The Receptivity of Different Drugs through Medigel Delivery in Mice

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Introduction

Rodents, specifically transgenic mice *(Mus musculus)* are handled relatively frequently, depending on the experimental protocol they are within. It has been noted by the experts in the field that handling these animals causes a considerable amount of stress. Because of this, minimizing handling procedures could greatly improve the life of these animals. Diet gels, specifically those from *ClearH2O* are utilized throughout the animal facility for diet supplementation for those animals who require extra nourishment. The idea behind medigels are to utilize the concept of diet gels whilst incorporating medication that is generally given through subcutaneous injection or orally. There were four different types of medigels that were tested. These was a carprofen medigel, TMS, Fenbendazole, and a carprofen test gel that contains the same formulation as that of a normal diet gel. Each of these contain a certain concentration of the medication (see figure 2). For each medigel there has been a calculated amount required to consume in order to acquire an adequate concentration of the medication through consumption (see figure 5). This experiment is a pilot and is centralized around palatability, but also ties in to whether the palatability of each of these is congruent to an adequate source of the medication they are aimed to provide. A medigel will be considered successful if the animals within that medigel treatment group eat an average of that calculated amount of gel for a span of 8 days. It should be noted that this experimental protocol was not the intended use of the company. They recommended the removal of the water bottles for eace cage. It was decided to keep the water bottles in for the experiment.

Materials and Methods

Housing and Equipment: All mice in the study were housed in divider cages, housing one animal per division. This was an 8 day pilot study.

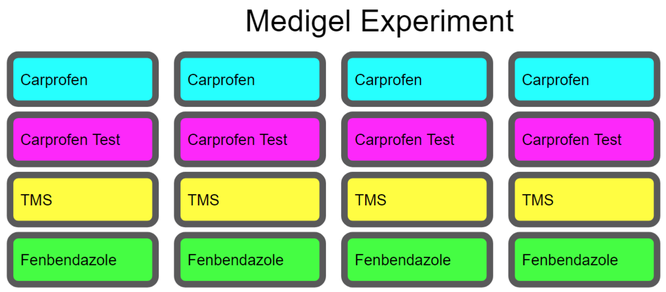

Figure 1: Diagram to describe cage set-up, including number of cages, and how many of each medication is within each cage. There are a total of 16(sixteen) cages with two animals per cage. Each section of the divider cage contains one of the specific medigels.

	Carprofen	Trimethoprim	Sulfamethoxazole	Fenbendazole
in gel	0.025mg/gram	5.0mg/gram	2.5mg/gram	0.150mg/gram
required	5mg/kg BW	15mg/kg BW		20mg/kg BW

Figure 2: Concentrations of each of the medications within each gel as well as the required concentrations for mice (and/or rodent alternatives)

Results

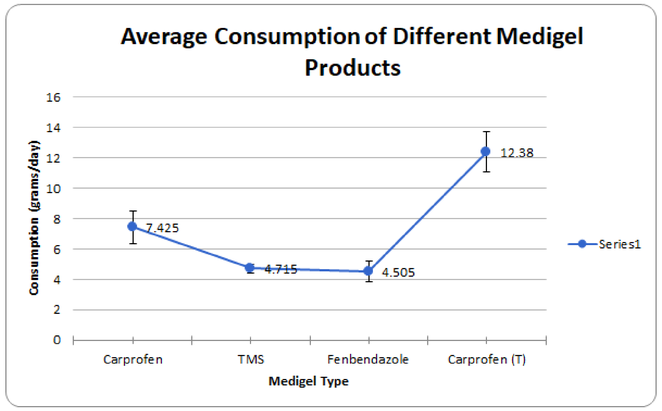

Figure 3: Graph depicting overall trend of medigel consumption for each type. This indicates the average overall consumption throughout the 8 day experiment for each of the four medigels

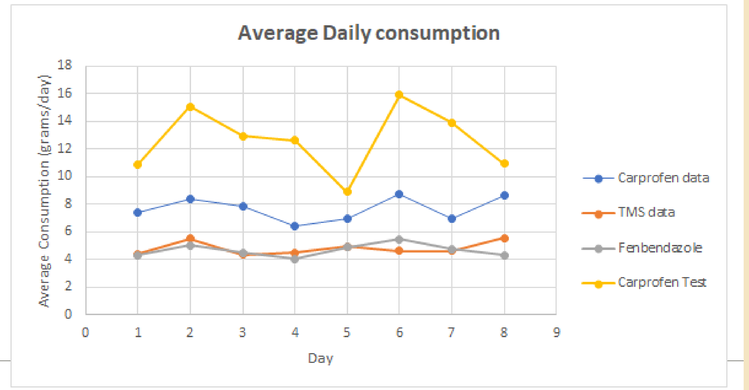

Figure 4: Graph depicting the daily average consumption of each of the four types of medigel. This shows the daily trend of consumption for the eight mice per medigel.

Figure 5: These four pictures show the overall set-up of each cage, from left to right: carprofen, TMS, Fenbendazole, and carprofen test. This displays the potential interactions and adjustments that the animals could have made with the isopad material and the medigel itself.

Results

	Average Mouse Wt: 30.5 grams	.035kg	
carprofen			
	0.025	7.425	0.185625
	0.185625	0.0305	6.086066
Carprofen test			
			LD50 for carprofen is 282mg/kg in mice
	0.025	12.38	0.3095
	0.3095	0.0305	10.14754
Fenbendazole			
	0.15	4.505	0.67575
	0.67575	0.0305	22.15574 LD50 for fenbendazole is 10,000mg/kg
Trimethoprim sulfamethoxazole			
	2.5	4.715	11.7875
	11.7875	0.0305	386.4754 LD50 for TMS is 2650mg/kg

Figure 6: data table of calculations done to determine success of the medigels

Discussion

Medigel products are in their infancy, and this study was utilized as a pilot to determine the palatability of these products to the mice within a laboratory setting. Transgenic mice were used to determine such palatability by being placed in an environment with no excessive enrichment and a certain medigel. The consumption of each was determined through daily weighing of the medigels and the mice themselves. In analysis of the data it is clear that the carprofen test diet gel was the most successful, while the others followed suit with success based upon their calculated concentration of individual medication intake. Each reached the therapeutic amount needed daily. The reason for the high success of the carprofen test has been hypothesized that this gel, apart from all the others, contains animal bi-products, whilst the other three are water based and/or vegan. The test carprofen formulation also emulated the nutrient content of a normal diet gel, a formulation that is relatively familiar to these animals. The carprofen with the altered vegan formulation was the same size, color and consistency of the carprofen test and diet gels. The TMS medigel, along with the fenbendazole were altered in color, shape and consistency. The cups were taller, making it harder for the animals to access, and the colors were pink and blue respectively, which could have made the gels less desirable. Since they were also vegan, they constituted minimal conformation to the typical omnivorous diet of a rodent, which could have limited success. This study has shown that even without removal of the water bottle each of the medigels reached therapeutic levels of drug consumption. We are likely to utilize these products for therapeutic purposes in the Porter Neuroscience center in the future.

References and Acknowledgements

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