



Animal Blood Collection Site – Standard Operating Procedures

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1. Overview

Purpose

The Drexel University Animal Care and Use Committee has established these procedures to specify the common blood collection routes consistent with The Guide for the Care and Use of Laboratory Animals and AVMA Guidelines on Euthanasia of animals. These procedures will ensure that distress to the animal is minimized during blood collection.

2. Blood Sample Location Charts

The following lists are meant to be used as guidelines for common methods and procedures by species. All methods of Blood Collection must be approved through IACUC prior to use. Please also see ACU-207 Blood Volume Sampling Procedures and ACU-210 Genotyping Tissue Collection Procedures.



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2.1 Mouse

| Species | Common Blood Collection Route | Anesthesia Required | Number of Samples | Adverse Effects | Comments |
|---------|-------------------------------|---------------------|---|---|--|
| Mouse | Facial vein/ Submandibular | No | | <ul style="list-style-type: none"> Hematoma Infection <1% | <ul style="list-style-type: none"> Repeated sampling is possible by alternating sides of the face. Sample may be a mixture of venous and arterial blood. Manual restraint of awake animals results in proper site alignment and venous compression for good blood flow. Can be performed rapidly and with a minimal amount of equipment, allowing for rapid completion. |
| | Saphenous Vein | Yes | No more than 4 within any 24 hour period | <ul style="list-style-type: none"> Bruising Hemorrhage Infection Temporary favoring of the limb | <ul style="list-style-type: none"> Variable sample quality The procedure is customarily done on an awake animal but effective restraint is required. This procedure requires more hands-on training than tail sampling in order to reliably withdraw more than a minimal amount of blood. Temporary favoring of the limb may be noted following the procedure. The clot/scab can be gently removed for repeated small samples if serial collection is required. |
| | Tail Vein | No | One or two blood samples can be taken per session and in any 24-hour period, depending on | <ul style="list-style-type: none"> Infections <1% Hemorrhage <1% | <ul style="list-style-type: none"> Sample collection by nicking the vessel is easily performed but produces a sample of variable quality that may be contaminated with tissue products. Sample quality decreases with prolonged bleeding times and “milking” of the tail. |



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| | | | sample volume. This limit also applies to microsampling | | <ul style="list-style-type: none"> • Sample collection using a needle (cannulation) minimizes contamination of the sample but is more difficult to perform in the mouse. • Repeated collections possible. With tail nicking, the clot/scab can be gently removed for repeated small samples if serial testing is required (e.g., glucose measures, etc.). • Cannulation and tail nicking are routinely done without anesthesia, although effective restraint is required. |
| Tail clip (biopsy) | Yes (for 21 days of age and older) | No more than 4 blood samples within a 24-hour period | <ul style="list-style-type: none"> • Infection <1% • Hemorrhage • Post procedural pain; not recommended | <ul style="list-style-type: none"> • Can be used by clipping (e.g. amputating) no more than 5 mm. • Produces sample of variable quality that may be contaminated with tissue products. • Sample quality decreases with prolonged bleeding times and “milking” of the tail. • Repeated collections possible. The clot/scab can be gently removed for repeated small samples if serial testing is required (e.g. glucose measures, etc.). • Hemostasis must be ensured after sampling. • Animals 21 days old and older require anesthesia for tail clipping. | |
| Retro-orbital sinus (terminal) | Yes | Only one sample be taken | <ul style="list-style-type: none"> • Terminal | <ul style="list-style-type: none"> • Non-survival only; Animal must be deeply anesthetized and not recover from anesthesia. | |
| Cardiac (terminal only) | Yes | Once | <ul style="list-style-type: none"> • Terminal | <ul style="list-style-type: none"> • Non-survival only; Animal must be deeply anesthetized and not recover from anesthesia. | |



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2.2 Rat

| Species | Common Blood Collection Route | Anesthesia Required | Number of Samples | Adverse Effects | Comments |
|---------|-------------------------------|---------------------|--|---|---|
| Rat | Saphenous vein | No | No more than 4 blood samples should be taken within any 24-hour period | <ul style="list-style-type: none"> • Bruising • Hemorrhage • Infection • Temporary favoring of the limb | <ul style="list-style-type: none"> • Variable sample quality. • The procedure is customarily done on an awake animal but effective restraint is required. • Requires more hands-on training than tail or retro-orbital sampling to reliably withdraw more than a minimal amount of blood. • Temporary favoring of the limb may be noted following the procedure. • The clot/scab can be gently removed for repeated small samples if serial collection is required. |
| | Tail vein | No | No more than 8 should be taken per session and in any 24-hour period | <ul style="list-style-type: none"> • Infection <1% • Hemorrhage <1% | <ul style="list-style-type: none"> • Sample collection by nicking the vessel is easily performed but produces a sample of carryable quality that may be contaminated with tissue products. Sample quality decreases with prolonged bleeding times and “milking” of the tail. • Sample collection using a needle (cannulation) minimizes contamination of the sample but, is more difficult to perform in the rat. • Repeated collections possible. With tail nicking, the clot/scab can be gently removed for repeated small samples if serial testing is required (e.g., glucose measures, etc.) • Cannulation and tail nicking are routinely done without anesthesia, although effective restraint is required. |



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|--|---------------------------------------|-----|--------------------------|---|--|
| | Jugular vein | Yes | | <ul style="list-style-type: none"> Bruising Infection <1% Hemorrhage <1% | <ul style="list-style-type: none"> Results in high quality sample. Does not easily lend itself to repeated serial sampling. Significant competence may replace the need for anesthesia. |
| | Subclavian vein or Anterior Vena Cava | Yes | | <ul style="list-style-type: none"> Hemorrhage <1% | <ul style="list-style-type: none"> Results in high quality sample. Repeated collections possible. |
| | Retro-orbital plexus (terminal) | Yes | Only one sample be taken | <ul style="list-style-type: none"> Terminal | <ul style="list-style-type: none"> Non-survival only; Animal must be deeply anesthetized and not recover from anesthesia. |
| | Cardiac (terminal only) | Yes | One | <ul style="list-style-type: none"> Terminal | <ul style="list-style-type: none"> Non-survival only; Animal must be deeply anesthetized and not recover from anesthesia. |

2.3 Rabbit

| Species | Common Blood Collection Route | Anesthesia Required | Number of Samples | Adverse Effects | Comments |
|---------------|-------------------------------|---------------------|--|---|---|
| Rabbit | Marginal ear vein/artery | No | Up to 8 samples may be taken in any 24-hour period, depending on the sample volume | <ul style="list-style-type: none"> Bruising <1% Infection <1% | <ul style="list-style-type: none"> Local anesthetic cream can be applied to the site 30 mins prior to blood sampling. Inserting a catheter into the vessel will allow for multiple samples at later timepoints Unless the animal is used to handling and restraint, use of anesthesia is best. |



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|--|----------------------------------|-----|------|--|--|
| | | | | | <ul style="list-style-type: none"> Serial blood samples can be taken moving towards the base of the ear on the same vein and by altering ears, but multiple collection using a catheter is preferred. The ear should be warmed in order to dilate the vessel. No more than 3 needles sticks should be given in any one attempt. Hemostasis must be ensured after sampling. |
| | Cardiac puncture (terminal only) | Yes | Once | <ul style="list-style-type: none"> Terminal | <ul style="list-style-type: none"> Non-Survival only; Animal must be deeply anesthetized and not recover from anesthesia. |

2.4 Swine

| Species | Common Blood Collection Route | Anesthesia Required | Number of Samples | Adverse Effects | Comments |
|---------|-------------------------------|---------------------|-------------------------------|---|---|
| Swine | Ear vein | No | Up to 8 in any 24 hour period | <ul style="list-style-type: none"> Bruising Hemorrhage Infection | <ul style="list-style-type: none"> Suitable for single and repeated sampling of small volumes; vein easily blown. Restraint should be used, sedation should be considered . No more than 3 attempts should be made per sampling. Local anesthetic cream can be applied to the site 30 minutes prior to blood sampling. The ear should be warmed in order to dilate the vessel. Pigs should be trained to cooperate with blood sampling in order to minimize stress. |



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| | | | | | |
|--|---|-----|------|--|--|
| | Cardiac puncture (terminal only) | Yes | Once | <ul style="list-style-type: none">• Terminal | <ul style="list-style-type: none">• Non-survival only; Animal must be deeply anesthetized and not recover from anesthesia. |
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3. Responsibilities

3.1 Drexel University IACUC Responsibilities

The Drexel University IACUC and the IACUC Office are responsible for maintaining this guidance document, training, and monitoring. All exceptions to this procedure must be approved by the IACUC. For inquiries regarding these procedures, please contact the Director of Animal Welfare, a part of the Office for Research & Innovation (ORI), or the Attending Veterinarian.

4. Resources

- [Blood sampling | NC3Rs](#)

5. Revisions

Edition 001/Effective Date: 05/10/2017 – Original Document

Edition 001/Review Date: 06/2021

Edition 002/Review/Revision: 06/12/2024 and Effective Date: 06/26/2024 – Revised Document

- Updated formatting to new template.
- Change title to “Animal Blood Collection Site Procedures”
- Removal of Cat collection routes. No longer in the collection.
- Section 2.2 – Removal of tail clip collection route
- Section 2.2 – Replace Retro-orbital sinus with Retro-orbital plexus
- Section 2.3 – Addition of “Inserting a catheter into the vessel will allow for multiple samples at later timepoints” under Marginal Ear Vein/Artery Comments
- Section 3.1 – Addition of Drexel IACUC responsibilities