



# Voluntary wheel running

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**Summary:** Voluntary wheel running provides detailed information on the running capacity and activity patterns of control, treated or mutant mice. Running activity is evaluated from the number of rotations of a stationary wheel detected by sensors attached to running wheel. Running wheel activity provides information regarding when the animal runs, for how long and far, providing temporal and longitudinal data. This system may also be used as a means of providing voluntary exercise in metabolic or exercise based studies.

## Reagents and Materials:

Reagent/Material	Vendor	Stock Number
Acclimation cages with lid, filter top, standard food rack and water bottle	Starr Life Sciences, (866)978-2779	1284L001, 1284L116, 1284L420R
In-cage running wheel with reed switch and food rack	Starr Life Sciences, (866)978-2779	610-0003-00
Animal Room Monitoring Log sheets (door)		
Standard mouse chow or defined diet		
Corn Cob bedding	Bed-o' Cob	93009
Weight/Food Intake Log sheet		
Animal and System Monitoring Log sheet		
pens		
DataPort 1224 - 24 Channel	Starr Life Sciences, (866)978-2779	9010002
VitalView A software	Starr Life Sciences, (866)978-2779	9010004
10% Nolvasan disinfectant		
Scale		
Dishwasher soap		
Gloves		
Lab coat		

## Protocol:

- 1) Acclimation to running wheel cages in running wheel or rodent incubator room (24 hr.)
  - a) In the AM (before 12:00, if possible) standard food rack and water bottles will be filled and placed in running wheel cage.
  - b) Mice will be weighed and their weights recorded on the weight and water/food intake log sheet before being placed into the running wheel cages (with standard food rack).
  - c) The time at which animals were placed in the acclimation cages will also be recorded in the Animal and System Monitoring Log sheet.
  - d) After all animals are housed in the acclimation cages, the door to the room will be closed and a “Testing in Progress” sign will be placed on the door while the animals are acclimating. Room temperature will be maintained at 22°C and recorded daily.
  - e) The acclimation room will be maintained on a 12 hour light/dark cycle, with lights off at 18:00 and on at 06:00. Mice may also be acclimated in a light and temperature (4 - 37°C) controlled rodent incubator as indicated by the study.
  - f) Animal Monitoring Log Sheet on the door will be filled out daily as per campus requirements.
  - g) At the end of 24 hours, the food and water grossly observed and documented on the Weight/Food/Water Intake Log sheet.

### 2) Running animals in voluntary running wheels

**Note:** It is essential that all phenotyping experimentation and cage changes are conducted at the same time of day because physiological and biochemical parameters e.g. metabolic rate, body temperature and activity are subject to circadian and ultradian rhythms (study should be started in the morning, before 12:00)

**Note:** Non-running (control exercise) animals will be housed in static cages in the same room.

- a) Computer set-up (see step-by-step procedure in section 7.0).
- b) Check hardware (wheels and reed switches) by spinning wheel to ensure software is reading properly and wheel spins smoothly.
- c) Replace standard food rack with in-cage running wheel with reed switch and food rack.
  - i) Mice may also be acclimated in a light and temperature (4 - 37°C) controlled rodent incubator as indicated by the study.
- d) Weight food and animal noting data on water/food intake log sheet.
- e) Run Equipment as described in 6.0. Equipment Set-up below noting start time on Animal Monitoring Log Sheet.
- f) Length of recording to be determined by study design.
- g) If longer than 7 days, wheels are disinfected (see 7.0 Cleaning and Disinfection of Running wheels and Cages below) and cages and water changed as per UCD Animal Care Policy on Rodent Husbandry for static care.
- h) Food and mouse weights will be taken to determine food consumption and weight changes.
- i) To end study: in Vital View program click Experiment → Stop. Export files.
- j) After the study is finished, the animals are weighed and returned to their home cage.
- k) The wheels are washed and disinfected (see attached protocols), Data are collected and analyzed. Surfaces of the rack are wiped down with 10% Nolvasan.

### l) Quality Control

- i) Measure lux inside the incubator
- ii) Make sure temperature inside incubator is steady at 22 °C or at temperatures (4 - 37°C) determined by the study.

### 3) Animal and Equipment monitoring

- a) During the first day, mice are to be monitored every two hours starting when they are first put into the running wheel cage during MBPs’ normal business hours of 08:00-17:00 Monday-Friday.

- b) Every day thereafter, animals will be visually checked in the morning before 10:00 and in the afternoon before 17:00. Daily monitoring of mice, food and water intake will continue for the remainder of the study and recorded in the animal and system monitoring log. Environmental conditions will also be checked.
  - i) Any problems will be evaluated with the proper action.

#### 4) Equipment Set-up

- a) Starting Run
  - i) Create study folder under “C:\\VitalViewSoftware datasets”
  - ii) Open VV-A program
  - iii) Configure- Load “Running Wheel Template 061516”
  - iv) For each channel makes the following changes as appropriate
    - (a) Chanel name = mouse ID number
    - (b) Chanel group = Genotype /treatment
    - (c) Sample interval bin at 10 min
  - v) Hardware configuration- Board 0 – “off” for 24 cages, “on” for 12 cages
  - vi) Create new/ unique log file path in “C:\\VitalViewSoftware datasets\\*study #*” with added study number and date
  - vii) Save and continue
  - viii) Start
    - (1) “now”- begin instantly
    - (2) “start at” at specific set time
      - (a) After X amount of time after introduced to wheel cage
  - ix) Begin recording and verify sensors are reading activity by active mice.
- b) Data Export
  - i) Exit (end) program
  - ii) Data Export- AWD- select all animals- save as “*Log file \_AWD*”
  - iii) Data Export- CVS