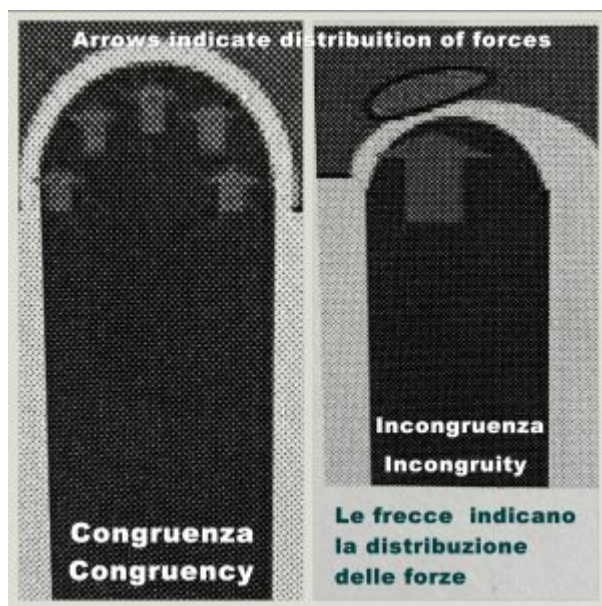


# Hip dysplasia (biomechanics)

Much has been written in hip dysplasia in dogs but, studying for my veterinary surgery exam, I am discovering things that owners and breeders usually do not know. A few days ago, I posted something on the biomechanics of the hip joint on Facebook and people asked for more information... Here I am!

To work properly, a joint, any joints, shall be properly built: joint surfaces should be congruent, if they are not, some parts of the joint will have to bear more weight than others.



Scientific studies have demonstrated that the maximum load cartilage can tolerate is  $1\text{kg/mm}^2$ . Prieur, a veterinarian, in 1980 published a very interesting research which is still valid: [Coxarthrosis in the Dog Part I: Normal and Abnormal Biomechanics of the Hip Joint W. D. PRIEUR, D.V.M. 1980](#)).

If we imagine a dog weighting 30 kgs, the total hip joint surface would be 220 square millimeters. In the table you see what happens if the articular surface gets reduced, the smaller the area, the more weight gets concentrated on 1 square mm.

## Load kg/mm<sup>2</sup> on the hip articular surface

• forze in kg/mm<sup>2</sup> sulla superficie articolare dell'anca (Priour 80)

Articular surface in a 30 kgs dog % in square mm	100% 220	50% 110	30% 66	15% 33
in stazione (STANDING)	0,01	0,2	0,3	0,6
su un solo arto 1 LIMB	0,1	0,35	0,5	<u>1,1</u>
al passo WALKING	0,2	0,65	<u>1,1</u>	<u>2,2</u>
nel salto JUMPING	0,5	<u>1,6</u>	<u>2,8</u>	<u>3,6</u>

In the first column, you see the weight the joint has to bear while the dog is standing on 4 limbs; standing on 1 limb; walking (pacing) and jumping. Anything above 1 kg for square mm damages cartilage. Such a compressed cartilage, in fact, gets "stressed" and changes: it loses elasticity, it softens, it breaks and eventually dies. The joint gets inflamed, becomes swollen, and arthrosis develops. The process cannot be stopped and leads to eburnation: an ivory-like reaction of bone occurring at the site of cartilage erosion. [Osteophytes](#) might develop as well. [Osteoarthritis is a degenerative disease of the joints characterized largely by central loss of cartilage and compensatory peripheral bone formation ([osteophytes](#)). Over time, as the cartilage wears away, bare, subchondral bone is revealed. Eburnation describes the bony sclerosis which occurs at the areas of cartilage loss.



**FIG. 83-14** The proximal ends of two femora illustrate the effects of advanced hip dysplasia. New-bone formation (exostoses) encircles the femoral necks at the junction of the head and neck (A). The femoral heads are shortened from wear and the cartilage surfaces are eroded and eburnated (B). (Reproduced with permission from Riser WH: The dysplastic hip joint: Its radiographic and histologic development. JAVRS 14:35, 1973)

Joint incongruity can generate friction which, on its turn, can increase temperatures inside the joint. It has been estimated that temperatures – inside an affected joint -can reach up to 70° Celsius (158°F) in a dysplastic hip joint (dog running).

Ps. Since health is fundamental to a dog's welfare, if you own a gundog (you hunt or run trials with) please check the [Gundog Project](#) and fill out the [survey](#)!

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## Esami displasia e calori (HD X-rays and bitches in season)

(English Below)

Avevo promesso a me stessa di NON scrivere di medicina veterinaria su questo blog ma gli eventi... Diciamo che sono rimasta molto sorpresa dal fatto che amici che allevano e testano i cani per la displasia dell'anca da svariati anni, non sapessero che non bisogna MAI fare radiografie a femmine

che sono vicine al calore.

Non sono certo io a dirlo, lo dice anche l'[FSA](#) (Fondazione Salute Animale), l'[OFA](#) (Orthopedic Foundation for Animals) in Usa e sicuramente qualsiasi altro veterinario informato.

Gli estrogeni, infatti, inducono lassità a livello di articolazione e possono falsare, peggiorandolo, il grado di displasia. Sul sito dell'OFA si consiglia di lastrare almeno un mese dopo il calore. Molti ortopedici consigliano però di attendere almeno 2 mesi, ritenendo 3 mesi dopo il calore il momento ideale.

#### Età per la Diagnosi Ufficiale

L'età minima per la diagnosi ufficiale per la **displasia dell'anca** è di **12 mesi** in tutte le razze ad eccezione delle seguenti:

- **15 mesi** per il Bovaro del Bernese, Grande Bovaro Svizzero, Briard, Rottweiler
- **18 mesi** per il Bullmastiff, cane da montagna dei Pirenei, cane di San Bernardo, Dogue de Bordeaux, Alano, Leonberger, Pastore Maremmano Abruzzese, Mastiff, Mastino napoletano, Terranova, Landseer continentale.

L'età minima per la diagnosi ufficiale per la **displasia di gomito** è di **12 mesi** per tutte le razze.

#### Raccomandazioni per il proprietario

Lo studio radiografico ufficiale viene effettuato su appuntamento e deve essere eseguito con il paziente in sedazione, pertanto il cane deve essere portato a **digiuno di cibo** da almeno 8 ore mentre l'acqua deve essere tolta un'ora prima della visita. Il paziente deve essere in buono stato di salute, nelle femmine intere è consigliabile prendere appuntamento lontano dal momento del calore e, nei soggetti con malattie accertate, è necessario mettere al corrente il medico veterinario dei farmaci che il cane sta assumendo al momento della sedazione.

**[www.fsa.it](http://www.fsa.it)**

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I promised myself not to write about veterinary medicine in this blog but sometimes people surprise me.

Last week, indeed, it came out that some friends who had been breeding and health testing dogs for several years... did not know that you should not x-ray a bitch in season or immediately after/before a season. It is science, not just my opinion as estrogens can relax the ligaments and the joint

capsule. Result? Hips can appear worse than they actually are.

Both [http://www.offa.org/hd\\_procedures.html](http://www.offa.org/hd_procedures.html) OFA (USA) and [FSA](#) (Italy) support state this on their website and any informed veterinarian cannot but agree. OFA suggest waiting at least 1 month after a season, 2 months are usually suggested by veterinarians and 3 months after a season considered to be the best moment.

*Radiography of pregnant or estrus females should be avoided due to possible increased joint laxity (subluxation) from hormonal variations.* OFA recommends radiographs be taken one month after weaning pups and one month before or after a heat cycle. Physical inactivity because of illness, weather, or the owner's management practices may also result in some degree of joint laxity. The OFA recommends evaluation when the dog is in good physical condition.

**[www.offa.org](http://www.offa.org)**