Received: 31 May 2023 | Revised: 19 July 2023 | Accepted: 27 July 2023

DOI: 10.1111/vru.13291

ACVR CONSENSUS STATEMENT

WILEY

ACVR and ECVDI consensus statement: Reporting elements for toxicity criteria of the veterinary radiation therapy oncology group v2.0

Valerie J. Poirier[1] | Michele Keyerleber[2] | Ira K. Gordon[3] | Michelle M. Turek[4] | Michael S. Kent[5] | Ellison Bentley[4] | Jessica Lawrence[6]

[1]Department of Clinical Studies, Ontario Veterinary College, University of Guelph, Guelph, Canada

[2]Department of Clinical Sciences, Tufts University Cummings School of Veterinary, North Grafton, Massachusetts, USA

[3]The Oncology Service, Springfield, Illinois, USA

[4]Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin-Madison, Madison, Wisconsin, USA

[5]Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California, Davis, California, USA

[6]Department of Veterinary Clinical Sciences, College of Veterinary Medicine, University of Minnesota, St. Paul, Minnesota, USA

Correspondence
Valerie J. Poirier, Animal Cancer Centre, Ontario Veterinary College, University of Guelph, Guelph, Ontario, ON N1G 2W1, Canada.
Email: vpoirier@uoguelph.ca

Abstract

The toxicity criteria of the veterinary radiation therapy oncology group (VRTOG) version 2 guidelines are a substantial update to reflect significant advances in radiation oncology over the last three decades. Radiation therapy techniques provide precise and spatially accurate radiation delivery, which facilitates treating tumors in more anatomic locations and incorporating hypofractionated protocols. The purpose of this update is to aid radiation oncology teams in capturing and grading clinically relevant data that impacts the decision-making process in everyday practice and the assessment of clinical trials involving radiation therapy. A dedicated committee initially updated the criteria to include more anatomical sites and grades to characterize a broad spectrum of possible radiation-induced acute and late tissue changes. Through the revision process, which solicited and incorporated feedback from all radiation oncologists within the American College of Veterinary Radiology (ACVR) and specialists outside the ACVR, the authors endeavored to create a grading structure reflective of clinical decision-making in daily radiation oncology. The updated VRTOG v2 toxicity criteria guideline complements the updated Veterinary Cooperative Oncology Group-Common Terminology Criteria for Adverse Events (VCOG-CTCAE v2) guidelines. Because radiation oncology continues to progress rapidly, the VRTOG toxicity criteria should be regularly updated as adverse event data that will be collected following this update further informs the practice of radiation oncology.

KEYWORDS
acute toxicity, delayed toxicity, radiation

1 | INTRODUCTION

The original veterinary radiation therapy oncology group (VRTOG) radiation toxicity criteria were first published in 2002.[1] Advances in radiation therapy techniques provide precise and spatially accurate

Abbreviations: ACVR, American College of Veterinary Radiology; ECVDI, European College of Veterinary Diagnostic Imaging; VCOG-CTCAE v2, Veterinary Cooperative Oncology Group-Common Terminology Criteria for Adverse Events; VRTOG, veterinary radiation therapy oncology group.

treatment to allow for the treatment of tumors in more anatomic locations. It is necessary to update the VRTOG toxicity criteria to reflect the potential adverse events that could arise during and following treatment. The American College of Veterinary Radiology (ACVR) Radiation Oncology discipline has consequently updated toxicity guidelines in this VRTOG v 2.0 Radiation Morbidity Scoring Scheme (Tables 1 and 2). The radiation oncology group tasked with this update consulted with additional co-authors to expand and refine the adverse event categories. This update serves to complement the recently updated Veterinary Cooperative Oncology Group-Common Terminology Criteria for Adverse Events (VCOG-CTCAE v2).[2] The rationale for this updated version is to improve the identification and reporting of radiation adverse events and to apply more clinical significance to the descriptions of grade since clinical decisions may be based on the assignment of grade. As such, this is designed for daily application. Not all pathologic abnormalities may be captured in this grading scheme and any adverse events falling outside the categories here should be reported separately. We support routine updates to the toxicity criteria as the discipline of veterinary radiation oncology continues to evolve.

The grading scheme is based on generalized criteria applied to each organ or tissue system intended to aid in easy clinical applicability.

Grade 1	Incidental finding on physical examination, laboratory test, imaging, or histopathology
Grade 2	Intermittent clinical signs with minimal impact on daily activities
Grade 3	Medically significant changes that moderately impact daily activities
Grade 4	Changes that markedly impact quality of life, lead to marked clinical signs, or require hospitalization or surgical intervention
Grade 5	Toxicity resulting in death or euthanasia

1.1 | Definitions

A semicolon indicates "or" within the description of the grade.

Subclinical indicates that clinical signs are not present despite an abnormal finding.

Incidental indicates a finding of minor consequence to the patient.

Acute radiation effects occur during or within 3 months of completion of radiation therapy.

Late radiation effects are complications that arise or persist more than 3 months after the completion of radiation therapy. Clinicians and investigators may continue to use the term consequential late toxicity to represent poorly healed or non-healed severe acute effects that persist after 3 months, as this falls within the late adverse event category.

1.2 | Adverse event attribution

In many instances, there may be several potential causes for adverse events, including the use of anesthesia, concurrent systemic therapy (e.g., concurrent chemotherapy, targeted therapy, medications), pre-existing conditions, and other interventions or life events (e.g., accidents). Therefore, each adverse event should be assigned an attribution, either to radiation therapy or to another event. The attribution is adapted from the CTCAE for human use.[3]

1.3 | Attribution standards are divided into five categories

Attribution categories have been selected to correspond to attribution standards outlined in VCOG-CTCAE v2 to improve consistency across veterinary oncology disciplines.[2]

Unrelated	The toxicity is *clearly not related* to radiation therapy
Unlikely	The toxicity is *doubtfully related* to radiation therapy
Possible	The toxicity *may be related* to radiation therapy
Probable	The toxicity is *likely related* to radiation therapy
Definite	The toxicity is *clearly related* to radiation therapy

1.4 | Further comments

If the animal presents with descriptors matching several grades, the highest grade should be assigned to the adverse event category for reporting.

Please note that, contrary to VCOG-CTCAE v2, a comma between clinical signs or toxicities within a grade does not always imply "and" and may mean "or". There are no categories that require that all items separated by a comma are necessary to establish that grade level.

For any toxicity related to the hematology, endocrinology, or hepatic system, the VCOG-CTCAE v2 should be used.[2]

Pets may present with co-morbidities or develop co-morbidities or clinical signs secondary to underlying tumors during and/or following radiation treatments. It may be difficult to distinguish radiation adverse events from clinical signs associated with the underlying tumor or co-morbidities. It is important to evaluate pets in light of their co-morbidities and apply attribution where possible so that future adverse event criteria may build upon potential distinguishing features.

2 | DISCUSSION

The updated descriptive grading scheme presented here represents a substantial change from the previously published version[1] to reflect the marked advances in veterinary radiation oncology over the past several decades. The purpose of these guidelines for adverse event reporting is to aid clinicians and radiation oncology teams in capturing clinically relevant data in a standardized format that may be used to shape decision-making in everyday practice and to inform therapeutic trial design and assessment. During the revision process, we sought to ensure the grading scheme adequately reflected

TABLE 1 VRTOG v2.0 Acute Radiation Morbidity Scoring Scheme.

Organ/tissue	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Pain	Mild pain not altering daily activities	Pain intermittently altering daily activities	Pain persistently altering daily activities	Pain requiring hospitalization or invasive intervention	Toxicity resulting in death or euthanasia
Skin	Erythema; alopecia; dry desquamation	Focal edema or moist desquamation affecting ≤ 50% of treated area	Edema or moist desquamation affecting >50% of treated area	Ulceration; bleeding caused by normal activity; necrosis; purulent discharge within the treated area; edema extending beyond the treated area	Toxicity resulting in death or euthanasia
Mucous membrane	Oral: Erythema; halitosis; thickened saliva Anal: Erythema Vaginal/penile: Erythema	Oral: Patchy mucositis ≤50% of treated area with normal ability to eat and drink Anal: Discomfort upon defecation with normal stool; patchy mucositis ≤50% of treated area Vaginal/penile: Discomfort upon urination; patchy mucositis ≤50% of treated area	Oral: Edema or mucositis affecting >50% of treated area; fibrinous, serohemorrhagic, or mucopurulent discharge; altered ability to eat or drink Anal: Edema or mucositis affecting >50% of treated area; anal sac infection; moderate discomfort or difficulty defecating, requiring dietary or medical intervention Vaginal/penile: Edema or mucositis affecting > 50% of treated area; fibrinous, serohemorrhagic, or mucopurulent discharge	Oral: Ulceration; persistent bleeding; necrosis; fistula; or any toxicity necessitating feeding tube placement Anal: Fecal incontinence; ulceration; non-traumatic bleeding; necrosis; fistula Vaginal/penile: Ulceration; persistent bleeding; necrosis; fistula	Toxicity resulting in death or euthanasia
Brain	Mild or subjective lethargy; cognitive or behavioral changes without other neurologic deficit(s); incidental imaging or post-mortem changes	Progressive or new neurologic deficit(s), seizures, or dull mentation with no change to daily activities	Progressive or new neurologic deficit(s), seizures, or obtunded mentation, significantly interfering with daily activities	Progressive or new neurologic deficit(s), seizures, or coma, requiring hospitalization, surgical intervention, or intensive nursing care	Toxicity resulting in death or euthanasia
Eye	Conjunctiva: Mild hyperemia (easily identifiable vessels, not readily apparent without illumination) Discharge: Mild clear to gray mucoid limited to medial canthus Lacrimal: Mild quantitative or qualitative tear film abnormalities	Conjunctiva: Moderate hyperemia (easily identifiable injected vessels) Discharge: Moderate mucoid to mucopurulent, extending past medial canthus Cornea: Neovascularization ≤25% of surface Lacrimal: Decreased tear production or qualitative tear abnormalities treated only with lubricant No blepharospasm	Conjunctiva: Severe hyperemia (can no longer identify individual vessels) Cornea: Nonsevere keratitis, fluorescein positive without infiltrate or infection (no creamy to yellow opacity); no stromal loss (no depth to ulcer, no divots); neovascularization covering ≤50% of surface Lacrimal: Decreased tear production or qualitative tear abnormalities treated with tear stimulant therapy Blepharospasm, intermittent or continuous	Cornea: Severe keratitis, fluorescein positive with infiltrate or infection (creamy to yellow opacity); stromal loss (divot) with associated uveitis; neovascularization covering >50% of surface Lacrimal: Schirmer tear test of 0; nonresponsive to tear stimulant therapy Any ocular condition requiring enucleation or other surgery	Toxicity resulting in death or euthanasia

(Continues)

TABLE 1 (Continued)

Organ/tissue	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Ear	Erythema; dry desquamation; incidental changes	Patchy moist desquamation; otitis externa or media; pruritus, head shaking or scratching; no overt change to hearing	Confluent moist desquamation; purulent discharge; narrowed ear canal, requiring non-invasive intervention; head tilt not limiting daily activities; partial hearing loss	Necrosis or otitis requiring invasive intervention; development of neurological changes (head tilt, nystagmus, ataxia, cranial nerve deficits) affecting daily activities; other consequences requiring hospitalization; deafness	Toxicity resulting in death or euthanasia
Larynx and trachea	Erythema; intermittent change in voice, bark or purr; cough on tracheal palpation	Patchy mucositis; focal edema; intermittent cough or stridor; loss of voice, bark, or purr	Confluent mucositis; edema; frequent cough or altered breathing pattern affecting daily activities	Perforation; hemoptysis; necrosis; any airway compromise requiring hospitalization, surgical, or interventional procedure	Toxicity resulting in death or euthanasia
Lung	Incidental radiographic evidence of pneumonitis; rare cough	Mild symptomatic pneumonitis; intermittent cough with no change to daily activities	Moderate symptomatic pneumonitis; persistent cough; increased respiratory rate at rest; mild or moderate exercise intolerance	Severe symptomatic pneumonitis; refractory cough; dyspnea; severe exercise intolerance; oxygen supplementation required	Toxicity resulting in death or euthanasia
Heart	Subclinical ECG abnormalities different from pretreatment	Progressive or different ECG abnormalities that require new or changes to medications; pericardial change with minimal fluid accumulation	Symptomatic cardiac changes leading to exercise intolerance or weakness; measured decreased cardiac function; pericardial effusion requiring infrequent pericardiocentesis	Syncope; congestive heart failure; symptomatic pericardial effusion requiring frequent pericardiocentesis or surgery	Toxicity resulting in death or euthanasia
Pharynx and esophagus	Mild ptyalism with no clinical impact; incidental changes	Dysphagia without decrease in volume consumed; rare regurgitation; moderate to marked ptyalism	Persistent dysphagia or regurgitation	Severe dysphagia; esophageal necrosis or perforation; regurgitation or other systemic impact requiring hospitalization, blood transfusion, surgery, or interventional therapy	Toxicity resulting in death or euthanasia
Stomach and small intestines	Occasional soft stool not altering daily activities; incidental changes	Hyporexia; occasional vomiting; persistent soft stool or intermittent diarrhea	Persistent anorexia, vomiting, diarrhea, or melena	Severe GI bleeding, necrosis, perforation, vomiting, diarrhea, or other systemic impact requiring hospitalization, blood transfusion, surgery, or interventional therapy	Toxicity resulting in death or euthanasia
Colon and rectum	Occasional soft stool not altering daily activities	Intermittent diarrhea or tenesmus; intermittent mucous or frank blood in stool	Persistent or progressive diarrhea or tenesmus; hemorrhagic colitis not requiring hospitalization; occasional fecal incontinence	Severe GI bleeding, fistula, necrosis, perforation, diarrhea, or other systemic impact requiring hospitalization, blood transfusion, or surgery; complete fecal incontinence	Toxicity resulting in death or euthanasia
Ureter, urinary bladder, and urethra	Pollakiuria <2× baseline; microscopic hematuria or pyuria	Pollakiuria 2–4× baseline; dysuria	Pollakiuria >4× baseline; macroscopic hematuria; urinary accidents in the home; excessive time to urinate	Hematuria with clots; acute urinary obstruction; necrosis; perforation	Toxicity resulting in death or euthanasia
Weight loss	5% to <10% from baseline	10% to <15% from baseline	15% to <20% from baseline	≥20% from baseline	Toxicity resulting in death or euthanasia

TABLE 2 VRTOG v2.0 Late Radiation Morbidity Scoring Scheme.

Organ/tissue	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Pain	Mild pain not altering daily activities	Pain intermittently altering daily activities	Pain persistently altering daily activities	Pain requiring hospitalization or invasive intervention	Toxicity resulting in death or euthanasia
Skin	Pigment change; alopecia; hypotrichia; leukotrichia	Fibrosis without impact on function	Fibrosis impacting function; contracture; non-healing ulceration	Necrosis; any toxicity requiring surgical intervention	Toxicity resulting in death or euthanasia
Brain	Mild or subjective lethargy; cognitive or behavioral changes without change to the neurologic exam; incidental imaging or postmortem changes	Progressive or new neurologic deficit(s), seizures, or dull mentation, not interfering with daily activities	Progressive or new neurologic deficit(s), seizures, or obtunded mentation, interfering with daily activities	Brain necrosis, infarction, progressive or new neurologic deficit(s), seizures, or coma, requiring hospitalization, surgical intervention, or intensive nursing care	Toxicity resulting in death or euthanasia
Spinal cord	Subclinical proprioceptive deficits or atrophy	Muscle weakness, atrophy, proprioceptive deficits, or ataxia, not interfering with daily activities	Ataxia or paresis interfering with daily activities or requiring intermittent assistance; intermittent incontinence	Dysfunction requiring continuous care, including severe paresis or plegia, complete incontinence, or sensory deficits leading to self-injury	Toxicity resulting in death or euthanasia
Nerve	Subclinical nerve change or dysfunction	Overt nerve dysfunction not interfering with daily activities	Nerve dysfunction interfering with daily activities or requiring intermittent assistance	Nerve dysfunction requiring continuous care or surgical intervention	Toxicity resulting in death or euthanasia
Muscle and bone	Subclinical changes including focal exostosis, osteopenia, or fibrosis	Intermittent muscular spasm, lameness, bone lysis not interfering with daily activities	Persistent lameness, fibrosis, muscle spasm, or bone lysis interfering with daily activities	Pathologic fracture, necrosis, or non-weight bearing lameness; any complication requiring surgical intervention	Toxicity resulting in death or euthanasia

(Continues)

TABLE 2 (Continued)

Organ/tissue	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Eye	Conjunctiva: Mild hyperemia (easily identifiable vessels, not readily apparent without illumination) Discharge: Mild clear to gray mucoid from medial canthus Cornea: Corneal scarring and/or pigmentation that does not impair vision (menace response present) with <25% of cornea involved Lens: Incomplete cataract (<25% of lens affected) where eye retains vision with menace response present) Retina: Pinpoint (<5 lesions) hemorrhages where the eye retains vision Lacrimal: Mild quantitative or qualitative tear film abnormalities	Conjunctiva: Moderate hyperemia (easily identifiable injected vessels) Discharge: Moderate mucoid to mucopurulent extending past medial canthus Cornea: Neovascularization of ≤25% of surface; corneal scarring and/or pigmentation that does not impair vision with menace response present, and 25%–50% of cornea involved Lens: Incomplete cataract (25%–50% of lens) where eye retains vision with menace response present Retina: Hemorrhages either pinpoint (>5 lesions) or larger lesions that are smaller than one optic disc diameter and that involve <50% of retina where eye retains vision (menace response present) Lacrimal: Decreased tear production or qualitative tear abnormalities treated only with lubricant	Conjunctiva: Severe hyperemia (can no longer identify individual vessels) Cornea: Nonsevere keratitis (fluorescein positive, no infiltrate/infection [no creamy to yellow opacity]), no stromal loss (no depth to ulcer, no divots); neovascularization covering >25%–≤50% of surface; corneal scarring and/or pigmentation covering 50%–75% of cornea Lens: Incomplete cataract (>50%–≤90% of lens) where eye retains vision with menace response present; lens-induced uveitis may be present but responds to treatment Retina: Hemorrhages that are greater than one optic disk diameter and involve ≥50% of retina where eye retains vision and menace response present Glaucoma (eye pressure >25 mmHg with associated optic nerve and retinal changes) controllable with medications or the first time it is noted where eye retains vision Lacrimal: decreased tear production or qualitative tear abnormalities treated with tear stimulant therapy Blepharospasm, intermittent or continuous	Cornea: Severe keratitis, fluorescein positive with infiltrate or infection (creamy to yellow opacity); stromal loss (divot) with associated uveitis; neovascularization covering >50% of surface; corneal scarring and/or pigmentation that prevents vision with absent menace response or covers ≥75% of the cornea; corneal rupture Lens: Cataract affecting 90%–100% lens leading to loss of vision with absent menace response Retina: Hemorrhages that involve ≥ 50% of retina and/or blood in vitreous and/or retinal detachment and/or loss of vision with absent menace response Glaucoma (eye pressure >25 mmHg with associated optic nerve and retinal changes) refractory to treatment or eye loses vision with absent menace response Phthisis bulbi (shrunken eye) Lacrimal: Schirmer tear test (STT) of 0 or nonresponsive to tear stimulant therapy Surgical intervention for any ocular disease, including enucleation	Toxicity resulting in death or euthanasia
Ear	Subclinical erythema, fibrosis, or other changes	Intermittent clinical otitis; stenotic but nonocclusive changes to the external ear canal	Persistent clinical otitis; neurological changes not interfering with daily activities; partial hearing loss	Complete stenosis; necrosis; osteomyelitis; meningitis; neurological changes (head tilt, nystagmus, ataxia, nerve deficits) requiring chronic intervention or interfering with daily activities; deafness; any change requiring invasive intervention	Toxicity resulting in death or euthanasia
Nose and sinus	Planum: Depigmentation, dryness, or thickening Sinonasal cavity: Intermittent or continuous serous discharge; mild congestion; occasional sneezing	Planum: Nonobstructive crusting, not requiring removal Sinonasal cavity: Rare epistaxis; intermittent non-serous discharge; subclinical fistula	Planum: Obstructive crusting impacting daily activity; nonhealing superficial ulceration Sinonasal cavity: Epistaxis, sneezing, or continuous non-serous discharge interfering with daily activities; clinical fistula	Planum: Necrosis; deep ulceration Sinonasal cavity: Severe epistaxis, necrosis, fistula, or infection requiring invasive treatment (beyond flushing or suction), surgery, or transfusion	Toxicity resulting in death or euthanasia

(Continues)

TABLE 2 (Continued)

Organ/tissue	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Larynx and trachea	Cough on tracheal palpation; Intermittent change in voice, bark, or purr; any incidental findings	Laryngeal dysfunction, cough, stridor, or tracheal collapse not interfering with daily activities; persistent change in voice, bark, or purr	Laryngeal dysfunction, cough, stridor interfering with daily activities; complete loss of voice, bark or purr	Perforation; hemoptysis; necrosis; any airway compromise requiring hospitalization, surgical, or interventional procedure	Toxicity resulting in death or euthanasia
Lung	Incidental radiographic changes; rare cough	Intermittent cough not interfering with daily activities	Tachypnea at rest; mild or moderate exercise intolerance; persistent cough	Dyspnea; marked exercise intolerance; refractory cough; oxygen supplementation required	Toxicity resulting in death or euthanasia
Heart	Subclinical ECG abnormalities	ECG abnormalities that require medications; mild pericardial fibrosis or effusion not requiring intervention	Exercise intolerance or weakness; decreased cardiac function; pericardial effusion requiring infrequent pericardiocentesis	Refractory dysrhythmia; pericardial effusion or tamponade requiring frequent pericardiocentesis or surgery; syncope; congestive heart failure	Toxicity resulting in death or euthanasia
Oral cavity	Change in pigmentation or appearance of mucosa	Dry mouth or fibrosis not interfering with function	Ulceration without bone exposure; subclinical fistula; dry mouth or fibrosis interfering with function	Necrosis; bone exposure; clinical fistula; any toxicity requiring nutritional support or surgery	Toxicity resulting in death or euthanasia
Pharynx and Esophagus	Subclinical fibrosis, stricture, or inflammation	Dysphagia without decrease in volume consumed or weight loss; occasional regurgitation	Persistent dysphagia or regurgitation interfering with daily activities	Stricture, fistula, necrosis, perforation, severe dysphagia, regurgitation, or pain requiring hospitalization, surgery, or interventional therapy	Toxicity resulting in death or euthanasia
Stomach and small intestines	Occasional soft stool; subclinical fibrosis, stricture, or inflammation	Occasional hyporexia or vomiting; persistent soft stool or intermittent diarrhea	Persistent anorexia, vomiting, diarrhea, or melena	Stricture, fistula, necrosis, perforation, vomiting, diarrhea, hematemesis, or melena requiring hospitalization, surgery, or interventional therapy	Toxicity resulting in death or euthanasia
Colon, anus, and rectum	Change in pigmentation or appearance of mucosa; soft stool or subclinical stricture not interfering with daily activities	Intermittent diarrhea or tenesmus; intermittent mucous or frank blood in stool	Subclinical ulceration or fistula; persistent diarrhea or tenesmus; occasional fecal incontinence; clinical stricture	Stricture, clinical fistula, necrosis, perforation, or diarrhea requiring hospitalization, surgery, or other medical procedure; complete fecal incontinence	Toxicity resulting in death or euthanasia
Kidney	IRIS stage 1[4], incidental changes	IRIS stage 2[4]	IRIS stage 3[4]	IRIS stage 4[4]	Toxicity resulting in death or euthanasia
Ureter, bladder, and urethra	Microscopic hematuria; subclinical pyuria	Ureteral narrowing without hydronephrosis, chronic pollakiuria, or stranguria; intermittent macroscopic hematuria; intermittent urinary incontinence; subclinical urethral stricture	Ureteral narrowing or stricture with hydronephrosis; persistent hematuria; persistent urinary incontinence; clinical urethral stricture; excessive time to urinate	Ureteral obstruction requiring intervention; hematuria requiring transfusion; urinary incontinence refractory to medical therapy; bladder necrosis; uroperitoneum; urethral stricture or obstruction requiring intervention	Toxicity resulting in death or euthanasia
Vagina and penis	Change in pigmentation or appearance of mucosa	Intermittent stranguria	Subclinical fistula or ulcer; persistent stranguria or dysuria	Necrosis; clinical fistula or ulcer; fibrosis or stricture requiring medical or surgical intervention	Toxicity resulting in death or euthanasia

Preamble

Consensus Statements of the American College of Veterinary Radiology (ACVR) and European College of Veterinary Diagnostic Imaging (ECVDI) establish position statements and other communications related to the practice of diagnostic imaging and radiation oncology. Best practices for medical physics, DICOM standards, and related equipment guidelines may also be communicated in the form of consensus statements. Consensus statement topics provide veterinarians with imaging guidelines, appropriate use criteria, selection, acquisition, and documentation of diagnostic imaging studies, interventional imaging procedures, and radiation therapy for veterinary patients. The ACVR supports collaboration with other veterinary specialties for the formation of consensus statements to improve overall delivery of care for veterinary patients. Evidence-based medicine is the foundation of Consensus Statements and Communications. If the evidence is conflicting or lacking beyond the scope of current information available in the veterinary literature, the ACVR recommendations are based upon the experience and best judgment from leaders in the field. Consensus Statement Communications are intended as a guideline toward establishing standard of care with respect to the use of imaging modalities and the practice of radiation oncology. Consensus statements are not intended as a substitute for clinical judgment.

the need for clinical intervention. Because there are few standards for clinical practice, the committee acknowledges the difficulty in creating a grading scheme that is strictly prescriptive. However, we anticipate that this updated scoring rubric will allow for more consistent reporting between published studies. Clinical judgment is still required to apply the grading scheme and attribution. We recognize that the use of concurrent medications or morbidities may affect the grade and attribution of toxicity. Due to the lack of consensus on prophylactic and reactive medications, inclusion of medications in grading is impossible to standardize. Adverse events in the same population of pets may be scored differently by various individuals and in these cases or the case that a clinician is unsure which grade is more appropriate, the committee advises choosing the higher grade for reporting purposes. The decision to include euthanasia secondary to radiation-induced toxicity as a grade 5 adverse event was not without controversy. Decisions to euthanize may be based on a variety of factors, from client and clinician perception to financial constraints to concurrent disease. Euthanasia is indeed a poor endpoint for outcomes in veterinary oncology and may not be related to adverse events that arise secondary to radiation therapy. However, current literature routinely reports the number of pets euthanized due to tumor and nontumor-related causes. The inclusion of attribution allows for grade 5 adverse events to be captured but attributed to potential causes other than radiation therapy. We hope that by routinely incorporating this adverse event guideline into daily practice that radiation oncologists will identify its strengths, weaknesses, and potential omitted categories that can be incorporated into future versions.

ACKNOWLEDGMENTS

We appreciate all the members of ACVR who provided feedback and input on this document, Chantale Pinard for review of the ocular toxicity, Man Kit Chan for help with formatting, Allison Zwingenberger for her guidance in the preparation of a consensus report, and Susan LaRue for initial feedback.

LIST OF AUTHOR CONTRIBUTIONS

Category 1

a. Conception and design: Poirier, Keyerleber, Gordon, Turek, Kent, Bentley, Lawrence
b. Acquisition of data: Poirier, Keyerleber, Gordon, Turek, Kent, Bentley, Lawrence
c. Analysis and interpretation of data: Poirier, Keyerleber, Gordon, Turek, Kent, Bentley, Lawrence

Category 2

a. Drafting the article: Poirier, Keyerleber, Gordon, Turek, Kent, Bentley, Lawrence
b. Revising article for intellectual content: Poirier, Keyerleber, Gordon, Turek, Kent, Bentley, Lawrence

Category 3

a. Final approval of the completed article: Poirier, Keyerleber, Gordon, Turek, Kent, Bentley, Lawrence

Category 4

a. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: Poirier, Keyerleber, Gordon, Turek, Kent, Bentley, Lawrence

CONFLICT OF INTEREST STATEMENT

The authors declared that there is no conflict of interest.

ORCID

Michele Keyerleber https://orcid.org/0000-0003-1888-7087
Jessica Lawrence https://orcid.org/0000-0002-8315-1909

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How to cite this article: Poirier VJ, Keyerleber M, Gordon IK, et al. ACVR and ECVDI consensus statement: Reporting elements for toxicity criteria of the veterinary radiation therapy oncology group v2.0. *Vet Radiol Ultrasound*. 2023;64:789–797. https://doi.org/10.1111/vru.13291