

# HydroGel™ is an Adequate Source of Hydration for Surgically Modified Rat Models

## ABSTRACT

Research animals typically receive a sterile, alternative hydration source during transport. These water source alternatives can contain a variety of additives including flavor enhancers and nutritional supplements. The objective of this study was to compare the benefits of the DietGel® Recovery hydration source, formulated specifically for surgically modified rodents, and the standard HydroGel™ hydration source, a multi-purpose water alternative. A total of 64 cannulated Hsd:Sprague Dawley™SD® rats (7–13 weeks old) were boxed to simulate shipping conditions. The first experimental cohort of animals received either HydroGel™ or DietGel® Recovery at the time of placement into the shipping box. The second experimental cohort was acclimated to either HydroGel™ or DietGel® Recovery for three days prior to boxing and provided the same gel during the simulated shipping. Both experimental cohorts remained in the box for a three day period with *ad libitum* access to one of the gel hydration sources and Harlan Teklad Global Research Diet 2018S. Daily food consumption, animal weights and observations were recorded. Animal body weight was used to determine the benefit of a particular hydration source. Animals maintained on the HydroGel™ benefited from gel acclimation demonstrated by increased food consumption and body weight as compared to the non-acclimated group. Conversely, animals acclimated to DietGel® Recovery had reduced body weights compared to non-acclimated animals and animals maintained on the HydroGel™. These findings indicate that HydroGel™ is an acceptable hydration source for the shipping of surgically modified rat models.

## INTRODUCTION

Animal stress during shipment is well documented<sup>1</sup>. Animal weight loss and hydration are of particular concern to rodents in shipment following surgical modification. The goals of this study were two-fold; compare the effects of two different hydration sources and determine the effect, if any, of acclimation to hydration sources prior to shipment of surgically modified rats. Previous internal studies (unpublished) have shown the benefit of acclimation to diet and hydration sources prior to shipment of standard commercial animals. We speculated that the same benefits of acclimation prior to shipment would be apparent in surgically modified rodents as well.

## METHODS

### Animals and Husbandry

- Sixty-four male Hsd:Sprague Dawley™SD® rats (7–13 weeks old and 225–380 g) with a single vascular cannulation were utilized
- All rats were provided ketoprofen (3–4 mg/kg, SQ) postoperatively and recovered in-house 1 to 6 days prior to the simulated shipping
- Rodents were produced within maximum security production barriers and free of common pathogens
- All animals were maintained on Harlan Teklad shredded aspen bedding and provided *ad libitum* Harlan Teklad Global Research Diet 2018S
- All gel hydration sources were provided by ClearH<sub>2</sub>O®, Portland, ME

### Experimental Design

Animals were divided equally into four groups. All treatments were the same except the following:  
 Group 1 – HydroGel™ at the time of boxing  
 Group 2 – DietGel® Recovery at the time of boxing  
 Group 3 – HydroGel™ with 3 day acclimation prior to boxing  
 Group 4 – DietGel® Recovery with 3 day acclimation prior to boxing

To simulate shipping, animals were singly housed in compartmentalized zip-top shipping containers and remained in the box, within an animal holding room, for three days. Food consumption and body weights were recorded daily. Accurate gel consumption could not be measured due to composition and wastage of the gel.

### Statistical Analysis

Data was analyzed (SAS), mean and standard error of the mean were computed for each variable. Differences were considered to be significant when P was less than 0.05.

## RESULTS

### Change in Body Weight by Gel Type and Acclimation

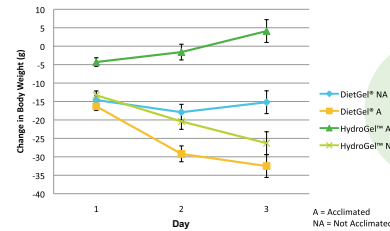


Figure 1

### Body Weight Change by Gel Type

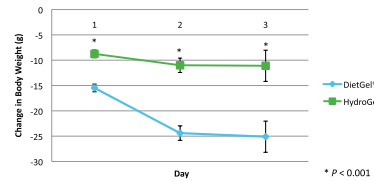


Figure 2

### Daily Food Consumption by Gel Type and Acclimation

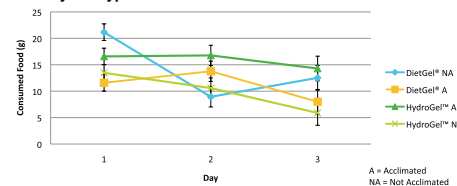


Figure 3

### Daily Food Consumption by Gel Type

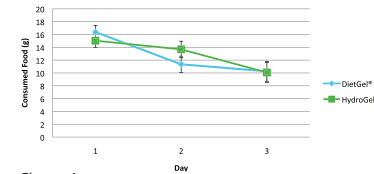


Figure 4

### Average Total Food Consumption (3 days)

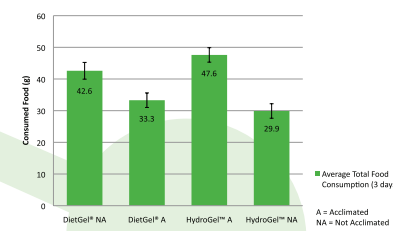


Figure 5



Figure 6. Zip-top shipping container, compartmentalized, with DietGel® Recovery and 2018S diet.

## DISCUSSION

Animals acclimated to HydroGel™ had a significantly higher body weight on each day in comparison to the non-acclimated group receiving the same gel type. Conversely, on the final day of body weight measurements, there was significant weight gain in the animals with no acclimation to the DietGel® Recovery in comparison to the animals acclimated to DietGel® Recovery. Overall, the animals acclimated to HydroGel™ were the only animals to recover and exceed their initial body weight, with a final mean body weight

change of 4.06 g, while other treatment groups did not recover their initial body weights (Fig 1). Considering the hydration sources alone, body weight change was significant each day with a preference for HydroGel™. Rats maintained on HydroGel™ had mean body weight changes of -8.75 g, -11.03 g and -11.09 g over the three day period compared to rats consuming DietGel® Recovery with daily mean body weight changes of -15.48 g, -23.57 g and -23.85 g (Fig 2).

While feed consumption values were not significant for any treatment group, animals acclimated to HydroGel™ consumed the most diet (47.6 g) and animals without acclimation to HydroGel™ consumed the least amount of diet (29.9 g, Fig 5). Individual food consumption rates were variable, as some rats were able to pass diet underneath the dividers within a box. Results from four animals in group two were eliminated for this reason. Surplus diet and gel were provided for all groups. Upon conclusion of the experiment, only one animal had completely consumed the provided diet. The animals that did not acclimate to the DietGel® Recovery displayed the steepest decrease in food intake on the second day, with an average decrease of 12.24 g of consumed diet (Fig 3). Not considering acclimation, daily food intake was similar for each type of gel and steadily decreased each day (Fig 4).

## CONCLUSIONS

Humane transport of surgically modified animals deserves considerable attention. Internally, we have observed animals often benefit from acclimation to new consumables prior to shipment. However, this study demonstrated that acclimation was only beneficial to those animals receiving HydroGel™. The animals acclimated to HydroGel™ performed considerably better as marked by significant weight gain and increased food consumption. Given the decreased food consumption of the animals acclimated to DietGel® Recovery, we conclude that the animals preferred and substituted the gel for the nutritionally balanced pelleted diet, although gel consumption rates were not recorded in this experiment. We recognize this enhanced gel may be beneficial to animals who refuse a hard pelleted diet when recovering from surgery or other compromising treatments, but maintain that a well balanced diet and a water-like hydration source are preferable when the animal is able and willing to consume such a diet. As a result of this study, we will continue to offer surgically modified animals HydroGel™ in transport and will begin to acclimate the recovering animals to this gel prior to shipment.

### References

1. Swallow, J., et al. (2005). Guidance on the transport of laboratory animals. *Laboratory Animals*. 39, 1-39.

### Acknowledgements

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