

# Hip dysplasia : epidemiologic considerations based on the analysis of 9738 radiographs

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## SUMMARY

A study based on 9738 standard radiographic evaluations for hip dysplasia of dogs belonging to several breeds showed that most of the dogs were radiographed later than the official age for evaluation. The percentage of unilateral dysplasia in the dysplastic dog group is 42 %, the significance of this high percentage being attributed by the authors to an imperfect diagnosis of bilateral coxo-femoral joint hyperlaxity. Obvious arthrotic changes were found in only 31.4 % of the dysplastic dogs aged from 12 to 24 months, 55 % of the dogs aged from 24 to 48 months, and 63 % of the dogs over 60 months of age.

**KEY-WORDS :** hip dysplasia - coxo-femoral joint - epidemiology - radiographic diagnosis - dog.

In France, the system currently in use for hip dysplasia (HD) control is based on standard radiographs, with extended hindlimbs, which should officially be performed between 12 and 16 months of age (18 for some giant breeds), depending on the breed size and decision of the breed club. For each club, the radiographs are scrutinized by a single reader. Scoring is based on the FCI (Fédération Canine Internationale) 5 grade classification (A : no dysplasia, B : near normal or transitional, C : light dysplasia, D : mild dysplasia, E : severe dysplasia). Few surveys of the epidemiologic situation regarding hip dysplasia in France have been published. This paper is a general analysis performed on a multi-breed population, which will be followed by a more specific breed-by-breed study.

## Material and methods

9738 standard radiographs with extended hindlimbs submitted by breeders or owners were evaluated by the same examiner for HD assessment based on the FCI 5 grade classi-

## RÉSUMÉ

**La dysplasie coxo-fémorale : considérations épidémiologiques basées sur l'analyse de 9738 clichés de dépistage.** Par J.P. GENEVOIS, D. FAU, G. BRUNON, L. CRANCE et D. REMY.

Une étude basée sur l'analyse de 9738 radiographies standard de dépistage de la dysplasie coxo-fémorale, concernant des chiens de différentes races, montre que la plupart des animaux sont radiographiés à un âge supérieur à l'âge du dépistage officiel. Chez 42 % des animaux dysplasiques le cliché de dépistage révèle une dysplasie unilatérale. Les auteurs attribuent ce taux élevé à une mise en évidence imparfaite d'une hyperlaxité coxo-fémorale bilatérale. Les modifications arthrosiques notables ne s'observent que chez 32,4 % des animaux âgés de 12 à 24 mois, 55 % des chiens entre 24 et 48 mois, et chez 63 % des animaux âgés de plus de 60 mois.

**MOTS-CLÉS :** dysplasie coxo-fémorale - hanche - épidémiologie - diagnostic radiographique - chien.

fication. All data were computerized to make further analysis possible. The population is composed of 59 different breeds ; in 23 of them, more than 50 individuals were assessed (Table I). We looked at the age of radiographic examination, distribution of hip dysplasia grades, unilateral dysplasia, non-arthrotic dysplasia.

## Results

**A) AGE AT WHICH THE RADIOGRAPH WAS PERFORMED** (figure 1)

Under 12 months 13 %, 12 to 16 months 22.72 %, 16 to 24 months 30.44 %, 24 to 36 months 19.14 %, over 36 months 14.7 %.

**B) DISTRIBUTION OF HIP DYSPLASIA GRADES IN THE POPULATION** (figure 2)

A : 63 % ; B : 13 % ; C : 11.3 % ; D : 9.5 % ; E : 3.2 % ; C + D + E : 24 %.

BREED	Number of evaluations	corresponding %
Rottweiler	2052	22.3%
Bernese Mountain Dog	1125	12.2%
French Briard	817	8.9%
Belgian Tervueren	649	7.0%
Great Dane	623	6.8%
Belgian Groenendaël	580	6.3%
Gordon Setter	449	4.9%
Siberian Husky	439	4.8%
Samoyed	369	4.0%
Belgian Malinois	278	3.0%
Akita Inu	248	2.7%
Berger picard	232	2.5%
Giant Schnauzer	214	2.3%
Shar Pei	209	2.3%
Bearded Collie	203	2.2%
Akaskan Malamute	146	1.6%
Chow-chow	107	1.2%
Newfoundland	102	1.1%
White American Shepherd Dog	99	1.1%
Tibetan mastiff	96	1.0%
Spitz-wolf	63	0.7%
Epagneul picard	59	0.6%
English Springer Spaniel	54	0.6%
TOTAL	9213	

TABLE I. — Breeds in which more than 50 individuals were assessed.

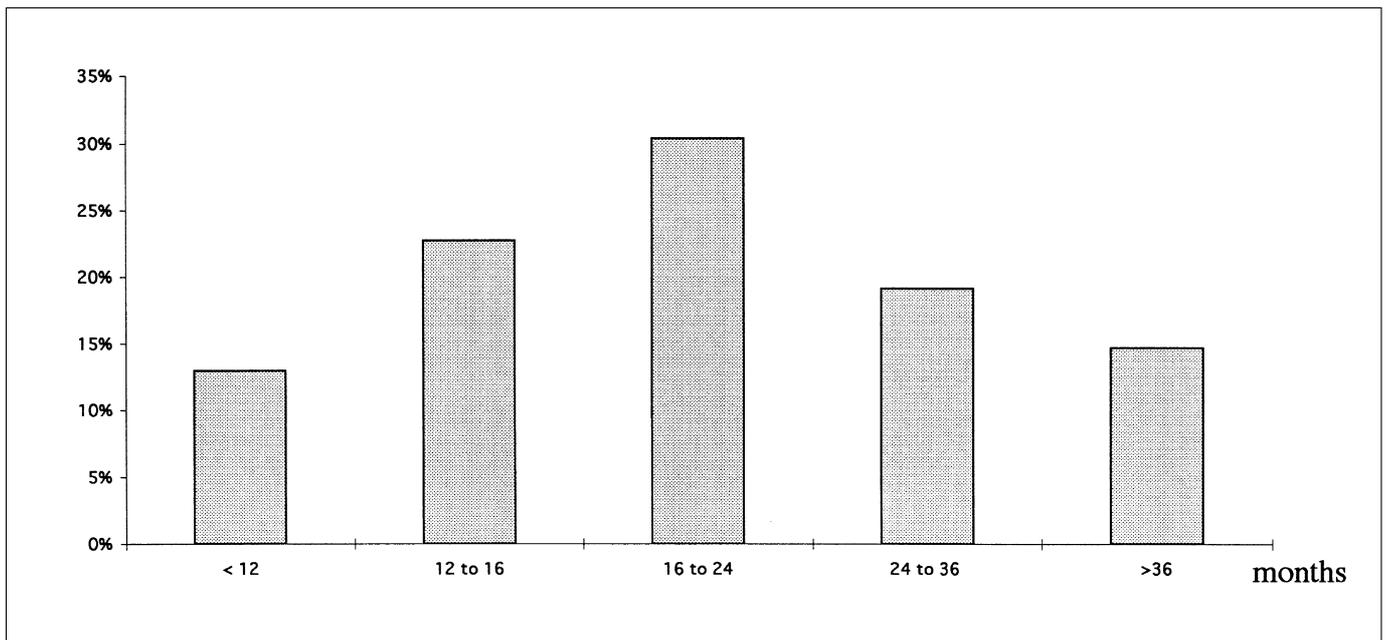


FIGURE 1. — Age (months) of dogs when radiographed.

**C) UNILATERAL DYSPLASIA** (figure 3)

Dogs were regarded as dysplastic when scored C, D or E : 42 % of all dysplastic dogs (dd = C + D + E), 10 % of the total population.

**Distribution of the grades** (figure 4)

One hip A + the other hip C or D or E : 41 % of the unilateral dysplastic dogs (= udd), 17 % of dd. One hip B + the other hip C or D or E : 59 % of udd, 24.6 % of the dd.

**Distribution within group A + C, D or E** (figure 5)

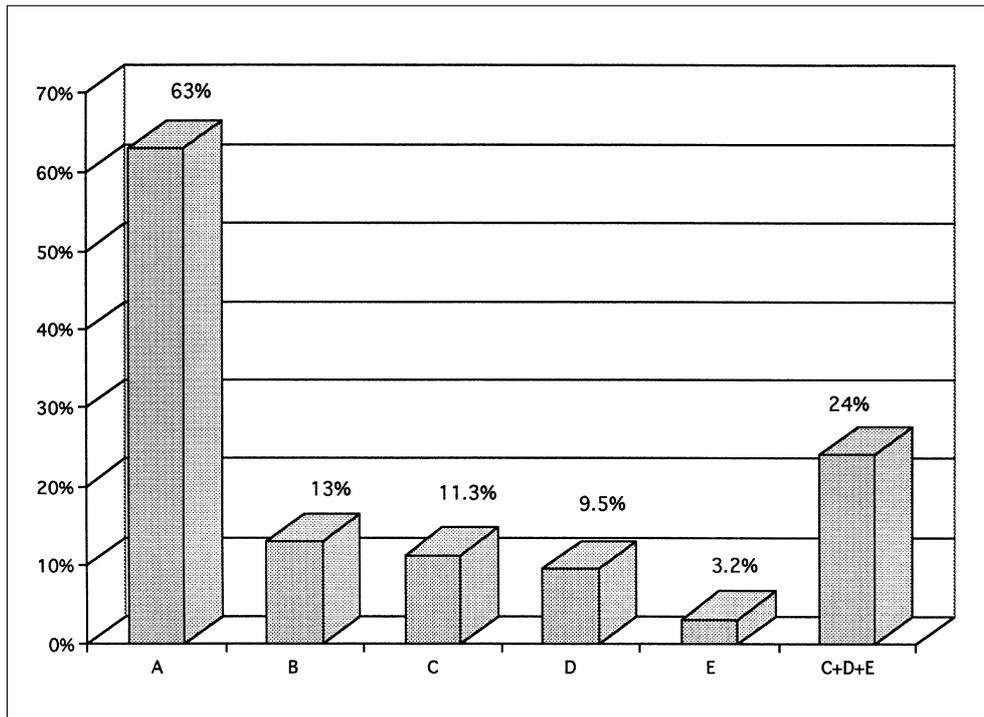
A + C 67.3 %, A + D 28.5 %, A + E 4.2 %.

**Distribution within group B + C, D or E** (figure 6)

B + C 68 %, B + D 28 %, B + E 4 %.

**Prevalence of a side in unilateral dysplasia**

C, D or E on left side 53 % of udd ; C, D or E on right side 47 % of udd. (light statistical side prevalence p. 4 %).



(A : no dysplasia ; B : near normal ; C : light dysplasia ; D : mild dysplasia ; E : severe dysplasia)

FIGURE 2. — Distribution of HD grades in the total population (N = 9738).

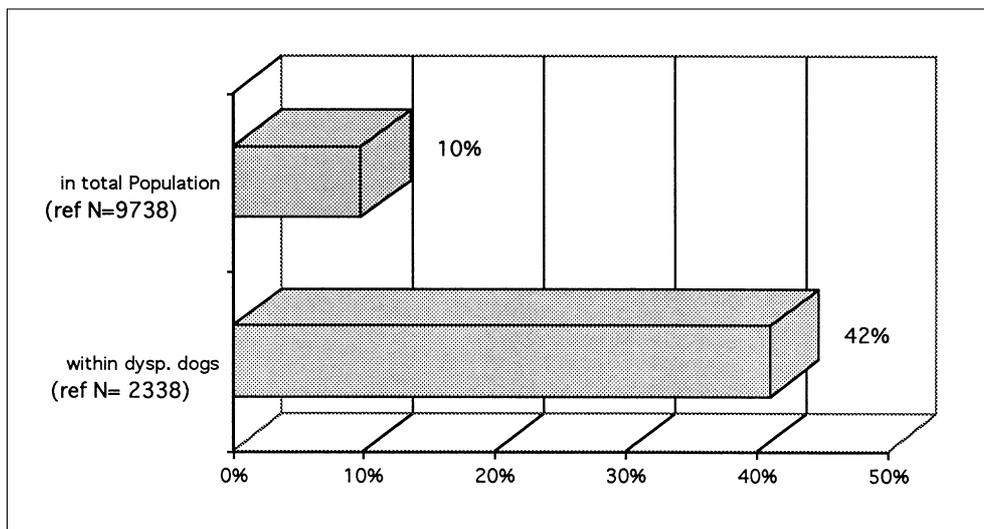
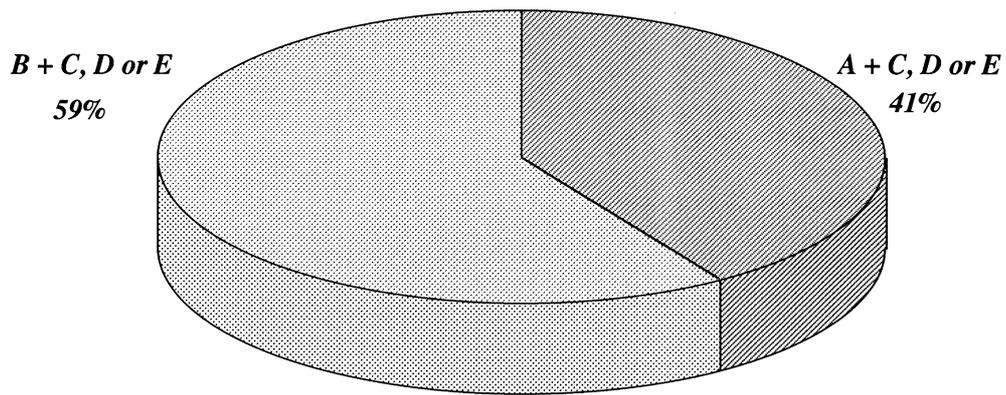
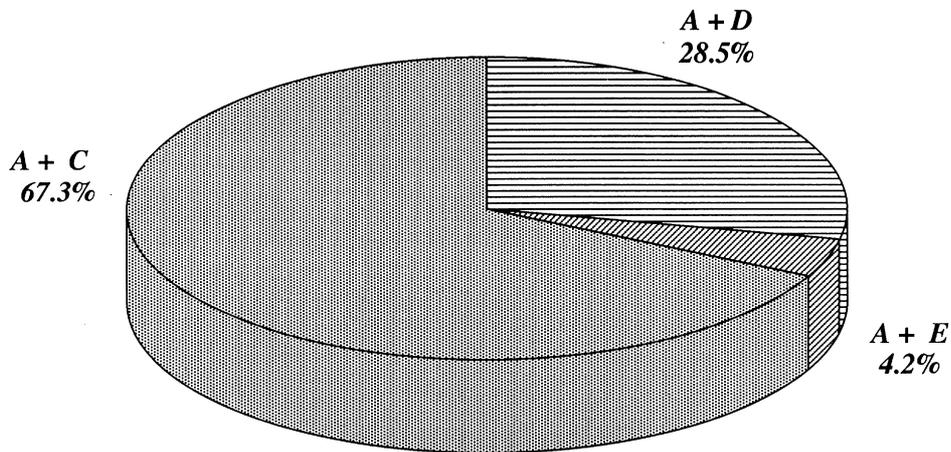


FIGURE 3. — Prevalence of unilateral dysplasia (N = 958).



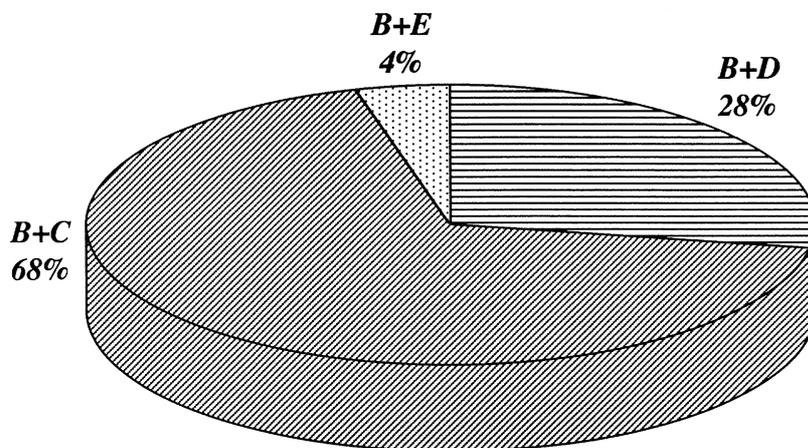
(A : no dysplasia ; B : near normal ; C : light dysplasia ; D : mild dysplasia ; E : severe dysplasia)

FIGURE 4. — Distribution of unilateral dysplasia within the unilateral dysplastic dog population (N = 958).



(A : no dysplasia ; B : near normal ; C : light dysplasia ; D : mild dysplasia ; E : severe dysplasia)

FIGURE 5. — Distribution within group A + C, D or E.



(A : no dysplasia ; B : near normal ; C : light dysplasia ; D : mild dysplasia ; E : severe dysplasia)

FIGURE 6. — Distribution within group B + C, D or E.

**D) NOR ARTHROTIC DYSPLASIA** (figure 7)

58 % of dd, Non arthrotic unilateral dysplasia : 33 % of udd, 77.8 % of odd. Non arthrotic bilateral dysplasia : 25 % of odd.

**Distribution related to the age of the dogs** (figure 8)

Non arthrotic dysplasia

among dysplastic dogs aged between 12 and 24 months :	68.6 %.
among dysplastic dogs aged between 24 and 36 months :	45.38 %
among dysplastic dogs aged between 36 and 48 months :	44.6 %
among dysplastic dogs aged between 48 and 60 months :	29.6 %

among dysplastic dogs over 60 months of age : 27 %

**Discussion**

**A) AGE AT WHICH THE RADIOGRAPH WAS PERFORMED**

A lot of dogs are radiographed much later than the «official» age (12 to 18 months depending on the breed). Though it may be a pity not to get the information related to the same class of age in the same breed, this might be considered as enhancing the reliability of the scoring [13, 3], though it is controversial [18]. On another hand, we receive more and more radiographs of dogs under 12 months of age for a preliminary non-official evaluation of their hip status.

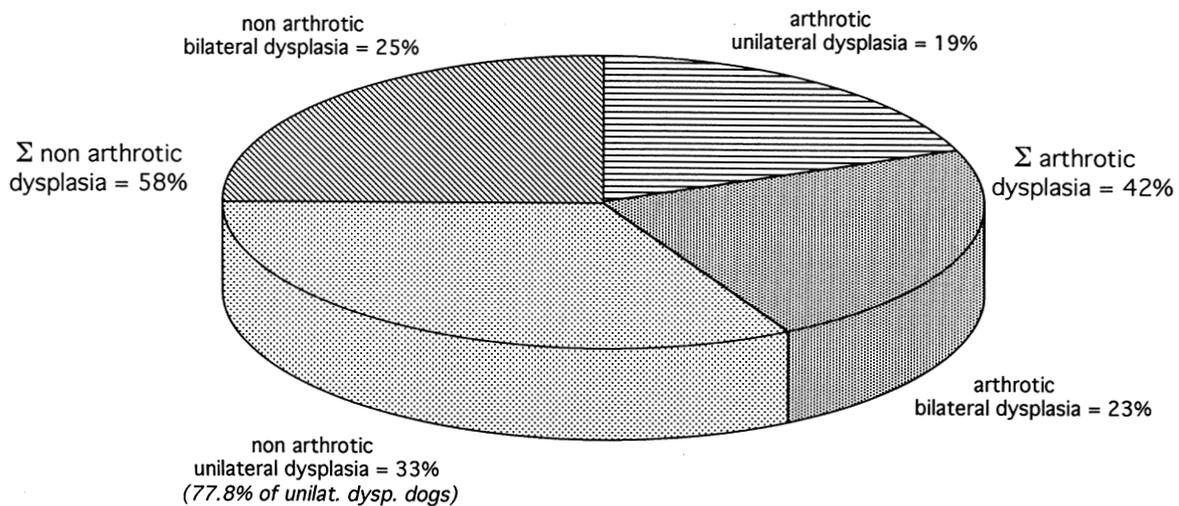


FIGURE 7. — Prevalence of non arthrotic dysplasia in the dysplastic dog group (N = 2289).

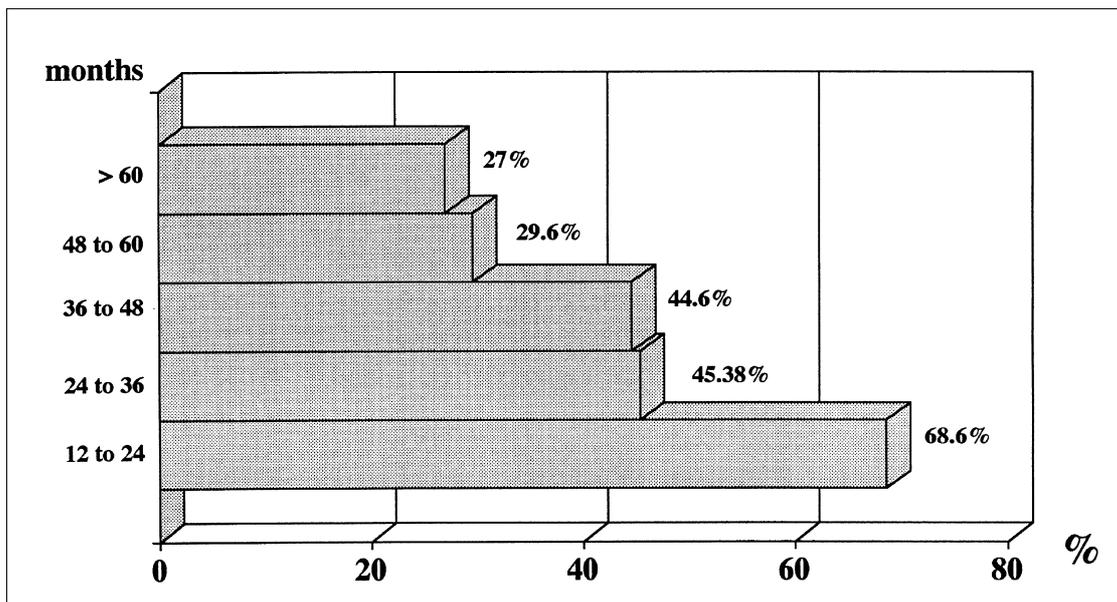


FIGURE 8. — Prevalence of non arthrotic dysplasia related to the age of the dogs.

## B) DISTRIBUTION OF HIP DYSPLASIA GRADES IN THE POPULATION

Like other authors [2, 16], we think that our results do not reflect the exact situation regarding hip dysplasia prevalence in the population, as not all the dogs are radiographed, and as we cannot evaluate the number of radiographs which are not submitted to an official evaluation because of a bad status of the hips, which was already diagnosed by the veterinarians who performed the Xray. The situation is probably very different from breed to breed as it can be seen when we compare the annual number of submitted radiographs in a breed and the number of births officially declared in the same breed the previous year (to be published in our breed-by-breed study).

As our population is very inhomogeneous, the exact distribution shown here is a piece of information of relative scientific signification.

## C) UNILATERAL DYSPLASIA

Hip dysplasia is generally considered a bilateral pathologic situation. It has been advanced [4, 2] that unilateral dysplasia varies from 3 to 30 % of the dysplastic dogs, depending on the population studied, and that the side of the involved hip might be a genetic inherited trait. We think that we could relate the high percentage of unilateral dysplasia to a problem of misdiagnosis of the exact situation in both hips. As we can see when looking at the number of non-arthrotic dysplasia, the diagnosis in our series is mainly based on subluxation and related changes of the Norberg-Olsson angle, that is on abnormal laxity of the hips. LUST [8, 9], MADSEN [10, 11], BELKOFF [1], FLUCKIGER [5], SMITH [14, 15, 16] and others have clearly demonstrated the relationship of coxofemoral joint laxity and hip dysplasia and the difficulty to reliably evaluate this laxity using standard radiographic positioning. It is our opinion that, in most of the cases of unilateral dysplasia, the apparent sound side on the standard position with extended hind limbs might correspond to a hidden hyperlaxity.

## D) NON ARTHROTIC DYSPLASIA

In our data, the diagnosis of arthrosis is based on the osteophytic remodeling of either the head, the neck or the acetabulum. Other modifications such as sub-chondral bone sclerosis have not been taken into account, this might be a minor bias in our analysis.

The low percentage of arthrosis in young dogs is normal : though some dysplastic dogs develop a very rapid arthrotic situation (it is not exceptional to find dogs aged 5 to 7 months with huge joint remodeling), in most of the cases the development of arthrosis will take some time.

Nevertheless we still find about 45 % of non arthrotic dysplastic dogs in our series till 48 months of age, and about 30 % of the dysplastic dogs over 60 months of age in our population are still non arthrotic. The different breed-related susceptibility of dysplastic dogs to develop arthrosis was demonstrated by POPOVITCH, SMITH & coll [13], in a comparison between rottweilers and german shepherd dogs. It has also been described by FLÜCKIGER [4]. In our experience, we found a similar situation in the dysplastic bernese mountain dogs and rottweilers, which develop very tardy

signs of arthrosis. These two breeds represent 34.5 % of our total population.

If we trust that hyperlaxity is a reliable inherited trait of hip dysplasia [7], to improve prevention by taking away dysplastic dogs from reproduction, it is controversial to base a definitive diagnosis of hip dysplasia on the presence of obvious arthrotic changes in the joint at 24 or 36 months...

## Conclusion

Despite the imperfections of the screening and control program, it is of utmost importance that the results of hip dysplasia scoring in the different breeds be published in France, like it has been since several years in other countries. These preliminary results give a general overview of the epidemiologic situation of hip dysplasia in a population composed of about 10,000 dogs belonging to some French breeds.

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