Body Composition (DEXA lean/fat) HAS_DXA_002

Purpose

Measure bone mineral content and density as well as body composition in mice using the DEXA (Dual Energy X-ray Absorptiometry) analyser.

Experimental Design

- **Age at test:** Females at 16 and 51 weeks.

Procedure

3.1 Calculate and record the volume of anaesthetic solution required for intraperitoneal (IP) injection.

3.2 Anesthetize the mice.

3.3 Monitor the animal carefully until unconsciousness by ensuring that the mouse is adequately sedated.

3.4 Weigh the mouse and record the value.

3.5 Measure the length of the mouse as follows and record the value (accuracy ±0.1cm)

3.5.1 Place the unconscious mouse on a disinfected ruler so that its nose is at zero

(figure 1).

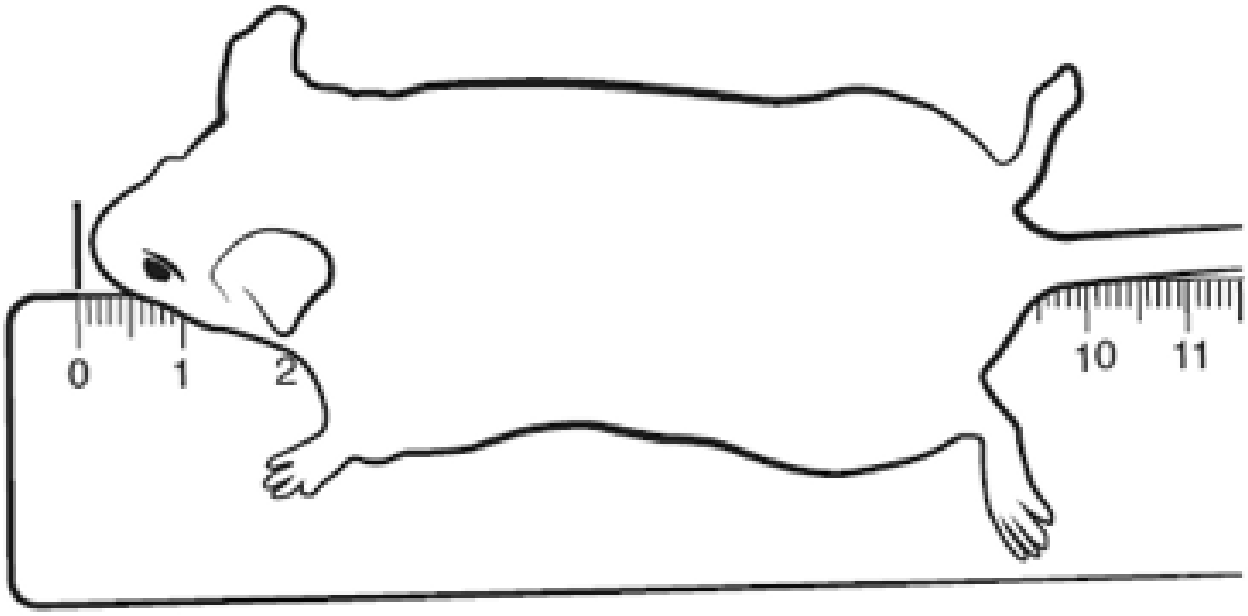

Figure 1

3.5.2 To measure the entire length of the head press gently against the ruler (figure 2) and gently pull the tail to ensure that the spine returns to its full length (figure 3).

Figure 2

Figure 3

3.5.3 Measure the length starting from the nose (0cm) to the beginning of the tail (figure 4). Record the measurement – the accuracy is within 0.1cm. For example in figure 4 the length of the mouse is 9.5cm.

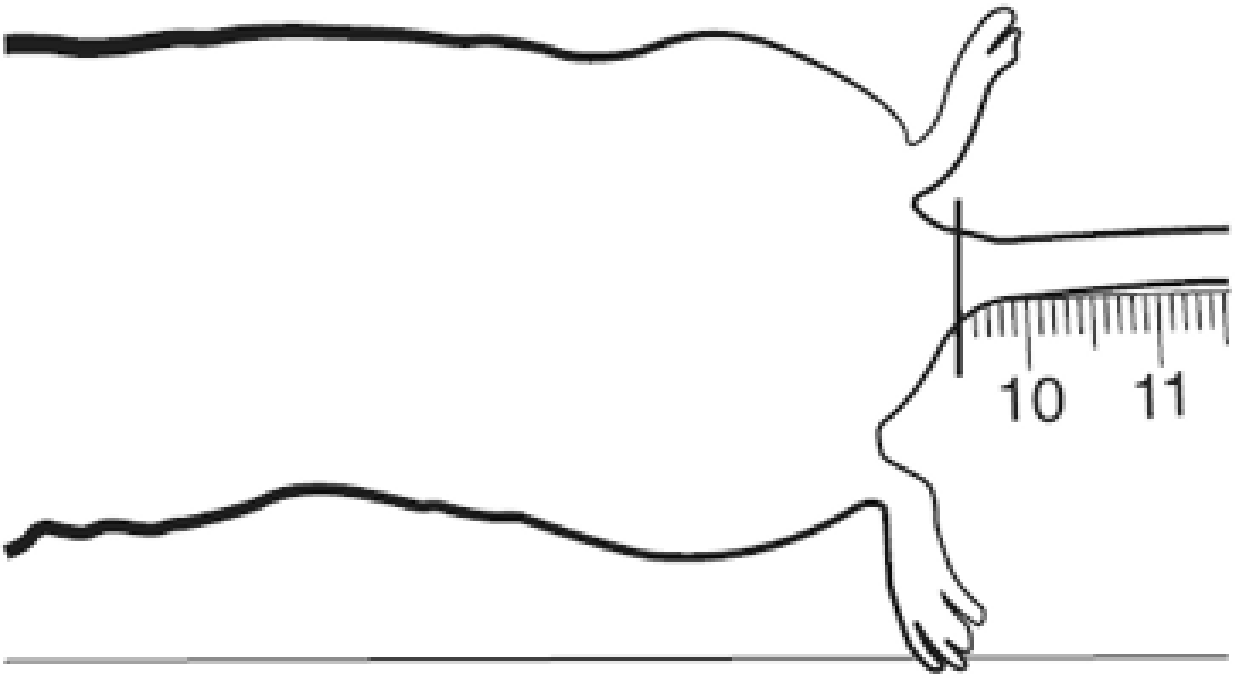

Figure 4

3.5.4 Disinfect the ruler and contact area after the measurement has been taken.

3.6 Place the unconscious mouse into the DEXA analyser.

3.7 Perform a scout-scan.

3.8 Optimise the area of interest and perform a measure-scan.

3.9 Note that the exposure dose per mouse is 300Sv.

3.10 For the analysis of the data, regions of interest must be defined. The standard analysis comprises of a whole body analysis excluding the head area.

Continue with X-ray analysis or

3.11 Remove the mouse once the image is captured. Place the mouse on a heated mat, set at 37ºC, in a cage and monitor closely until consciousness is regained.

Notes

Dual-energy X-ray Absorptiometry (DEXA or DXA) is a method of quantifying bone mineral content and density. DXA uses an X-ray generator of high stability to produce photons over a broad spectrum of energy levels. Its photon output is filtered to produce the two distinct peaks necessary to distinguish bone from soft tissue.

The technique used for separating photon output into two distinct energy levels is known as ‘K-edge’ filtration. By placing a filter element in the beam path, energy levels reacting with the filter material are sharply attenuated. The filter effect gradually lessens at higher energy

levels, and so a second peak is introduced. The tin filter material used in this system produces energy peaks at 28keV and 48keV. Two solid-state detectors and proprietary energy discrimination are used to determine high and low energy counts.

The count data is transformed by software into bone and non-bone components, thus generating the bone density values. Information is generated about body weight, body length, fat and bone mass, bone mass density, and lean mass of each mouse.

Data QC

Calibration of the system is done in daily intervals using the phantoms delivered by the manufacturer. The results from the calibration runs are recorded by the system.

Parameters and Metadata

Body weight HAS_DXA_001_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

Unit Measured: g

Description: body_weight

Fat mass HAS_DXA_002_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: g

Description: fat_mass

Lean mass HAS_DXA_003_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: g

Description: lean_mass

Bone Mineral Density (excluding skull) HAS_DXA_004_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: g/cm^2

Description: bone_mineral_density_excluding_skull_

Bone Mineral Content (excluding skull) HAS_DXA_005_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: g

Description: bone_mineral_content_excluding_skull_

Body length HAS_DXA_006_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: cm

Description: body_length

BMC/Tissue weight HAS_DXA_007_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: g

Derivation: archived('Bone Mineral Content/Tissue Weight')

Lean/Tissue weight HAS_DXA_008_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: g

Derivation: archived('Lean mass/Tissue Weight')

Fat/Tissue weight HAS_DXA_009_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: g

Derivation: archived('Fat mass/Tissue Weight')

Bone Area HAS_DXA_010_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: cm^2

Equipment ID HAS_DXA_011_001 | v1.2

procedureMetadata

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

Description: equipment_name

Equipment manufacturer HAS_DXA_012_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Description: equipment_manufactuer

Equipment model HAS_DXA_013_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Description: equipment_model

Anesthesia HAS_DXA_015_001 | v1.0

procedureMetadata

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

Description: anesthesia

Experimenter ID HAS_DXA_016_001 | v1.0

procedureMetadata

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

Date equipment last calibrated HAS_DXA_017_001 | v1.0

procedureMetadata

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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Date of procedure HAS_DXA_018_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

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Alive HAS_DXA_019_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

Description: alive

Options: Yes, No - terminal bleed, No - frozen, No - fixed,

Threshold HAS_DXA_014_001 | v1.3

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Total tissue mass HAS_DXA_020_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

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Tissue area HAS_DXA_021_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

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RST HAS_DXA_022_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

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Minor Axis pixels HAS_DXA_023_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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Major Axis pixels HAS_DXA_024_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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CenterElipseX pixels HAS_DXA_025_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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CenterElipseY pixels HAS_DXA_026_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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CenterRectX pixels HAS_DXA_027_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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CenterRectY pixels HAS_DXA_028_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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LengthRect pixels HAS_DXA_029_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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WidthRect pixels HAS_DXA_030_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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DegAngle degrees HAS_DXA_031_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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Procedural comments HAS_DXA_032_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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Anaesthetic reversal HAS_DXA_033_001 | v1.0

procedureMetadata

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

Description: anaesthetic_reversing_agent

Options: Yes, No,

Anesthetic agent 1 HAS_DXA_034_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Description: anesthetic_agent_1

Options: Ketamine,

Anesthetic agent 2 HAS_DXA_035_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Description: anesthetic_agent_2

Options: Xylazine,

Anesthetic agent 1 dosage HAS_DXA_036_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Unit Measured: mg/g

Description: anesthetic_agent_1_dosage

Options: 1,

Anesthetic agent 2 dosage HAS_DXA_037_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Unit Measured: mg/g

Description: anesthetic_agent_2_dosage

Options: 0.01,

General comments HAS_DXA_038_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

Description: general_comments_about_the_mouse

Site HAS_DXA_039_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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Software version HAS_DXA_040_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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% BMC HAS_DXA_041_001 | v1.2

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: %

% Lean HAS_DXA_042_001 | v1.2

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: %

% Fat HAS_DXA_043_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: %
