



# INDIANA UNIVERSITY

## Office of Research Compliance (ORC)

### Institutional Animal Care and Use Committee (IACUC)

## Guidelines for Agent Administration

This guidance applies to all Indiana University faculty, staff, and students in the use of animals in biomedical research involving agent administration. The IUSM IACUC is obligated to provide policies that notify and train personnel concerning the appropriate techniques, equipment, and agents for performing appropriate procedures to ensure humane care and use of laboratory animals.

### Background

These guidelines are intended to provide general guidance for those planning experimental procedures on animals that includes the injection of drugs or any compounds, including saline. Exceptions to these guidelines may be approved by the IACUC based on written scientific justification provided by the investigator. For species or guidelines not listed, LARC veterinarians can assist with the selection of appropriate procedures.

Dosing methodology is an important consideration in protocol planning to optimize agent delivery while minimizing potential adverse responses. The qualities of the agent, volume of administration, absorbability of the agent, and number of injections should all be considered when choosing a route for administration. All personnel performing administration should have adequate training and competency in the chosen method.

### Statement

#### Restraint

All animals will need to be restrained to prevent movement that could result in the laceration and injury of the animals during blood collection. Some species may be physically restrained by a handler. Rodents and rabbits have physical restraint devices that can be used. Pigs and dogs can be trained to use a physical restraint device as well. Chemical sedation can be used in any animal.

#### Routes of administration

| Rodents              |                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oral                 |                                                                                                                                                                                                                                                                                                                                           |
|                      | Oral agents can be voluntarily consumed or administered by oral gavage. Larger volumes of administration should be given by oral gavage, as the rodents will only voluntarily ingest a limited quantity of agent. However, volumes closer to the maximum should be given with care as they can cause discomfort and stress in the animal. |
| Subcutaneous (SQ)    |                                                                                                                                                                                                                                                                                                                                           |
|                      | This is a preferred method of administering large volumes of fluid to rodents. Inject dorsally, over the neck or back of the rodent.                                                                                                                                                                                                      |
| Intraperitoneal (IP) |                                                                                                                                                                                                                                                                                                                                           |

|  |                                                                                                                                                                                    |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | This is a preferred method of administering large volumes of fluid to rodents. Inject off midline, in the lower right quadrant, to minimize the risk of damage to internal organs. |
|  | Intravenous (IV)                                                                                                                                                                   |
|  | Due to the size of rodent vessels, this method requires steady technique. Sites of intravenous injection include the tail vein.                                                    |
|  | Intradermal (ID)                                                                                                                                                                   |
|  | This method is only appropriate for small volumes of fluid per site.                                                                                                               |
|  | Intramuscular (IM)                                                                                                                                                                 |
|  | This is not a preferred method of delivery due to the small muscle body size in rodents.                                                                                           |
|  | Intranasal                                                                                                                                                                         |
|  | This method is only appropriate for small volumes of fluid.                                                                                                                        |

| <b>USDA covered species (Dogs, Swine, and Rabbits)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                        | Oral                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                        | Oral agents can be voluntarily consumed by mouth or administered through oral gavage. Larger volumes may cause a quicker transit from the stomach into the small intestine.                                                                                                                                                                                                                                                                                                                      |
|                                                        | Subcutaneous (SQ)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                        | This is a preferred method of administering large volumes of fluid to dogs and rabbits                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                        | Intraperitoneal (IP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                        | This method is rarely used in dogs, swine and rabbits, and should not be the preferred method of agent administration.                                                                                                                                                                                                                                                                                                                                                                           |
|                                                        | Intravenous (IV)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                        | Sites of intravenous injection:<br>Marginal ear vein is the preferred location in rabbits<br>Jugular vein can be used in dogs or swine<br>Cephalic vein can be used in rabbits, dogs, or swine<br>Saphenous vein can be used in dogs or swine                                                                                                                                                                                                                                                    |
|                                                        | Intradermal (ID)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                        | This method is only appropriate for small volumes of fluid per site.                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                        | Intramuscular (IM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                        | This is a preferred method of administration for dogs, swine and rabbits. Locations for IM injections:<br>Triceps in the fore limb<br>Quadriceps muscles of the cranial muscle mass of the hind limb<br>Semimembranosus and semitendinosus, the caudal muscle mass of the hind limb. When giving injections at this location, angle the needle caudally to avoid damage to the sciatic nerve.<br>Dorsal lumbar muscles of the back.<br>Dorsal cervical muscles of the neck can be used in swine. |
|                                                        | Intranasal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                        | This method is only appropriate for small volumes of fluid.                                                                                                                                                                                                                                                                                                                                                                                                                                      |

#### Maximum volumes for administration

|        | Oral       | SQ        | IP       | IV        | ID     | IM     | Intranasal  |
|--------|------------|-----------|----------|-----------|--------|--------|-------------|
| Mouse  | 0.2ml      | 3ml       | 3ml      | 0.2ml     | 0.05ml | 0.05ml | 0.03-0.05ml |
| Rat    | 2.5ml      | 10 ml     | 5-10 ml  | 2.5 ml    | 0.05ml | 0.1 ml | 0.03-0.05ml |
| Rabbit | 10 ml/kg   | 50 ml     | 10 ml/kg | 50-100 ml | 0.1ml  | 1 ml   | 0.2-0.5ml   |
| Dog    | 5-10 ml/kg | 100-200ml | 10 ml/kg | 10-15 ml  | 0.1ml  | 2-5ml  | 0.2-0.5ml   |
| Swine  | 10 ml/kg   | 10 ml     | 10 ml/kg | 2.5 ml/kg | 0.1ml  | 5 ml   |             |

## References

1. JJ Bogdanske, S Stelle, MR Riley, BM Schiffman. 2011. Laboratory Mouse, Procedural Techniques. CRC Press.

2. JJ Bogdanske, S Stelle, MR Riley, BM Schiffman. 2011. Laboratory Rat, Procedural Techniques. CRC Press.
3. N Duffee, A Vaughn. 2014. Laboratory Animal Data, Quick Reference Guide. 2nd edition. American Association for Laboratory Animal Science.
4. PV Turner, T Brabb, C Pekow, MA Vasbinder. 2011. Administration of Substances to Laboratory Animals: Routes of Administration and Factors to Consider. J Am Assoc Lab Anim Sci 50(5): 600-613.
5. M Varga. 2014. Textbook of Rabbit Medicine. 2nd edition. Butterworth Heinemann.

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## Contact

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