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Comparison of Water-Soluble CBD and CBD Oil as an Anti-Inflammatory in Canines with Osteoarthritis

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HONORS Thesis

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Comparison of Water-Soluble CBD and CBD Oil as an Anti-Inflammatory in Canines with Osteoarthritis

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Comparison of Water-Soluble CBD and CBD Oil as an Anti-Inflammatory in Canines with Osteoarthritis

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Abstract

Osteoarthritis is one of the most common forms of arthritis in canines. Osteoarthritis affects the entire joint, and typically results in pain, inflammation, decreased range of motion and development of bone spurs. The purpose of this study was to provide clinical research comparing Water-Soluble Cannabidiol (CBD) and Cannabidiol (CBD) oil as an anti-inflammatory in arthritic dogs by using gait analysis on the Tekscan Strideway System, Canine Brief Pain Inventory owner surveys, and analysis of blood test results. One clinical trial was conducted with thirteen privately owned dogs. Participants were split into three treatment groups by listing them by last names and labeling them 1,2,3,1,2,3, etc. The first group was given CBD oil daily for the entirety of the 8-week clinical trial, the second group was given Water-Soluble CBD daily for the entirety of the 8-week clinical trial, and the third group was given placebo daily for the entirety of the 8-week clinical trial.

Gait analysis results did not show improvement in gait and body weight distribution in either treatment group, nor did they show that the Water-Soluble CBD had increased improvement compared to the CBD oil. Canine Brief Pain Inventory Surveys did not show significant reductions in pain severity scores and pain interference scores in the Water-Soluble CBD group and the placebo group but did show significant reduction in the CBD oil group in 4 of the 5 patients. The chemistry panel and Complete Blood Count (CBC) did not show significant overall effect on liver and kidney functions in any of the canines.

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I. Introduction

Osteoarthritis is one of the most common forms of arthritis in dogs. This disease encompasses the entire joint and the deterioration of the joint cartilage results in pain, inflammation, decreased range of motion, and the development of bone spurs (AKC Staff). This disease often impacts older canines but there are risk factors that can cause osteoarthritis to occur such as elbow and hip dysplasia, as well as genetic diseases (Marcellin-Little, 2020). While osteoarthritis has no cure, there is a variety of medical treatments currently being used to treat the side effects and symptoms. Supplements such as glucosamine, chondroitin sulfate, and omega 3's can decrease inflammation and help repair joints. There are also medications such as steroids, non-steroidal anti-inflammatory drugs (NSAIDs), and other pain relievers that can help reduce pain (Dunn, 2018). Proactive approaches can also be used to help prevent osteoarthritis including slowing down bone growth while canines are growing, using glucosamine supplements early in life, as well as keeping canines at a healthy weight (Marcellin-Little, 2020).

The hemp and cannabidiol industry have had an increase in research for the medical community. Many human studies have used CBD for pain treatment, anxiety relief, and even used to try and reduce chemo side effects for cancer patients. As increasing information has been released in human medicine areas, questions continue to be raised in regard to veterinary medicine and CBD's potential use in veterinary medicine.

The purpose of this study was to evaluate and compare the results of Water-Soluble CBD and CBD oil in canines with osteoarthritis in regard to arthritic side effects and provide data to the veterinary community on the use of CBD in animals. The objectives of this study were: (1) to determine if the bioavailability that is found in Water-Soluble CBD vs CBD oil in humans is comparable to the bioavailability in arthritic dogs in terms of alleviating symptoms (essentially

determining if the Water-Soluble product is better at alleviating osteoarthritis symptoms), (2) to determine if either treatment provided any relief for the arthritic canines, and (3) evaluate the short-term safety through bloodwork results.

Problems to consider

1. The first problem to consider was to determine if there was any significant difference in the Water-Soluble CBD and CBD oil in terms of decreasing pain by evaluating objective data acquired using the Tekscan Strideway System for gait analysis.
2. The second problem to consider was to determine if there was any significant difference in the Water-Soluble CBD and CBD oil in terms of decreasing pain by evaluating subjective data acquired through owner surveys.
3. The third problem to consider was to determine if either product truly showed evidence of relieving arthritic pain symptoms by evaluating objective data acquired using the Tekscan Strideway System for gait analysis.
4. The fourth problem to consider was to determine the safety of oral administration of both Water-Soluble CBD and CBD oil by evaluating Total Chemistry Panel blood tests used to evaluate liver and kidney function.

Hypotheses

0 (Null): There will be no difference between the canine groups being treated with Water-Soluble CBD and CBD oil and the group receiving placebo treatment.

1 (Research hypothesis): Canines receiving Water-Soluble CBD will show an increased pain-relief compared to CBD oil due to bioavailability, will see improvement in overall gait and present no negative side-effects from treatment in regard to blood chemistry values.

Assumptions

1. All canine owners will follow instructions throughout the duration of the clinical trial and administer treatment as prescribed, as well as keeping canines off of any other anti-inflammatory medications throughout the duration of the clinical trial.
2. Owners provided accurate and unbiased evaluations when completing owner surveys in regard to their canine's pain.
3. Breed, sex, age, diet, and exercise routine has no effect on Water-Soluble CBD and CBD oil.

Limitations

1. This study was limited to 13 canines of various breeds, ages, and sex.
2. This study was limited to Kentucky Hemp Works products, the CBD Pure Product and CBD Full Spectrum product.
3. This study will not prove that CBD oil and Water-Soluble CBD will be safe for long-term use in arthritic canines.
4. This study will not prove that CBD oil and Water-Soluble CBD will cure canine arthritis.

Definition of terms (add any terms needed)

1. NSAID: non-steroidal anti-inflammatory drug commonly used to alleviate and manage pain and inflammation
2. Tekscan Strideway System: a modular platform that captures multiple paw strikes in a single pass; used to observe and quantify lameness in cats and dogs; evaluates pressure and force per limb, symmetry between limbs, cadence, velocity, distance, and more (Tekscan)

II. Review of Literature

a. Osteoarthritis

Osteoarthritis is one of the most common forms of arthritis in dogs. Osteoarthritis is a disease of the entire joint, including all of its tissues but is most frequently associated with the loss and dysfunction of articular cartilage (Anderson, et al). Cartilage acts as a cushion in a healthy joint, allowing it to move smoothly through its full range of motion. Stated by the American Kennel Club staff, the deterioration of this cartilage results in pain, inflammation, decreased range of motion, and the development of bone spurs and that while any dog can develop osteoarthritis, there are some risk factors that can predispose a dog to the condition. Some of these risk factors include being a large or giant breed, obesity, age, stress from athletic activities, previous injuries, genetics, improper nutrition, or poor conformation (AKC Staff). Another set of risk factors is osteoarthritis associated with elbow dysplasia and hip dysplasia due to subluxation and cranial cruciate ligament injuries (Marcellin-Little, 2020). Some signs that indicate osteoarthritis in dogs include stiffness or lameness, lethargy, reluctance to run, pain when touched, difficulty posturing to urinate or defecate, or loss of muscle mass over limbs and spine (AKC Staff).

There are several stages for osteoarthritis, Stages 1 and 2 tending to go undetected by owners. Once canines make it to stage 3, that is when diagnosis often occurs due to evidence of chronic pain and potential loss of strength. Stage 4 is when dogs lose the ability to walk, however, some rehabilitation devices can get these cases their ability to walk again (Marcellin-Little, 2020).

While there is no cure for osteoarthritis, there are a few treatments and supplements that can be used to help with discomfort and pain in arthritic dogs, as well as proactive approaches to help prevent osteoarthritis. Supplements such as glucosamine, chondroitin sulfate, and omega 3's can

decrease inflammation and help repair joints. There are also medications such as steroids, NSAIDs, other pain relievers that can help reduce pain (Dunn, 2018). Proactive approaches would include slowing down bone growth while canines are growing, using glucosamine supplements early in life to help protect cartilage, as well as keeping canines at a healthy weight to decrease the weight the skeletal system has to carry (Marcellin-Little, 2020).

b. CBD vs THC

Cannabis sativa is the plant that marijuana and hemp is derived from. Both hemp and marijuana contain 2 cannabinoids, tetrahydrocannabinolic acid (THCA) and cannabidiolic acid (CBDA). THCA, when dried or heated, converts to the psychoactive cannabinoid, delta-9 tetrahydrocannabinol (THC). Similarly, decarboxylation of CBDA yields cannabidiol (CBD) (Kogan et al., 2016). Hemp is also legally defined by the United States as any part of the cannabis plant that contains less than or equal to 0.3% THC (De Briyne et al., 2021).

There are more than 80 active cannabinoid chemicals in the marijuana plant, one of them being CBD. CBD does not produce euphoria or intoxication like the main psychoactive cannabinoid, tetrahydrocannabinol. THC acts on specific brain cell receptors and this causes a number of effects including altered senses, changes in mood, impairment of memory and ability to move body, as well as potentially hallucinations or delusions (National Institute on Drug Abuse, 2017).

Cannabinoids effect the body by interacting with specific cell receptors in the body and brain, which will be discussed further below. THC and CBD react on different receptors and more evidence shows that CBD acts on different type of brain signaling and that that may contribute to its therapeutic effects (“The Biology and Potential Therapeutic Effects of Cannabidiol”, 2015). CBD being a non-psychotropic that exerts anti-inflammatory effects is an

option to be explored for dogs with osteoarthritis, but its bioavailability is extremely low when given orally due to the high first-pass effect through the liver (Brioschi et al., 2020).

This bioavailability issue is why water-soluble CBD was used as a treatment in the study to discover if this first-pass effect occurred for CBD oil and if the potential bioavailability affected the effectiveness in relieving osteoarthritis related pain in canines.

c. Water-Soluble CBD

Water-Soluble CBD is made with a nanotechnology that allows CBD to be absorbed in water rather than an oil. This technology breaks CBD into small particles with sound waves and because of the small size of the particles, they are small enough to mix with water. In the research done thus far, it shows that the body absorbs Water-Soluble CBD easier than CBD oil because the nanoparticles can enter the bloodstream and cells quicker (Clark, 2021).

The high lipophilicity and low stability mean that cannabinoids benefit from nanotechnology approaches. The nanotechnology essentially gives us another way to administer CBD from the traditional approach (Bruni et al., 2018). In the research article "Evaluation of pharmacokinetics and acute anti-inflammatory potential of two oral cannabidiol preparations in healthy adults," they stated that, "The water-soluble preparation resulted in significantly higher levels of plasma CBD detected at the 45-120 min time point range compared to the lipid-soluble preparation ($T=45$, $p=0.044$; $T=60$, $p=0.035$; $T=90$, $p=0.015$)…The water-soluble CBD treatment group had a larger C_{max} (2.82 ng/ml) than the treatment group given the lipid soluble CBD (C_{max} =0.645 ng/ml)." This points to evidence of water-soluble CBD having a much higher absorption rate into the bloodstream compared to CBD oil in the body of humans.

The study also showed that the relative bioavailability of the water-soluble formula was determined to be ~4.5 times greater than that of the lipid-soluble CBD. As expected, the water-

soluble CBD also had a longer half-life in plasma and significantly higher absorption rate (Hobbs et al., 2020). There are also differences in formulation as well as administration of food or water with the absorption rate of CBD and this could be a consideration for why water-soluble CBD may absorb better (Williams et al., 2021)

This topic has limited research and information continues to be added to the hemp and CBD industry on the effectiveness of this different technology to produce water-soluble CBD and if it is truly more bioavailable to produce better results than CBD oil.

d. Structure and Mechanism of CBD and THC

The structure and mechanism of CBD and THC is outlined in this section. It is important to have a basic understanding of the mechanisms. These mechanisms are not fully explained, as research is continuing to be done in order to understand these mechanisms further.

CBD is a terpenophenol compound containing twenty-one carbon atoms, with the formula $C_{21}H_{30}O_2$ and a molecular weight of 314.66 g/mol. CBD has potential antioxidant properties due to its free cationic radicals that create several resonance structures (Atalay et al., 2020).
The endocannabinoid receptor system is composed of two cannabinoid receptors CB1 and CB2. These two receptors play a role in pain and inflammation and are located throughout the central and peripheral nervous system (Brioschi et al., 2020).

The psychotropic effects of cannabis are primarily mediated by CB1. CB1 is a cannabinoid receptor located in many tissues in the body. CB1 activation inhibits adenylate cyclase and reduces cAMP and protein kinase A activity, which results in the activation of A-type potassium channels and decreased cellular potassium levels (Bruni et al., 2018). These CB1 receptors result in the inhibition of both excitatory and inhibitory neurotransmitter release, as well as activate phospholipase C and PI-3-kinase (De Briyne et al., 2021).

CB2 receptors are not found very frequently in the CNS (De Briyne et al., 2021). CB2 receptors are primarily located in immune cells, as well as other cells, which classifies it as a peripheral cannabinoid receptor. CB2 inhibits adenylate cyclase as well, but also increases intracellular calcium levels via phospholipase C (Bruni et al., 2018).

THC is the primary psychoactive component of cannabis and works as a partial agonist of CB1 and CB2 receptors. By contrast, CBD has little affinity for these receptors, acting as a partial antagonist of CB1and a weak inverse CB2 agonist. There is other non CB1 receptor mechanisms of CBD that have been proposed to explain the observed CBD effects including analgesic, anti-inflammatory, anti-anxiety, and anti-psychotic effects (Bruni et al., 2018). It is also believed that CBD acts on unique receptors in the brain and allow the formation of norepinephrine, dopamine, and serotonin. (De Briyne et al., 2021) Essentially, the receptors in the body that interact with THC are different from those that react to CBD and allow different effects to occur.

e. Role of Cannabinoids in Inflammation and Pain

Pain and inflammation occur due to the body's response to injury, infection, and genetic changes. These responses have two different phases: acute and chronic. Acute phases are the early phases that releases inflammatory mediators, as well as accumulating fluid and blood proteins in interstitial spaces and increased capillary permeability. Pain is produced by the pro-inflammatory agents and if the process continues, it can change to a chronic inflammation (Bruni et al., 2018). Chronic state of inflammation plays a role in inflammatory diseases such as arthritis. One of the common treatments to improve inflammation and pain is the use of steroidal and non-steroidal anti-inflammatories.

Endocannabinoids belongs to a large group of compounds and are similar to cannabinoids (Atalay et al., 2020). There is a large number of side effects related with taking anti-inflammatory compounds and evidence that the endocannabinoid system actively participates in the pathophysiology of osteoarthritis pain. There is support for using anti-inflammatory properties of endocannabinoid agonists that will target CB2 receptors (Bruni et al., 2018). This is important because it has allowed cannabinoid research to improve and more research to be done.

Using specific CB2 agonist has confirmed that there is potential pain relief associated with using cannabis products. It has been shown that inflammatory effects can be controlled by increasing the use of cannabinoid receptors activity (Bruni et al., 2018). There is also limited evidence in the dose range needed to provide pain relief. It has been shown in five studies of CBD supplementation that the doses have a wide range between experiments and that different dogs responded to smaller doses, while others required a larger dose for the same effect (Yu, Rupasinghe, 2021). Ultimately, the research on CBD dosing and CBD formulation to best reduce pain and inflammation in humans as well as canines is limited and continuing to evolve.

f. Noted Side Effects in Canines from CBD Products

While there are few studies on canines and the use of CBD products, there has been some evidence of side effects from short-term studies that are worth noting. Overall, CBD products have been shown to be well tolerated by canines, however, some bloodwork results should be taken into consideration. There have been multiple cases of elevated serum ALP during CBD treatment in healthy dogs as well as dogs with osteoarthritis (Yu, Rupasinghe, 2021). One study noted loose stools as a side effect, as well as vomiting (Deabold et al., 2019). Another study also showed elevations in ALP which could mean that there is an induction of cytochrome p450 mediated oxidative metabolism of the liver with long-term use of cannabis (Deabold et al.,

2019). Another study reported hypersalivation in dogs treated with a high dose of CBD (Coelho et al., 2021). With these listed side effects in mind, it would be imperative to watch for an increase in liver enzymes with the use of CBD, as multiple studies have shown evidence of this increase and to be aware of other side effects that have been seen on a smaller scale.

Ultimately, not all potential side-effects have been discovered and there could be more potential side effects that come to light as more studies continue to be done on canines and the use of CBD.

III. Methodology

a. Purpose

The purpose of this study was to contribute research regarding the bioavailability of Water-Soluble CBD vs CBD oil and the safety of these products in alleviating side effects of osteoarthritis in canines. The objectives of the study were:

1. To determine if the bioavailability that is found in Water-Soluble CBD vs CBD oil in humans is comparable to the bioavailability in arthritic dogs in terms of alleviating symptoms through objective and subjective evaluations of the arthritic canines (essentially determining if the Water-Soluble product is better at alleviating osteoarthritis symptoms than CBD oil product)
2. To evaluate the safety of both the Water-Soluble CBD and CBD oil treatments through observing any side effects in the Complete Blood Count (CBC) and Chemistry Panel Testing

b. Population and Sample

Thirteen privately-owned arthritic dogs were used for this study. Arthritic dogs were recruited through flyers placed in Carman Pavilion, communicating with owners at the Murray State University Veterinary Technology/Pre-Veterinary Medicine Club's Doggie Day Spa at Carman Pavilion, professor owned dogs, and personal connections. Owners were asked to refrain from giving any medication for a month prior to the baseline examinations and throughout the duration of the clinical trial, except for the designated clinical trial treatment given to them. All participants were of varying breeds.

The trial originally began with 16 patients, but two were removed from the study due to underlying conditions seen in the preliminary bloodwork and one passed away (unrelated to the treatment), leaving the trial with thirteen participants that were part of the trial for its duration. These three removals caused the trial to contain five CBD oil patients, five Water Soluble CBD patients, and three placebo patients.

c. Design of Research

One clinical trial was conducted for eight weeks. Baseline examination and data collection took place before beginning the designated treatment for the trial. The baseline examination consisted of owner surveys, gait analysis with the Tekscan Strideway System, and blood tests consisting of a Complete Blood Count (CBC) and Total Chemistry Panel. After baseline examination, participants began their treatment. Patients were placed in alphabetical order according to last name and numbered 1,2,3,1,2,3 etc. to assign groups. Patients in the first group were assigned the CBD oil, patients in the second group were assigned the Water-Soluble CBD, and patients in the third group were assigned the placebo.

After four weeks, patients were re-examined with owner surveys, gait analysis with the Tekscan Strideway System, and blood tests consisting of a Complete Blood Count and Total Chemistry Panel. At the end of the 8-week trial, patients were examined for the last time with owner surveys, gait analysis with the Tekscan Strideway System, and blood tests consisting of a Complete Blood Count and Total Chemistry Panel.

At the end of the eight weeks, owners were informed of which treatment they had been receiving and an informative flyer from Kentucky Hemp Works, who donated the materials for the clinical trial. Kentucky Hemp Works donated their CBD Pure product (the Water-Soluble product) and their CBD Full Spectrum product (the CBD oil product). CBD pure contains cold-

pressed hemp seed oil and CBD isolate, which contains pure CBD and no other cannabinoids. CBD Full Spectrum Drops contains cold-pressed hemp seed oil and CBD extract.

d. Data Collection

All data collection occurred in Carman Pavilion at Murray State University every four weeks during the clinical trial. Once owners arrived, patients were transported to a separate classroom for blood collection and owners were given the Canine Brief Pain Inventory Survey to complete. Once blood collection was completed for the Complete Blood Count and Total Chemistry Panel, patients then were walked across the Tekscan Strideway System. Once all data parameters were collected, patients and owners were dismissed for that trial date.

i. Subjective Data

Subjective data was collected every four weeks using owner blind surveys. These owner blind surveys were given to assess how the owner felt their dog was doing before, during, and at the end of the treatment. These are considered owner blind because the owners were unaware of which treatment they were receiving. The Canine Brief Pain Inventory (CBPI) surveys are copyrighted by Dr. Dorothy Cimino Brown.

The survey assesses two different categories: severity and interference. The severity domain contains four items, and the interference domain contains six items. Each item in both categories is rated 0-10 numerical rating scale; 0=no pain and 10=extreme pain on the severity category, and 0=no interference and 10=completely interferes on the interference category. Pain severity scores were averaged between the numbered answers to questions 1-4. Pain interference scores were averaged between the numbered answers to questions 5-10. The remaining question related to overall quality of life for the animal, giving the options of: “Poor,” “Fair,” “Good,” “Very good,” and “Excellent.”

This study was an owner-blind study to avoid any bias results in the Canine Brief Pain Inventory surveys that were filled out by owners.

*An example blank copy of the survey can be found in the appendix

ii. Objective Data

Gait analysis data was recorded using the Tekscan 2-Tile Standard Resolution Strideway System belonging to the Murray State University Hutson School of Agriculture. This machine is used to observe and quantify force and pressure data. As the canine is led across the force plate system, an automatic strike detection system determines and records where the paws of the canine meet the pressure tiles. A real-time pressure data movie is recorded on each pass across the force plate. This movie is then synchronized to the paw strikes. Each paw strike is then color coded, which indicates the pressure range.

Results were then evaluated on a laptop using the Tekscan Strideway software. The system will automatically detect which paw hits the force plate and is labeled with peak pressure of each strike. Quadruped data tables are then generated based on the pressure data. These tables include several parameters for gait data, stride, and symmetry (ratio) data. These tables were then analyzed for each dog to determine whether the treatment demonstrated any variation in the patient's gait, and if it did demonstrate variation in the patient's gait, was there consistent variation in the patient's gait dependent on which treatment they were receiving.

iii. Blood Collection and Analysis

Blood testing was used to check values on the CBC and Total Chemistry Panel to ensure the safety of the treatment. Blood was collected from the jugular vein using a 3mL syringe and a 22 x 1inch gauge needle. Blood was placed in a purple top EDTA tube and placed on a tube rocker. The rest of the blood was placed in a red-top tube and allowed to clot. Red-top tubes

were placed in the centrifuge at 3000-5000 RPM's for 7-10 minutes. After centrifuging, serum was placed in a new red-top tube using a pipette to transfer.

Blood samples were also used to perform a PCV (%), a Total Plasma Protein (g/dL), and to evaluate plasma color. Results were recorded and obtained by Tara Joiner, MS, LVT. Blood samples were also used to make a blood smear to be evaluated by Barbie Papajeski, MS, LVT, RLATG, VTS, for additional information.

The EDTA and serum filled red-top tubes were placed in plastic Ziploc bags and placed in a cooler for transport to Breathitt Veterinary Center in Hopkinsville, KY. The serum and blood samples were evaluated at Breathitt Veterinary Center and results were delivered to veterinarian, Dr. Laura Ken Hoffman.

e. Response Rate

Each examination and data collection took place as scheduled: every four weeks for gait analysis, blood collection, and Canine Brief Pain Inventory survey. There was a 100% response rate for blood collection and Canine Brief Pain Inventory survey. Due to technological issues, only in 9 out of 13 patients were we able to collect gait analysis data. Only five CBD oil patients, three Water-Soluble CBD patients, and one Placebo patient was gait analysis data able to be collected, limiting what testing could be done to observe statistical significance.

f. Data Analysis

Subjective data was analyzed using scoring techniques outlined in the Canine Brief Pain Inventory: User Guide and tables were created using Microsoft Excel. All objective data was collected and analyzed on the Tekscan Strideway System software.

IV. Results

a. Overview

Seventeen arthritic canines were originally participating in the study. One participant never answered after initial contact and interest despite numerous attempts to contact (canine slotted to receive placebo). Then due to abnormal bloodwork, two canines were dropped from the study after baseline testing (one receiving placebo and the other receiving CBD oil). After baseline testing, another canine was dropped from the study due to her unfortunately passing due to medical issues (completely unrelated to the study). This canine was receiving Water-Soluble CBD.

Thirteen arthritic canines participated in the entirety of the clinical trial. Of the thirteen that participated, five canines were in the Water-Soluble CBD treatment group throughout the duration of the eight-week trial and five canines were in the CBD oil treatment group. Two drops from a dropper from a small bottle of liquid Water-Soluble CBD and CBD oil were administered on the gums twice daily- one administration in the morning and one in the evening. After consultation with Kentucky Hemp Works, it was determined that approximately 2-3 drops contain a concentration of 2-3 mg of CBD per dosage (putting us in the daily range of 4-6 mg of CBD for both products). Three canines were in the placebo treatment group throughout the duration of the eight-week trial. Two sprays from the spray bottle of olive oil were administered orally twice daily- one administration in the morning and one in the evening.

A total of three evaluations took place at Carman Pavilion at Murray State University: baseline (Trial 1), 4-weeks in (Trial 2), and 8-weeks in (Trial 3). Owners transported their dogs to Carman Pavilion for a previously discussed appointment time. At each of these appointments and trials, canines were evaluated using gait analysis with the Tekscan Strideway System and

blood collection. While canines were participating in the force plate and blood collection, owners were given a Canine Brief Pain Inventory (CBPI) survey at each examination. Owners were asked to fill these out at each appointment on each trial date.

b. Gait analysis results

Gait analysis was recorded on each dog at each trial date. This data was recorded on a 2-Tile Standard Resolution Strideway System by Tekscan and analyzed on the corresponding Tekscan software on a laptop. Due to complications with the system, only 9 patients' data was collected via the force plate. This includes five CBD oil patients, three Water-Soluble CBD patients, and one placebo patient. Quadruped Gait tables, Quadruped Stance-Stride tables, and Symmetry tables results for each dog are displayed in Tables 1-9. Tables 1-5 display results of canine in the CBD oil treatment group. Tables 6-8 display results of canines in the Water-Soluble CBD treatment group. Table 9 displays results of canines in the Placebo treatment group. Graphs labeled "a" and "b" show quadruped gait results differences between baseline and 4 weeks (Difference #2-#1) and 4 weeks and 8 weeks (Difference #3-#2). Graphs labeled "c" and "d" show quadruped stance-stride results differences between baseline and 4 weeks (Difference #2-#1) and 4 weeks and 8 weeks (Difference #3-#2). Graphs labeled "e" and "f" show symmetry table results between baseline and 4 weeks (Difference #2-#1) and 4 weeks and 8 weeks (Difference #3-#2).

Due to technological difficulties, Patient 011 (Table 8) graphs are labeled as the following: graphs labeled "g", "j", and "m" show quadruped gait results for baseline, 4 weeks, and 8 weeks, graphs labeled "h", "k", and "n" show quadruped stance-stride results for baseline, 4 weeks and 8 weeks, and graphs labeled "i", "l", and "o" show quadruped symmetry results for baseline, 4 weeks and 8 weeks.

Our goal is to ascertain if the two groups of subjects (Water-Soluble Treatment Dogs and CBD Oil Treatment Dogs) have equivalent patterns of outcome from Trial 3 data (which would mean patients had been on treatment for 8 weeks) measured as the pressure put on each leg as a percent of the animal's bodyweight. All dogs had four legs (front left "FL", front right "FR", hind left "HL", and hind right, "HR"), thus the measured outcome is denoted as the vector

$$\omega_i = \begin{pmatrix} \omega_{i,FL} \\ \omega_{i,FR} \\ \omega_{i,HL} \\ \omega_{i,HR} \end{pmatrix}$$

Where each element $\omega_{i,j}$ is the pressure applied to the dog i's j^{th} leg, that is, for $j \in \{FL, FR, HL, HR\}$, as a percent of dog i's total body weight (measured in pounds) at the time of examination.

However, a healthy dog's weight distribution should follow the baseline pressure vector

$$\omega_i^0 = \begin{pmatrix} 0.30 \\ 0.30 \\ 0.20 \\ 0.20 \end{pmatrix}$$

That is, the two front legs should each bear approximately 30% of the weight of dog i (60% of the total) and the two hind legs should bear 20% each (40% of the total). Combining these two vectors, the measured discrepancy or difference between dog i's actual weight placement and the baseline is denoted

$$\gamma_i = \omega_i - \omega_i^0 = \begin{pmatrix} \omega_{i,FL} - 0.30 \\ \omega_{i,FR} - 0.30 \\ \omega_{i,HL} - 0.20 \\ \omega_{i,HR} - 0.20 \end{pmatrix}$$

From here, we compute the total discrepancy in the outcome as the sum of the squared deviations, or $\Delta_i = \gamma_i^T \gamma_i = \left(\omega_{i,FL} - 0.30\right)^2 + \left(\omega_{i,FR} - 0.30\right)^2 + \left(\omega_{i,HL} - 0.20\right)^2 + \left(\omega_{i,HR} - 0.20\right)^2$

Canines Receiving CBD Oil (Trial 3 Data)

	LF	RF	LH	RH	Treatment	Total Discrepancy Trial 3
001	0.27	0.27	0.26	0.20	Oil	0.0054
004	0.27	0.26	0.28	0.20	Oil	0.0089
010	0.31	0.27	0.22	0.20	Oil	0.0014
013	0.26	0.30	0.16	0.27	Oil	0.0081
015	0.25	0.25	0.26	0.23	Oil	0.0095

Canines Receiving Water-Soluble CBD (Trial 3 Data)

	LF	RF	LH	RH	Treatment	Total Discrepancy Trial 3
002	0.30	0.26	0.20	0.24	WS	0.0032
005	0.27	0.33	0.20	0.20	WS	0.0018
011	0.29	0.28	0.21	0.23	WS	0.0015

*Note: Only one Placebo patient had data recorded on Tekscan Strideway system due to technical errors, therefore, we omitted the placebo group for this test and only compared the two CBD groups

For the population of healthy dogs, we assume each discrepancy is distributed normally with mean zero and a constant variance, or $\gamma \sim N(0, \sigma_\gamma^2)$. The total discrepancy, Δ, or sum of squared deviations is distributed Chi-square. A dog suffering from osteoarthritis is expected to have asymmetric gait and stance, and thus will have an outcome vector such that its computed value of Δ is significantly larger than zero. This amounts to a $\chi^2(1)$ test. However, to test for

potential differences between multiple groups (in this instance, groups with differing treatments), one must employ an F-test.[1]

An F-test for group differences (also called a "pooling test") is well known and widely applied in several fields, particularly economics. Such a test was pioneered by Chow (1960), where equivalencies between regression coefficient vectors are tested in this same manner. However, the maintained hypothesis of the Chow Test in using the F-distribution is that there is no meaningful heterogeneity between observations – which, in our present context, would mean that there are no significant "dog-specific" effects arising from factors like breed, diet, owner characteristics, or age. Put differently, it assumes that a rejection of the null hypothesis (no group differences) stems purely from group differences and not differences between the dogs comprising the groups. This assumption is problematic.

In recent work by Binkley & Young (Journal of Statistical and Econometric Methods), it is shown that when the assumption fails, the test overstates the significance of group differences by mistaking individual effects for group effects.[2] Those authors point out that this assumption is unlikely to hold when, first, the strength of such effects is likely to be large, and second, each observational unit has multiple observations itself. Not only is it not immediately clear whether unobserved, dog-specific factors have a strong or weak effect on our outcome's response to treatment, but each dog measured three times.

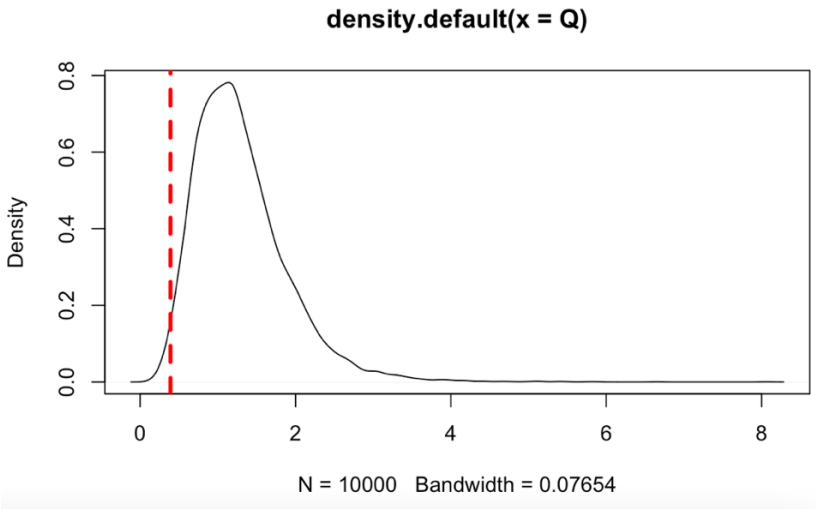
For these reasons, we employ Binkley & Young's (2021) Empirical Chow Test for group differences. The procedure is simple: first, perform the standard F-test. Second, reconstruct the

[1] In a test for equivalence of variances, each variance is a sum of squared deviations divided by the appropriate degrees of freedom. An F-statistic is a ratio of two Chi-square statistics, each with its own degrees of freedom. Hence, the F-statistic has a "numerator" and "denominator" degrees of freedom.

[2] Allowing for variable intercepts or mean-shifts using fixed effects fail to rectify the issue. See Binkley & Young (2021) for a more detailed explanation.

groups by randomly selecting dogs from both groups without distinction for treatment status and rerun the test. Third, perform the second step a large number of times to generate an empirical or pseudo F-distribution. Fourth and finally, compare the value of the test statistic computed in the first step to desired percentiles (chosen based on the researcher's pre-specified level of statistical significance or beliefs about the chances of a Type-I error in the data). The benefit of using the empirical distribution as opposed to one in the back of a statistics textbook is that it has the same degrees of freedom but different critical values. Thus, if there was an effect of dog age, for instance, then it would be already part of the data generating process used to build the empirical distribution.

It is interesting to note that the groups' outcomes are not significantly different by any conventional significance levels. The F-statistic for the dogs participating in the trial and receiving either the water-soluble CBD treatment or the CBD oil treatment was 0.299. After using the data to randomly select dogs from both treatments and re-running the test, it was performed 10,000 additional times to generate an empirical or pseudo-F distribution. This value was 0.9868. Lastly, the value of the test statistic computed in the first step was compared to desired percentiles.



When looking at the graph created, the red-line position indicates that there was no statistically significant difference between the Water-Soluble and CBD oil group when compared to 10,000 randomly generated dogs. If there was statistical significance, the red line would be located on the right side of the curve. The fact that they are not statistically significance indicates that the Water-Soluble product worked equally as effective or ineffective to the CBD oil.

After the results of the test above showed that there was no statistically significant difference between the Water-Soluble CBD and CBD oil products, another test was run to determine if there was any statistical significance between both CBD products from baseline testing to week 8 that would indicate that the products helped improve gait and weight distribution. This test was essentially used to determine if the Water-Soluble CBD and CBD oil products were effective or ineffective.

First, Trial 1 Maximum Force and Trial 3 Maximum force for each patient and each limb were calculated into Total Discrepancy values for each trial in percentages for each patient.

Patient	**Trial 1 Maximum Force**				**Trial 3 Maximum Force**				**Total Discrepancy Trial 1%**	**Total Discrepancy Trial 3%**	**Difference between Trial 1 Discrepancy and Trial 3 Discrepancy**	**Treatment**
	LF%	**RF%**	**LH%**	**RH%**	**LF%**	**RF%**	**LH%**	**RH%**				
001	0.300	0.287	0.206	0.206	0.274	0.271	0.258	0.197	0.02%	0.49%	-0.46%	Oil
002	0.249	0.284	0.209	0.257	0.300	0.264	0.199	0.237	0.62%	0.26%	0.36%	WS
004	0.242	0.305	0.247	0.207	0.266	0.258	0.277	0.200	0.56%	0.88%	-0.32%	Oil
005	0.345	0.256	0.183	0.216	0.271	0.327	0.202	0.200	0.45%	0.15%	0.29%	WS
010	0.284	0.262	0.254	0.199	0.309	0.269	0.220	0.202	0.46%	0.15%	0.32%	Oil
011	0.310	0.301	0.186	0.203	0.286	0.279	0.207	0.227	0.03%	0.14%	-0.11%	WS
013	0.324	0.313	0.171	0.192	0.264	0.301	0.163	0.272	0.16%	0.79%	-0.62%	Oil
015	0.259	0.284	0.253	0.205	0.255	0.252	0.263	0.229	0.48%	0.92%	-0.44%	Oil

*Numbers rounded to 3-significant figures for visual simplicity
*WS= Water-Soluble

When looking at the difference between Trial 1 Discrepancy and Trial 3 Discrepancy, if the treatment showed an improvement between baseline and week 8, the number would be a positive percentage. If the treatment did not show an improvement between baseline and week 8, the number would be a negative percentage.

Out of the 5 CBD Oil patients, only one showed an improvement from baseline to week 8. The other four showed no improvement from baseline to week 8. Out of the 3 Water-Soluble CBD patients, two showed an improvement from baseline to week 8. One showed no improvement from baseline to week 8.

Next, a z-Test was run to determine if there was any statistical difference from Trial 1 (baseline) to Trial 3 (week 8). Variable 1 indicates Trial 1 and Variable 2 indicates Trial 3.

z-Test: Two Sample for Means		
	Variable 1	*Variable 2*
Mean	0.003489539	0.004726652
Known Variance	0.000006	0.000012
Observations	8	8
Hypothesized Mean Difference	0	
z	-0.824741964	
P(Z<=z) one-tail	0.204759051	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0.409518102	
z Critical two-tail	1.959963985	

The mean of each trial was found as well as the z value and the P value of the one tail test. These are the values to focus on as we examine whether or not there was any improvement from Trial 1 to Trial 3 in the gait of the canines. The z value is -0.824, which indicates that there was no statistically significant improvement from Trial 1 to Trial 3. If there had been an

improvement, the z value would be positive and large. Not only is it small, but it is also negative, and the associated p-value is 0.204. This evidence fails to reject the null hypothesis of no improvement. An important note regarding the p-value, is while this does not prove statistical significance, reaching the 20% mark indicates that there could be something of notability. This could indicate that the sample size was extremely small or that there could potentially be something to consider. However, it is not statistically significant, therefore failing to reject the null hypothesis.

Tables 1-5: Gait Analysis Data of Canines in CBD Oil Treatment Group

Table 1a. Quadruped Gait Table for Patient 001 (Lucy Buchanan); data from Trial 1 (BuchL01) and Trial 2 (BuchL02) displayed. Average of BuchL01 and BuchL02 is displayed in column four. Difference between BuchL01 and BuchL02 is displayed in column five.

Quadruped Gait Table	BuchL01.fsx	BuchL02.fsx	Avg	Difference
	Lucy Buchanan	Lucy Buchanan	#1, #2	#2-#1
Number of Stances	106	87	97	-19
Gait Time - Front (sec)	8.90	7.48	8.19	-1.42
Gait Distance - Front (cells)	1357.0	1059.0	1208.0	-298.0
Gait Velocity - Front (cells/sec)	152.5	141.6	147.0	-10.9
Gait Cycle Time (sec)	0.30	0.20	0.25	-0.10
Cycles/Minute	203	301	252	98

Table 1b. Quadruped Gait Table for Patient 001 (Lucy Buchanan); data from Trial 1 (BuchL01), Trial 2 (BuchL02), and Trial 3 (BuchL03) displayed. Average of BuchL01, BuchL02, and BuchL03 is displayed in column four. Difference between BuchL02 and BuchL03 is displayed in column five.

Quadruped Gait Table	BuchL01.fsx	BuchL02.fsx	BuchL03.fsx	Avg	Difference
	Lucy Buchanan	Lucy Buchanan	Lucy Buchanan	#1, #2, #3	#3-#2
Number of Stances	106	87	70	88	-17
Gait Time - Front (sec)	8.90	7.48	6.26	7.55	-1.22
Gait Distance - Front (cells)	1357.0	1059.0	719.0	1045.0	-340.0
Gait Velocity - Front (cells/sec)	152.5	141.6	114.9	136.3	-26.7
Gait Cycle Time (sec)	0.30	0.20	0.22	0.24	0.03
Cycles/Minute	203	301	267	257	-34

Table 1c. Quadruped Stance-Stride Table for Patient 001 (Lucy Buchanan); data from Trial 1 (BuchL01) and Trial 2 (BuchL02) displayed. Difference between BuchL01 and BuchL02 is displayed in column four.

Quadruped Stance-Stride Table	BuchL01.fsx				BuchL02.fsx				Difference			
	Lucy Buchanan				Lucy Buchanan				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.09	0.10	0.10	0.10	0.11	0.10	0.10	0.11	0.02	0.01	0.00	0.02
Swing Time (sec)	0.19	0.10	0.22	0.23	0.08	0.10	0.11	0.32	-0.11	-0.00	-0.11	0.09
Stride Time (sec)	0.28	0.18	0.32	0.35	0.20	0.20	0.20	0.42	-0.08	0.02	-0.12	0.07
Stride Length (cells)	39.9	3.0	50.5	64.0	32.0	32.0	42.8	34.0	-7.9	29.0	-7.7	-30.0
Stride Velocity (cells/sec)	144.3	16.7	158.5	182.9	163.3	160.0	212.2	81.0	19.0	143.3	53.7	-101.9
Stride Acceleration 1-2 (cells/sec2)	1077.0	n/a	-6364.3	41.7	524.7	n/a	-823.4	n/a	-552.3	n/a	5540.9	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	545	374	521	374	375	312	369	318	-170	-62	-153	-56
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	44	28	45	31	35	29	32	31	-9	1	-12	0
Maximum Peak Pressure (raw)	92	76	91	84	78	73	81	69	-14	-2	-10	-15

Table 1d. Quadruped Stance-Stride Table for Patient 001 (Lucy Buchanan); data from Trial 1 (BuchL01), Trial 2 (BuchL02), and Trial 3 (BuchL03) displayed. Difference between BuchL02 and BuchL03 is displayed in column four.

Quadruped Stance-Stride Table	BuchL01.fsx				BuchL02.fsx				BuchL03.fsx				Difference			
	Lucy Buchanan				Lucy Buchanan				Lucy Buchanan				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.09	0.10	0.10	0.10	0.11	0.10	0.10	0.11	0.13	0.22	0.14	0.16	0.02	0.12	0.04	0.05
Swing Time (sec)	0.19	0.10	0.22	0.23	0.08	0.10	0.11	0.32	0.11	n/a	0.10	-0.06	0.03	n/a	-0.01	-0.38
Stride Time (sec)	0.28	0.18	0.32	0.35	0.20	0.20	0.20	0.42	0.22	n/a	0.23	0.06	0.03	n/a	0.03	-0.36
Stride Length (cells)	39.9	3.0	50.5	64.0	32.0	32.0	42.8	34.0	31.5	n/a	24.2	17.0	-0.5	n/a	-18.6	-17.0
Stride Velocity (cells/sec)	144.3	16.7	158.5	182.9	163.3	160.0	212.2	81.0	142.2	n/a	105.1	283.3	-21.1	n/a	-107.1	202.4
Stride Acceleration 1-2 (cells/sec2)	1077.0	n/a	-6364.3	41.7	524.7	n/a	-823.4	n/a	400.1	n/a	n/a	n/a	-124.6	n/a	n/a	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	545	374	521	374	375	312	369	318	335	315	331	241	-40	3	-38	-76
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	44	28	45	31	35	29	32	31	34	52	37	32	-1	22	5	1
Maximum Peak Pressure (raw)	92	76	91	84	78	73	81	69	82	68	73	64	4	-6	-7	-5

Table 1e. Quadruped Symmetry Table for Patient 001 (Lucy Buchanan); data from Trial 1 (BuchL01) and Trial 2 (BuchL02) displayed. Average of BuchL01 and BuchL02 is displayed in column four. Difference between BuchL01 and BuchL02 is displayed in column five.

Quadruped Symmetry Table (ratio)	BuchL01.fsx Lucy Buchanan	BuchL02.fsx Lucy Buchanan	Avg #1, #2	Difference #2-#1
Stance Time Front / Hind	0.99	0.97	0.98	-0.02
Stride Time Front / Hind	1.12	^0.64	0.88	-0.48
Stride Length Front / Hind	^1.35	1.13	1.24	-0.22
Stride Velocity Front / Hind	^1.52	^1.56	^1.54	0.04
Max Force Front / Hind	^1.43	1.18	1.30	-0.25
Stance Time Left / Right	1.00	1.01	1.00	0.02
Stride Time Left / Right	^0.68	^0.64	^0.66	-0.05
Stride Length Left / Right	^0.37	0.83	^0.60	0.46
Stride Velocity Left / Right	^0.47	1.10	0.79	0.63
Max Force Left / Right	1.03	1.00	1.01	-0.03
Stance Time Left Front / Right Front	0.97	1.12	1.05	0.15
Stride Time Left Front / Right Front	0.87	0.97	0.92	0.10
Stride Length Left Front / Right Front	0.79	^0.75	0.77	-0.04
Stride Velocity Left Front / Right Front	0.91	0.77	0.84	-0.14
Max Force Left Front / Right Front	1.05	1.02	1.03	-0.03
Stance Time Left Hind / Right Hind	1.02	0.92	0.97	-0.10
Stride Time Left Hind / Right Hind	^0.51	^0.48	^0.50	-0.04
Stride Length Left Hind / Right Hind	^0.05	0.94	^0.49	0.89
Stride Velocity Left Hind / Right Hind	^0.09	^1.98	1.03	1.89
Max Force Left Hind / Right Hind	1.00	0.98	0.99	-0.02

Table 1f. Quadruped Symmetry Table for Patient 001 (Lucy Buchanan); data from Trial 1 (BuchL01), Trial 2 (BuchL02), and Trial 3 (BuchL03) displayed. Average of BuchL01, BuchL02, and BuchL03 is displayed in column four. Difference between BuchL02 and BuchL03 is displayed in column five.

Quadruped Symmetry Table (ratio)	BuchL01.fsx Lucy Buchanan	BuchL02.fsx Lucy Buchanan	BuchL03.fsx Lucy Buchanan	Avg #1, #2, #3	Difference #3-#2
Stance Time Front / Hind	0.99	0.97	^0.72	0.89	-0.25
Stride Time Front / Hind	1.12	^0.64	n/a	0.88	n/a
Stride Length Front / Hind	^1.35	1.13	n/a	1.24	n/a
Stride Velocity Front / Hind	^1.52	^1.56	n/a	^1.54	n/a
Max Force Front / Hind	^1.43	1.18	1.20	1.27	0.02
Stance Time Left / Right	1.00	1.01	1.17	1.06	0.16
Stride Time Left / Right	^0.68	^0.64	n/a	^0.66	n/a
Stride Length Left / Right	^0.37	0.83	n/a	^0.60	n/a
Stride Velocity Left / Right	^0.47	1.10	n/a	0.79	n/a
Max Force Left / Right	1.03	1.00	1.14	1.05	0.13
Stance Time Left Front / Right Front	0.97	1.12	0.93	1.01	-0.20
Stride Time Left Front / Right Front	0.87	0.97	0.96	0.93	-0.01
Stride Length Left Front / Right Front	0.79	^0.75	1.31	0.95	0.56
Stride Velocity Left Front / Right Front	0.91	0.77	^1.35	1.01	0.58
Max Force Left Front / Right Front	1.05	1.02	1.01	1.03	-0.00
Stance Time Left Hind / Right Hind	1.02	0.92	^1.39	1.11	0.47
Stride Time Left Hind / Right Hind	^0.51	^0.48	n/a	^0.50	n/a
Stride Length Left Hind / Right Hind	^0.05	0.94	n/a	^0.49	n/a
Stride Velocity Left Hind / Right Hind	^0.09	^1.98	n/a	1.03	n/a
Max Force Left Hind / Right Hind	1.00	0.98	1.30	1.10	0.32

Table 2a. Quadruped Gait Table for Patient 004 (Paul Ferguson); data from Trial 1 (FergP01) and Trial 2 (FergP02) displayed. Average of FergP01 and FergP02 is displayed in column four. Difference between FergP01 and FergP02 is displayed in column five.

Quadruped Gait Table	FergP01.fsx	FergP02.fsx	Avg	Difference
	Paul Ferguson	Paul Ferguson	#1, #2	#2-#1
Number of Stances	42	35	39	-7
Gait Time - Front (sec)	5.66	4.24	4.95	-1.42
Gait Distance - Front (cells)	687.0	510.0	598.5	-177.0
Gait Velocity - Front (cells/sec)	121.4	120.3	120.8	-1.1
Gait Cycle Time (sec)	0.47	0.42	0.44	-0.05
Cycles/Minute	128	144	136	15

Table 2b. Quadruped Gait Table for Patient 004 (Paul Ferguson); data from Trial 1 (FergP01), Trial 2 (FergP02), and Trial 3 (FergP03) displayed. Average of FergP01, FergP02, and FergP03 is displayed in column four. Difference between FergP02 and FergP03 is displayed in column five.

Quadruped Gait Table	FergP01.fsx	FergP02.fsx	FergP03.fsx	Avg	Difference
	Paul Ferguson	Paul Ferguson	Paul Ferguson	#1, #2, #3	#3-#2
Number of Stances	42	35	39	39	4
Gait Time - Front (sec)	5.66	4.24	4.44	4.78	0.20
Gait Distance - Front (cells)	687.0	510.0	611.0	602.7	101.0
Gait Velocity - Front (cells/sec)	121.4	120.3	137.6	126.4	17.3
Gait Cycle Time (sec)	0.47	0.42	0.27	0.39	-0.14
Cycles/Minute	128	144	218	163	74

Table 2c. Quadruped Stance-Stride Table for Patient 004 (Paul Ferguson); data from Trial 1 (FergP01) and Trial 2 (FergP02) displayed. Difference between FergP01 and FergP02 is displayed in column four.

Quadruped Stance-Stride Table	FergP01.fsx				FergP02.fsx				Difference			
	Paul Ferguson				Paul Ferguson				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.31	0.27	0.25	0.25	0.29	0.37	0.37	0.35	-0.02	0.10	0.13	0.10
Swing Time (sec)	0.22	0.42	0.21	n/a	0.09	n/a	0.10	0.23	-0.13	n/a	-0.11	n/a
Stride Time (sec)	0.55	0.54	0.42	n/a	0.31	n/a	0.48	0.43	-0.23	n/a	0.06	n/a
Stride Length (cells)	62.5	11.0	56.7	n/a	59.3	n/a	57.0	35.3	-3.2	n/a	0.3	n/a
Stride Velocity (cells/sec)	114.7	20.4	134.1	n/a	189.4	n/a	118.8	82.8	74.7	n/a	-15.4	n/a
Stride Acceleration 1-2 (cells/sec2)	-766.0	n/a	-440.8	n/a	-595.8	n/a	1698.6	562.9	170.2	n/a	2139.4	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	932	951	1176	798	736	816	897	747	-196	-135	-279	-51
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	203	171	222	156	146	195	242	190	-57	24	20	34
Maximum Peak Pressure (raw)	85	121	97	82	94	130	104	92	8	9	8	10

Table 2d. Quadruped Stance-Stride Table for Patient 004 (Paul Ferguson); data from Trial 1 (FergP01), Trial 2 (FergP02), and Trial 3 (FergP03) displayed. Difference between FergP02 and FergP03 is displayed in column four.

Quadruped Stance-Stride Table	FergP01.fsx				FergP02.fsx				FergP03.fsx				Difference			
	Paul Ferguson				Paul Ferguson				Paul Ferguson				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.31	0.27	0.25	0.25	0.29	0.37	0.37	0.35	0.25	0.31	0.27	0.23	-0.04	-0.06	-0.10	-0.12
Swing Time (sec)	0.22	0.42	0.21	n/a	0.09	n/a	0.10	0.23	0.09	0.64	0.02	0.14	-0.00	n/a	-0.08	-0.09
Stride Time (sec)	0.55	0.54	0.42	n/a	0.31	n/a	0.48	0.43	0.24	0.92	0.34	0.38	-0.08	n/a	-0.14	-0.05
Stride Length (cells)	62.5	11.0	56.7	n/a	59.3	n/a	57.0	35.3	56.6	39.0	46.7	59.5	-2.7	n/a	-10.3	24.2
Stride Velocity (cells/sec)	114.7	20.4	134.1	n/a	189.4	n/a	118.8	82.8	239.8	42.4	137.3	156.6	50.5	n/a	18.5	73.8
Stride Acceleration 1-2 (cells/sec2)	-766.0	n/a	-440.8	n/a	-595.8	n/a	1698.6	562.9	675.0	n/a	119.0	3233.5	1270.8	n/a	1579.6	2670.6
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	932	951	1176	798	736	816	897	747	837	871	811	628	100	55	-87	-119
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	203	171	222	156	146	195	242	190	163	181	157	113	17	-14	-85	-77
Maximum Peak Pressure (raw)	85	121	97	82	94	130	104	92	79	116	81	95	-14	-14	-23	3

Table 2e. Quadruped Symmetry Table for Patient 004 (Paul Ferguson); data from Trial 1 (FergP01) and Trial 2 (FergP02) displayed. Average of FergP01 and FergP02 is displayed in column four. Difference between FergP01 and FergP02 is displayed in column five.

Quadruped Symmetry Table (ratio)	FergP01.fsx Paul Ferguson	FergP02.fsx Paul Ferguson	Avg #1, #2	Difference #2-#1
Stance Time Front / Hind	1.05	0.93	0.99	-0.13
Stride Time Front / Hind	n/a	n/a	n/a	n/a
Stride Length Front / Hind	n/a	n/a	n/a	n/a
Stride Velocity Front / Hind	n/a	n/a	n/a	n/a
Max Force Front / Hind	1.21	1.05	1.13	-0.16
Stance Time Left / Right	1.16	0.91	1.04	-0.25
Stride Time Left / Right	n/a	n/a	n/a	n/a
Stride Length Left / Right	n/a	n/a	n/a	n/a
Stride Velocity Left / Right	n/a	n/a	n/a	n/a
Max Force Left / Right	0.95	0.94	0.95	-0.01
Stance Time Left Front / Right Front	1.24	0.77	1.01	-0.46
Stride Time Left Front / Right Front	1.29	^0.65	0.97	-0.64
Stride Length Left Front / Right Front	1.10	1.04	1.07	-0.06
Stride Velocity Left Front / Right Front	0.86	^1.59	1.22	0.74
Max Force Left Front / Right Front	0.79	0.82	0.81	0.03
Stance Time Left Hind / Right Hind	1.08	1.06	1.07	-0.02
Stride Time Left Hind / Right Hind	n/a	n/a	n/a	n/a
Stride Length Left Hind / Right Hind	n/a	n/a	n/a	n/a
Stride Velocity Left Hind / Right Hind	n/a	n/a	n/a	n/a
Max Force Left Hind / Right Hind	1.19	1.09	1.14	-0.10

Table 2f. Quadruped Symmetry Table for Patient 004 (Paul Ferguson); data from Trial 1 (FergP01), Trial 2 (FergP02), and Trial 3 (FergP03) displayed. Average of FergP01, FergP02, and FergP03 is displayed in column four. Difference between FergP02 and FergP03 is displayed in column five.

Quadruped Symmetry Table (ratio)	FergP01.fsx Paul Ferguson	FergP02.fsx Paul Ferguson	FergP03.fsx Paul Ferguson	Avg #1, #2, #3	Difference #3-#2
Stance Time Front / Hind	1.05	0.93	0.97	0.98	0.04
Stride Time Front / Hind	n/a	n/a	^0.44	^0.44	n/a
Stride Length Front / Hind	n/a	n/a	1.05	1.05	n/a
Stride Velocity Front / Hind	n/a	n/a	^1.90	^1.90	n/a
Max Force Front / Hind	1.21	1.05	1.10	1.12	0.05
Stance Time Left / Right	1.16	0.91	1.09	1.05	0.18
Stride Time Left / Right	n/a	n/a	^1.61	^1.61	n/a
Stride Length Left / Right	n/a	n/a	0.90	0.90	n/a
Stride Velocity Left / Right	n/a	n/a	0.96	0.96	n/a
Max Force Left / Right	0.95	0.94	1.19	1.03	0.24
Stance Time Left Front / Right Front	1.24	0.77	0.89	0.97	0.12
Stride Time Left Front / Right Front	1.29	^0.65	^0.69	0.88	0.04
Stride Length Left Front / Right Front	1.10	1.04	1.21	1.12	0.17
Stride Velocity Left Front / Right Front	0.86	^1.59	^1.75	^1.40	0.15
Max Force Left Front / Right Front	0.79	0.82	1.03	0.88	0.21
Stance Time Left Hind / Right Hind	1.08	1.06	1.32	1.15	0.26
Stride Time Left Hind / Right Hind	n/a	n/a	^2.42	^2.42	n/a
Stride Length Left Hind / Right Hind	n/a	n/a	^0.66	^0.66	n/a
Stride Velocity Left Hind / Right Hind	n/a	n/a	^0.27	^0.27	n/a
Max Force Left Hind / Right Hind	1.19	1.09	^1.39	1.22	0.29

Table 3a. Quadruped Gait Table for Patient 010 (Daphne Papajeski); data from Trial 1 (PapaD01) and Trial 2 (PapaD02) displayed. Average of PapaD01 and PapaD02 is displayed in column four. Difference between PapaD01 and PapaD02 is displayed in column five.

Quadruped Gait Table	PapaD01.fsx	PapaD02.fsx	Avg	Difference
	Daphne Papajeski	Daphne Papajeski	#1, #2	#2-#1
Number of Stances	36	62	49	26
Gait Time - Front (sec)	5.90	5.56	5.73	-0.34
Gait Distance - Front (cells)	544.0	901.0	722.5	357.0
Gait Velocity - Front (cells/sec)	92.2	162.1	127.1	69.8
Gait Cycle Time (sec)	0.57	0.29	0.43	-0.28
Cycles/Minute	105	207	156	102

Table 3b. Quadruped Gait Table for Patient 010 (Daphne Papajeski); data from Trial 1 (PapaD01), Trial 2 (PapaD02), and Trial 3 (PapaD03) displayed. Average of PapaD01, PapaD02, and PapaD03 is displayed in column four. Difference between PapaD02 and PapaD03 is displayed in column five.

Quadruped Gait Table	PapaD01.fsx	PapaD02.fsx	PapaD03.fsx	Avg	Difference
	Daphne Papajeski	Daphne Papajeski	Daphne Papajeski	#1, #2, #3	#3-#2
Number of Stances	36	62	58	52	-4
Gait Time - Front (sec)	5.90	5.56	4.30	5.25	-1.26
Gait Distance - Front (cells)	544.0	901.0	674.0	706.3	-227.0
Gait Velocity - Front (cells/sec)	92.2	162.1	156.7	137.0	-5.3
Gait Cycle Time (sec)	0.57	0.29	0.31	0.39	0.02
Cycles/Minute	105	207	196	169	-11

Table 3c. Quadruped Stance-Stride Table for Patient 010 (Daphne Papajeski); data from Trial 1 (PapaD01) and Trial 2 (PapaD02) displayed. Difference between PapaD01 and PapaD02 is displayed in column four.

Quadruped Stance-Stride Table	PapaD01.fsx				PapaD02.fsx				Difference			
	Daphne Papajeski				Daphne Papajeski				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.36	0.41	0.38	0.38	0.17	0.17	0.21	0.21	-0.20	-0.23	-0.16	-0.18
Swing Time (sec)	0.15	n/a	0.29	n/a	0.13	0.28	0.10	0.36	-0.03	n/a	-0.19	n/a
Stride Time (sec)	0.48	n/a	0.65	n/a	0.28	0.47	0.31	0.60	-0.20	n/a	-0.34	n/a
Stride Length (cells)	63.7	n/a	51.1	n/a	47.2	22.3	31.2	10.0	-16.5	n/a	-19.9	n/a
Stride Velocity (cells/sec)	132.6	n/a	78.5	n/a	168.5	47.3	100.0	16.7	35.9	n/a	21.5	n/a
Stride Acceleration 1-2 (cells/sec2)	-716.7	n/a	-139.4	n/a	938.2	6.9	-605.6	n/a	1654.9	n/a	-466.2	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	484	433	446	339	497	457	547	391	14	23	101	51
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	125	125	124	97	74	59	92	59	-50	-66	-32	-37
Maximum Peak Pressure (raw)	71	71	67	58	71	60	79	68	-0	-11	12	10

Table 3d. Quadruped Stance-Stride Table for Patient 010 (Daphne Papajeski); data from Trial 1 (PapaD01), Trial 2 (PapaD02), and Trial 3 (PapaD03) displayed. Difference between PapaD02 and PapaD03 is displayed in column four.

Quadruped Stance-Stride Table	PapaD01.fsx				PapaD02.fsx				PapaD03.fsx				Difference			
	Daphne Papajeski				Daphne Papajeski				Daphne Papajeski				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.36	0.41	0.38	0.38	0.17	0.17	0.21	0.21	0.23	0.21	0.23	0.22	0.07	0.04	0.02	0.01
Swing Time (sec)	0.15	n/a	0.29	n/a	0.13	0.28	0.10	0.36	0.30	0.19	0.09	0.26	0.17	-0.10	-0.01	-0.10
Stride Time (sec)	0.48	n/a	0.65	n/a	0.28	0.47	0.31	0.60	0.50	0.37	0.29	0.44	0.22	-0.10	-0.02	-0.16
Stride Length (cells)	63.7	n/a	51.1	n/a	47.2	22.3	31.2	10.0	69.0	39.0	46.4	41.0	21.8	16.8	15.2	31.0
Stride Velocity (cells/sec)	132.6	n/a	78.5	n/a	168.5	47.3	100.0	16.7	138.0	106.4	160.1	93.2	-30.5	59.0	60.1	76.5
Stride Acceleration 1-2 (cells/sec2)	-716.7	n/a	-139.4	n/a	938.2	6.9	-605.6	n/a	n/a	726.7	606.5	n/a	n/a	719.8	1212.1	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	484	433	446	339	497	457	547	391	544	387	473	356	46	-70	-75	-34
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	125	125	124	97	74	59	92	59	94	66	81	59	19	7	-11	-0
Maximum Peak Pressure (raw)	71	71	67	58	71	60	79	68	74	56	62	62	4	-4	-17	-5

Table 3e. Quadruped Symmetry Table for Patient 010 (Daphne Papajeski); data from Trial 1 (PapaD01) and Trial 2 (PapaD02) displayed. Average of PapaD01 and PapaD02 is displayed in column four. Difference between PapaD01 and PapaD02 is displayed in column five.

Quadruped Symmetry Table (ratio)	PapaD01.fsx Daphne Papajeski	PapaD02.fsx Daphne Papajeski	Avg #1, #2	Difference #2-#1
Stance Time Front / Hind	0.93	1.00	0.96	0.06
Stride Time Front / Hind	n/a	^0.55	^0.55	n/a
Stride Length Front / Hind	n/a	^2.43	^2.43	n/a
Stride Velocity Front / Hind	n/a	^4.19	^4.19	n/a
Max Force Front / Hind	1.20	1.23	1.22	0.03
Stance Time Left / Right	1.01	0.81	0.91	-0.20
Stride Time Left / Right	n/a	0.82	0.82	n/a
Stride Length Left / Right	n/a	^1.69	^1.69	n/a
Stride Velocity Left / Right	n/a	^1.85	^1.85	n/a
Max Force Left / Right	1.17	1.02	1.09	-0.15
Stance Time Left Front / Right Front	0.96	0.78	0.87	-0.18
Stride Time Left Front / Right Front	^0.74	0.90	0.82	0.16
Stride Length Left Front / Right Front	1.24	^1.51	^1.38	0.27
Stride Velocity Left Front / Right Front	^1.69	^1.69	^1.69	-0.00
Max Force Left Front / Right Front	1.08	0.91	1.00	-0.18
Stance Time Left Hind / Right Hind	1.06	0.84	0.95	-0.22
Stride Time Left Hind / Right Hind	n/a	0.78	0.78	n/a
Stride Length Left Hind / Right Hind	n/a	^2.22	^2.22	n/a
Stride Velocity Left Hind / Right Hind	n/a	^2.84	^2.84	n/a
Max Force Left Hind / Right Hind	1.28	1.17	1.22	-0.11

Table 3f. Quadruped Symmetry Table for Patient 010 (Daphne Papajeski); data from Trial 1 (PapaD01), Trial 2 (PapaD02), and Trial 3 (PapaD03) displayed. Average of PapaD01, PapaD02, and PapaD03 is displayed in column four. Difference between PapaD02 and PapaD03 is displayed in column five.

Quadruped Symmetry Table (ratio)	PapaD01.fsx Daphne Papajeski	PapaD02.fsx Daphne Papajeski	PapaD03.fsx Daphne Papajeski	Avg #1, #2, #3	Difference #3-#2
Stance Time Front / Hind	0.93	1.00	1.08	1.00	0.09
Stride Time Front / Hind	n/a	^0.55	0.98	0.77	0.43
Stride Length Front / Hind	n/a	^2.43	^1.44	^1.94	-0.99
Stride Velocity Front / Hind	n/a	^4.19	^1.49	^2.84	-2.70
Max Force Front / Hind	1.20	1.23	^1.37	1.27	0.13
Stance Time Left / Right	1.01	0.81	1.00	0.94	0.19
Stride Time Left / Right	n/a	0.82	1.19	1.00	0.36
Stride Length Left / Right	n/a	^1.69	1.24	^1.46	-0.45
Stride Velocity Left / Right	n/a	^1.85	0.96	^1.41	-0.89
Max Force Left / Right	1.17	1.02	1.12	1.10	0.11
Stance Time Left Front / Right Front	0.96	0.78	1.01	0.92	0.23
Stride Time Left Front / Right Front	^0.74	0.90	^1.72	1.12	0.83
Stride Length Left Front / Right Front	1.24	^1.51	^1.49	^1.41	-0.03
Stride Velocity Left Front / Right Front	^1.69	^1.69	0.86	^1.41	-0.82
Max Force Left Front / Right Front	1.08	0.91	1.15	1.05	0.24
Stance Time Left Hind / Right Hind	1.06	0.84	0.98	0.96	0.14
Stride Time Left Hind / Right Hind	n/a	0.78	0.83	0.81	0.05
Stride Length Left Hind / Right Hind	n/a	^2.22	0.95	^1.59	-1.27
Stride Velocity Left Hind / Right Hind	n/a	^2.84	1.14	^1.99	-1.70
Max Force Left Hind / Right Hind	1.28	1.17	1.09	1.18	-0.08

Table 4a. Quadruped Gait Table for Patient 013 (Reese Rascher); data from Trial 1 (RascR01) and Trial 2 (RascR02) displayed. Average of RascR01 and RascR02 is displayed in column four. Difference between RascR01 and RascR02 is displayed in column five.

Quadruped Gait Table	RascR01.fsx	RascR02.fsx	Avg	Difference
	Reece Rascher	Reece Rascher	#1, #2	#2-#1
Number of Stances	34	39	37	5
Gait Time - Front (sec)	6.52	6.14	6.33	-0.38
Gait Distance - Front (cells)	527.0	583.0	555.0	56.0
Gait Velocity - Front (cells/sec)	80.8	95.0	87.9	14.1
Gait Cycle Time (sec)	0.70	0.56	0.63	-0.14
Cycles/Minute	86	107	97	21

Table 4b. Quadruped Gait Table for Patient 013 (Reese Rascher); data from Trial 1 (RascR01), Trial 2 (RascR02), and Trial 3 (Rasc03) displayed. Average of RascR01, RascR02, and RascR03 is displayed in column four. Difference between RascR02 and RascR03 is displayed in column five.

Quadruped Gait Table	RascR01.fsx	RascR02.fsx	RascR03.fsx	Avg	Difference
	Reece Rascher	Reece Rascher	Reece Rascher	#1, #2, #3	#3-#2
Number of Stances	34	39	32	35	-7
Gait Time - Front (sec)	6.52	6.14	4.64	5.77	-1.50
Gait Distance - Front (cells)	527.0	583.0	487.0	532.3	-96.0
Gait Velocity - Front (cells/sec)	80.8	95.0	105.0	93.6	10.0
Gait Cycle Time (sec)	0.70	0.56	0.48	0.58	-0.08
Cycles/Minute	86	107	126	106	19

Table 4c. Quadruped Stance-Stride Table for Patient 013 (Reese Rascher); data from Trial 1 (RascR01) and Trial 2 (RascR02) displayed. Difference between RascR01 and RascR02 is displayed in column four.

Quadruped Stance-Stride Table	RascR01.fsx				RascR02.fsx				Difference			
	Reece Rascher				Reece Rascher				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.48	0.35	0.37	0.34	0.39	0.37	0.35	0.37	-0.09	0.02	-0.02	0.03
Swing Time (sec)	0.27	0.18	0.37	n/a	0.27	n/a	0.17	n/a	-0.00	n/a	-0.20	n/a
Stride Time (sec)	0.74	0.38	0.66	n/a	0.64	n/a	0.49	n/a	-0.10	n/a	-0.17	n/a
Stride Length (cells)	67.4	50.0	57.0	n/a	45.4	n/a	57.7	n/a	-22.0	n/a	0.7	n/a
Stride Velocity (cells/sec)	91.6	131.6	85.9	n/a	70.9	n/a	116.9	n/a	-20.6	n/a	31.0	n/a
Stride Acceleration 1-2 (cells/sec2)	-58.6	n/a	-23.6	n/a	13.3	n/a	7.5	n/a	71.9	n/a	31.2	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	722	381	698	429	636	429	615	530	-87	48	-83	102
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	261	106	208	120	191	128	179	142	-70	22	-30	21
Maximum Peak Pressure (raw)	94	66	84	77	84	79	80	110	-10	13	-3	33

Table 4d. Quadruped Stance-Stride Table for Patient 013 (Reese Rascher); data from Trial 1 (RascR01), Trial 2 (RascR02), and Trial 3 (RascR03) displayed. Difference between RascR02 and RascR03 is displayed in column four.

Quadruped Stance-Stride Table	RascR01.fsx				RascR02.fsx				RascR03.fsx				Difference			
	Reece Rascher				Reece Rascher				Reece Rascher				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.48	0.35	0.37	0.34	0.39	0.37	0.35	0.37	0.37	0.34	0.40	0.37	-0.02	-0.03	0.05	0.01
Swing Time (sec)	0.27	0.18	0.37	n/a	0.27	n/a	0.17	n/a	0.17	n/a	0.03	0.32	-0.09	n/a	-0.14	n/a
Stride Time (sec)	0.74	0.38	0.66	n/a	0.64	n/a	0.49	n/a	0.59	n/a	0.44	0.70	-0.05	n/a	-0.06	n/a
Stride Length (cells)	67.4	50.0	57.0	n/a	45.4	n/a	57.7	n/a	59.7	n/a	44.6	84.0	14.3	n/a	-13.0	n/a
Stride Velocity (cells/sec)	91.6	131.6	85.9	n/a	70.9	n/a	116.9	n/a	101.7	n/a	102.6	120.0	30.8	n/a	-14.3	n/a
Stride Acceleration 1-2 (cells/sec2)	-58.6	n/a	-23.6	n/a	13.3	n/a	7.5	n/a	-13.7	n/a	-104.9	n/a	-27.0	n/a	-112.4	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	722	381	698	429	636	429	615	530	532	329	607	549	-103	-99	-8	19
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	261	106	208	120	191	128	179	142	158	100	187	164	-32	-29	9	22
Maximum Peak Pressure (raw)	94	66	84	77	84	79	80	110	84	61	79	83	0	-18	-1	-27

Table 4e. Quadruped Symmetry Table for Patient 013 (Reese Rascher); data from Trial 1 (RascR01) and Trial 2 (RascR02) displayed. Average of RascR01 and RascR02 is displayed in column four. Difference between RascR01 and RascR02 is displayed in column five.

Quadruped Symmetry Table (ratio)	RascR01.fsx	RascR02.fsx	Avg	Difference
	Reece Rascher	Reece Rascher	#1, #2	#2-#1
Stance Time Front / Hind	1.23	1.00	1.11	-0.23
Stride Time Front / Hind	n/a	n/a	n/a	n/a
Stride Length Front / Hind	n/a	n/a	n/a	n/a
Stride Velocity Front / Hind	n/a	n/a	n/a	n/a
Max Force Front / Hind	^1.75	1.30	^1.53	-0.45
Stance Time Left / Right	1.16	1.06	1.11	-0.10
Stride Time Left / Right	n/a	n/a	n/a	n/a
Stride Length Left / Right	n/a	n/a	n/a	n/a
Stride Velocity Left / Right	n/a	n/a	n/a	n/a
Max Force Left / Right	0.98	0.93	0.95	-0.05
Stance Time Left Front / Right Front	1.29	1.12	1.20	-0.17
Stride Time Left Front / Right Front	1.11	1.30	1.20	0.19
Stride Length Left Front / Right Front	1.18	0.79	0.98	-0.40
Stride Velocity Left Front / Right Front	1.07	^0.61	0.84	-0.46
Max Force Left Front / Right Front	1.03	1.03	1.03	-0.00
Stance Time Left Hind / Right Hind	1.03	1.02	1.02	-0.01
Stride Time Left Hind / Right Hind	n/a	n/a	n/a	n/a
Stride Length Left Hind / Right Hind	n/a	n/a	n/a	n/a
Stride Velocity Left Hind / Right Hind	n/a	n/a	n/a	n/a
Max Force Left Hind / Right Hind	0.89	0.81	0.85	-0.08

Table 4f. Quadruped Symmetry Table for Patient 013 (Reese Rascher); data from Trial 1 (RascR01), Trial 2 (RascR02), and Trial 3 (RascR03) displayed. Average of RascR01, RascR02, and RascR03 is displayed in column four. Difference between RascR02 and RascR03 is displayed in column five.

Quadruped Symmetry Table (ratio)	RascR01.fsx Reece Rascher	RascR02.fsx Reece Rascher	RascR03.fsx Reece Rascher	Avg #1, #2, #3	Difference #3-#2
Stance Time Front / Hind	1.23	1.00	1.08	1.10	0.08
Stride Time Front / Hind	n/a	n/a	n/a	n/a	n/a
Stride Length Front / Hind	n/a	n/a	n/a	n/a	n/a
Stride Velocity Front / Hind	n/a	n/a	n/a	n/a	n/a
Max Force Front / Hind	^1.75	1.30	1.30	^1.45	-0.01
Stance Time Left / Right	1.16	1.06	0.92	1.05	-0.14
Stride Time Left / Right	n/a	n/a	n/a	n/a	n/a
Stride Length Left / Right	n/a	n/a	n/a	n/a	n/a
Stride Velocity Left / Right	n/a	n/a	n/a	n/a	n/a
Max Force Left / Right	0.98	0.93	^0.75	0.88	-0.18
Stance Time Left Front / Right Front	1.29	1.12	0.93	1.11	-0.19
Stride Time Left Front / Right Front	1.11	1.30	^1.35	1.25	0.05
Stride Length Left Front / Right Front	1.18	0.79	^1.34	1.10	0.55
Stride Velocity Left Front / Right Front	1.07	^0.61	0.99	0.89	0.38
Max Force Left Front / Right Front	1.03	1.03	0.88	0.98	-0.16
Stance Time Left Hind / Right Hind	1.03	1.02	0.92	0.99	-0.09
Stride Time Left Hind / Right Hind	n/a	n/a	n/a	n/a	n/a
Stride Length Left Hind / Right Hind	n/a	n/a	n/a	n/a	n/a
Stride Velocity Left Hind / Right Hind	n/a	n/a	n/a	n/a	n/a
Max Force Left Hind / Right Hind	0.89	0.81	^0.60	0.77	-0.21

Table 5a. Quadruped Gait Table for Patient 015 (Maddie Simpson); data from Trial 1 (SimpM01) and Trial 2 (SimpM02) displayed. Average of SimpM01 and SimpM02 is displayed in column four. Difference between SimpM01 and SimpM02 is displayed in column five.

Quadruped Gait Table	SimpM01.fsx	SimpM02.fsx	Avg	Difference
	Maddie Simpson	Maddie Simpson	#1, #2	#2-#1
Number of Stances	62	64	63	2
Gait Time - Front (sec)	6.60	7.14	6.87	0.54
Gait Distance - Front (cells)	786.0	829.0	807.5	43.0
Gait Velocity - Front (cells/sec)	119.1	116.1	117.6	-3.0
Gait Cycle Time (sec)	0.26	0.30	0.28	0.03
Cycles/Minute	227	203	215	-24

Table 5b. Quadruped Gait Table for Patient 015 (Maddie Simpson); data from Trial 1 (SimpM01), Trial 2 (SimpM02), and Trial 3 (SimpM03) displayed. Average of SimpM01, SimpM02, and SimpM03 is displayed in column four. Difference between SimpM02 and SimpM03 is displayed in column five.

Quadruped Gait Table	SimpM01.fsx	SimpM02.fsx	SimpM03.fsx	Avg	Difference
	Maddie Simpson	Maddie Simpson	Maddie Simpson	#1, #2, #3	#3-#2
Number of Stances	62	64	69	65	5
Gait Time - Front (sec)	6.60	7.14	6.82	6.85	-0.32
Gait Distance - Front (cells)	786.0	829.0	650.0	755.0	-179.0
Gait Velocity - Front (cells/sec)	119.1	116.1	95.3	110.2	-20.8
Gait Cycle Time (sec)	0.26	0.30	0.26	0.27	-0.03
Cycles/Minute	227	203	227	219	25

Table 5c. Quadruped Stance-Stride Table for Patient 015 (Maddie Simpson); data from Trial 1 (SimpM01) and Trial 2 (SimpM02) displayed. Difference between SimpM01 and SimpM02 is displayed in column four.

Quadruped Stance-Stride Table	SimpM01.fsx				SimpM02.fsx				Difference			
	Maddie Simpson				Maddie Simpson				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.12	0.14	0.13	0.19	0.13	0.15	0.12	0.13	0.00	0.02	-0.01	-0.07
Swing Time (sec)	0.15	0.10	0.20	n/a	0.18	n/a	0.21	n/a	0.03	n/a	0.01	n/a
Stride Time (sec)	0.24	0.18	0.30	n/a	0.29	n/a	0.30	n/a	0.06	n/a	0.00	n/a
Stride Length (cells)	39.2	10.0	42.8	n/a	39.2	n/a	37.8	n/a	0.0	n/a	-5.0	n/a
Stride Velocity (cells/sec)	166.1	55.6	142.5	n/a	134.2	n/a	126.0	n/a	-31.9	n/a	-16.5	n/a
Stride Acceleration 1-2 (cells/sec2)	-4531.3	n/a	-75.8	n/a	816.0	n/a	213.0	n/a	5347.2	n/a	288.7	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	341	334	375	271	345	304	386	285	4	-30	11	14
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	34	31	38	41	36	38	37	28	2	8	-1	-13
Maximum Peak Pressure (raw)	75	70	82	54	78	68	80	67	2	-2	-2	13

Table 5d. Quadruped Stance-Stride Table for Patient 015 (Maddie Simpson); data from Trial 1 (SimpM01), Trial 2 (SimpM02), and Trial 3 (SimpM03) displayed. Difference between SimpM02 and SimpM03 is displayed in column four.

Quadruped Stance-Stride Table	SimpM01.fsx				SimpM02.fsx				SimpM03.fsx				Difference			
	Maddie Simpson				Maddie Simpson				Maddie Simpson				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.54	0.14	0.13	0.19	0.13	0.15	0.12	0.13	0.10	0.11	0.10	0.09	-0.03	-0.04	-0.02	-0.03
Swing Time (sec)	0.15	0.10	0.20	n/a	0.18	n/a	0.21	n/a	0.27	n/a	0.11	0.28	0.09	n/a	-0.09	n/a
Stride Time (sec)	0.24	0.18	0.30	n/a	0.29	n/a	0.30	n/a	0.36	n/a	0.20	0.38	0.07	n/a	-0.10	n/a
Stride Length (cells)	39.2	10.0	42.8	n/a	39.2	n/a	37.8	n/a	7.5	n/a	13.7	16.0	-31.7	n/a	-24.1	n/a
Stride Velocity (cells/sec)	166.1	55.6	142.5	n/a	134.2	n/a	126.0	n/a	20.8	n/a	68.3	42.1	-113.4	n/a	-57.7	n/a
Stride Acceleration 1-2 (cells/sec2)	4531.3	n/a	-75.8	n/a	816.0	n/a	213.0	n/a	7.6	n/a	48.5	n/a	-808.3	n/a	-164.5	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	342	334	375	271	345	304	386	285	332	343	329	299	-13	39	-57	14
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	35	31	38	41	36	38	37	28	29	29	28	26	-7	-9	-9	-2
Maximum Peak Pressure (raw)	77	70	82	54	78	68	80	67	76	60	82	63	-2	-8	1	-5

Table 5e. Quadruped Symmetry Table for Patient 015 (Maddie Simpson); data from Trial 1 (SimpM01) and Trial 2 (SimpM02) displayed. Average of SimpM01 and SimpM02 is displayed in column four. Difference between SimpM01 and SimpM02 is displayed in column five.

Quadruped Symmetry Table (ratio)	SimpM01.fsx	SimpM02.fsx	Avg	Difference
	Maddie Simpson	Maddie Simpson	#1, #2	#2-#1
Stance Time Front / Hind	0.76	0.89	0.83	0.12
Stride Time Front / Hind	n/a	n/a	n/a	n/a
Stride Length Front / Hind	n/a	n/a	n/a	n/a
Stride Velocity Front / Hind	n/a	n/a	n/a	n/a
Max Force Front / Hind	1.18	1.24	1.21	0.06
Stance Time Left / Right	0.80	1.14	0.97	0.34
Stride Time Left / Right	n/a	n/a	n/a	n/a
Stride Length Left / Right	n/a	n/a	n/a	n/a
Stride Velocity Left / Right	n/a	n/a	n/a	n/a
Max Force Left / Right	1.05	0.97	1.01	-0.08
Stance Time Left Front / Right Front	0.95	1.07	1.01	0.11
Stride Time Left Front / Right Front	0.79	0.97	0.88	0.19
Stride Length Left Front / Right Front	0.92	1.04	0.98	0.12
Stride Velocity Left Front / Right Front	1.17	1.07	1.12	-0.10
Max Force Left Front / Right Front	0.91	0.89	0.90	-0.02
Stance Time Left Hind / Right Hind	^0.70	1.20	0.95	0.51
Stride Time Left Hind / Right Hind	n/a	n/a	n/a	n/a
Stride Length Left Hind / Right Hind	n/a	n/a	n/a	n/a
Stride Velocity Left Hind / Right Hind	n/a	n/a	n/a	n/a
Max Force Left Hind / Right Hind	1.23	1.07	1.15	-0.17

Table 5f. Quadruped Symmetry Table for Patient 015 (Maddie Simpson); data from Trial 1 (SimpM01), Trial 2 (SimpM02), and Trial 3 (SimpM03) displayed. Average of SimpM01, SimpM02, and SimpM03 is displayed in column four. Difference between SimpM02 and SimpM03 is displayed in column five.

Quadruped Symmetry Table (ratio)	SimpM01.fsx Maddie Simpson	SimpM02.fsx Maddie Simpson	SimpM03.fsx Maddie Simpson	Avg #1, #2, #3	Difference #3-#2
Stance Time Front / Hind	^2.05	0.89	0.97	1.30	0.08
Stride Time Front / Hind	n/a	n/a	n/a	n/a	n/a
Stride Length Front / Hind	n/a	n/a	n/a	n/a	n/a
Stride Velocity Front / Hind	n/a	n/a	n/a	n/a	n/a
Max Force Front / Hind	1.18	1.24	1.03	1.15	-0.21
Stance Time Left / Right	^2.11	1.14	1.08	^1.44	-0.05
Stride Time Left / Right	n/a	n/a	n/a	n/a	n/a
Stride Length Left / Right	n/a	n/a	n/a	n/a	n/a
Stride Velocity Left / Right	n/a	n/a	n/a	n/a	n/a
Max Force Left / Right	1.05	0.97	1.07	1.03	0.11
Stance Time Left Front / Right Front	^4.24	1.07	1.01	^2.11	-0.05
Stride Time Left Front / Right Front	0.79	0.97	^1.80	1.19	0.83
Stride Length Left Front / Right Front	0.92	1.04	^0.55	0.83	-0.49
Stride Velocity Left Front / Right Front	1.17	1.07	^0.30	0.85	-0.76
Max Force Left Front / Right Front	0.91	0.89	1.01	0.94	0.12
Stance Time Left Hind / Right Hind	^0.70	1.20	1.16	1.02	-0.05
Stride Time Left Hind / Right Hind	n/a	n/a	n/a	n/a	n/a
Stride Length Left Hind / Right Hind	n/a	n/a	n/a	n/a	n/a
Stride Velocity Left Hind / Right Hind	n/a	n/a	n/a	n/a	n/a
Max Force Left Hind / Right Hind	1.23	1.07	1.15	1.15	0.08

Tables 6-8: Gait Analysis Data of Canines in Water-Soluble CBD Treatment Group

Table 6a. Quadruped Gait Table for Patient 002 (Lily Costello); data from Trial 1 (CostL01) and Trial 2 (CostL02) displayed. Average of CostL01 and CostL02 is displayed in column four. Difference between CostL01 and CostL02 is displayed in column five.

Quadruped Gait Table	CostL01.fsx	CostL02.fsx	Avg	Difference
	Lily Costello	Lily Costello	#1, #2	#2-#1
Number of Stances	39	40	40	1
Gait Time - Front (sec)	5.32	5.70	5.51	0.38
Gait Distance - Front (cells)	523.0	564.0	543.5	41.0
Gait Velocity - Front (cells/sec)	98.3	98.9	98.6	0.6
Gait Cycle Time (sec)	0.49	0.49	0.49	0.01
Cycles/Minute	123	122	123	-2

Table 6b. Quadruped Gait Table for Patient 002 (Lily Costello); data from Trial 1 (CostL01), Trial 2 (CostL02), and Trial 3 (CostL03) displayed. Average of CostL01, CostL02, and CostL03 is displayed in column four. Difference between CostL02 and CostL03 is displayed in column five.

Quadruped Gait Table	CostL01.fsx	CostL02.fsx	CostL03.fsx	Avg	Difference
	Lily Costello	Lily Costello	Lily Costello	#1, #2, #3	#3-#2
Number of Stances	39	40	35	38	-5
Gait Time - Front (sec)	5.32	5.70	5.38	5.47	-0.32
Gait Distance - Front (cells)	523.0	564.0	390.0	492.3	-174.0
Gait Velocity - Front (cells/sec)	98.3	98.9	72.5	89.9	-26.5
Gait Cycle Time (sec)	0.49	0.49	0.65	0.54	0.16
Cycles/Minute	123	122	92	112	-30

Table 6c. Quadruped Stance-Stride Table for Patient 002 (Lily Costello); data from Trial 1 (CostL01) and Trial 2 (CostL02) displayed. Difference between CostL01 and CostL02 is displayed in column four.

Quadruped Stance-Stride Table	CostL01.fsx				CostL02.fsx				Difference			
	Lily Costello				Lily Costello				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.35	0.33	0.34	0.37	0.40	0.37	0.30	0.31	0.05	0.04	-0.05	-0.06
Swing Time (sec)	0.19	n/a	0.16	0.43	0.08	0.04	0.32	0.46	-0.12	n/a	0.15	0.03
Stride Time (sec)	0.50	n/a	0.47	0.75	0.44	0.47	0.59	0.71	-0.06	n/a	0.11	-0.04
Stride Length (cells)	55.0	n/a	55.3	71.5	45.6	23.5	61.2	11.0	-9.4	n/a	5.9	-60.5
Stride Velocity (cells/sec)	110.6	n/a	116.9	95.3	103.5	50.0	104.1	15.5	-7.1	n/a	-12.8	-79.8
Stride Acceleration 1-2 (cells/sec2)	-140.8	n/a	15.6	-57.0	-1199.3	-190.4	-21.1	13.0	-1058.5	n/a	-36.7	70.0
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	486	408	554	502	516	420	494	398	30	12	-60	-103
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	125	100	155	126	154	130	103	89	29	31	-52	-36
Maximum Peak Pressure (raw)	63	79	56	78	66	57	53	58	3	-22	-3	-20

Table 6d. Quadruped Stance-Stride Table for Patient 002 (Lily Costello); data from Trial 1 (CostL01), Trial 2 (CostL02), and Trial 3 (CostL03) displayed. Difference between CostL02 and CostL03 is displayed in column four.

Quadruped Stance-Stride Table	CostL01.fsx				CostL02.fsx				CostL03.fsx				Difference			
	Lily Costello				Lily Costello				Lily Costello				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.35	0.33	0.34	0.37	0.40	0.37	0.30	0.31	0.42	0.28	0.34	0.40	0.02	-0.09	0.05	0.09
Swing Time (sec)	0.19	n/a	0.16	0.43	0.08	0.04	0.32	0.46	0.22	0.58	0.41	0.42	0.14	0.54	0.09	-0.04
Stride Time (sec)	0.50	n/a	0.47	0.75	0.44	0.47	0.59	0.71	0.60	0.66	0.70	0.78	0.16	0.19	0.12	0.07
Stride Length (cells)	55.0	n/a	55.3	71.5	45.6	23.5	61.2	11.0	49.0	39.0	50.8	61.0	3.4	15.5	-10.4	50.0
Stride Velocity (cells/sec)	110.6	n/a	116.9	95.3	103.5	50.0	104.1	15.5	81.1	59.1	72.2	78.2	-22.4	9.1	-31.9	62.7
Stride Acceleration 1-2 (cells/sec2)	-140.8	n/a	15.6	-57.0	1199.3	-190.4	-21.1	13.0	79.5	n/a	-143.0	n/a	1278.8	n/a	-121.9	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	486	408	554	502	516	420	494	398	495	328	436	391	-21	-92	-57	-8
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	125	100	155	126	154	130	103	89	153	77	110	109	-1	-53	6	20
Maximum Peak Pressure (raw)	63	79	56	78	66	57	53	58	53	51	60	53	-13	-6	7	-5

Table 6e. Quadruped Symmetry Table for Patient 002 (Lily Costello); data from Trial 1 (CostL01) and Trial 2 (CostL02) displayed. Average of CostL01 and CostL02 is displayed in column four. Difference between CostL01 and CostL02 is displayed in column five.

Quadruped Symmetry Table (ratio)	CostL01.fsx	CostL02.fsx	Avg	Difference
	Lily Costello	Lily Costello	#1, #2	#2-#1
Stance Time Front / Hind	0.98	1.01	1.00	0.03
Stride Time Front / Hind	n/a	0.87	0.87	n/a
Stride Length Front / Hind	n/a	^3.09	^3.09	n/a
Stride Velocity Front / Hind	n/a	^3.17	^3.17	n/a
Max Force Front / Hind	1.14	1.23	1.19	0.09
Stance Time Left / Right	0.96	1.26	1.11	0.31
Stride Time Left / Right	n/a	^0.70	^0.70	n/a
Stride Length Left / Right	n/a	0.96	0.96	n/a
Stride Velocity Left / Right	n/a	1.28	1.28	n/a
Max Force Left / Right	0.85	1.05	0.95	0.20
Stance Time Left Front / Right Front	1.02	^1.33	1.18	0.31
Stride Time Left Front / Right Front	1.05	^0.75	0.90	-0.30
Stride Length Left Front / Right Front	0.99	^0.74	0.87	-0.25
Stride Velocity Left Front / Right Front	0.95	0.99	0.97	0.05
Max Force Left Front / Right Front	0.88	1.05	0.96	0.17
Stance Time Left Hind / Right Hind	0.90	1.20	1.05	0.30
Stride Time Left Hind / Right Hind	n/a	^0.66	^0.66	n/a
Stride Length Left Hind / Right Hind	n/a	^2.14	^2.14	n/a
Stride Velocity Left Hind / Right Hind	n/a	^3.23	^3.23	n/a
Max Force Left Hind / Right Hind	0.81	1.06	0.93	0.24

Table 6f. Quadruped Symmetry Table for Patient 002 (Lily Costello); data from Trial 1 (CostL01), Trial 2 (CostL02), and Trial 3 (CostL03) displayed. Average of CostL01, CostL02, and CostL03 is displayed in column four. Difference between CostL02 and CostL03 is displayed in column five.

Quadruped Symmetry Table (ratio)	CostL01.fsx	CostL02.fsx	CostL03.fsx	Avg	Difference
	Lily Costello	Lily Costello	Lily Costello	#1, #2, #3	#3-#2
Stance Time Front / Hind	0.98	1.01	1.11	1.04	0.10
Stride Time Front / Hind	n/a	0.87	0.91	0.89	0.04
Stride Length Front / Hind	n/a	^3.09	1.00	^2.05	-2.10
Stride Velocity Front / Hind	n/a	^3.17	1.12	^2.14	-2.05
Max Force Front / Hind	1.14	1.23	1.30	1.22	0.06
Stance Time Left / Right	0.96	1.26	0.94	1.06	-0.32
Stride Time Left / Right	n/a	^0.70	0.85	0.78	0.15
Stride Length Left / Right	n/a	0.96	0.79	0.87	-0.17
Stride Velocity Left / Right	n/a	1.28	0.93	1.11	-0.35
Max Force Left / Right	0.85	1.05	1.00	0.96	-0.05
Stance Time Left Front / Right Front	1.02	^1.33	1.22	1.19	-0.11
Stride Time Left Front / Right Front	1.05	^0.75	0.86	0.89	0.11
Stride Length Left Front / Right Front	0.99	^0.74	0.96	0.90	0.22
Stride Velocity Left Front / Right Front	0.95	0.99	1.12	1.02	0.13
Max Force Left Front / Right Front	0.88	1.05	1.13	1.02	0.09
Stance Time Left Hind / Right Hind	0.90	1.20	^0.70	0.93	-0.50
Stride Time Left Hind / Right Hind	n/a	^0.66	0.85	0.75	0.18
Stride Length Left Hind / Right Hind	n/a	^2.14	^0.64	^1.39	-1.50
Stride Velocity Left Hind / Right Hind	n/a	^3.23	0.76	^1.99	-2.47
Max Force Left Hind / Right Hind	0.81	1.06	0.84	0.90	-0.21

Table 7a. Quadruped Gait Table for Patient 005 (Chase Joiner); data from Trial 1 (JoinC01) and Trial 2 (JoinC02) displayed. Average of JoinC01 and JoinC02 is displayed in column four. Difference between JoinC01 and JoinC02 is displayed in column five.

Quadruped Gait Table	JoinC01.fsx	JoinC02.fsx	Avg	Difference
	Chase Joiner	Chase Joiner	#1, #2	#2-#1
Number of Stances	34	46	40	12
Gait Time - Front (sec)	4.48	4.62	4.55	0.14
Gait Distance - Front (cells)	458.0	735.0	596.5	277.0
Gait Velocity - Front (cells/sec)	102.2	159.1	130.7	56.9
Gait Cycle Time (sec)	0.59	0.30	0.44	-0.29
Cycles/Minute	102	203	153	101

Table 7b. Quadruped Gait Table for Patient 005 (Chase Joiner); data from Trial 1 (JoinC01), Trial 2 (JoinC02), and Trial 3 (JoinC03) displayed. Average of JoinC01, JoinC02, and JoinC03 is displayed in column four. Difference between JoinC02 and JoinC03 is displayed in column five.

Quadruped Gait Table	JoinC01.fsx	JoinC02.fsx	JoinC03.fsx	Avg	Difference
	Chase Joiner	Chase Joiner	Chase Joiner	#1, #2, #3	#3-#2
Number of Stances	34	46	43	41	-3
Gait Time - Front (sec)	4.48	4.62	3.90	4.33	-0.72
Gait Distance - Front (cells)	458.0	735.0	443.0	545.3	-292.0
Gait Velocity - Front (cells/sec)	102.2	159.1	113.6	125.0	-45.5
Gait Cycle Time (sec)	0.59	0.30	0.44	0.44	0.15
Cycles/Minute	102	203	135	147	-68

Table 7c. Quadruped Stance-Stride Table for Patient 005 (Chase Joiner); data from Trial 1 (JoinC01) and Trial 2 (JoinC02) displayed. Difference between JoinC01 and JoinC02 is displayed in column four.

Quadruped Stance-Stride Table	JoinC01.fsx				JoinC02.fsx				Difference			
	Chase Joiner				Chase Joiner				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.46	0.36	0.46	0.34	0.32	0.27	0.26	0.23	-0.14	-0.09	-0.20	-0.12
Swing Time (sec)	0.12	0.23	0.23	0.20	-0.11	n/a	0.10	0.39	-0.24	n/a	-0.13	0.19
Stride Time (sec)	0.53	0.81	0.66	0.52	0.17	n/a	0.33	0.57	-0.36	n/a	-0.33	0.05
Stride Length (cells)	49.8	31.0	54.0	53.0	64.0	n/a	35.6	63.0	14.3	n/a	-18.4	10.0
Stride Velocity (cells/sec)	93.9	38.3	81.8	101.9	376.5	n/a	107.3	110.5	282.6	n/a	25.5	8.6
Stride Acceleration 1-2 (cells/sec2)	-222.5	-56.0	-47.4	0.6	1804.4	n/a	-722.0	9201.9	1581.9	n/a	-674.6	9201.2
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	642	340	477	401	628	562	657	398	-15	222	180	-3
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	201	97	175	116	142	100	128	67	-59	3	-47	-49
Maximum Peak Pressure (raw)	82	83	81	67	85	70	93	69	3	-12	12	2

Table 7d. Quadruped Stance-Stride Table for Patient 005 (Chase Joiner); data from Trial 1 (JoinC01), Trial 2 (JoinC02), and Trial 3 (JoinC03) displayed. Difference between JoinC02 and JoinC03 is displayed in column four.

Quadruped Stance-Stride Table	JoinC01.fsx				JoinC02.fsx				JoinC03.fsx				Difference			
	Chase Joiner				Chase Joiner				Chase Joiner				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.46	0.36	0.46	0.34	0.32	0.27	0.26	0.23	0.34	0.24	0.35	0.32	0.02	-0.04	0.09	0.10
Swing Time (sec)	0.12	0.23	0.23	0.20	-0.11	n/a	0.10	0.39	0.16	0.27	0.15	0.10	0.27	n/a	0.05	-0.29
Stride Time (sec)	0.53	0.81	0.66	0.52	0.17	n/a	0.33	0.57	0.49	0.38	0.41	0.40	0.32	n/a	0.08	-0.17
Stride Length (cells)	49.8	31.0	54.0	53.0	64.0	n/a	35.6	63.0	55.3	48.3	49.5	17.0	-8.7	n/a	13.9	-46.0
Stride Velocity (cells/sec)	93.9	38.3	81.8	101.9	376.5	n/a	107.3	110.5	113.7	127.2	120.7	42.5	-262.8	n/a	13.4	-68.0
Stride Acceleration 1-2 (cells/sec2)	-222.5	-56.0	-47.4	0.6	1804.4	n/a	-722.0	9201.9	-502.1	335.5	-35.2	-135.9	1302.3	n/a	686.8	9337.7
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	642	340	477	401	628	562	657	398	532	396	641	393	-95	-166	-17	-5
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	201	97	175	116	142	100	128	67	135	77	171	95	-7	-24	43	28
Maximum Peak Pressure (raw)	82	83	81	67	85	70	93	69	68	65	84	62	-18	-5	-8	-8

Table 7e. Quadruped Symmetry Table for Patient 005 (Chase Joiner); data from Trial 1 (JoinC01) and Trial 2 (JoinC02) displayed. Average of JoinC01 and JoinC02 is displayed in column four. Difference between JoinC01 and JoinC02 is displayed in column five.

Quadruped Symmetry Table (ratio)	JoinC01.fsx	JoinC02.fsx	Avg	Difference
	Chase Joiner	Chase Joiner	#1, #2	#2-#1
Stance Time Front / Hind	1.29	1.15	1.22	-0.14
Stride Time Front / Hind	0.89	n/a	0.89	n/a
Stride Length Front / Hind	1.24	n/a	1.24	n/a
Stride Velocity Front / Hind	1.25	n/a	1.25	n/a
Max Force Front / Hind	^1.51	^1.34	^1.42	-0.17
Stance Time Left / Right	1.02	1.22	1.12	0.20
Stride Time Left / Right	1.14	n/a	1.14	n/a
Stride Length Left / Right	0.75	n/a	0.75	n/a
Stride Velocity Left / Right	^0.72	n/a	^0.72	n/a
Max Force Left / Right	1.12	1.13	1.12	0.01
Stance Time Left Front / Right Front	1.00	1.24	1.12	0.24
Stride Time Left Front / Right Front	0.80	^0.51	^0.66	-0.29
Stride Length Left Front / Right Front	0.92	^1.80	^1.36	0.88
Stride Velocity Left Front / Right Front	1.15	^3.51	^2.33	2.36
Max Force Left Front / Right Front	^1.35	0.95	1.15	-0.39
Stance Time Left Hind / Right Hind	1.05	1.20	1.13	0.15
Stride Time Left Hind / Right Hind	^1.56	n/a	^1.56	n/a
Stride Length Left Hind / Right Hind	^0.58	n/a	^0.58	n/a
Stride Velocity Left Hind / Right Hind	^0.38	n/a	^0.38	n/a
Max Force Left Hind / Right Hind	0.85	^1.41	1.13	0.57

Table 7f. Quadruped Symmetry Table for Patient 005 (Chase Joiner); data from Trial 1 (JoinC01), Trial 2 (JoinC02), and Trial 3 (JoinC03) displayed. Average of JoinC01, JoinC02, and JoinC03 is displayed in column four. Difference between JoinC02 and JoinC03 is displayed in column five.

Quadruped Symmetry Table (ratio)	JoinC01.fsx	JoinC02.fsx	JoinC03.fsx	Avg	Difference
	Chase Joiner	Chase Joiner	Chase Joiner	#1, #2, #3	#3-#2
Stance Time Front / Hind	1.29	1.15	1.23	1.23	0.08
Stride Time Front / Hind	0.89	n/a	1.15	1.02	n/a
Stride Length Front / Hind	1.24	n/a	^1.60	^1.42	n/a
Stride Velocity Front / Hind	1.25	n/a	^1.38	1.32	n/a
Max Force Front / Hind	^1.51	^1.34	^1.49	^1.45	0.15
Stance Time Left / Right	1.02	1.22	0.86	1.04	-0.35
Stride Time Left / Right	1.14	n/a	1.07	1.10	n/a
Stride Length Left / Right	0.75	n/a	^1.56	1.16	n/a
Stride Velocity Left / Right	^0.72	n/a	^1.48	1.10	n/a
Max Force Left / Right	1.12	1.13	0.90	1.05	-0.23
Stance Time Left Front / Right Front	1.00	1.24	0.99	1.08	-0.24
Stride Time Left Front / Right Front	0.80	^0.51	1.19	0.83	0.67
Stride Length Left Front / Right Front	0.92	^1.80	1.12	1.28	-0.68
Stride Velocity Left Front / Right Front	1.15	^3.51	0.94	^1.87	-2.57
Max Force Left Front / Right Front	^1.35	0.95	0.83	1.04	-0.12
Stance Time Left Hind / Right Hind	1.05	1.20	^0.73	0.99	-0.47
Stride Time Left Hind / Right Hind	^1.56	n/a	0.95	1.25	n/a
Stride Length Left Hind / Right Hind	^0.58	n/a	^2.84	^1.71	n/a
Stride Velocity Left Hind / Right Hind	^0.38	n/a	^2.99	^1.68	n/a
Max Force Left Hind / Right Hind	0.85	^1.41	1.01	1.09	-0.40

Table 8g. Quadruped Gait Table for Patient 011 (Reecey Papajeski); data from Trial 1 (PapaR01) displayed.

Quadruped Gait Table	PapaR01.fsx Reecey Papajeski
Number of Stances	31
Gait Time - Front (sec)	3.62
Gait Distance - Front (cells)	428.0
Gait Velocity - Front (cells/sec)	118.2
Gait Cycle Time (sec)	0.39
Cycles/Minute	153

Table 8h. Quadruped Stance-Stride Table for Patient 011 (Reecey Papajeski); data from Trial 1 (PapaR01) displayed.

Quadruped Stance-Stride Table	PapaR01.fsx Reecey Papajeski			
	LF	LH	RF	RH
Stance Time (sec)	0.42	0.49	0.42	0.51
Swing Time (sec)	0.11	n/a	-0.08	0.64
Stride Time (sec)	0.46	n/a	0.32	1.18
Stride Length (cells)	57.6	n/a	34.8	13.0
Stride Velocity (cells/sec)	125.2	n/a	107.4	11.0
Stride Acceleration 1-2 (cells/sec2)	-43.5	n/a	n/a	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	538	324	524	352
FTI (%BW*sec)	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	175	116	174	126
Maximum Peak Pressure (raw)	74	71	71	62

Table 8i. Quadruped Symmetry Table for Patient 011 (Reecey Papajeski); data from Trial 1 (PapaR01) displayed.

Quadruped Symmetry Table (ratio)	PapaR01.fsx Reecey Papajeski
Stance Time Front / Hind	0.84
Stride Time Front / Hind	n/a
Stride Length Front / Hind	n/a
Stride Velocity Front / Hind	n/a
Max Force Front / Hind	^1.57
Stance Time Left / Right	0.99
Stride Time Left / Right	n/a
Stride Length Left / Right	n/a
Stride Velocity Left / Right	n/a
Max Force Left / Right	0.98
Stance Time Left Front / Right Front	1.01
Stride Time Left Front / Right Front	^1.42
Stride Length Left Front / Right Front	^1.66
Stride Velocity Left Front / Right Front	1.17
Max Force Left Front / Right Front	1.03
Stance Time Left Hind / Right Hind	0.96
Stride Time Left Hind / Right Hind	n/a
Stride Length Left Hind / Right Hind	n/a
Stride Velocity Left Hind / Right Hind	n/a
Max Force Left Hind / Right Hind	0.92

Table 8j. Quadruped Gait Table for Patient 011 (Reecey Papajeski); data from Trial 2 (PapaR02) displayed.

Quadruped Gait Table	PapaR01.fsx Reecey Papajeski
Number of Stances	44
Gait Time - Front (sec)	5.40
Gait Distance - Front (cells)	667.0
Gait Velocity - Front (cells/sec)	123.5
Gait Cycle Time (sec)	0.41
Cycles/Minute	148

Table 8k. Quadruped Stance-Stride Table for Patient 011 (Reecey Papajeski); data from Trial 2 (PapaR02) displayed.

Quadruped Stance-Stride Table	PapaR01.fsx Reecey Papajeski			
	LF	LH	RF	RH
Stance Time (sec)	0.30	0.31	0.25	0.29
Swing Time (sec)	0.22	n/a	0.15	0.42
Stride Time (sec)	0.49	n/a	0.36	0.69
Stride Length (cells)	47.4	n/a	48.6	23.0
Stride Velocity (cells/sec)	96.3	n/a	133.5	33.3
Stride Acceleration 1-2 (cells/sec2)	-151.6	n/a	-83.8	-66.8
Maximum Force (%BW)	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	622	394	648	483
FTI (%BW*sec)	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	139	93	121	86
Maximum Peak Pressure (raw)	77	65	85	70

Table 8l. Quadruped Symmetry Table for Patient 011 (Reecey Papajeski); data from Trial 2 (PapaR02) displayed.

Quadruped Symmetry Table (ratio)	PapaR01.fsx Reecey Papajeski
Stance Time Front / Hind	0.92
Stride Time Front / Hind	n/a
Stride Length Front / Hind	n/a
Stride Velocity Front / Hind	n/a
Max Force Front / Hind	^1.45
Stance Time Left / Right	1.13
Stride Time Left / Right	n/a
Stride Length Left / Right	n/a
Stride Velocity Left / Right	n/a
Max Force Left / Right	0.90
Stance Time Left Front / Right Front	1.21
Stride Time Left Front / Right Front	^1.35
Stride Length Left Front / Right Front	0.98
Stride Velocity Left Front / Right Front	^0.72
Max Force Left Front / Right Front	0.96
Stance Time Left Hind / Right Hind	1.06
Stride Time Left Hind / Right Hind	n/a
Stride Length Left Hind / Right Hind	n/a
Stride Velocity Left Hind / Right Hind	n/a
Max Force Left Hind / Right Hind	0.82

Table 8m: Quadruped Gait Table for Patient 011 (Reecey Papajeski); data from Trial 3 (PapaR03) displayed.

Quadruped Gait Table	PapaR02.fsx Reecey Papajeski
Number of Stances	34
Gait Time - Front (sec)	4.62
Gait Distance - Front (cells)	490.0
Gait Velocity - Front (cells/sec)	106.1
Gait Cycle Time (sec)	0.45
Cycles/Minute	134

Table 8n: Quadruped Stance-Stride Table for Patient 011 (Reecey Papajeski); data from Trial 3 (PapaR03) displayed.

Quadruped Stance-Stride Table	PapaR02.fsx Reecey Papajeski			
	LF	LH	RF	RH
Stance Time (sec)	0.30	0.33	0.42	0.41
Swing Time (sec)	0.17	n/a	0.13	0.00
Stride Time (sec)	0.42	n/a	0.47	0.42
Stride Length (cells)	43.3	n/a	59.4	1.0
Stride Velocity (cells/sec)	103.0	n/a	126.9	2.4
Stride Acceleration 1-2 (cells/sec2)	-46.7	n/a	301.9	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	494	357	482	392
FTI (%BW*sec)	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	122	89	156	122
Maximum Peak Pressure (raw)	65	49	67	66

Table 8o: Quadruped Symmetry Table for Patient 011 (Reecey Papajeski); data from Trial 3 (PapaR03) displayed.

Quadruped Symmetry Table (ratio)	PapaR02.fsx Reecey Papajeski
Stance Time Front / Hind	0.97
Stride Time Front / Hind	n/a
Stride Length Front / Hind	n/a
Stride Velocity Front / Hind	n/a
Max Force Front / Hind	1.31
Stance Time Left / Right	0.76
Stride Time Left / Right	n/a
Stride Length Left / Right	n/a
Stride Velocity Left / Right	n/a
Max Force Left / Right	0.97
Stance Time Left Front / Right Front	^0.72
Stride Time Left Front / Right Front	0.90
Stride Length Left Front / Right Front	^0.73
Stride Velocity Left Front / Right Front	0.81
Max Force Left Front / Right Front	1.03
Stance Time Left Hind / Right Hind	0.79
Stride Time Left Hind / Right Hind	n/a
Stride Length Left Hind / Right Hind	n/a
Stride Velocity Left Hind / Right Hind	n/a
Max Force Left Hind / Right Hind	0.91

*Note: Patient 011: Reecey Papajeski tables listed differently due to technological issues when pulling data from system. Data is correct, just listed in a different way than the rest of the patients. It also meant we were unable to compare the differences in values (#2-#1) and (#3-#2), as well as the average of #1, #2, and #3.

Table 9: Gait Analysis Data of Canine in Placebo Treatment Group

Table 9a. Quadruped Gait Table for Patient 003 (Sophie Costello); data from Trial 1 (CostS01) and Trial 2 (CostS02) displayed. Average of CostS01 and CostS02 is displayed in column four. Difference between CostS01 and CostS02 is displayed in column five.

Quadruped Gait Table	CostS01.fsx	CostS02.fsx	Avg	Difference
	Sophie Costello	Sophie Costello	#1, #2	#2-#1
Number of Stances	57	51	54	-6
Gait Time - Front (sec)	6.52	5.54	6.03	-0.98
Gait Distance - Front (cells)	803.0	576.0	689.5	-227.0
Gait Velocity - Front (cells/sec)	123.2	104.0	113.6	-19.2
Gait Cycle Time (sec)	0.34	0.29	0.32	-0.05
Cycles/Minute	174	204	189	30

Table 9b. Quadruped Gait Table for Patient 003 (Sophie Costello); data from Trial 1 (CostS01), Trial 2 (CostS02), and Trial 3 (CostS03) displayed. Average of CostS01, CostS02, and CostS03 is displayed in column four. Difference between CostS02 and CostS03 is displayed in column five.

Quadruped Gait Table	CostS01.fsx	CostS02.fsx	CostS03.fsx	Avg	Difference
	Sophie Costello	Sophie Costello	Sophie Costello	#1, #2, #3	#3-#2
Number of Stances	57	51	55	54	4
Gait Time - Front (sec)	6.52	5.54	4.90	5.65	-0.64
Gait Distance - Front (cells)	803.0	576.0	740.0	706.3	164.0
Gait Velocity - Front (cells/sec)	123.2	104.0	151.0	126.1	47.0
Gait Cycle Time (sec)	0.34	0.29	0.27	0.30	-0.02
Cycles/Minute	174	204	219	199	15

Table 9c. Quadruped Stance-Stride Table for Patient 003 (Sophie Costello); data from Trial 1 (CostS01) and Trial 2 (CostS02) displayed. Difference between CostS01 and CostS02 is displayed in column four.

Quadruped Stance-Stride Table	CostS01.fsx				CostS02.fsx				Difference			
	Sophie Costello				Sophie Costello				#2-#1			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.22	0.22	0.24	0.31	0.28	0.24	0.27	0.28	0.06	0.02	0.03	-0.03
Swing Time (sec)	0.23	n/a	0.10	n/a	0.08	0.32	0.03	0.16	-0.15	n/a	-0.07	n/a
Stride Time (sec)	0.44	n/a	0.29	n/a	0.35	0.50	0.26	0.22	-0.09	n/a	-0.03	n/a
Stride Length (cells)	49.5	n/a	42.4	n/a	43.9	49.0	33.5	24.0	-5.6	n/a	-8.8	n/a
Stride Velocity (cells/sec)	112.5	n/a	144.7	n/a	124.8	98.0	129.9	109.1	12.3	n/a	-14.8	n/a
Stride Acceleration 1-2 (cells/sec2)	87.5	n/a	27708.4	n/a	844.8	n/a	10000.0	n/a	757.3	n/a	-17708.3	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	321	200	320	267	301	215	284	210	-20	15	-37	-57
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	53	31	57	55	65	44	60	49	12	13	3	-7
Maximum Peak Pressure (raw)	63	51	69	62	63	55	63	43	-0	4	-6	-19

Table 9d. Quadruped Stance-Stride Table for Patient 003 (Sophie Costello); data from Trial 1 (CostS01), Trial 2 (CostS02), and Trial 3 (CostS03) displayed. Difference between CostS02 and CostS03 is displayed in column four.

Quadruped Stance-Stride Table	CostS01.fsx				CostS02.fsx				CostS03.fsx				Difference			
	Sophie Costello				Sophie Costello				Sophie Costello				#3-#2			
	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH	LF	LH	RF	RH
Stance Time (sec)	0.22	0.22	0.24	0.31	0.28	0.24	0.27	0.28	0.19	0.17	0.23	0.20	-0.09	-0.07	-0.03	-0.08
Swing Time (sec)	0.23	n/a	0.10	n/a	0.08	0.32	0.03	0.16	0.02	n/a	0.07	0.17	-0.06	n/a	0.05	0.01
Stride Time (sec)	0.44	n/a	0.29	n/a	0.35	0.50	0.26	0.22	0.20	n/a	0.32	0.33	-0.15	n/a	0.06	0.11
Stride Length (cells)	49.5	n/a	42.4	n/a	43.9	49.0	33.5	24.0	32.4	n/a	62.4	29.7	-11.5	n/a	28.8	5.7
Stride Velocity (cells/sec)	112.5	n/a	144.7	n/a	124.8	98.0	129.9	109.1	162.0	n/a	194.9	89.0	37.2	n/a	65.0	-20.1
Stride Acceleration 1-2 (cells/sec2)	87.5	n/a	7708.4	n/a	844.8	n/a	0000.0	n/a	n/a	n/a	306.1	-195.6	n/a	n/a	9693.9	n/a
Maximum Force (%BW)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum Force (raw sum)	321	200	320	267	301	215	284	210	317	163	281	211	17	-52	-3	2
FTI (%BW*sec)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FTI (raw sum*sec)	53	31	57	55	65	44	60	49	43	25	49	35	-23	-19	-11	-14
Maximum Peak Pressure (raw)	63	51	69	62	63	55	63	43	65	42	62	51	2	-13	-2	8

Table 9e. Quadruped Symmetry Table for Patient 003 (Sophie Costello); data from Trial 1 (CostS01) and Trial 2 (CostS02) displayed. Average of CostS01 and CostS02 is displayed in column four. Difference between CostS01 and CostS02 is displayed in column five.

Quadruped Symmetry Table (ratio)	CostS01.fsx	CostS02.fsx	Avg	Difference
	Sophie Costello	Sophie Costello	#1, #2	#2-#1
Stance Time Front / Hind	0.86	1.06	0.96	0.20
Stride Time Front / Hind	n/a	0.85	0.85	n/a
Stride Length Front / Hind	n/a	1.06	1.06	n/a
Stride Velocity Front / Hind	n/a	1.23	1.23	n/a
Max Force Front / Hind	^1.37	^1.38	^1.37	0.00
Stance Time Left / Right	0.79	0.95	0.87	0.16
Stride Time Left / Right	n/a	^1.78	^1.78	n/a
Stride Length Left / Right	n/a	^1.61	^1.61	n/a
Stride Velocity Left / Right	n/a	0.93	0.93	n/a
Max Force Left / Right	0.89	1.05	0.97	0.16
Stance Time Left Front / Right Front	0.91	1.06	0.98	0.14
Stride Time Left Front / Right Front	^1.50	^1.36	^1.43	-0.14
Stride Length Left Front / Right Front	1.17	1.31	1.24	0.14
Stride Velocity Left Front / Right Front	0.78	0.96	0.87	0.18
Max Force Left Front / Right Front	1.00	1.06	1.03	0.06
Stance Time Left Hind / Right Hind	^0.70	0.85	0.77	0.15
Stride Time Left Hind / Right Hind	n/a	^2.27	^2.27	n/a
Stride Length Left Hind / Right Hind	n/a	^2.04	^2.04	n/a
Stride Velocity Left Hind / Right Hind	n/a	0.90	0.90	n/a
Max Force Left Hind / Right Hind	0.75	1.03	0.89	0.28

Table 9f. Quadruped Symmetry Table for Patient 003 (Sophie Costello); data from Trial 1 (CostS01), Trial 2 (CostS02), and Trial 3 (CostS03) displayed. Average of CostS01, CostS02, and CostS03 is displayed in column four. Difference between CostS02 and CostS03 is displayed in column five.

Quadruped Symmetry Table (ratio)	CostS01.fsx Sophie Costello	CostS02.fsx Sophie Costello	CostS03.fsx Sophie Costello	Avg #1, #2, #3	Difference #3-#2
Stance Time Front / Hind	0.86	1.06	1.13	1.02	0.07
Stride Time Front / Hind	n/a	0.85	n/a	0.85	n/a
Stride Length Front / Hind	n/a	1.06	n/a	1.06	n/a
Stride Velocity Front / Hind	n/a	1.23	n/a	1.23	n/a
Max Force Front / Hind	^1.37	^1.38	^1.60	^1.45	0.22
Stance Time Left / Right	0.79	0.95	0.82	0.85	-0.13
Stride Time Left / Right	n/a	^1.78	n/a	^1.78	n/a
Stride Length Left / Right	n/a	^1.61	n/a	^1.61	n/a
Stride Velocity Left / Right	n/a	0.93	n/a	0.93	n/a
Max Force Left / Right	0.89	1.05	0.98	0.97	-0.07
Stance Time Left Front / Right Front	0.91	1.06	0.80	0.92	-0.25
Stride Time Left Front / Right Front	^1.50	^1.36	^0.62	1.16	-0.74
Stride Length Left Front / Right Front	1.17	1.31	^0.52	1.00	-0.79
Stride Velocity Left Front / Right Front	0.78	0.96	0.83	0.86	-0.13
Max Force Left Front / Right Front	1.00	1.06	1.13	1.06	0.07
Stance Time Left Hind / Right Hind	^0.70	0.85	0.84	0.80	-0.01
Stride Time Left Hind / Right Hind	n/a	^2.27	n/a	^2.27	n/a
Stride Length Left Hind / Right Hind	n/a	^2.04	n/a	^2.04	n/a
Stride Velocity Left Hind / Right Hind	n/a	0.90	n/a	0.90	n/a
Max Force Left Hind / Right Hind	0.75	1.03	0.77	0.85	-0.26

c. Canine Brief Pain Inventory Results

The Canine Brief Pain Inventory (CBPI) owner surveys were completed at every trial by each owner throughout the duration of the clinical trial (Baseline, 4-weeks, and 8-weeks). These surveys were blind to the owners as they did not know which treatment their dog was receiving. The copyright for this document is held by Dr. Dorothy Cimino Brown and the procedures for using, analyzing and the PDF version is found on www.canineBPI.com. A blank copy can be viewed in Appendix A.

The survey assesses two different categories: severity and interference. The severity domain contains four items, and the interference domain contains six items. Each item in both categories is rated 0-10 numerical rating scale; 0=no pain and 10=extreme pain on the severity category, and 0=no interference and 10=completely interferes on the interference category. Pain severity scores were averaged between the numbered answers to questions 1-4 to produce a pain severity score.

Pain severity scores were calculated for each completed CBPI and are displayed in Tables 16-20 and in the form of a line graph in Figures 1-5 for canines in the CBD Oil treatment group; Tables 21-25 and in the form of a line graph in Figures 6-10 for canines in the Water-Soluble CBD treatment group; and Tables 26-28 and in the form of a line graph in Figures 11-13 for canines in the Placebo treatment group.

Pain interference scores were averaged between the numbered answers to questions 5-10 to produce a pain interference score. Pain interference scores were calculated for each completed CBPI and are displayed in Tables 16-20 and in the form of a line graph in Figures 1-5 for canines in the CBD Oil Treatment group; Tables 21-25 and in the form of a line graph in Figures 6-10 for canines in the Water-Soluble treatment group; and Tables 26-28 and in the form of a line

graph in Figures 11-13 for canines in the Placebo treatment group. The remaining question related to overall quality of life for the animal, giving the options of: “Poor,” “Fair,” “Good,” “Very good,” and “Excellent.” These answers are displayed in Tables 16-28 for each group of patients and each completed CBPI.

This data was used to assess whether the treatments had any measurable effect for each dog. The criteria for a successful treatment of an individual patient have been defined as a reduction greater than or equal to 2 in pain interference scores and greater than or equal to 1 in pain severity scores. Tables 29 and 30 show the reduction scores for pain severity and pain interference for each canine in all treatment groups. Significant reductions are highlighted in yellow. We will define CBPI (1) as baseline or Trial 1 survey results, CBPI (2) as 4 weeks in or Trial 2 survey results, and CBPI (3) as 8 weeks in or Trial 3 results.

In a comparison of the differences between CBPI (1) results and CBPI (3) results of the canines that received CBD oil treatment for the entirety of the 8-week clinical trial, 2 demonstrated significant reductions in pain severity and pain interference, 2 demonstrated significant reduction in only pain severity scores, and one did not show significant reductions for either score.

In the comparison of the differences between CBPI (1) results and CBPI (3) results of the canines that received Water-Soluble treatment for the entirety of the 8-week clinical trial, only one demonstrated significant reduction in pain severity and pain interference, while the other 4 did not demonstrated significant reductions in pain severity or pain interference.

In comparison of the differences between CBPI (1) and CBPI (3) results of the canines that received Placebo treatment for the entirety of the 8-week clinical trial, only one demonstrated significant reduction in pain severity only and only one demonstrated significant

reduction in pain interference only. Two did not have any significant reduction in pain severity scores or pain interference.

In comparison of the differences between CBPI (1) and CBPI (2) results of the canines that received CBD oil treatment for the entirety of the 8-week clinical trial, only one demonstrated significant reduction in pain severity and pain interference. Only one demonstrated significant reduction in pain severity. Three did not show any significant reduction in pain severity and four did not show any significant reduction in pain interference.

In comparison of the differences between CBPI (1) and CBPI (2) results of the canines that received Water-Soluble CBD treatment for the entirety of the 8-week clinical trial, one showed a significant reduction in both pain interference and pain severity. Four showed no significant reduction in both pain severity and pain interference.

In comparison of the differences between CBPI (1) and CBPI (2) results of the canines that received Placebo treatment for the entirety of the 8-week clinical trial, one showed a significant reduction in pain severity only. Another showed a significant reduction in pain interference only. Two did not have any significant reduction in pain severity scores or pain interference.

In comparison of the differences between CBPI (2) and CBPI (3) results of the canines that received CBD oil treatment for the entirety of the 8-week clinical trial, one showed a significant reduction in pain severity and pain interference. Two showed a significant reduction in pain severity only. Two did not show a significant reduction in pain interference or pain severity scores.

In comparison of the differences between CBPI (2) and CBPI (3) results of the canines that received Water-Soluble CBD treatment for the entirety of the 8-week clinical trial, only one

showed a significant reduction in pain severity and pain interference scores. Four did not show a significant reduction in pain interference or pain severity scores.

In comparison of the differences between CBPI (2) or CBPI (3) results of the canines that received Placebo treatment for the entirety of the 8-week clinical trial, none of the patients showed any significant reduction in pain severity or pain interference scores.

When looking at Tables 10-15, these were used to analyze any trends between each treatment group CBPI scores as a collective group. In Tables 10 and 11, 4 out of 5 patients show a general decrease in both pain severity scores and pain interference scores. Overall, it appears to have a downward trend from baseline testing scores to the final testing scores at 8 weeks for the CBD oil patients.

This trend does not continue for the Water-Soluble CBD treatment group. When analyzing Tables 12 and 13, there is no obvious trend occurring. For the pain severity scores, 2 out of 5 patients show a decrease from baseline to 4 weeks in, but the number rises back up to about the same as baseline testing at 8 weeks. Two patients stay relatively within the same range from baseline to 8 weeks. One patient actually increases at the 4-week mark and then drops in score considerably at the 8-week mark. For the pain interference scores, 3 out of 5 patients show a decrease from baseline to 4 weeks in, but the number rises back up to about the same as baseline testing at 8 weeks. One patient has the same score for baseline and 4 weeks but sees an increase in score at 8 weeks. One patient decreases slightly from baseline to 4 weeks, and then sees a significant decrease at the 8-week mark.

For the placebo treatment group, there is no visible trend in scores. For the pain severity scores, one patient showed an increase from baseline to 4-weeks and then a decrease from 4-weeks to 8-weeks, however, the 8-week score was still higher than baseline. Two patients

showed a general decrease in scores over the 8-week trial. For the pain interference scores, one patient showed a general increase in scores over the 8-week trial. One patient showed a decrease from baseline to 4-weeks, then increased from 4-weeks to 8-weeks. One patient showed a general decrease in scores over the 8-week trial.

Tables 10-11 Canine Brief Pain Inventory Survey Scores for Severity and Interference Domain for all CBD Oil Patients

Figure 1 Depicting CBD oil patients' overall quality of life scores

Table 10. CBD Oil Patients Severity Domain Scores from the CBPI Survey

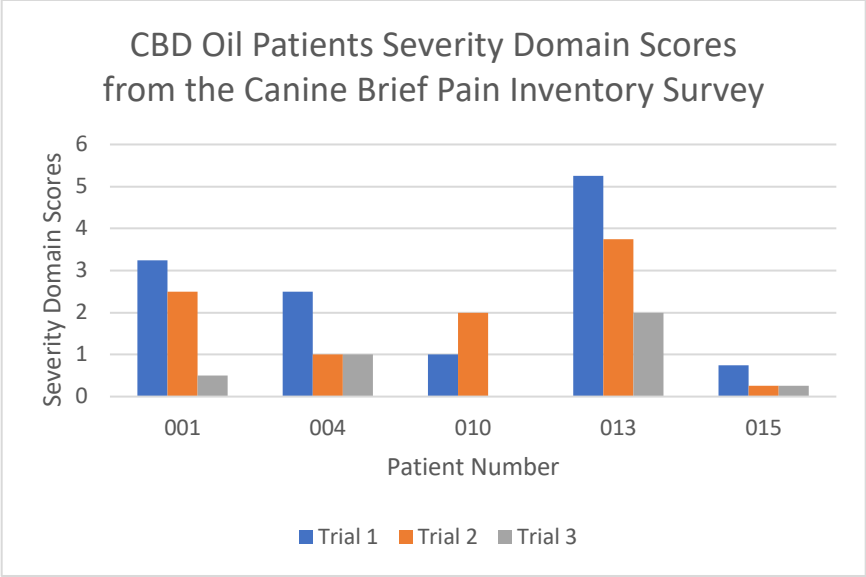


Table 11. CBD Oil Patients Interference Domain Scores from the CBPI Survey

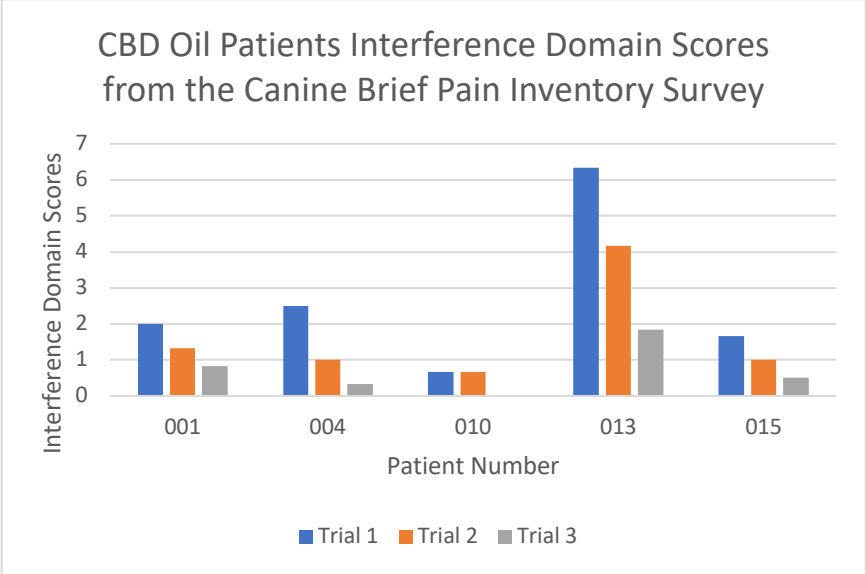


Figure 1. Table showing all CBD oil Patients Overall Quality of Life Scores

Patient ID	**Trial 1 Overall Quality of Life Score**	**Trial 2 Overall Quality of Life Score**	**Trial 3 Overall Quality of Life Score**
001	Good	Very Good	Very Good
004	Very Good	Very Good	Very Good
010	Very Good	Very Good	Excellent
013	Good	Good	Very Good
015	Very Good	Very Good	Very Good

Tables 12-13 Canine Brief Pain Inventory Survey Scores for Severity and Interference Domain for all Water-Soluble CBD Patients

Figure

Figure 2 Depicting Water-Soluble CBD patients overall quality of life scores

Table 12. Water-Soluble CBD Patients Severity Domain Scores from the CBPI Survey

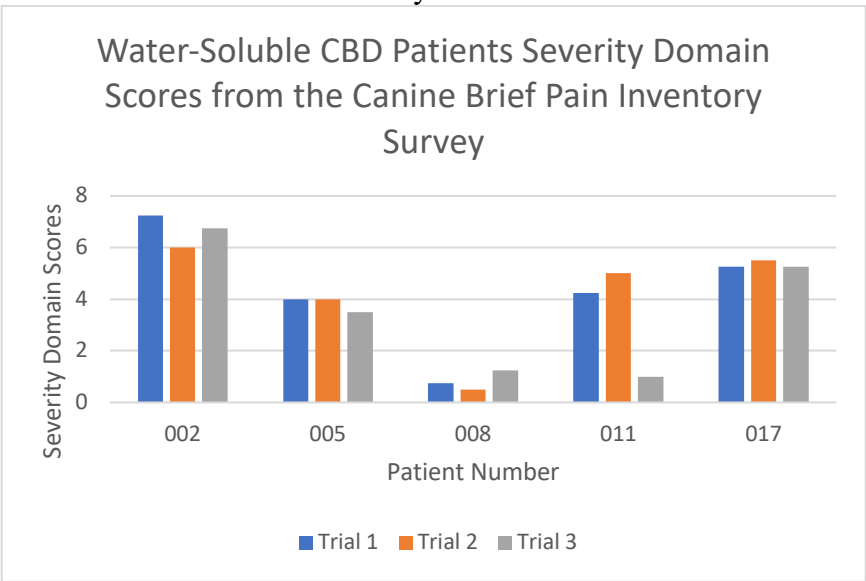


Table 13. Water-Soluble CBD Patients Interference Domain Scores from the CBPI Survey

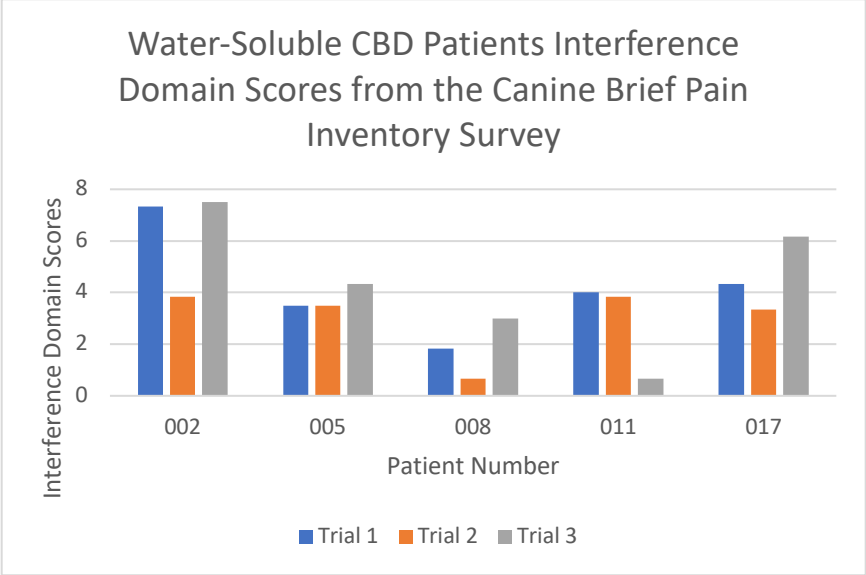


Figure 2. Table showing all Water-Soluble CBD Patients Overall Quality of Life Scores

Patient ID	**Trial 1 Overall Quality of Life Score**	**Trial 2 Overall Quality of Life Score**	**Trial 3 Overall Quality of Life Score**
002	Fair	Good	Good
005	Fair	Good	Good
008	Very Good	Very Good	Very Good
011	Good	Good	Very Good
017	Good	Good	Good

Tables 14-15 Canine Brief Pain Inventory Survey Scores for Severity and Interference Domain for all Placebo Patients

Figure 3 Depicting Placebo patients' overall quality of life scores

Table 14. Placebo Patients Severity Domain Scores from the CBPI Survey

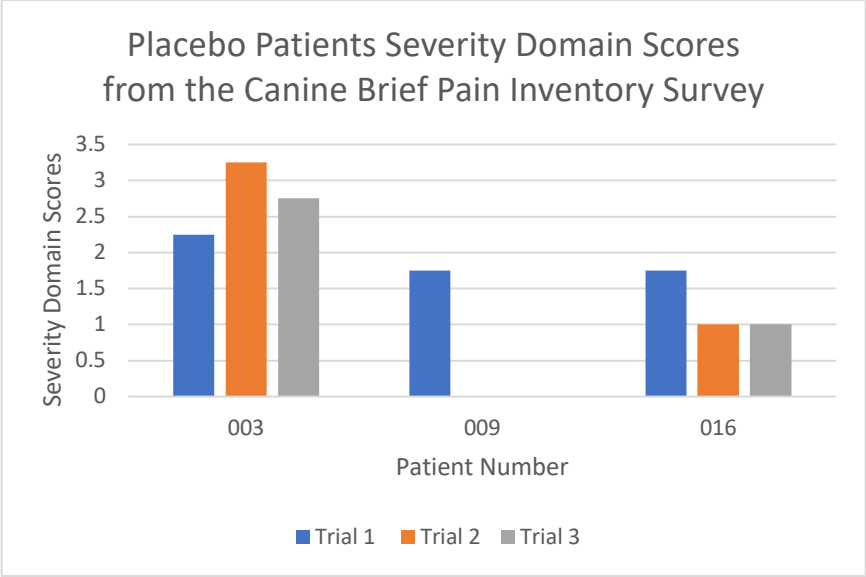


Table 15. Placebo Patients Interference Domain Scores from the CBPI Survey

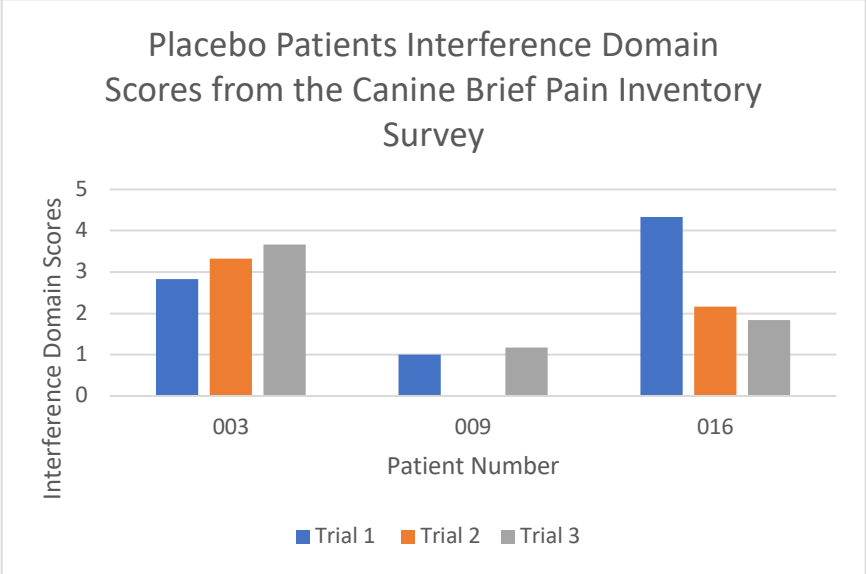


Figure 3. Table showing all Placebo Patients Overall Quality of Life Scores

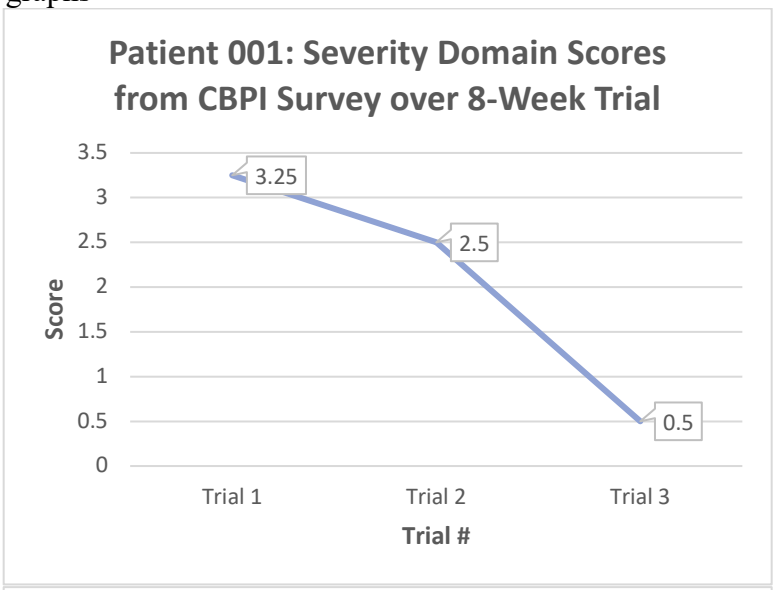
Patient ID	**Trial 1 Overall Quality of Life Score**	**Trial 2 Overall Quality of Life Score**	**Trial 3 Overall Quality of Life Score**
003	Good	Good	Good
009	Excellent	Excellent	Excellent
016	Good	Very Good	Very Good

Tables 16-20 And Figures 4-8 CBPI Scores for Individual Patients in CBD Oil Treatment Group

Table 16: Canine BPI Pain Severity and Pain Interference Scores for Lucy Buchanan

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	3.25	2.5	0.5
Interference Domain Scores	2	1.33	0.833
Overall Quality of Life Scores	Good	Very Good	Very Good

Figure 4. Canine BPI Pain Severity and Pain Interference Scores for Lucy Buchanan illustrated in the form of line graphs



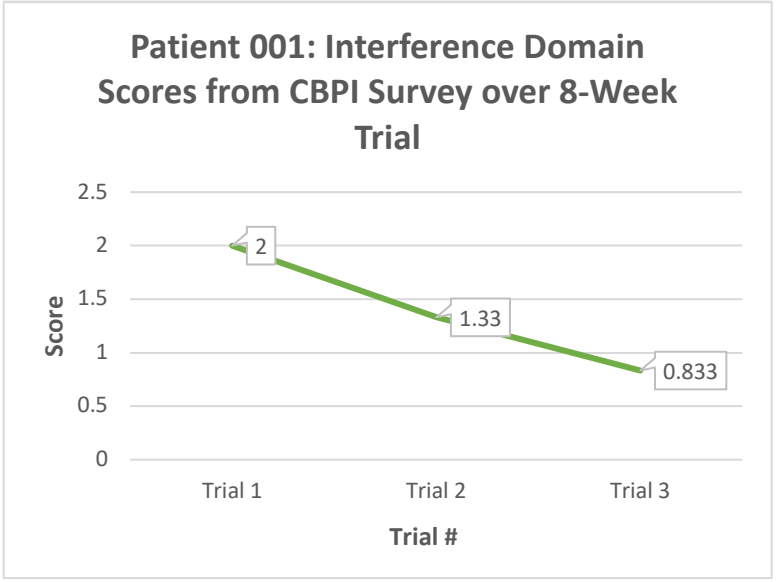
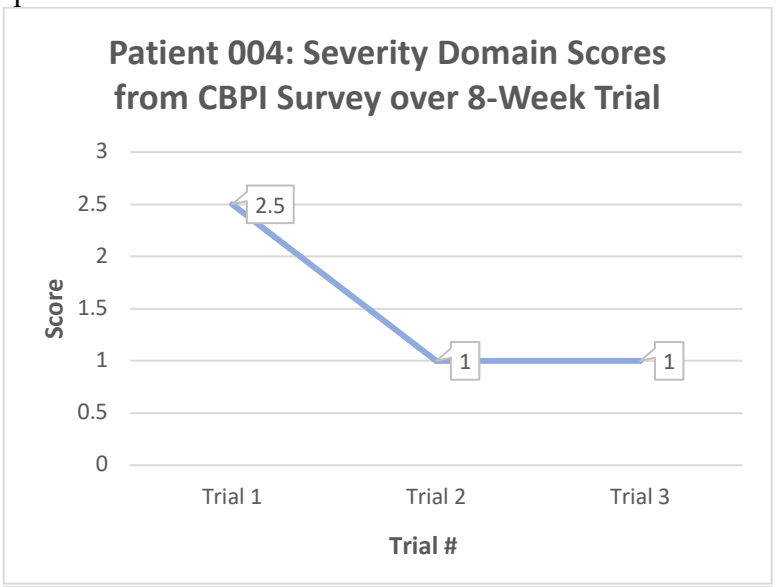


Table 17: Canine BPI Pain Severity and Pain Interference Scores for Paul Ferguson

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	2.5	1	1
Interference Domain Scores	2.5	1	0.33
Overall Quality of Life Scores	Very Good	Very Good	Very Good

Figure 5. Canine BPI Pain Severity and Pain Interference Scores for Paul Ferguson illustrated in the form of line graphs



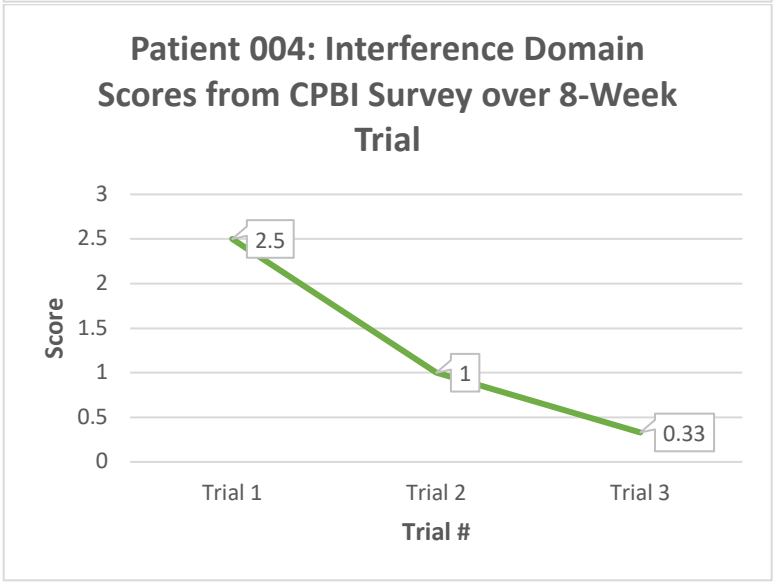


Table 18: Canine BPI Pain Severity and Pain Interference Scores for Daphne Papajeski

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	1	2	0
Interference Domain Scores	0.66	0.66	0
Overall Quality of Life Scores	Very Good	Very Good	Excellent

Figure 6: Canine BPI Pain Severity and Pain Interference Scores for Daphne Papajeski illustrated in the form of line graphs

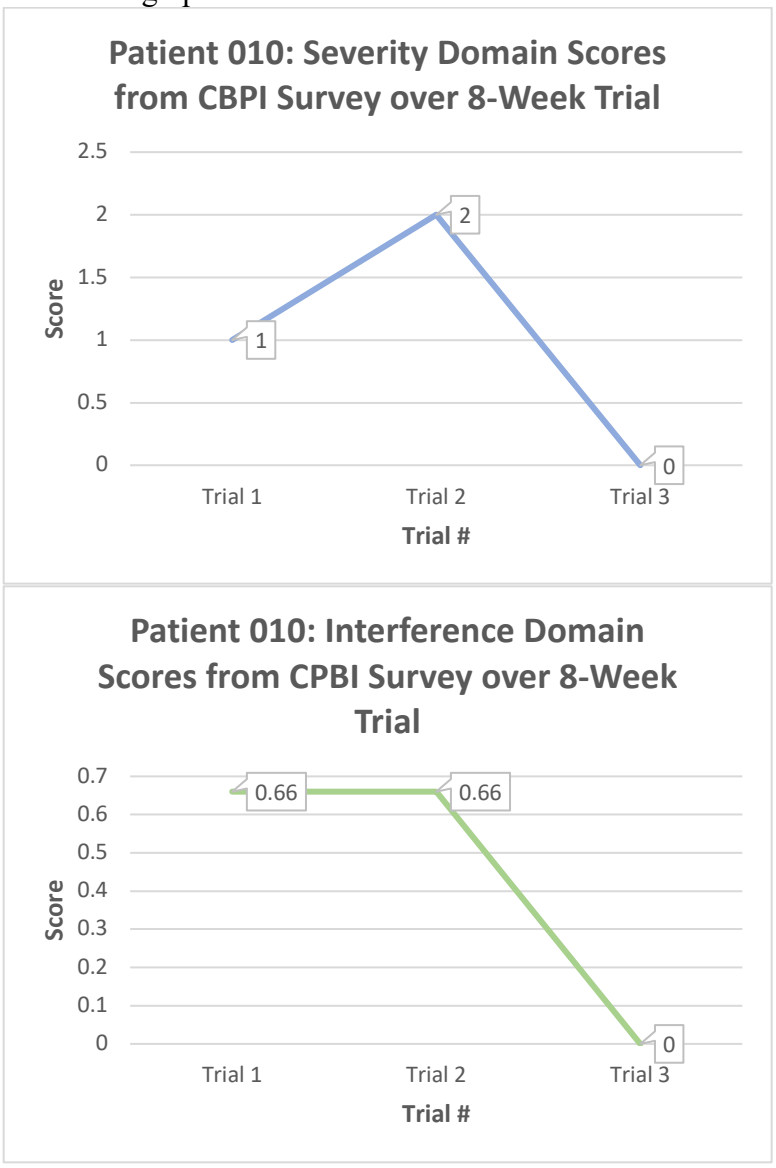
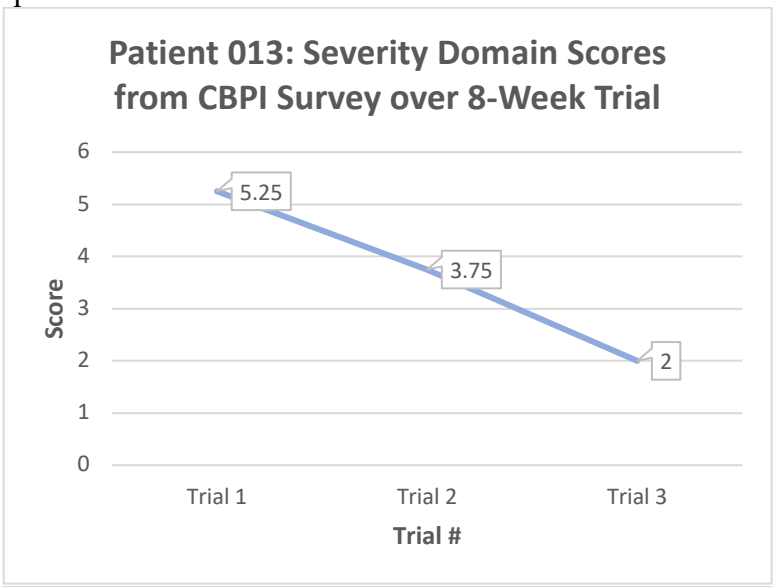


Table 19: Canine BPI Pain Severity and Pain Interference Scores for Reese Rascher

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	5.25	3.75	2
Interference Domain Scores	6.33	4.166	1.833
Overall Quality of Life Scores	Good	Good	Good

Figure 7. Canine BPI Pain Severity and Pain Interference Scores for Reese Rascher illustrated in the form of line graphs



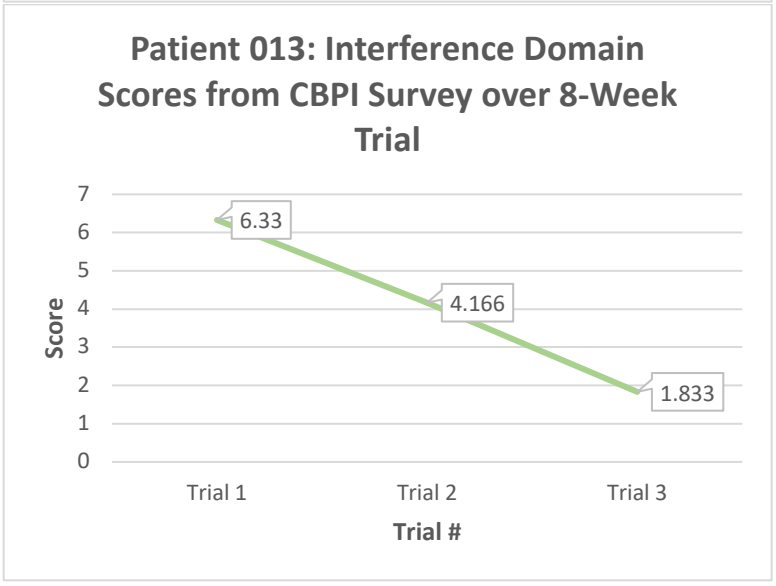
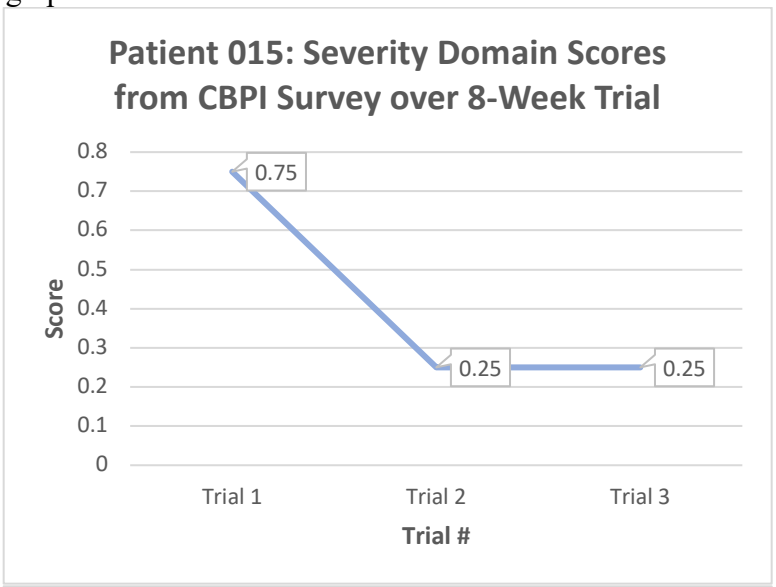


Table 20: Canine BPI Pain Severity and Pain Interference Scores for Maddie Simpson

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	0.75	0.25	0.25
Interference Domain Scores	1.66	1	0.5
Overall Quality of Life Scores	Very Good	Very Good	Very Good

Figure 8. Canine BPI Pain Severity and Pain Interference Scores for Maddie Simpson illustrated in the form of line graphs



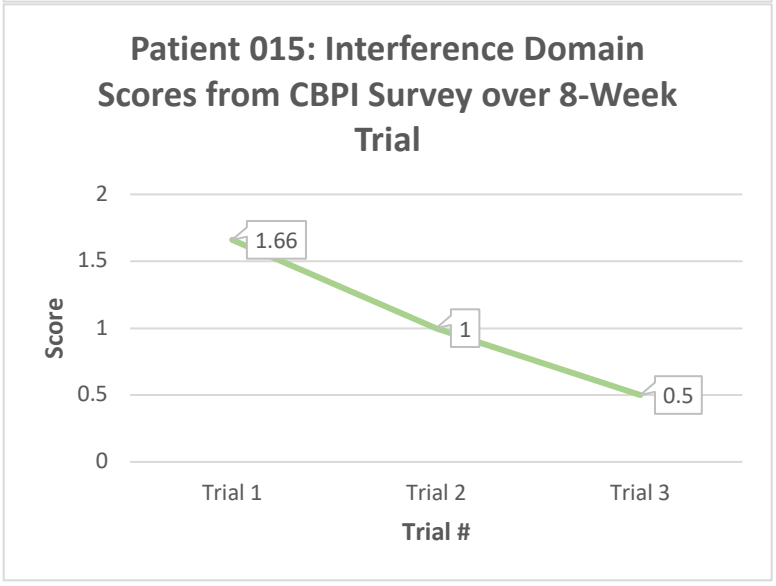
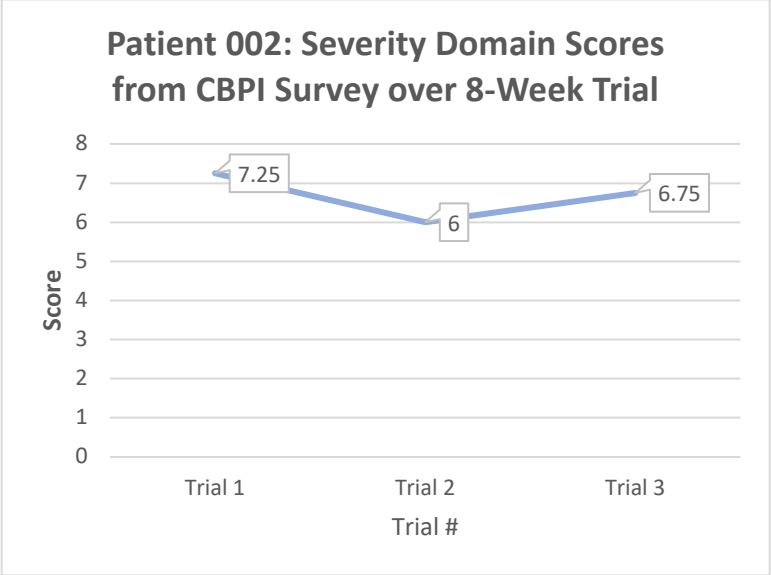


Table 21-25 And Figures 9-13 CBPI Scores for Individual Patients in Water-Soluble CBD Treatment Group

Table 21: Canine BPI Pain Severity and Pain Interference Scores for Lily Costello

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	7.25	6	6.75
Interference Domain Scores	7.33	3.833	7.5
Overall Quality of Life Scores	Fair	Good	Good

Figure 9. Canine BPI Pain Severity and Pain Interference Scores for Lily Costello illustrated in the form of line graphs



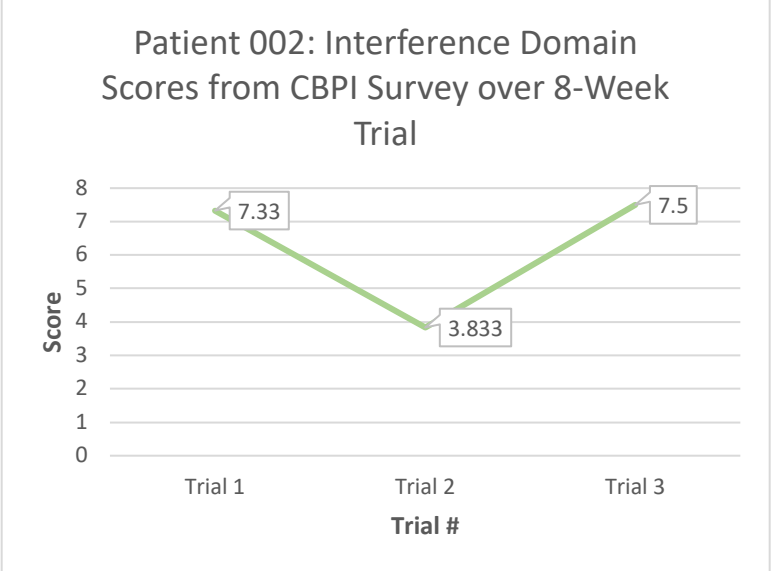
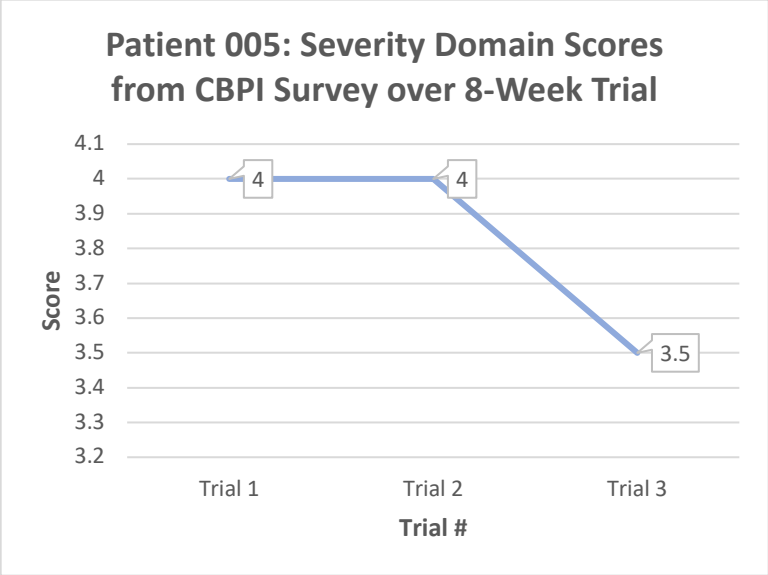


Table 22: Canine BPI Pain Severity and Pain Interference Scores for Chase Joiner

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	4	4	3.5
Interference Domain Scores	3.5	3.5	4.33
Overall Quality of Life Scores	Fair	Good	Good

Figure 10. Canine BPI Pain Severity and Pain Interference Scores for Chase Joiner illustrated in the form of line graphs



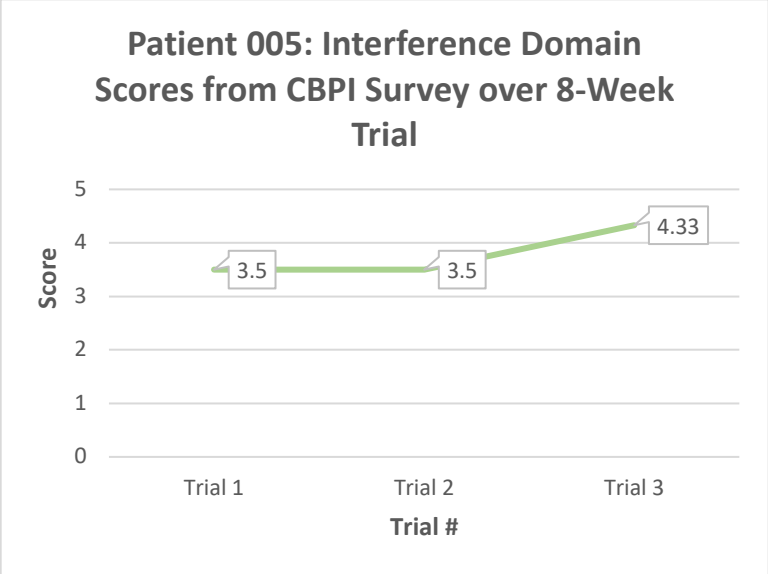
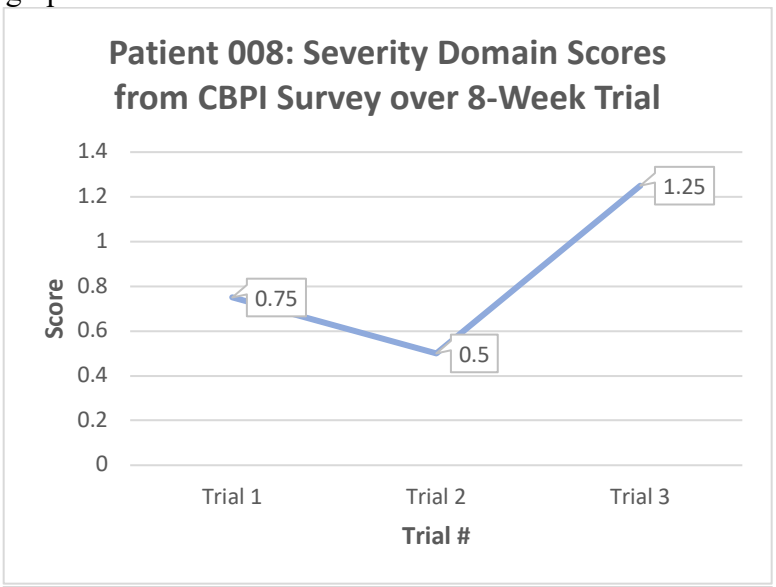


Table 23: Canine BPI Pain Severity and Pain Interference Scores for Bianca Lorrah

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	0.75	0.5	1.25
Interference Domain Scores	1.833	0.66	3
Overall Quality of Life Scores	Very Good	Very Good	Very Good

Figure 11.. Canine BPI Pain Severity and Pain Interference Scores for Bianca Lorrah illustrated in the form of line graphs



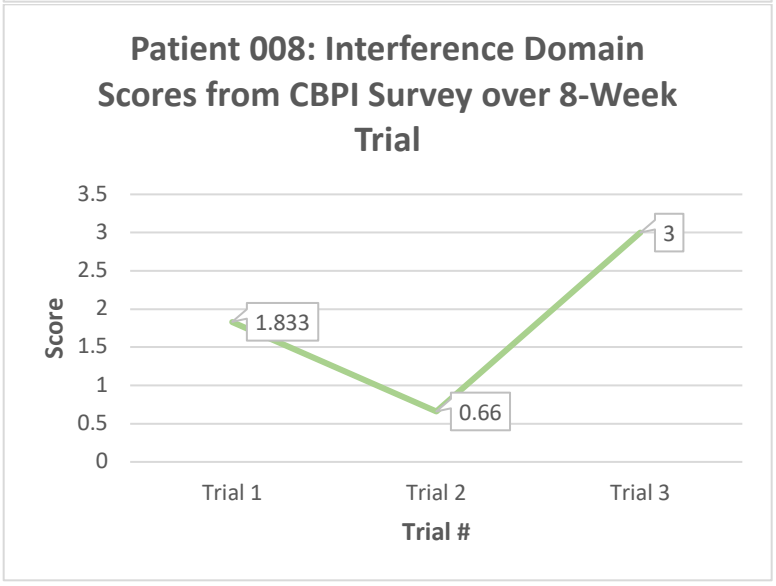
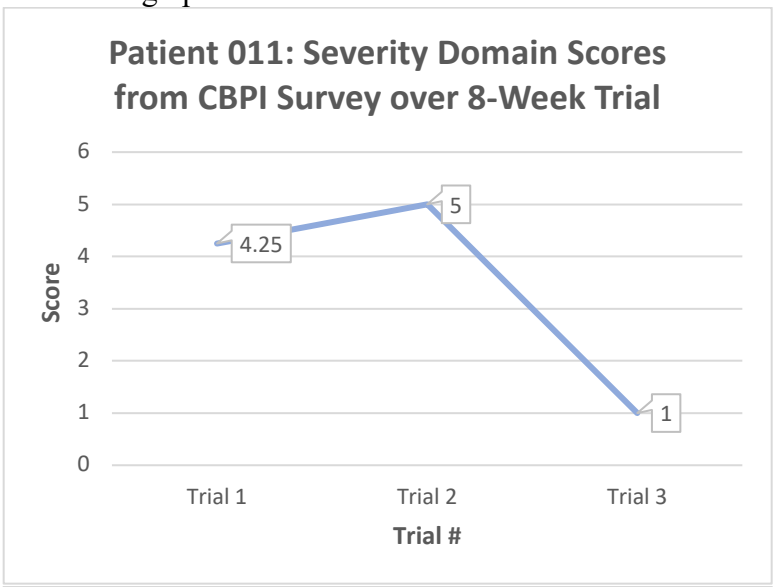


Table 24: Canine BPI Pain Severity and Pain Interference Scores for Reecey Papajeski

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	4.25	5	1
Interference Domain Scores	4	3.833	0.66
Overall Quality of Life Scores	Good	Good	Very Good

Figure 12. Canine BPI Pain Severity and Pain Interference Scores for Reecey Papajeski illustrated in the form of line graphs



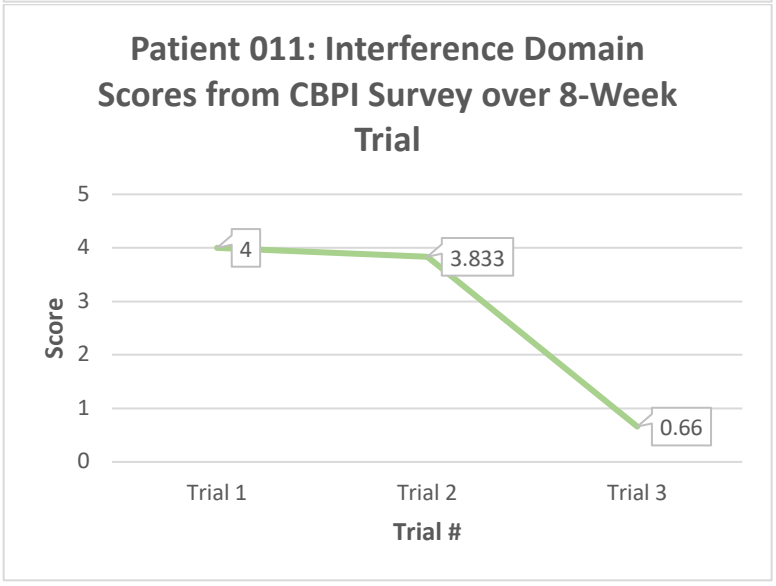
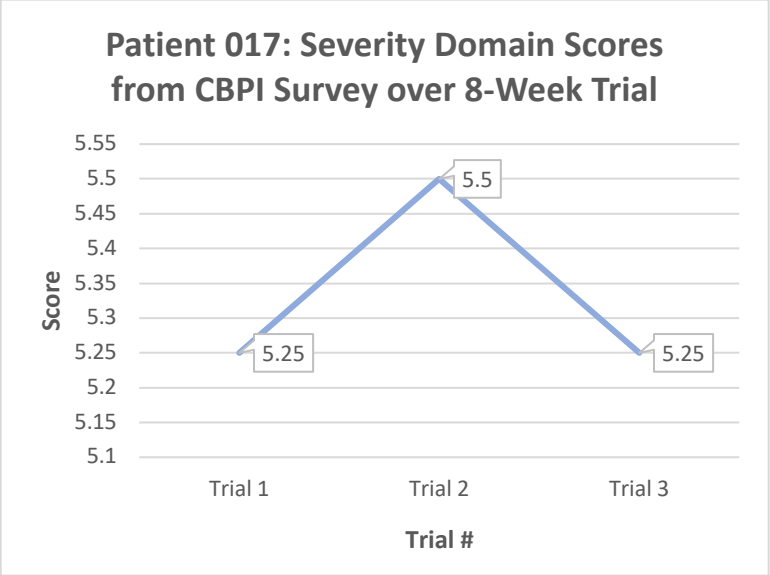


Table 25: Canine BPI Pain Severity and Pain Interference Scores for Bat White

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	5.25	5.5	5.25
Interference Domain Scores	4.33	3.33	6.166
Overall Quality of Life Scores	Good	Good	Good

Figure 13. Canine BPI Pain Severity and Pain Interference Scores for Bat White illustrated in the form of line graphs



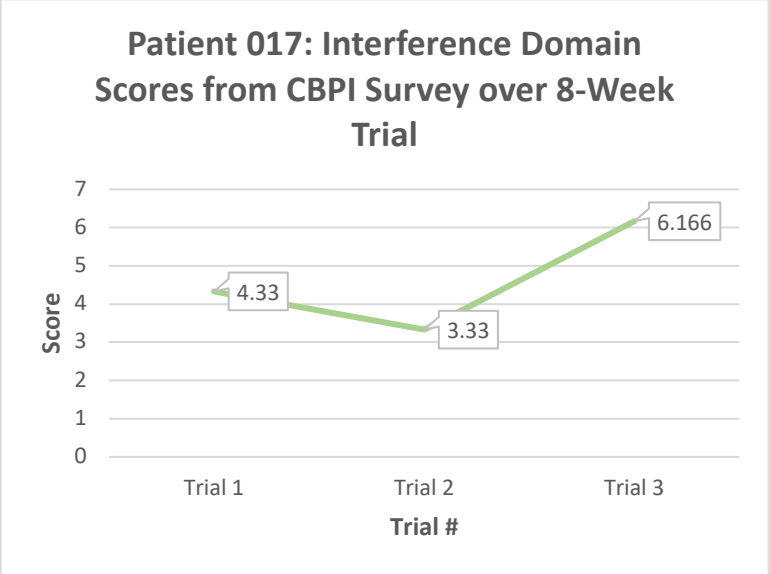
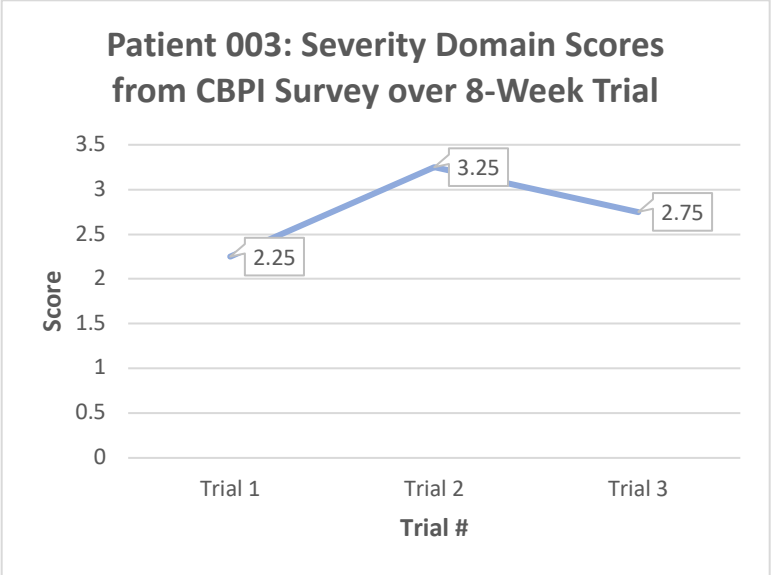


Table 26-28 And Figures 14-16 CBPI Scores for Individual Patients in Placebo Treatment Group

Table 26: Canine BPI Pain Severity and Pain Interference Scores for Sophie Costello

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	2.25	3.25	2.75
Interference Domain Scores	2.833	3.33	3.66
Overall Quality of Life Scores	Good	Very Good	Very Good

Figure 14. Canine BPI Pain Severity and Pain Interference Scores for Sophie Costello illustrated in the form of line graphs



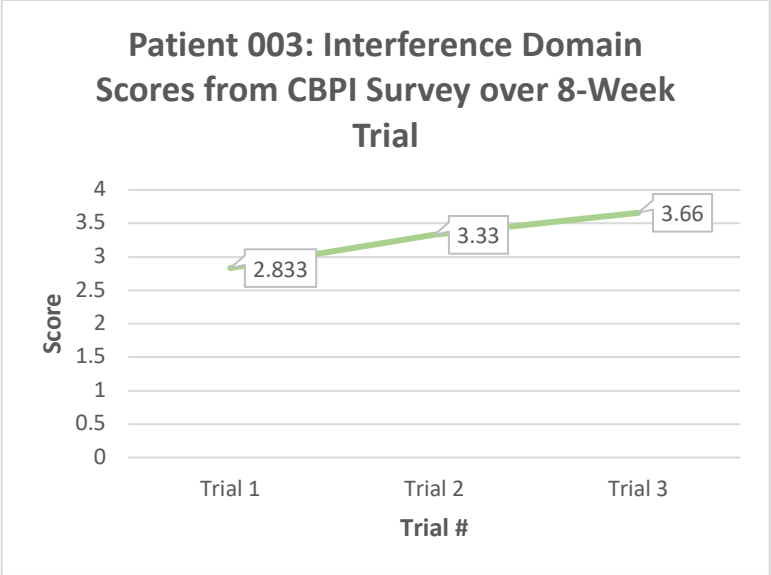
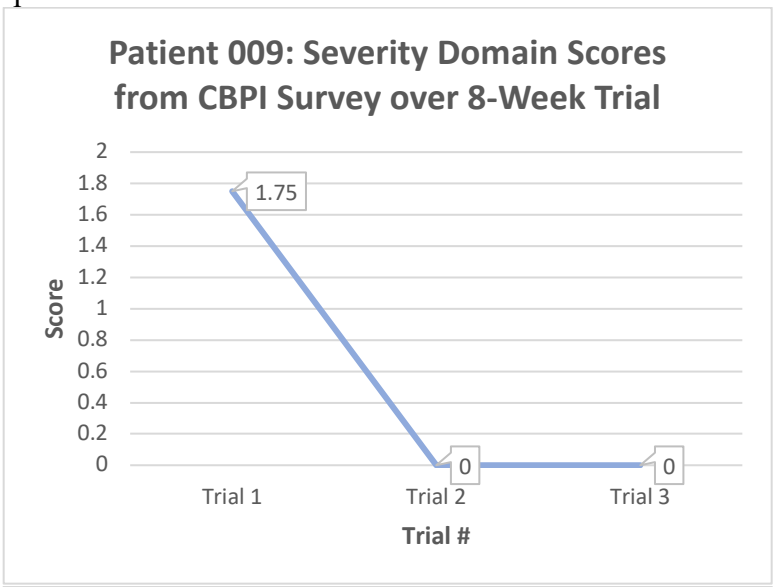


Table 27: Canine BPI Pain Severity and Pain Interference Scores for Rosie Moss

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	1.75	0	0
Interference Domain Scores	1	0	1.166
Overall Quality of Life Scores	Excellent	Excellent	Excellent

Figure 15. Canine BPI Pain Severity and Pain Interference Scores for Rosie Moss illustrated in the form of line graphs



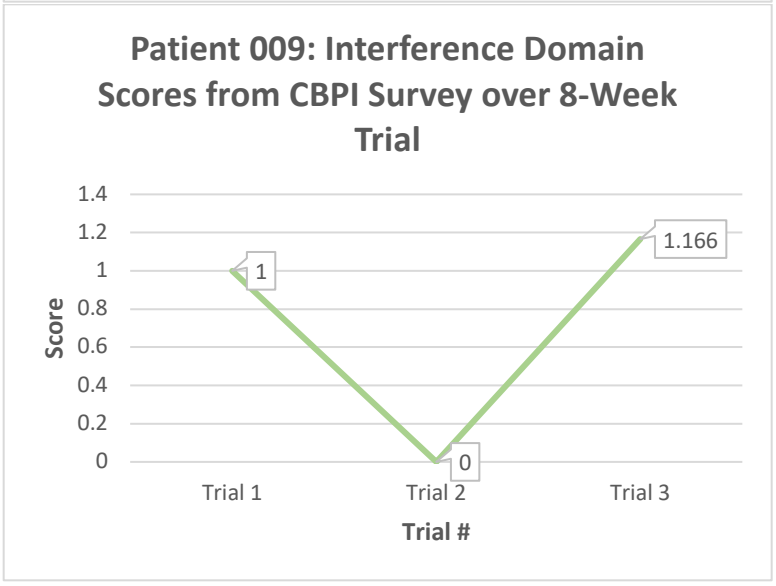
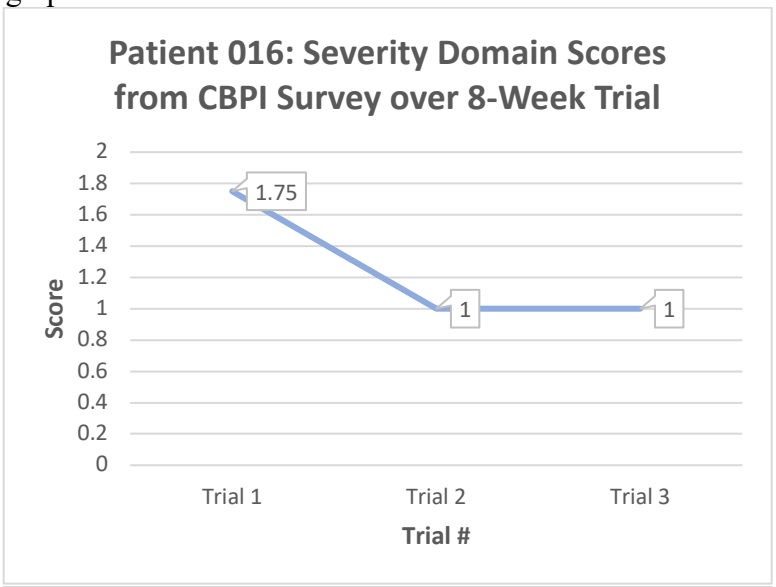
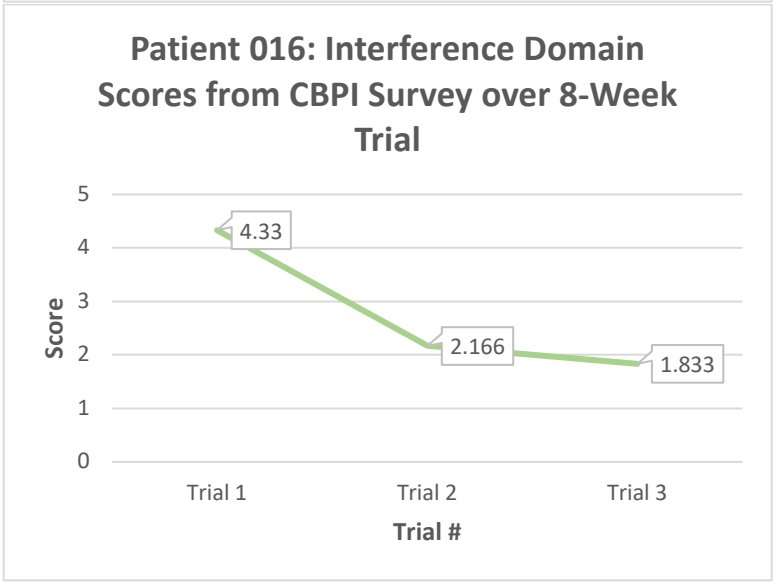


Table 28: Canine BPI Pain Severity and Pain Interference Scores for Solo Simpson

	Trial 1 CPBI	Trial 2 CPBI	Trial 3 CPBI
Severity Domain Scores	1.75	1	1
Interference Domain Scores	4.33	2.166	1.833
Overall Quality of Life Scores	Good	Very Good	Very Good

Figure 16. Canine BPI Pain Severity and Pain Interference Scores for Solo Simpson illustrated in the form of line graphs





Tables 29-30: Canine Brief Pain Inventory Survey Score Reduction Calculations depicting which canines showed a significant reduction in pain severity and pain interference scores in each treatment group

Table 29. CBPI Pain Severity Scores Reduction Calculations for Canines receiving each treatment

Pain Severity			
CBD Oil Patients	**CBPI 1→3 (B→8 wks)**	**CBPI 1→2 (B→4 wks)**	**CBPI 2→3 (4 wks→8 wks)**
001	3.25-0.5= 2.75	3.25-2.5= 0.75	2.5-0.5= 2
004	2.5-1= 1.5	2.5-1= 1.5	1-1= 0
010	1-0= 1	1-2= -1	2-0= 2
013	5.25-2= 3.25	5.25-3.75= 1.5	3.75-2= 1.75
015	0.75-0.25= 0.5	0.75-0.25= 0.5	0.25-0.25= 0
Water-Soluble CBD Patients	**CBPI 1→3 (B→8 wks)**	**CBPI 1→2 (B→4 wks)**	**CBPI 2→3 (4 wks→8 wks)**
002	7.25-6.75= 0.5	7.25-6= 1.25	6-6.75= -0.75
005	4-3.5= 0.5	4-4= 0	4-3.5= 0.5
008	0.75-1.25= -0.5	0.75-0.5= 0.25	0.5-1.25= -0.75
011	4.25-1= 3.25	4.25-5= -0.75	5-1= 4
017	5.25-5.25= 0	5.25-5.5= -0.25	5.5-5.25= 0.25
Placebo Patients	**CBPI 1→3 (B→8 wks)**	**CBPI 1→2 (B→4 wks)**	**CBPI 2→3 (4 wks→8 wks)**
003	2.25-2.75= -0.5	2.25-3.25= -1	3.25-2.75= 0.5
009	1.75-0= 1.75	1.75-0= 1.75	0-0= 0
016	1.75-1= 0.75	1.75-1= 0.75	1-1= 0

*Significant reductions are highlighted in yellow. Pain Severity scores show a significant reduction at ≥ 1.

Table 30. CBPI Pain Interference Scores Reductions Calculations for Canines receiving each treatment

Pain Interference			
CBD Oil Patients	**CBPI 1→3 (B→8 wks)**	**CBPI 1→2 (B→4 wks)**	**CBPI 2→3 (4 wks→8 wks)**
001	2-0.833= 1.167	2-1.33= 0.67	1.33-0.833= 0.497
004	2.5-0.33= 2.17	2.5-1= 1.5	1-0.33= 0.67
010	0.66-0= 0.66	0.66-0.66= 0	0.66-0= 0.66
013	6.33-1.833= 4.497	6.33-4.166= 2.164	4.166-1.833= 2.33
015	1.66-0.5= 1.16	1.66-1= 0.66	1-0.5= 0.5
Water-Soluble CBD Patients	**CBPI 1→3 (B→8 wks)**	**CBPI 1→2 (B→4 wks)**	**CBPI 2→3 (4 wks→8 wks)**
002	7.33-7.5= -0.17	7.33-3.833= 3.497	3.833-7.5= -3.667
005	3.5-4.33= -0.83	3.5-3.5= 0	3.5- 4.33= -0.83
008	1.833-3= -1.167	1.833-0.66= 1.173	0.66-3= -2.34
011	4-0.66= 3.34	4-3.833= 0.167	3.833-0.66= 3.173
017	4.33-6.166= -1.836	4.33-3.33= 1	3.33-6.166= -2.836
Placebo Patients	**CBPI 1→3 (B→8 wks)**	**CBPI 1→2 (B→4 wks)**	**CBPI 2→3 (4 wks→8 wks)**
003	2.833-3.66= -0.827	2.833-3.33= -0.497	3.33-3.66= -0.33
009	1-1.166= -0.166	1-0= 1	0-1.166= -1.166
016	4.33-1.833= 2.497	4.33-2.166= 2.164	2.166-1.833= 0.333

*Significant reductions are highlighted in yellow. Pain Interference scores show a significant reduction at ≥ 2.

d. Chemistry Panel Results

Chemistry panel results are important to evaluate in order to determine the short-term safety of CBD use in canines. Some concerns in previous research have been the elevation of bloodwork values related to the liver and the kidneys. These include BUN, creatinine, ALP, ALT, and total bilirubin.

Three patients, one from each treatment group showed evidence of an increase in ALP. Interestingly enough, values were elevated to begin with at baseline testing at Trial 1, increase even more at Trial 2, and come back down to a still elevated value by Trial 3. Due to the fact this was seen in three patients across all treatment groups, there does not appear to be evidence that this elevation was the result of the treatment.

One patient in the CBD oil treatment group showed evidence of an increase in creatinine by a marginal amount. The reference range is 1.35 mg/dL, and the patient showed an increase to 1.40 mg/dL.

One patient in the Water-Soluble CBD treatment group showed evidence of an increase in ALT to 148 IU. The reference range is 120 IU.

One patient had an increased BUN at baseline in the placebo treatment group, but the values came down within normal ranges for trial 2 and trial 3. One patient had an increased ALT from baseline to trial 2 but remained the same from trial 2 to trial 3. This same patient had an increased total bilirubin at trial 1, but returned to normal range at trial 2 and remained normal for trial 3

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Tables 31-38: Chemistry Panel and other bloodwork related charts for all patients

Table 31. Chemistry Panel Results for Patients taking CBD oil

Patient ID	Parameters (units)	Trial 1 Baseline	Trial 2 4 weeks	Trial 3 8 weeks
001	BUN (mg/dL)	12.00	14.00	6.00
	Creatinine (mg/dL)	0.69	0.71	0.58
	ALP (IU/L)	554.00	982.00	512.00
	ALT (IU)	65.00	66.00	76.00
	Total Bilirubin (mg/dL)	0.10	0.20	0.20
004	BUN (mg/dL)	18.00	17.00	19.00
	Creatinine (mg/dL)	1.20	1.15	1.16
	ALP (IU/L)	29.00	28.00	32.00
	ALT (IU)	26.00	24.00	27.00
	Total Bilirubin (mg/dL)	0.20	0.30	0.20
010	BUN (mg/dL)	12.00	11.00	13.00
	Creatinine (mg/dL)	1.35	1.31	1.40
	ALP (IU/L)	21.00	23.00	27.00
	ALT (IU)	44.00	59.00	85.00
	Total Bilirubin (mg/dL)	0.20	0.20	0.20
013	BUN (mg/dL)	18.00	14.00	17.00
	Creatinine (mg/dL)	0.65	0.79	0.84
	ALP (IU/L)	54.00	45.00	103.00
	ALT (IU)	37.00	37.00	69.00
	Total Bilirubin (mg/dL)	0.20	0.20	0.20
015	BUN (mg/dL	15.00	20.00	17.00
	Creatinine (mg/dL)	1.06	0.96	0.97
	ALP (IU/L)	25.00	24.00	23.00
	ALT (IU)	15.00	23.00	18.00
	Total Bilirubin (mg/dL)	0.20	0.20	0.20

*Values outside reference range are highlighted in red

Table 32. Chemistry Panel Results for Patients taking Water-Soluble CBD

Patient ID	Parameters (units)	Trial 1 Baseline	Trial 2 4 weeks	Trial 3 8 weeks
002	BUN (mg/dL)	13.00	9.00	13.00
	Creatinine (mg/dL)	0.56	0.52	0.55
	ALP (IU/L)	80.00	110.00	118.00
	ALT (IU)	107.00	95.00	62.00
	Total Bilirubin (mg/dL)	0.30	0.20	0.20
005	BUN (mg/dL)	25.00	23.00	30.00
	Creatinine (mg/dL)	1.07	1.09	1.23
	ALP (IU/L)	95.00	95.00	97.00
	ALT (IU)	51.00	45.00	36.00
	Total Bilirubin (mg/dL)	0.10	0.20	0.20
008	BUN (mg/dL)	22.00	21.00	19.00
	Creatinine (mg/dL)	0.78	0.71	0.69
	ALP (IU/L)	35.00	35.00	13.00
	ALT (IU)	77.00	111.00	86.00
	Total Bilirubin (mg/dL)	0.20	0.30	N/A
011	BUN (mg/dL)	16.00	20.00	28.00
	Creatinine (mg/dL)	0.98	0.96	1.10
	ALP (IU/L)	168.00	243.00	204.00
	ALT (IU)	61.00	100.00	62.00
	Total Bilirubin (mg/dL)	0.20	0.20	0.20
017	BUN (mg/dL	26.00	18.00	13.00
	Creatinine (mg/dL)	0.97	1.31	0.80
	ALP (IU/L)	19.00	18.00	20.00
	ALT (IU)	102.00	114.00	148.00
	Total Bilirubin (mg/dL)	0.10	0.20	0.10

*Values outside reference range are highlighted in red

Table 33. Chemistry Panel Results for Patients taking Placebo

Patient ID	Parameters (units)	Trial 1 Baseline	Trial 2 4 weeks	Trial 3 8 weeks
003	BUN (mg/dL)	9.00	12.00	7.00
	Creatinine (mg/dL)	0.71	0.63	0.62
	ALP (IU/L)	348.00	566.00	430.00
	ALT (IU)	45.00	65.00	52.00
	Total Bilirubin (mg/dL)	0.20	0.10	0.20
009	BUN (mg/dL)	28.00	22.00	15.00
	Creatinine (mg/dL)	0.74	0.65	0.68
	ALP (IU/L)	102.00	110.00	103.00
	ALT (IU)	84.00	72.00	81.00
	Total Bilirubin (mg/dL)	0.10	0.10	0.20
016	BUN (mg/dL)	12.00	15.00	10.00
	Creatinine (mg/dL)	0.53	0.52	0.47
	ALP (IU/L)	22.00	40.00	75.00
	ALT (IU)	65.00	130.00	130.00
	Total Bilirubin (mg/dL)	0.70	0.10	0.40

*Values outside reference range are highlighted in red

Table 34. Reference Ranges for Chemistry Panel Results

Parameters (units)	Reference Ranges
BUN (mg/dL)	7-26
Creatinine (mg/dL)	0-1.35
ALP (IU/L)	5-130
ALT (IU)	10-120
Total Bilirubin (mg/dL)	0.1-0.6

Table 35. Averages of Chemistry Panel Results for all Groups: Group 1 indicates patients taking CBD oil, Group 2 indicates patients taking Water-Soluble CBD, and Group 3 indicates patients taking placebo

Group	Parameters (units)	Trial 1 Baseline	Trial 2 4 Weeks	Trial 3 8 Weeks
1	BUN (mg/dL)	15.00	15.2	14.4
2		20.4	18.2	20.6
3		16.33	16.33	10.66
1	Creatinine (mg/dL)	0.99	0.984	0.99
2		0.872	0.918	0.874
3		0.66	0.6	0.59
1	ALP (IU/L)	136.6	220.4	139.4
2		79.4	100.2	90.4
3		157.33	238.66	202.66
1	ALT (IU)	37.4	41.8	55
2		79.6	93	78.8
3		64.66	89	87.66
1	Total Bilirubin (mg/dL)	0.18	0.22	0.20
2		0.18	0.22	0.175**
3		0.33	0.10	0.266

**Average is not entirely accurate due to insufficient sample amounts submitted (therefore, not reported) for 1 patient in Trial 3 at 8 weeks.

Table 36. PCV %, Total Plasma Protein (g/dL), and Plasma Color for Patients taking CBD oil

Patient ID	Parameters	Trial 1 Baseline	Trial 2 4 weeks	Trial 3 8 weeks
001	PCV %	53	50	50
	Total Plasma Protein (g/dL)	7.6	8.2	7
	Plasma Color	hemolyzed	hemolyzed	clear
004	PCV %	58	56	57
	Total Plasma Protein (g/dL)	6.9	7	7.2
	Plasma Color	clear	Slight hemolyzed	Slight hemolyzed
010	PCV %	52	46	49
	Total Plasma Protein (g/dL)	7.3	6.4	N/A
	Plasma Color	Slight hemolyzed	clear	N/A
013	PCV %	55	52	51
	Total Plasma Protein (g/dL)	6.8	7.2	7
	Plasma Color	clear	clear	Slight hemolyzed
015	PCV %	51	54	56
	Total Plasma Protein	6.3	6.4	6.4
	Plasma Color	clear	Slight hemolyzed	clear

Table 37. PCV%, Total Plasma Protein (g/dL), and Plasma Color for Patients taking Water-Soluble CBD

Patient ID	Parameters	Trial 1 Baseline	Trial 2 4 weeks	Trial 3 8 weeks
002	PCV%	56	52	50
	Total Plasma Protein (g/dL)	5.8	6.6	7
	Plasma Color	clear	clear	clear
005	PCV %	52	45	45
	Total Plasma Protein (g/dL)	6.7	7	7.2
	Plasma Color	Slight hemolyzed	clear	clear
008	PCV %	52	58	56
	Total Plasma Protein (g/dL)	7.1	7.8	7.6
	Plasma Color	clear	hemolyzed	hemolyzed
011	PCV %	47	38	39
	Total Plasma Protein (g/dL)	7.1	6.8	N/A
	Plasma Color	clear	Lipemic/hemolyzed	N/A
017	PCV %	48	54	52
	Total Plasma Protein (g/dL)	7.1	6.4	6
	Plasma Color	clear	clear	clear

Table 38. PCV %, Total Plasma Protein (g/dL), and Plasma Color for Patients taking Placebo

Patient ID	Parameters	Trial 1 Baseline	Trial 2 4 weeks	Trial 3 8 weeks
003	PCV%	46	49	50
	Total Plasma Protein (g/dL)	6.3	7	7.2
	Plasma Color	clear	clear	Slight hemolyzed
009	PCV %	52	52	54
	Total Plasma Protein (g/dL)	7.4	7.6	7.6
	Plasma Color	clear	Slight hemolyzed	clear
016	PCV %	48	47	47
	Total Plasma Protein (g/dL)	7.1	6.4	8
	Plasma Color	Lipemic/hemolyzed	clear	Lipemic/hemolyzed

V. Conclusion

In conclusion, it can be determined based on the evidence from this clinical trial that there is no difference between the Water-Soluble CBD and CBD oil in terms of effectiveness in osteoarthritis pain relief in canines. There was also no statistically significant evidence that there was improvement in gait and weight distribution from Trial 1 and Trial 3. Therefore, we fail to reject the null hypothesis.

However, using the subjective data collected through the Canine Brief Pain Inventory results, the CBD oil patients' owners felt that there was overall improvement in severity domain and pain interference scores as a group and showed a downward trend overall in scores. The water-soluble CBD patients' owners did not have a clear trend on whether or not there was improvement in severity domain and pain interference scores, however, a few did show a downward trend in scores. There is no visible trend in placebo patients' scores. While this does not prove that there is significance to either CBD being used on osteoarthritic patients in terms of pain relief, there is the possibility that there are minute behavioral and attitude differences being made with CBD oil in arthritic patients that owners were able to recognize.

CBC and Total Chemistry Panel results showed no significant or major short-term side effects with the liver and kidney values in the canines using the CBD products.

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Appendix A- Canine Brief Pain Inventory Surveys

Canine Brief Pain Inventory

Description of pain:

Rate your dog's pain:

1. Fill in the oval next to the one number that best describes the pain at its **worst** in the last 7days.

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

No pain Extreme pain

2. Fill in the oval next to the one number that best describes the pain at its **least** in the last 7 days

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

No pain Extreme pain

3. Fill in the oval next to the one number that best describes the pain at its **average** in the last 7 days.

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

No pain Extreme pain

4. Fill in the oval next to the one number that best describes the pain as it is **right now**.

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

No pain Extreme pain

Description of function:

Fill in the oval next to the one number that best describes how during the last 7 days **pain has interfered** with your dog's:

5. **General Activity**

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

Does not interfere Completely interferes

6. **Enjoyment of Life**

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

Does not interfere Completely interferes

7. **Ability to Rise to Standing From Lying Down**

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

Does not interfere Completely interferes

Brief Pain Inventory, con't

8. **Ability to Walk**

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

Does not interfere — Completely interferes

9. **Ability to Run**

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

Does not interfere — Completely interferes

10. **Ability to Climb Stairs, Curbs, Doorsteps, etc.**

○0 ○1 ○2 ○3 ○4 ○5 ○6 ○ 7 ○ 8 ○ 9 ○ 10

Does not interfere — Completely interferes

Overall impression:

11. Fill in the oval next to the one number that best describes your dog's overall quality of life over the last 7 days.

○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent