LabMaster/Phenomaster systems: Indirect calorimetry for mice

The LabMaster/Phenomaster instruments (TSE systems) consists of a combination of sensitive feeding and drinking sensors for automated online measurement. The calorimetry system is an open-circuit system that determines O2 consumption, CO2 production, and respiratory exchange ratio (RER). A photobeam-based activity monitoring system detects and records ambulatory movements, including rearing and climbing, in every cage. All the parameters are measured continuously and simultaneously

1. Training: prior to the measurement of the mice in the LabMaster/PhenoMaster systems the mice will be trained to drink from drinking bottles and eat from eating baskets similar to the ones in the system. This training period may last up to 4 days.

2. Habituation: Mice will be singly housed in the metabolic cages for 48h in which they will habituate to the new environment.

3. Testing: In the metabolic cages the above mentioned parameters will be monitored continuously. Mice will be monitored for 48-96h.

4. The additional features/protocols may be used:
a. Food preference (between two commercial available diets)
b. Food deprivation (for maximum of 24h) with water offered ad libitum.
c. Administration of the food in certain regime using feeder access control (for example food will be available only during the dark phase)
d. Administration of high-fat diet.
e. Leptin sensitivity test: includes daily injection of leptin (1mg/kg, 100microleter i.p) for 3 consecutive days.
f. Measurement of exercising induces gas exchange and energy expenditure- when combined with the Treadmill apparatus. The Treadmill system (TSE-systems) is a computerized electronically-controlled system that is used to assess exercise physiology in mice. A servo-controlled motor provides precise speed profiles ranging from 0.07 to 2m/sec, as either constant speed or acceleration/deceleration phases with adjustable durations; The inclination angle may be adjusted (-10 to + 25 degrees). The mouse is forced-exercised. A mouse that stops running will receive an electric shock from the floor grids. If a fall on the floor grid is detected, the electric stimulus may be of variable intensity (0-3mA, usually used at 0.7mA).

The amount of water drank and the amount of food eaten by the animals will be monitored on a daily basis.
The mouse body weight will be monitored twice a week.
Monitoring of home-cage locomotion (locomotion in the Labmaster/phenomaster system) will be checked daily and used as an indices of well-being

In some of the cases the mice will be injected with Leptin or saline.

Leptin reduces the food intake in mice. This reduction is up to 30% of the intake and does not mediate a large decrease in body weight (less than 10% reduction).