STAAR

10 YEAR ANNIVERSARY

Symposium on Therapeutic Advances in Animal Rehabilitation

PROGRAM

April 24 - 28, 2019 Wyndham Hamilton Park Hotel & Conference Center, Florham Park NJ

info@staarconference.com +1 908 963 2255 staarconference.com

Ilaria Borghese, MS, MA, OT

CEO and Co-Founder
Symposium on Therapeutic Advances in Animal Rehabilitation (STAAR)

President
Thera-Paw, Inc.

International speaker, instructor, and author on canine rehabilitation and greyhound-specific conditions

and
Sunder
(aka: "Cloonsman")

★ STAAR ★

Thank You, Dog

The car grumbled in the splintering sleet and the seat warmer had yet to kick in as I rushed to work. I was late again and sure to irritate the people waiting on me. The coffee churned my angst-laced innards to a rolling boil. Driving, I rifled through my mental checklist that had little chance of being tackled. I was overworked, over-committed, half-conscious, and physically agitated. I cursed in my native tongue (more impactful) when the streetlight ahead turned red. As I sat waiting, feeling myself age with each passing second, I spotted a figure tottering beyond the intersection. A dog with a tessellated coat and weighty jowls, swayed his head out a car window, greeting the morning air with gusto. Ears pricked and muzzle twitching, he gobbled every scented morsel of air. His tongue flicked and flittered up to lubricate his nose and ensure that not one molecule escaped the tacky, black snout. He was alert, happy, and present in the "now."

When the light turned green, I edged past the car with the dog. Forgetting to rush off, I found myself transfixed by this animal, as if passing slowly enough would somehow infect me with his energy and zeal. His excitement reached a crescendo as he whisked by, ears and tongue and lips flapping in unison, applauding the road ahead. I smiled, unconsciously, the reflex templated in my brain. And as the moment passed, I came to realize the power of the dog. The power to reel me back into the "now," to ease my fretted body, the discord in my head, my aching back and tired eyes. If only for a moment, it erased the frustrations, doubt, and insecurity that came along with a day saturated with social maneuverings and obligations.

I have always loved dogs, but my sudden change in demeanor came as a complete surprise. Intrigued, I quickly formulated a list of my favorite things for comparison – a freshly-powdered ski-ripe mountain; the clear, sun-dappled, Caribbean-blue water; the molasses-sweet, velvety touch of my horse's nose; Marley's "Three Little Birds" playing on the radio – none could have united me with the present and brought a reflexive smile to my face like that dog. An unknowing mystic.

We are celebrating STAAR's 10-year anniversary and thank you all for joining us! STAAR is the communal culmination of academic and creative efforts by all its attendees – participants and instructors, exhibitors and sponsors, dog handlers and staff. We share our space and our knowledge with many new faces and a growing family of close friends. This is a special community like no other. As we gather together this week, let us take a few brief moments throughout each day to look at the dogs that surround us and realize their soothing power. These creatures are able to strip us of our differences and insecurities, our burdens and obligations, and bring us together in that universal tug that binds all of us to one another in fellowship and gratitude for this unknowing mystic. Thank you, dog.

Welcome to STAAR 10 Year Anniversary

SCHEDULE-AT-A-GLANCE

PRE-SYMPOSIUM WORKSHOP LABS

Wednesday, April 24 (9:00AM – 6:30PM) & Thursday, April 25 (9:00AM – 6:30PM) (2 Full Days – includes breakfast and lunch)	**Basic Manual Therapy for the Canine Spine** *Laurie Edge-Hughes*
Wednesday, April 24 (9:00AM – 6:30PM) (1 Full Day – includes breakfast and lunch)	**Canine Neurodynamics: Testing and Treating the Nerves of The Thoracic Limb** *Sabine Hárrer*
Thursday, April 25 (9:00AM – 6:30PM) (1 Full Day – includes breakfast and lunch)	**Canine Neurodynamics: Testing and Treating the Nerves of The Pelvic Limb** *Sabine Hárrer*

SYMPOSIUM WORKSHOP LABS

7:30AM BREAKFAST – 4th FLOOR **FRIDAY, APRIL 26**

START 8:30 AM	1 Full Day **Myofascial Manual Therapies for the Axial Skeleton and Extremities** *Laurie Edge-Hughes* **Break 10:00-10:15**	1 Full Day **Enhancing Quality of Functional Movement with Proprioceptive Neuromuscular Facilitation** *Amie Hesbach* **Break 10:00-10:15**	1 Full Day **Canine Neurodynamics: Testing and Treating the Nerves of the Central Nervous System** *Sabine Hárrer* **Break 10:00-10:15**	1/2 Day **Advanced Exercise Techniques for the Pelvis** *(Repeated Saturday)* *Debbie Torraca* **Break 10:00-10:15**	1/2 Day **Keeping Geriatric Patients Mobile and Pain-Free: Home Care and Pain Management** *Carmella Britt* **Break 10:00-10:15**	1/2 Day **Shockwave and Laser: Uses and Protocols** *Ria Acciani* **Break 9:45-10:00**
END 12:45 PM						
12:45PM-2:15PM LUNCH IN "SOCIAL KITCHEN" DINING ROOM GROUND FLOOR						
START 2:15 PM	1 Full Day Continued **Myofascial Manual Therapies for the Axial Skeleton and Extremities** *Laurie Edge-Hughes* **Break 3:45-4:00**	1 Full Day Continued **Enhancing Quality of Functional Movement with Proprioceptive Neuromuscular Facilitation** *Amie Hesbach* **Break 3:45-4:00**	1 Full Day Continued **Canine Neurodynamics: Testing and Treating the Nerves of the Central Nervous System** *Sabine Hárrer* **Break 3:45-4:00**	1/2 Day **Mulligan Principles and Applications for Mobilization of the Canine Spine** *(Repeated Saturday)* *Debbie Torraca* **Break 3:45-4:00**	1/2 Day **Objective and Subjective Gait Analysis: Improve Your Clinical Skills, Research Capacity, and Profitability** *Jennifer Repac* **Break 3:45-4:00**	1/2 Day **Cross-Training and Rehabilitation for the High-Performance Athlete** *(Repeated Saturday)* *Ria Acciani* **Break 3:45-4:00**
END 6:30 PM						

7:00PM – 10:00PM STAAR COCKTAIL PARTY – 4th floor Hall –Theme: *BEACH PARTY*

Welcome to STAAR 10 Year Anniversary

SCHEDULE-AT-A-GLANCE

SYMPOSIUM WORKSHOP LABS

7:30AM BREAKFAST – 4th FLOOR **SATURDAY, APRIL 27**

START 8:30 AM	1/2 Day **Cross-Training and Rehabilitation for the High-Performance Athlete** *(Repeated Friday)* *Ria Acciani* **Break 10:00-10:15**	1/2 Day **Tap Into Your Patient's Potential with Kinesiology Taping** *Amie Hesbach* **Break 10:00-10:15**	1/2 Day **Mulligan Principles and Applications for Mobilization of the Canine Spine** *(Repeated Friday)* *Debbie Torraca* **Break 10:00-10:15**	1/2 Day **Nonsurgical Management of Elbow and Stifle Conditions** *(Repeated PM)* *Andrea Looney* **Break 10:00-10:15**	2 Hours **Senior Dogs – Common Issues and the Use of Laser on Acupuncture Points** *(Repeated PM)* *Carrie Smith* 2 Hours **Creating a Senior Dog Mobility and Exercise Program for Your Clinic and Your Clients** *(Repeated PM)* *Carrie Smith*
END 12:45 PM					
12:45PM-2:15PM LUNCH IN "SOCIAL KITCHEN" DINING ROOM GROUND FLOOR					
START 2:15 PM	1/2 Day **Introduction to Craniosacral Therapy** *Laurie Edge-Hughes* **Break 3:45-4:00**	1/2 Day **The "Core" of Therapeutic Exercise for Alignment, Balance, and Control** *Amie Hesbach* **Break 3:45-4:00**	1/2 Day **Advanced Exercise Techniques for the Pelvis** *(Repeated Friday)* *Debbie Torraca* **Break 3:45-4:00**	1/2 Day **Nonsurgical Management of Elbow and Stifle Conditions** *(Repeated AM)* *Andrea Looney* **Break 3:45-4:00**	2 Hours **Creating a Senior Dog Mobility and Exercise Program for Your Clinic and Your Clients** *(Repeated AM)* *Carrie Smith* 2 Hours **Senior Dogs – Common Issues and the Use of Laser on Acupuncture Points** *(Repeated AM)* *Carrie Smith*
END 6:30 PM					

SYMPOSIUM ROUNDTABLE DISCUSSION GROUPS

MORNING COFFEE & BEVERAGES

START 9:00 AM	**Conditioning Concepts for Return to Sport** *Laurie Edge-Hughes*	**Canine Forelimb Lameness: Medical, Interventional, & Rehabilitative Options** *Andrea Looney*
END 12:00 PM		

CONFERENCE ENDS

General Information & Amenities

Cocktail Reception
Friday evening 7:00 to 9:00 pm. Join us on the 4th floor Conference Level to meet the exhibitors and mingle with peers. This year, the Cocktail Reception's theme is "Beach Party" with music, open bar (wine, beer, specialty drinks), and hors d'oeuvres.

Raffle begins at 8:30 pm. 100% of proceeds benefit Animal Aid USA. Please wear your lanyard for admittance. **Must be present to win.**

Pre-Symposium
Courses are located on the 4th floor Conference Level, along with registration. Included is breakfast from 7:30 to 8:30 am, lunch 1:00 to 2:00 pm.

Workshops
Symposium workshops classrooms are located on the 4th floor Conference Level, along with registration. Classrooms are clearly labeled.

Exhibit Hall Hours (suggested hours)
Friday 7:30 am to 6:30 pm
Friday Cocktail Reception 7:00 to 9:00 pm
Saturday 7:30 am to 6:30 pm

Breakfast
Continental breakfast is provided on the 4th floor Conference Level, from 7:30 to 8:30 am on Friday and Saturday. **No breakfast provided on Sunday.**

Lunch
Friday and Saturday from 12:45 to 2:15 pm in the 'Social Kitchen' restaurant on the Main Level. Please present hostess with your Lunch Ticket. Those without tickets will be charged. Snacks and beverages will be served all day.

Hotel Check Out
12:00 pm (noon)

ATM Machine
Near Vanderbilt's entrance on First Floor.

Computer Stations
Located on the 3rd and 4th floors, along with complimentary printers.

Hotel Access
The bridge entrance leading to the back parking lot area is the pet entrance/exit area. It will automatically lock each night from 11:00 pm until 6:00 am. To enter during those hours, please use your guestroom keycard. For your convenience, the front entrance will remain open on a 24-hour basis.

Fitness Center (1st Floor)
You may access the gym area on a 24-hour basis using your guest room keycard. Indoor and outdoor heated pools and hot tub hours are 6:00 am to 11:00 pm daily. For a pickup game of basketball, volleyball, or racquetball, equipment is available at the front desk.

Off-Site Restaurants
Florham Park:
Puleo's Brick Oven, 162 Columbia Turnpike
Starbucks, 184 Columbia Turnpike
China Chalet, 184 Columbia Turnpike
Nonna's, 176 Columbia Turnpike
Panera, 187 Columbia Turnpike
Thirsty Turtle, 186 Columbia Turnpike

Morristown:
Roots Steak House, 40 W Park Place
Sushi Lounge, 12 Schuyler Place
Asahi Sushi Restaurant, 65 Morris Street
Committed Pig, 28 W Park Place
Origin French Thai, 10 South Street
Famished Frog, 18 Washington Street

Madison:
Shanghai Jazz, 24 Main Street
Begum Palace Indian, 300 Main Street
Biladi Grill, 77 Main Street
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54 Main Bar & Grille, 54 Main Street
Rocco's Pizzeria Restaurant, 30 Cook Plaza
Il Mondo Vecchio, 72 Main Street

Complimentary shuttle service available to local stops. Contact the front desk for information.

Friday Night Cocktail Reception
co-sponsored by STAAR and Vital Vet

Karen Talbot
AAU co-founder

Lorenzo Borghese
AAU co-founder

Georgina Bloomberg
AAU volunteer

Meredith Vieira
AAU volunteer

We have many amazing raffle items donated by our Exhibitors and Sponsors! STAAR participants enrolled in eight or more course credits will receive 2 free raffle tickets at Registration. Additional raffle tickets may be purchased throughout the day on Friday for $2.00 each. Winning tickets will be randomly chosen at the STAAR Cocktail Reception on Friday evening (7:00 to 9:00 pm). Raffle begins at 8:30 pm and **you must be present to win.**

About Animal Aid USA – the STAAR 2019 Raffle Proceeds Benefactor
All raffle proceeds will be donated to Animal Aid USA (AAU), which was created in January 2012 by a small group of animal lovers. As a 100% volunteer organization based in New Jersey, AAU is dedicated to helping animals (501c3 charity; Tax ID number – 45-4473502). Through their rescue and relocation model, AAU has created a lifeline for unwanted, abused and abandoned animals in the southern states, while also helping animals and their families in local communities.

Each month, volunteers drive more than 1,600 miles from NJ to GA and back in order to relocate animals from high-kill shelters to receiving rescues and homes. To date, AAU has rescued and provided veterinary care to more than 25,000 homeless animals... averaging over 300 lives saved per trip!

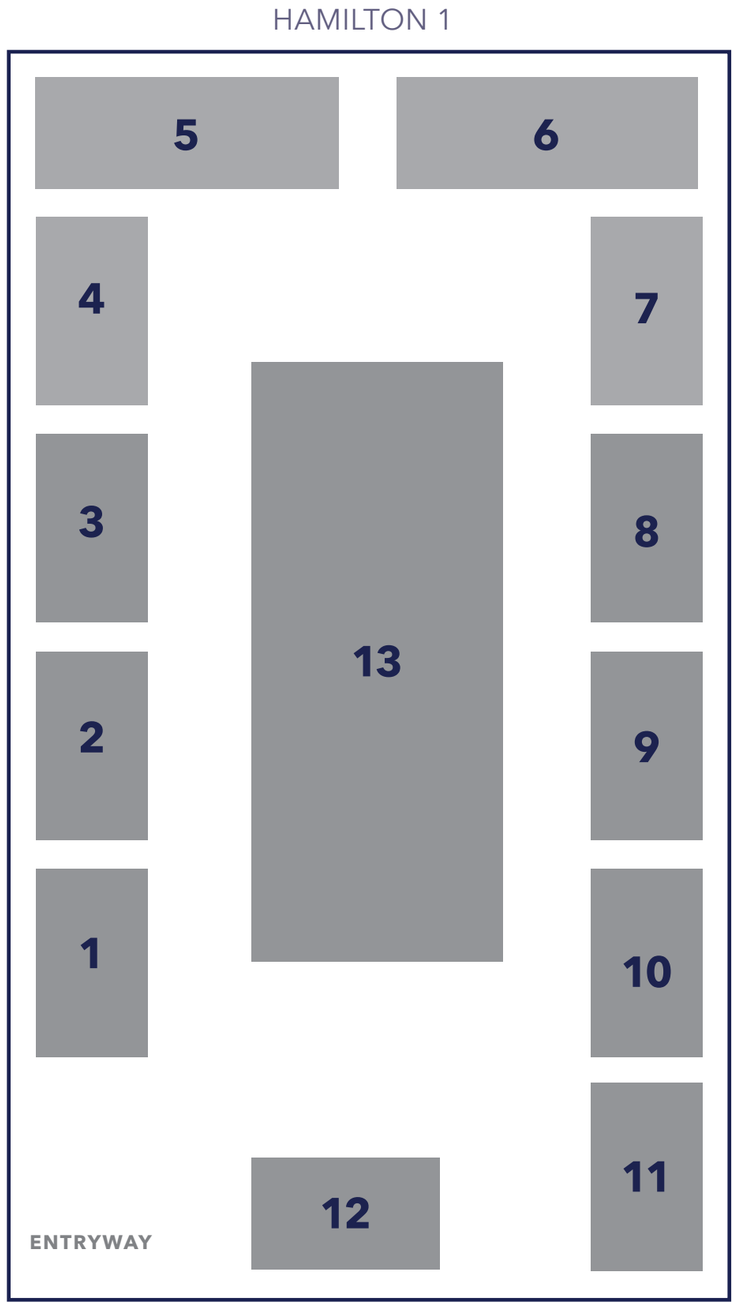
In addition, AAU raises money to fund spay and neuter programs in low income communities, and raises awareness of the legal animal cruelties happening daily in the U.S. The members of AAU believe that by providing the proper education and resources, we can change the future of unwanted, abused and abandoned animals.

Thank you for your raffle donations!
100% of Raffle proceeds go to Animal Aid USA

Exhibit Hall

1 Thera-Paw / Vital Vet
2 Respond Systems
3 Musculoskeletal Therapies for Animals
4 Boehringer Ingelheim
5 SpectraVET
6 DogLeggs
7 Hill's Pet Nutrition
8 Multi Radiance Medical
9 Walkin' Pets by HandicappedPets.com
10 PulseVet
11 Hudson Aquatic Systems
12 Help 'Em Up Harness
13 Physiotec
14 Hero Braces
15 Purina Pro Plan Veterinary Diets

Vendor Village Map



1 Canna Companion
2 Eagle ProSix
3 American Regent Animal Health
4 KVP International
5 Tekscan
6 Eddie's Wheels for Pets
7 Kinesio
8 OrthoPets
9 ASPCA Pet Health Insurance
10 International Win
11 Elite Science/1TDC
12 Empire Vet Solutions/Arthrex
13 Gyms For Dogs

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The Endocannabinoid System and Cannabinoid Administration as an Adjunct to Rehabilitation

A CASE REPORT

Sarah Brandon, DVM, CEO CannaCompanion

Veterinary cannabinoid administration, like hemp-based CBD, is a trending topic, growing alongside the practice of veterinary rehabilitation. Professionals and pet parents understand how vital rehabilitation therapies are for patient quality of life and enhancement of the human-animal bond. Less is understood about the endocannabinoid system (ECS), the internal cannabis receptor system, particularly as it pertains to healing and health maintenance processes surrounding injured tissues. Yet it seems that everyone is giving their dog or cat hemp or CBD supplements and raving about the results. Why?

To answer this question, we followed Jake, an 11 yr, M/N ,30.9 kg (68 lb), Golden Retriever. Several years ago, Jake was diagnosed with right-sided FCP resulting in severe osteoarthritis (OA) within that joint; he also had moderate OA in the left elbow joint secondary to MCD. Jake became a patient at MSU Veterinary Rehabilitation Services in 2016, where he continues to receive regular physical and red laser treatments. Jake's attending veterinarian prescribed Galliprant at ~2 mg/kg/day which helped stabilize his PROM measurements during flexion and extension but his discomfort and general quality of life parameters continued to decline. July 2018, Jake was given a hemp pet supplement with the hope of stimulating the ECS, reducing pain, and improving overall comfort and mobility.

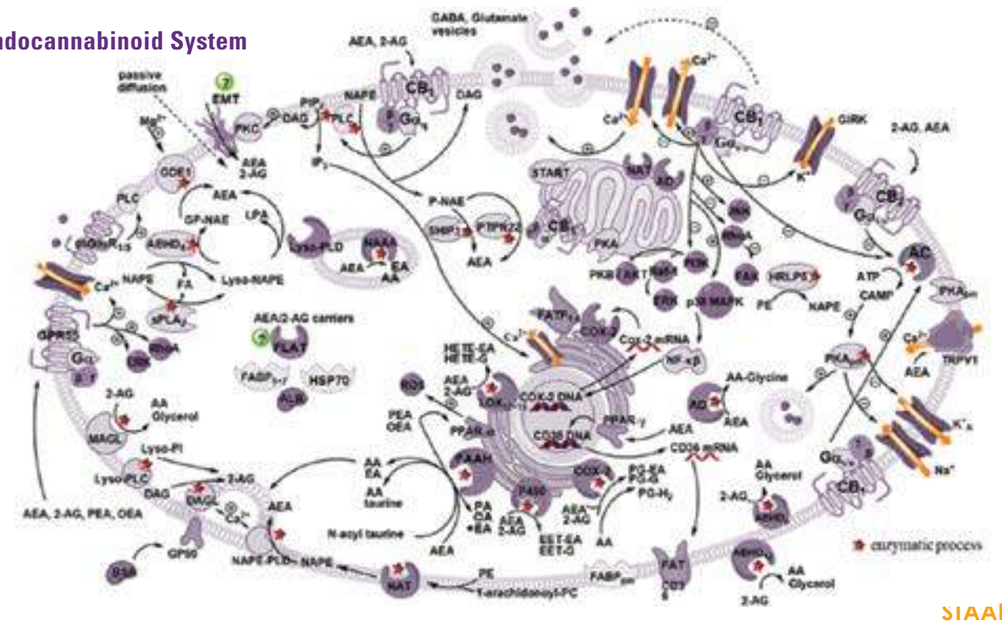
ECS physiology as it pertains to cellular stress, the arguable root of all joint discomfort, is made up of:

- Four receptor subtypes: CB1, CB2, CB4 & CB6)
- Endogenous ligands: anandamide and 2-AG
- Signaling pathways: multiple exist and more are discovered yearly
- Associated synthetic and catabolic pathways

The ECS's sole purpose is to listen to and correct cellular stress by using chemokines to direct resources (receptor components, ligands, secondary compounds like terpenes, etc.). Through such attraction, the ECS CBs can address a variety of important cellular functions, affecting all aspects of the analgesic cascade

(article continues on page 18)

The Endocannabinoid System (ECS)



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The Endocannabinoid System and Cannabinoid Administration as an Adjunct to Rehabilitation

Sarah Brandon, DVM, CEO CannaCompanion

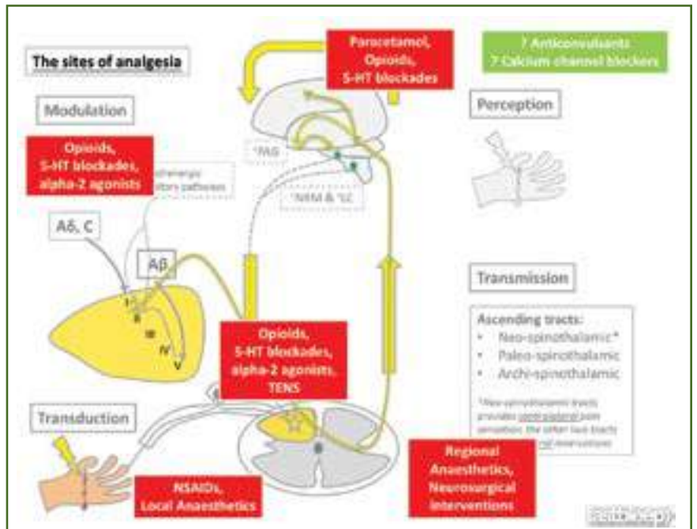
(article continuation from page 14)

and a wide range of inflammatory cells (including macrophages, monocytes, NKC, lymphocytes, mast cells, CD4+8 and CD4+).

The ECS accomplishes reduction in cellular stress via alterations of anandamide/THC and 2-AG/CBD, engaging receptors using combinations of cannabinoid, terpenoids, flavonoids and electrolytes like calcium, for an entourage effect. Because CBs are essentially negative feedback loops between CBD and THC, the ECS functions at peak capabilities when it is broadly supported. When large amounts of single compounds are administered over long periods of time (anecdotally 4-6 mo), it can result in the ECS CB fighting back – negating the effects as if the ECS-supportive supplements were never administered. At this time, cannabis research favors a CBD:THC 2:1-10:1 whereby small quantities of multiple compounds are administered, allowing the ECS to utilize them according to cellular chemokine production. When supported in this manner, it appears to reduce cellular stress at low doses, with few adverse effects (like sedation or GI upset), without taxing the negative feedback loop.

Ongoing research in our patient population will reveal more details regarding what doses and ratios work for which conditions. In the meantime, a general dose range of 0.1-1.5 mg/kg CBD:THC 2:1-10:1 is preferred and this coincides with most pet-centric ECS supporting supplements (hemp oil, hemp capsules, CBD products, etc.). Smaller patients often use higher doses due to faster metabolisms, and carnivores generally use higher doses then omnivores or herbivores. Frequency of administration varies according to species and individual response, and generally ranges from once daily to every 6 hours. More severe patients and those with multiple conditions, often need higher doses and/or more frequent administration.

For Jake, the healthcare team added a powdered hemp pet supplement at 0.21 mg/kg CBD:THC 5:1-6:1 twice daily with food or a dairy treat (Calcium is one of the electrolytes directly interacting with CBs.



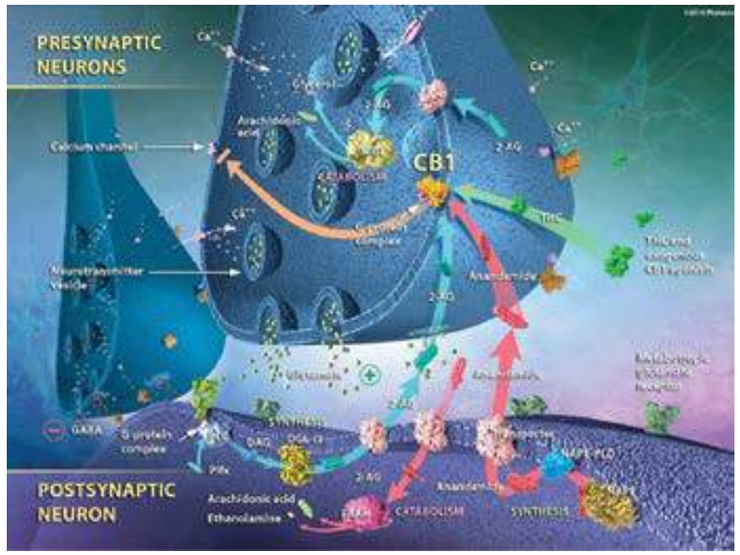
Analgesia Cascade
CB1 have a bidirectional upregulation with mu receptors in the periaqueductal gray, rostral ventromedial medulla (RVM), dorsal horn, and possibly the locus coeruleus (LC).

Cannabinoids affect pain in all areas of the cascade: transduction, transmission, perception, and modulation.

ECS modulation of pain cascade occurs …
- Supraspinal: PAG, RVM, & LC
- Spinal: dorsal horn
- Peripheral: C fibers, A fibers

Cannabinoids decrease sensitivity to substance P, reduce sprouting, and alter NMDA & glutamate concentrations.

Neurological Unit of the ECS



Additionally, these compounds are lipophilic, so dairy fat enhances absorption in the carnivorous GI tract). By August 2018, little overall improvement was noted, though Jake seemed slightly more comfortable during normal daily functions. His dose was increased to 0.42 mg/kg CBD:THC 5:1-6:1 twice daily, then a few weeks later, thinking his ECS needed more consistent support, his dosing changed to 0.21 mg/kg q6hr. Early September, Jake's attendings increased his Galliprant to 3 mg/kg/day, which improved overt pain but not overall quality of life.

Late September 2018, Jake's ECS therapy was altered to include a hemp oil. Due to differences in absorption and metabolism, these formulations have differing areas of ideal use. Hemp oils have a faster onset of action (1-3 min buccal/sublingual, 15-30 min GI absorption) and shorter duration of action (half-life 4-6 hr). Hemp oils are ideal for immediate ECS support during acute cellular stress (e.g., separation anxiety in an otherwise calm patient) when the cannabis system could use a boost on top of maintenance support, as well as for patients who have compromised absorption abilities (e.g., geriatric cats). Conversely, powdered hemp supplements have a longer onset of action (45-60 min) and typically carry half-lives of 8-10 hr (ranges changes per species based on absorption and metabolic rates of solids). The latter provides a more even support from which the ECS can draw from, helping to address chronic levels of cellular stress – as we know exist in Jake's elbow joints.

Jake's altered ECS therapy carried a combined daily dose mid-way between his previous two, at 0.37 mg/kg CBD:THC 5:1-10:1 q8hr, using powder and oil formulations and multiple cannabinoid and terpenoids.

Hemp powder: 0.21 mg/kg CBD:THC 5:1-6:1 q8hr AND
Hemp oil: 0.16 mg/kg 9:1-10:1 CBD:THC q8hr with meal or dairy treat AND
Topical essential oil blend for joint health: 1 drop/elbow/evening, gently rubbed into the skin providing additional terpene support for his ECS

Two weeks after starting the above therapy, Jake was examined by MSU medical staff and his normal PT performed three times to confirm results. Jake's flexion and extension parameters improved by 20 points on the right and less dramatically on the left. At maximum flexion/extension, pain was noted and quickly subsided with reduced stresses. In March 2019, Jake's humans reported that he continues to maintain the same parameters and acts like a 3-year-old in an 11-year old's body. With proper ECS support, Jake's rehabilitation team was able to improve his quality of life past all expectations, helping him to enjoy another birthday and some well-deserved lounging time.

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Diet + Rehabilitation Increases Speed to Improvement from TPLO Surgery

Wendy Baltzer, DVM, PhD, DACVS-SA, DACVSMR
Institute of Veterinary Animal and Biomedical Sciences, Massey University, Palmerston North, New Zealand

You recently published a study[1,2] comparing the effects of diet and rehabilitation on dogs following orthopedic surgery. Why did you undertake this research?

As a specialist in both surgery and sports medicine, I have been disappointed in recovery rates of canine patients following orthopedic surgery. Studies have shown that dogs consistently require approximately five to seven months of recovery following a tibial plateau leveling osteotomy (TPLO) surgery.[3,4,5] Because I find this recovery time to be too prolonged, I wanted to explore ways to reduce it.

I approached Nestlé Purina about sponsoring a double-blinded study on dogs that had undergone TPLO surgery, with a goal of evaluating how an anti-inflammatory diet and rehabilitation might affect recovery, both separately and together. In the study, 48 dogs were randomly assigned to one of four groups:

1. Adult maintenance diet (control diet)
2. Dry Omega-3- and protein-enriched diet (Purina® Pro Plan® Veterinary Diets JM Joint Mobility® Canine Formula)
3. Adult maintenance diet (control diet) + rehabilitation
4. Dry Omega-3- and protein-enriched diet (Purina® Pro Plan® Veterinary Diets JM Joint Mobility® Canine Formula) + rehabilitation

Dogs in the study were followed for six months, with assessments conducted at 2 weeks, 8 weeks, 16 weeks and 24 weeks post-surgery. Among the outcomes evaluated were gait analysis, as measured by ground reaction force data; progression of osteoarthritis, as measured via radiography and synovial fluid evaluation; and daily activity (as measured via accelerometer).

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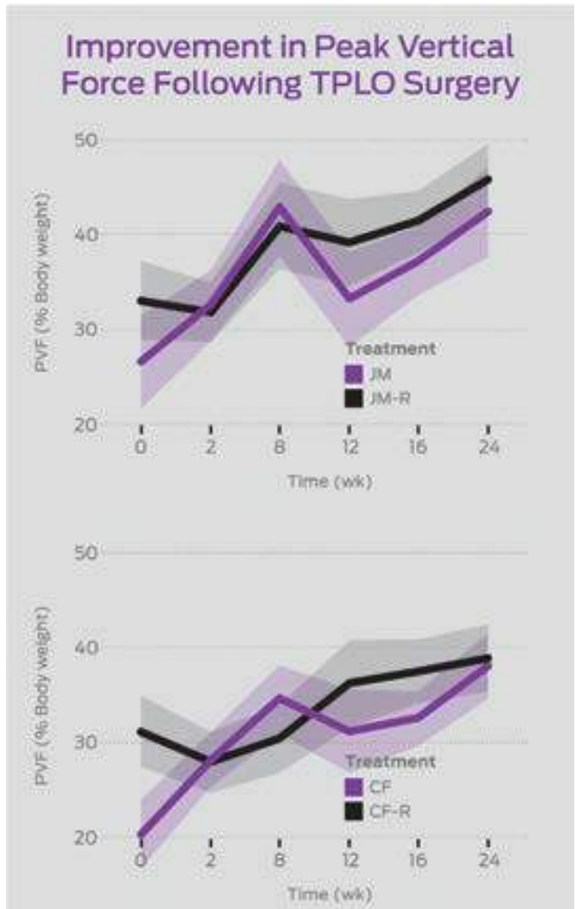

When the JM diet and rehabilitation were used together, dogs experienced significant improvement in peak vertical force by 8 weeks post-surgery, compared to the control fed + rehabilitation group.

Diet + Rehabilitation Increases Speed to Improvement from TPLO Surgery

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What were the study results?

This study shattered the myth around the impact of surgery on dogs. By looking at all four groups, we also learned how diet and rehabilitation exercise work individually and together.

- Compared to the control diet + rehabilitation group, when the JM diet and rehabilitation were used together, dogs experienced significant improvement in ground reaction forces, as measured by peak vertical force (PVF) at 8 weeks and vertical impulse (VI) by 16 weeks post-surgery.
- Rehabilitation therapy, which included sit-stand exercises and underwater treadmill therapy, was associated with significant increases in time spent in light-to-moderate activity.

What did you learn about diet and OA management?

The results of the study indicated that JM played an important role in reducing inflammation and the progression of OA by reducing production of inflammatory mediators such as PGE2 in the synovial fluid. This is likely due to the higher levels of omega-3 fatty acids from marine sources in the diet – specifically high levels of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Unfortunately, many diets and supplements contain insufficient levels of EPA and DHA and/or contain alpha-linolenic acid, a fatty acid found in sources such as flaxseed, which is less efficient in being converted to EPA and DHA.

While owners were blinded to which diet they were feeding, those whose dogs were fed the JM diet observed reduced frequency in lameness over time when trotting or running.

Conclusion: According to this this study, the combined effects of diet and rehabilitation offered significant benefits for both surgical and OA patients. The latter group is especially important, since OA is believed to affect ~20 percent of dogs over the age of 1 year.[6]

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Summary of study lead by Dr. Leilani Alvarez at the Animal Medical Center, NY

Effect of Targeted Pulsed Electromagnetic Field Therapy on Canine Postopertive Hemilaminectomy: A Double-Blind, Randomized, Placebo-Controlled Clinical Trial

Alvarez LX, McCue J, Lam NK, Askin G, Fox PR. J Am Anim Hosp Assoc 2019; 55:83–91

Key Points

- PEMF therapy may improve postoperative recovery for dogs undergoing hemilaminectomy
- Our study demonstrated dogs receiving PEMF therapy following hemilaminectomy had improved wound scores at week 6 and reduced mean number of owner-administered pain medications in the 7-day post-operative period compared to sham therapy

Background

Intervertebral disk disease (IVDD) is the most common spinal cord injury of dogs and leads to pain, paralysis and morbidity. The severity of spinal cord dysfunction following disc extrusion has been attributed primarily to spinal cord compression and subsequent swelling and inflammation of the cord. Multiple human clinical trials have demonstrated the potential for PEMF therapy to promote wound healing and reduce pain and inflammation. One possible mechanism of action for PEMF is via upregulation of the voltage dependent binding of calcium to calmodulin, which downregulates inducible nitric oxide (iNOS) synthase and reduces IL-1β and other inflammatory cytokines. PEMF has also been shown to stimulate regeneration of peripheral nerves and improve function in animals following spinal cord injury.

Study Methods and Objective

We prospectively evaluated naturally occurring IVDD in 53 client owned dogs in a double-blind, placebo-controlled trial. Our objective was to evaluate postoperative pain, wound healing and functional outcome following hemilaminectomy by comparing dogs treated with targeted PEMF to those receiving sham therapy.

Dogs were randomized to receive either targeted PEMF (N=27) or sham treatment (N=28) following hemilaminectomy. Patients with prior episodes of IVDD, other concurrent diseases, seizure history, or arrhythmias were excluded. All dogs were non-ambulatory at study onset and had standardized pain management and postoperative care. Study treatment (PEMF or sham) sessions were administered q 6 hr for 15 minutes during hospitalization, followed by q 12 hr home therapy until 7 days post-operative. The study protocol was reviewed and approved by the Animal Medical Center's IACUC Committee.

Patients were evaluated at day 0, day 14, and day 42 postoperative for neurologic grade (0-5), and wound healing via Visual Analogue Score (VAS) and Wound Evaluation Scale (WES). Once discharged, clients filled out a questionnaire twice daily during the initial 7-day post-operative period and recorded: time of PEMF treatment, pain score, pain medications administered, ability to urinate, stand and walk. Statistical analysis included median, interquartile range, and frequencies for all variables. The Wilcoxon rank-sum test was used to compare all veterinarian and client outcomes between treatment groups. ANCOVA and two-sample t-test was used to assess change in neurologic score from day 0 to endpoint. The difference in time to event for client reported outcomes was estimated by the Kaplan-Meier method. A p-value of <0.05 was considered significant.

Results

Veterinarian assessed pain scores and neurologic scores did not differ significantly between groups for any of the selected evaluation days. Median neurologic grades improved over time in both treatment groups,

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Effect of Targeted Pulsed Electromagnetic Field Therapy on Canine Postopertive Hemilaminectomy: A Double-Blind, Randomized, Placebo-Controlled Clinical Trial

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with greater overall improvement in the PEMF group, but did not yield statistically significant differences between groups (Fig 1). Linear regression analysis (ANCOVA) comparing changes over time showed improvement in mean neurologic score from baseline to week 6 in the PEMF group, but was just shy of statistical significance (p= 0.051). Dogs receiving PEMF therapy had a significantly greater median VAS and WES incisional score at 6 weeks (p= 0.010 and p=0.023, respectively). Owner outcomes did not show differences between treatment groups in median time to achieve each functional task (urinate, stand, walk) or in median pain scores. Sham dogs had a longer median time to walk compared to the PEMF group (6 days vs 3 days respectively), but this was not statistically significant (p=0.08). Patients in the control group had a significantly higher number of owner-administered pain medications (p= 0.010), with codeine administered 1.8 times more frequently in the sham group. No untoward effects were recorded in either treatment group.

Discussion/Conclusion

Presenting neurologic status affects clinical outcome for dogs with IVDD. Despite a worse starting mean neurologic grade in the PEMF versus sham group (4 versus 3, respectively), we demonstrated greater improvement from baseline to week 6 in the PEMF treatment group (p= 0.051). We also demonstrated improved wound healing, although this was most apparent at 6 weeks postoperative rather than the expected initial 14-day time period, when most wound healing is expected to occur. This may have been due to lack of assessment at earlier time points or lack of more frequent PEMF treatments. Although PEMF did not yield statistically faster time to ambulation or improved pain scores, we determined a larger sample size would be required. A post-hoc power calculation revealed that a total of 152 patients (72 per group) would be needed to provide 85% power to detect a significant difference in pain scores and a total of 82 patients (41 per group) to detect a significant difference in time to ambulation.

Significantly fewer occurrences of pain medication administration by the owners in the PEMF group was a major finding of the study. This finding has also been substantiated in the human PEMF literature and may help to reduce use of pharmaceutical pain medications, especially given the current epidemic in human opioid abuse.

Limitations of the study included lack of earlier and more frequent evaluations and lack of histologic samples to evaluate wound healing.

PEMF therapy appears to be safe and may improve postoperative outcomes in dogs undergoing hemilaminectomy for IVDD. Statistically significant improvements were noted in wound healing at 6 weeks and reduced number of owner-administered pain medications.

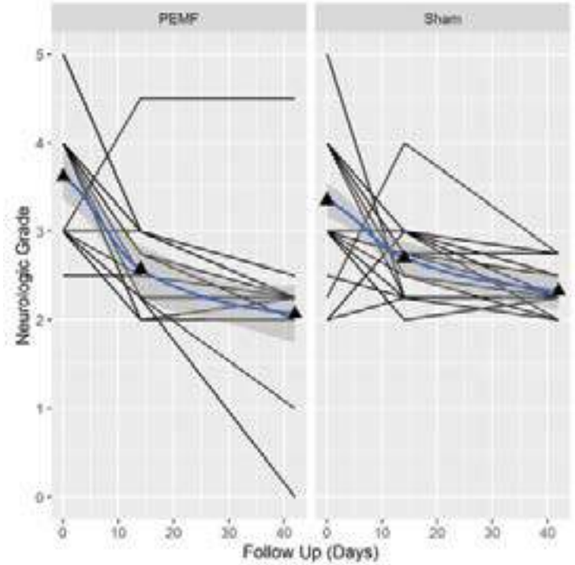

Fig 1. Spaghetti plots of veterinarian reported neurologic grade at baseline (day 0), 14 days and 42 days (6 weeks) following hemilaminectomy with pulsed electromagnetic field (PEMF) therapy versus control group (Sham). Locally weighted scatterplot smoothing is fit to the data and plotted in blue with standard errors in grey shading. Differences in median neurologic grade were not statistically significant between treatment groups at day 0 (p=0.160), 14 days (p=0.141) or 6 weeks (p=0.157)

References available upon request

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