

The GRCA Board of Directors has received a number of inquiries on the topic of elbow dysplasia (ED), and has requested that the Health & Genetics Committee provide additional information for the membership. We are pleased that breeders are discussing ED, because it is important to raise awareness of this disease. And we are especially pleased with the opportunity to respond to some of the questions, because such discussions are most productive when they include the most accurate information. We will try to answer the most frequently asked questions below.

**1) Is there a \*new\* way of reading elbows by the OFA? Is this in direct correlation for what appears to be MORE failing ratings?**

OFA has followed the same reading and grading protocol since it began issuing elbow clearances in 1990. Examination of the OFA ED data in Goldens shows a promising trend for Goldens born from 1990 through 2001. By year of birth, and grouped in 4 year time spans, the percentage of ED in the breed has changed as follows:

1990 thru 1993	1033 Goldens evaluated, 11.8% ED
1994 thru 1997	3018 Goldens evaluated, 11.1% ED
1998 thru 2001	5250 Goldens evaluated, 10.2% ED

Since data obtained in the year 2003 reflects 24 month readings on dogs born in 2001, this is the most current data available. A closer examination shows that Goldens born in the year 2000 (1546 dogs) had a 9.8% rate of ED; and Goldens born in the year 2001 (987 dogs) had a 7.3% rate of ED.

Because most breeders (perhaps even most GRCA members) are not evaluating elbows on all of their dogs, it is premature to conclude from this data whether this reflects an actual decrease in the rate of ED in the breed.

A likely explanation for the increase that some owners believe they have observed is that since ED has been included in the GRCA Code Of Ethics (COE), more breeders are examining their dogs. With approximately 1 in 9 Goldens affected with ED, and with many breeders radiographing multiple dogs, most breeders have owned, bred, or know of affected dogs. Several years ago this may not have been the case, primarily because far fewer dogs were being examined.

**2) We should investigate the protocol from other countries. Several have chosen to use Grade 1's with great success. Should we consider that?**

GRCA considered this topic at length prior to adding elbow clearances to the COE. The decision was made to include ED among the diseases to be examined because it is extremely important that breeders know and disclose the status of dogs' elbows regardless of whether the final decision is to breed or not.

Only through complete and openly discussed knowledge of disease status will breeders have the information they need to make good breeding decisions.

There are many factors to consider when evaluating the progress of countries that permit breeding Grade I elbows. There may indeed be reasons to consider using Grade I elbows in breeding programs for the purpose of maintaining a broader gene pool, especially in countries where the overall rate of ED is approximately 25% or higher (as appears to be the case in some European countries). One must balance the potential consequences as they pertain both to the entire gene pool, and to elbow disease as a part of the gene pool. With a lower rate of ED in US Golden Retrievers, the genetic pressures to include Grade I ED's in most US breeding programs may not be the same as in other countries. Below are two sets of data which may help provide a basis for making a more informed decision whether to breed a dog affected with Grade I ED.

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In a study of 13,151 breeding pairs of dogs with known elbow status:

normal x normal = 12.2% ED

normal x ED = 26.1% - 31.3% ED

ED x ED = 41.5% ED

In this very large breeding study (primarily Golden Retrievers, Labrador Retrievers, Rottweilers, and German Shepherd Dogs), the rate of ED more than doubled when one parent was affected, and more than tripled when both parents were affected.

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Below are some comparative elbow statistics on Golden Retrievers from the BVA (UK) scheme and the OFA.

Of the total of 556 Golden Retrievers evaluated by the BVA (through 2003):

422 are normal (75.8%)

80 are Grade I (14.4%)

39 are Grade II (7.0%)

15 are Grade III (2.7%)

Total of 24.2% affected

Of the total of 9630 Golden Retrievers evaluated by the OFA (through 2003):

88.1% are normal

8.9% are Grade I

1.9% are Grade II

0.7% are Grade III

Total of 11.6% affected

Comparing that data, it would appear that when the overall percentage of ED in the breed is higher, so also is the overall percentage of Grade II's and Grade III's

– the potentially clinically affected dogs. It is also possible that this percentage may increase even more rapidly than the overall breed percentage. Note that while the total percentage of Goldens affected with ED in the UK is approximately double that of the US (24.2% compared to 11.6%), the percentage of higher grades in the UK is more than triple that of the US (9.7% compared to 2.6%). Although it is not certain that US Goldens would follow this exact trend if the percentage of ED began to increase, the data is compelling enough to warrant close vigilance and caution regarding potentially breeding Goldens with Grade I ED.

**3) Is the OFA part of the International Elbow Working Group? Why are they reading different than other countries?**

The OFA elbow protocol is based on the IEWG recommendations. The IEWG reported that ED can be evaluated by using 3 radiographic views at approximately 1 year of age to look for actual disease processes; or by using 1 radiographic view at 2 years of age to look for secondary changes (osteophytes) associated with ED. It is believed that there are fewer false positives (dogs incorrectly diagnosed with ED) when the diagnostic criteria include these secondary changes.

A recent study (1) noted the increased accuracy of evaluating ED at 24 months of age as compared to 12 months of age: *“The value of increased precision in the diagnosis of elbow arthrosis with increasing age at examination should be balanced against the possibility that with a higher minimum age for evaluation, a lower percentage of dogs would be evaluated.”* The decision to set the minimum age for final ED certification at 24 months is consistent with OFA’s hip dysplasia protocol, and provides a good balance of the above considerations.

**4) Other countries have more data on elbows that may be helpful to us. Sweden has been doing elbows for many years and they have an open registry where ALL of the Goldens’ results that were checked are posted. Might it be in the GRCA’s interest to see what progress they have made? They breed both normals and grade 1’s. The data they have for several generations may be very useful for us.**

A comprehensive published study (1) using data provided by the Swedish Kennel Club included the following results: *“There was a positive relationship between the prevalence of elbow arthrosis of any grade and the percentage of affected dogs with moderate or severe (grade 2 or 3) elbow arthrosis (i.e., matings of affected parents resulted not only in more affected progeny, but also in progeny with more severe grades of elbow arthrosis).”* (H&G: The term elbow arthrosis used in this study refers to arthritic changes in the elbow joint regardless of the underlying cause.)

This study also noted: *“the decreasing prevalence in arthrosis in these 2 breeds can be attributed mainly to the use of unaffected sires. There is still a lot of opportunity for improvement among dams, because a large number of affected females are still used for breeding.”*

**5) Why is it that most veterinarians cannot predict the outcome, with a certain measure of success, of elbow readings? These are experienced veterinarians.**

This is a common source of misunderstanding and confusion. It might be useful to consider the analogy of human general practitioners as compared to human radiologists; and veterinary general practitioners as compared to veterinary radiologists. The additional training required to become Board certified in a specialty is expected to result in a greater level of skill and expertise as compared to the general practitioner. On a difficult case, most people would prefer to have their own radiographs evaluated by a Board certified radiologist rather than their general practitioner because they know their general practitioner cannot be an expert in everything. The same is true in veterinary medicine.

Breeders have become accustomed to their veterinarians (and often the breeder him/her self) being able to see and diagnose HD prior to sending the films to OFA, but this is typically not the case with ED. While the higher grades are often diagnosed by the radiographing veterinarian, most do not have the training or equipment to reliably diagnose Grade I's.

Although it is understandable that clients want an immediate opinion on the radiographs from the veterinarian prior to submitting to OFA (and the veterinarian often tries to comply with this request), it is not reasonable to expect a degree of expertise that general practitioner veterinarians usually do not have. It is usually more satisfactory and less confusing for the owner and radiographing veterinarian to defer to board certified radiologists without trying to “prescreen” the x-ray.

**6) One of the biggest issues is the inability of vets and fanciers to understand why X-rays that look the same may or may not clear. Some breeders say that they have submitted the same X-ray, and the first time it failed to clear, but then it did clear when they resubmitted. If there is so much inconsistency in the reading of these X-rays, then how can we trust whether the DJD they see is really there? Just how accurate are these readings? This is of great concern to many of us.**

As discussed above, general practitioner veterinarians and fanciers usually do not have the expertise to accurately evaluate elbow radiographs. Films that may appear the same to the untrained eye, may actually have differences as evaluated by board certified radiologists. These subtle but significant differences

may result in different evaluations, even when the radiographs appear the same to others.

However, OFA computers automatically reject applications in which the radiograph has the same date as a prior submission. Thus, the same radiograph (or an identical copy) is never evaluated twice. Breeders do sometimes resubmit the same dog using a different set of radiographs, and this can occasionally result in a different evaluation. The evaluation can be influenced by a number of factors, such as density, contrast, and positioning (similar to the effects that focus, lighting, and camera angle might have on a photograph). Correct positioning and good radiographic technique will result in the most accurate evaluation.

OFA quality control statistics show a remarkable degree of consistency among the readings of the 3 board certified radiologists who evaluate each elbow radiograph, each one evaluating the radiograph without knowledge of other readings. There is 98% agreement between all 3 radiologists as to whether the elbow is normal or dysplastic. This high level of consistency should offer reassurance that the findings as reported are actually present.

**7) Most elbow reports seem to only have DJD marked as the finding. How do we know whether the dog has UAP, OCD, or FCP? Don't we need to know this to make breeding decisions?**

Ununited anconeal process (UAP), osteochondrosis (OCD) and fragmented medial coronoid process (FCP) have all been identified as part of the degenerative joint disease (DJD) complex referred to as elbow dysplasia. In most cases, when only DJD is marked on the OFA report, it can be assumed that lesions associated with coronoid process disease are present. This accounts for the majority of ED.

There are several theories about the genetics of ED. Some research has suggested that there may be a single underlying cause for all three forms of ED (2, 3), but other research suggests that the diseases may be inherited separately (4). Most of that research is not current.

However, multiple current studies (1, 4, 5) have all concluded that the heritability of ED is moderate to high. This means that breeding selections can have a significant impact on the rate of ED in a breed. In a breed such as (US) Golden Retrievers, where the overall percentage of affected dogs is already significantly lower than the percentage that can be expected when a dog affected with ED is bred to a normal dog (26.1% - 31.3% ED), one would find few circumstances in which progress can be made by breeding a dog affected with any form of ED.

**8) Until these issues can be resolved, might it be prudent to take the elbow recommendation from a requirement to a recommendation until such time as all this data can be studied?**

The GRCA COE (and the Health & Genetics Committee) strongly recommend that Golden Retrievers considered for a breeding program – and their siblings – be radiographed to determine their elbow status. This information should be an important and carefully considered part of breeding decisions, but there are no requirements imposed on breeders as to their personal decisions.

### **References**

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### **A few additional comments on the Code of Ethics**

In regards to GRCA, the GRCA Code of Ethics is not a punitive document. We are a club of Golden Retriever enthusiasts who have come to agreement on certain issues that comprise ethical behavior. In regards to the breeding of Golden Retrievers, four tests exist for the presence of conditions that are hereditary in our breed. The Code of Ethics appropriately states that the

examinations should be done and should be made available to verify disease status.

The Code of Ethics is silent on the issue of whether or not grade I elbow dysplasia should be bred. In our opinion, that silence is appropriate. Within our breed as a whole, the prevalence of elbow dysplasia is currently 11.6% with 0.7% having grade III and 1.9% having grade II. Elbow dysplasia, particularly at higher grades, can cause tremendous pain in our Golden Retrievers, especially in some of the performance fields, such as agility. Many dogs will not show clinical lameness, even at the higher grades but radiographic changes are apparent. We as a club made the decision in 2001 that we should examine our dogs for that condition so that we can work to help reduce the problem. The “should” in the code of ethics is absolutely appropriate. For example, what if someone wants to use semen frozen from a dog that died prior to 2001 and never had his elbows radiographed? Would that be unethical? Of course not. The Code of Ethics further states that the report should be made available to verify disease status. It does not state that the elbow disease status should be normal. In some European countries, guidelines are often more specific than in this country. However, all of the breeding schemes we have seen include the examination and disclosure of results recommended within our own Code of Ethics. For example, a recent British summary regarding elbow dysplasia is M.J. Peard and S. Guthrie, Elbow Dysplasia in Dogs - A New Scheme Explained and specifically states that dogs used for breeding include those that are either normal or have grade I disease which is available on line at [http://www.bva.co.uk/pdf/chs\\_elbow.pdf](http://www.bva.co.uk/pdf/chs_elbow.pdf) A portion of that article is included below:

“If sires and dams are only selected from animals with minimal ED, most of the clinical and subclinical animals can be eliminated from the breeding programme, which prevents them passing their defective genetic make up on to the next generation. Success of such control depends on a high proportion of any breed participating, and making the information public, so that low-risk animals can be selected by anyone wishing to breed. In other countries,

screening schemes like this have been successful in significantly reducing the ED problem. There is an international standard for such schemes administered by the International Elbow Working Group (IEWO), which encourages a coordinated approach to the problem. “

This scheme includes the examinations and public disclosure recommended by our Code of Ethics but includes more radiographic views and is specific regarding which grades may be bred. Regarding data from the single radiographic view evaluated in the OFA evaluations at 2 or more years of age, the following is from the OFA s The Use of Health Databases and Selective Breeding: A Guide for Dog and Cat Breeders and Owners, 4th edition, 2003 by Greg Keller ,and shows the total number (T) and dysplastic percentage (D) of affected offspring from various combinations of breeding dogs with some grade of elbow dysplasia

Sire		Normal	Dysplastic
Normal	T=10,245	T=1,345	
	D=12.2%	D=31.3%	
Dam		T=1,289	T=272
		D=26.1%	D= 41.5%

The percentage of affected dogs from normal to normal combinations is very similar to the percentage of affected Golden Retrievers at 11.6%. Thus, for continued improvement for the breed in the U.S. overall, breeding of dogs with normal elbows to dogs with normal elbows is an overall goal. However, the prevalence of elbow dysplasia in Golden Retrievers varies among bloodlines and among countries. Because the scoring systems vary in the different countries and other countries often use additional radiographic views, these are not always directly comparable. For Golden Retrievers in England, the following data is available from the Kennel Club:

Of the total of 556 radiographed Golden Retrievers:

422 are normal (75.8%)

80 are Grade I (14.4%)

39 are Grade II (7.0%)

15 are Grade III (2.7%)

Total of 24.2% affected

For overall genetic improvement in these bloodlines, improvement in prevalence of elbow dysplasia may well be achieved where both normal to normal and grade I to normal breedings are a part of the breeding program and would permit greater genetic diversity by not excluding dogs from breeding that are otherwise superior individuals without evidence of other hereditary conditions. As improvement of elbows occurs in the offspring, normal elbows would increasingly be produced and selected for in breeding. So if a breeder from England comes to this country with their dogs for a few years, are they unethical if they following a breeding program that selects for normal to normal elbows in most breedings but occasionally uses a dog with grade I elbow dysplasia? Is a US breeder importing Golden Retrievers from England unethical for selective use of dogs with Grade 1 elbow dysplasia? Is a U.S. breeder who radiographs their own dogs and finds a higher than anticipated rate of elbow dysplasia in dogs of their breeding unethical to occasionally include a dog with grade I elbow dysplasia in breeding as they try to improve the elbows in their dogs? Is a US breeder who owns the sole remaining individual of a rare bloodline that is otherwise outstanding but has grade I elbow dysplasia unethical if they breed that dog to a normal dog and select the normal offspring? Our Code of Ethics is silent on such decisions. However, when such difficult decisions are made, it is appropriate that such decisions be made by breeders who are aware of the disease status and disclose that information to other breeders and potential owners as indicated in our Code of Ethics.

Breeders who radiograph the elbows of their dogs, find their dogs have elbow dysplasia, and make a profit by asserting the dogs have either not been radiographed or are clear of elbow dysplasia, may wish to contact their attorneys

to see if they have committed fraud. Breeders who either do not radiograph their dogs' elbows, or do not disclose those findings upon request, may be violating the Code of Ethics and should consider radiographing their breeding dogs and disclosing the findings.

Please feel free to contact us if you have additional questions.

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