appropriate targets for intervention and combining small molecule inhibitors with standard treatment modalities, such as radiation therapy and chemotherapy.

Cancer Immunotherapy for the Veterinary Patient

1137

Barbara J. Biller

The ability of the immune system to protect against tumor development and to attack malignant cells once they arise has been recognized for more than 50 years. Since this time, our understanding of the complex relation between the immune system and the development of cancer has increased dramatically, largely because of improvements in the tools used to study tumor immunology at the molecular level. These advances are leading to the development of increasingly sophisticated and effective immunotherapeutics for human and veterinary oncology patients; indeed, some forms of immunotherapy already have a place alongside more conventional treatment modalities, such as surgery, radiation therapy, and chemotherapy.

Intensity-Modulated Radiation Therapy and Helical Tomotherapy: Its Origin, Benefits, and Potential Applications in Veterinary Medicine

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Jessica A. Lawrence and Lisa J. Forrest

Intensity-modulated radiation therapy (IMRT), especially image-guided IMRT as represented by helical tomotherapy, is a novel approach to therapy and is rapidly evolving. Both of these forms of therapy aim to allow targeted radiation delivery to the tumor volume while minimizing dose to the surrounding normal tissues. Adaptive radiation therapy and conformal avoidance are possible with intensity-modulated therapy and helical tomotherapy, which offer opportunities for improved local tumor control, decreased normal tissue toxicity, and improved survival and quality

of life. Human and veterinary patients are likely to benefit from the continued development of this radiation delivery technique, and data over the next several years should be crucial in determining its true benefit.

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