

# Intervertebral disc disease

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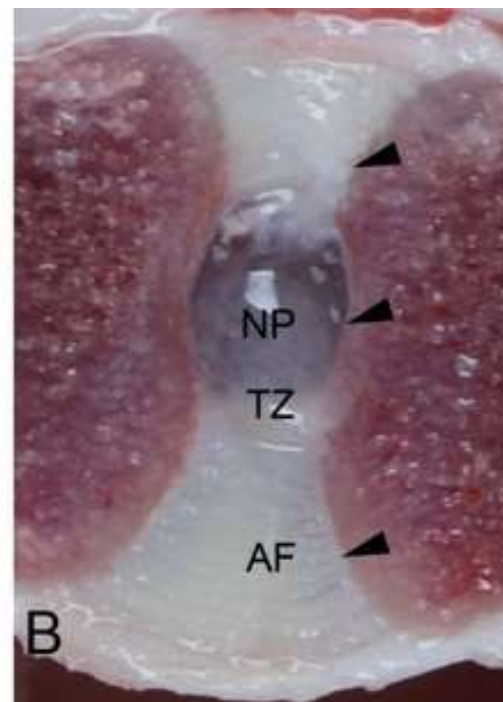
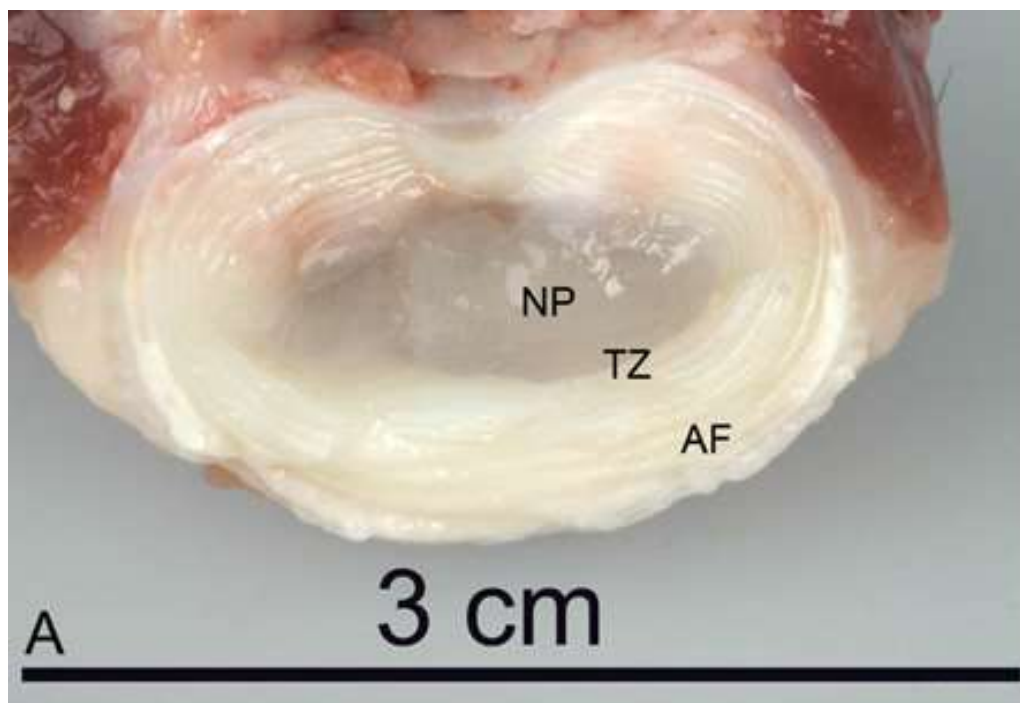
# Scope of lecture

- The intervertebral disc (IVD)
- The IVD in the chondrodystrophic dog
- Clinical signs and prognosis
- Non surgical management
- Surgical management
- Genetics
- Prevention



# The intervertebral disc

picture acknowledgement Niklas Bergknut



The Veterinary Journal 195 (2013) 282-291

Intervertebral disc degeneration in the dog. Part 1: Anatomy and physiology of the intervertebral disc and characteristics of intervertebral disc degeneration

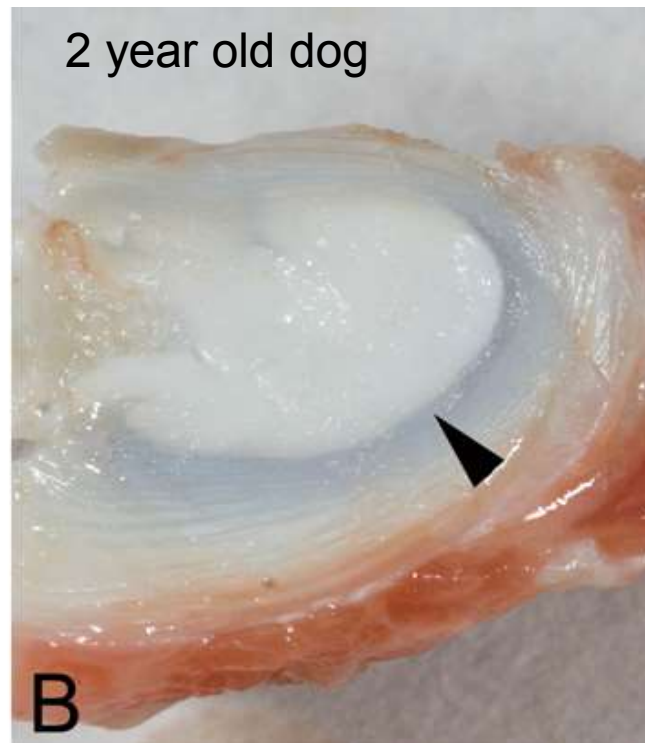
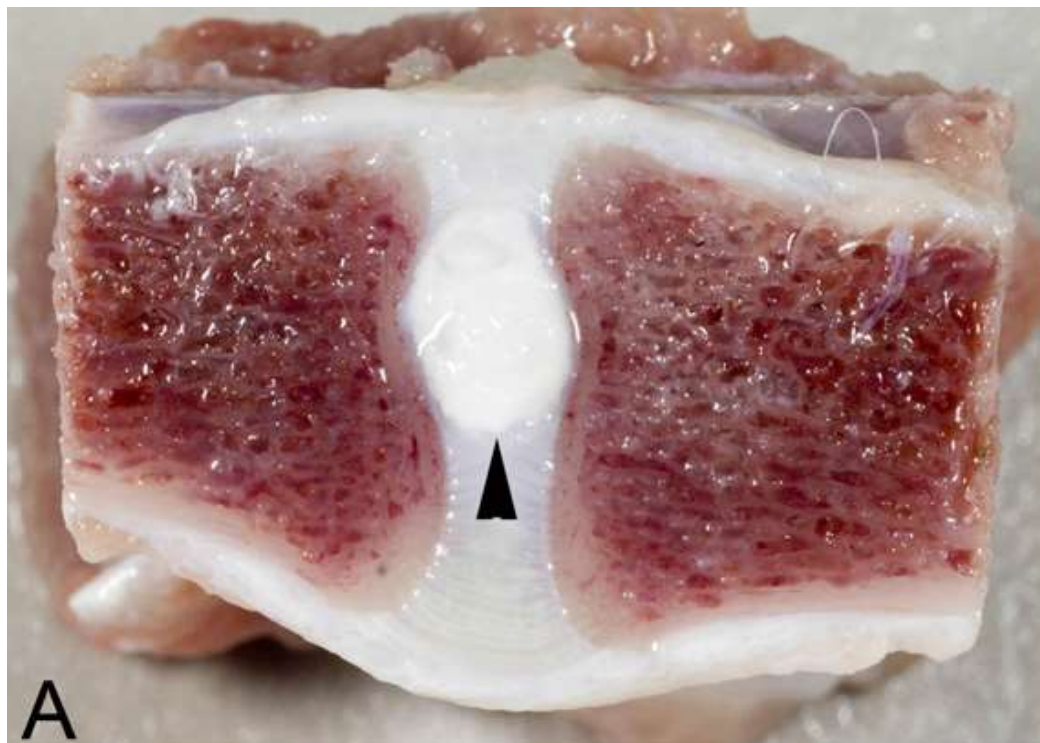
Niklas Bergknut<sup>a,b,\*,1</sup>, Lucas A. Smolders<sup>a,1</sup>, Guy C.M. Grinwis<sup>c</sup>, Ragnvi Hagman<sup>b</sup>, Anne-Sofie Lagerstedt<sup>b</sup>, Herman A.W. Hazewinkel<sup>a</sup>, Marianna A. Tryfonidou<sup>a</sup>, Björn P. Meij<sup>a</sup>





# Chondrodystrophic disc

picture acknowledgement Niklas Bergknut



The Veterinary Journal 195 (2013) 292-299

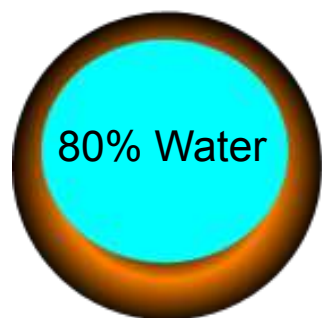
Intervertebral disc degeneration in the dog. Part 2: Chondrodystrophic and non-chondrodystrophic breeds

Lucas A. Smolders<sup>a,\*</sup>, Niklas Bergknut<sup>a,b,1</sup>, Guy C.M. Grinwis<sup>c</sup>, Ragnvi Hagman<sup>b</sup>, Anne-Sofie Lagerstedt<sup>b</sup>, Herman A.W. Hazewinkel<sup>a</sup>, Marianna A. Tryfonidou<sup>a</sup>, Björn P. Meij<sup>a</sup>

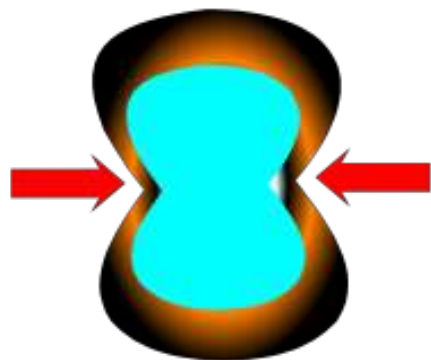


# Hansen type I disc disease

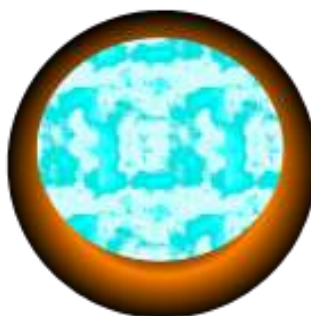
## Hansen type I disc degeneration



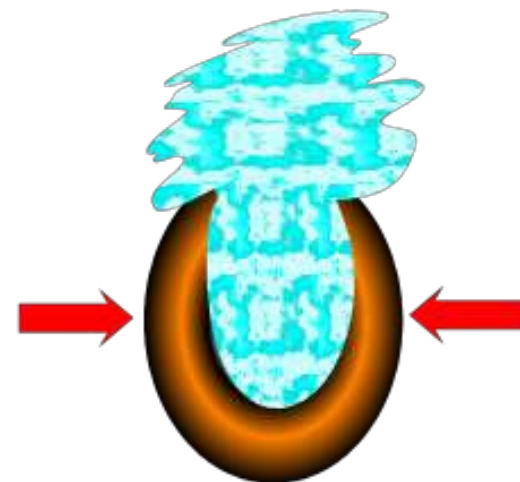
Normal disc has a fibrous outer coat and a jelly centre



Normal disc deforms under pressure - acting as a shock absorber



Centre of disc in chondrodystrophic dogs like Dachshund and Bassett Hound dehydrate, degenerate and calcify



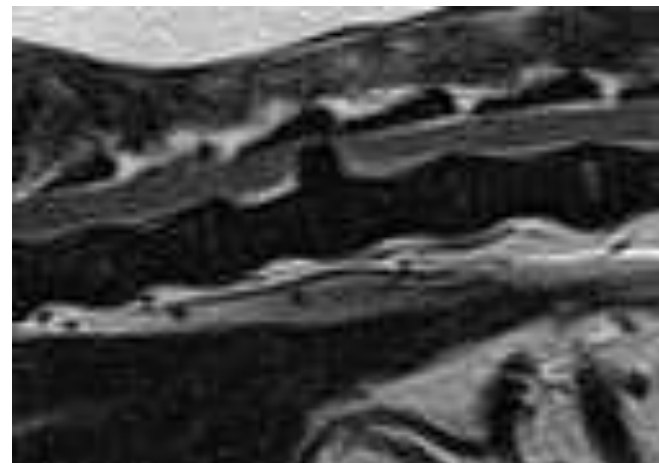
Disc is no longer able to deform under pressure  
The outer layer tears and the inner contents burst out compressing and damaging the spinal cord above



# Chondrodystrophic dogs

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- Nucleus pulposa (NP) is smaller
- NP is eccentric (more dorsal)
- NP degeneration can be observed at 3-4m
  - becomes replaced by chondrocyte cells
- NP dehydration complete at 1y
  - 75% cervical
  - 100%, thoracic
  - 93.8% lumbar
- Disc extrusion from 2y

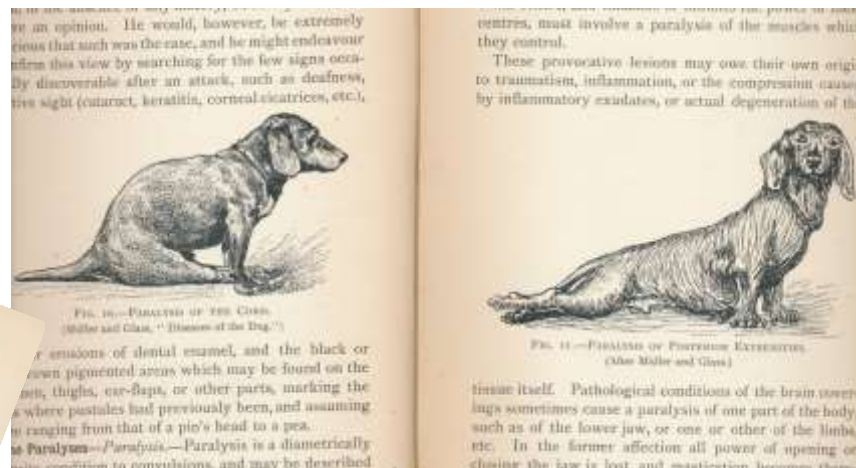






# IVDD – not a new disease

1922



1<sup>st</sup> report - Janson, 1881  
chondroma mass compressing spinal cord

1<sup>st</sup> correct report - Tillmanns, 1939  
extrusion of nucleus pulposa

1<sup>st</sup> good description – Hansen 1952  
Hansen type I and type II description



# Fitzpatrick Referrals

## excellence in spinal surgery

### Surgery for thoracolumbar IVDD

- 2012
  - 244 dogs
  - 67/244 Dachshunds (27.46%)
- 2011
  - 264 dogs
  - 55/265 Dachshunds (20.83%)
- i.e. Dachshunds ~ 1/4 surgical case load and at least 1 / week



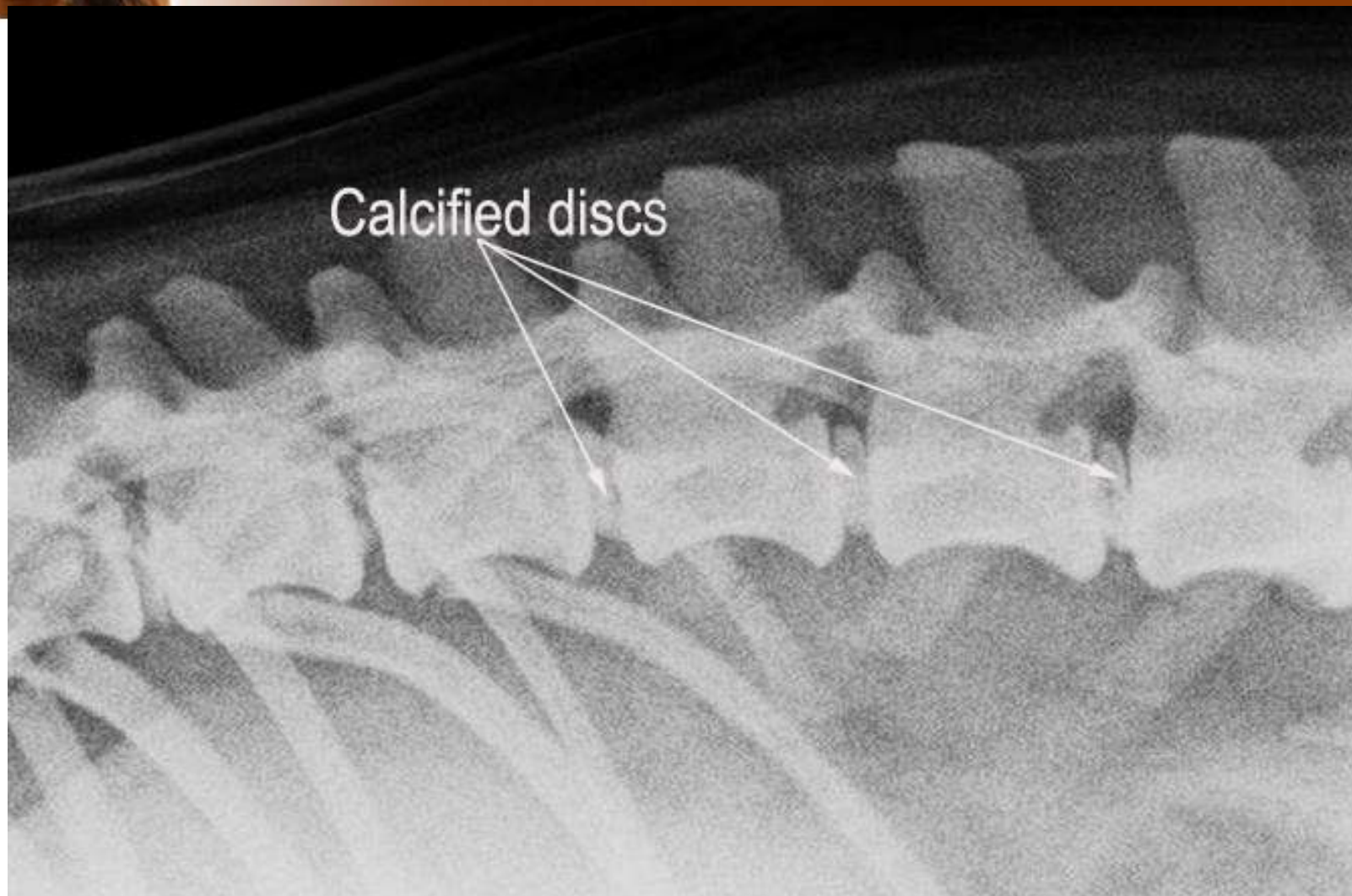


# Grading of spinal cord injury

- Grade 1 Pain
- Grade 2 Pain, paraparesis (walking)
- Grade 3 Pain, paraparesis (not walking) or paraplegia
- Grade 4 Pain, paraplegia and urinary incontinence
- Grade 5 Paraplegia, urinary incontinence and loss of deep pain perception  
poorer prognosis and surgical emergency



# Diagnosis - radiographs





# Disc Calcification chondrodystrophic dogs

- Calcified discs are more likely to herniate
- 1 year of age
  - 31.2% cervical, 62.5% thoracic, 43.8% lumbar
- Steady state / maximum at 24–27 months
- Screening?
  - Radiographs entire spine at 24–42 months
  - Dachshunds with 5 calcified discs excluded from breeding (Denmark)
  - Lucas terriers (UK)



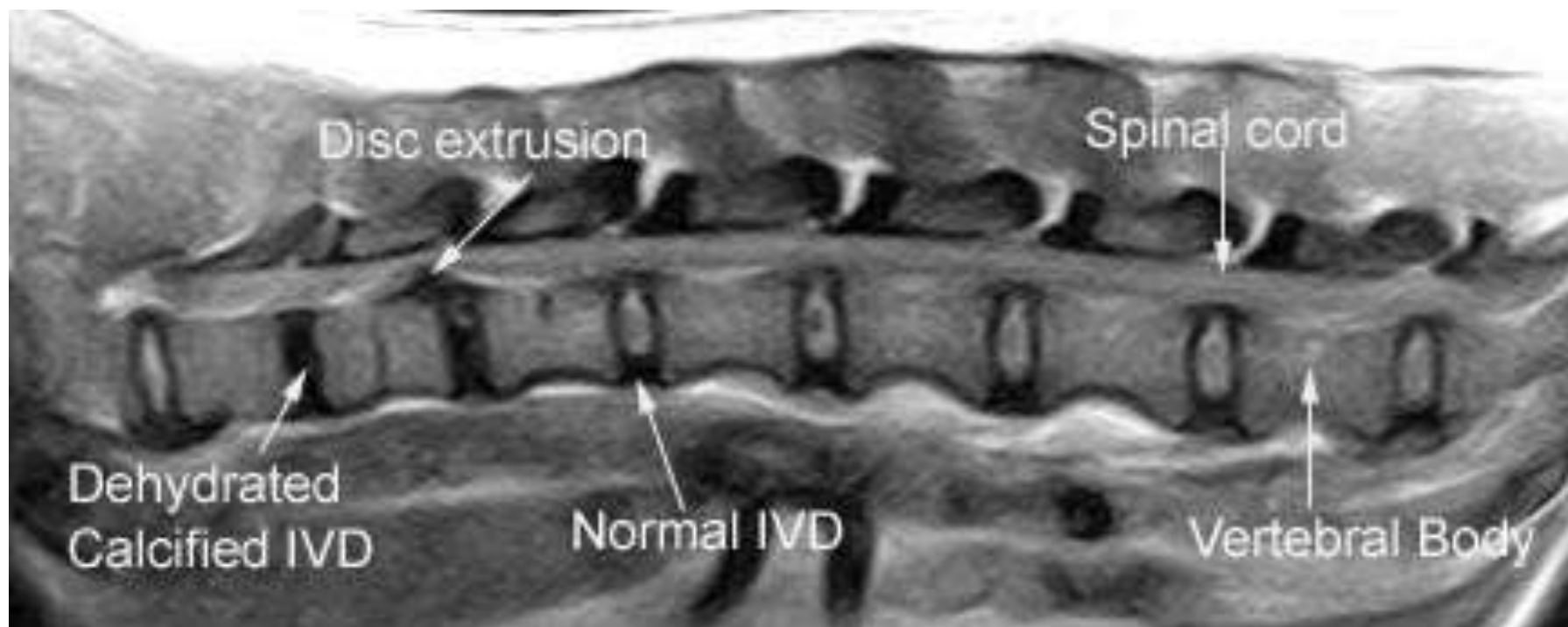
# Diagnosis - myelogram







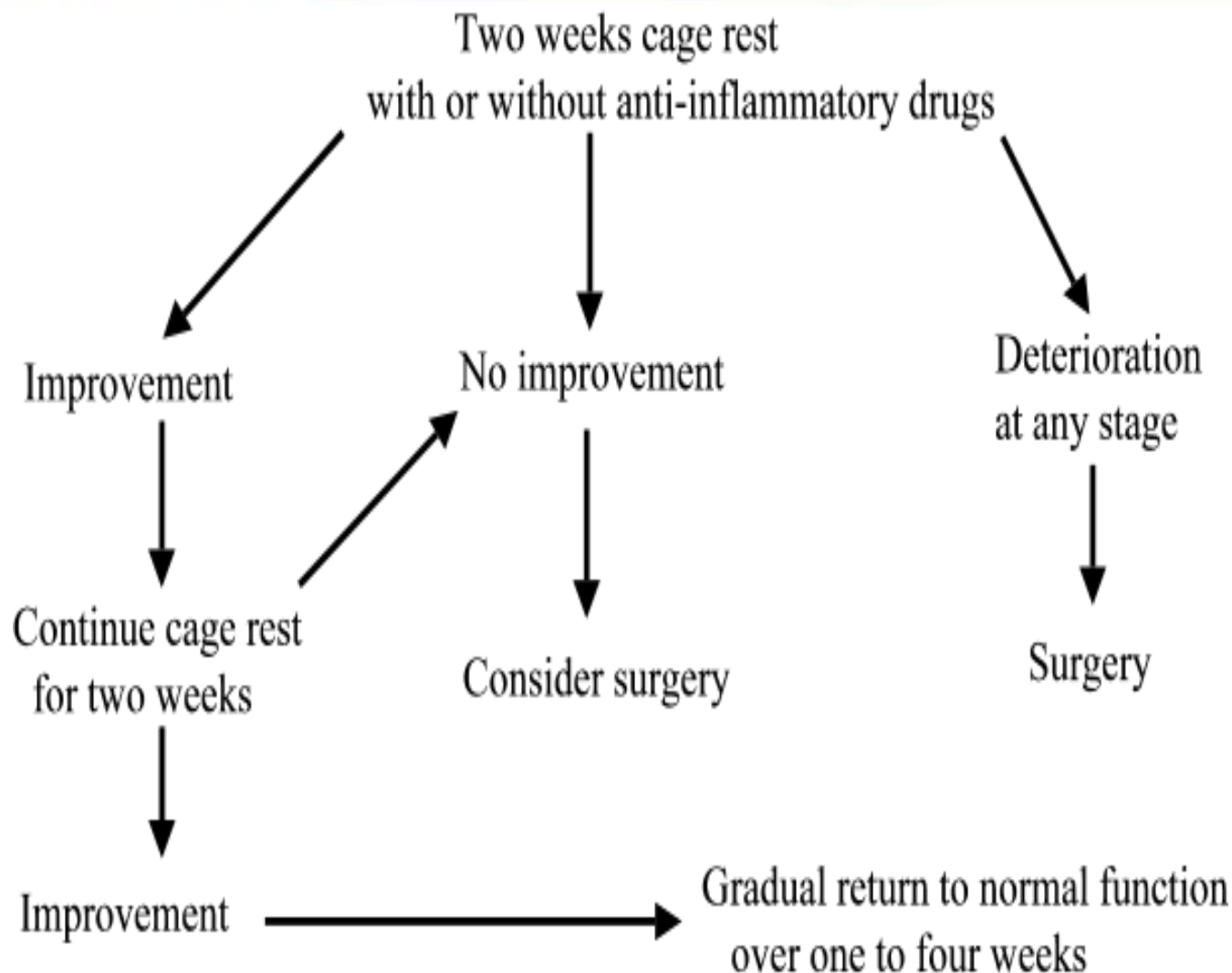
# Diagnosis – MRI





# Non surgical management

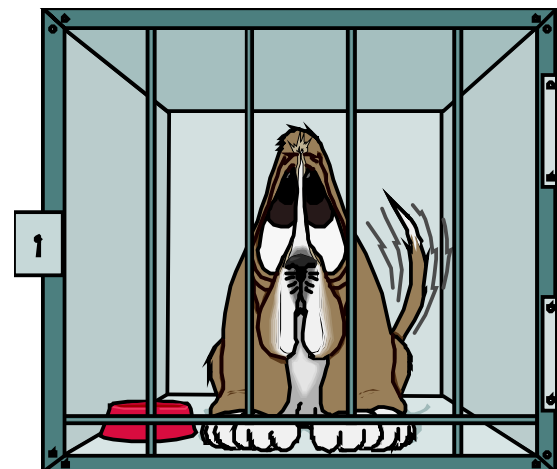
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# Non-surgical management

- Indicated
  - Grades 1-2
  - May be success up to grade 4.
  - Grade 5 cases are a surgical emergency
- Advantages
  - Comparatively inexpensive
  - Does not require specialised equipment or expertise
- Disadvantages
  - A high rate of recurrence
  - Higher chance of deterioration
  - Higher chance persistent neurological deficits
  - Diagnostic tests may not be performed





# Non-surgical management

- Hansen type I - Restriction of movement
  - limits further IVD extrusion / exacerbation of injury.
  - natural healing process repairs damaged spinal cord
- Painkillers
  - Must restrict!
  - NSAIDs (e.g. Previcox), opioids or gabapentin (Neurontin)







# Surgery – Fenestration

- Easy, quick, no specialised equipment
- Prophylactic?
  - disc material in vertebral canal remains
  - not suitable for large spinal cord compression
- Nuclei pulposus
  - removed (?) through small window in annulus fibrosis.
  - T11/T12 to L3/L4

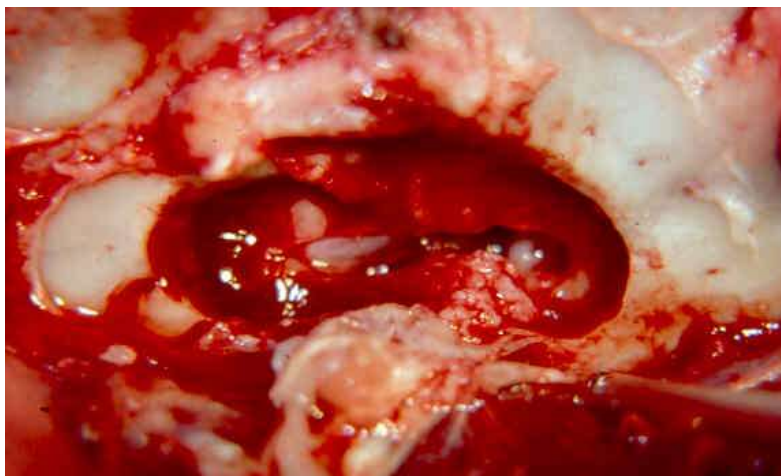




# Surgery – Hemilaminectomy

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- Hole made (with drill) into vertebral canal
- Extruded disc material removed
- Technically difficult
- Requires specialised equipment & training





# Physiotherapy

Inactivity and recumbency results in decreased joint movement and muscle contracture.

Short walks with support (if not cage rested)

Referral to chartered physiotherapist

specialised techniques e.g. laser therapy

exercise program

e.g. to improve joint position sense & core strength







# Physiotherapy & Rehabilitation







# Cart rehabilitation



Kerdog rehabilitation cart





# Neurogenic bladder

## Pharmacological aids for neurogenic bladder

- Diazepam 2-10mg 3x daily
- Phenoxybenzamine 0.5mg/kg 3x daily

Bladder expression 3x daily 20-30 mins after drugs





# Stem cell therapy?

## Nose cell transplant enables paralysed dogs to walk

COMMENTS (240)



Jasper the dachshund walking again

**Scientists have reversed paralysis in dogs after injecting them with cells grown from the lining of their nose.**

The pets had all suffered spinal injuries which prevented them from using their back legs.

The Cambridge University team is cautiously optimistic the technique could eventually have a role in the treatment of human patients.

The study is the first to test the transplant in "real-life" injuries rather than laboratory animals.

In the study, funded by the Medical Research Council and published in the **neurology journal Brain**, the dogs had olfactory ensheathing cells from the lining of their nose removed.





# Genetics

- Severe disc degeneration with calcification highly heritable 0.47–0.87
  - Jensen and Christensen 2000
- What does that actually mean?
  - You could breed away from it if you knew what to select for
  - Selection based on tendency for calcification may reduce disc disease but not change breed characteristics
  - Is influenced by other (environmental) factors





# Genetics

- locus on chromosome 12
- Program to collect DNA from confirmed cases and 10y dogs with no hx IVDD

*Journal of Heredity* 2011;102(S1):S81–S86  
doi:10.1093/jhered/esr021

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## **Genome-Wide Association Study in Dachshund: Identification of a Major Locus Affecting Intervertebral Disc Calcification**

METTE SLOTH MOGENSEN, PETER KARLSKOV-MORTENSEN, HELLE FRIIS PROSCHOWSKY, FRODE LINGAAS, ANU LAPPALAINEN, HANNES LOHI, VIBEKE FRØKJÆR JENSEN, AND MERETE FREDHOLM

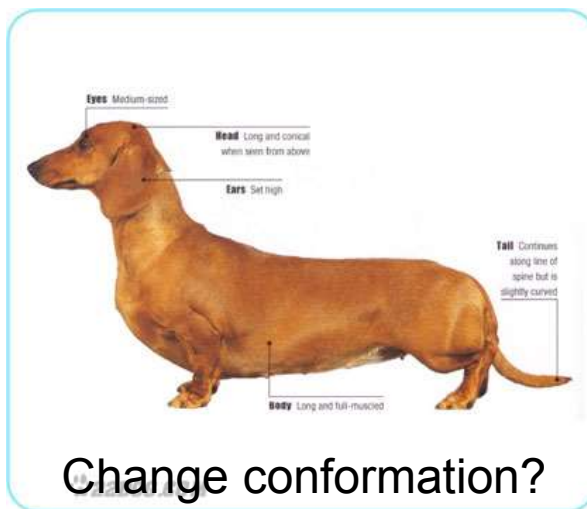


# Prevention?



Optimise diet ??

Optimise activity ?



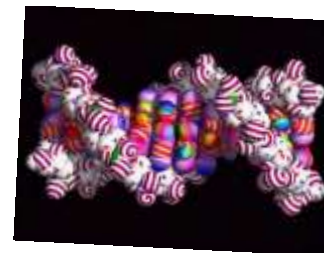
Change conformation?



Optimise body condition ?



Improve core strength?



Find the gene?



# Summary

- IVVD is a significant problem
  - 1 in 10 Dachshund deaths are due to neurological disease (11%)  
Purebred Dog Health Survey for Dachshunds (UK Kennel Club)
  - More of a problem in smooths?
    - 15.3% prevalence rate
    - Dachs-Life May 2012: Page 22
- We need to work together to improve the health and welfare of our dogs



**Thank you for  
listening!**

**Any questions**

