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**ORIGINAL RESEARCH**

***Husbandry***

**Korte et al. Effects of Fenbendazole-impregnated Feed and Topical Moxidectin during Quarantine on the Gut Microbiota of C57BL/6 Mice, pp. 229-235**

Domain 3: Research

Primary Species: Mouse (Mus musculus)

SUMMARY: This study looks at how quarantine procedures affect gut microbiota. Female mice, 48 in each groups, arrived from 2 different vendors at 6 weeks of ae. Mice were divided in to 4 groups: one group was fed fenbendazole impregnated feed for 8 weeks, once group received topical moxidectin upon arrival and 2 weeks later, one group received both the fenbendazole and moxidectin treatments, and the control group received no treatment. After 8 weeks on study all groups were moved to the base feed. Feces were collected from animals at arrival, 8 weeks (end of treatment) and 2 and 4 weeks post-treatment. Feces were analyzed by DNA extraction for 16srRNA.

Results showed a “decrease in relative abundance of specific taxa” across all treatment groups. There were changes seen between the pre and post-treatment samples for all groups including controls, evidence that not all of the changes were the result of treatment. Richness (the number of OTUs- operational taxonomic units) and diversity (the combination of richness and evenness) as well as composition of the samples was examined. Vendor A typically show richer gut microbiota than vendor B, that was also the case in these samples. Vendor A showed no significant differences in richness from baseline and final samples between the different treatment groups. There were minor differences seen among some groups at the week 0 and week 2 samples. Main effects seen were due to time, with some effects due to treatment or time x treatment, and an overall decrease in richness was seen in all groups. With vendor B time, treatment and the interaction of the two showed significant effects on richness, but again, time showed the greater effect.

These results were consistent with previous research that showed a stabilization of the gut microbiota following time (based on a change in location or age of the animal). While significant effects were seen across all time points for treatment group and time, time showed the greater effects.

QUESTIONS

1. What are the mechanisms of action of fenbendazole and moxidectin?

2. T/F: the author concludes that treatment-associated variation from the quarantine period is unlikely to affect studies due to changes in the gut microbiota.

3. Increases in the following genera have been shown to affect research models how?

a.  Alistipes

b.  Akkermansia

c.  Turicibacter

d.   Tenericutes

ANSWERS

1. Moxidectin caseus flaccid paralysis by binding GABA (gamma aminobutyric acid) and glutamate-gated chloride channels. Fenbendazole inhibits binding of tubulin subunits to inhibit cell motility, division, and secretion.

2. True

3. Increases in the following genera have been shown to affect research models how?

a.   Alistipes: increased frailty, depression, leanness

b.  Akkermansia: increased colitis, exacerbated immune responses in gnotobiotics

c.  Turicibacter: increases are seen following changes in facility or in sedentary animals

d.  Tenericutes: increases are seen with high fata diets or dietary changes

**Giles et al. Effect of Environmental Enrichment on Aggression in BALB/cJ and BALB/cByJ Mice Monitored by Using an Automated System, pp. 236-243**

Domain2: Management of Pain and Distress

Primary Species: Mouse (Mus musculus)

SUMMARY: Aggressive behavior is a common problem among male mice in laboratory animal medicine and may result in severe wounds and even mortality when mice are unable to escape within their home cage. Several strategies for reducing aggression in group-housed male mice have been discussed, including transferring cotton squares during cage changes, decreasing housing density and offering various types of environmental enrichment such as shelters, wheels and toys; however, published studies present conflicting evidence of whether particular practices or forms of environmental enrichment are effective in reducing aggression. The current study aims to evaluate the effect of 3 different enrichment items on aggression-bilevel mezzanine, cotton square and a mouse hut. The authors used 2 substrains of BALB/c mice, BALB/cJ and BALB/cByJ, known respectively for their high and low aggression, and monitored activity level using an automated home cage monitoring system using digital ventilated cages (DVC) following 2 types of behavioral challenge tests.

A total of 90 BALB/cJ and 90 BALB/cByJ mice were randomly allocated and housed 3 per cage in IVC and given 1 of 3 enrichment items: cotton square, shelter, or a mezzanine (polysulfone ledge mounted from the wire bar). Both structural forms of enrichment provided exit and entrance points. Ten cages for each type of enrichment were used for each substrain of mouse. Challenge tests for aggression were summarized as: placement in a completely clean cage without transfer of cotton square material, and removal and reintroduction of a cage mate. Clean cage tests were conducted every 2-weeks with a modified resident-intruder behavioral test being done on the opposite week. This modified test included removing one mouse from each home cage and replacing him with an intruder mouse for 10-min. Aggressive encounters were recorded and scored from 0 (no aggression) to 4 (obvious aggression) every 15 seconds. The DVC system included a DVC board with 12 electrodes evenly positioned underneath the cage, allowing activity to be recorded and averaged over set intervals.

Housing conditions did not have an effect on mouse weight. Visual observation of aggression after cage change were low but in general, the BALB/cJ strain had significantly more aggressive encounters than the BALB/cByJ after placement into a clean cage. High levels of aggressive interactions occurred during the removal and reintroduction test, with enrichment not having any effects on the amount of aggression in the BALB/cJ strain, but the BALB/cByJ strain housed with a mezzanine had less fighting than both the cotton square and shelter groups. Mouse substrain did not significantly affect the time spent in aggressive encounters, but it was noted that the number of aggressive episodes increased during the dark phase. DVC activity monitoring revealed strain differences in activity level during the dark phase (BALB/cJ was more active). Retrospective analysis of DVC activity during the removal-and-reintroduction test revealed that DVC activity did not correlate with severity of aggression. Further analysis revealed similar DVC activity measures for cages with aggressive interactions and those with high amounts of locomotion.

In conclusion, introduction of the mezzanine reduced aggression in one of the substrains after the removal-and-reintroduction test and the DVC system may be useful for assessment of generalized cage activity over time.

QUESTIONS

1. What would you use a digital ventilated cage system for?
   1. Timed dosing in a toxicological study
   2. Activity monitoring in the mouse home cage
   3. Identifying aggressive behaviors
   4. As a form of environmental enrichment
2. Methods that can be used to minimize intermale aggression include which of the following?
   1. Cohousing littermates
   2. Providing environmental enrichment
   3. Removing individual animals from a cage for 10-minutes and then replace back to same cage
   4. A and B
   5. All of the above

ANSWERS

1. b
2. d

**Spangenberg and Wichman. Methods for Investigating the Motivation of Mice to Explore and Access Food Rewards, pp. 244-252**

Domain 3: Research

Primary Species: Mouse (*Mus musculus*)

SUMMARY: The emotional state of domestic animals is considered an additional estimate when assessing the welfare of animals. Theoretical basis that helps to measure emotional states is that an individual’s background mood (long lasting emotional state) is affected by its environment and exposure to different situations; and concepts such as judgement bias and anticipation have been used as measures of emotional state resulting in new test methods and observations. Additionally, behavior and exploration have been investigated as potential indicators of positive emotional states. The study main goal was to adapt and develop established tests and methods that can be used to assess positive emotional states in mice by measuring reward sensitivity.

In order to measure emotional state in mice the research group focus on different parameters such as free exploration (behavior), motivation or anticipation to get access to a reward and the contrast test; the latter is based on the finding that brief positive or negative emotional states can be induced by shifting the magnitude of an expected reward. Female and male mice were used in the study. An exploratory arena divided in 9 sections with a large central area was used, with a “start” box in the middle of the arena; so exploration was evaluated. For the level of motivation (opening a push door of increasing weight) and anticipation (behavioral transitions in a start box) the mice showed to get access to the exploration arena. Control mice were placed in the start box for 3 min and returned to their home cage; they never entered the exploratory arena. To measure anticipation, mice were released from the start box to the arena when the experimenter opened a sliding door with some seconds of delay; delay was increased progressively. For the motivation group, mice had to push a door; the weight of the door was increased by adding metal weights to the outside of the door. Behavior observations were recorded for mice in the anticipation and motivation group while they explored the arena for 5 min after leaving the start box; different objects were placed randomly on the 9 sections of the exploratory arena. For the contrast test, a runway was used with two wooden obstacles a part form each other; after passing the last obstacle mice got access to the reward. Mice went through 7 days of training with their designated reward. Then, a shift in reward was implemented to investigate the contrast effect.

No significant differences were found between sexes for parameters such as the push door weight and the number of visits to different sections of the arena. Section containing the branches was visited most frequently by mice. Findings indicate that mice found exploring the area to be a rewarding and positive experience. Also, mice seem to have high motivation to visit areas accessible to them; even when a cost is imposed on performing the behavior. The positive contrast group (from neutral reward to a tasty reward) ran faster whereas the negative contrast group (from tasty reward to a neutral reward) ran slower, but the chance was insufficient to achieve a significant difference compared with the control group. This could be due to a ceiling effect. The performance of the mice in the tests suggests that they experienced the set ups as positive and free from negative components; these tests might be further evaluated for their potential as tools to assess reward sensitivity in mice.

QUESTIONS (True or False)

1.   Background mood has been suggested to influence how an animal perceives or  appraises a short-term situation and, consequently, how it responds to that situation.

2.   Play behavior and exploration have been investigated as potential indicator of positive emotional states, relevant for animal welfare.

3.   Authors suggest that mice don’t find exploratory activity highly motivational when they have to pay a price for an activity that it is completely unrelated to the resource they reach.

ANSWERS

1.  True

2.  True

3.   False. Mice seem to high motivation to visit areas accessible to them, even when a cost is imposed on performing the behavior.

***Management***

**Smith et al. Extending the Use of Disposable Caging Based on Results of Microbiologic Surface Testing, pp. 253-257** 

Domain 4: Animal Care; K3 - Methods of Sterilization, Sanitation, and Decontamination

Primary Species: Mouse (*Mus musculus*)

SUMMARY:  Steam sterilization is one of the most widely used and dependable sterilization techniques.  However, prions are not inactivated by standard sterilization procedures and require higher temperatures and longer time.  Due to decreased cage life span resulting from the higher temperatures and longer times, the authors sought to find a cost-effective alternative to caging for prion-infected mice.  ATP swabs and RODAC plates were used to compare the institution’s current 2-week cage changing protocol to a disposable cage changing protocol where the soiled bedding was changed every 2 weeks, leaving cage components for a total of 8 weeks.  ATP systems are able to detect live or dead organic material while RODAC plates detect cultivatable, aerobic organisms.  41 mice (15 males, 26 females), aged 2 to 6 months, were randomly assigned to traditional and disposable cages.  Mice were free of prions and other infectious agents according to the institutions sentinel protocol.  Averages from ATP swabs did not differ significantly between traditional and disposable cages at any time point tested over the 8-week period.  Similarly, colony counts on RODAC plates did not differ significantly between disposable cages and traditional cages at any time point tested. Housing density also had no significant effect on the microbiologic environment.  The authors conclude that prolonged use of disposable cages may lower cost by 18-fold when compared with traditional cage use as well as provide an alternative housing method that has no additional environmental concerns.

QUESTIONS

1.  According to the *Guide for the Care and Use of Laboratory Animals*, what is the absolute minimum frequency bedding must be changed?

a.   Every 2 weeks

b.   Every 4 weeks

c.   There is no absolute minimum for frequency

d.   Every week

2. Cage changing interval depends on what factors?

a.   % of soiled bedding and fecal and urinary outputs only

b.   Number and size of animals, fecal and urinary outputs, wetness of bedding, primary enclosure size, and experimental conditions

c.    Size of animals, % soiled bedding, experimental conditions

d.   Fecal and urinary outputs and size of animals only

3.  What is a key difference between ATP swabs and RODAC plates?

a.   ATP swabs detect only aerobic organisms while RODAC plates both live and dead organisms

b.   ATP swabs detect both live and dead organisms while RODAC plates only detect aerobic organisms

c.   Both are able to detect the same microorganisms. Cost is the major difference

d.   ATP tests overestimate levels of bacteria while RODAC plates underestimate colony levels

ANSWERS

1.   c

2.   b

3.   b

***Anesthesia***

**Beninson et al. Analgesic Efficacy and Hematologic Effects of Robenacoxib in Mice, pp. 258-267**

**Domain 2:**Management of Pain and Distress

Primary Species: Mouse (Mus musculus)

SUMMARY: Much has been described, questioned, validated, and reported on how to evaluate rodents for pain. This becomes even more difficult when study goals can be confounded by certain classes of drugs. These authors sought whether robenacoxib, a NSAID similar to carprofen, would be a better choice because it has a shorter half-life compared to the other commonly used, COX-2 specific inhibitors. It was further theorized that this NSAID may be a better choice if it didn’t interfere with research objectives, such as a venous thrombus mouse model. As a proof-of-concept study, the effective dosage and best combination of assays was first established. Then the effect on venous thrombus formation was evaluated. Of the dosages they tested, 32 mg/kg didn’t negatively affect hematological parameters. For minor procedures, this NSAID at this dosage would be a good choice. However, for major surgeries, it did not manage pain as a single agent treatment plan.

QUESTIONS

1.  Why were a combination of different assays used in this study?

2.   What is another NSAID option for treating pain in lab animals?

ANSWERS

1.  Traditional analgesiometric assays are limited in providing evidence of pain and relies on mechanical sensitivity which measures tissue sensitivity. Pain is multidimensional and analysis of nesting behavior (nest consolidation score) and the behavioral recording system (MouseTrapp) provide better evidence of analgesic effectiveness.

2.  Meloxicam

**Lee and Jones. Effects of Ketamine Compared with Urethane Anesthesia on Vestibular Sensory Evoked Potentials and Systemic Physiology in Mice, pp. 268-277**

Domain 2

Primary Species: Mouse (Mus musculus)

SUMMARY: Ketamine-xylazine is commonly used for electrophysiology experiments in rodents and other lab animals. In fact, KX has been the anesthetic of choice in rodents over the last decade for electrophysiology studies using recordings such vestibular sensory evoked potentials (VsEP). It is recognized that general anesthesia can produce significant changes in systemic physiology to include neural function. The degree of these physiologic changes is dependent upon the anesthetic regimen selected. Herein, a comparison was made using ketamine-xylazine (KX) vs. urethane-xylazine (UX).

The UX produced a longer duration of anesthesia, prolonged survival times, and less compromised respiratory and cardiovascular function than did KX. VsEP thresholds, latencies, and amplitudes did not differ between the two anesthetic regimens when brain temperature was held at the same set point. Accordingly, the UX regimen was shown to provide improved systemic physiologic conditions in mice when compared to KX and thus is the preferable anesthetic regimen of the two as it pertains to studies using the VsEP to evaluate peripheral vestibular function and perhaps other areas of neuroscience.

QUESTIONS (True or False)

1. The VsEP is a commonly used test of peripheral vestibular function. T/F

2. Beyond producing a longer duration of anesthesia, the UX vs the KX regimen is likely to reduce the rodent mortality rate and thus reduce the number of animals needed for experimentation due to it producing less compromised respiratory and cardiovascular function and prolonged survival times. T/F

ANSWERS

1. True

2. True

**Gonzalez-Gil et al. Corticoadrenal and Cardiorespiratory Responses to Administration of Propofol Combined with Dexmedetomidine or Ketamine in Rabbits, pp. 278-281**

Domain 2

Primary Species: Rabbit (Oryctolagus cuniculus)

SUMMARY**:** Anesthetics can influence adrenal function altering serum glucocorticoid concentrations which may confound the analytic results obtained. Therefore, effective methods for modulating the stress response are desirable to minimize secondary effects during the perioperative period. This study evaluated the effects that propofol, in combination with dexmedetomidine or ketamine, had on corticoadrenal function, as well as heart and respiratory rates of rabbits. Propofol and ketamine consistently increased glucocorticoid secretion, whereas propofol and dexmedetomidine had no significant effects on glucocorticoid secretion. These findings suggest that dexmedetomidine inhibited propofol induced increases in serum cortisol. Thus, the surgical stress response may be attenuated by sympatholytic activities mediated by dexmedetomidine. Previous studies have shown correlations between dexmedetomidine and decreased glucocorticoid levels in dogs, rabbits and humans. The decrease in heart rate was significantly less pronounced when propofol was administered with ketamine as compared to propofol with dexmedetomidine. Therefore, the addition of ketamine might counteract the inhibitory effect of propofol establishing appropriate cardiovascular stability.

QUESTIONS

1.  What schedule of drug is Propofol?

a.  Schedule I

b.  Schedule III

c.  Schedule IV

d.   N/A

2.   What is the reversal agent for an alpha-2 agonist?

a.   Naloxone

b.   Yohimbine

c.  Fluazenil

d.  N/A

ANSWERS

1.  d. Propofol is not currently a controlled substance, but the DEA has proposed that it be added to the list as a schedule IV substance

2.  b. Yohimbine and atipamezole reverse the effects of alpha-2 agonists.

**Evenson and Mans. Analgesic Efficacy and Safety of Hydromorphone in Chinchillas (*Chinchilla lanigera*), pp. 282-285**

Domain 2: Management of Pain and Distress

Tertiary Species: Other

SUMMARY: Hydromorphone is a u-opioid agonist that has been widely used in mammals. Most dosage recommendations are based on either dog/cat ranges or limited studies in rodents, with no studies done on effective dosages in chinchillas. This study aimed to determine analgesic efficacy of hydromorphone at different dosages in a thermal pain model utilizing a plantar test (Hargreaves apparatus) to measure hindlimb withdrawal latencies in response to a heat stimulus. 16 chinchillas were acclimated to the apparatus for 2 weeks, followed by 2 weeks of baseline withdrawal measurements. Chinchillas then received either 0.5, 1, or 2 mg/kg SC hydromorphone, or 0.5 ml/kg SC saline (control). Hindlimb withdrawal latency was measured at 1, 2, 4, and 8 hours post-treatment. Food intake, fecal output, and weight change were measured for 6 days post-treatment. Hydromorphone at 2 mg/kg significantly increased withdrawal latency at 1 and 2 hours after treatment compared to baseline and controls. No other dosage found significant increases in latency. Food intake significantly decreased from baseline and controls in a dose-dependent manner for all hydromorphone concentrations on day 1. Food intake returned to normal (control levels) by day 3.  Fecal output was significantly reduced from control for animals receiving 1 and 2 mg/kg hydromorphone for 2 days following treatment and remained reduced for the 2 mg/kg group for 6 days following treatment. The authors concluded that hydromorphone at 2 mg/kg is an effective analgesic for <4 hours in chinchillas, with reductions in food intake seen for up to 3 days and fecal output for up to 6 days.

QUESTIONS

1. Which of the following side effects has not been seen in animals administered hydromorphone?
   1. Exophthalmos
   2. Pruritus
   3. Muscle and tail rigidity
   4. Hyperthermia
   5. All have been seen
2. T/F: Morphine is 5x more potent than hydromorphone.
3. Chinchillas are part of which rodent suborder?

a.  Anomaluromorpha

b.  Castorimorpha

c.    Hystricomorpha

d.  Myomorpha

e.   Sciuromorpha

ANSWERS

1. e

2. False;  Hydromorphone is 5x more potent than morphine

3. c

**Fox and Mans. Analgesic Efficacy and Safety of Buprenorphine in Chinchillas (*Chinchilla lanigera*), pp. 286-290**

Domain 2: Management of Pain and Distress

Tertiary Species: Other Rodents

SUMMARY: Buprenorphine is currently the most used opioid analgesic in Chinchillas and dose range recommendations are reported at 0.01 to 0.1 mg/kg (IM or SC) every 6 to 12 hours, which are extrapolated from studies done in rats and mice. It is favored due to fewer cardiovascular and respiratory side effects in rodents. The objective of the study was to investigate the analgesic efficacy and safety of subcutaneously injected buprenorphine in Chinchillas using the Hargreaves method, which involves measuring limb withdrawal latencies in response to a noxious thermal stimulus. For Experiment A: 13 chinchillas were used to evaluate the analgesic efficacy of buprenorphine at 0.05, 0.1, and 0.2 mg/kg SC with saline injected as the control.  Forelimb withdrawal latencies were measured at 0, 3, 6, 10, and 24 hours after administration. Body weight, 24-hour food intake, and fecal output was measured the day prior to starting each treatment and daily for six days after treatment. For Experiment B: 11 chinchillas were used to test the efficacy of a single dose of buprenorphine at 0.2 mg/kg SC, measuring hindlimb withdrawal latencies using a different plantar testing device than the one used in experiment A. For Experiment C: 8 chinchillas were used to assess the effects of repeated administration of 0.2 mg/kg buprenorphine administration every 6 hours for 3 doses. Body weight, 24-hour food intake, and fecal output was measured the day prior to starting each treatment and daily for six days after treatment. From Experiment A and B: Buprenorphine at 0.2 mg/kg SC was the only dose that resulted in increased limb withdrawal latencies and also significantly decreased food intake. Experiment A also showed that food intake and fecal output was reduced in the control group and all buprenorphine groups in a dose-dependent manner over the first 24 hours after treatment. However, this dose only increased limb withdrawal latencies for less than 4 hours and did not decrease food intake but significantly decreased fecal output. From experiment C, treatment did not reduce food intake, but reduced fecal output for the first 24 hours. They concluded that previously recommended ranges (0.01 to 0.1 mg/kg) were not sufficient for analgesia, and that there is analgesic efficacy at the dose of 0.2 mg/kg for less than 4 hours, but repeated administration at this dose does not cause decreased food intake, but can causes gastrointestinal ileus.

QUESTIONS

1. How much more potent is buprenorphine than morphine?

a.  5-10 times

b.   10-20 times

c.   25-30 times

d.   30-40 times

e.   Morphine is more potent than buprenorphine

2. In this study, what is the Hargreaves method measure?

3. In this study, what was the predominant side effect that was noted with multiple doses of buprenorphine?

a. Inappetence

b.  Weight loss

c.   Hypotension

d.  Decrease fecal output

e.  Apnea

ANSWERS

1. c

2. The interval between limb withdrawal and presentation of a noxious stimulus (heat)

3. d

**Eshar et al. Influence of Isoflurane Anesthesia on Plasma Thyroxine Concentrations in Black-tailed Prairie Dogs (*Cynomys ludovicianus*), pp. 291-294**

Domain 3: Research

Tertiary Species: Other Rodents

SUMMARY: In humans and several other animal species (rats, dogs), anesthesia has been documented to affect thyroxine (total T4) concentrations. Abnormalities in T4 and other thyroid hormones can cause unstable anesthesia and increase the associated risks. The current study aimed to assess the effect of isoflurane anesthesia on thyroxine levels in black-tailed prairie dogs (*Cynomys ludovicianus*).

Twelve clinically healthy intact, juvenile male black-tailed prairie dogs used for this study. Each animal was induced with 5% isoflurane in 2L/min oxygen then maintained under general anesthesia with a tight-fitted face mask on 2% isoflurane in 1.5 L/min oxygen for 60 minutes. Blood samples were collected immediately following induction (baseline, 0 min) and at 30 min and 60 minutes. A T4 and cholesterol panel (Abaxis) was promptly performed using a benchtop biochemistry analyzer.

Results revealed that plasma T4 concentrations at 30 min and 60 min were significantly lower than baseline. However, all T4 values for all animals at all time points were within the reported reference interval (0.6-8.0 ug/dL). Authors indicated that these inconsistencies suggest that thyroid function in black-tailed prairie dogs may be less sensitive to the influence of isoflurane compared to other species. In this study, decreases in T4 may have alternatively been caused by altered protein binding, increased T4 metabolism or decreased secretion by the thyroid. The authors proposed to conduct future studies with prolonged testing periods and additional groups to evaluate the effect of sex and age on T4 measurements.

In conclusion, this study found that isoflurane significantly but inconsistently decreased T4 concentration in black-tailed prairie dogs, and these changes likely have minimal clinical importance.

QUESTIONS

1. Prairie dogs have historically been used for which of the following:

a. Circadian rhythm

b. Biliary physiology and pathophysiology of gallstone formation

c. Hibernation

d. Renal physiology and water conservation

2. The two most-reported spontaneous neoplasms in prairie dogs are:

a. Mammary fibroadenoma and elodontoma

b. Hepatocellular carcinoma and thoracic lipoma

c. Mammary fibroadenoma and thoracic lipoma

d. Hepatocellular carcinoma and elodontoma

ANSWERS

1. b

2. d

***Experimental Use***

**Doerning et al. Refinement of Perioperative Feeding in a Mouse Model of Vertical Sleeve Gastrectomy, pp.**

**295-301**

Domain 3: Research

Primary Species: Mouse (*Mus musculus*)

One-Line Summary**:** Feeding a high-calorie dietary gel supplement (DG) to C57BL/6J mice undergoing Vertical Sleeve Gastrectomy (VSG) surgery is a viable alternative to Liquid Enteral Nutrition (LEN), given that DG does not significantly affect the surgical model of weight loss or result in adverse clinical outcomes.

SUMMARY:This group identified a problem with the pre- and postoperative nutrition of rodent models of bariatric surgery.  In this article they investigated the use of a high-calorie diet gel supplement (DG) and compared it to Liquid Enteral Nutrition (LEN) pre- operatively and post-operatively in male mice undergoing Vertical Sleeve Gastrectomy (VSG).  Twenty-eight male C57BL/6J mice between the ages of 8 – 10 weeks were assigned to 4 study groups.  Group 1 and 2 had the VSG done and one group was given DG, while the other group was given LEN.  While mice assigned to Groups 3 and 4 had sham surgeries performed but one group was fed the DG, while the other was fed LEN.  Both direct and indirect markers of rodent health were assessed.  These included body weight, surgical site condition, pain status, attitude and appearance, MRIs were done and food and water intakes measured.

The mice that were fed DG lost significantly more weight preoperatively than those fed LEN.  However there was no significant differences seen postoperatively.  It should be highlighted that the DG and LEN formulations did not have equivalent nutritional profiles as DG contained higher protein, fat and carbohydrate concentrations than LEN. Based on their results, the authors concluded that the use of DG is a clinically safe alternative to a liquid diet for mice recovering from bariatric surgery.  They go on to suggest that additional metabolic characterization of DG supplementation be done to ensure that this diet would not confound research goals in rodent models of VSG.

QUESTIONS

1. The burying of novel objects by rodents is an indication of what?

a. Digging behavior

b.  Play

c.  Stress

d.  Hiding

2.   List some benefits of a gel-based diet over a liquid diet for rodents.

ANSWERS

1.   c. Stress

2.   a. Easy to provide as opposed to liquid diets where special equipment and bottles are necessary.

b. No need for a delivery system and hence obstruction of sipper tubes.  These can be placed directly on floor of cage.

c. No adverse changes seen in mice fed gel diets.

d. Gel diets seem to be more reliable and less labor-intensive.

e. Consistency of LEN diets vary over time.

**Xie et al. Characterization of the Correct Mandibular Premolar Region for Delayed Dental Implantation in Beagle Dogs, pp. 302-307**

Primary Species: Dog (Canis familiaris)

SUMMARY: This study investigated anatomic features of the mandible in beagle dogs to develop recommendations regarding the correct implantation region and available bone area for delayed dental implantation surgery. To study the anatomic features of the beagle mandible, the authors created delayed dental implantation models. Crucial landmarks, including the mental foramen, canine root apex, and mandibular canal, were measured on cone-beam CT (CBCT) images and anatomic specimens.

20 purebred male beagle dogs were used. Bilateral mandibular premolars were extracted under anesthesia. After 3 months, dogs were euthanized and mandibles were extracted and fixed in formaldehyde.

The positions and characteristics of the mental foramen, canine, premolar region of the mandible, alveolar crest, and mandibular canal were examined visually, recorded, and measured. Moreover, the bilateral mandibles were scanned by CBCT. The locations of the mental foramen, canine teeth, and mandibular canal and the vertical height and horizontal width of the correct implantation region on the CBCT images were measured.

QUESTIONS

1. True or False?

a. Dental implantation is a favorable treatment option for oral rehabilitation of people who have lost teeth.

b. Various species of animals have been used as models for dental implantation.

c. Pigs are the first choice of animal model because tooth shape, bone density, anatomic structure, and rate of remodeling and healing

d. Dogs are the best model for dental implantation studies.

2. Which is the most commonly used area of dog mandible to study dental implantation?

3. Why pigs are not the best model for dental implantation?

4. Why the authors used dogs of 12 to 14 months old?

ANSWERS

1. a. True; b. True; c. False; d. True

2. The mandibular premolar region.

3. Because the high rate growth, body size, and excessive weight.

4. Because they have all the teeth erupted and young animals have great healing activity.