



Standard Practice for Detailed Clinical Observations of Test Animals¹

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1. Scope

1.1 This practice describes the terms used in observing and recording cutaneous, gastrointestinal, respiratory, reproductive, neuromuscular, ocular, and general clinical signs of animals undergoing toxicological testing. This practice also assists in properly observing and assessing laboratory animals for signs of disease or adverse effects of compound administration.

1.2 This practice includes codes and descriptions for a wide variety of clinical signs, anatomical locations, and other descriptive qualifiers, and a technique for scoring the extent or severity of clinical signs.

1.3 This practice assumes that the reader is knowledgeable in animal toxicology and related pertinent areas and is trained in making clinical observations.

2. Referenced Documents

2.1 *Federal Standards:*

Title 40, Code of Federal Regulations (CFR), Environmental Protection Agency, Subchapter E, Pesticide Programs, Part 160, Good Laboratory Practice Standards²

Title 40, Code of Federal Regulations (CFR), Toxic Substances Control Act, Part 792, Good Laboratory Practice Standards²

Title 40, Code of Federal Regulations (CFR), Environmental Protection Agency, Part 798, Health Effects Testing Guidelines²

3. Significance and Use

3.1 This practice pertains to all forms of toxicological testing (acute, subchronic, or chronic) performed by any route of administration (inhalation, oral, dermal, ocular, or other).

3.2 The U.S. Environmental Protection Agency, Good Laboratory Practices for Nonclinical Laboratory Studies, as listed in 40 CFR, requires that a testing facility maintain specific standard operating procedures (SOPs) including an SOP covering clinical observations in test animals.

3.3 This practice serves as a basis for consistency in clinical observations. Actual procedures and forms to be used in recording observations must be described in individual study protocols.

4. Procedure

4.1 Observe the health of an animal at a distance and of its housing environment to gain a general impression of its health. Also note environmental factors such as temperature, humidity, ventilation, air quality and hygienic conditions.

4.2 Observe each animal and note any subtle changes in animal behavior, physical appearance, posture, gait, vocalization, food and water consumption, and waste production. See Section 5 for details.

4.3 Observe control animals first, followed by test groups in order of increasing level of treatment. Observe positive control group, if any, last.

4.4 Note any dead animals and collect necessary tissues and data before decomposition occurs.

4.5 Report animals that show signs of sickness so that appropriate diagnosis, treatment, or euthanasia, if appropriate, can be performed.

5. General Clinical Signs

5.1 Note the overall activity, behavior, and condition of the animal. Determine the hydration status by examining skin turgor, position of the eyes such as normal or sunken, mucous membrane color, and capillary refill time. Look for asymmetry or the presence of abnormal swellings, hemorrhage or signs of pain.

5.2 The following are some general conditions along with suggested codes for record keeping that do not fall into any specific organ system. Refer to Annex A1-Annex A3 for a detailed listing of the codes and their descriptions. Other general reference material will also be helpful.^{3,4,5}

5.2.1 Activity may be described as: decreased (ACD); increased (ACI); hyperexcitable (HX); hyperactive (HYP);

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² Available from U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402.

³ Taylor, E.J., ed., *Dorland's Illustrated Medical Dictionary*, W.B. Saunders, Philadelphia, PA, 27th edition, 1988.

⁴ *Stedman's Medical Dictionary*, Williams and Wilkins, Baltimore, MD, 25th edition, 1990.

⁵ Thomas, C.L., ed., *Tabor's Cyclopedic Medical Dictionary*, F. A. Davis Co., Philadelphia, PA, 17th edition, 1993.

lethargic (LE); irritable (IRR); moribund (MB), that is near death; prostate (PRO), that is, exhibiting inability or unwillingness to maintain upright posture.

5.2.2 Body condition may be described as: obese (OBS); thin (THN); decreased rectal temperature (BTD); increased rectal temperature (BTI); hypothermia that is cold to touch (HPO); hyperthermia that is warm to touch (HPR).

5.2.3 Death may be described as: accidental death (AD); euthanized (ETH); found dead (FD).

5.2.4 Examine skin for dehydration (DHY). The skin should fall back into place immediately after it is pulled out of position; if the skin is pulled out of position and tends to stick together or slowly fall back into place, the animal may be dehydrated. Other signs of dehydration include sunken eyeball (SUN), pale or dry mucous membranes (MM), and a capillary refill time of >3 s (CR4). Distinguish between dehydration and various types of shock.

5.2.5 Generalized edema (EDE) may appear as swelling of the limbs, lower abdomen, head or under the mandible. When the apparently fluid-filled tissue is pressed, an indentation may persist for a short time.

5.2.6 Evidence of hemorrhage (HE) may appear on the haircoat (HEH) or underlying skin or nails (HES), in urine (HEU) or feces (HEF), from the mouth (HEM), nose or epistaxis (EPI), eyes (HEO), ears (HEE), genitalia (HEG), or anus (HEA).

5.2.7 Jaundice (JAU) is an overall slight yellow to pale orange tinge to the skin and mucous membranes.

5.2.8 Mucous membrane condition (MM) is noted by the color and condition of the mucous membranes of the eye, nose, mouth, or external genitalia.

5.2.9 Swelling (SW) is noted by the size, location and probable cause, such as edema (SWE) from: a solid tissue or tumor (SWT); blood (SWH); air (SWA); or pus (SWB).

6. Specific Clinical Signs

6.1 Inspect the entire haircoat and underlying skin for integumentary signs. Some common clinical signs and their suggested codes are as follows:

6.1.1 Alopecia, that is, hair loss (ALO), includes hair thinning, patchy/focal hair loss or balding.

6.1.2 Haircoat condition (HC) may be described as: oily (HCO); rough (HCR); wet (HCW); soiled (HCS); dry (D); bloody (HEH); or piloerection (HCP), that is, distinctly raised fur, excluding the vibrissae, giving a bristled or porcupine-like appearance.

6.1.3 Swelling (SW) is an increase in tissue size or increased abnormal shape of the skin or other organs from abnormal presence of: air, that is, emphysema (SWA); fluid or water, that is, edema (SWE); solid tissue or tumor (SWT); blood, that is, hematoma (SWH); pus, that is, abscess (SWB).

6.1.4 Skin condition (SK) may be described as: thickened (SKT); thinned (SKH); scaly (SKS); dry (SKD); or red (SKY) (see 6.1.5).

6.1.5 Erythema (ERY) is an increased pink or red color on smooth skin.

6.1.6 Rash (RAS) is small red, pink or white dots or pustules on the skin; petechiae (PET) are red dots formed from blood.

6.1.7 Blisters (BLS) are fluid-filled vesicles. The fluid is usually clear, but can be pink (blood-tinged) or red/brown (filled with blood). White-filled vesicles are either pustules (RAS) (< 5 mm) or abscesses (SW) (> 5 mm).

6.1.8 Color change (CC) may be other than pink or red, for example, bluish-black as in brushing, green as in bruising or severe infection, brown as in increased pigmentation, or white as in blanching.

6.1.9 Abrasions (ABR) are denuded skin or mucous membrane.

6.1.10 Lacerations (LCN) are cuts in the skin from mechanical injury, that is, bite, scratch, foreign object, and so forth.

6.1.11 Ulceration (ULC) is an open sore accompanied by the disintegration of tissue, usually with necrosis, that is, death of tissue.

6.1.12 Scab (SCB) is an eschar formed from sloughed skin.

6.1.13 Pruritis (PRU) is itching evidenced by scratching, with or without a rash or abrasion.

6.1.14 Urticaria (URT) is a transient appearance of smooth, slightly elevated bumps which are redder or paler than the surrounding skin and often accompanied by severe itching. Urticaria often appears as localized, discrete or confluent areas of edema.

6.1.15 Purpura (PUR) is confluent petechiae, that is, pinpoint hemorrhages, which form ecchymoses, that is, blotchy hemorrhages over any part of the body.

6.1.16 Common manifestations of dermal sensitivity reactions are:

6.1.16.1 Contact dermatitis (COD) is pruritis, erythema and vesiculation that may be followed by pustulation and necrosis and that has a pattern consistent with the touch of a foreign object or substance.

6.1.16.2 Exanthema (EXA) is macular or papular redness in discrete areas.

6.1.16.3 Exfoliation (EXF) is loss of superficial skin layers with redness, swelling, and presence of free blood.

6.1.16.4 Bullous eruption (BUL) is the presence of discrete serous or seropustular areas.

6.1.16.5 Erythema multiform (EMF) is the presence of multiple types of macules, papules and nodules.

6.2 Gastrointestinal signs are observed during external evaluations of the gastrointestinal system conducted from the oral cavity to the anal area. Visually inspect the teeth and mucous membranes of the oral cavity, palpate the abdomen and inspect the perianal area. An inspection of the animal's cage will allow evaluation of the volume, color, and consistency of the stool.

6.2.1 Oral cavity signs and codes are:

6.2.1.1 Salivation may be described as: increased salivation (SAL); or lack of saliva, that is, xerostomia (XER).

6.2.1.2 Dentition (TE) includes: missing teeth (TEM); loose teeth (TEL); discolored teeth (TEC); damaged teeth (TED); or malocclusion (TEO).

6.2.1.3 For mucous membranes, note capillary refill time (CR), color, and condition, such as erosions or vesicles.

6.2.1.4 Gums may be described as: healthy, intact (GUH); or gingivitis (GUI), that is, inflamed or bleeding gums.



6.2.2 For the abdomen, look at the overall symmetry and size. The abdomen may be described as: smaller or more “tucked-in” (STA) if the animal is dehydrated; larger as distended or pendulous abdomen (OPA); or asymmetrical as if an enlargement or swelling in a focal area (SW).

6.2.3 In the perianal area, look for: abnormal anal sphincter (OEA); fecal (FEF) or urine staining (PEU); matted hair (PEH); mucous (PEM); or rectal prolapse (RPR), that is, a red to dark red tubular protrusion from the anus.

6.2.4 For feces, note: consistency, such as normal (FEN), hard or dry (FEH), soft or watery (FED), oily (FEO); amount, such as none (FEA), small (FES), normal (FEN) or large (FEL); content, such as normal (FEN), blood (FEB), mucous (FEM) or foreign material (FEF); or evidence of straining to defecate, that is, tenesmus (TEN). Hard feces may indicate constipation. Soft or watery feces may indicate diarrhea.

6.2.5 Function may be anorexia or loss of appetite (ANO), emesis or vomiting (EM).

6.3 Respiratory signs are found by evaluating the following:

6.3.1 Rate of breathing (RR) may be slow (RRS), normal (RRN), or fast (RRF).

6.3.2 Depth of breathing (RD) may be shallow (RDS), normal (RDN), or deep (RDD).

6.3.3 Difficulty in breathing is dyspnea (DYS).

6.3.4 Periodic cessation of breathing is apnea (APN).

6.3.5 Nasal discharge (ND) is either none (NDN), clear (NDC), yellow (NDY), green (NDG), or white (NDW).

6.3.6 Respiratory sounds include rales (RAL), coughing (COU), gasping for air (G), and sneezing (SNE).

6.3.7 Epistaxis (EPI) is the free flow of blood or hemorrhage from the nose. This is sometimes indicated by the presence of dry blood or dark material around the nose.

6.4 For reproductive or urogenital signs, carefully examine the external genitalia and look for evidence of normal or abnormal reproductive discharge. Examine the amount and color of urine and whether or not the animal is expressing signs of incontinence or difficulty in urination (difficult to distinguish from tenesmus). When applicable, note breeding behavior, pregnancy, abortion, and quality of mothering.

6.4.1 Male examination is as follows:

6.4.1.1 For external genitalia, look for the presence (TSB), absence (TSA or TSC), and condition of the testicles (TSE, TED, or TSN); paraphimosis (PM), that is, inability to retract penis into foreskin, or abnormal discharge from the penis.

6.4.1.2 Penile discharge is either none (PDA), normal (PDN), increased (PDI), bloody (PDB), serous (PDS), or mucous (PDM).

6.4.2 Female examinations include:

6.4.2.1 In external genitalia look for mucous membrane abnormalities (MM) or swellings (SW) of the vagina (VA) or vulva (VA).

6.4.2.2 In vaginal discharge types or consistency of discharge are: none (VDN), normal (VDN), increased (VDI), decreased (VDD), bloody (VDB), serous (VDS), or mucous (VDM).

6.4.3 For urine or urination note the following conditions:

6.4.3.1 Hematuria (HEU) is bloody urine. Use caution with rabbits as their urine may range from amber to light red without the presence of blood.

6.4.3.2 Anuria (ANU) is the absence of urine for a prolonged period.

6.4.3.3 Dysuria (DYU) is difficulty urinating; be sure to differentiate with tenesmus.

6.4.3.4 Polyuria (PLY) is excessive volume of urine.

6.4.4 Fertility signs include the following:

6.4.4.1 Breeding efficiency may be failure to breed (FTB), conceive (FTC), or low litter size or weight (LLS).

6.4.4.2 Abortion (ABO) is premature delivery of dead offspring.

6.4.4.3 For pregnancy status, animal appears pregnant (APR).

6.4.4.4 Mothering may be described as: poor care of young (PCY); evidence of cannibalism (CAN); or poor milk production (PMP).

6.5 Neuromuscular signs include disease, trauma, and compounds which adversely affect the central or peripheral nervous system resulting in structural or functional changes being seen in the neuromuscular system, or degree of alertness or activity in animals. Evaluation of locomotion and coordinated movements may reflect the status of the animal's neuromuscular system.

6.5.1 Musculoskeletal signs may be lameness or weight bearing (LMW) or non-weight bearing (LMN), limb paralysis (LP), or enlarged appendage (ENA).

6.5.2 Posture or head carriage may be normal (HDN), tilted (HDT), raised (HDR), lowered (HDL), or hunched posture (HP); gait may be normal (GAN), exaggerated (GAE), or slow (GAS).

6.5.3 Central nervous systems signs include comatose (COM), tremors (TR), convulsions (CON), ataxia (ATX), circling (CIR), or paralysis (PAR).

6.6 For ocular signs, carefully examine the orbit and eyeball including the eyelids, conjunctiva, cornea, sclera and pupil. If necessary, use a penlight to determine the direct and consensual pupillary light reflexes. Note abnormal eye movements such as excessive squinting, nystagmus, photophobia and apparent inability to see. Note the presence, consistency and color of any tearing or discharge.

6.6.1 Squinting (SQ) is blepharospasm or involuntary partial eye closure (see also 6.6.9).

6.6.2 Excessive blinking (BLI).

6.6.3 Conjunctivitis (CJS) is inflamed conjunctiva or reddening and swelling of membranes around the eyeball.

6.6.4 Tearing (LAC) is lacrimation or excessive secretion of clear tears.

6.6.5 Chromodacryorrhea (CHR) is brown, red, or yellowish tears.

6.6.6 Crusty eyes (CRE) denotes a collection of dried material around the eyeball.

6.6.7 Miosis (MIO) is the contraction of the pupil, that is, dark portion, of the eye.

6.6.8 Mydriasis (MYD) is dilation of the pupil, that is, dark portion, of the eye.

6.6.9 Photophobia (PHB) is squinting due to light intolerance.

6.6.10 Eyelid ptosis (PTO) is drooping of the upper eyelid.

6.6.11 Relaxed nictitating membrane (RNM) is protruding or prominent third eyelid.

6.6.12 Nystagmus (NYS) is involuntary, rapid eye movement.

6.6.13 Pannus (PAN) describes blood vessels or granular tissue visible on the cornea.

6.6.14 Corneal opacity (COP) is when the cornea is opaque, but does not seem inflamed.

6.6.15 Scleritis (SCL) is inflammation of the sclera or white part of the eyeball.

6.6.16 Lens opacity or cataract (CAT) is an opaque lens, apparent behind the pupil.

6.6.17 Exophthalmos (EXO) is a protrusion of the eyeball from the bony orbit.

6.6.18 Microphthalmia (MIC) is when the eye appears abnormally small.

6.6.19 Apparent blindness (BLD) is seeming inability to see objects.

6.6.20 Pupillary light reflex is as follows:

6.6.20.1 No direct light reflex (PLD) is when the pupil fails to constrict when stimulated with light.

6.6.20.2 No consensual light reflex (PLC) is when light is shined in one eye and the pupil of the opposite eye fails to constrict.

6.6.21 Sunken eye ball (SUN) is when the eyeball appears to be sunken into the orbit.

7. Quality Assurance

7.1 To ensure the quality and reliability of data developed using this practice, follow good laboratory practices (see Section 2).

8. Keywords

8.1 adverse reactions; animals; clinical codes; clinical signs; toxicity

ANNEXES

(Mandatory Information)

A1. CLINICAL SIGNS AND CODES

A1.1 Table A1.1 gives the codes for the clinical signs described in this practice.

TABLE A1.1 Clinical Signs and Codes

Code	Clinical Signs
ABO	Abortion (premature delivery of dead offspring)
ABR	Abrasion
abscess	see SW swelling
ACD	Activity decreased
ACI	Activity increased
AD	Accidental death
ALO	Alopecia (hair loss)
ANO	Anorexia (loss of appetite)
ANU	Anuria
APN	Apnea (periodic cessation of breathing)
APR	Appears pregnant
AT	Ataxia
BLD	Apparent blindness
BLI	Excessive blinking
BLS	Blisters
BTD	Body temperature decrease
BTI	Body temperature increase
BUL	Bullous eruption
CAN	Cannibalism
CAT	Cataract
CC	Color change
	B Black
	L Blue
	W White
	R Brown (for example, increased pigmentation)
	G Green
	Y Yellow
	O Orange
	A Gray
CHR	Chromo dacryorrhea (shedding colored tears)
CIR	Circling
CJS	Conjunctivitis
CL	Clear

TABLE A1.1 Continued

Code	Clinical Signs
COD	Contact dermatitis
COM	Comatose
CON	Convulsion
COP	Corneal opacity
COU	Coughing
CR	Capillary Refill Time
	1 One second
	2 Two seconds
	3 Three seconds
	4 Greater than three seconds
CRE	Crusty eyes
DHY	Dehydration
DOR	Dorsal
DPA	Distended/pendulous abdomen
DR	Dry
DYS	Dyspnea (difficulty or labored breathing)
DYU	Dysuria (difficulty urinating)
EDE	Edema (generalized) ^A
EL	Left eye
EM	Emesis (throw up of contents of stomach by mouth)
EMF	Erythema multiforme
ENA	Enlarged appendage
EPI	Epistaxis (free flow of blood from the nose)
ER	Right eye
ERY	Erythema
ETH	Euthanized
EXA	Exanthema
EXF	Exfoliation
EXO	Exophthalmos
FE	Feces
	N Normal
	H Hard or dry
	D Soft or watery (diarrhea)
	S Small amount
	L Large
	B Blood
	M Mucous

TABLE A1.1 *Continued*

Code	Clinical Signs
	F Foreign material
	O Oily
	A Absent
FD	Animal found dead
FTB	Failure to breed
FTC	Failure to conceive
G	Gasping
GA	Gait
	N Normal
	E Exaggerated
	S Slow
GU	Gums
GUH	Healthy gums
GUI	Inflamed/bleeding gums
HCV	Haircoat
	O Oily
	R Rough
	W Wet
	S Soiled
	D Dry
	P Piloerection
HD	Head carriage
	N Normal
	T Head tilt
	R Head raised
	L Head lowered
HE	Hemorrhage (blood loss)
	H Blood anywhere on the haircoat
	S Blood from underlying skin or nails
	U Blood in urine
	F Blood in feces
	M Blood from the mouth ^B
	O Blood from the eyes
	E Blood from the ears
	G Blood from the genitalia
	A Blood from the anus
HP	Hunched posture
HPO	Hypothermia (cold to touch)
HPR	Hyperthermia (warm to touch)
HR	Hard
HX	Hyperexcitability
HYP	Hyperactive
IRR	Irritability
JAU	Jaundice
LAC	Lacrimation (tearing)
LCN	Laceration
LE	Lethargy
LLS	Low litter size or weight
LO	Lower
LM	Lameness
	W Weight-bearing
	N Non weight-bearing
LP	Limb paralysis
MB	Moribund
MIC	Microphthalmia
MIO	Miosis
MM	Mucous membrane
	P Pink
	R Red
	A Pale
	G Gray
	E Erosions
	V Vesicles/blisters
MYD	Mydriasis
N	Normal
NC	No change
ND	Nasal discharge
	N None
	C Clear
	Y Yellow
	G Green
	W White
NO	Nose
NYS	Nystagmus

TABLE A1.1 *Continued*

Code	Clinical Signs
OBS	Obese
ORO	Oral cavity
PAN	Pannus (superficial vascularization of the cornea)
PAR	Paralysis
PCY	Poor care of young
PD	Penile discharge
	A Absent
	N Normal
	I Increased
	B Bloody
	S Serous
	M Mucous
PE	Perineal area
	A Abnormal anal sphincter
	F Fecal staining
	U Urine staining
	M Mucous
	H Matted hair
PET	Petechiae
PHB	Photophobia
PLC	No consensual light reflex
PLD	No direct light reflex
PLY	Polyuria (excessive volume of urine)
PM	Paraphimosis (inability to retract penis into foreskin)
PMP	Poor milk production
PN	Penis
PRO	Prostration
PRU	Pruritus
PTO	Ptosis (dropping of the upper eyelid)
PUR	Purpura
RAL	Rales
RAS	Rash
RD	Respiratory depth
	S Shallow
	N Normal
	D Deep
RNM	Relaxed nictitating membrane
RPR	Rectal prolapse
RR	Respiratory rate
	S Slow
	N Normal
	F Fast
RS	Removed from study
S1	<1 cm
S2	1-5 cm
SAL	Salivation increased
SCB	Scab
SCL	Scleritis
SF	Soft
SK	Skin
	T Thickened
	H Thinned
	S Scaly
	D Dry
SNE	Sneezing
SQ	Squinting
SSM	Small stationary tissue mass (<2 cm dia)
STA	Smaller or tucked-in abdomen
STM	Small movable tissue mass (<2 cm dia)
SUN	Sunken eyeball
SW	Swelling
	E Edema (swelling from abnormal fluid into tissue)
	T Tissue (solid tissue or tumor)
	H Hematoma (swelling from blood)
	A Air in an abnormal place (emphysema)
	B Abscess (swelling from pus)
	O Due to organ enlargement (for example, enlarged liver or spleen)
TA	Tail
TE	Teeth
	M Missing
	L Loose
	C Discolored
	D Damaged
	O Malocclusion

**TABLE A1.1** *Continued*

Code	Clinical Signs
TEN	Tenesmus (straining to defecate)
THN	Thin
TR	Tremors
TS	Testicles
	A Absent
	B Bilateral (both present)
	C Cryptorchid (one absent or not descended)
	E Enlarged
	D Decreased in size
	N Normal
ULC	Ulceration
UP	Upper
URT	Urticaria
VA	Vagina

TABLE A1.1 *Continued*

Code	Clinical Signs
VEN	Ventral
VD	Vaginal discharge
	A Absent
	N Normal
	I Increased
	D Decreased
	B Bloody
	S Serous
	M Mucous
VU	Vulva
XER	Xerostomia (dryness of mouth from lack of saliva)

^A See SW (swelling) for localized edema.^B See also EPI (epistaxis).**A2. SEVERITY AND EXTENT SCALES**

A2.1 Table A2.1 gives the scales for indicating the severity and extent of clinical signs noted in accordance with this practice.

TABLE A2.1 **Severity and Extent Scales**

Scale	Description
1	Minimal severity
2	Minimal to moderate severity
3	Moderate severity
4	Moderate to severe severity
5	Severe severity
E1	Focal
E2	Multifocal
E3	Generalized

A3. ANATOMICAL LOCATIONS

A3.1 Table A3.1 gives the codes for the anatomical locations noted in accordance with this practice.

TABLE A3.1 Anatomical Locations

Code	Location
DOR	Dorsal
DR1	Dorsal right cranial
DL1	Dorsal left cranial
DR2	Dorsal right cervical
DL2	Dorsal left cervical
DR3	Dorsal right cranial thoracic
DL3	Dorsal left cranial thoracic
DR4	Dorsal right caudal thoracic
DL4	Dorsal left caudal thoracic
DR5	Dorsal right lumbar area
DL5	Dorsal left lumbar area
DR6	Dorsal right
DL6	Dorsal left
DR7	Right sacral area
DL7	Left sacral area
EL	Left eye
ER	Right eye
NO	Nose
ORO	Oral cavity
PA	Perineal area

TABLE A3.1 Continued

Code	Location
PN	Penis
TA	Tail
TS	Testicles
VA	Vagina
VU	Vulva
VEN	Ventral
VR1	Ventral right cranial
VL1	Ventral left cranial
VR2	Ventral right cervical
VL2	Ventral left cervical
VR3	Ventral right cranial thoracic
VL3	Ventral left cranial thoracic
VR4	Ventral right caudal thoracic
VL4	Ventral left caudal thoracic
VR5	Ventral right cranial abdominal
VL5	Ventral left cranial abdominal
VR6	Ventral right caudal abdominal
VL6	Ventral left caudal abdominal
VR7	Ventral right inguinal area
VL7	Ventral left inguinal area
LR1	Right front limb
LL2	Left front limb
LR3	Right rear limb
LR4	Left rear limb

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