

# Calcification of Intervertebral Discs in the Dachshund

## A Radiographic Study of 327 Young Dogs

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**Stigen, Ø: Calcification of intervertebral discs in the dachshund. A radiographic study of 327 young dogs. Acta vet. scand. 1991, 32, 197–203.** – The vertebral columns of 327 clinically normal, 12 to 18 months old dachshunds, were x-rayed. This sample represented 16.1 % of all dachshunds registered with the Norwegian Kennel Club in the period 1986–1988. Calcified intervertebral discs were identified in 79 (24.2 %) of the dogs and the number of calcified discs in each individual varied from 1 to 11 with a mean of 2.3. Calcified discs were estimated to occur in 23.5 % of Norwegian dachshunds.

The occurrence of calcified discs in standard-sized dachshunds was higher in the wirehaired variety (27.1 %) than in the smoothcoated (16.4 %) or longhaired (9.1 %) varieties. However, within the longhaired variety the occurrence was higher in dwarfs and kaninchens (36.0 %) than in standard-sized dachshunds (9.1 %). Calcification was identified in all cervical, thoracic and lumbar intervertebral discs other than T1-2, and was found to be most frequent in the caudal thoracic vertebral column.

vertebral column; degeneration.

### Introduction

Dogs classified as chondrodystrophoid dwarfs are genetically predisposed to degeneration of intervertebral discs (*Ghosh et al. 1975, Verheijen & Bouw 1982*). The degenerative changes are primarily limited to the nucleus pulposus and have an early onset. From 3–4 months of age, mesenchymal cells of the nucleus pulposus are replaced progressively by chondrocytes (*Hansen 1951, Hansen 1952, Verheijen & Bouw 1982*) and before 1 year of age, 75–100 % of all intervertebral discs contain hyaline cartilage (*Hansen 1966, LeCouteur et al. 1986*). Thirty to 60 % of the cartilaginous nuclei undergo dystrophic calcification within the first year of life (*Hansen 1966*) and it is usually the calcified intervertebral discs which pro-

trude and subsequently cause clinically significant intervertebral disc disease (IDD) (*Havranek-Balzaretti 1980*).

IDD is most frequently seen in the dachshund (*Oliver et al. 1987*) and different studies have shown 45–70 % of all canine cases to occur in this breed (*Brown et al. 1977, Gage 1975*). The occurrence of IDD in dachshunds has been estimated to be 19.0 % (*Ball et al. 1982*).

This paper presents the findings from a radiographic survey of calcified intervertebral discs in dachshunds aged between 12 and 18 months and details the distribution of these lesions within the vertebral column.

### Material and methods

Written inquiries were made to owners of

young dachshunds registered with the Norwegian Kennel Club (NKC). The owners were requested to present their animals for a physical and radiographic examination. The examination were conducted at the Department of Small Animal Clinical Sciences, Norwegian College of Veterinary Medicine in the period 1987–1989. The dogs were divided into classes based on size and coat variety according to international cynological classification (Fiorone 1973).

Lateral radiographs were taken of the vertebral columns of 327 dachshunds which represented 16.1 % of all dachshunds registered with the NKC during the period 1986–1988. All dogs included in the radiographic survey were clinically normal and their ages ranged from 365 to 549 days with a mean of 423 days (SD = 35.8 days). There were 175 (53.5 %) females and the size and coat distribution is presented in Table 1. The study population had a similar sex-distribution to that of dachshunds registered with the NKC but the size and coat distribution contained too few wirehaired standards and too many longhaired dwarfs.

All dogs were sedated and radiographs were taken of the cervical, thoracic and lumbar column in lateral view. At least 4 exposures were taken of each dog using 13×18 cm rectangle x-ray cassettes. The total number of

calcified discs and their location in the vertebral column were recorded according to earlier described methods of examination (Burk & Ackerman 1986, Morgan & Silverman 1982). The pattern of calcification was noted to be central, dorsal, ventral or ring-like and all were included in the study.

Statistical analysis was done by testing the null-hypothesis, using chi-square test.  $p \leq 0.05$  was considered significant.

### Results

Calcified discs were identified in 79 (24.2 %) of the dachshunds (Fig. 1 and 2). However, after size- and coat-standardization the occurrence of calcified discs in Norwegian dachshunds was estimated to be 23.5 %.

The frequency of calcified discs did not differ among sexes. The occurrence of calcified discs in the different size and coat varieties of dachshunds is presented in Table 2. Within standard-sized dogs, the occurrence of calcified discs ranged from 9.1 % (longhaired) to 27.1 % (wirehaired) and this was found not to be a random distribution. Over all sizes, the risk of calcification was 1.48 times higher in longhaired and 1.78 times higher in wirehaired than in smoothcoated dachshunds.

Among longhaired dachshunds, the occurrence of calcified discs ranged from 9.1 %

Table 1. The distribution of 327 dachshunds into their size and coat varieties.

The number of dogs from each variety and the percentage it represents of all dogs examined are shown.

| Coat         | Size       |            |           | Total       |
|--------------|------------|------------|-----------|-------------|
|              | Standard   | Dwarf      | Kaninchen |             |
| Smoothcoated | 61 (18.7)  | 0 (0)      | 0 (0)     | 61 (18.7)   |
| Wirecoated   | 85 (26.0)  | 4 (1.2)    | 0 (0)     | 89 (27.2)   |
| Longhaired   | 77 (23.5)  | 98 (30.0)  | 2 (0.6)   | 177 (54.1)  |
| Total        | 223 (68.2) | 102 (31.2) | 2 (0.6)   | 327 (100.0) |

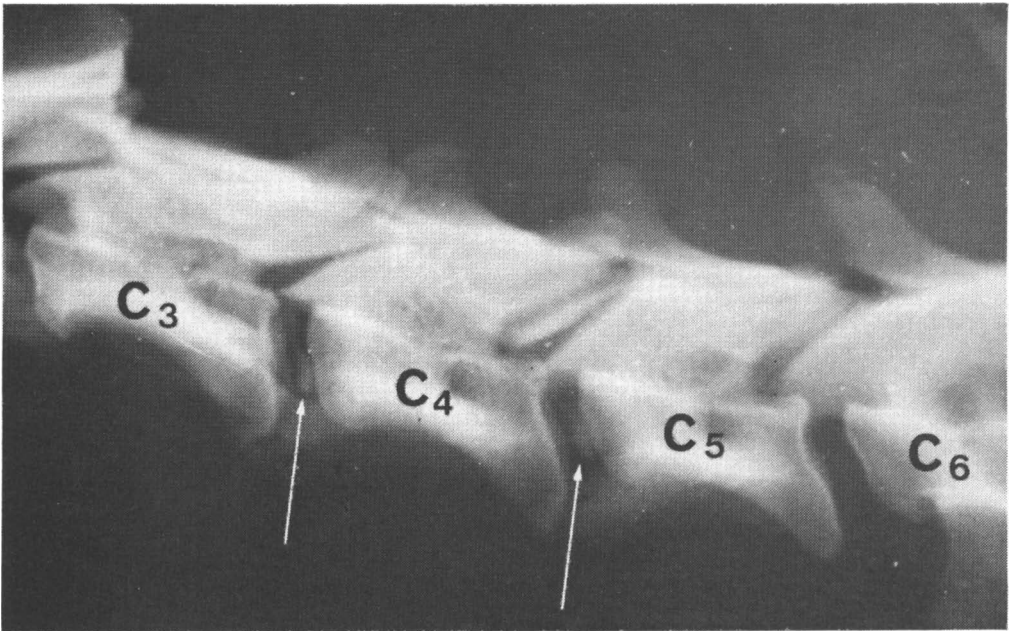


Figure 1. Wirehaired dachshund of standard size, 410 days old, with 2 calcified intervertebral discs in the cervical column (arrows).

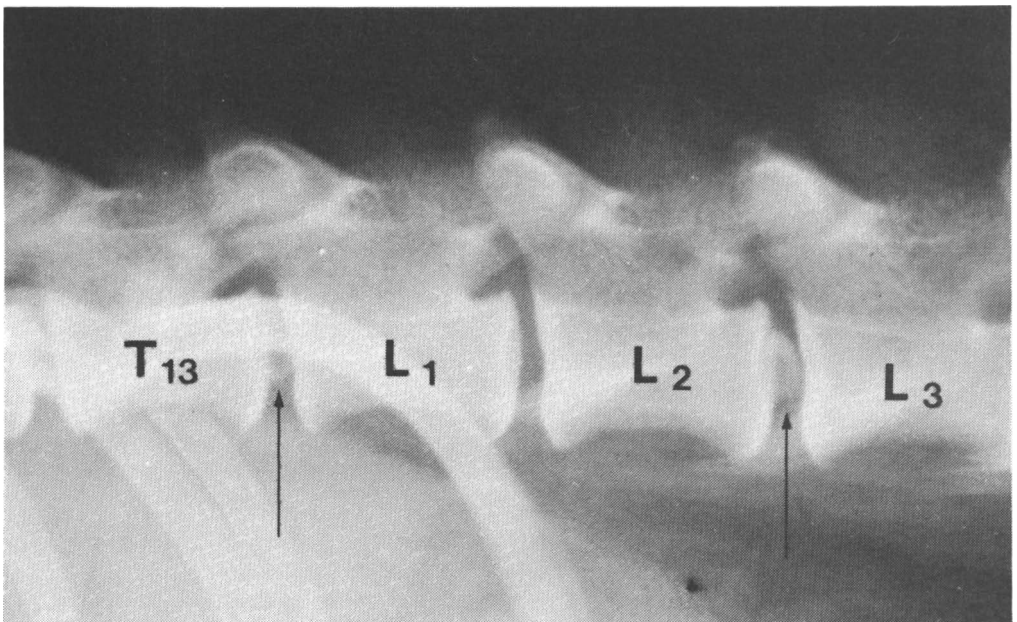


Figure 2. Wirehaired dachshund of standard size, 465 days old, with 2 calcified intervertebral discs in the thoracolumbal-column (arrows).

Table 2. The distribution of 79 affected dachshunds into their size and coat varieties.

The number of affected dogs from each variety and the percentage it represents of, firstly, all affected dogs and, secondly, all dogs of the same variety (*italics*; derived from number in Table 1) are shown.

| Coat         | Size     |        |           | Total   |
|--------------|----------|--------|-----------|---------|
|              | Standard | Dwarf  | Kaninchen |         |
| Smoothcoated | 10       | 0      | 0         | 10      |
|              | (12.7)   | (0)    | (0)       | (12.7)  |
|              | (16.4)   | -      | -         | (16.4)  |
| Wirehaired   | 23       | 3      | 0         | 26      |
|              | (29.1)   | (3.8)  | (0)       | (32.9)  |
|              | (27.1)   | (75.0) | -         | (29.2)  |
| Longhaired   | 7        | 34     | 2         | 43      |
|              | (8.9)    | (43.0) | (2.5)     | (54.4)  |
|              | (9.1)    | (34.7) | (100.0)   | (24.3)  |
| Total        | 40       | 37     | 2         | 79      |
|              | (50.7)   | (46.8) | (2.5)     | (100.0) |
|              | (17.9)   | (36.3) | (100.0)   | (24.2)  |

(standard) to 100.0 % (kaninchen). There was a significant size-difference in the presence of calcified discs when longhaired standards were compared to longhaired miniatures (i.e. dwarfs plus kaninchen). Over all coat varieties and relative to the occurrence in standards, the relative risk of calcification was 2.0 in dwarfs and 5.6 in kaninchen.

A total of 179 calcified discs were found in 79 dogs. The number of calcified discs in each affected dog ranged from 1 to 11 (Fig. 3) with a mean of 2.3 (SD = 1.9). Calcification was identified in each cervical, thoracic and lumbar intervertebral disc other than T1-2. The distribution of affected discs (Fig. 4) was non-random and the only section of the vertebral column with 10 or more calcified discs per intervertebral space was T10-13.

### Discussion

The Dachshunds radiographed in this study

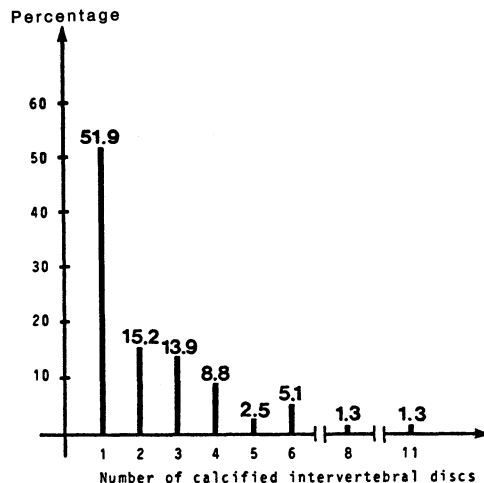


Figure 3. Seventynine dachshunds distributed (percentage) by number of calcified intervertebral discs.

came mainly from Oslo and its surrounding districts and the predominance of pet dogs in this area could explain the differences in composition between the study population

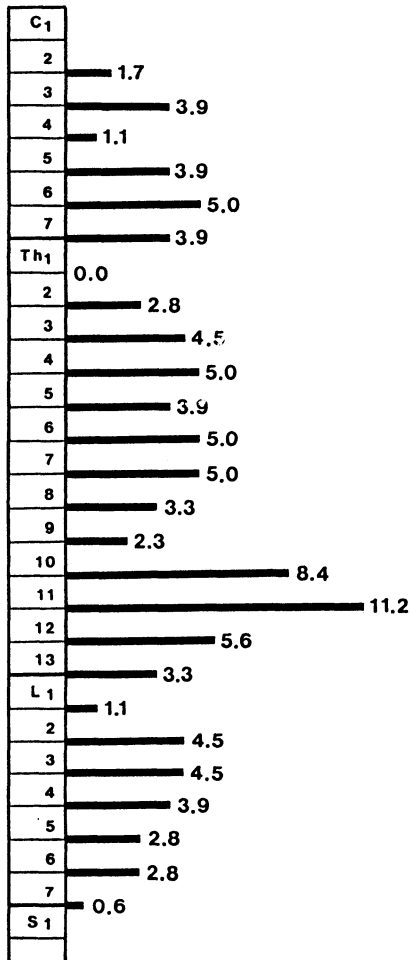


Figure 4. The percentage distribution of 179 calcified intervertebral discs in 79 affected dachshunds. The atlanto-axial joint (C1-2) does not contain an intervertebral disc.

and all dachshunds registered with the NKC. In Norway, wirehaired standard-sized dachshunds are mainly used as hunting dogs while longhaired dwarfs are usually kept as pets.

In the dachshund IDD is mainly caused by discs which have begun to calcify within 12 months of age (Havranek-Balzaretti 1980). Thus, the 23.5 % of dachshunds estimated to

have calcified discs would be the IDD-risk population. A 19 % occurrence of IDD (Ball *et al.* 1982) would suggest that 81 % of the population at risk will develop clinically significant disc disease. In a previous study Havranek-Balzaretti (1980) found that 79 % (49/62) of dachshunds with calcified discs developed IDD.

The occurrence of calcified discs varied between dachshunds of different coat and size variety and probably has a genetic basis (Oliver *et al.* 1987). The observed differences with coat and size variety may represent true differences in the dachshund population. The restricted geographical origins of the surveyed dogs and the possible influence of a few abnormal dog-families should however be considered. While both population and family factors have probably contributed in this study, the former would be expected to be of greater importance, because dachshunds are a genetically heterogeneous group with regard to coat and size (Palmer 1985, Wallerstedt 1988). Differences observed in the occurrence of IDD in various breeds of dachshunds (Funkquist & Henricson 1969, Priester 1976) may also be contributing to differences in the calcification of intervertebral discs. The influence of dog-families on the calculated occurrence of calcified discs in the Norwegian dachshund would be less than on the occurrence in the different varieties as the larger number of dogs in the total sample population would reduce the contribution of individual families.

In the 79 affected dogs the average number of calcified discs was 2.3 which is less than the average of 11.7 that would be expected if dystrophic calcification took place in 30–60 % of the 26 intervertebral discs (7.8–15.6) (Hansen 1966). A number of causes could be responsible for this disparity although, differences in diagnostic methods

(radiographic versus pathologic study) may be significant.

The caudal part of the thoracic vertebral column was found to have the highest occurrence of calcification. Between the 10th thoracic and 1st lumbar vertebra, 51 calcified discs (28.5 %) were found, however in this section, 55.4 % of all canine disc lesions have been reported to occur (*Oliver et al.* 1987). As the majority of dogs with IDD are dachshunds, the presence of calcified discs would not appear to be the only significant factor in the development of IDD.

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#### Sammendrag

*Forkalkede intervertebralskiver hos dachshund. En røntgenologisk undersøkelse av 327 unge hunder.*

Virvelsøylen til 327 klinisk normale dachshunder i alderen 12–18 måneder ble undersøkt røntgenologisk. Hundene utgjorde 16.1 % av samtlige dachshunder registrert i Norsk Kennel Klub i perioden 1986–1988. Forkalkede intervertebralskiver ble påvist hos 79 (24.2 %) av hundene. Hos disse var fra 1 til 11 skiver forkalket, med gjennomsnitt på 2.3. Forkalkede skiver ble estimert til å forekomme hos 23.5 % av norske dachshunder.

For hundene med standard-størrelse var forekomsten av forkalkede skiver høyere hos strihår (27.1 %) enn hos glatt- (16.4 %) og langhår (9.1 %). For langhårsvarianten var også forekomsten høyere hos dverg- og kanin-størrelsene (36.0 %) enn hos standard-størrelsen (9.1 %).

Forkalkning ble påvist i samtlige cervicale, thoracale og lumbale intervertebralskiver bortsett fra T1-2. Bakre del av thoracalcolumna ble funnet å være vanligste lokalisasjon for forkalkede skiver.

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