

# Injection Guidelines

There are five commonly used routes of parenteral (route other than digestive tract) administration: subcutaneous (SC/SQ), intraperitoneal (IP), intravenous (IV), intradermal (ID), and intramuscular (IM). Not all techniques are appropriate for each species. For example; IM injections are avoided in most rodents because the amount of material that can be injected into the rodent's limited muscle mass is so small that the technique is not practical; IP injections are not administered to rabbits as other techniques are more suitable. It is essential that the appropriate parenteral site be selected. Systemic absorption and distribution differ considerably between sites.

Dosage and volume of material administered must be carefully considered relative to the type of agent, site of injection, and species used. The size of syringe and needle must also be considered. In order to assure the delivery of an accurate volume of injected material, the volume of the syringe should, in general, not exceed the volume of material to be administered by 10 fold. The length of the selected needle should be long enough that sufficient tissue penetration is achieved but not be so long that it becomes unmanageable or is likely to be inserted too far. You do not need to advance the needle to the hub; simply as far as is necessary to get the tip of the needle to the desired delivery site. The volume and viscosity to the material to be injected directly impacts the selection of a particular delivery system. The needle's size should be as small (highest gauge) as possible to limit tissue trauma but should also be large enough that the injection can be made relatively rapidly, without applying excessive pressure to the syringe plunger. Syringe and needles should be of the locking type in order to prevent accidental dislodgement, which may result in back spray and the need for a second injection.

Injection volumes provided in this document are general recommendations. Under some circumstances it may be inappropriate to inject the recommended volume. For example, volumes should be reduced when the agent is irritating, hypotonic, or hypertonic. Volumes may be increased when giving isotonic fluids for rehydration and fluid maintenance. For example, rabbits, cats, and dog can receive 10 – 20 mL/kg (LRS or 0.9%NaCl) subcutaneously for anorexia or surgery.

**“Good practice” administration routes and volumes for mice, rats, and rabbits are indicated in [Table 1](#) .**

**Recommended needle sizes and injection sites for various species are indicated in [Table 2](#).**

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**Table 1. Administration of recommended volumes considered good practice (and possible maximal dose volumes).** Adapted from: Journal of Applied Toxicology  
Species, route, and volumes (mL/kg)

Species	SQ*	IP	IM**	IV (bolus)	IV (slow)
Mouse	10 (40)	20 (80)	0.05(0.1)	5	(25)
Rat	5 (10)	10 (20)	0.1 (0.2)	5	(20)
Rabbit	1 (2)	5 (20)	0.25 (0.5)	2	(10)

\*Subcutaneous sites should be limited to two or three sites per day. The subcutaneous site does not include Freund's adjuvant administration.

\*\*For non-aqueous injectables, consideration must be given to time of absorption before re-dosing. No more than two intramuscular sites should be used per day.

**Table 2. Needle Sizes and Recommended Injection Sites.** Adapted from: Formulary for Laboratory Animals, 3rd Ed., Hawk, Leary, Morris, 2005

Species	Injection Site; Needle gauge			
	SC	IM	IP	IV
Guinea pig	Scruff, back; 23 – 25	Quadriceps; 25G	23 – 25G	Ear vein, Saphenous vein; 25 – 27G
Hamster	Scruff; 25G	Quadriceps; 25G <b>(Not recommended at UGA)</b>	23 – 25G	Femoral or jugular vein; 25 – 27G
Mouse	Scruff, back; 25G	Quadriceps; 27G <b>(Not recommended at UGA)</b>	25 – 27G	Lateral tail vein; 26 – 28G
Rabbit	Scruff, flank; 21 – 25G	Quadriceps, lumbar muscles; 25G	21 – 23G	Marginal ear vein; 23 – 25G
Rat	Scruff; 25G	Quadriceps; 25G	23 – 25G	Lateral tail vein; 21 – 23G