Webinar Q&A Report

Cravings and Weightlifting Squats: Technologies that Explore New Metabolic and Behavioral Research

Questions in this Q&A Report were submitted during the live webinar, Cravings and Weightlifting Squats: Technologies that Explore New Metabolic and Behavioral Research.

Answers have been provided by:

Diego Bohórquez, PhD
Assistant Professor of Medicine
Duke University School of Medicine

Zhen Yan, PhD
Professor of Medicine,
University of Virginia

1. **I love Dr. Yan's system. Is it available for purchase?**

Z. Yan: Thank you for your interest. This invention is patented and licenced by TSE, and it is not commercially available yet.

2. **Dr. Yan, have you developed an apparatus for rats?**

Z. Yan: [answer] We have not developed an apparatus for rats. I personally believe it is entirely possible to modify the system for a use in rats.

3. Do dietary regimens (e.g. high fat, high glucose) produce different neuropod-brain responses?

D. Bohórquez: Direct evidence does not exist yet, but other available evidence suggests the answer is yes.

4. What strain of mouse did you use? Have you looked at both male and female mice?

Z. Yan: We used male mice of C57BL/6 strain in our study published in FASEB J. We have not compared male and female mice with regard to their voluntary weightlifting activity and adaptability.

5. Does the weightlifting protocol alter food consumption patterns?

Z. Yan: This is a very important question. We have carefully compared the daily food consumption between weightlifting mice and sedentary control mice and found no statistically significant difference in food consumption between the two groups. However, if the distance from the ramp to the food is greater than measured length from the nose to heel minus 0.7 cm, it will result in significant difficulties for the mouse to get food during the night cycle. Under such a condition, the mouse will eat significantly more during the day (we place the mice back to normal cage during the day) and have reversed day-night eating pattern. This is an important technical issue particularly for metabolic studies.

6. Are neuropods in stomach, small intestine, and/or colon? What might be their functional significance in colon?

D. Bohórquez: Yes, the gastrointestinal tract is presented with different stimuli throughout its length. Therefore, sensory function would vary depending on stimuli present.

7. Food consumption activates many of the same anabolic pathways as the act of weightlifting. Is it possible to condition the rodents using something other than food?

Z. Yan: It is entirely possible to use other incentives to induce voluntary weightlifting activity in rodents. A caveat could be altered food consumption if other incentives are used.

8. Dr. Yan, I am curious what would happen in the case of diabetic/obese mice, where the muscle would be insulin resistant. Any speculation?

Z. Yan: Great question. As we observed profound improvement of insulin sensitivity in skeletal muscle in weightlifting trained mice on normal chow diet with moderate reduction in adiposity, I

would speculate that weightlifting training would prevent obesity and improve insulin sensitivity in diabetic/obese mice. The beneficial effects on insulin sensitivity in this case would be due to reduced obesity as well as direct impacts on muscle insulin signaling.

9. Do you think that cephalic phase can stimulate brain (vagus)-gut signals?

D. Bohórquez: Yes, it should.

10. Other models of resistance training in rats and cats that use a food reward results in animals eating less and losing body weight. Does this not occur in your mouse model?

Z. Yan: Thank you for the question. All the existing models of resistance training require some form of human handling. The training session could be during the day or night cycle. These may well be the reason for the reduced eating and loss of body weight. As I mentioned above, we have compared the daily food consumption between weightlifting mice and sedentary control mice and did not find statistically significant difference in food consumption between the two groups. The weightlifting group did not lose body weight during 8 weeks of training in our study.

11. Dr. Yan, do the animals do mostly full plantarflexion to lift the weight or do they do partial contractions to perform the weight lifting task?

Z. Yan: We have not used any objective assays, such EMG, to quantify the activities of plantar flexors. For each mouse, we visually inspect their weightlifting activities to ensure full plantarflexion to the best of experience. We cannot exclude the possibility of partial contractions.

12. Dr. Bohórquez, are any of the beautiful videos you showed us available for teaching purposes?

D. Bohórquez: Yes, here is the link to one of them: https://youtu.be/oym87kVhqm4. Other videos are available in our published articles in supplements.

13. Was there any change in markers of mitophagy in the resistance exercise trained mice?

Z. Yan: We have not measured mitophagy markers. As we did not observe any signs of adaptation toward oxidative metabolism, I would predict no significant response of mitophagy to weightlifting activity.

14. Are there different types of neuropod cells?

D. Bohórquez: Yes, technically no cell should be the identical to each other - like humans, despite looking similar, details make us different.

15. Were mice allocated to each modified cage alone? How long did they spend there alone?

Z. Yan: In the study we published, the mice in both groups were housed individually during the whole 8-week training period. However, it is not unreasonable to put mice in back to normal cage with group housing during the light cycle to avoid the negative impacts of isolation.

Contact Information

If you have additional questions for Dr. Zhen Yan, Dr. Diego Bohórquez or TSE Systems regarding content from this webinar, or if you would like to receive additional information, please contact them at:

Zhen Yan, PhD
Email: zhen.yan@virginia.edu

Diego Bohórquez, PhD
Email: diego.bohorquez@duke.edu
Twitter: @gutbrains

TSE Systems
Website: **www.tse-systems.com**

North America

TSE Systems, Inc.
186 Chesterfield Industrial Blvd.
Chesterfield, MO 63005

Phone: +1 636 536 6502
Toll-free: +1 866 466 8873
Fax: +1 636 536 0840
Email: info@TSE-Systems.com

Europe / Asia

TSE Systems GmbH
Louisenstr. 65
61348 Bad Homburg
Germany

Phone: +49 6172 789 0
Fax: +49 6172 789 500
Email: info@TSE-Systems.com