

Subject: Administration of Substances: Maximum Volumes and Other Recommendations

BACKGROUND

This Standard Operating Procedure (SOP) describes best practice standards for administration of substances to laboratory animals. If an investigator wishes to deviate from this SOP, all changes must be outlined and justified in the protocol application (approval of the protocol indicates approval of the deviation from the SOP for that project only).

The administration of substances must be performed in such a manner that the animal’s health is not compromised. Administration of excessive volumes can lead to adverse health outcomes, such as painful injections, ulceration or necrosis of the injection site. If multiple injections are administered recommend alternating injection sites in order to avoid adverse consequences of multiple injections at the same site.

In addition, the investigator must remain cognizant of hazardous agents being injected into animals. Procedures using safe practices to avoid self-inoculation must be performed. **OEHS will offer some examples of safe injection practices and procedures** [\(link\)](#)

IACUC Procedure

1. Repeated needle use
 - i. Best practice: Use a sterile needle only once then discard. Use of the same needle on multiple animals can spread infectious diseases. In addition, dull, dirty, or bent needles can lead to adverse consequences such as injection site abscesses or systemic bacterial infections.
 - ii. On the same animal: the same needle may be re-used if the initial injection attempt was unsuccessful. The needle should not be used more than 2-3 times on the same animal (maximum of 5 uses, see below).
 - iii. On multiple animals: when multiple rodents need the same volume of the same drug, some investigators will draw up a total amount of drug for several animals into one syringe and use that syringe to inject multiple animals. However, the same needle should not be used. The needle should be replaced between animals. Care must be taken to prevent needle injuries to the technician. If the animals are in the same cage, one needle may be used on multiple animals if it is in the IACUC-approved protocol. This is not encouraged, however, up to 5 uses per needle may be considered approvable with adequate justification. Note that 5 uses does not mean 5 animals—if one animal requires 2 injection attempts, that counts as 2 uses. This procedure is discouraged in animals housed in different cages. Once a needle is inserted into an animal, it can never be re-inserted into the stock container of solution (i.e. vial, tube, bag). If resistance is felt upon inserting into an animal, the needle must be discarded regardless of how many times it was used.

Table 1. Administration volumes: Best practice (Maximum)

Species	Route and volumes (ml/kg unless otherwise indicated)					
	Oral	S.C.*	I.P.	I.M.**	I.V. bolus	I.V. slow infusion
Mouse	10 (50)	10 (40)	20 (80)	0.05 ml (0.1 ml)	5	(25)
Rat	10 (40)	5 (10)	10 (20)	0.1 ml (0.2 ml)	5	(20)
Rabbit	10 (15)	1 (2)	5 (20)	0.25 (0.5)	2	(10)
Dog	5 (15)	1 (2)	1 (20)	0.25 (0.5)	2.5	(5)
Minipig	10 (15)	1 (2)	1 (20)	0.25 (0.5)	2.5	(5)
Cat	(50)	(100ml)		(0.5ml)		

*Subcutaneous sites should be limited to 2 or 3 sites per day. The subcutaneous recommendations do not apply to complete Freund's adjuvant.
 **No more than 2 intramuscular sites should be used per day.

Diehl KH et al. A good practice guide to the administration of substances and removal of blood, including routes and volumes. J Appl. Toxicol. 21:15-23 (2001).

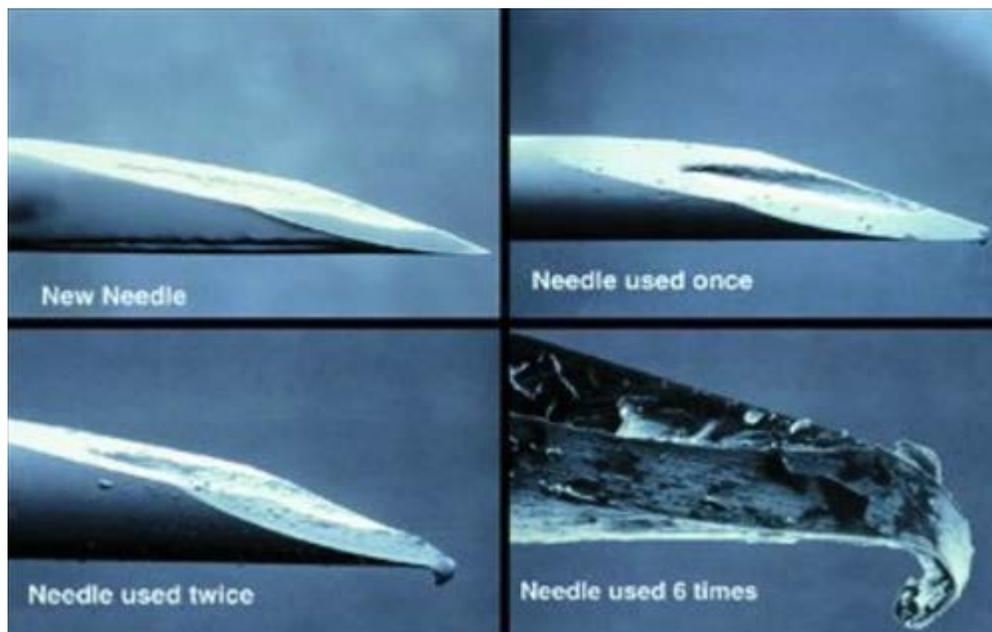
Table 2. Needle Size Recommendations (Needle sizes decrease in diameter with increasing gauge)

Species	Route and volumes (ml/kg unless otherwise indicated)				
	Oral*	S.C.	I.P.	I.M.	I.V.
Mouse	21g	26g	26g	26g	26g
Rat	16-15g	25-23g	25-20g	26-25g	25-23g
Rabbit	8Fr	25-21g	22-20g	25-22g	25-20g
Dog	NA	18-22g	NA**	20-25g	18-22g
Minipig	NA	20g	NA**	19-22g	20-22g
Cat	8Fr	25-21g	NA**	26-22g	23-22g

*External diameter

**Consult with a veterinarian for these species

Figure 1. Needle deterioration after multiple uses.



From: <http://www.hdiamondfarms.com/injections.html>

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