

Weight lifting cage protocols.v3

This is the protocol used for acute weight lifting exercise and weight lifting training using the voluntary weight lifting cage invented by Zhen Yan at UVA.

Acute weightlifting protocol

Day 1-3 (acclimatization)

1. **Remove food** at 2-3 pm for all the mice.
2. **Put a plastic block under the ramp to** elevate the stage to the height that the mouse does not have to lift their heels to get the food (distance from the top of ramp to the food in the container < (body length in cm from the mouth to the heel – 0.7 cm).
3. **Put food in the food container** (try to choose big pallet to avoid dropping of the food).
4. **Place a water bottle** the holder to ensure water supply.
5. **Lift up the plate level** and secure it at the lifted position with a rubber band. This will allow mice to eat the food without pushing the lever plate.
6. **Put a weight lifting collar** (11 mm diameter made of plastic coated metal wire) around the neck of a mouse under isoflurane and secure the open end with an orthodontic rubber band. Make sure the collar is not choking the mouse.
7. **Place the mouse in the weight lifting cage at 6 pm** when the light is turning off.
8. **Place the mouse back to a regular cage** next morning before 9 am.
9. **Repeat step 1-8** for day 2 and day 3.

Day4 (weightlifting overnight)

10. **Remove the plastic block under the ramp and remove the rubber band** to release the lever plate when place the weight lifting cage top at 6 pm. Add weight to achieve load to **150% body weight** (according to the calibration equation).

Day 5

11. Sacrifice the mice at 6 am under anesthesia and harvest GA, SO, PL, TA, EDL, QC, HT and LV **for western blot**.
12. Harvest GA **for mRNA** and freeze SO, PL, TA, EDL, QC and HT for additional analyses.
13. **Save the carcasses** for other laboratories.

Summary

For Exercise group

Day 1-3----Lever plate lifted with elevated ramp (no load, no heel lift)

Day 4----150% weight with normal ramp

For Sedentary group

Day 0-4---- Lever plate lifted with elevated ramp

Weight lifting training protocol

1. **Put a plastic block under the ramp** in the weightlifting cage.
2. **Put food in the food container and place the water bottle**.
3. **Lift up the plate level** and secure it at the up position with a rubber band.

4. Put a weight lifting collar around the neck of a mouse under isoflurane and secure it with an orthodontic rubber band on the open end. Make sure the collar is not choking the mouse.
5. Place the mouse in the weight lifting cage and connect it to computer at 6 pm.
6. Place the mouse to a regular cage with food and water next morning before 9 am.
7. Repeat step 1-6 but with the block removed.
8. Repeat step 1-6 but with the rubber band removed. This will allow the mouse to push the unloaded lever plate. The “Sedentary” group will have the plate level lifted as before. Always place the mouse back to regular cage with food and water the next morning.
9. Each day, the weight to be lifted will increase by 20% until 240% body weight load.
10. We found that we need to give mice a day of break every 2-3 days of training.

Summary

Day 1----Lever plate lifted with elevated ramp (no load, no heel lift)

Day 2----Lever plate lifted with normal ramp (no load, heel lift)

Day 3----Lever plate lowered with no load (only the weight of the lever plate, heel lift)

Day 4----Break

Day 5----100% body weight load

Day 6----120% body weight load

Day 7----Break

Day 8----140% body weight load

Day 9----160% body weight load

Day 10----180% body weight load

Day 11----Break

Day 12----200% body weight load

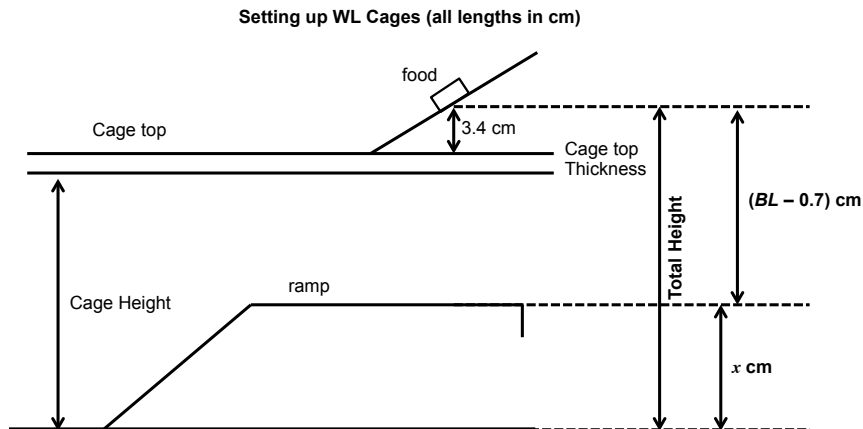
Day 13----220% body weight load

Day 14----Break

Day 15----240% body weight load

Day 16----Same work load there after

Schematic presentation of weightlifting cage set up:



Cage height: distance from the bottom of cage (inside) to the top of the cage

Cage top thickness: the thickness of the WL cage top

Total Height: Cage height + Cage top thickness + 3.4 (top of lid to food)

BL (body length): distance from the mouth to heel (measure with a marked cotton string);

Ramp height (x) = **Total Height** - (**BL** - **0.7**)

Example:

If the cage height is 12.35 cm, and the Cage top thickness is 0.5 cm;

The Total height is then 16.25 cm;

If the mouse has an 8.5 cm in BL;

The Ramp height for the mouse should be 8.45 cm.