University of Cincinnati
Animal Care and Use Program

Tumor Monitoring

The Guide states that “while all studies should employ endpoints that are humane, studies that commonly require special consideration include those that involve tumor models.”

Questions - contact LAMS staff at 513-558-5174 or LAMS@uc.edu.

Requirements for using tumor cell lines and primary tissue

Rodent cell lines, tumor tissue samples, and hybridomas must be screened for rodent viruses and mycoplasma (human cell lines if not passed through rodents) contamination prior to inoculation into animals to ensure that they are free from pathogens. The Institutional Biosafety Committee (IBC) must approve use of human cells or any genetically modified cells with viral vectors into animals.

Tumor study considerations

1. Pilot studies using small number of animals should be considered when working with unfamiliar or novel tumor models (e.g. cells, cell number, route) , investigational anti-tumor drugs, or if the approximate time for induced tumor growth or tumor profile is unknown.
2. For spontaneously arising tumors (e.g., induced by carcinogens, genetic manipulation), researchers must pay particular attention to the time of onset, tumor progression, and identify unexpected tumor development sites.
3. Where possible, researchers should use biochemical and pathological indicators, bioluminescent imaging or other imaging techniques to monitor non-superficial tumor burden.
4. Sites of solid tumors will influence the maximum acceptable tumor load, as well as the humane endpoints.
5. Tumors located within the cranium, thoracic cavity, footpad, bone, mouth, or behind the eyes may interfere with vital functions, though maximum size is considerably smaller. An assessment of overall health status takes priority.
6. Tumor burden should always be limited to the minimum required in order to establish a valid scientific outcome.
7. When extended survival data is needed from a tumor model it is necessary to try to determine a specific point or parameter at which to record the animal as ‘moribund’ or as ‘dead’ without jeopardizing the humane treatment of the animals, and will not necessitate the use of death as an endpoint.

Monitoring and Record keeping

The Public Health Service (PHS) policy requires proper documentation of animal care and use in order to assess compliance with research protocols and clinical care procedures.

1. Research staff must monitor animals at a frequency determined by the known biology of the tumor, ensuring that everyone is trained to recognize tumor-specific clinical signs and are able to readily apply humane endpoints.

2. Animals inoculated with tumor cells or that develop spontaneous tumors (e.g. tumorigenic strain), should be observed at least once weekly by research staff in addition to the regular daily husbandry staff observations.
3. Monitoring will increase upon tumor detection to at least two times a week (e. g., Monday and Friday). As tumors near their endpoint (generally 75% of the allowed tumor burden humane endpoint), observations will increase to daily, including weekends and holidays.
4. The frequency of monitoring should increase as dictated by experimental and/or approaching humane endpoints, at the request of the veterinary staff or if the tumor kinetics are unknown.
5. The size of the tumor burden should be measured by caliper or other mechanisms for Palpable/Superficial tumors; and biochemical and pathological indicators, bioluminescent imaging or other imaging techniques for non-palpable tumors.
6. Body Condition Score (BCS) and clinical evaluations of the animals take priority over the measured burden of the tumor.
7. Cage cards should indicate the specific date of inoculation as well as the nature of the injected substance (e.g.- cells, viral vectors.
8. Each instance of observation requires a minimum recording of associated information: the date, observation (tumor present/absent, change in tumor, score), and initials of the observer.
9. Records of observations, including weights and/or measurements, as appropriate, should be maintained and made available.

Selected Criteria for Euthanasia for tumor studies

The criteria below are clinical signs of illness or disease that constitute a tumor study humane endpoint include, but are not limited to:

1. The maximum allowable tumor size for a single spontaneous or implanted tumor on the flank and dorsum is 2.0 cm (4.3 cm^3) and 4.0 cm (33.5 cm^3) in any dimension (cumulative diameter of multiple tumors) in an adult mouse and rat, respectively, if it remains otherwise healthy.
2. For bilateral tumors, either tumor reaches 2 cm or greater in size (longest diameter) or the summation of the longest diameter of first tumor and the longest diameter of second tumor exceeds 3 cm in size.
3. If tumors are expected to grow with accumulation of fluid in the peritoneal cavity (ascites), the animal should be euthanized or the fluid removed from the abdominal cavity when body weight exceeds 120% of baseline body weight.
4. Tumors induced in body cavities (cranium, orbit, abdomen, or thorax) have maximum size is considerably smaller. These animals must be monitored very closely for any severe impairment in physiological or neurological function and must be euthanized as signs become apparent.
5. The tumor interferes with normal body functions, including but not limited to ambulation, eating, drinking, defecation, or urination.
6. Tumors become ulcerated, remain vascular and are infected.
7. Additional criteria for euthanasia can be found in humane endpoints guideline.