Guidelines on Tail Biopsy for DNA Analysis and/or Genotyping of Mice

Purpose

Obtaining tissue from a mouse for DNA analysis via tail biopsy is a safe, effective and humane procedure when performed properly. DNA prepared from tail biopsies is suitable for analysis by either Southern Blot or PCR. DNA can also be obtained from ear punches, hair samples or oral swabs.

Procedures for Tail Biopsy

1. Procedures for tail biopsy for DNA analysis and/or genotyping must be described in an approved Animal Study Proposal (ASP).
2. Ideally, mice should be 10-21 days old. At this age the tail tissue is soft (vertebra are not yet calcified) and the yield of DNA is highest. In addition, prompt analysis of tail tissue allows the desired mice to be identified prior to weaning which can facilitate more efficient use of cage space.
   For mice under 28 days of age no anesthesia of the tail is required.
   For mice greater than 28 days of age, the use of anesthesia is required prior to collection of tissue.
3. Manually restrain the mouse between thumb and forefinger. This is a convenient time to identify the animals using the appropriate method (i.e. ear punch, ear tag, transponder, etc.)
4. With sterile scalpel or scissors cleanly excise the distal 5 mm of tail. If the proper procedures are followed, the yield of DNA from 5 mm of tail should exceed 50 micrograms, enough for multiple analyses. The yield of DNA does not proportionally increase as tail fragments larger than 5mm are used. Samples larger than 5 mm need to be justified in the ASP. If small amounts of DNA are required, investigators should consider taking only 2 mm of tail. For the analysis of RNA and DNA great care should be taken to avoid cross contamination of samples; disinfect the scalpel or scissors between animals or use fresh instruments on animals in different groups.
5. The investigator must monitor the animals to assure hemostasis after the animals are returned to the cage. Apply digital pressure, silver nitrate, electric cautery, surgical glue or other means of hemostasis.
6. Repeat tail biopsies require anesthesia *(five percent of the total animal number must be placed in Pain/Distress Category 2 to account for repeat tail biopsies).*

References

1. Hofstetter JR, Shang A, Mayeda AR, Guscar T, Nurnberger JI and Lihiri DK. Genomic DNA from Mice: A Comparison of Recovery Methods and Tissue Sources. Biochem Mol Med 1997 Dec; 62(2): 197-202
2. Dennis MB. IACUC Review of Genetic Engineering. Lab Animal 2000 Mar 29 (3):34-37.
3. Irwin MH, Moffatt RJ and Pinkert CA. Identification of transgenic mice by PCR analysis of saliva. Nat Biotechnol 1996 Sep:14(9) 1146-8.
4. M Fitzgerald and S Gibson. The postnatal physiological and neurochemical development of peripheral sensory C fibres. Neuroscience 1984 13(3):933-944.
5. M Fitzgerald. Post-natal development of cutaneous afferent fibre input and receptive field organization in the rat dorsal horn. J Physiol 1985 364: 1-18.

Revised February 2005
Approved October 2000

Revised February 2005
Approved October 2000