

# 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  $\pm 0.1$ cm)

3.5.1 Place the unconscious mouse on a disinfected ruler so that its nose is at zero (figure 1).

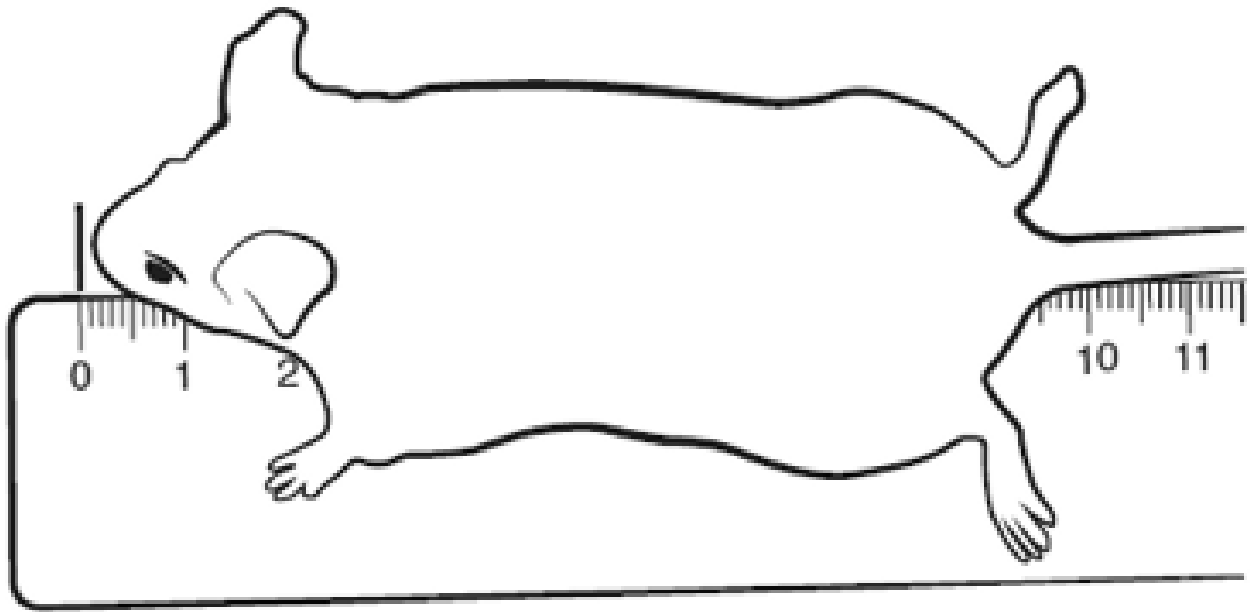


Figure 1

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.

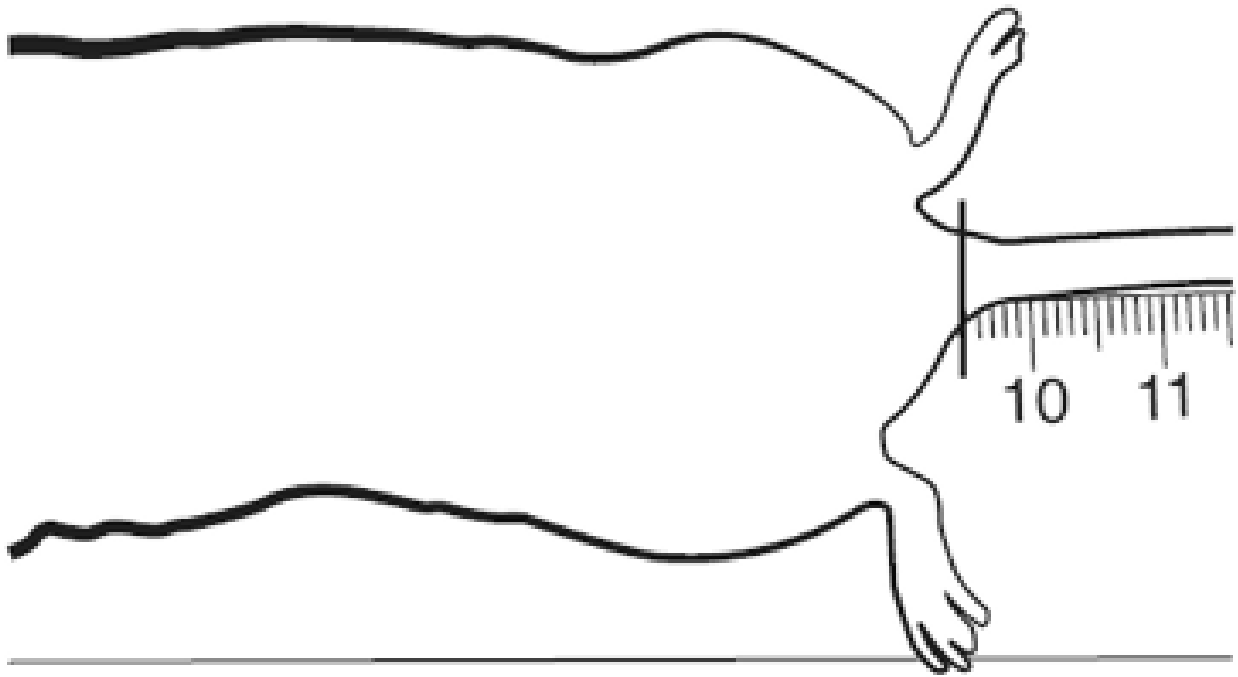


Figure 4

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 37°C, 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

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### Fat mass HAS\_DXA\_002\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: true

Is Annotated: true

Unit Measured: g

Description: fat\_mass

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## Lean mass HAS\_DXA\_003\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: true

Is Annotated: true

Unit Measured: g

Description: lean\_mass

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## 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<sup>2</sup>

Description: bone\_mineral\_density\_excluding\_skull\_

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## 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\_

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## Body length HAS\_DXA\_006\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: true

Is Annotated: true

Unit Measured: cm

Description: body\_length

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## 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')

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## 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')

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## 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')

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## Bone Area HAS\_DXA\_010\_001 | v1.1

simpleParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: true

Unit Measured: cm<sup>2</sup>

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## Equipment ID HAS\_DXA\_011\_001 | v1.2

procedureMetadata

Req. Analysis: false

Req. Upload: true

Is Annotated: false

Description: equipment\_name

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## Equipment manufacturer HAS\_DXA\_012\_001 | v1.0



procedureMetadata

**Req. Analysis:** true

**Req. Upload:** true

**Is Annotated:** false

**Description:** equipment\_manufactuer

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## **Equipment model** HAS\_DXA\_013\_001 | v1.0

procedureMetadata

**Req. Analysis:** true

**Req. Upload:** true

**Is Annotated:** false

**Description:** equipment\_model

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## **Anesthesia** HAS\_DXA\_015\_001 | v1.0

procedureMetadata

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** false

**Description:** anesthesia

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## **Experimenter ID** HAS\_DXA\_016\_001 | v1.0

procedureMetadata

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** false

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## **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,

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## **Threshold** HAS\_DXA\_014\_001 | v1.3

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

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## **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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## CenterEllipseX pixels HAS\_DXA\_025\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: false

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## CenterEllipseY 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,

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## 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,

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## 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,

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## 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,

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## 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,

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## General comments HAS\_DXA\_038\_001 | v1.1

simpleParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: false

Description: general\_comments\_about\_the\_mouse

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**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: %

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## **% Lean** HAS\_DXA\_042\_001 | v1.2

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Unit Measured:** %

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## **% Fat** HAS\_DXA\_043\_001 | v1.1

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Unit Measured:** %

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