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## KUSH™ CASE STUDY

I am a veterinarian (Purdue, 1988) and have spent most of my career in Laboratory animal medicine and experimental surgery. I purchased an 8 week old "purebred" silver Labrador retriever puppy in October of 2014. At the time of purchase, the breeder represented that the sire and dam were OFA certified for hips, elbows and shoulders. The puppy received the standard series of vaccinations and deworming through the fall and early winter of 2015.

This puppy first demonstrated a subtle, shifting front limb lameness beginning approximately 4 month of age, just after its first rabies vaccination. This lameness initially presented as mild and intermittent, and I did not think much of it. The lameness gradually worsened and I started to suspect elbow dysplasia despite the breeder's representation that the sire and dam were OFA certified. By 6-7 months, the lameness was primarily confined to the left front limb and was a constant Grade I or II out of V. I could sometimes elicit a pain response when I placed the elbow in full flexion. Radiographic images of the left elbow demonstrated lesions consistent with early signs of elbow dysplasia, which I thought was very unusual for such a young dog. I telephoned the breeder and explained the situation and expected he would refund the cost of the dog. But after promising to produce the certificates and "make it right", he stopped taking my calls. I spayed the dog approximately 8 months old so it could not reproduce.

I have two labs approximately the same age that run in the mountains every morning with my wife. They run off trail and chase rabbits, birds and each other, running an average of at least 5-8 hard miles every morning. A vigorous mountain run would always exacerbate Kona's lameness to a Grade III/V lameness, (significant head tilt and severe limp) that would persist for at least a day before reverting back to her "normal" Grade II lameness.

I was considering euthanizing the dog because of the persistent lameness when you suggested I try an intra-articular injection of Kush nano-particles to see if that would help. I will admit I was a bit skeptical, but had nothing to lose. I anesthetized Kona prepared the joint for injection in mid-June and injected the contents of a 0.8 ml syringe into the left elbow joint. The procedure was uneventful, and after the injection, I manipulated the elbow through multiple ranges of motion to disperse the particles within the joint. She received no other drug treatments, by either the systemic or intra-articular route. The day following the injection Kona showed no improvement and was actually a little worse. I then went out of town for a week or so, and Kona did not go on any long mountain runs. After returning from vacation, Kona demonstrated a Grade I lameness, which was a significant improvement. I saw her the next afternoon after morning mountain run and she was a very mild Grade II - at least a full lameness grade improvement over the pre-injection lameness score after a run. She continued to improve over

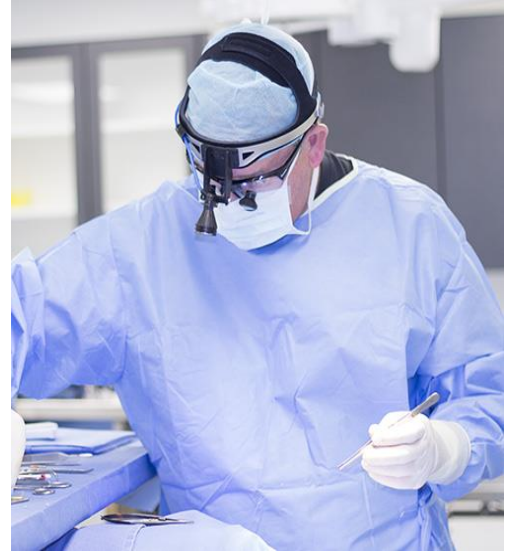
the next 7-10 days and stabilized at a Grade I lameness (slight intermittent limp, with an occasional subtle head tilt). She remained at this level until February of 2016 despite vigorous mountain runs at least 4-5 days a week.

Several weeks ago (early February, 2016), Kona's condition worsened to a "normal" Grade III lameness (significant head tilt, severe limp). She was worse after a mountain run, and stopped chasing rabbits through deep snow off the trail-I think because of the lameness. After 2 weeks, I assumed this was her new "normal". I repeated the radiographs, which still demonstrated mild elbow arthritis. I injected 0.5 cc of DepoMedrol into the joint along with 0.8 cc of Kush into the left elbow. No improvement was seen after the first 2 days. But in the 11 days since, she has improved every day. She is currently demonstrating a Grade I lameness, which will get a little worse after a hard run. She is back to going after rabbits off-trail, and generally looks to be improving.

Despite my early skepticism, I am a firm believer in Kush for dogs with arthritic lesions. Kona was unusual in that she was quite young to show clinical lameness from elbow dysplasia, and I thought her clinical signs would worsen with time and she would be unable to get out and run. The Kush treatment not only stabilized her condition, but significantly improved her gait, allowing her to run every day, chase around with our other dog and go after rabbits in the snow (which, of course, the rabbits always win). The early indication is that her second treatment also seems to be effective in improving her gait and decreasing the discomfort from her elbow arthritis. I am a firm believer in Kush.....

## **Dr. Mike Larson**

Dr. Larson established IBEX Preclinical Research, Inc. as a natural progression of a veterinary career in animal research. His experience in the field spans over 20 years and includes GLP discovery research support, experimental surgery, model development, research animal medicine and regulatory compliance in pharmaceutical, academic and contract research environments. He is also an experienced study director. Dr. Larson's 20 plus year biomedical research career highlights include:



- Purdue DVM, 1988
- Letterman Army Institute for Research-Surgery
- In Vivo Preclinical Director of Organ Transplantation Studies, Stanford University, Palo Alto, CA.
- Director of Experimental Surgery and Model Development, Roche Bioscience, Palo Alto, CA.
- Co-Owner and Study Director, Frontier Biomedical, Inc.
- Clinical Veterinarian, Stanford University Department of Comparative Medicine, Palo Alto, CA.