

# Guidelines on administration of substances and blood collection in MICE

Procedure	Maximum volume range <sup>a</sup>	Needle size <sup>a</sup>	Sites <sup>b,c,d,e,f</sup>	Anaesthesia <sup>a,g,h</sup>
<b>ADMINISTRATION OF SUBSTANCES (Adults)</b>				
Intradermal	0.05 - 0.1 mL/site Maximum of 6 sites	27-30G x 13mm	Shaved skin over dorsal thorax, back, flank	Yes
Intramuscular	0.05 - 0.1 mL/site <sup>g,i,j</sup> No more than 2 sites per day <sup>g</sup>	26-30G x 13-25mm	Quadriceps muscles / Posterior thigh <sup>k</sup>	No/Yes
Intraperitoneal	10 <sup>a,j</sup> – 80 <sup>g,i</sup> mL/kg Maximum bolus volume is 1% of BW	25-27G x 13-25mm	Lower left or right abdominal quadrants	No
Intravenous	5 <sup>g,i,j</sup> – 10 <sup>l</sup> mL/kg bolus (injected in 1min)	25-30G x 13mm	Lateral Tail vein, Saphenous vein	No
Oral Gavage	10 <sup>a,i</sup> – 50 <sup>g,i</sup> mL/kg	See table below; consider plastic feeding needles	Oral (may be necessary to restrict food intake before dosing of larger volumes) <sup>g</sup>	No (gavage needle)
Subcutaneous	2 - 40 mL <sup>g,i,j</sup> /kg Maximum of 4 sites per session <sup>l</sup>	25-26G x 13-25mm	Loose skin over the intrascapular (scruff), neck, shoulder, back, flank	No
Topical - dermal	Less than 500 µl <sup>i</sup>	NA	Apply test substances uniformly covering no more than 10% of body surface. Prepare site 24 h previously to allow recovery <sup>i,*</sup>	No/ Yes
<b>ADMINISTRATION OF SUBSTANCES in Neonates<sup>h,m,n</sup></b>				
Oral Gavage	0.05 mL From postnatal day 1	30G blunt tip attached to size 10 polyethylene tubing, lubricate end, food dye may be added to visualise administration to stomach (up to 10% of total volume)	Oral	No
Intravenous	0.05 – 0.1 mL From postnatal day 3	33G x 6.35mm T-connector extension	External jugular; Superficial temporal veins (postnatal day 1 and 2 only) <sup>o</sup>	Sedated with mild hypothermia
Intraperitoneal	0.1 mL	30G	Insert needle into skin parallel to right	No

			femoral vessels, then advance subcutaneously until abdominal cavity is punctured	
Subcutaneous	0.1 mL	30G	Neck/ Intrascapular	No
<b>BLOOD COLLECTION (Adults)</b>				
Intravenous – single bleed	up to 7% of TBV weekly	25-30G x 13mm: Lateral tail, Saphenous vein		No
	10% of TBV Every 2 weeks	5.5mm lancet: Superficial Temporal Vein/ Maxillary vein <sup>p</sup>		No/Yes
	15% of TBV Every 3 weeks			
Intravenous – daily bleed	0.05% of BW every 24 hours	Scalpel blade or scissors (tail tip) = Tail clip <sup>q</sup>		No/Yes
Intra-cardiac	Once, terminal bleed	20-25G x 25-38mm	Cardiac puncture	Yes, terminal
Retro-orbital	1x per eye, terminal bleed	27G needle, microhematocrit tube	Retro-orbital venous plexus/sinus	Yes, terminal

Recommended standard gavage needle sizes for use in laboratory mice<sup>h</sup>

Weight range (grams)	Needle size	Ball Diameter	Shape
Up to 14 g	24G x 25mm	1.25mm	Straight
15-20 g	22G x 25-38mm	1.25mm	Straight
20-25 g	20G x 25-76mm	2.25mm	Straight, Curved
25-30 g	18G x 25-51mm	2.25mm	Straight, Curved
30-35 g	18G x 51-76mm	2.25mm	Straight, Curved

**General Considerations:**

- \* Skin area of application for highly toxic substances should be reduced. Avoid eyes and genital areas. Potential welfare impact of tight or adhesive dressings.
- Repeated retro-orbital blood collection must be justified in an animal ethics application
- Consider absorption time for non-aqueous or irritating substances before re-dosing.
- Divide large doses and inject into multiple sites.

**Abbreviations:** TBV = total blood volume; BW = body weight; NA = Not Applicable; min = minute

**Techniques:** Examples of tutorials

- substance administration <http://www.procedureswithcare.org.uk/administration-of-substances/>
- compound administration: [JoVE Science Education Database. Lab Animal Research. Compound Administration I. JoVE, Cambridge, MA, \(2023\).](https://www.jove.com/doi/10.1038/nprot.2013.100)
- blood collection <https://www.nc3rs.org.uk/3rs-resources/blood-sampling>

### Normative data for the mouse<sup>h,e</sup>

Heart Rate	310-840 beats/min
Respiration frequency	163/min
Body temperature	37 <sup>0</sup> – 37.2 <sup>0</sup> C
Food Consumption	5.0 gm/ 8weeks age
Water Consumption	6.7 ml / 8weeks age
Urine Volume	0.5-2.5 ml/24hr
Total blood volume	5.85 <sup>h,e</sup> - 7 <sup>a</sup> ml/100 gm BW

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