

An Introduction to Radiographic Diagnosis for Hip Dysplasia

By Kath Coniglio

Here you are, buying a large breed puppy. The breeder is talking about having a PennHIP X-ray done in addition to the OFA X-ray. What is that you ask? You've heard of OFA, you've even been to the site and read about Hip Dysplasia, but PennHIP is totally new. When the breeder explains that it's a diagnostic tool to determine the probability of hip dysplasia, you want to know what's the difference. In a nutshell, the simplest way to define the difference is that the PennHIP radiograph shows an absolute measurement of hip laxity, where the OFA radiograph is subjective - the judgment of the veterinarian reading the X-ray.

Whether your pup is intended as a working dog, a pet/companion, service, therapy dog, or a show/breeding dog, the issue is the same. There is a risk of hip dysplasia. Genetics is the primary factor in canine hip dysplasia. Without the genetic transmission of the disease, hip dysplasia will not develop. A dog is either dysplastic or it is not. An affected dog can exhibit a wide range of phenotypes, from normal to severely dysplastic and functionally crippled. It is genetic and is inherited, it cannot be caught from another dog or through any form of exposure. However, there are environmental effects, that include nutrition and exercise. These effects play a part in mitigating or retarding the onset of signs or symptoms, but hip dysplasia remains a genetically transmitted disease.

Hip dysplasia is a multi faceted problem. It is a congenital disease that, in its more severe form, can eventually cause pain and/or lameness to varying degrees, and is a precursor to what can be painful arthritis of the joints. It makes sense to have lean puppies and to avoid breeding animals from litters that have shown signs of hip dysplasia. Even normal exercise levels can increase the expression of HD in a genetically predisposed dog. Stay away from all calcium supplementation, all it can do is harm. Vitamin C has not been proven to prevent HD, but there are indications that it may be useful in reducing pain and inflammation in a dysplastic dog. All breeds are at risk, but there is a higher incident in the larger breeds. Unfortunately, there is no definitive test. As early as six months, both OFA and PennHIP can predict HD, but in earlier testing, only the extremes are readily apparent.

(OFA) ORTHOPEDIC FOUNDATION FOR ANIMALS

<http://www.offa.org/>

The OFA was founded in 1966 and its initial mission: To provide radiographic evaluation, data management, and genetic counseling for canine hip dysplasia. Today, the OFA mission has expanded: To improve the health and well being of companion animals through a reduction in the incidence of genetic disease, and they include more than just canines. The information acquired through the X-ray and evaluation process, not only aids breeding programs, but is useful simply in the acquisition of a healthy dog and determining what the dog will be utilized for over time. HD does not mean that the dog will be a complete invalid or be in extreme pain. The dog may lead a normal, healthy and relatively pain-free life. One of the problems is that it is unknown what degree of degeneration will occur. OFA utilizes the hip-extended view as shown in pictures three and four. It is the only view that is evaluated and the subjective evaluation into seven different categories:(Excellent, Good, Fair) Borderline and dysplastic (Mild, Moderate and Severe.) Once each of the radiologists classifies the hip into one of the seven phenotypes above, the final hip grade is decided by a consensus of the three independent outside evaluations.

Examples:

Two radiologists reported excellent, one good - the final grade would be excellent.

One radiologist reported excellent, one good, one fair-the final grade would be good.

One radiologist reported fair, two radiologists reported mild - the final grade would be mild.

The hip grades of excellent, good and fair are within normal limits and are given OFA numbers. This information is accepted by AKC on dogs with permanent identification (tattoo, microchip) and is in the public domain. Radiographs of borderline, mild, moderate and severely dysplastic hip grades are reviewed by the OFA radiologist and a radiographic report is generated documenting the abnormal radiographic findings. Unless the owner has chosen the open database, dysplastic hip grades are not in the public domain.

OFA RADIOGRAPHIC X-RAYS

The hip-extended radiographic method is the traditional X-ray position. Generally, the dog is sedated, although there are some vets that will do the X-ray without sedation provided the dog can be quiet and remain in the required position. The dog is on it's back, with legs fully extended and the patella facing upward. The evaluation by the radiologist is subjective and can vary in interpretation with different radiologists. The hip-extended position has been criticized because it can mask joint laxity.

POSITIONING FOR OFA RADIOGRAPHS

Since there is only one view - the Hip-extended View, the correct position can make a very big difference. In pictures one and two we see the dog being positioned and measured to get the best placement for the radiograph. Pictures of the dog are all the same dog, and the radiographs are of the same dog, but not the dog used in the pictures.



The veterinarian ensures that the dog is in the correct position, using the foot pedal to work the camera, both hands are free to maintain the proper position for the dog.



Picture three shows the correct position for the OFA radiograph. The dog is on the X-ray table in the hip-extended view. Picture four is an actual radiograph of the hip-extended view.

(PENNHIP) UNIVERSITY OF PENNSYLVANIA HIP IMPROVEMENT PROGRAM

<http://www.pennhip.org/>

PennHIP is a collaborative effort consisting of the Veterinary School at the University of Pennsylvania and a worldwide network of nearly 1200 certified PennHIP-trained veterinarians. The primary objective is to reduce the frequency and severity of hip dysplasia. The PennHIP method is a different way to assess, measure and interpret hip joint status. There are three separate radiographs: the distraction view, the compression view and the hip extended view. The distraction and compression views were developed by Dr. Gail Smith and are used to obtain accurate and precise measurements of hip joint laxity and congruity. The hip-extended view supplies supplementary information regarding the existence of degenerative joint disease in the hip joint.

PennHIP can be performed on dogs as young as sixteen weeks in age, thereby predicting the onset of degenerative joint disease at a much younger age than the standard technique used for the OFA radiograph with preliminary evaluations starting at six months and the final certification at two years. Breeders can identify potential breeding stock much sooner and pet owners can obtain an estimate of their dog's risk for developing degenerative joint disease, and plan for possible lifestyle changes as indicated to enhance the dog's quality of life.

PennHIP is more than a radiographic technique. It is also a network of trained veterinarians that perform the PennHIP methodology. It is a large scientific database for the PennHIP data, as well. As more information becomes available, the PennHIP laboratory is able to obtain more precise answers to questions about the etiology (cause), prediction and genetic basis of HD. When you have your dog evaluated through the PennHIP procedure, you receive a percentile ranking that is relative to other members of the same breed. Your results will provide the information that explains the comparison within your breed. At this time, PennHIP is beginning to correlate the information in the database to provide public access. But, for now, if you are researching HD in your breed, you can call the 1-800-736-6447 and they will fax you a listing of the dogs in your breed that are within the top-ranking percentiles.

PENNHIP RADIOGRAPHIC X-RAYS

To obtain diagnostic radiographs, the dog (patient) and the surrounding musculature must be completely relaxed. For the comfort of the animal, this requires sedation and/or general anesthesia. Typically, three separate radiographs are made during an evaluation. First is the compression view where the femurs are positioned in a neutral, stance-phase orientation and the femoral heads are pushed fully into the sockets. This provides an indication of the "fit" of the ball in the socket and shows the depth of the hip socket. Next is the distraction view. The hips are positioned in a neutral orientation and a special positioning device is used to show the degree of passive hip laxity. Passive hip laxity is a primary risk factor associated with the development of DEGENERATIVE JOINT DISEASE. The third view is a hip-extended view and is included solely to examine the existing joint for diseases such as osteoarthritis.

POSITIONING FOR PENNHIP RADIOGRAPHS

The Hip-extended View is also utilized in the PennHIP evaluation. If both sets of radiographs are being done at the same time, the measurements are re-checked and the same care is taken to get the correct position. Additional radiographs are included with the PennHIP - the Distraction View and the Compression View.



Picture five shows the placement of the dog on the table and a re-check of the measurements before the final positioning for the compression view.



Picture six shows the placement of the dog in position for the distraction view.



Picture seven is the radiograph of the distraction view. The looser the joint on the distraction view, the greater the risk of the hip developing degenerative joint disease.

Many people feel that since they have no plans to show or breed their dog, the OFA certification/evaluation or PennHIP radiograph is unnecessary. What they fail to consider is that hip dysplasia is not only a genetically transmitted disease, but that

it's a degenerative disease that can get progressively worse over time. If a dog is destined for a more severe form of the disease, with arthritic deterioration, early diagnosis can provide options that might not be available to the older dog at a more severe level of progression. There are various treatments that can help the condition and provide a dog with a better quality of life and may even alleviate the discomfort and allow the dog normal physical function. The OFA begins reading and evaluating at age six months, PennHIP can be done as early as 16 weeks with good accuracy.

THE QUESTION OF SEDATION/ANESTHESIA

In order to obtain good quality diagnostic radiographs with the PennHIP procedure, the musculature around the hip joint must be completely relaxed. Without proper sedation/anesthesia, the dog does not relax to the degree needed for the radiographs. The standard hip-extended view, which is used in both the PennHIP and OFA radiographs can be done without sedation/anesthesia, but the dog would have to have someone work with it, not only to lie quietly and still on it's back on a hard surface, but to allow the veterinarian to position it as needed without moving. This is not really feasible and in the case of the additional positions needed for the PennHIP radiographs, the dog would resist the manipulation of the joint into the appropriate position. There was a time when many considered anesthesia very dangerous, particularly for some of the larger breed dogs. With the newer drugs available, and the training given today, the risk is greatly reduced. It is always advisable to let your vet know if your dog is sensitive to any drugs or medications and be certain that they understand the type of dosage that is best for your breed of dog. There are dogs, like the Anatolian Shepherd that has a very low ratio of body fat and therefore would require a lower dose than a dog, like a Mastiff where the ratio is higher. Know your breed. Know if there are sensitivities and be comfortable that your vet is knowledgeable about your breed.

FOOD FOR THOUGHT

The OFA radiograph does not have to be sent to the Orthopedic Foundation for Animals for evaluation. An owner and their vet can choose to withhold any X-ray that they consider to be less than good. This practice will skew the data that is collected from the radiographs that are submitted and processed. Additionally, all X-rays that are submitted allow for the option of not publishing any negative evaluation results, you actually have to check and initial if you will allow negative results to be published. On the other hand, PennHIP radiographs must be submitted for analysis and inclusion in the PennHIP database. Once the process is begun, there is no turning back. An owner cannot choose to withhold the X-ray from submission. It is thought that the policy would eliminate the practice of "pre-screening" radiographs and sending only the best hips for evaluation. PennHIP does not publish any results at this time and the information that is available does not include the lower scores, nor does any information identify any individual dog within a breed. The reasoning behind the PennHIP policy, at least in part, felt that with the exclusion of the worst hips from the processed data, it has lead to a false impression that genetic progress is being made. However, let's examine the procedure a little closer. Since both the OFA and PennHIP utilize the hip-extended view, it's practical and economical to do the OFA radiograph and PennHIP at the same time. If that first radiograph indicates that the hips are good, then the remaining radiographs for the PennHIP analysis can be completed with reduced risk of negative results - or indications of degenerative joint disease. By doing both radiograph procedures at the same time, there is the option of not completing the series of PennHIP radiographs and thus, only the best are being submitted, creating the very situation that the required submission was trying to eliminate. PennHIP regulations do require that once the procedure of taking the radiographs has been started, the X-rays must be submitted for evaluation and inclusion in the data base and an ethical veterinarian will inform the client of this policy and follow the procedures. However, knowing that "influence" can make a difference, there is still the possibility that an owner would exert pressure/influence on the veterinarian to stop the procedure after the hip-extended view for OFA, if there was an indication of degenerative joint disease. We would like to think that all veterinarians are ethical and honest, but it's a known fact that money talks, social influence has an effect and the potential loss of an economically valuable client can and does have an effect on some. Another issue would be the client that has the OFA radiograph completed, and based on the outcome, either chooses to submit or not and only if the decision is to submit the radiograph, do they schedule the PennHIP, if they even schedule it at all.

It is apparent that the use of radiographic evaluation to determine the probability of HD has progressed significantly over the years. Procedures are changing and more information is becoming available. A conscientious breeder will do health checks on their dogs before breeding and will want the radiographic evaluations on all puppies they breed in order to improve their breeding programs and provide the most healthy and sound dogs possible. If you are purchasing a puppy and the breeder requests your compliance in this regard, it is for the future of the breed as well as the future of your puppy that you agree to the procedure(s). After all, it really should be "All about the dog!"

References and Credits

Orthopedic Foundation for Animals - <http://www.offa.org>

American Kennel Club - <http://www.akc.org>

University of Pennsylvania Hip Improvement Program - <http://pennhip.org>

Canine Hip Dysplasia (Parts I though VIII) by John C. Cargill, By John C. Cargill, MA MBA, MS and Susan Thorpe-Vargas, MS

Current Techniques in Small Animal Surgery 4th Edition. Edited by M. Joseph Bojrab, DVM, MS, PhD. Associate Editors Gary W. Ellison, DVM, MS and Barclay Slocum, DVM. Subsections on Diagnostic Tests and Radiographic Characteristics of Hip Dysplasia by Theresa

Devine Slocum and Barclay Slocum.

Photographs

Photographs of the actual procedure and placement of the dog provided through the courtesy of Frank Wuest, DVM, Blue Skies Veterinary Hospital, Hickory, North Carolina. The actual name/identification of the dog is withheld at the request of the owner.