Minispec HMGULA_MIN_002

Purpose

The Minispec qNMR is a benchtop scanner that provides information about body composition parameters by using quantitative approach of a time-resolved nuclear magnetic resonance method for detection of Hydrogen (+H). The instrument allows to quantify fat, lean mass and body fluids of non-anesthetised mice. The NMR signals and corresponding amplitudes are correlated with the calibration samples properties. By using a calibration system with reference standards, the machine extrapolates values expressed in grams for lean and fat mass and in milliliters for biological fluids quantization.

Experimental Design

- **Minimum number of animals:** 7M or7F
- **Age at test:** Unrestricted
- **Sexual dimorphism:** In general, female mice have higher body fat compared to males, which instead show greater amount of lean mass and therefore higher body weight. Genotype x sex interaction are not rare and therefore testing only one sex is acceptable but not recommended.

It is essential that all phenotyping experimentation is conducted in such a way as to reduce stress on the animal.

Equipment

1. Analyzer unit containing the magnet system, the probe assembly and all electronics
2. Standard PC with user interface (GUI) for measurement control and data processing with apparatus software installed
3. Body weight scale
4. Calibration/ Daily Check sample
5. Sample tube

Procedure

1. Prepare and calibrate the Minispec NMR system to confirm the accuracy measurement by performing a daily check prior to each experiment

2. Select the appropriate calibration curve, previously generated in the software interface, covering highest and lowest values

3. Place the animal on a weight scale and report the exact body weight at the time of measurement

4. Place the animal in the measuring tube and insert the latter in the machine and start the measurement by clicking the specific button on the computer interface

5. Wait for the analysis to be over and remove the animal from the tube by placing it back inside its cage

6. Wipe clean the tube to remove any feces or urine residues

7. Repeat the same procedure for other animals

8. Generating a data report: Download and upload of all the data from the experimentation including:

    - Fat mass (grams)
    - Lean mass (grams)
    - Free fluids (milliliters)
    - Body weight (grams)

9. Wash and wipe clean the tube and removable tools with appropriate disinfectant solution (Magnesium monoperoxyphthalate hexahydrate)

Notes

The system requires periodic daily check for calibration to ensure precise measurements. The calibration procedure consists of the insertion of a sampling tube of known composition and it is required on a daily basis. The analyzers should not be shut down if not urgently required for maintenance. Minispec analysis should not be conducted after a long fasting in order to avoid body fat or lean mass loss.

Personal Safety:

The instrument contains strong magnetic fields, some of which extend beyond the magnet unit house. These pose no danger to routine users but are hazardous to persons with heart pacemakers or other medical implantations as well as metal implants.

Ferromagnetic materials, tools and electromagnets must be kept away from the device.

Data QC

1. Correct calibration according to manufacturer's manual.
2. Minispec daily-check successfully conducted.
3. Weight scale calibration correctly done.
4. Cleaning of sample tube between measurements.
5. For each animal, 2 measurements are taken at different times. Data with sequence_id 1 is the first measurement and data with sequence_id 2 is the second measurement.

Parameters and Metadata

Fat mass NMR HMGULA_MIN_003_001 | v1.0

simpleParameter

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

Unit Measured: g

Lean mass NMR HMGULA_MIN_004_001 | v1.0

simpleParameter

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

Unit Measured: g

Body mass NMR HMGULA_MIN_005_001 | v1.0

simpleParameter

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

Unit Measured: g

Free fluid HMGULA_MIN_006_001 | v1.0

simpleParameter

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

Unit Measured: g

Date/time of procedure start HMGULA_MIN_007_001 | v1.0

procedureMetadata

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

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Minispec equipment ID HMGULA_MIN_008_001 | v1.0

procedureMetadata

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

Options: 1030, 1258,

Minispec equipment manufacturer HMGULA_MIN_009_001 | v1.0

procedureMetadata

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

Options: Bruker,

Minispec equipment model HMGULA_MIN_010_001 | v1.0

procedureMetadata

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

Options: Minispec LF50, Minispec LF65,

Mouse status HMGULA_MIN_011_001 | v1.0

procedureMetadata

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

Options: Awake,

Anesthesia HMGULA_MIN_012_001 | v1.0

procedureMetadata

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

Options: No anesthesia,

Experimenter ID HMGULA_MIN_013_001 | v1.0

procedureMetadata

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

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Balance equipment ID HMGULA_MIN_014_001 | v1.0

procedureMetadata

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

Options: 1158, 1259, 1000, 1299,

Balance manufacturer HMGULA_MIN_015_001 | v1.0

procedureMetadata

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

Options: Kern & Sohn GmbH, Sartorius,

Balance equipment model HMGULA_MIN_016_001 | v1.0

procedureMetadata

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

Options: 440-47N, Cubis, CP2202S,
