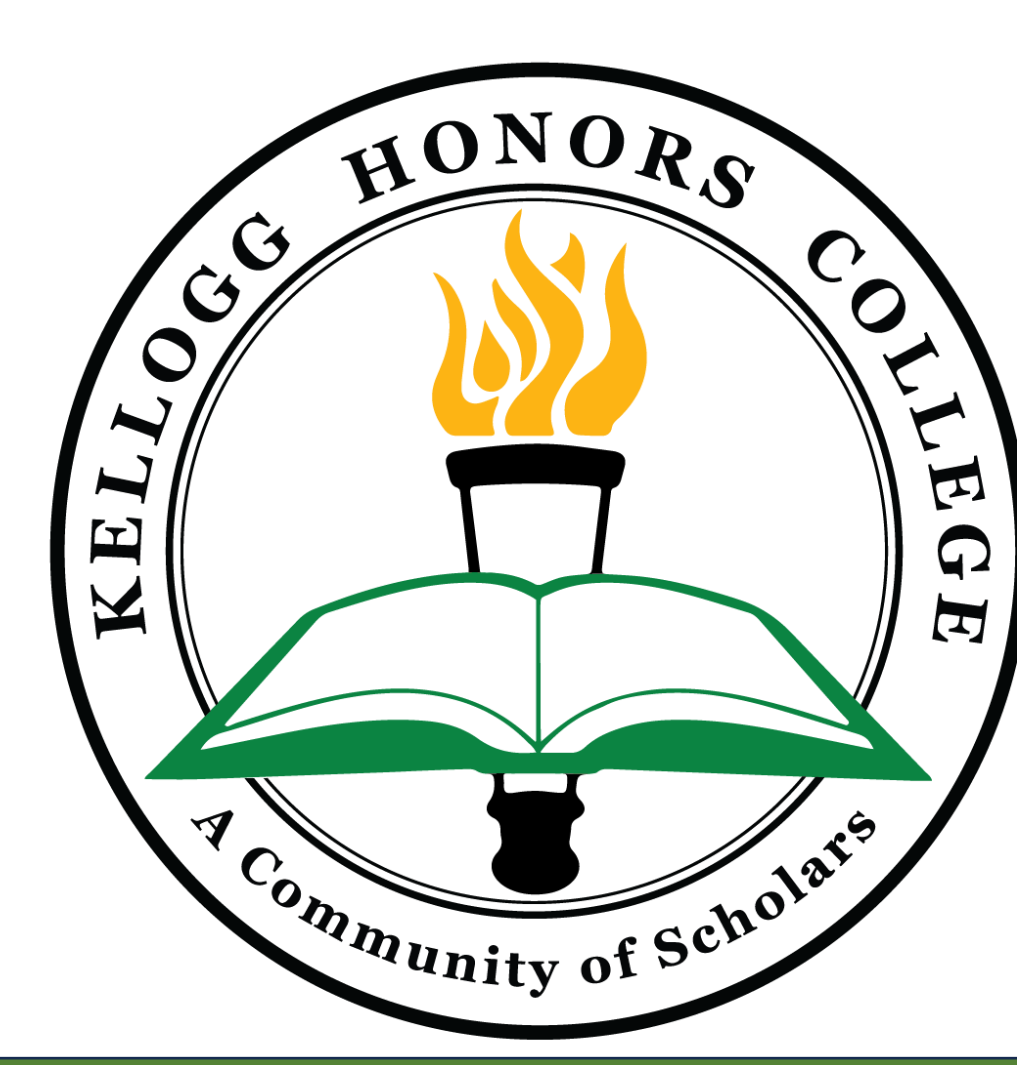




The Incidence of Intervertebral Disc Disease (IVDD) in Domestic Dogs with Achondroplasia



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Abstract

Intravertebral disc disease, also known as IVDD or degenerative disc disease, is a medical condition that commonly afflicts dogs; most commonly dogs diagnosed with achondroplasia. This study sought to research this frequency, and how accurately existing research aligns with the field experience of veterinary care staff. Research was also dedicated to answering questions that ask what exceptions there are to this linkage, how improper breeding plays a role in the development of IVDD, and what associated genes are involved in both achondroplasia and IVDD.

A survey was conducted and sent to Animal Science students and veterinary teaching staff at the California State Polytechnic University, Pomona, and was available via link for 102 days (about 3 and a half months). The survey asked participants' personal experiences with treating, handling, or interacting with dogs who were diagnosed with or showing signs of both achondroplasia and IVDD, or other related conditions. It also asked questions about the potential genetic linkage of dogs with IVDD and their offspring.

According to the survey results, it was found that, of the 14 participants, half stated they "sometimes" see a short-legged dog diagnosed with IVDD or related condition, most stated they "sometimes" see a short-legged dog with early onset IVDD or similar clinical signs, and most have "never" seen an IVDD patient produce offspring that are later diagnosed with IVDD. However, participants also stated how they've seen numerous other breeds that don't commonly have achondroplasia but had IVDD, including Labrador Retrievers, German Shepherd dogs, chihuahua mixes, and Alaskan Huskies.

Ultimately, the survey shows how the field experience of veterinary care staff doesn't line up exactly with known research.

However, it's also possible that breeding standards have become so focused on cosmetics, that it puts the health and future wellbeing of the animal at risk. To an extent where IVDD is seen in almost all breeds now, ranging in a diversity from the German Shepherd dog to the French bulldog. But it's also possible that IVDD is simply an effect of aging.

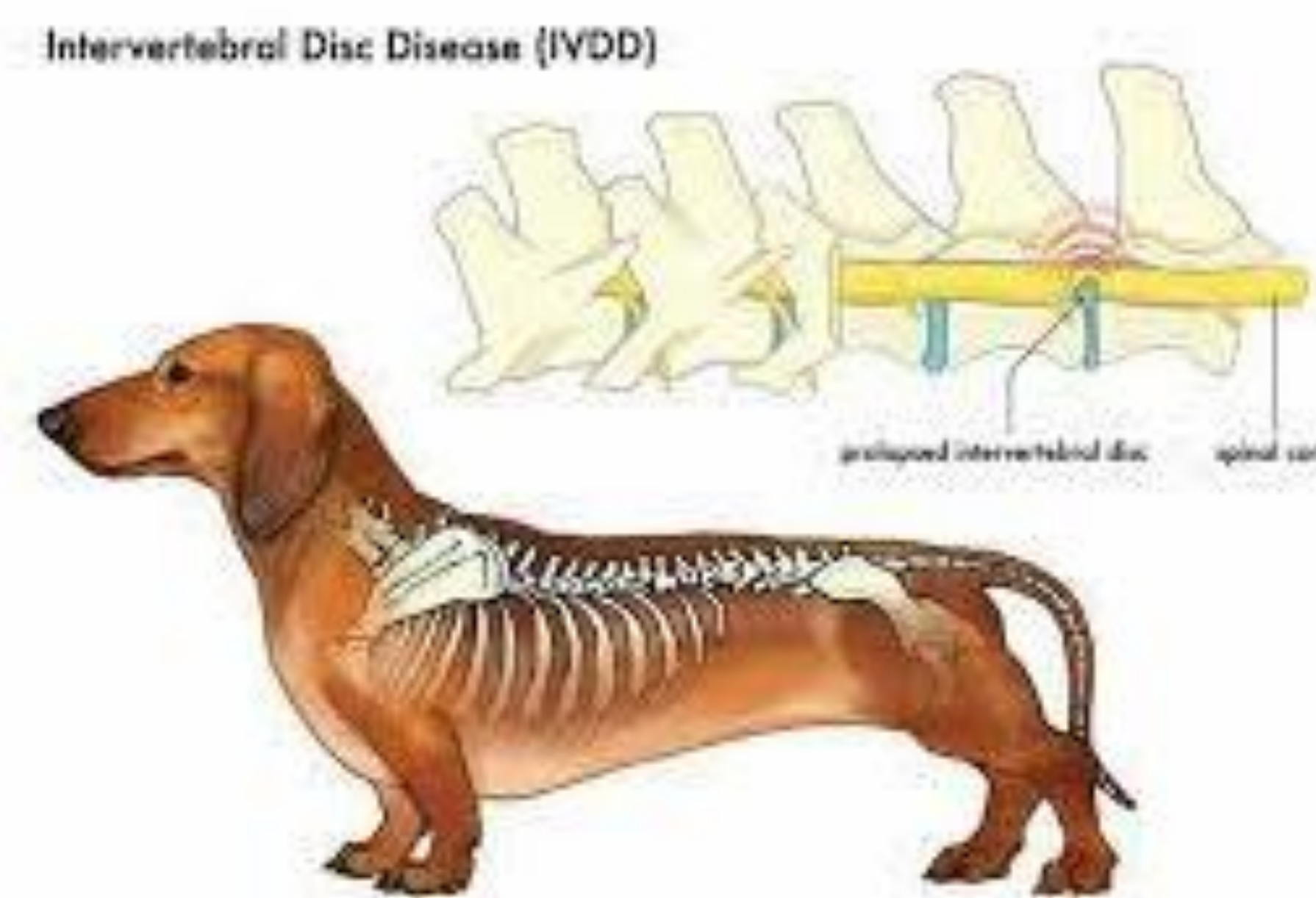
As such, it's crucial to be a responsible pet owner, and to become aware of a pet's potential health problems. This includes monitoring one's pet, ensuring healthy exercise and enrichment, and, when possible, observing or documenting a pet's genetic lineage to track health problems that have genetic potential.

Introduction

Intravertebral disc disease is a painful condition in which a spinal disc becomes ruptured, slipped, or bulges, generally resulting in back pain, difficulty walking, and paralysis. It's also known to be the most common cause of spinal cord injuries in dogs.

Achondroplasia, commonly known as short-limbed dwarfism, is a genetic condition in which fibroblast growth receptors in the body function abnormally. This results in disproportionately short limbs in relation to the rest of its body, as observed in certain breeds. These include Dachshunds, Pembroke Welsh and Cardigan Corgis, Basset and Pekingese Hounds, Beagles, and Cocker Spaniels. There are also breeds considered "mildly achondroplastic", including English and French bulldogs.

As a result of their anatomy, these breeds are at a higher risk for contracting or developing certain diseases, including IVDD. However, how often are these breeds seen actually developing IVDD in the field? Are they diagnosed at a higher frequency than "regular" breeds? Does IVDD have the potential to be passed on to offspring? This study sought to answer these questions.



Discussion

The survey participants determined that IVDD and other related conditions are seen relatively commonly among all breeds, not particularly among breeds with achondroplasia.

Upon further research, in an article titled *Chondrodystrophy (CDDY and IVDD) and Chondrodysplasia (CDPA)*, it discusses how the gene associated with IVDD, FGF4-12, follows a dominant inheritance pattern, meaning only one copy of the gene mutation is needed to cause disc degeneration. It was also discussed how dogs that possess both the FGF4-12 and FGF4-18 genes have achondroplasia.

Since some breeds mentioned by survey participants don't possess these genes, why do they become diagnosed with IVDD?

It's not uncommon to see health conditions result from improper breeding, especially breeding for cosmetic purposes. For instance, the German Shepherd dog had been bred throughout multiple generations to have a sloped back, angling downward towards its hind legs, as a cosmetic choice. As a result, this breed is also especially susceptible to back conditions and ailments in comparison to previous, healthier generations.

IVDD can also result from environmental factors, such as insufficient exercise or poor mobility, but can also be simply an effect of age. As such, it's difficult to pinpoint an exact cause of IVDD, as a multitude of factors contribute to this condition, and can affect most breeds with equal incidence.

Acknowledgements

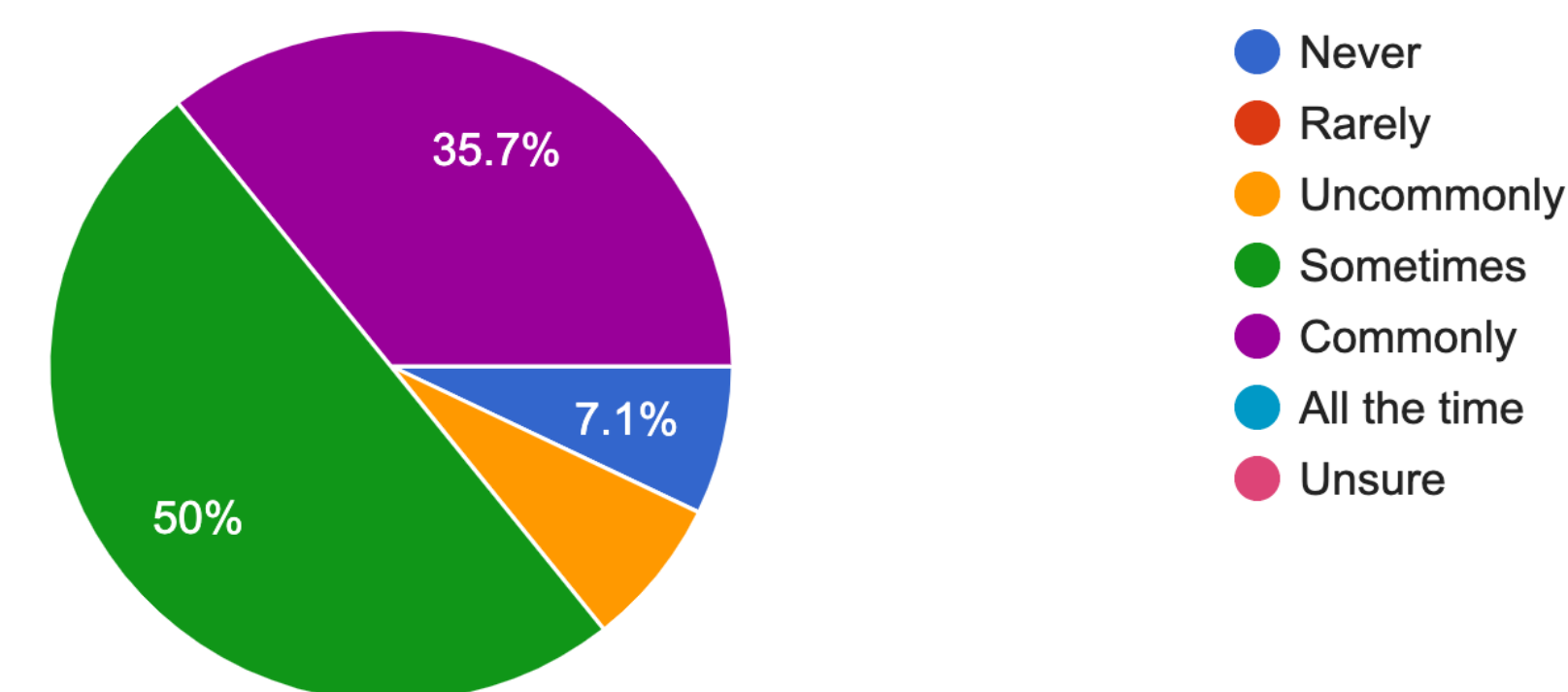
Special thanks to Dr. Wallace for her support and to all survey participants.

Methods

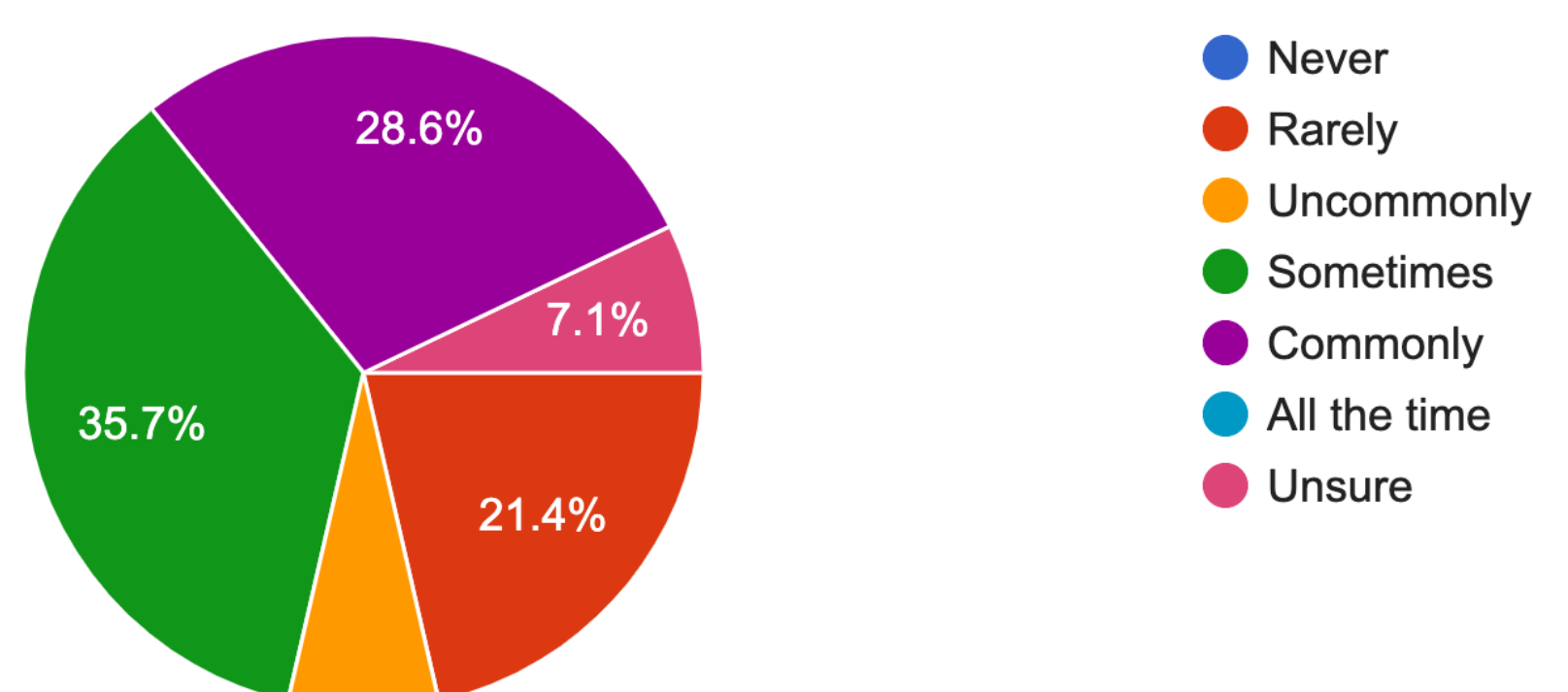
A survey was conducted with 7 questions, asking about the participants' experience in the veterinary care field and about their experiences treating dogs with achondroplasia that also have IVDD or other related conditions. A total of 14 answers were collected. It should be noted that not all survey answers are displayed below, but are available upon request.

The survey was sent through a mass email to all Animal Science students attending the California State Polytechnic University, Pomona in addition to being posted on the primary investigator's social media accounts (Instagram and LinkedIn). This survey was available for 102 days before data was collected and analyzed.

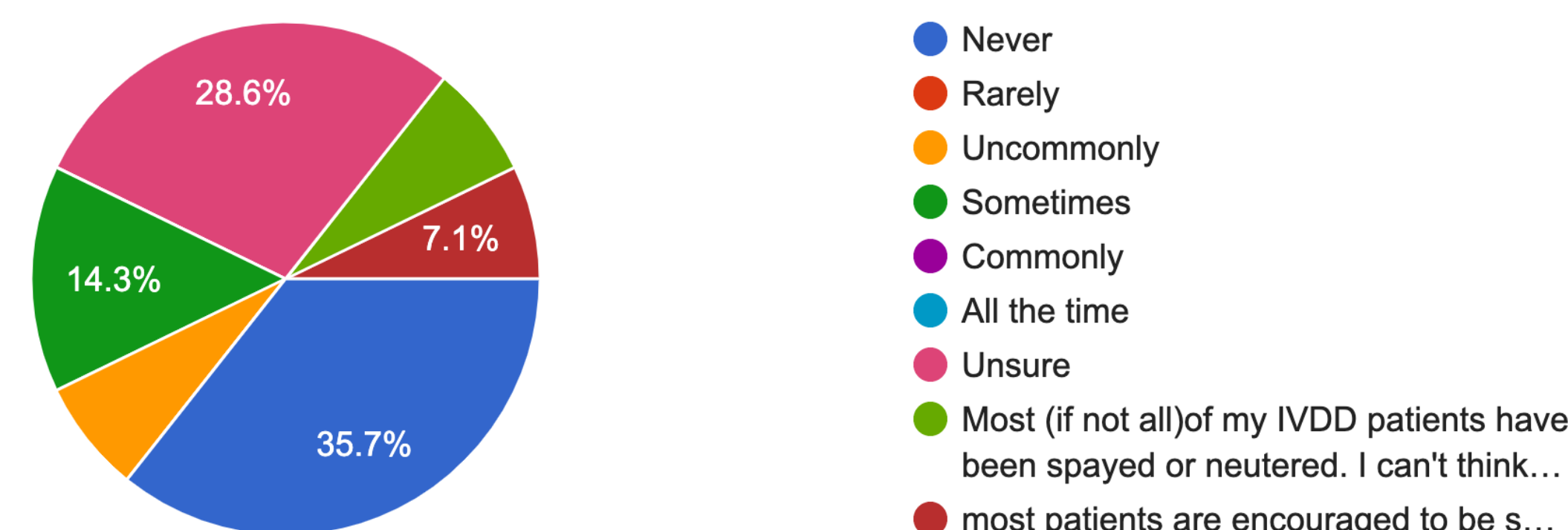
How often do you see a short-legged dog diagnosed with IVDD or a related condition?
14 responses



How often do you see a short-legged dog with early onset IVDD or clinical signs similar to IVDD?
14 responses



How often have you seen an IVDD patient produce offspring that were later diagnosed with IVDD?
14 responses



Results

From the survey, the results are as follows:

- "How often do you see a short-legged dog diagnosed with IVDD or a related condition?"
 - Top response: **50%: Sometimes**
- "How often do you see a short-legged dog with early onset IVDD or clinical signs similar to IVDD?"
 - Top response: **35.7%: Sometimes**
- "How often have you seen an IVDD patient produce offspring later diagnosed with IVDD?"
 - Top response: **35.7%: Never**
- "How often have you seen an IVDD patient with a family history of IVDD?"
 - Top response: **42.9%: Unsure**
 - It should be noted that some participants stated in the survey that they or the pet's owners didn't know about the pet's family history

Additionally, survey participants reported seeing the following breeds diagnosed with IVDD or a similar condition (excluding achondroplasia-common breeds): Labrador Retriever, Chihuahua mix, Alaskan husky, and the German Shepherd dog. The following achondroplasia-common breeds were also listed: shih tzu, dachshund mix, basset hound, and French bulldog; with "French bulldog" being the most common response.

Participants also had the following additional comments:

- "I have never seen it at the clinic I work at but I feel like at the shelter I work at, I think a handful of dogs have similar symptoms to ivdd but [their] symptoms are characterized as something else."
- "I think there are clinical signs present in more patients, but owners do not want to do diagnostic testing to confirm the diagnosis of IVDD."
- "I have not seen many IVDD pets at the general practice I work at. The ones I do see are common patients that come in regularly for other issues as [well] though."
- "[IVDD is] most prevalent in smaller breeds."
- "[IVDD can] occur in any breed or mix."

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