

**University of Kansas-Lawrence  
Institutional Animal Care and Use Committee**

**Rodent Tumor Burden Guidelines**

**Purpose:** Tumor production in laboratory animals is an important research activity which must balance experimental needs and animal welfare concerns. These guidelines provide acceptable humane endpoints for rodent tumor models.

**Applicability:** University of Kansas investigators are expected to adhere to these guidelines in the design and conduct of rodent tumor production studies. The IACUC recognizes these guidelines may not be applicable to all studies. Guideline deviations must be clearly described and justified in the Animal Use Statement and reviewed and approved by the IACUC prior to work commencement.

**Guidelines:**

- The principal investigator, who has precise knowledge of both the study objectives and the proposed model, must identify, explain, and include in the Animal Use Statement a study endpoint that is both humane and scientifically sound. Acceptable endpoints will vary by tumor model and will be dependent on cell line, rodent species/strain, cell quantity, injection route, and treatment. Use of survival time as an end point is rarely justifiable and should be avoided.
- Rodents used in tumor production studies must be monitored by laboratory personnel at least once a week from the time of cell/tissue inoculation until a visible or palpable tumor is observed. Animals must be observed by laboratory personnel at least twice weekly following observation of a visible or palpable tumor. More frequent observations may be necessary based on tumor growth, study parameters, and general health of the animal. If environmental changes, diet restriction, or sleep deprivation are parts of the study design, more frequent monitoring may also be required following cell/tissue inoculation.
- Rodents should be euthanized before tumor burden becomes excessive and before the animal becomes debilitated.
- Calipers are generally used to measure tumor size. Tumors on the dorsum or flank of adult rodents may be allowed to reach a diameter of 1.8 cm (18 mm) in mice and 3.5 cm (35 mm) in rats. For animals with multiple tumors, the total tumor burden must not exceed the listed diameters. Animals with tumors larger than those described above should be humanely euthanized. If deviation from this norm is necessary, strong scientific justification and a more frequent monitoring protocol must be provided in the Animal Use Statement with the knowledge that the justification may not be accepted by the IACUC.
- Tumor volume (TV), using the formula,  $TV = (\text{width})^2 \times \text{length} / 2$ , may also be used to determine tumor burden. Tumors on the dorsum or flank of adult rodents may be allowed to reach a maximum volume of 1800 mm<sup>3</sup> in mice and 3500 mm<sup>3</sup> in rats. Animals with tumors larger than those described above should be humanely euthanized. If deviation from this norm is necessary, strong scientific justification and a more frequent monitoring protocol must be provided in the Animal Use Statement with the knowledge that the justification may not be accepted by the IACUC.
- For studies involving subcutaneous or intradermal tumors in other anatomic locations or tumor production in juvenile rodents, the principal investigator must describe maximum tumor diameter or volume endpoints in the Animal Use Statement.

- For subcutaneous or intradermal tumors in other anatomical locations or for tumor production studies in juvenile rodents, the principal investigator must detail maximum tumor diameter or volume in the Animal Use Statement.
- The overall health and well-being of the animal take priority over precise tumor measurements in decisions regarding euthanasia or other interventions. General euthanasia criteria include:
  - Body condition score <2.
  - Weight loss  $\geq$  20%.
  - Tumor size equal to 10% of body weight
  - Tumor ulceration
  - Discharge or hemorrhage from tumor
  - Tumor interferes with normal body functions, including but not limited to ambulation, eating, drinking, defecation, or urination; tumor negatively affects animal's gait or posture independent of tumor size
  - Labored breathing
  - Lack of movement
  - Hypothermia
  - Self-mutilation
  - Animals that in the opinion of the University Attending Veterinarian require euthanasia for humane reasons.

### **References**

Thomas Jefferson University Rodent Tumor Monitoring Guidelines

The University of Tennessee, Knoxville Institutional Animal Care and Use Committee Guidelines for Tumors in Rodents

Ullman-Cullere, M. H. and C. J. Foltz. 1999. Body Condition Scoring: a rapid and accurate method for assessing health status in mice. *Lab Anim Sci* 49(3): 319-323.

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