

Tables from the article *A good practice guide to the administration of substances and removal of blood, including routes and volumes.*

Journal of Applied Toxicology 21, 15 - 23, 2001.

Table 1. Administration volumes considered good practice (and possible maximal dose volumes)^a

<i>Species</i>	Route and volumes (ml kg⁻¹)					
	Oral	s.c.	i.p.	i.m.	i.v. (bolus)	i.v.(slow inj.)
Mouse	10 (50)	10 (40)	20 (80)	0.05b (0.1) ^b	5	(25)
Rat	10 (40)	5 (10)	10 (20)	0.1b (0.2) ^b	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)
Macaque	5 (15)	2 (5)	^c (10)	0.25 (0.5)	2	^c
Marmoset	10 (15)	2 (5)	^c (10)	0.25 (0.5)	2.5	(10)
Minipig	10 (15)	1 (2)	1 (20)	0.25 (0.5)	2.5	(5)

^a For non-aqueous injectates, consideration must be given to time of absorption before re-dosing. No more than two intramuscular sites should be used per day. Subcutaneous sites should be limited to two or three sites per day. The subcutaneous site does not include Freund's adjuvant administration.

^b Values in millilitres per site.

^c Data not available.

NLAC note: Volumes /animal of given body weight

	Route and volumes (ml/animal)					
	Oral	s.c.	i.p.	i.m.	i.v.(bolus)	i.v. (slow)
Mouse 30 g	0.3	0.3	0.6	0.0015	0.15	(0.75)
Rat 300 g	3.0	1.5	3.0	0.03	1.5	(6)
Rabbit 3000 g	30.0	3	15	0.75	6.0	(30)
Dog 10 kg	50.0	10	10	2.5	25.0	(50)

Table 2. Repeated intravenous infusion: dose volumes/rates (and possible maximal volumes/rates)^a

<i>Daily infusion period</i>	<i>Mouse</i>	<i>Rat</i>	<i>Rabbit^b</i>	<i>Dog</i>	<i>Macaque</i>	<i>Minipig</i>
Total daily volume (ml kg ⁻¹)						
4 h ^c	L ^c	20	L ^c	20	L ^c	L ^c
24 h	96(192)	60 (96)	24 (72)	24 (96)	60	24
Rate (ml kg ⁻¹ h ⁻¹)						
4 h	L ^c	5	L ^c	5	L ^c	L ^c
24 h	4 (8)	2.5 (4)	1 (3)	1 (4)	2.5	1

^a For non-aqueous injectates, see text. In some cases two sets of values are shown. Those in parentheses are the possible maximal values.

^b Based on teratology studies.

^c Data not available.

Table 3. Circulating blood volume in laboratory animals

<i>Species</i>	Blood volume (ml kg⁻¹)	
	Recommended mean^a	Range of means
Mouse	72	63-80
Rat	64	58-70
Rabbit	56	44-70
Dog (Beagle)	85	79-90
Macaque (Rhesus)	56	44-67
Macaque (Cynomolgus)	65	55-75
Marmoset	70	58-82
Minipig	65	61-68

^aThe recommended mean corresponds to the mid-point of the range of means.

Table 4. Limit volumes and recovery periods

<i>Single sampling (e.g. toxicity study)</i>		<i>Multiple sampling (e.g. toxicokinetic study)</i>	
% Circulatory blood volume removed	Approximate recovery period	% Circulatory blood volume removed in 24 h	Approximate recovery period
7.5 %	1 week	7.5 %	1 week
10 %	2 weeks	10-15 %	2 weeks
15 %	4 weeks	20 %	3 weeks

Table 5. Total blood volumes and recommended maximum blood sample volumes for species of given body weights

<i>Species (weight)</i>	<i>Blood volume (ml)</i>	<i>7.5 % (ml)</i>	<i>10 % (ml)</i>	<i>15 % (ml)</i>	<i>20 % (ml)</i>
Mouse (25 g)	1.8	0.1	0.2	0.3	0.4
Rat (250 g)	16	1.2	1.6	2.4	3.2
Rabbit (4 kg)	224	17	22	34	45
Dog (10 kg)	850	64	85	127	170
Macaque (Rhesus) (15 kg)	280	21	28	42	56
Macaque (Cynomolgus) (5 kg)	325	24	32	49	65
Marmoset (350 g)	25	2.0	2.5	3.5	5
Minipig (15 kg)	975	73	98	146	195

Table 6. Summary of the advantages and disadvantages of the various methods of blood sampling

<i>Route/vein</i>	<i>General anaesthesia</i>	<i>Tissue damage^a</i>	<i>Repeat bleeds</i>	<i>Volume</i>	<i>Species</i>
Jugular	No	Low	Yes	+++	Rat, dog, rabbit
Cephalic	No	Low	Yes	+++	Macaque, dog
Saphenous/lateral tarsal	No	Low	Yes	++(+)	Mouse/rat, marmoset/maquette, dog
Marginal ear	No (local)	Low	Yes	+++	Rabbit, minipig
Femoral	No	Low	Yes	+++	Marmoset/maquette
Sublingual	Yes	Low	Yes	+++	Rat
Lateral tail	No	Low	Yes	++(+)	Rat, mouse, marmoset
Central ear artery	No (local)	Low	Yes	+++	Rabbit
Cranial vena cava	No	Low	Yes	+++	Minipig
Tail tip amputation (<1-3 mm)	Yes	Mod	Limited	+	Mouse/rat
Retrolubar plexus	Yes	Mod/high	Yes	+++	Mouse/rat
Cardiac ^b	Yes	Mod	No	+++	Mouse/rat/rabbit

^aThe potential for tissue damage is based on the likely incidence occurring and the severity of any sequelae, e.g. inflammatory reaction or histological damage.

^bOnly carried out as a terminal procedure under general anaesthesia.

Table 7. Recommended sites for repeated blood sampling

<i>Species</i>	<i>Recommended site</i>
Mouse	Saphenous, lateral tail
Rat	Saphenous, lateral tail, sublingual
Rabbit	Marginal ear, central ear artery, jugular
Dog	Cephalic, jugular, saphenous
Macaque	Cephalic, saphenous, femoral
Marmoset	Femoral, saphenous
Minipig	Cranial vena cava