

## Prevalence of Canine Hip Dysplasia in a Veterinary Teaching Hospital Population

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The purpose of this study was to determine the prevalence of canine HD in a population in which there was minimal or no prior screening of radiographs for the disorder. Patient information was obtained from the radiographic database at the University of Missouri-Columbia Veterinary Teaching Hospital during the five-year period of 1991-1995. The coxofemoral joints on ventrodorsal radiographs of the pelvis were independently evaluated by three veterinary radiologists. A consensus evaluation of normal, borderline, or dysplastic was compiled. There were 2885 dogs identified representing 116 breeds and the mixbreds. There were 2236 purebred dogs (1071 males and 1165 females) and the prevalence of HD was 19.7%. There were 649 mixbred dogs (340 males and 309 females) and the prevalence of HD was 17.7%. There was no significant difference in the prevalence of HD between sexes or between purebred and mixbred dogs ( $P = 0.16$ ;  $P = 0.29$ ). Degenerative joint disease (DJD) was the most common radiographic manifestation of HD and there appeared to be threshold at 12 months of age after which the presence of DJD was the primary diagnostic criteria.

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**Key words:** *hip dysplasia (HD), canine, subluxation, degenerative joint disease (DJD).*

### Introduction

Hip dysplasia (HD) is the abnormal development of the coxofemoral joint(s). The disorder has been reported in humans and most domesticated animals.

Since the first report of HD in the dog in 1935, the disorder has become one of the most commonly diagnosed orthopaedic diseases in the canine.<sup>1</sup>

In HD, it is accepted that the coxofemoral joint is normal at birth and that HD is a developmental disorder.<sup>2</sup> The initiating factor (or factors) is unknown and the rate and extent of the development are variable.

Laxity is generally considered to be one of the earliest pathologic findings in HD and the generally accepted pathophysiology is that laxity is a major precursor for the degenerative arthritic changes that are typically associated with HD.<sup>2,3</sup>

The polygenic mode of inheritance for HD has made reduction in the prevalence slow.<sup>4</sup> The inability to identify the specific genes responsible for the predisposition has left only phenotypical evaluation by radiography for the screening of individuals. The expression of polygenic traits can be modified by environmental influences making the determination of specific heritability indices difficult.<sup>5</sup>



Registries maintaining databases of the radiographic evaluations for the presence or absence of HD exist throughout the world. The radiographic criteria of subluxation, shallow acetabulum, and degenerative arthritic changes are well documented. Standardized diagnostic protocols for the evaluation of radiographs are established for these registries.<sup>6-8</sup> Breeding programs using selection of dogs with phenotypically normal hips, as determined by standardized protocols, have documented a reduction in the prevalence of HD in the progeny.<sup>6,7,9-11</sup>

It has been suggested that the prevalence of HD cited by these registries may not be truly representative of the prevalence of the disorder in the general or breed specific population.<sup>3</sup> It

has also been speculated that through heterosis mixbred dogs have a decreased prevalence of dysplasia when compared to purebred dogs.<sup>12,13</sup> Little data exist regarding the prevalence of HD in the general canine population; many breeds are markedly under represented in HD registries since HD has been predominantly regarded as a disease of large dogs.<sup>14-16</sup> In addition, data on mixbred dogs are seldom submitted to genetic registries. No published data regarding the prevalence of dysplasia in these populations were found. The purpose of this study was to determine the prevalence of canine HD in a population in which there was minimal or no prior screening of radiographs for the disorder.

**Table 1: Listed by Breed when at least 30 individuals of that breed were evaluated**

Breed	Total #	#M/#F	%(#) Dysplastic	#M/#F Dysplastic	CI (lower)	CI (upper)
Australian Shepherd	43	19/24	20.9 (9)	4/5	0.10044	0.36042
Beagle	46	22/24	6.5 (3)	1/2	0.01397	0.18268
Brittany	43	21/22	34.9 (15)	7/8	0.21008	0.50927
Boxer	41	20/21	17.1 (7)	4/3	0.06974	0.31364
Cocker Spaniel	133	47/86	20.3 (27)	11/16	0.13394	0.27713
Dachshund	125	57/68	3.2 (4)	2/2	0.00502	0.06908
Dalmatian	36	20/16	8.3 (3)	2/1	0.01753	0.22469
Doberman Pinscher	50	27/23	10.0 (5)	2/3	0.03328	0.21814
Golden Retriever	99	54/45	30.3 (30)	19/11	0.21698	0.40735
German Shepherd Dog	149	88/61	32.9 (49)	27/22	0.25967	0.41839
Labrador Retriever	201	103/98	27.4 (55)	26/29	0.21327	0.34080
Miniature Schnauzer	66	24/42	1.5 (1)	0/1	0.00039	0.08276
Poodle	121	52/69	9.9 (12)	5/7	0.05275	0.16817
Rottweiler	99	40/59	35.4 (35)	18/17	0.27171	0.47357
Shih Tzu	57	29/28	22.8 (13)	7/6	0.12740	0.35836
Shar Pei	32	19/13	6.3 (2)	1/1	0.00766	0.20807
Shetland Sheepdog	48	20/28	10.4 (5)	3/2	0.03625	0.23570
Yorkshire Terrier	68	32/36	7.4 (5)	2/3	0.01626	0.14382
Subtotal	1457	694/763	19.2 (280)	141/139	0.17206	0.21339
Other breeds 779	377/402	20.6 (161)	76/85	0.18285	0.24165	
Purebred dogs	2236	1071/1165	19.7 (441)	217/224	0.18229	0.21598
Mixbred dogs	649	309/340	17.7 (115)	61/54	0.14927	0.20974
Total	2885	1380/1505	19.3 (556)	284/278	0.17971	0.20903

M = Male; F = Female; # = Number; % = Percent; CI = Confidence Interval

## Method

The radiographic database at the University of Missouri-Columbia Veterinary Teaching Hospital (UMC-VTH) for the 5-year period of 1991 through 1995 was used for data retrieval. Canine radiographic examinations (pelvic, abdomen, spine, etc.) that included a ventrodorsal projection of the coxofemoral joints were retrieved. Evaluation for proper radiographic technique was conducted. Diagnostic studies were considered those in which the entire well-positioned pelvis was included. Obturator foramina were symmetrical and the femora were positioned to allow for accurate assessment of the femoral head and neck area. If studies were of diagnostic quality they were included for further examination. Canine radiographic evaluations deemed non-diagnostic due to inadequate positioning, poor radiographic technique, pelvic trauma, or age (< 3 months) were excluded. Due to the tertiary referral status of the UMC-VTH, there were a number of patients referred specifically for triple pelvic osteotomy or total hip arthroplasty. These patients were analyzed separately.

Dogs that met the design criteria were evaluated independently by three board certified radiologists (GK, JL, EC). The coxofemoral joints were determined to be normal, borderline, or dysplastic by radiographic criteria. The normal coxofemoral joint was congruent and had no radiographic evidence of DJD. The dysplastic joint was incongruent and may or may not have radiographic signs of DJD. Each hip was evaluated independently but only one designation was given per dog. Designation was according to the most abnormal hip joint conformation. Dogs with unilateral disease were considered dysplastic. The three individual evaluations were compiled to form a consensus evaluation. In addition to hip status, the breed, age, and sex of the animal was recorded. Statistical significance for differences in the population variables was established at  $P < 0.05$ . A row by column chi-square test was used.\* Confidence intervals were calculated as described by Daly.†

## Results

Initial retrieval produced 2937 radiographic studies. For the reasons previously listed, 52 did not meet the design criteria. Of the includ-

ed studies, (52 dogs) 39 were purebred and 13 were mixbred dogs. A total of 2885 dogs (1380 males and 1505 females) met the design criteria. These dogs represented 116 breeds (2236 dogs: 1071 males, 1165 females) and mixbreds (649 dogs: 309 males, 340 females). There was a significant difference in the number of purebred to mixbred dogs ( $P = 0.0045$ ). The dogs ranged in age from 3 to 221 months with a mean of 60.1 and a median of 48.0 months. (purebred mean 57.4; median 45.0. mixbred mean 69.5; median 60.0).

The prevalence of HD for purebred and mixbred dogs was 19.3% (556/2885) (Table 1) the prevalence of HD in the purebred dogs was 19.7% (441/2236). The prevalence of HD in the mixbred dogs was 17.7% (115/649). There was no statistical difference in the prevalence of HD between the purebred and mixbred dogs ( $P = 0.29$ ). There was no significant difference in the prevalence of HD between males and females ( $P = .16$ ). There was no significant difference between the dysplastic male and female in the purebred (217 males/224 females,  $P = 0.49$ ) or the mixbred dogs (61 males/54 females,  $p = 0.14$ ).

Degenerative joint disease (DJD) was the most common radiographic manifestation of HD and there appeared to be a threshold at 12 months of age after which the presence of DJD was the primary diagnostic criteria (344/441 purebred and 96/115 mixbred dogs) (Figure 1). The purebred dogs with DJD (344) ranged in age from 3 to 192 months with a mean of

## Subluxation vs. DJD

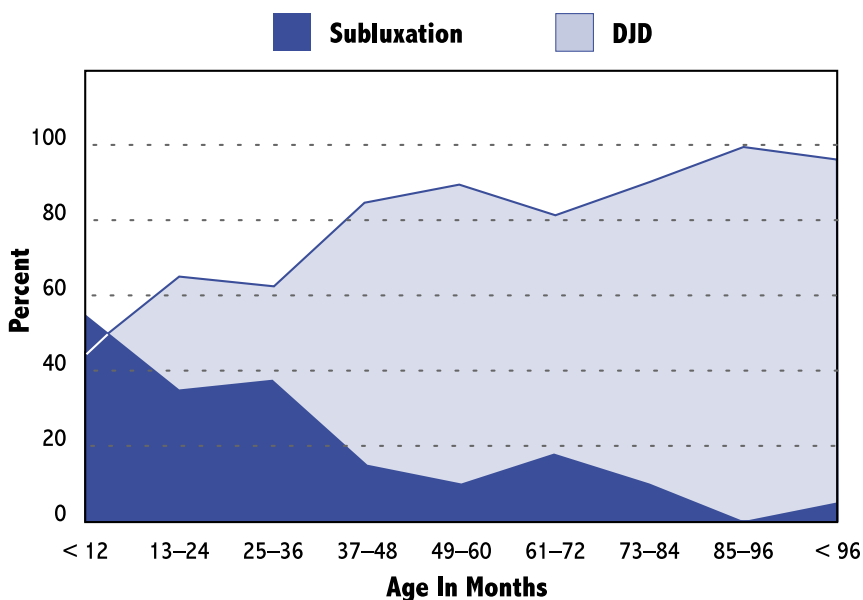


Figure 1: Diagnostic Criteria

\* SAS system, SAS/Statistics Institute Inc. User's Guide Version 8, 1999. Cary, NC

† Daly L., Simple SAS macro for the calculation of exact binomial confidence limits. Computers in Biology and Medicine 1992; 22(5):351-361.

72.9 and a median of 65.9 months. The mixed dogs (96) ranged from 7 to 204 months of age with a mean of 79.5 and a median of 74.5 months.

There was a statistically significant difference in the prevalence of HD in dogs  $\leq$  36 months of age (206/1207) when compared to dogs  $>$  36 months of age (350/1678). The age group for this difference was found by further dividing the ages of the dogs into subgroups ( $<$  12 months, 70/389; 12-24 months, 82/449; 25-36 months, 54/369; 37-48 months, 47/248) with comparison of each subgroup to the dogs  $>$  48 months of age (303/1430) the difference was statistically significant until 37-48 months of age ( $P = 0.001$ ,  $P = 0.005$ ,  $P = 0.019$ ,  $P = 0.606$  respectively). Among the three age groups of  $\leq$  36 months of age there was not significant difference between 12 months of age and 12-24 months of age ( $P = 0.48$ ), or 12-24 months of age and 25-36 months of age ( $P = 0.07$ ). There was a significant difference between  $<$  12 months of age and 25-36 months of age ( $P = 0.008$ ). The number of dogs receiving a borderline grade decreased with increasing age (Table 2).

There were (115) dysplastic evaluations based on the radiographic appearance of subluxation without DJD. The purebred dogs with subluxation and no DJD (96) ranged in age from 3 to 108 months with a mean of 25.4 and a median of 19.2 months. The mixed dogs with subluxation and no DJD (19) ranged in age from 5 to 144 months with a mean of 22.5 and a median of 12.5 months. When these 2 groups were combined the mean was 26.1

months with a median of 15.0 months. Fifty-seven of the 115 dogs diagnosed dysplastic due to subluxation without DJD ranged in age from 15 to 144 months with a mean and median 43.1 and 28.5 months, respectively.

The percent agreement among the three radiologists (when all three had the same reading) for the phenotypic grade was 89.0% (2592/2860). In 10% of the dogs, 2 radiologists had the same phenotypic grade. In only 1% of the dogs none of the radiologists agreed on the phenotypic grade. When 2 radiologists agreed, 59.9% were normal, 37.0% were dysplastic, and 3.1% were borderline grades. When all three radiologists agreed the grades were either normal or dysplastic. The majority of borderline grades were when none of the radiologists agreed.

There were 139 dogs that were referred to the UMC-VTH specifically for surgical treatment of HD (Triple pelvic osteotomy 32, Total hip arthroplasty 107, mixedbred 30, purebred 109). There was no significant difference in the ratio of mixedbred to purebred dogs in this subpopulation (139) when compared to the ratio in the total population (2885) ( $P = 0.882$ ). There was a significant difference in the number of mixedbred to purebred dogs ( $P < 0.0001$ ). Within this subset of dogs, there was no significant difference in the number of affected males compared to affected females (males 70, females 69,  $P > .95$ ). When this subset of dogs, with 100% incidence of HD was added to the total population ( $n = 3024$ ), the prevalence of HD increased to 23.2%.

**Table 2: Phenotypic Data Provided for Subgroups by Age**

Age Group	Borderline	Dysplastic	Normal	Total #
$<$ 12 months	N = 13 % = 3.3	N = 70 % = 18.0	N = 306 % = 78.7	N = 389 % = 13.5
12–24 months	N = 9 % = 2.0	N = 82 % = 18.3	N = 358 % = 79.7	N = 449 % = 15.6
25–36 months	N = 2 % = 0.5	N = 54 % = 14.6	N = 313 % = 84.8	N = 369 % = 12.8
37–48 months	N = 2 % = 0.8	N = 47 % = 19.0	N = 199 % = 80.2	N = 248 % = 8.6
$>$ 48 months	N = 7* % = 0.5	N = 303 % = 21.2	N = 1120 % = 78.3	N = 1430 % = 49.6

\*49–60 months,  $n = 1$ ; 61–72 months,  $n = 1$ ; 73–84 months,  $n = 1$ ; 85–96 months,  $n = 1$ ; 97–108 months,  $n = 0$ ; 109–120 months,  $n = 2$ ; 121–132 months,  $n = 1$ .

## Discussion

This study confirms that HD is a problem in the general population of pet dogs. The prevalence of HD was 19.3% (556/2885) and appeared to be breed dependent. Factors such as geographic location and popularity of certain breeds may affect the data obtained from this or other isolated databases that do not maintain a compilation of data from multiple geographic sites.

The Orthopedic Foundation for Animals (OFA) database has been theorized as reporting a lower prevalence of HD than is truly present in the general population.<sup>3</sup> The databases are subsets of the general population and contain information on animals that are used for show, performance, and breeding purposes. Submission of data is voluntary and it is feasible that obviously dysplastic dogs are not submitted for entry into the database. Four of the six breeds in this study (with over 90 individuals evaluated) were the four most popular

breeds registered by the American Kennel Club. The percent dysplasia for these breeds in this study was 30.3% for Golden Retrievers, 32.9% for German Shepherd Dogs, 27.4% for Labrador Retrievers, and 35.4% for Rottweilers. These percentages are greater than reported by the OFA for the hip database (animals 2 years of age and older), but are similar to preliminary hip data (animals less than 2 years of age) (Golden Retrievers 32.6%, German Shepherd Dogs 31.1%, Labrador Retrievers 28.1% and Rottweilers 38.3%) reported by OFA which may represent a truer estimate of HD in these breeds.<sup>17</sup> This current study suggests that pre-screening of radiographs submitted to the OFA for preliminary evaluation had little to no effect on the prevalence of HD as this study eliminated that bias from consideration as much as possible. The difference in percentages for this study and the OFA hip database could be attributed to pre-screening of radiographs prior to submission, the culling of dogs for performance (or other non-health related reasons), or the culling of dogs because of the presence of other genetic disorders.<sup>18,19</sup>

The speculation that mixbred dogs are genetically superior to purebred dogs for HD due to heterosis is not substantiated by the results of this study. Separating the data into the 2 categories of purebred and mixbred allowed for the determination that there was no significant difference in the prevalence of HD, 19.7% and 17.7% respectively. Since the gene pool for mixbred dogs originated from the purebred population, it is reasonable that no significant difference exists.

The lack of a statistically significant difference between the male and female dogs with dysplasia is consistent with results from prior studies in dogs and cats, but not in humans in which there is a female predilection.<sup>20-23</sup>

The statistically significant difference between dogs  $\leq$  36 months of age and dogs  $>$  36 months of age would be consistent with the developmental or chronic progressive nature of the disease. The lack of a statistically significant difference between adjacent age subgroups in dogs  $\leq$  36 months of age could be attributed to a very gradual increase that would not be detected until a larger age difference is evaluated. This would explain the significant difference observed between dogs  $<$  12 months of age and 25-36 months of age. A comparison among the OFA grade, Norberg angle (NA), and percent coverage of the femoral head (PC) showed a strong correlation. Using NA and PC values that were determined by logistic regression versus OFA assigned grades sensitivity and specificity ranged from 91.4-97% and 92.3-

98.4% respectively. The overall high values for correct classification, sensitivity, and specificity coupled with low values for false-positive and false-negative rates indicated good consistency in subjective evaluation of hip status.<sup>24</sup> Specificity and sensitivity for the preliminary OFA evaluations ranged from 96.9-97.5% and 73.9-82.2% respectively.<sup>17</sup> The significant difference between dogs  $\leq$  36 months and dogs  $>$  36 months of age may be the insensitivity of the extended hip view in detecting HD in the absence of DJD or subluxation. This method of phenotypic evaluation for HD is dependent on the development of radiographically detectable abnormalities. Factors associated with HD like the developmental nature and variable onset would affect the ability for early detection.

In this study, the consensus opinion of normal, borderline, or dysplastic was unanimous among the three radiologists in 89.0% of the dogs. Studies evaluating unanimous consensus results report varying frequencies.<sup>22,25,26</sup> The disposition of the 318 dogs where there was not unanimous decision was according to the consensus system. If two radiologists had the same grade, then the dog received that



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grade. When data of the 318 dogs were evaluated, it could be concluded that after 3 years of age, subluxation was less of a factor in diagnosing HD. At this age there was a definite increase in the amount of DJD compared to subluxation. This finding is consistent with a prior study.<sup>27</sup> This could account for the decrease in the number of borderline grades with increasing age of the dogs. Since subluxation is often subjective, hips with the typical degenerative changes would be easier to diagnose as dysplastic. The decrease in the number

of borderline evaluations with increasing age also would be consistent with the developmental nature of HD.

Not all dogs with radiographic subluxation will develop DJD.<sup>17</sup> This could mean that subluxation in itself, is not specific for HD. The coxofemoral joint requires additional forces from the abductor muscles and the joint capsule, round ligament and hydrostatic effect of the synovial fluid, to maintain normal anatomic positioning.<sup>2</sup> Any condition affecting these supporting structures could potentially result in joint incongruity. Subluxation associated with HD has been accepted as the inciting factor for the development of the degenerative changes but it is unclear whether laxity precedes the subluxation or *visa versa*. Subluxation in itself may not be causative of DJD. Recent studies have been directed toward defining the role of subluxation or laxity in relation to the development of the degenerative changes. There has been a realization that small degrees of laxity may not lead to the typical degenerative changes.<sup>28</sup> It appears that there may not be a definitive amount of subluxation after which DJD will develop but rather that a range exists. This range could be the result of other conformational considerations within given individuals. This range would represent subluxation through which individuals could function without the development of typical degenerative changes. It would be feasible that these conformational considerations could change with time. Individuals would then no longer be able to compensate and DJD would develop. This could explain the small number of dogs that do not present with clinical signs referable to HD until senescence.

As HD progresses the joint capsule fibroses, the synovial effusion resolves, and the bony remodeling results; the initial subluxation may no longer be present.<sup>2,29</sup> In this study, the degenerative changes in the hip were considered to be more significant and subluxation was not recorded if degenerative changes were noted. The very small number of older dogs with only subluxation could be explained by the presence of conditions affecting the supporting structures of the hip or the presence of subluxation that coupled with individual conformational considerations, is insufficient to progress to DJD.

In this study the majority of the dogs (441) with HD had DJD. The remaining 115 dysplastic dogs were diagnosed solely on the basis of subluxation. Subluxation is diagnosed radiographically by incongruity of the joint. In this group of dogs, since the age ranged to 12 years,

it would be possible that subluxation in these older dogs is a radiographically perceived incongruity resulting from varying cartilage thickness. If small degrees of laxity can exist without the development of DJD, then it remains to be determined at what level the subluxation becomes pathological. Pathological subluxation would then be the amount of subluxation sufficient for the subsequent development of degenerative changes. While it generally is accepted that subluxation will eventually result in DJD, the presence of subluxation in mature dogs of advanced age may indicate that multiple factors need to be present for the ultimate development of DJD. These dogs may be able to compensate for the subluxation with components of joint structure contributing to functional stability of the hip joint.<sup>28,30</sup> More extensive evaluations would be necessary on the older dogs with only subluxation to determine the exact nature of the incongruity.

Idiopathic (or primary) degenerative joint disease (IDJD) becomes more prevalent in animals greater than 10 years of age. In a small number of dogs, the signs of HD are not observable until old age. The overlap of age in the clinical presentations of IDJD and HD necessitate differentiation by radiographic evaluation. In an attempt to eliminate some of the confusion, strict criteria for the radiographic diagnosis of IDJD have been established.<sup>27,31</sup> These include joint space narrowing and structural changes in the bone. The presence of osteophytes alone is insufficient.<sup>32-34</sup> The differentiation between IDJD and HD remains controversial.

This study confirms the importance of HD in the general population and underscores the need for control of the problem. Registries maintain databases and encourage breeders to screen for inherited diseases but registries do not control breeding decisions. Acknowledgment by breeders that an inherited disease is a problem is the crucial first step. A diagnostic protocol that is cost effective and applicable for screening must be used. Progress in reducing the prevalence of HD has been documented using the OFA database.<sup>10</sup> When the data are compiled and evaluated there is a trend toward increasing the percent of dogs with excellent hip conformation and decreasing the percent dysplastic. Data indicate that when breed clubs focus on the reduction of a specific inherited disease progress can steadily be noted.<sup>35,36</sup> Veterinarians and breeders need to better understand the basis of inherited diseases and that choosing breeding stock based on screening for such diseases can be effective in reducing the prevalence of these diseases.

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Photo Cheri McNealy

# Canine Health Information Center

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The Canine Health Information Center, also known as CHIC, is a centralized canine health database jointly sponsored by the AKC/Canine Health Foundation (AKC/CHF) and the Orthopedic Foundation for Animals (OFA).

## Mission Statement

To provide a source of health information for owners, breeders, and scientists, that will assist in breeding healthy dogs.

## CHIC Goals

- To work with parent clubs in the identification of health issues for which a central information system should be established.
- To establish and maintain a central health information system in a manner that will support research into canine disease and provide health information to owners and breeders.
- To establish scientifically valid diagnostic criteria for the acceptance of information into the database.
- To base the availability of information on individually identified dogs at the consent of the owner.

## CHIC Benefits

Once in place and accepted within the dog breeding community, the CHIC program offers benefits to breeders, buyers, parent clubs, and researchers.

- For breeders, CHIC provides a reliable source of information regarding dogs they may use in their breeding programs. In the future, breeders can begin to analyze the pedigrees of a proposed breeding for health strengths and weaknesses as well the traditional analysis of conformation, type, and performance strengths and weaknesses.
- For buyers, the CHIC program provides accurate information about the results of a breeder's health testing. For diseases that are limited to phenotypic evaluations, there are no guarantees. However, the probability that an animal will develop an inherited disease is reduced when its ancestry has been tested normal. Further, as more DNA tests

become available and the results are entered into CHIC, the CHIC database will be able to establish whether progeny will be clear, carriers, or affected.

- For parent clubs considering establishment of health databases on their own, CHIC provides the answer with no upfront investment required by the club. The CHIC infrastructure is supplied and maintained by the OFA. The data is maintained in a secure environment by trained staff. The services are not subject to the time, technology, and resource constraints that parent clubs might face on their own. This frees parent clubs to focus on their core strengths of identifying health concerns, educating their membership, and encouraging participation in the CHIC program.
- For researchers, CHIC provides confidential and accurate aggregate information on multiple generations of dogs. CHIC information will also be useful for epidemiological studies enhancing our knowledge of health issues affecting all breeds of dogs.
- For everyone interested in canine health issues, CHIC is a tool to monitor disease prevalence and measure progress.

## CHIC Policies and Guidelines

The CHIC database is a tool that collects health information on individual animals from multiple sources. This centralized pool of data is maintained to assist breeders in making more informed breeding choices, and for scientists in conducting research. In order for data to be included in CHIC, test results must be based on scientifically valid diagnostic criteria.

## Breed Specific

Core to the CHIC philosophy is the realization that each breed has different health concerns. Not all diseases have known modes of inheritance, nor do all diseases have screening tests. Some screening tests are based on phenotypic evaluation, others on genetic testing. With all these variables, a key element of CHIC is to customize or tailor the CHIC requirements to the needs of each breed. These unique requirements are established through input from the parent club prior to the breed's entry into the CHIC program. Breed specific requirements typically consist of the inherited diseases that

are of the greatest concern and for which some screening test is available. Each parent club also drives specific screening protocols. As an example, one parent club may allow cardiac exams to be performed by a general practitioner. Another parent club may require the exam to be performed by a board certified cardiologist. A club may also use the CHIC program to maintain information on other health issues for anecdotal purposes. Later, as screening tests become available, the disease may be added to the breed specific requirements.

## Identification

Regardless of breed, each dog must be permanently identified in order to have test results included in CHIC. Permanent identification may be in the form of a microchip or tattoo.

## Informed Consent

CHIC operates an informed consent database. All information regarding test results remains confidential unless the owner specifically authorizes release of the information into the public domain. Owners are encouraged to release all test results realizing it is in the ultimate health interests of the breed and the information greatly increases the depth and breadth of any resulting pedigree analysis. For those not quite ready to accept open sharing of information, there is still value in submitting their results. All test information entered into the database is available in aggregate for research and statistical reporting purposes, but does not disclose identification of individual dogs. This results in improved information on the prevalence of the disease, as well as information regarding progress in reducing the incidence of the disease.

## CHIC Numbers and CHIC Reports

A CHIC number is issued when test results are entered into the database satisfying each breed specific requirement, and when the owner of the dog has opted to release the results into the public domain. The CHIC number itself does not imply normal test results, only that all the required breed specific tests were performed and the results made publicly available.

A CHIC report is issued at the same time as the CHIC number. The CHIC report is a consolidated listing of the tests performed, the age of the dog when the tests were performed, and the corresponding test results. As new results are recorded, updated CHIC reports

reflecting the additional information will be generated. For example, if a breed requires annual CERF examinations, an updated CHIC report will be generated every time updated CERF results are entered. Another potential example is as new DNA tests are developed and added to the breed specific requirements, updated CHIC reports will be generated as the test results are entered.

Once included in the CHIC program, the breed specific requirements are dynamic. As health priorities within a breed change, or as new screening tests become available, the breed specific requirements can be modified to reflect the current environment. If the breed specific requirements are modified, existing CHIC numbers are not revoked. Again, the CHIC number is issued to a dog that completed all required tests at a given point in time.

CHIC will provide the parent club quarterly reports consisting of both aggregate numbers and specific dogs who have been issued CHIC numbers.

## CHIC Fee Structure

Existing test results from the OFA and CERF, as well as owner's selections whether or not to release results, are shared automatically with the CHIC program. There is no fee to enter test results from either of the OFA or CERF, and there is no requirement to fill out any additional forms.

To enter results into CHIC from another source such as PennHIP, GDC, OVC, or parent club maintained databases, there is a one time per dog fee of \$25.00. To enter results from any of these organizations, the *CHIC Application To Enter Test Results* must be completed. The completed form, test result documentation, and fee should be sent to the OFA. Any additional results after the one time fee is paid are recorded at no charge. Additionally, there is no charge when entering results on an affected animal from a non-CERF/OFA source.

## CHIC Website

The CHIC website is [www.caninehealthinfo.org](http://www.caninehealthinfo.org). The website contains basic information on CHIC such as its mission and goals, and maintains a listing of the participating breeds and approved breed specific test protocols. Forms such as the *Parent Club Application* and *Application To Enter Test Results* are available as downloads. The CHIC website also provides a search engine to locate dogs who have been issued CHIC numbers, their test dates, and the results of their tests.

## Participation

Any parent club interested in participating in the CHIC program should contact either the OFA or the AKC/CHF to discuss the program, entry requirements, answer any questions, or to request application forms.

Each breed should have a health committee and survey results which determine the major health concerns within the breed. The club should select one person from the health committee to be the CHIC liaison, and to work with the club's membership in determining what health tests should be considered for participation in the CHIC program. Questions to be considered are: what tests are currently available and being used, and at what age are the tests appropriate and reliable. Staff members from the OFA and the AKC/CHF will assist parent clubs during this phase of requirement and protocol definition.

The following list of breed specific requirements for Labrador Retrievers and Bull Terriers illustrates how CHIC has tailored specific test requirements to the health issues facing each breed:

### Labrador Retrievers

- Hip Dysplasia
- Elbow Dysplasia
- Eye Disease

### Bull Terriers

- Congenital Cardiac Disease
- Congenital Deafness
- Patella Luxation
- Kidney Disease

## Contacts

Questions regarding the CHIC program may be addressed to:

### Eddie Dziuk or Dr. Greg Keller

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The Orthopedic Foundation for Animals is a nonprofit 501(c)(3) foundation formed in 1966 with the following objectives:

1. To collate and disseminate information concerning orthopedic and genetic diseases of animals.
2. To advise, encourage and establish control programs to lower the incidence of orthopedic and genetic diseases.
3. To encourage and finance research in orthopedic and genetic disease in animals.
4. To receive funds and make grants to carry out these objectives.

The AKC/Canine Health Foundation is a 501(c)(3) nonprofit organization formed in 1995 with the following mission: To develop significant resources for basic and applied health programs with emphasis on canine genetics to improve the quality of life for dogs and their owners. The AKC/Canine Health Foundation is the largest funder of exclusively canine health research in the world.

# News and Announcements

## New website coming soon

Watch for a complete redesign of the OFA website. The redesigned site will have easier, faster navigation and a greatly expanded search feature, including instant access to sires, dams, siblings, half-siblings, and offspring of animals in the OFA database. The website address is [www.offa.org](http://www.offa.org).

## New Application forms online

All OFA application forms have been reformatted and redesigned, and are available on the OFA website, [www.offa.org](http://www.offa.org). Please print and use these new forms when submitting applications to the OFA. If you need large quantities of OFA forms, contact the OFA at [info@offa.org](mailto:info@offa.org).

## Legg-Calve-Perthes Database Now Available

In an effort to assist breeders in establishing control programs to limit the prevalence of the LCPD, the OFA is offering a new health database specific to LCPD. The OFA evaluations and the subsequent database of information will allow breeders to make more informed breeding decisions. With time as the database becomes more populated, statistical data regarding prevalence and improvement will be an added benefit. The LCPD database will operate in a similar fashion to the existing OFA database for hip dysplasia evaluations. The basic process is as follows:

Owners submit radiographs of their dogs in the standard ventrodorsal view endorsed by the AVMA.

Dogs must be a minimum of 12 months of age on the date of the radiograph to be eligible to receive an OFA Legg-Calve-Perthes number.

- The radiographs may be taken by any veterinarian, but must contain the required dog identification in the film emulsion, exhibit proper positioning, and must be of sufficient quality for the OFA to reach a diagnosis.
- The radiographs along with the completed application and \$25 evaluation fee are submitted to the OFA for review.
- At the time of submission, the owner selects whether any abnormal findings will be released in the public domain. All normal results are released in the public domain and are available on the OFA website.
- A Board Certified Radiologist reviews the radiograph for evidence of avascular necrosis (Legg-Perthes).
- Dogs with no evidence of avascular necrosis are assigned an OFA Legg-Calve-Perthes number and a certificate is generated.
- Dogs with evidence of avascular necrosis are not assigned a number. The OFA will issue a report stating the findings.
- The OFA submits quarterly reports to the parent club containing the dogs receiving LCPD numbers, as well as overall aggregate statistical data.
- Affected dogs are at no charge

In the past, some owners of smaller dogs at risk for LCPD have used the OFA hip dysplasia evaluation as a method to screen for LCPD. The OFA has defined the following procedure in order to 'grandfather' these past results.

The same radiographic image is used to evaluate the presence of both LCPD and hip dysplasia. Evidence of LCPD would be detected during an OFA hip dysplasia evaluation and would yield abnormal results. A dog over 12 months of age receiving a normal OFA preliminary support or an OFA Hip number is therefore also normal for Legg-Calve-Perthes Disease and is automatically eligible to obtain an OFA LCPD number.

To receive an OFA LCPD number based on a previous hip evaluation, owners should complete the appropriate application and an OFA LCPD number will be assigned and a certificate generated and mailed. There is no charge for this service.

