



# X-RAY PROCEDURE

## FOR DETECTION OF CALCIFIED INTERVERTEBRAL DISCS IN THE DACHSHUND

for evaluation by the Norwegian Kennel Club



Figure 1



Figure 2



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# PROCEDURE FOR X-RAYING THE VERTEBRAL COLUMN OF THE DACHSHUND

for evaluation by the Norwegian Kennel Club

A standardized x-ray procedure is required to secure the quality of the evaluation results. The aim of the x-ray examination is to detect calcified intervertebral discs. The results of the evaluations will be included in the Norwegian Kennel Clubs database and made available to club members and veterinarians through DogWeb (for foreign dogs not registered in the Norwegian Kennel Club– see page 10 for information). The results may be used as a tool in the Dachshund breeding program and as a part of health screening conducted by the Norwegian Kennel Club and The Norwegian Dachshund Club.

Dachshunds are particularly predisposed to intervertebral disc prolapse; various studies have shown that the disease affects approximately 20% of the dogs (1, 2). Depending on the location of the prolapse and its severity, symptoms will vary from mild back pain and paresis to total paralysis. It is well known that degenerative changes within the intervertebral discs, with dystrophic calcification, occur prior to the prolapse itself (3). Radiographic examinations have shown that the number of calcified discs in dogs is largest at 2 years of age (4), whilst the incidence of clinical disc prolapse is the greatest at 5 years of age (5). Dachshunds that have a high number of clearly calcified intervertebral discs at a young age have a higher risk of developing disc prolapse in later life. A relatively high heritability for the development of calcified discs has been found in the breed (6, 7).

## Minimum age requirement (official radiographic age)

X-rays of the vertebral column are performed when the dog is between 2 and 4 years of age.

## Preparation of the patient

The dog must not be given any food 12 hours prior to the examination, but can have free access to drinking water. The coat on the neck, back and shoulder should be brushed and groomed so that dirt and small particles do not affect x-ray quality.

## Sedation

The dog must be sedated prior to the radiographic exam. The sedation must be deep enough to allow positioning of the dog as specified in this procedure.

## Identification of x-rays

The dog's identity (registration number and chip/tattoo number), as well as the date of the x-ray, must be included in the image before processing the x-ray so that it is clearly visible. The x-rays will not be evaluated if this information is not included in the image. The dog's ID number must be checked when the dog is on the x-ray table.

The radiographer should strive to achieve optimal aperture for the primary beam, i.e. approximately 7 vertebrae in length by 8cm in width.

## Projections and positioning

The X-rays should only be in a **lateral projection**.

The vertebral column from C2 (2<sup>nd</sup> cervical vertebra) to S1 (1<sup>st</sup> sacral vertebra) must be included in the x-rays.

The dog should be placed in *right lateral recumbency, without rotation* and with the *spine parallel to the table top*. In practice, this will require the dog to be firmly stretched out with its legs held parallel to the table top, while placing small spacer pads under the neck and caudal lumbar region (loin).

**Standard Dachshund: a minimum of 5 exposures**

1. Regio cervicalis (C2-T1): The beam should be centered on C5 (Figures 3 and 4)
2. Regio thoracalis cranialis (C7-T7): The beam should be centered on T3-4 (Fig. 5 and 6)
3. Regio thoracalis (T6-12): The beam should be centered on T9 (Figures 7 and 8).
4. Regio thoraco-lumbalis (T11-L4): The beam should be centered on L1 (Figures 9 and 10)
5. Regio lumbalis (L3-S1): The beam should be centered on L5-6 (Figures 11 and 12)

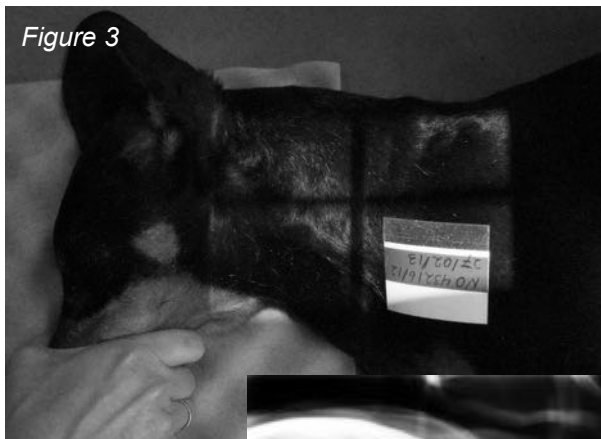


Figure 3

Figures 3 and 4:  
Regio cervicalis (C2-T1)  
The beam should be centered on C5

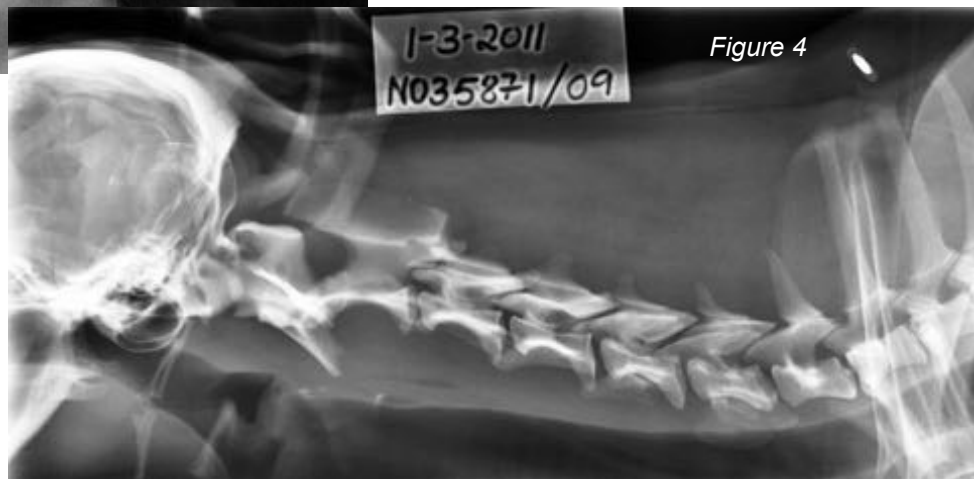


Figure 4

When x-raying the **cervical column**, one should avoid rotating the dog's head and make sure *both of the dog's front legs are stretched firmly backwards* – in order to avoid the shoulder and shoulderblade being projected over the posterior cervical vertebrae.

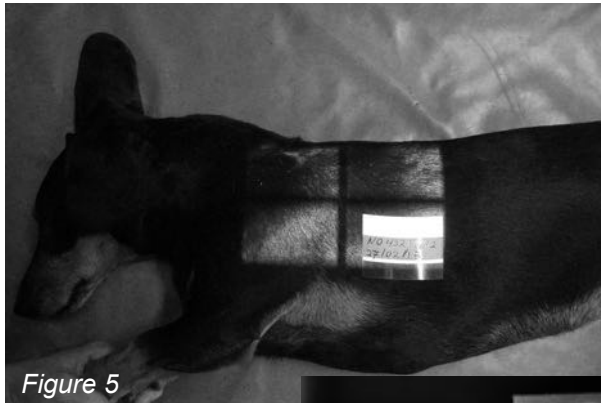


Figure 5

Figure 5 and 6:  
Regio thoracalis cranialis (C7-T7)  
The beam should be centered on T3-4



Figure 6

When x-raying the anterior part of the **thoracic column**, the dog's front legs should be firmly stretched forward – in order to avoid projecting the shoulder and shoulder blade over the anterior thoracic vertebrae.



Figure 7

Figure 7 and 8:  
Regio thoracalis (T6-12)  
The beam should be centered on T9



Figure 8



Figure 9

Figure 9 and 10:  
Regio thoraco-lumbalis (T11-L4)  
The beam should be centered on L1



Figure 10



Figure 11

Figure 11 and 12:  
Regio lumbalis (L3-S1)  
The beam should be centered on L5-6

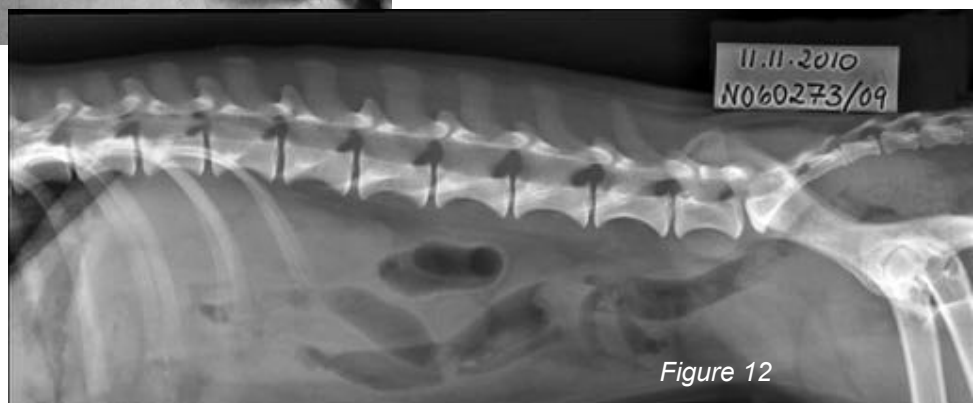
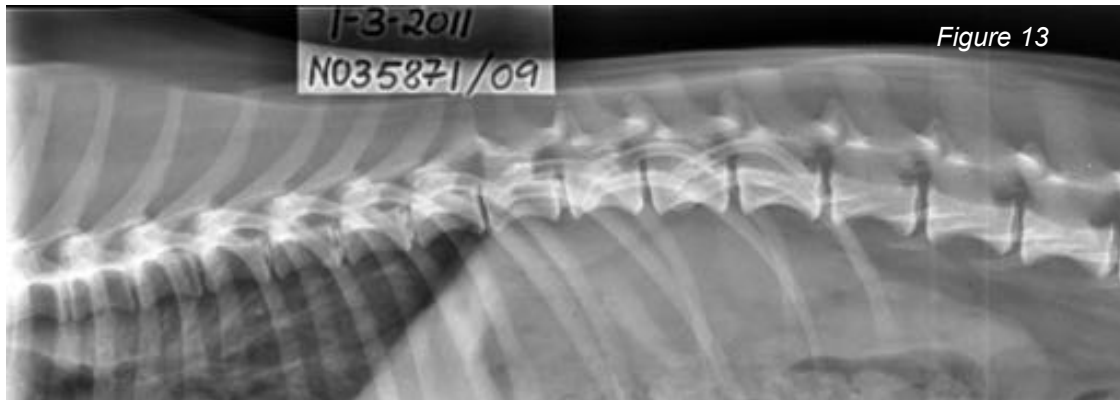


Figure 12

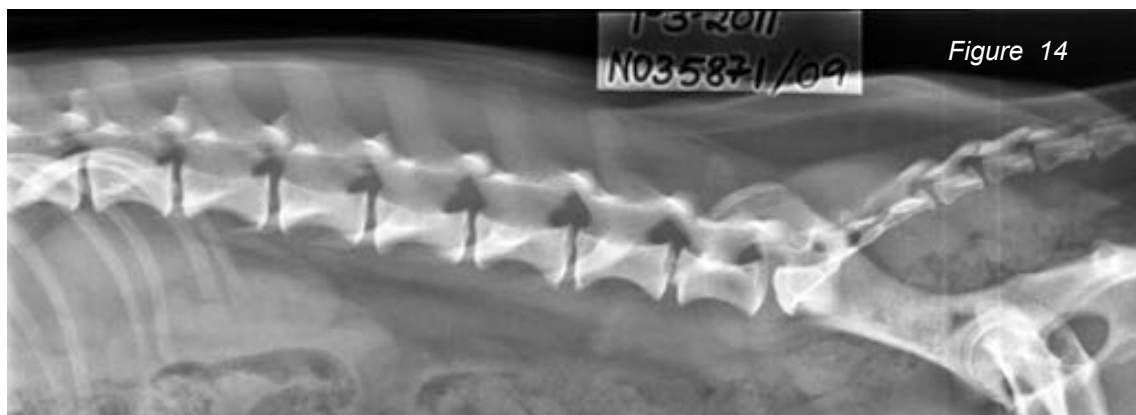
**Rabbit and Miniature Dachshund: a minimum of 4 exposures**

1. Regio cervicalis (C2-T1): The beam should be centered on C5 (*Figures 3 and 4*)
2. Regio thoracalis cranialis (C7-T8): The beam should be centered on T4 (*Figures 5 and 6*)
3. Regio thoraco-lumbalis (T7-L2): The beam should be centered on T11 (*Figure 13*)
4. Regio lumbalis (L1-S1): The beam should be centered on L4-5 (*Figure 14*)

*Figure 13:*  
Regio thoraco-lumbalis (T7-L2)  
The beam should be centered on T11



*Figure 14*  
Regio lumbalis (L1-S1)  
The beam should be centered on L4-5



## **ASSESSMENT OF X-RAY QUALITY**

The veterinarian conducting the x-ray examination should assess the x-rays with respect to technical quality, positioning and projections.

One should try to obtain sharp x-rays with fine detail so that the trabecular structure in the vertebral bodies can be identified. The x-rays should not be too rich in contrast, but have a good contrast scale, i.e., white – several shades of grey – black.

It is important that the x-rays expose all of the intervertebral spaces from C2 to S1. The aim of this is to make sure no bony tissue (NB *processus costalis* and the epiphyses of the vertebral bodies) will be projected over the intervertebral disc, with the risk of camouflaging small calcifications in the discs.

In the lumbar region (L2-S1), the pelvis (*os ilium*) will be projected over the last intervertebral disc. In cases where calcification (radiographically dense areas) of this disc is suspected, an extra x-ray should be done, centered on L7 using a slightly stronger exposure.

Any unsatisfactory images need to be replaced or supplemented with new ones.

## **EVALUATION**

The x-rays are evaluated by The Norwegian Kennel Club's radiologist in order to determine the number (0-26) of calcified intervertebral discs. The following classification scale is used:

<i>Free:</i>	No calcified discs
<i>Weak:</i>	1-2 calcified discs
<i>Moderate:</i>	3-4 calcified discs
<i>Advanced:</i>	5 or more calcified discs

## **SUBMITTING X-RAYS**

The x-rays must be accompanied by an order form that is completed and signed by both the owner and the veterinarian who conducted the x-ray examination. The dog owner should order the form and pay the evaluation fee on "Min side" at [www.nkk.no](http://www.nkk.no). This must be done BEFORE the x-rays are taken. The dog owner will receive the form via e-mail and should bring this to the veterinarian conducting the x-ray examination.

For foreign dogs see page 10.

The x-ray images should not be bent. Digital x-rays can be sent using a CD.

The x-rays together with a completed and signed form should be sent to the Norwegian Kennel Club, Helseavdelningen, Postbox 163 Bryn, 0611 Oslo, Norway.

## **WHO CAN SUBMIT X-RAYS?**

Only veterinarians who have a valid agreement with NKK can submit x-rays for evaluation (does not apply to foreign dogs). This is the same agreement as HD/ED.

## **APPEAL OF THE RESULT**

The dog owner can appeal the result of NKK's evaluation. The x-rays that are the basis for the original diagnosis will be submitted to NKK's appeal board.

If an appeal leads to a different result (better or worse), it is the appeal board's result that shall prevail and will be included in the dog's data in NKK's register.

Upon submission of an appeal, the owner will be charged a fee of 700 NOK. If the appeal results in a better status for the dog than NKK's original evaluation result, this fee will be reimbursed to the owner.



## **REGISTRATION OF DIAGNOSES FOR DOGS WITH CLINICAL SYMPTOMES WHO ARE EXAMINED FOR CALCIFIED INTERVERTEBRAL DISCS AND/OR PROLAPSE REGARDLESS OF AGE**

In order to ensure registration of definite diagnoses in cases where the dog is not necessarily of official radiographic age, NKK and SVF have determined the following guidelines for registration:

If the examining veterinarian diagnoses calcified intervertebral discs and/or prolapse on the basis of clinical symptoms, radiographic findings or other examinations, the x-rays and a description of the examination findings can be sent to NKK. A copy of the dog's registration certificate should be enclosed and the dog's ID-number should be checked and confirmed in the form signed by both the veterinarian and the owner. When a diagnosis of prolapse, or a moderate or advanced degree of calcified intervertebral discs is confirmed by NKK's radiologist, the diagnosis will be registered in NKK's register, and NKK will pay for the evaluation and registration of the result. The owner and the primary veterinarian will be informed of the result of NKK's evaluation.

A separate form for this purpose is available online at [www.nkk.no](http://www.nkk.no). The form must accompany the x-rays. Contact the Health Department ([helse@nkk.no](mailto:helse@nkk.no)) if you have any questions.

## **REFERENCES**

1. Ball MU, McGuire JS, Swaim SF, Hoerlein BF. Patterns of occurrence of disk disease among registered dachshunds. *J Am Vet Med Assoc* 1982; 180: 519-22.
2. Schriver Nilsson N. Diskusprolaps hos gravhund—en populasjonsundersøgelse. Kjøbenhavn 2001. Thesis. Royal Veterinary and Agricultural University.
3. Hansen HJ. A pathologic-anatomical study on disc degeneration in dog. *Acta Orthop Scand* 1952; suppl. 11, 1-117.
4. Jensen VF, Ambjerg J. Development of intervertebral disk calcification in the dachshund: a prospective study. *J Am Anim Hosp Assoc* 2001; 37(3): 274-82.
5. Gage ED. Incidence of clinical disc disease in the dog. *J Am Anim Hosp Assoc* 1975; 11: 135-8.
6. Stigen Ø. Calcification of the intervertebral discs in dachshund: An estimation of heritability. *Acta Vet Scand* 1993; 34: 357-61.
7. Jensen VF, Christensen KA. Inheritance of disc calcification in the dachshund. *J Vet Med A* 2000; 47(6): 331-40.

## **FOREIGN DOGS NOT REGISTRATED IN NKK**

The Norwegian Kennel Club can evaluate X-rays for foreign dogs not registered in the Norwegian Kennel Club. The X-rays will be evaluated, but it will not be registered in NKK's data register. The owner of the dog will be notified of the result in a letter or e-mail.

## **CONSENT FROM NATIONAL KENNEL CLUB**

NKK is bound by international agreements, and a dog is supposed to be X-rayed and evaluated in the country where it is registered (and live). However, for dachshunds that is often not possible. We wish to help to evaluate the x-rays from foreign countries, but in order to do so we need the consent from the national kennel club. We have consent from the following kennel clubs:

- The Swedish Kennel Club
- The Kennel Club (UK)

For other countries, the owner or breed club must contact the national kennel club in advance to determine if they object to the Norwegian Kennel Club administrating the evaluation of X-rays for dogs registered in their country.

## **HOW TO PROCEED**

The x-rays together with the completed and signed form should be sent to the Norwegian Kennel Club, Helseavdelingen, Postbox 163 Bryn, 0611 Oslo, Norway.

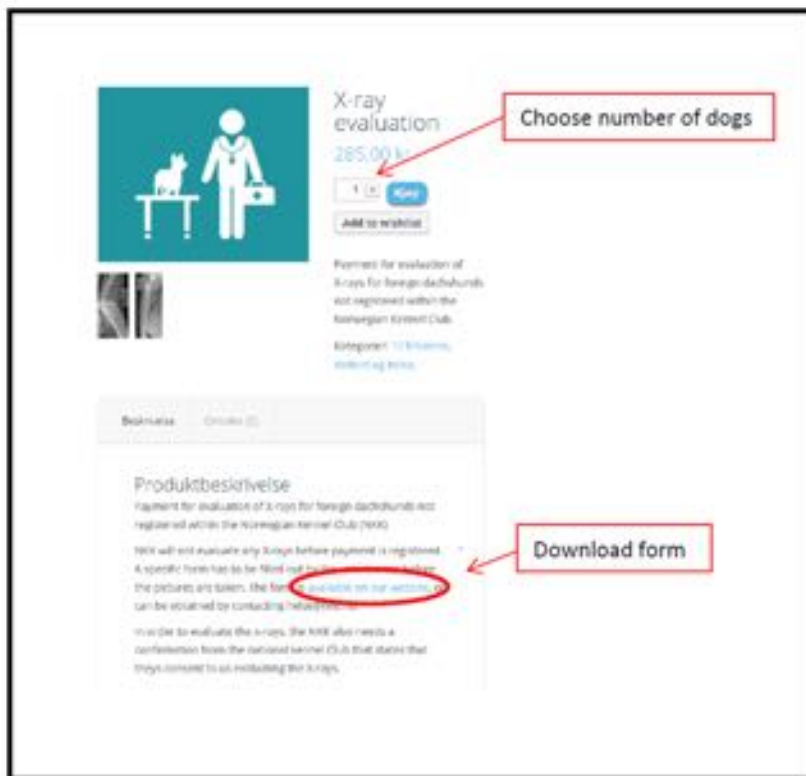
Foreign dogs not registered in the Norwegian Kennel Club need to use a specific form available on [nkk.no](http://nkk.no), and the evaluation must be paid for online in advance.

Unfortunately, the online instructions are in Norwegian, but below is an English instruction on how to proceed:

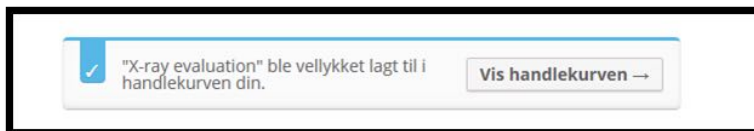
1. Use the following link <http://www.nkkbutikken.no/produktkategori/helse/>  
(or go to [nkk.no](http://nkk.no) > nettbutikken > Til firbente > Helse)
2. Choose the product "X-ray evaluation":



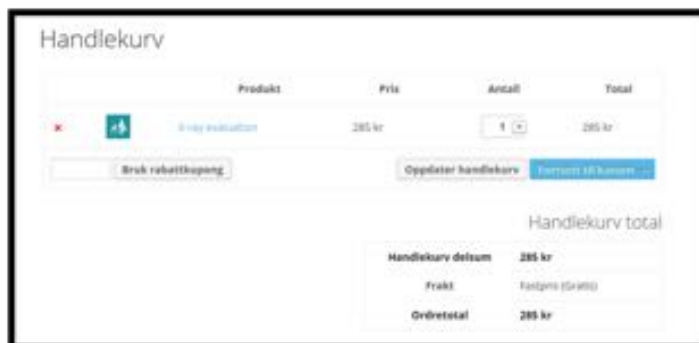
3. Download the form, choose number of dogs, and press “Kjøp”:



4. The following box will appear, and choose “Vis handlekurven”:



5. Choose the blue box "Fortsett til kassen”:



6. Fill in the required information; remember to include the dogs' registration number in the box to the right. Proceed by pressing "Send ordre" at the bottom right.

## Til kassen

Tilbakevendende kunde? [Klikk her for å logge inn](#)

Har du en kupong? [Klikk her for å skrive inn koden din](#)

**Faktureringsdetaljer**

Land  
**Norge**

Fornavn \*      Etternavn \*  
 First name     Last name

Navn på firma  
 Name of company (optional)

Adresse \*  
 Street address ✓  
 (Optional)

Postnummer / Zip \*  
 Postcode/zip ✓

By \*  
 City ✓

Epostadresse \*    Telefon \*  
 e-mail address ✓     Telefonnummer ✓


Abonner på nyhetsbrev  
 Opprett en konto?

**Sende til en annen adresse**  Do not tick this box

Ordrenotater  
 Doge registrasjonsnr. (other information)

**Ordren din**

Produkt	Total
X-ray evaluation × 1	285 kr
<b>Handlekurv delsum</b>	<b>285 kr</b>
<b>Frakt</b>	<b>Fastpris (Gratis)</b>
<b>Ordretotal</b>	<b>285 kr</b>

 Nets

Betal med kort eller bankoverføring via Nets

Proceed to type credit card information, and your payment will be registered. The Health department will receive a confirmation of payment.

If you have any questions, please contact the Health Department: [helse@nkk.no](mailto:helse@nkk.no)