

Accuracy of Data

When results of 1.8 million radiographic evaluations by 45 radiologists were analyzed, it was found that all three radiologists agreed as to whether the dog should be classified as having a normal phenotype, borderline phenotype, or HD 94.9% of the time. In addition, 73.5% of the time, all three radiologists agreed on the same hip phenotype (excellent, fair, good, borderline, mild, moderate or severe). Twenty-one percent of the time, two radiologists agreed on the same hip grade and the third radiologist was within one hip grade of the other two. Two radiologists agreed on the same hip grade and the third radiologist was within two hip grades of the other two 5.4% of the time. This percentage of agreement is high considering the subjective nature of the evaluation.

Other Radiographic Findings

In addition to assessing the dog's hip conformation, the veterinary radiologist reports other radiographic findings that could have familial, inherited causes such as transitional vertebrae or spondylosis. Transitional vertebrae are a congenital malformation of the spine that occur at the junctions of major divisions of the spine (usually between the thoracic and lumbar vertebral junction and the lumbar and sacral vertebral junction). Transitional vertebrae take on anatomic characteristics of both divisions of the spine it occurs between. The most common type of transitional vertebrae in dogs is in the lumbo-sacral area where the last lumbar vertebral body takes on anatomic characteristics of the sacrum. Transitional vertebrae are usually not associated with clinical signs and the dog can be used in a breeding program. The OFA recommends breeding the dog to another dog that does not have transitional vertebrae. Spondylosis is another incidental radiographic finding where smooth new bone production is visualized between vertebral bodies at the intervertebral disc spaces. The new bone production can vary in extent from formation of small bone spurs to complete bridging of adjacent vertebral bodies. Spondylosis may occur secondary to spinal instability but often it is of unknown cause and clinically insignificant. A familial basis for its development has been reported. Like transitional vertebrae, dogs with spondylosis can be used in a breeding program.



Orthopedic Foundation for Animals

Hip Dysplasia

Taken from OFA websites
<http://www.offa.org/index.html>
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Hip Dysplasia Radiograph Procedures

General Information

Radiographs submitted to the OFA must follow the American Veterinary Medical Association guidelines for positioning. This view is accepted world wide for detection and assessment of hip joint irregularities and secondary arthritic hip joint changes. To obtain this view, the animal must be placed on its back in dorsal recumbency with the rear limbs extended and parallel to each other. The knees (stifles) are rotated internally and the pelvis is symmetric. Chemical restraint (anesthesia) to the point of relaxation is recommended. For elbows, the animal is placed on its side and the respective elbow is placed in an extreme flexed position.

Mailing Recommendations

The radiograph, application and fees should be enclosed in a mailing envelope. These may be paper clipped together. Use the mail service of your choice. Obtain large envelopes from office supply store, veterinary hospital or other radiology department. The envelope should be sealed with tape. Light cardboard may be included to stiffen the package, but is not required. Avoid using boxes, tubes, padded envelopes, stapling check and application, bending/folding radiographs, or taping application or check to envelope.

OFA's Handling Procedures

When a radiograph arrives at the OFA, the information on the radiograph is checked against information on the application.

The board-certified veterinary radiologist on staff at the OFA screens the radiographs for diagnostic quality. If it is not suitable for diagnostic quality (poor positioning, too light, too dark or image blurring from motion), it is returned to the referring veterinarian with a written request that it be repeated. An application number is assigned.

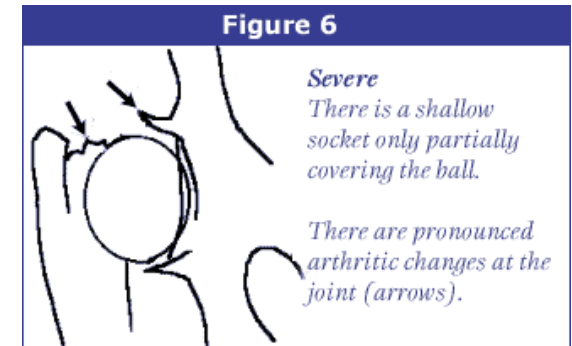
changes usually along the femoral neck and head (termed remodeling), acetabular rim changes (termed osteophytes or bone spurs) and various degrees of trabecular bone pattern changes called sclerosis. Once arthritis is reported, there is only continued progression of arthritis over time.

Severe

Severe HD (Figure 6): assigned where radiographic evidence of marked dysplasia exists. There is significant subluxation present where the ball is partly or completely out of a shallow socket. Like moderate

HD, there are also large amounts of secondary arthritic bone changes along the femoral neck and head, acetabular rim changes and large amounts of abnormal bone pattern changes

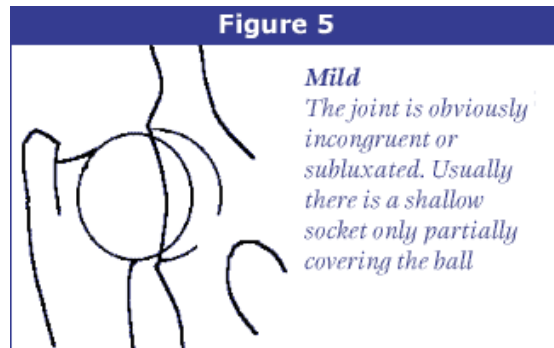
The hip grades of excellent, good and fair are within normal limits and are given OFA numbers. This information is accepted by AKC on dogs with permanent identification and is in the public domain. Radiographs of borderline, mild, moderate and severely dysplastic hip grades are reviewed by the OFA radiologist and a radiographic report is generated documenting the abnormal radiographic findings. Unless the owner has chosen the open database, dysplastic hip grades are closed to public information.



definitively diagnose the hip joint being dysplastic. There also may be a bony projection present on any of the areas of the hip anatomy illustrated above that can not accurately be assessed as being an abnormal arthritic change or as a normal anatomic variant for that individual dog. To increase the accuracy of a correct diagnosis, it is recommended to repeat the radiographs at a later date (usually 6 months). This allows the radiologist to compare the initial film with the most recent film over a given time period and assess for progressive arthritic changes that would be expected if the dog was truly dysplastic. Most dogs with this grade (over 50%) show no change in hip conformation over time and receive a normal hip rating; usually a fair hip phenotype.

Mild

Mild Canine Hip Dysplasia (Figure 5): there is significant subluxation present where the ball is partially out of the socket causing an incongruent increased joint space. The socket is



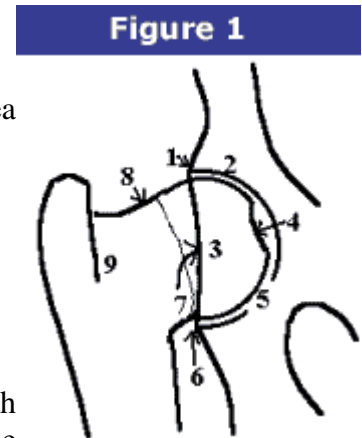
usually shallow only partially covering the ball. There are usually no arthritic changes present with this classification and if the dog is young (24 to 30 months of age), there is an option to resubmit an radiograph when the dog is older so it can be reevaluated a second time. Most dogs will remain dysplastic showing progression of the disease with early arthritic changes. Since HD is a chronic, progressive disease, the older the dog, the more accurate the diagnosis of HD (or lack of HD).

Moderate

Moderate Canine Hip Dysplasia: there is significant subluxation present where the ball is barely seated into a shallow socket causing joint incongruency. There are secondary arthritic bone

Radiographs of animals 24 months of age or older are independently evaluated by three randomly selected, board-certified veterinary radiologists from a pool of 20 to 25 consulting radiologists throughout the USA in private practice and academia. Each radiologist evaluates the animal's hip status considering the breed, sex, and age. There are approximately 9 different anatomic areas of the hip that are evaluated (Figure 1).

- Cranio-lateral acetabular rim
- Cranial acetabular margin
- Femoral head (hip ball)
- Fovea capitis (normal flattened area on hip ball)
- Acetabular notch
- Caudal acetabular rim
- Dorsal acetabular margin
- Junction of femoral head and neck
- Trochanteric fossa



The radiologist is concerned with deviations in these structures from the breed normal. Congruency and confluence of the hip joint (degree of fit) are also considered which dictate the conformation differences within normal when there is an absence of radiographic findings consistent with HD. The radiologist will grade the hips with one of seven different physical (phenotypic) hip conformations: normal which includes excellent, good, or fair classifications, borderline or dysplastic which includes mild, moderate, or severe classifications.

Seven classifications are needed in order to establish heritability information (indexes) for a given breed of dog. Definition of these phenotypic classifications are as follows: Excellent Good, Fair, Borderline, Mild, Moderate, Severe Hip Grades

Hip Grades

The phenotypic evaluation of hips done by the Orthopedic Foundation for Animals falls into seven different categories. Those categories are normal (Excellent, Good, Fair), Borderline, and dysplastic (Mild, Moderate, Severe). Once each of the radiologists classifies the hip into one of the 7 phenotypes above, the final hip grade is decided by a consensus of the 3 independent outside evaluations. Examples would be:

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

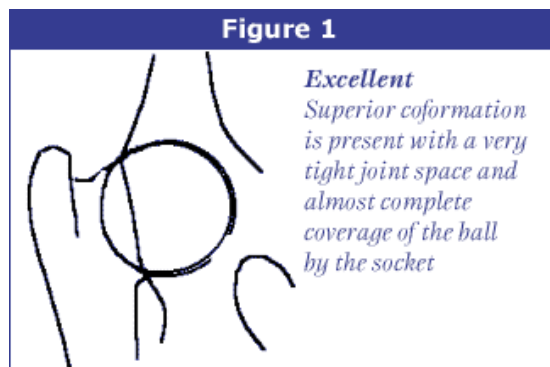
One radiologist reported excellent, one good, one fair—the final grade would be good

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.

Excellent

Excellent (Figure 1): this classification is assigned for superior conformation in comparison to other animals of the same age and breed. There is a deep seated ball (femoral head) which fits tightly into a well-formed socket (acetabulum) with minimal joint space.



Good

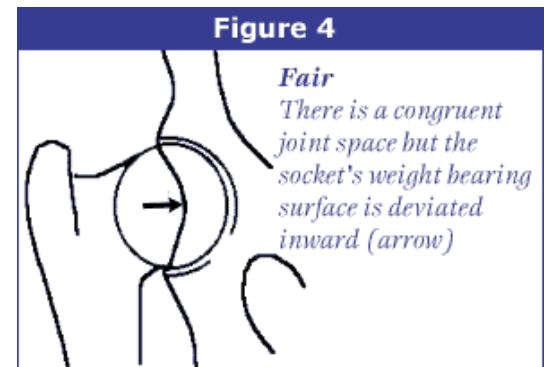
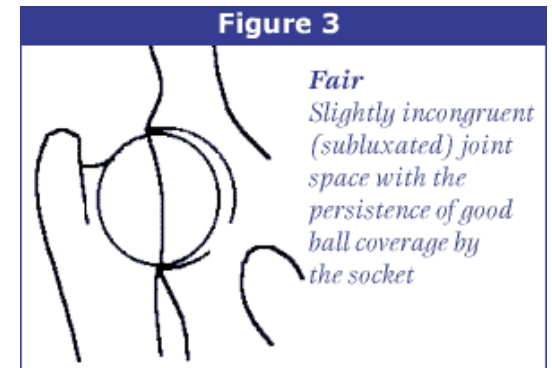
Good (Figure 2): slightly less than superior but a well-formed congruent hip joint is visualized. The ball fits well into the socket and good coverage is present.

Fair

Fair (Figure 3):

Assigned where minor irregularities in the hip joint exist. The hip joint is wider than a good hip phenotype. This is due to the ball slightly slipping out of the socket causing a minor degree of joint incongruency. There may also be slight

inward deviation of the weight-bearing surface of the socket (dorsal acetabular rim) causing the socket to appear slightly shallow (Figure 4). This can be a normal finding in some breeds however, such as the Chinese Shar Pei, Chow Chow, and Poodle.



Borderline

Borderline: there is no clear cut consensus between the radiologists to place the hip into a given category of normal or dysplastic. There is usually more incongruency present than what occurs in the minor amount found in a fair but there are no arthritic changes present that

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