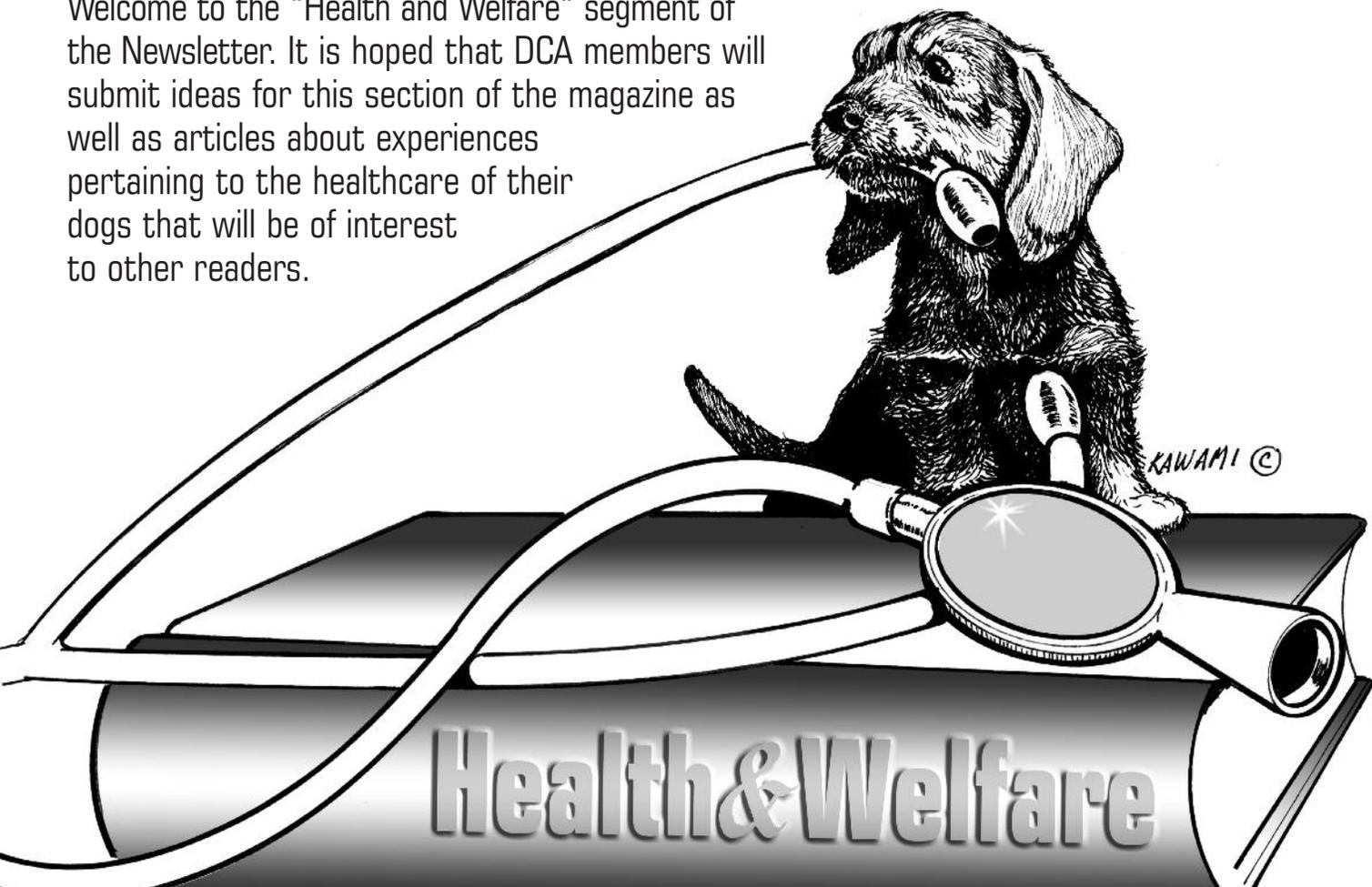


Welcome to the "Health and Welfare" segment of the Newsletter. It is hoped that DCA members will submit ideas for this section of the magazine as well as articles about experiences pertaining to the healthcare of their dogs that will be of interest to other readers.



Please send ideas, suggestions and articles to: Charlotte Borghardt, DCA Health & Welfare Committee, P.O. Box 1126, Sierra Vista, AZ 85636-1126, teckelhofaz@yahoo.com

## Breeder Education Part of Effort to Raise Awareness About Pes Varus

*From the Purina Pro Club  
Dachshund Update Newsletter*

Though some breeders believe that pes varus has occurred in Dachshunds for about 40 years, others are still learning about the potentially crippling orthopedic disorder known in layman's terms as bowlegged syndrome.

Andra O'Connell of Kerhonkson, N.Y., first encountered pes varus in 2003 when a Standard Longhaired Dachshund puppy from a litter she bred developed the condition. O'Connell, who breeds under the Amtekel prefix, had bred Dachshunds for 30 years but was not familiar with the disorder. When the puppy was sold around 12 weeks of age, there was no indication of the condition.

The owner noticed signs of lameness and a bowlegged conformation when the puppy was 4.5 months old. The veterinarian diagnosed the puppy as having damaged growth plates.

"There was never any mention or discussion

of pes varus or a genetic inheritance," O'Connell says.

The puppy had corrective surgery, and today, at age 8, is healthy.

Pes varus cropped up again in 2010 in two of seven puppies that O'Connell bred. One of the puppies is mildly affected, and the other one is considered severely affected because it is completely crippled. "It has been upsetting to have this disorder show up in two litters," says O'Connell.

***Pes varus affects less than 1 percent of Dachshunds***, yet the condition has the potential to detrimentally impact quality of life, says Dan Burke, D.V.M., a clinician at the Veterinary Centers of America in Phoenix and a Dachshund breeder for 40 years. "I have been seeing more and more cases of pes ves over the last 10 years," he says. "The important thing to realize is that this is a genetic based problem."

Experts **suggest** that the condition, medically known as **angular hock deformity**, has an autosomal recessive mode of inheritance, meaning affected dogs inherit a copy of the gene mutation from both the sire and dam. Carriers are not affected by the disease but can pass the mutant gene to 50 percent of their offspring. However, because studies have not been completed, there is not conclusive evidence of this form of inheritance.

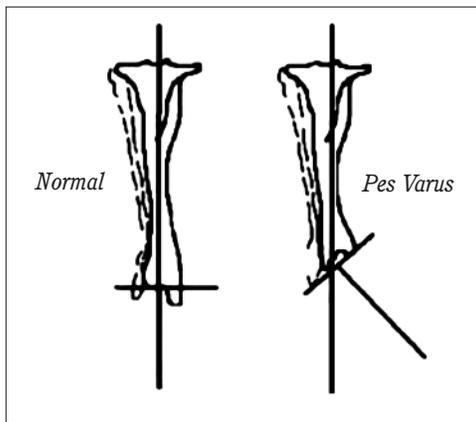
Charlotte Borghardt, chairwoman of the Dachshund Club of America Health Committee, says pes varus has become more common in recent years. "We seem to have quite a few cases in our breed all of a sudden," she says. "It's important to get the word out to breeders and owners, so they will be aware of the condition and know what signs to look for."

### A BOWLEGGED APPEARANCE

Pes varus is a Latin term that combines pes (foot) and varus (inward) and describes a deformity in which the distal tibia is turned inward toward the body. The disorder occurs when the distal tibial (shinbone) growth plate closes prematurely, causing asymmetrical growth of the tibia that results in a bowlegged appearance and lameness.

E. Mayrhofer first reported pes varus, describing it as metaphyseal dysplasia of the tibia, in an article in the German veterinary journal *Kleintierpraxis* in 1977. Stuart G. Johnson, D.V.M., and his colleagues at Texas A&M University were the first to use the term pes varus, reporting favorable results from type II linear external fixation devices to treat the condition in five Dachshunds in an article in *Veterinary Surgery* in 1989.<sup>1</sup>

The disorder also occurs in horses and humans. In people, the musculature deformity is



*These drawings depict differences between a normal distal tibia and one turned inward toward the body due to pes varus. The disease causes uneven growth of the tibia and a varus angulation of the distal tibia. Source: Dr. Dan Burke*

called club foot and generally is corrected without surgery.

All bones have growth plates, called epiphyseal or epiphysis plates. Immature, noncalcified cells comprise the soft, spongy matter that makes up young bones. As a puppy matures, the long bones of the legs grow from the immature cells located at the ends of the bones. When dogs are around 8 to 11 months of age, the distal epiphysis growth plates close, a process in which they mineralize or become hard with calcium and minerals. Until these growth plates close, the bones continue to grow in length.

"In dogs with pes varus, the medial side of the distal growth plate closes prematurely, thus stopping growth, whereas the lateral side of the growth plate continues to grow," Burke says. "This causes an uneven growth of the tibia and a varus angulation of the distal tibia. While the lateral side of the growth plate functions properly, the medial side does not. Because the distal portion of the affected tibia is not level to the ground, the affected leg looks bowlegged." In the early stage, pes varus is noticeable when a dog puts weight on the affected leg, with the body's center of gravity shifting toward the side of the affected leg. Viewed from behind, the



*This radiograph shows the bowlegged deformity in a Dachshund with bilateral pes varus. Image provided by Dr. Dan Burke.*

heel is in the inward position. As the tibial deformity progresses, laxity of the knee joint and lateral dislocation of the patellar occur, causing a dog to walk with a limp or with the affected leg lifted.

Pes varus has been documented in all three coat varieties and in both Miniature and Standard Dachshunds. The disorder occurs globally, with cases reported in Dachshunds from Finland, the Czech Republic and Japan. The disease ranges from mild to severe and can be unilateral or bilateral, meaning it can occur in one or both hind legs. The bowing of the legs usually is the first sign. Besides lameness, the disease can cause an inability to run and play, with dogs often stopping to rest after a few steps. When both legs are affected, one leg typically is more severely affected. Puppies with mild pes varus may show no clinical signs.

"The younger the age in which the growth plate closes, the more severe the deformity," says James Tomlinson, D.V.M., DACVS, professor of surgery at the University of Missouri College of Veterinary Medicine. "Dogs that are mildly affected generally have no longterm problems as long as they maintain a reasonable weight. Many moderately affected dogs adapt well with seemingly no pain or limitation in their ability to get around."

Surgery to correct pes varus, called an open wedge osteotomy, generally produces good to excellent results, with most dogs making a full recovery within eight to 12 weeks. Without surgery, osteoarthritis is inevitable and dogs may have problems with corresponding joints such as joint incongruity and instability. Unfortunately, the procedure, which averages around \$3,000 per leg but varies based on the geographical location, is cost prohibitive to some owners.

"The open wedge osteotomy involves cutting across the tibia bone, close to the curvature, while leaving a portion of the contralateral cortical bone intact," Tomlinson explains. "This creates a hinge on the lateral side of the tibia. As the bone is straightened, a pie-shaped wedge or deficit is created. Bone graft tissue is then inserted into the osteotomy site. Stabilization is done with a veterinary Tplate, a type of bone plate, or a modified external fixator."

Advantages of the bone plate include a low risk of postoperative infection. "Since the plate is embedded in the body, the affected limb can be used soon afterward and the hardware does not need to be removed," says Tomlinson. "The greatest chance for successful transplantation of live bone is with a cancellous autograph, which means the tissue comes from a dog's own body." Cancellous bone, also known as trabecular or spongy bone, is harvested from the upper end of the humerus or the wing of the ilium. In

Dachshunds, this is a small area of bone that is often difficult to harvest, Tomlinson says. An alternative is using cancellous allograft, or tissue harvested from a donor dog, or a collection of cancellous autograft tissue mixed with allograft tissue.



*Pes Varus in a standard longhair puppy.*

## AVOIDING A GENETIC BOTTLENECK

When Jeanne Rice of Yatesville, Ga., bred her first litter of Miniature Dachshunds in 1970, one of three puppies developed a curvature of the tibia around 4 months of age. "Back then, breeders referred to this as bowlegged syndrome," she says. "No one really knew what it was."

Between 1970 and 1991, Rice had six litters (Longhair, Wirehair and Smooth) in which one puppy in each litter developed a unilateral curvature. Several veterinarians and orthopedic specialists examined and took radiographs of the dogs, but none was able to name the condition. Though she never learned definitely that the dogs had pes varus, Rice believes that this was the cause of their bowlegged appearance. "When I tried to correlate the pedigrees and affected puppies, I could not find a commonality," Rice says. "Though I still don't know with a certainty that it was pes varus, I believe that the description of the condition and signs were similar."

Though pes varus is *believed* to be an inherited condition with an autosomal recessive

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## Pes Varus

continued from page 11...

mode of inheritance, there is no genetic test available to identify carriers. "This makes it difficult to offer solid recommendations to breeders," says Paula Henthorn, Ph.D., professor of medical genetics at the University of Pennsylvania School of Veterinary Medicine.

*"You want to remove the deleterious genes, but not necessarily at the cost of removing all affected dogs and their immediate relatives (sires, dams, offspring and littermates) from the gene pool," Henthorn continues. "Doing so could create a bottleneck effect in which you inadvertently increase the risk for other diseases or conditions that are more complicated or life threatening."*

Henthorn advises breeders to consider all of a dog's attributes in choosing breeding partners. "It also is important to keep accurate records," she says. "If the mode of inheritance is autosomal recessive, a dog may be clinically normal but a carrier for pes varus."

Though no genetic research is planned to identify the causative mutation for pes varus, Borghardt is optimistic that a project could come about in the not too distant future. T-Gen Research in Arizona may consider the project. Research support via funding and sample collection will come through educational efforts, she believes.

O'Connell, who will be submitting blood samples from her affected and normal Dachshunds when a research project starts, agrees. The samples are stored at the DNA Repository at the Canine Health Information Center (CHIC), a canine health database sponsored by the Orthopedic Foundation for Animals and the AKC Canine Health Foundation.

"If other breeders of affected and normal dogs would collect and store DNA, we would have a larger DNA collection ready when the research begins," O'Connell says. "That's my goal. I hope that one day we'll know much more about this disease in Dachshunds."

*1. Izumisawa Y, Seno T, Abe R, Miyoshi K, Maehara S, Wakaiki S, Kushiro T, Umar MA, Tsuzuki K, Yamashita K, Hayashi S. Axial Correction of Pes Varus by Transverse Opening Wedge Osteotomy and TPlate Fixation with BetaTricalcium Phosphate Transplantation in Dachshunds. Journal of Veterinary Medical Science. 2005;67(4):437440.*

### MY EXPERIENCE WITH PES VARUS

by Patricia Nance

<http://www.fieldworthy.com/pes-varus.html>

In 2010 I had a new and difficult experience. A good young bitch that I bred and owned, the only young bitch that I owned, developed Pes Varus.

Ironically, the rear conformation of this dog was one of the things I liked most about her when she was a young puppy. But in January, when she was about five months old, I began to notice something different with her hind legs, especially the right hind. They began to look a bit different. A hair crooked. I did not know

what I was seeing. I thought it was minor and that she would grow out of it. So I waited for months, but it only became much more evident that there was some kind of a problem.

Having never seen anything like it in my dogs, I researched and read what little I could find about hock deformities. The first information I found was about Pes Varus in foals. Then I read about Pes Varus in human babies. I found mention of it on a site for dandie dinmont terriers. And finally, I found more than I really wanted to know about Pes Varus in dachshunds.

#### Banking DNA for the Future

Dachshund breeders and owners are encouraged to submit blood samples from affected and normal dogs to support future research to identify the causative mutation for pes varus. Samples should be sent to the Canine Health Information Center (CHIC). For information about sending DNA samples, please visit: [www.caninehealthinfo.org](http://www.caninehealthinfo.org).

The disorder varies between species. In horses and humans, Pes Varus is commonly called "club foot", it affects newborns, it may involve one or more legs, it is related to musculature, and it is correctable by methods other than surgery.

In dogs, it is also known as Angular Hock Deformity, it develops as the tibial growth plates start to close at about five months of age, it is usually bilateral, it is bone related, and it is not correctable except by surgery which may be done in severe cases.

The degree of severity of Pes Varus varies. As mentioned, severe cases may require surgical correction. In my limited understanding, though, many if not most dogs with the deformity do very well. Meaning, they evidence no pain and no real limitations in their ability to get around.

Arthritis in the affected joints may be an issue as the dog gets older, and some lack of stamina may also become evident as the dog ages. This makes sense because if some parts of the skeleton aren't functioning properly, other parts must compensate.

Pes Varus most likely is a genetic disorder. It is presently thought to be an autosomal recessive meaning that two copies of the abnormal gene must be inherited for the trait to develop, one from each parent.

Fortunately, my youngster did not develop severe deformity. She ran and zoomed with more energy, speed, and sheer joy than most puppies I have had. I never saw her take a halting step or act as though movement was uncomfortable. I will add that the problem is greater in her right leg than in the left, which seems to be true in other cases I am aware of.

The Pes Varus diagnosis became 'official' when she was seen by a veterinary orthopedic specialist in August, 2010. In November, my pick of the litter, the bitch I'd waited for for six years, went to her new home. She will not be bred.



A look at the right rear legs of these two young bitches shows a marked difference in stance. The longhair has Pes Varus.



Another view of the difference in lower hind limb alignment.



X-ray of the standard dapple bitch pictured

Since this experience, I've realized that I have seen Pes Varus in dachshunds before but did not know what it was. Nearly a lifetime in the breed and I did not know what Pes Varus was!

Also since then, I have seen Pes Varus in two other dachshunds, both longhairs. (Maybe because longhairs are the only dachshunds I look at?!). One was a standard black/tan male of European bloodlines, and the other a miniature red female of American breeding. In addition, I received photos of Pes Varus in a standard longhaired bitch [see photos above], and have heard of it in a female standard wire puppy in whose bloodlines, too, the disorder was not known.

Does it only seem so because it is new to me, or is Pes Varus becoming more common in our breed?

Dachshund breeders, exhibitors, and judges need to know about Pes Varus. 🐾

*Above photos are courtesy of Tia Eskelinen Kennel Cadium in Finland*