

# Neurografía por RM del Plexo Braquial y Lumbosacro



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*Mae de Deus Hospital - Porto Alegre - Brazil*

# Diagnosis of Nerve Injury

- Historically electrophysiological evaluation has been considered the mainstay of diagnosis.
- Today, **MR Neurography**, plays an increasingly important role in the work-up of neuropathies.



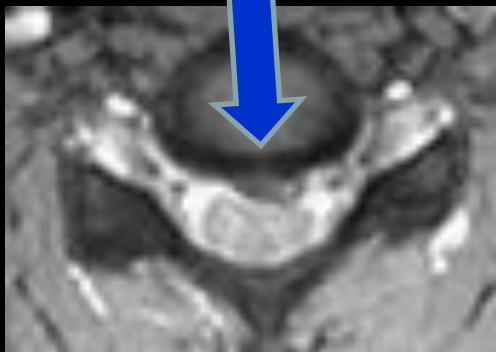
# MR Neurography

- MR Imaging dedicated to Nerves
- T2-weight, Diffusion and DTI
- Indications in Brachial and Lumbosacral Plexus:
  - Radiculopathies
  - Neuropathies
  - Post Operative
  - Pain of Unknown Location



# MR Neurography

1.5 T

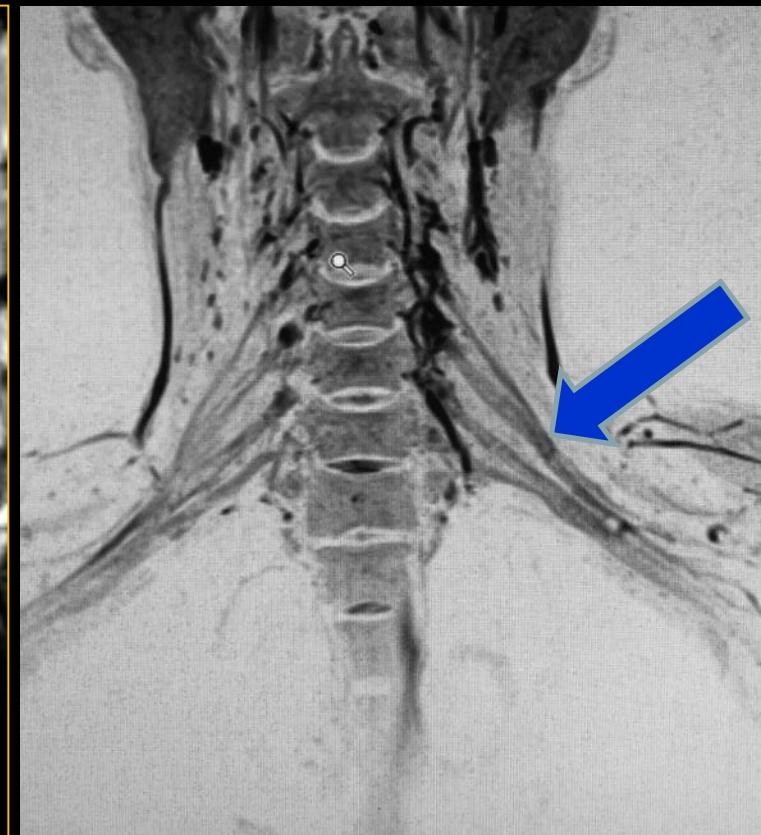


Disc Protrusion

T2-weighted (STIR SPACE 3D)



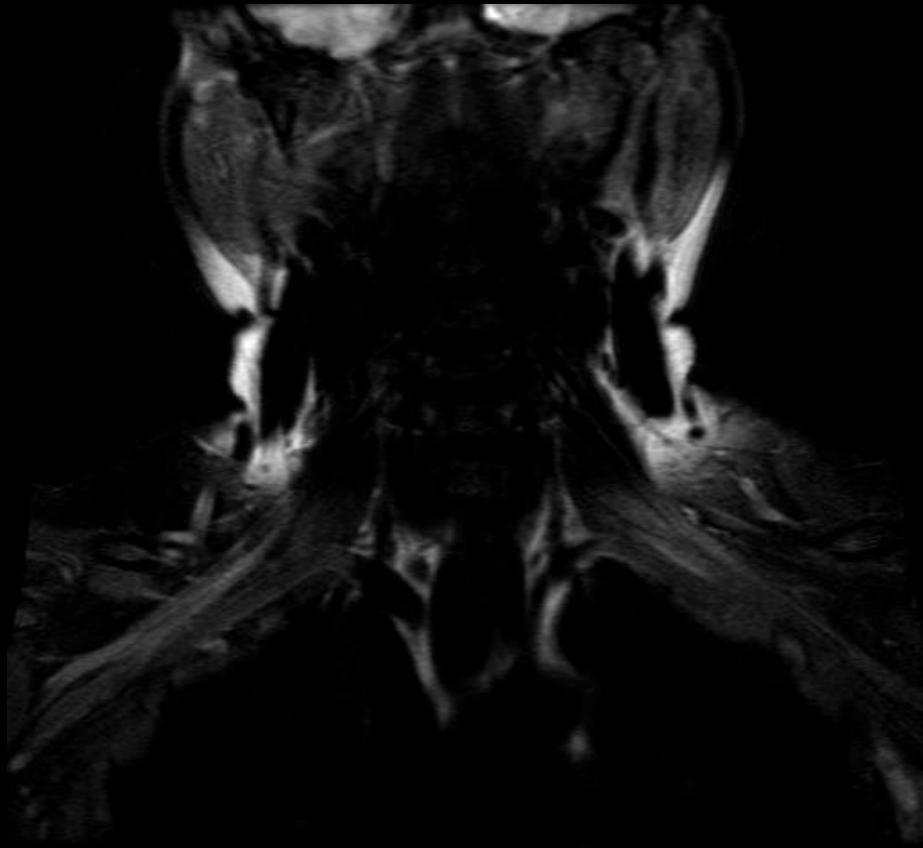
3T Isotropic 0.9mm



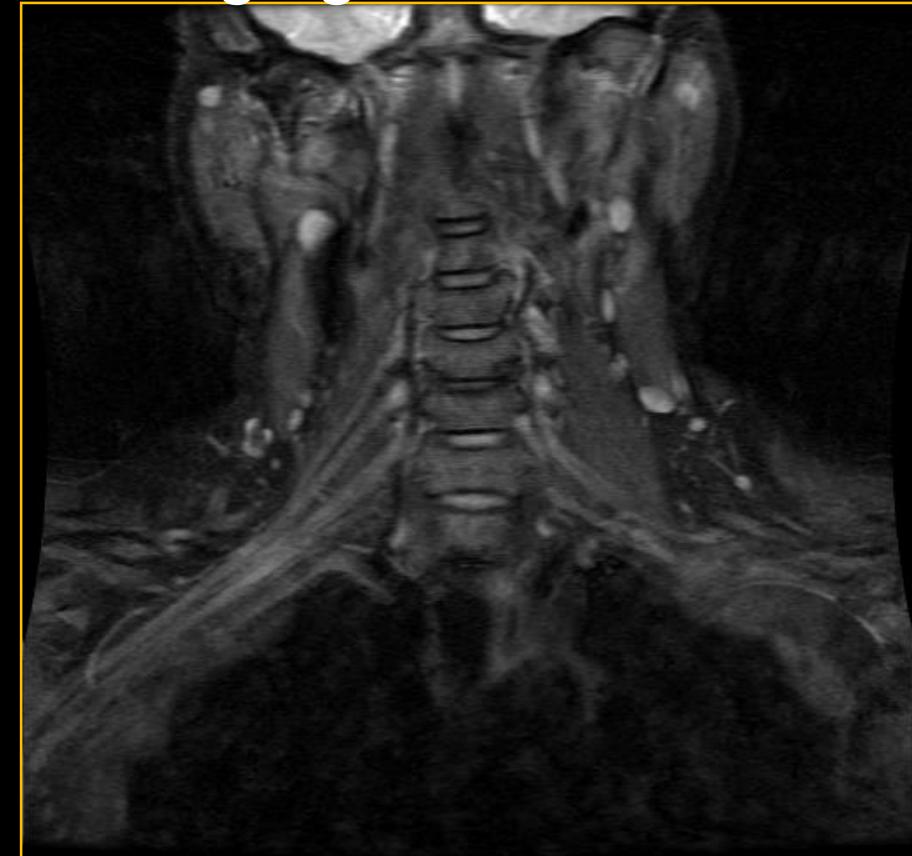
MRN STIR + MIP 10mm + MPR

# MR Neurography

## *1.5 T Fat/Water Imaging*



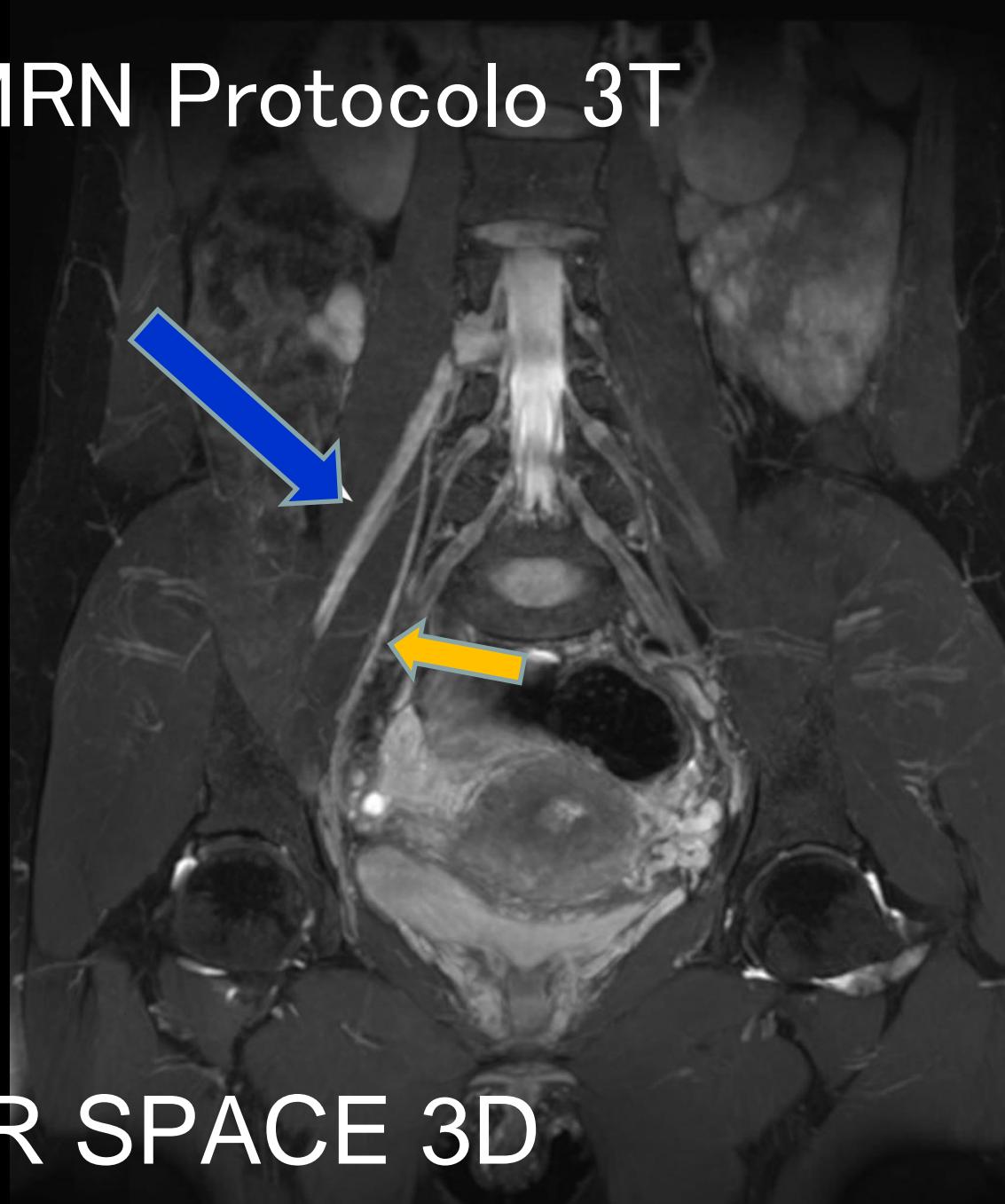
Fat-Sat FSE



IDEAL FSE

courtesy of John Carrino HSS NY

# MRN Protocol 3T



STIR SPACE 3D

Courtesy Dr Chabra, Dallas.

# MR Neurography

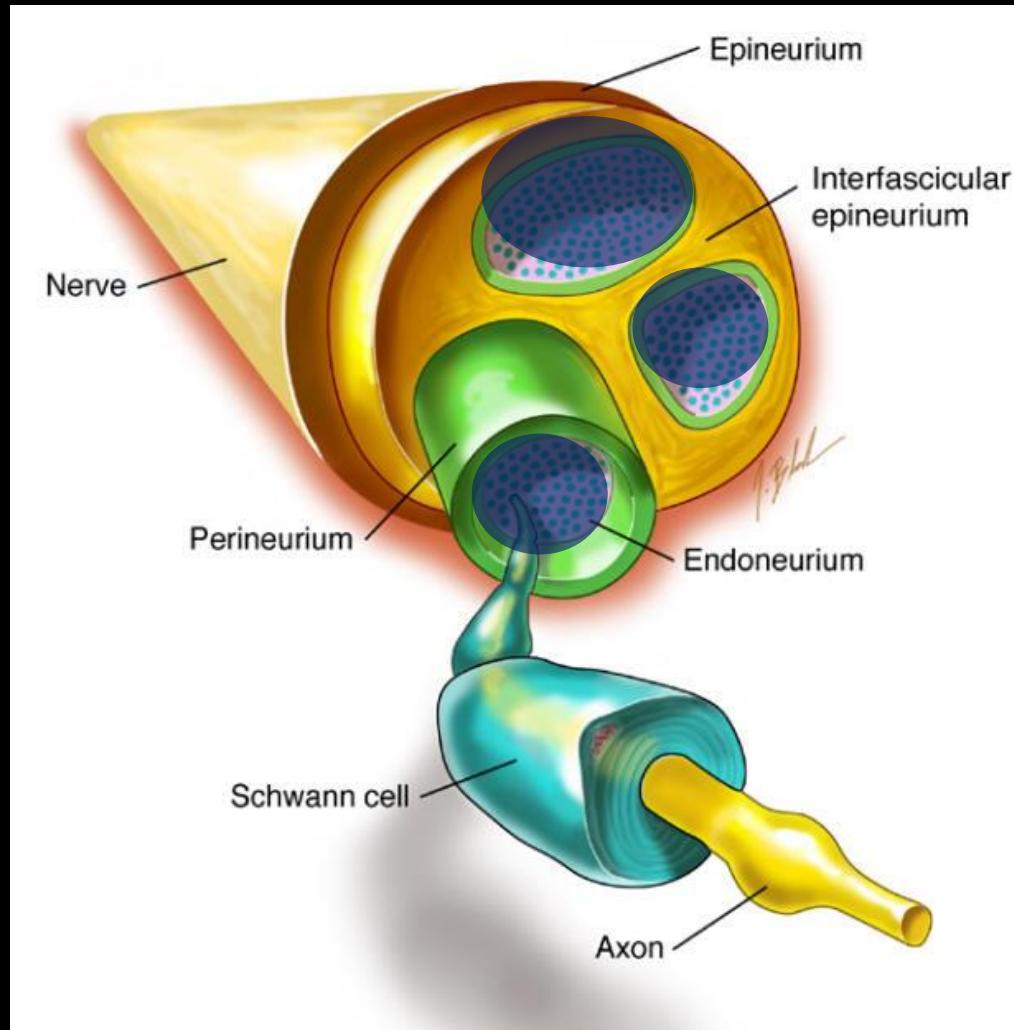
## Physics

### Endoneurial Fluid

Protein ↓ = (long T2)

Nerve damage

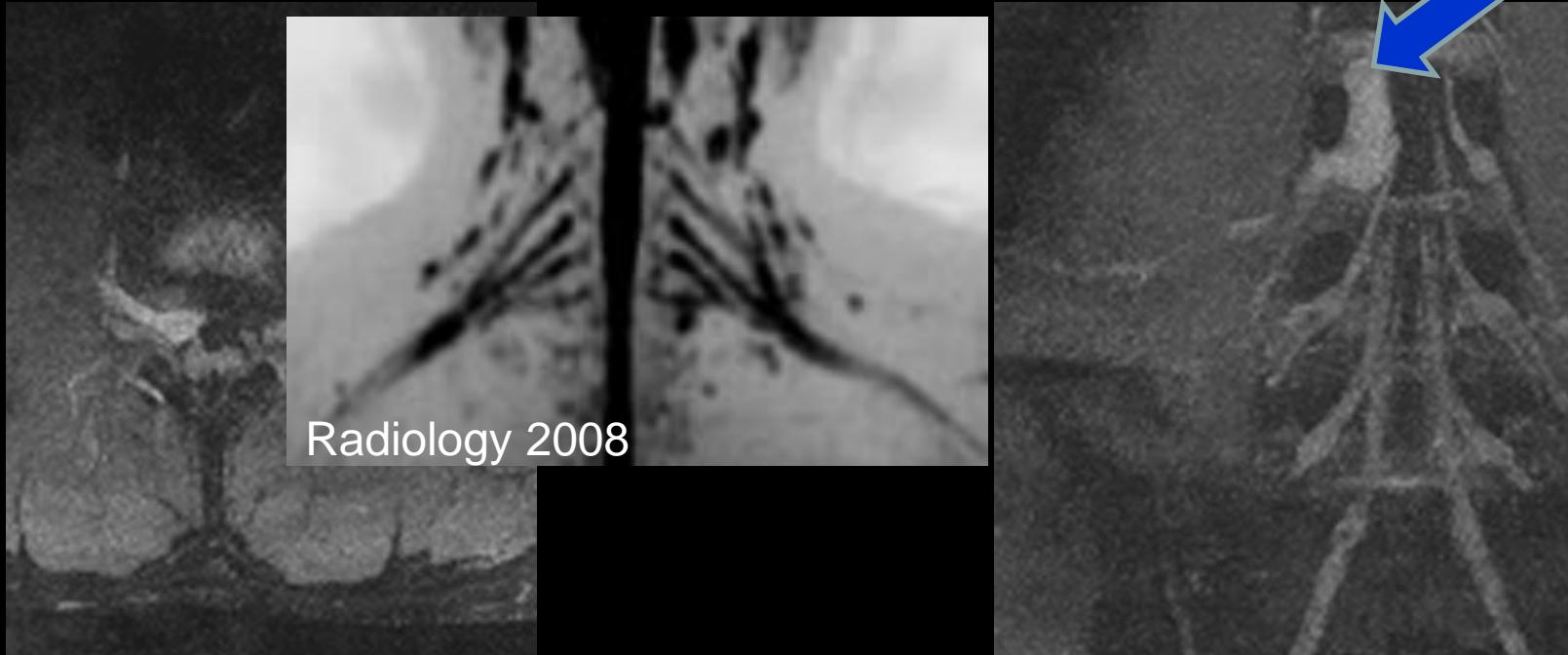
↑ fluid endoneurial



# MR Neurography

## Diffusion weighted

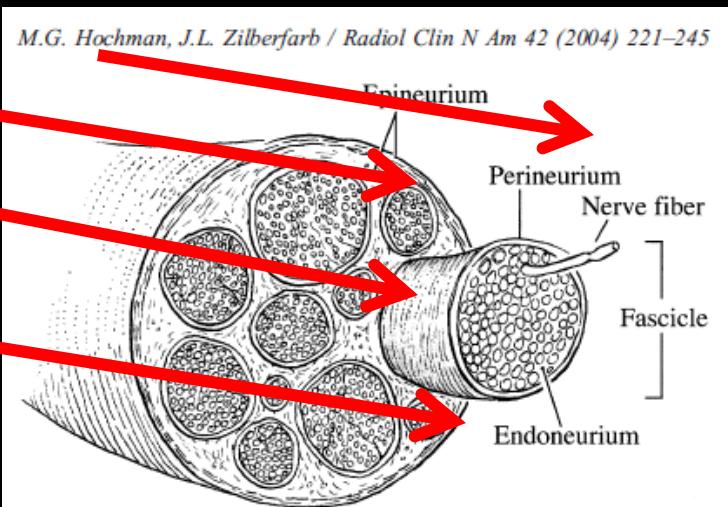
- PSIF axial com MPR e MIP (10mm)
  - 2.5mm or 1mm axial (3-5 min)



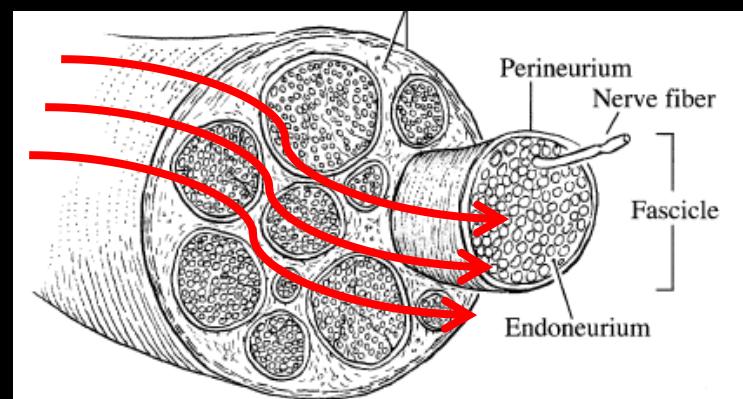
# Increase in Diffusion

- Neural Edema
- Permeability
- Rupture of do endoneurium with pressure increase
- **Desmyelination**, isquemia, Walleriana deg

Nerv: Normal



Nervo: Compressed



Water molecules movement alteration



# NIH Public Access

## Author Manuscript

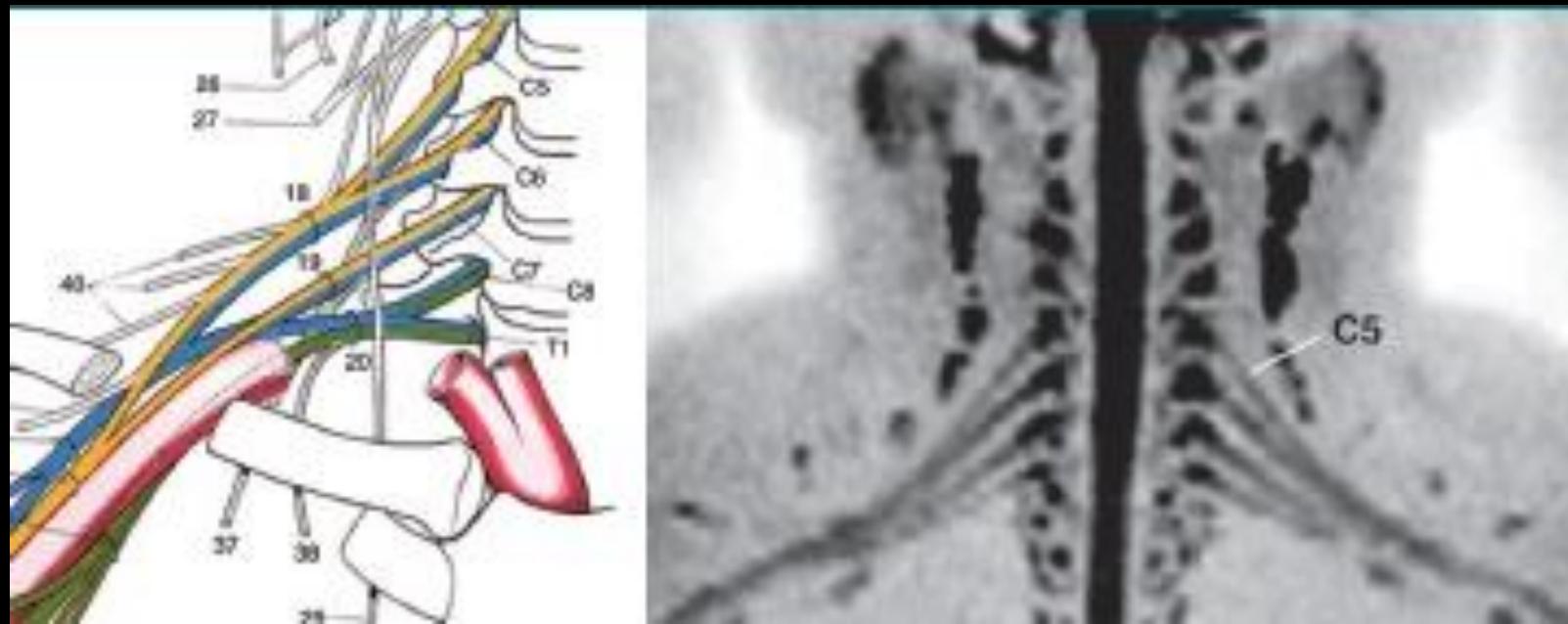
*Neurosurgery*: Author manuscript; available in PMC 2010 October 1.

Published in final edited form as:

*Neurosurgery*. 2009 October ; 65(4 Suppl): A29–A43. doi:10.1227/01.NEU.0000351279.78110.00.

## MR Neurography and Diffusion Tensor Imaging: Origins, History & Clinical Impact of the first 50,000 cases with an Assessment of Efficacy and Utility in a Prospective 5,000 Patient Study Group

Aaron Filler, MD, PhD, FRCS  
Neurography Institute, Santa Monica, CA



# Whole-Body Magnetic Resonance Neurography

Yamashita T, M.D. *Tokai University Kanagawa, Japan*

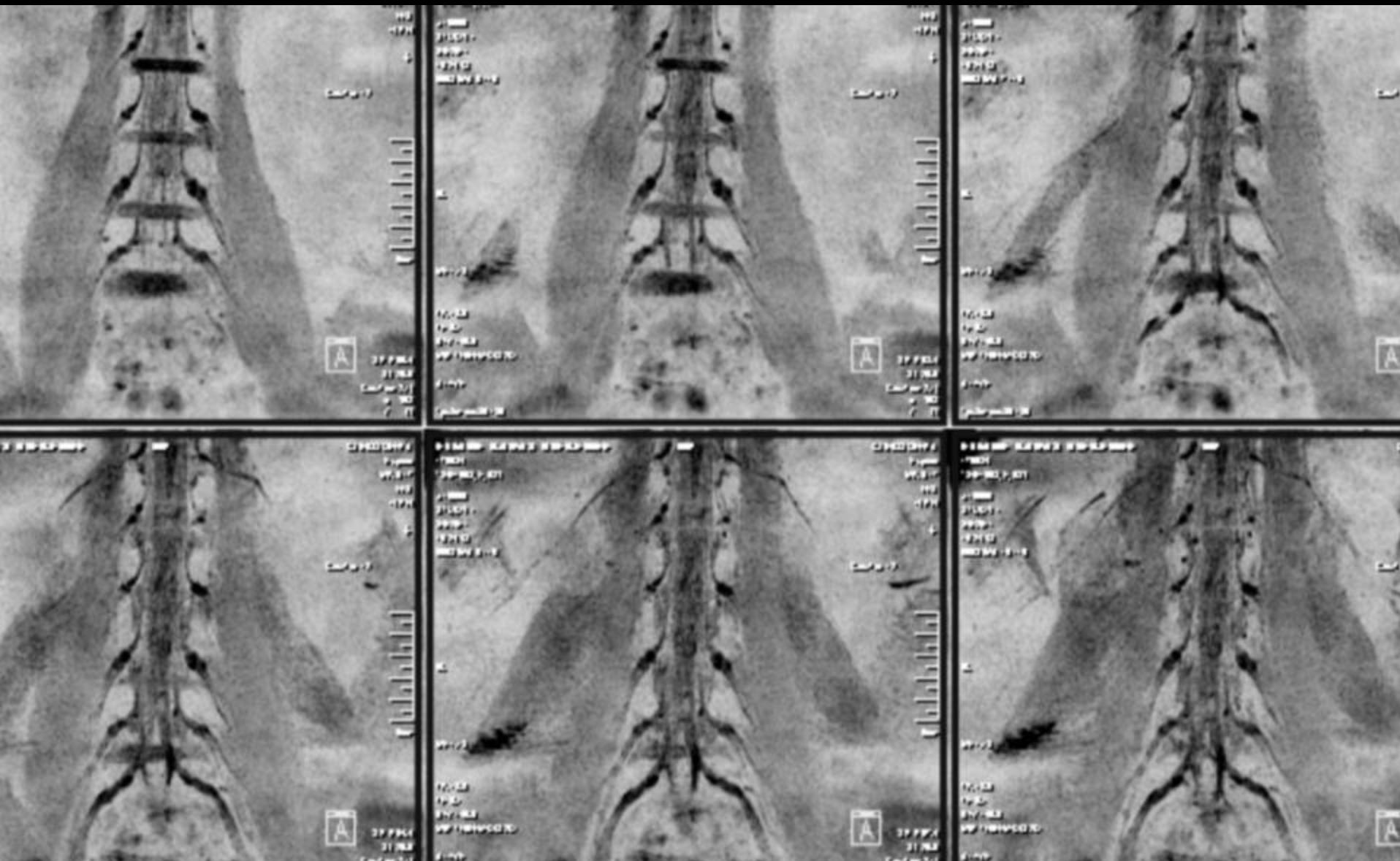
Kwee T, M.D. *University Utrecht, Utrecht, the Netherlands*

NEJM 2010



healthy 23-year-old  
male volunteer

73-year-old man  
with chronic  
inflammatory  
demyelinating  
polyneuropathy  
(CIDP)

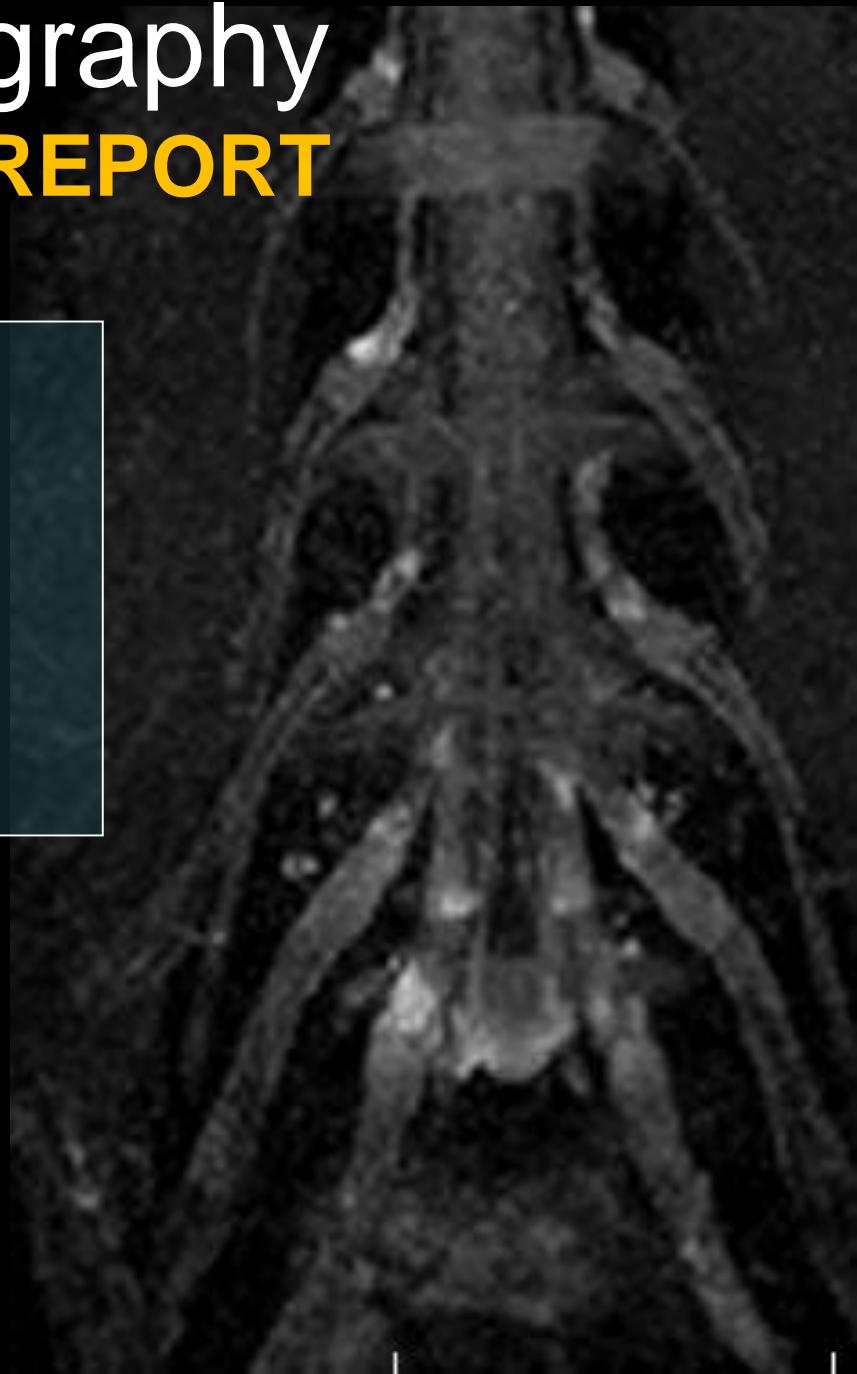


9.9.2012 – CLINOSON- POA, presented Singapore 2012 NeuroAsia Congress

# MR Neurography

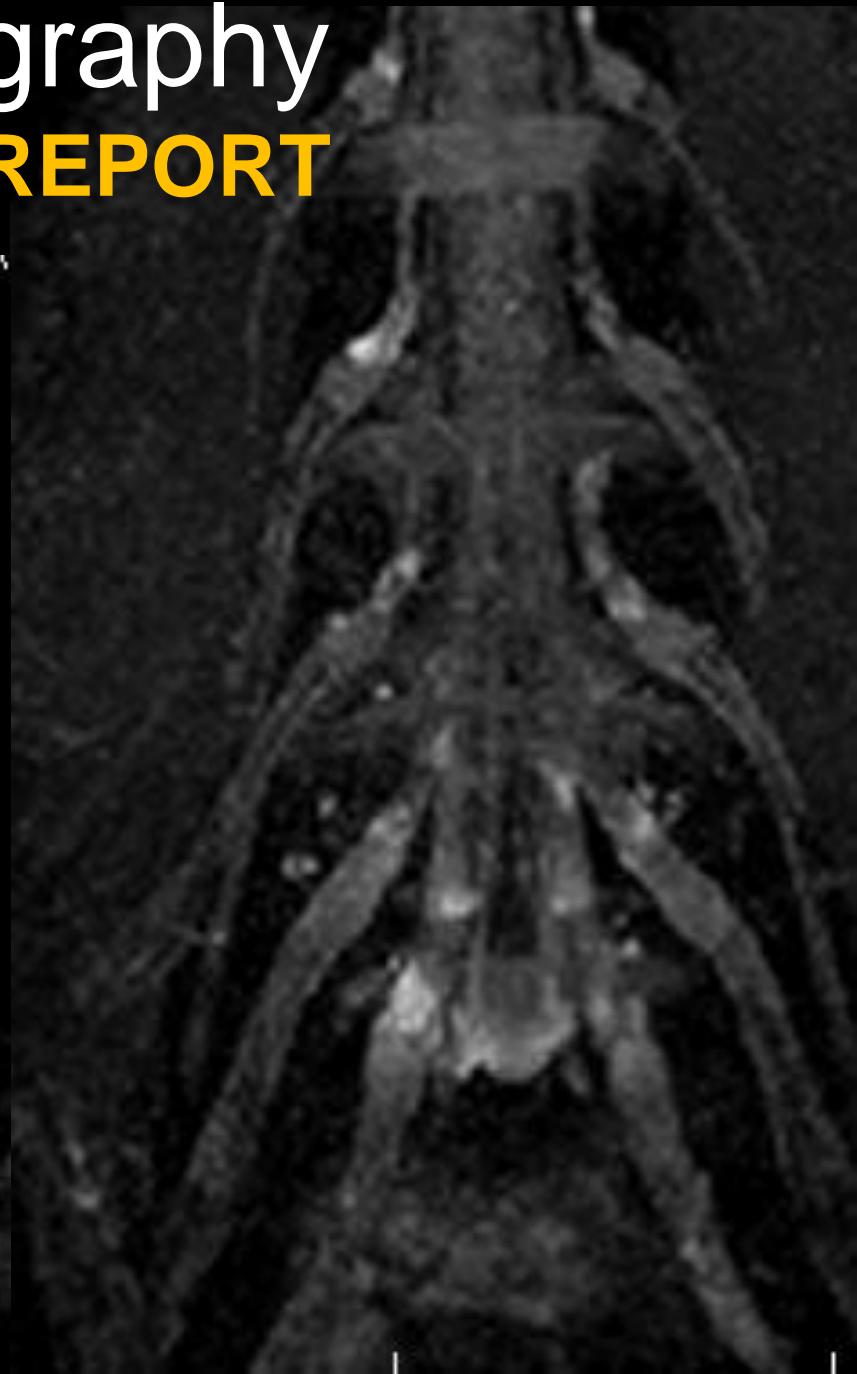
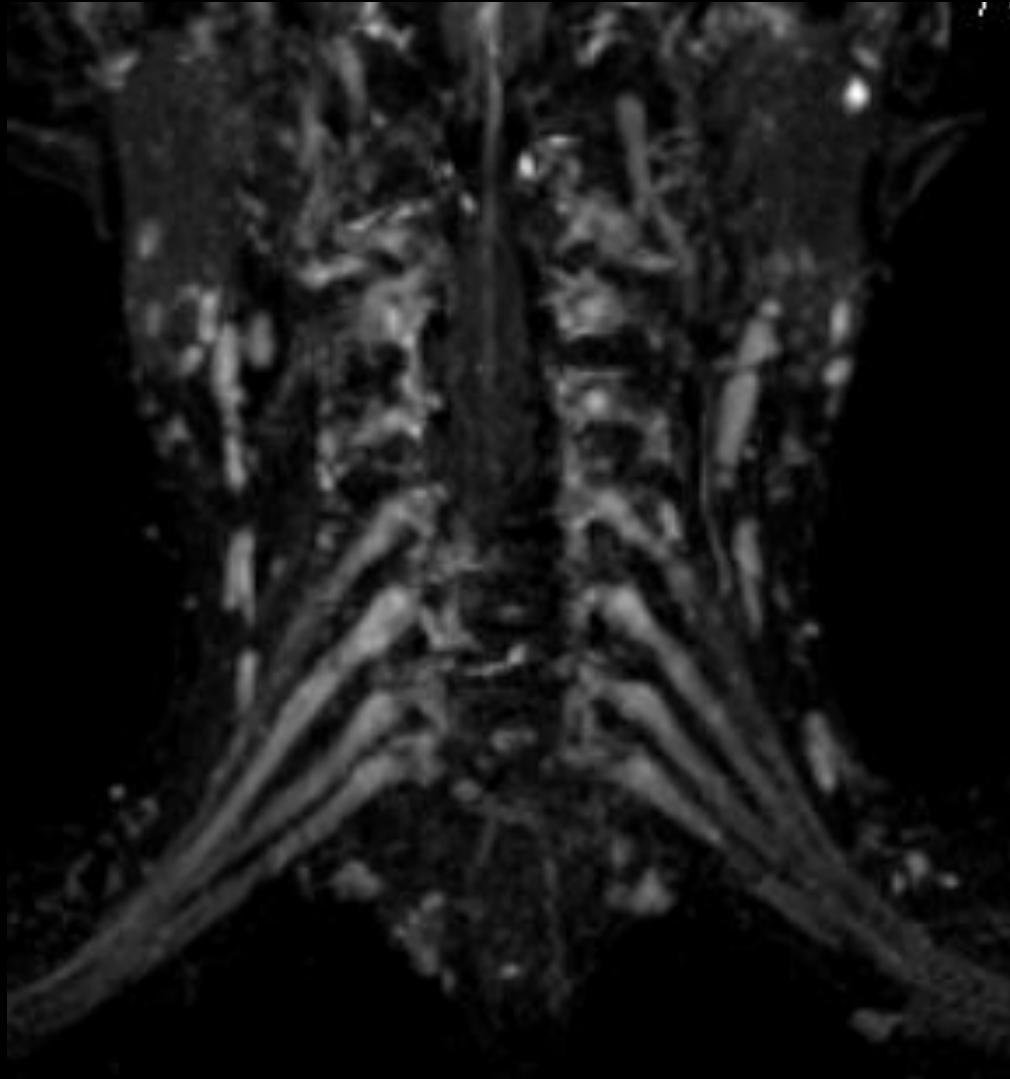
## RADIOLOGY REPORT

- Compare Nerves (sides)
- Nerve Signal
- Nerve Thickness
- Ganglia Thickness



# MR Neurography

## RADIOLOGY REPORT



# STIR 3D SPACE MIP 10mm

Cor>Tra -9  
>Sag 0

G5 G5

G6

G7

G7

G6

(cervical)

# DIFFUSION PSIF MIP 10mm

Cor>Tra -6

C6  
C7  
C6  
C7

A

## **Neuropathies that should be considered**

Inflammatory demyelinating polyneuropathies (CIDP and GBS)

Metabolic neuropathies (e.g. diabetes), toxic neuropathies, Charcot-Marie-Tooth disease,

Vasculitic neuropathy, hereditary neuropathy with liability to pressure palsies (HNPP)

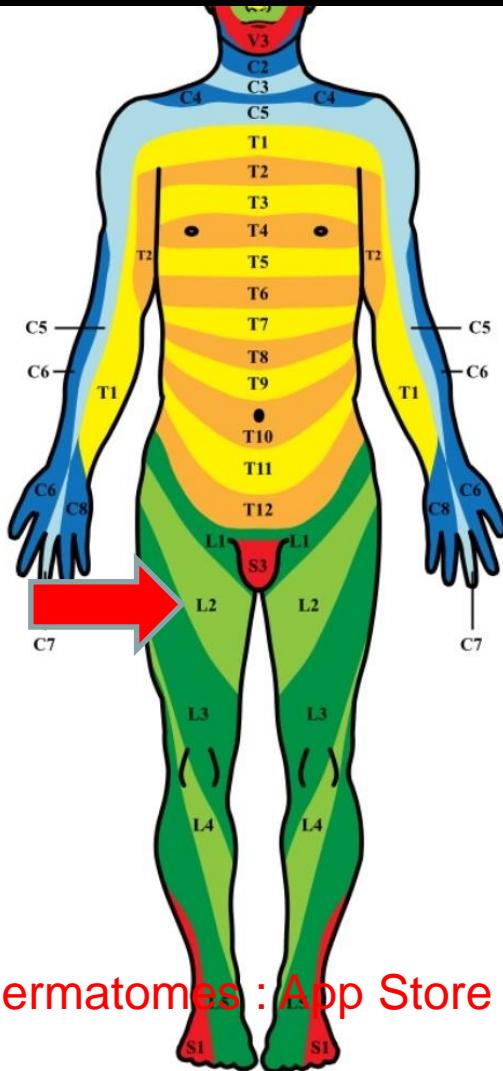
Motor neuron disease, multifocal motor neuropathy

Radiculopathy

Sensory neuronopathies from paraneoplastic syndrome, Sjogren's syndrome, et al.

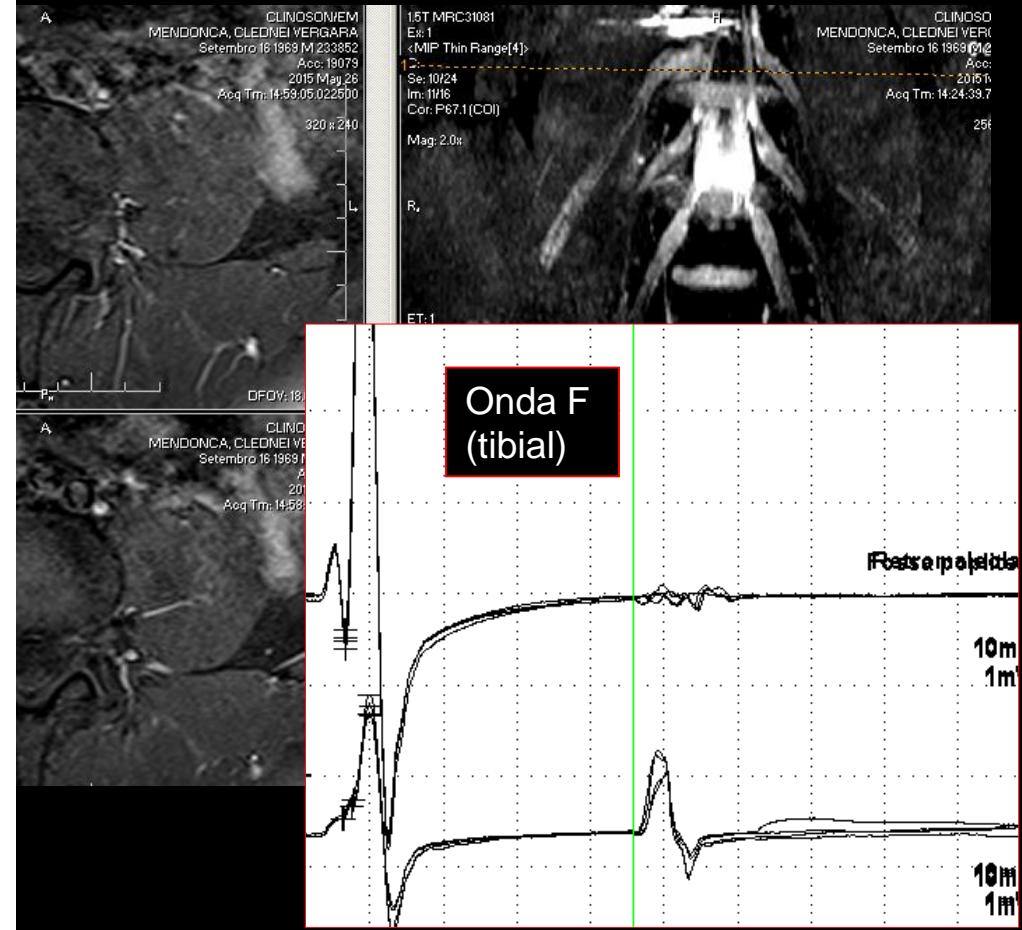
Amyloidosis, diabetic neuropathy

# MRN Protocol 1.5T



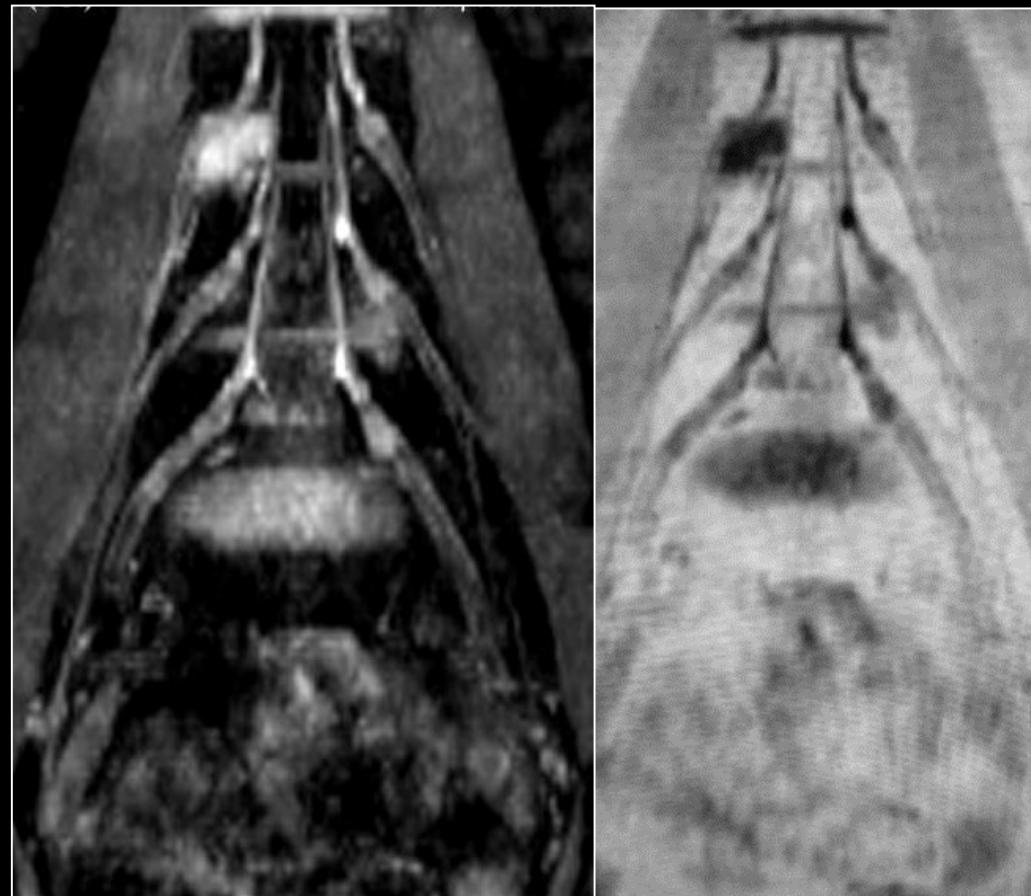
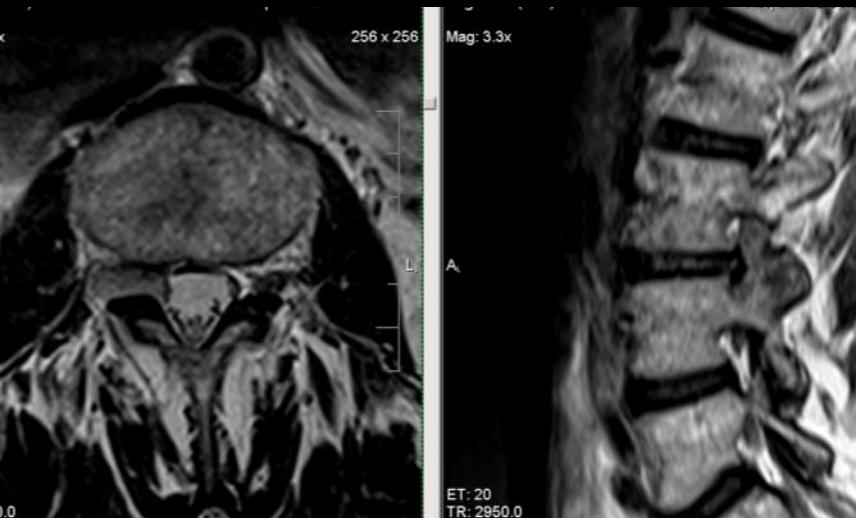
App Dermatomes : App Store

and at routine MR.

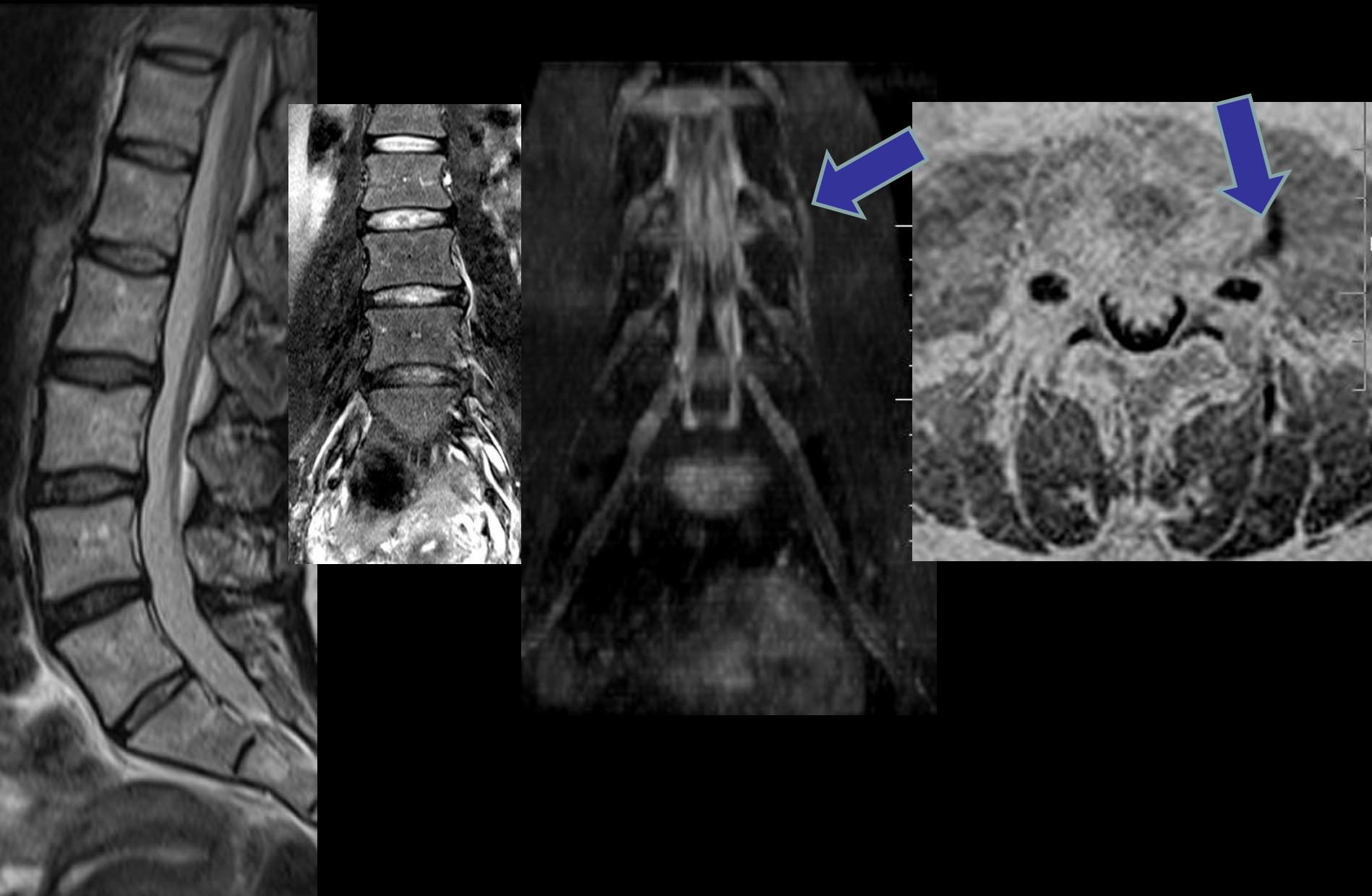


# *Case 1. Right Foraminal herniated disc L3-L4.*

**MRN PSIF (+ & -)**

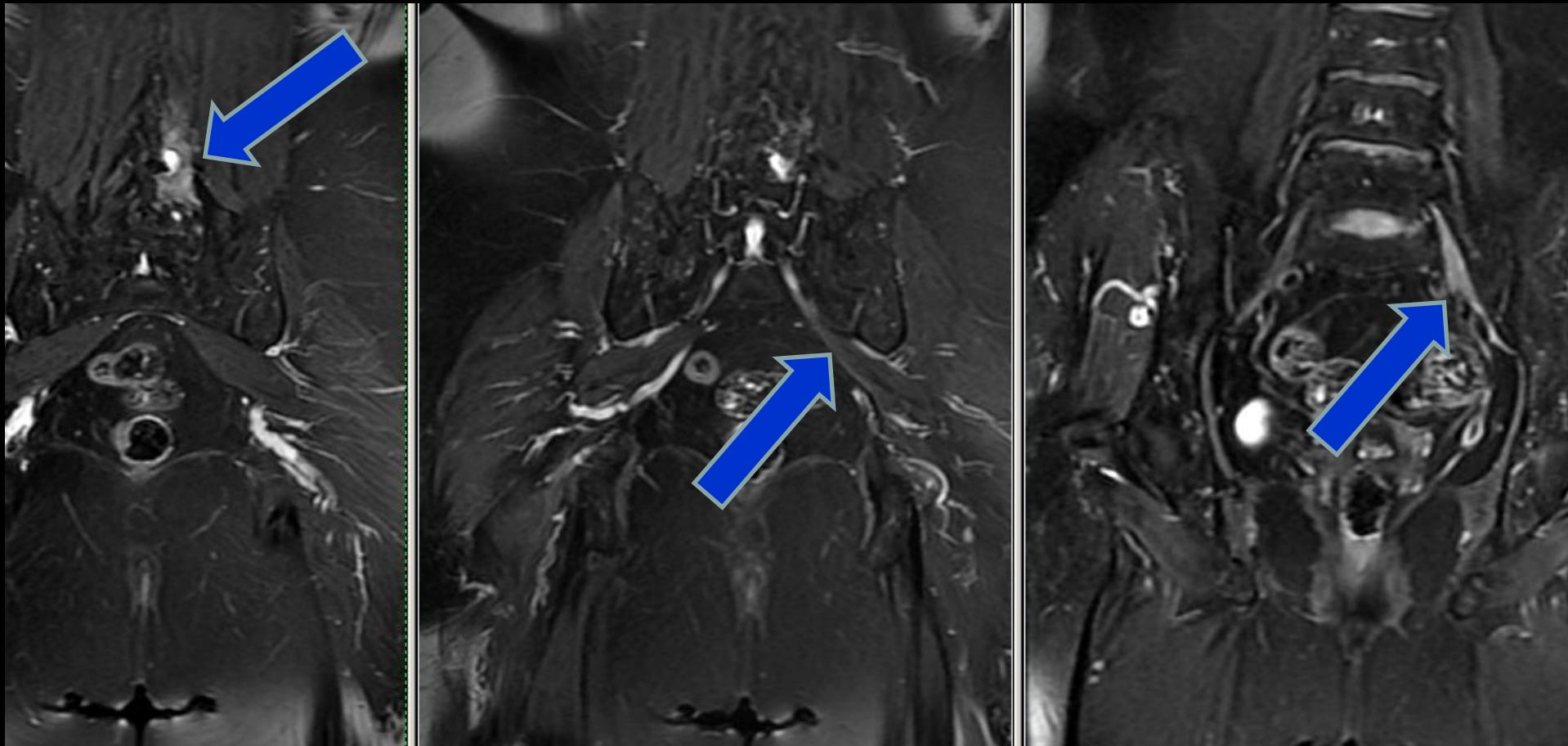


*Case 2. Radicolo L3, HIZ, 47<sup>a</sup>*



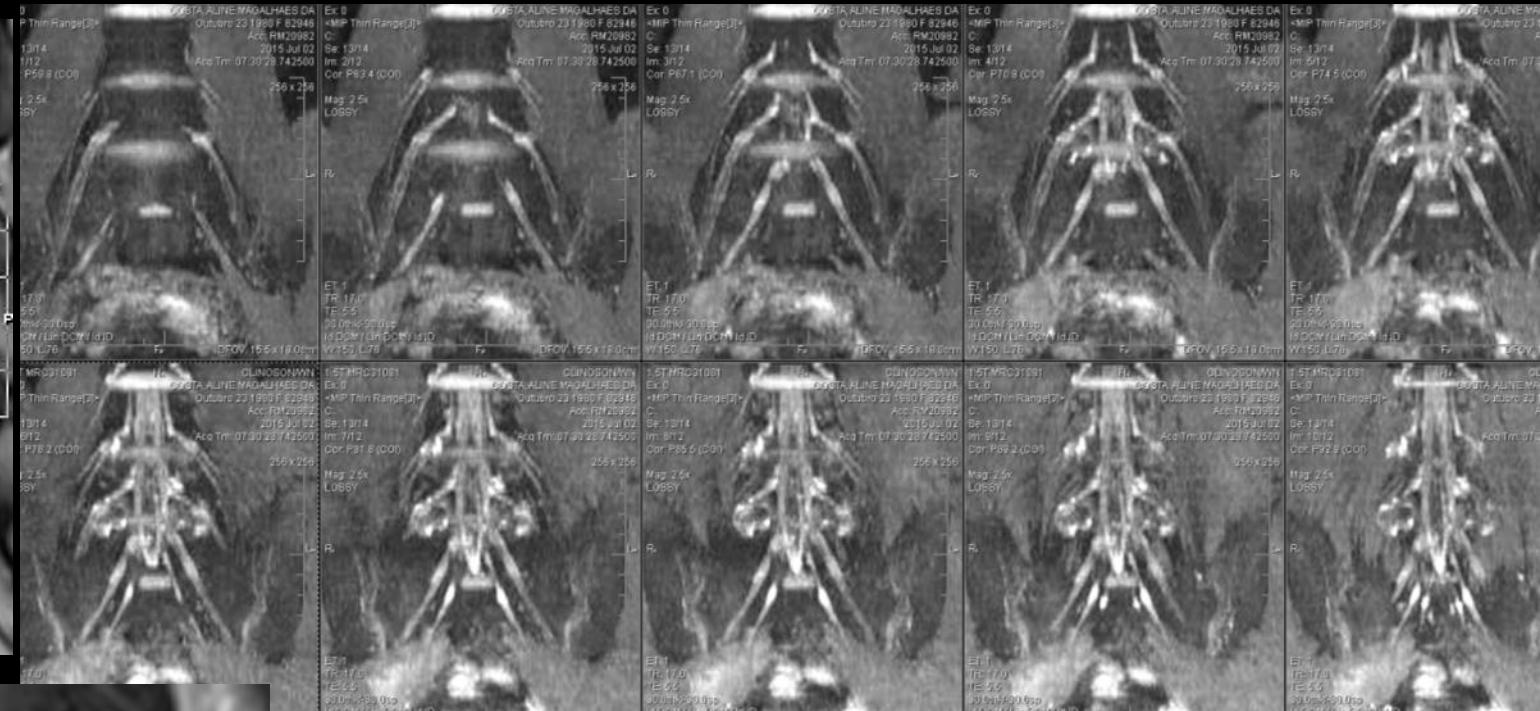
Case 3. Pos Op: left radiculopathy.

MRN STIR SPACE 3D: denervation paravertebral, left L5 RAD



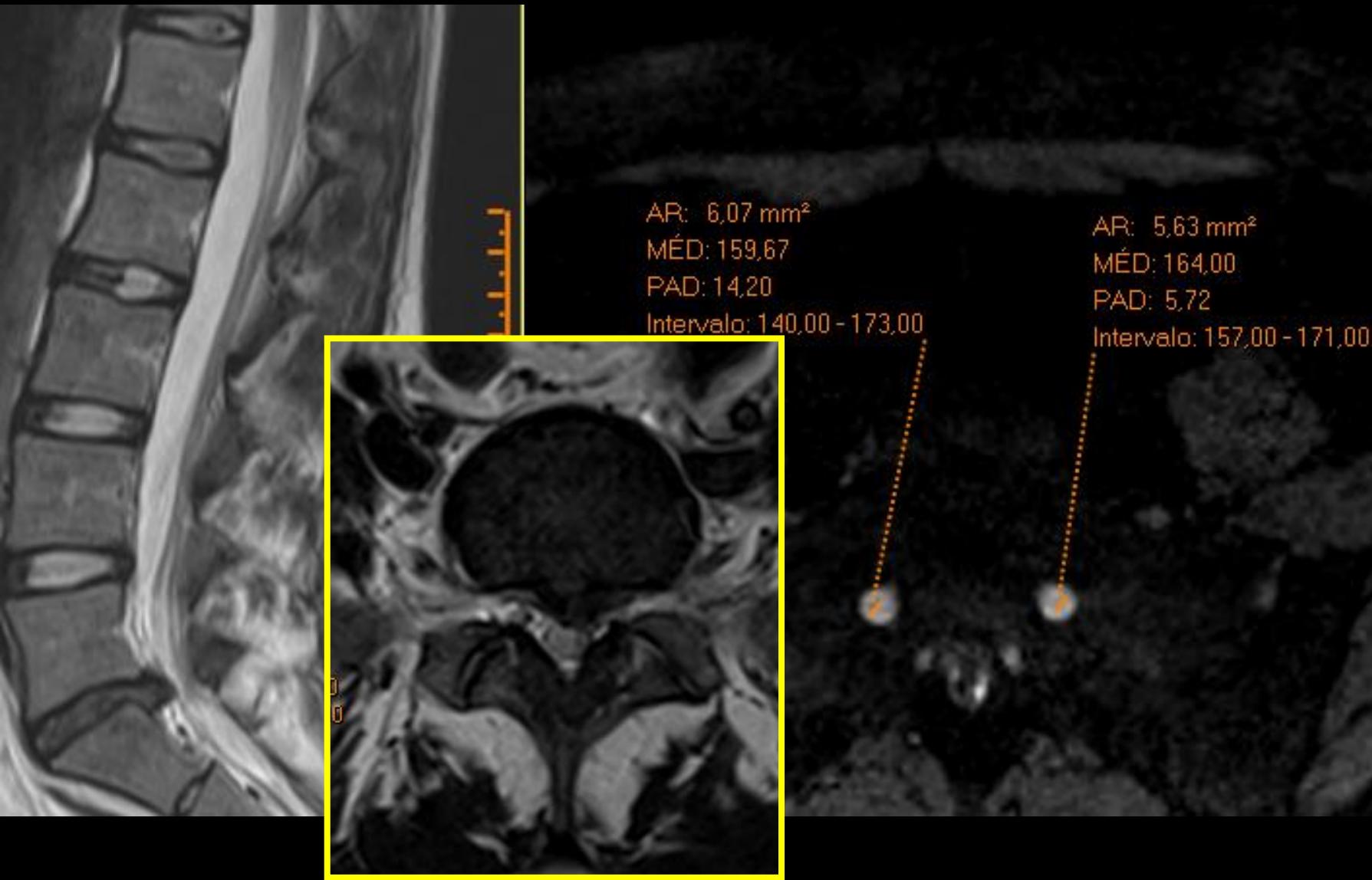
MRN STIR

# Case 4. Left Radiculopathy for 3 months, getting better. MRN: normal

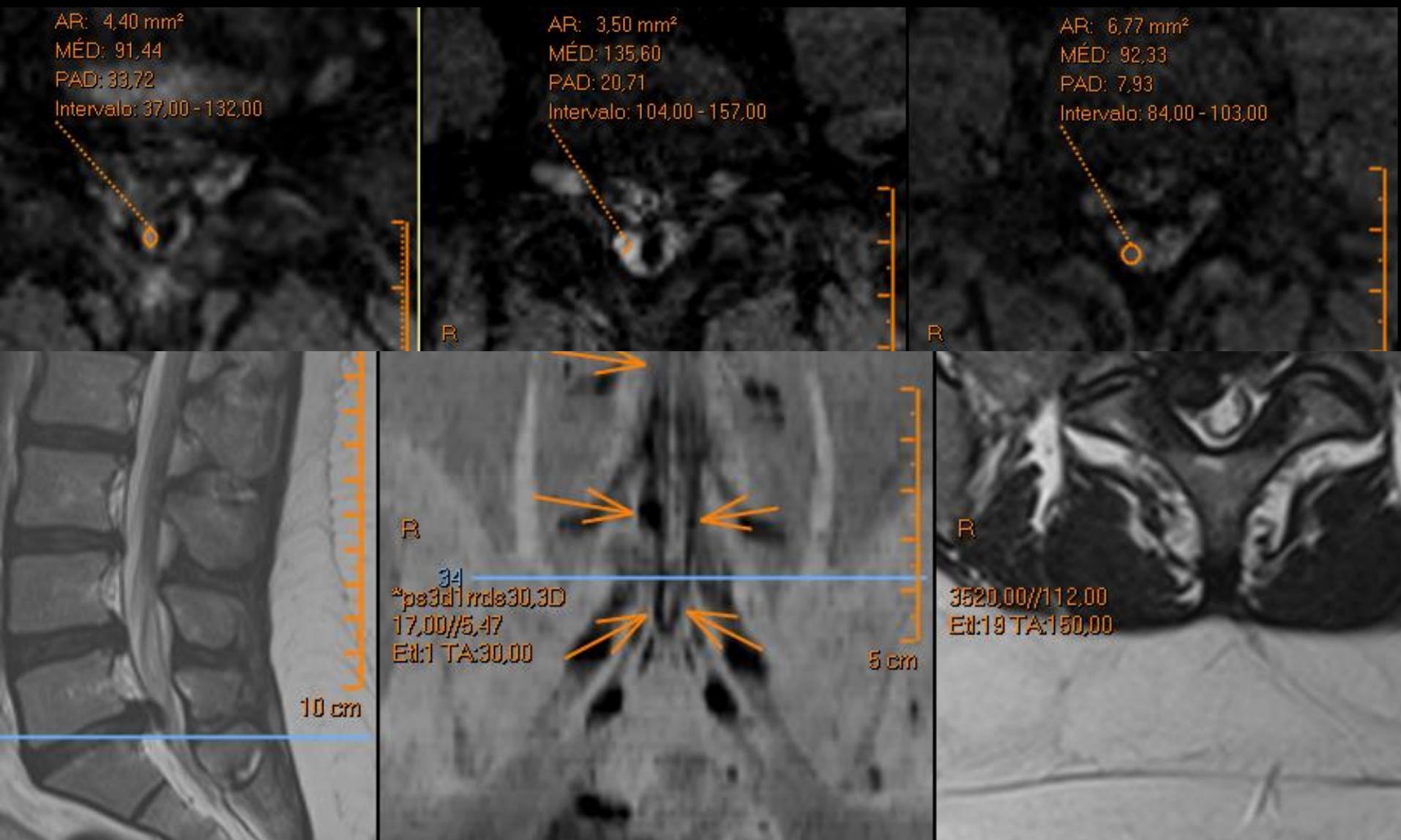


MRN Difusão PSIF

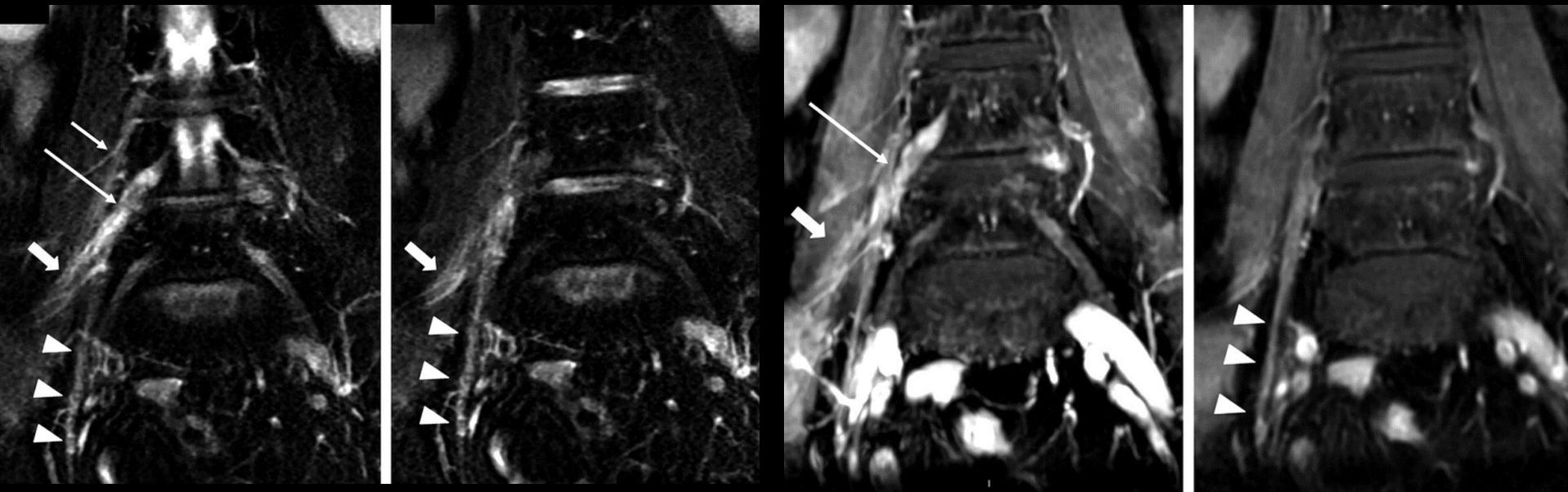
# Case 4.Left Radiculopathy for 3 months, getting better. MRN: normal



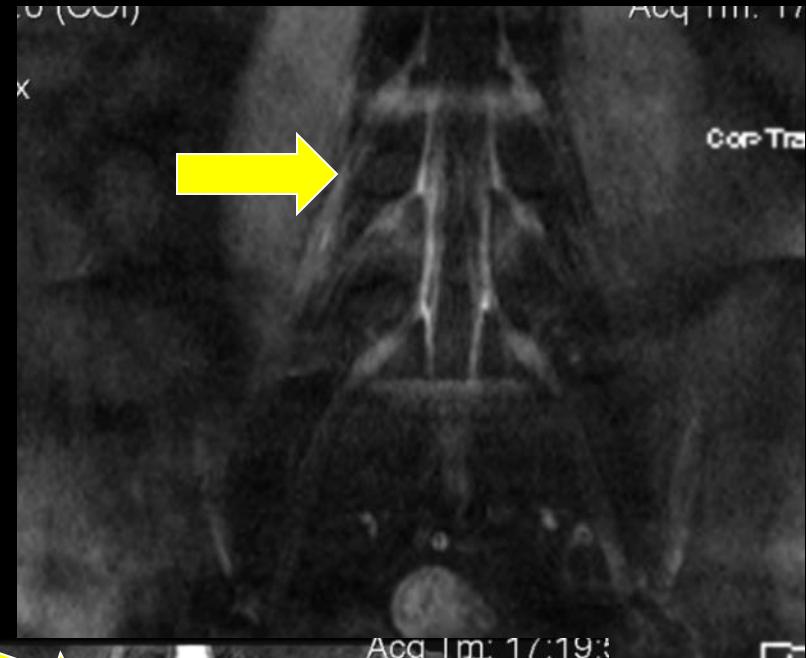
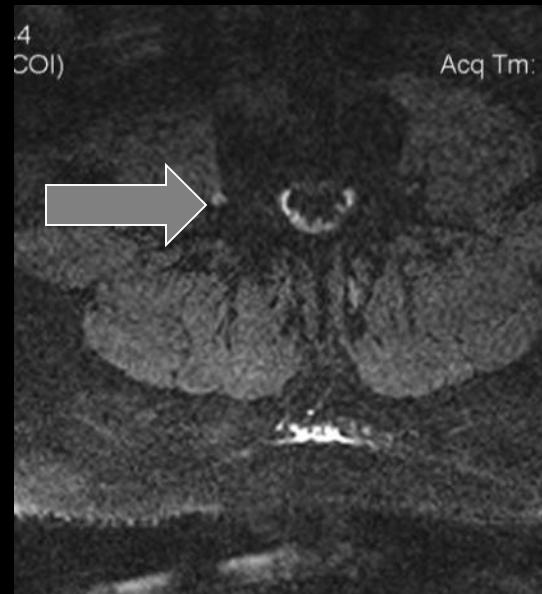
## Case 5: 38y F, 1 week of pain and cauda equina syndrome.



Case 6. Diabetic Neuropathy, M 60a DM2, Right leg weakness with + EMG test.

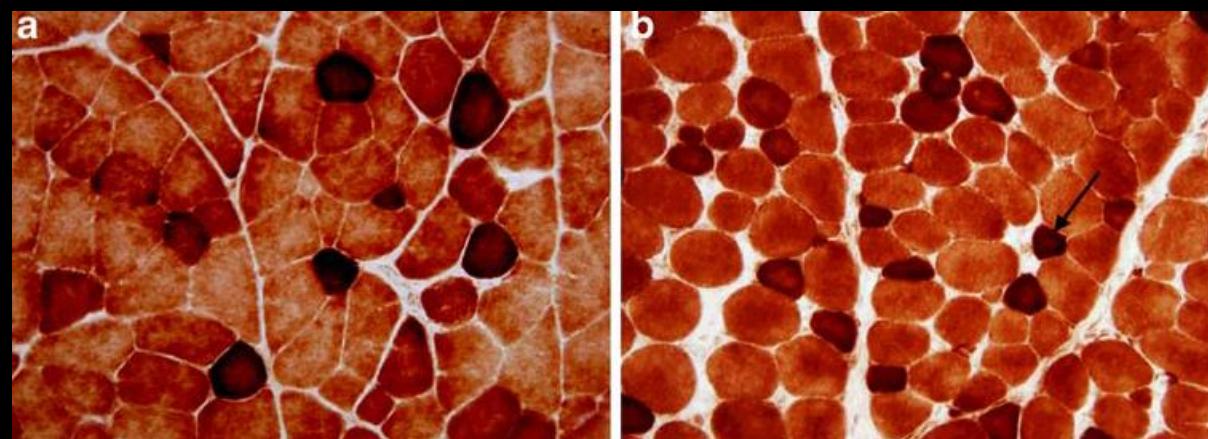
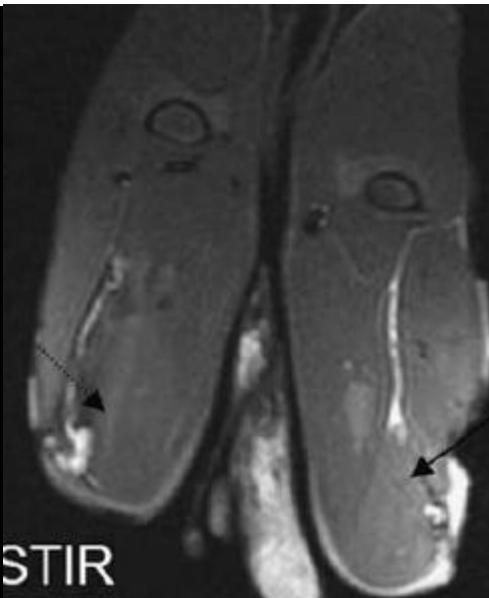


## Case 7: 48y F, right radiculopathy



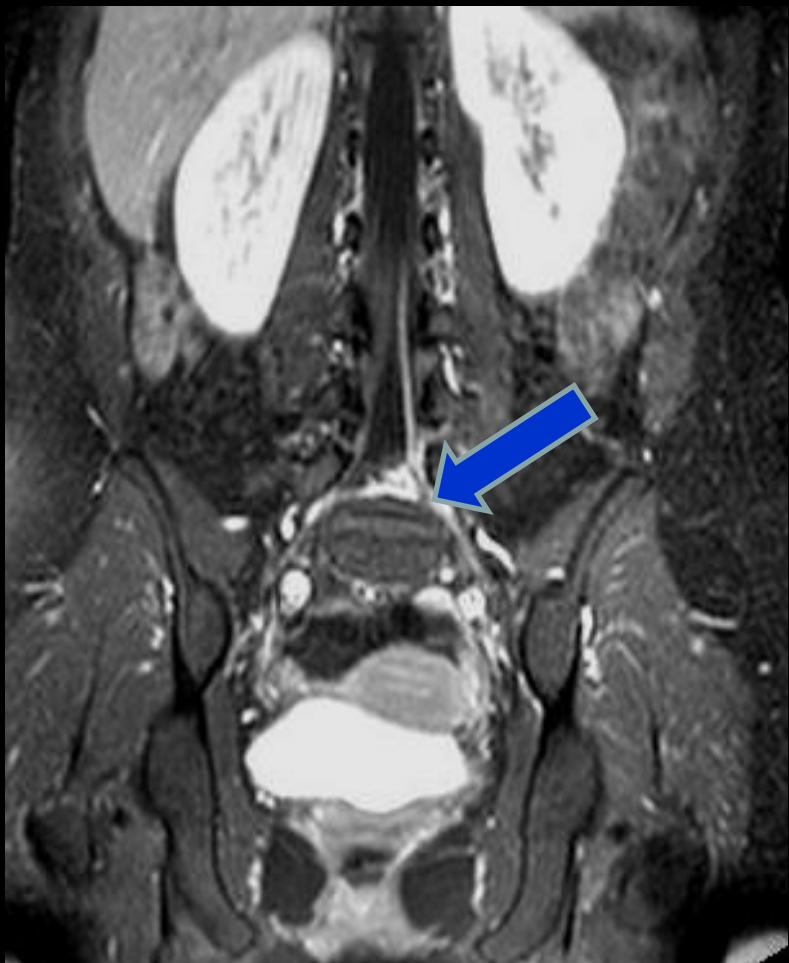
# Diffusion-weighted MRI of denervated muscle: a clinical and experimental study

Nathalie Holl · Andoni Echaniz-Laguna ·

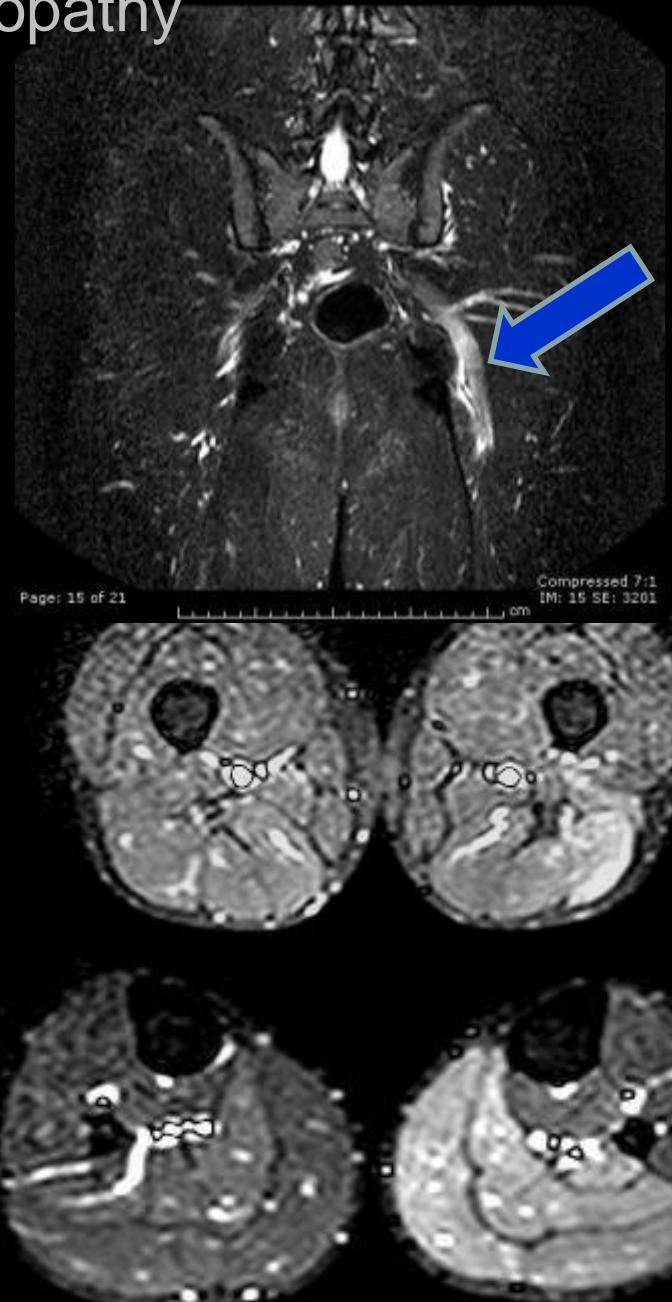


**STIR e Difusion: start day 2  
ENMG: start day 7**

## Case 8: 52 y F, pos op, left S1 Radiculopathy



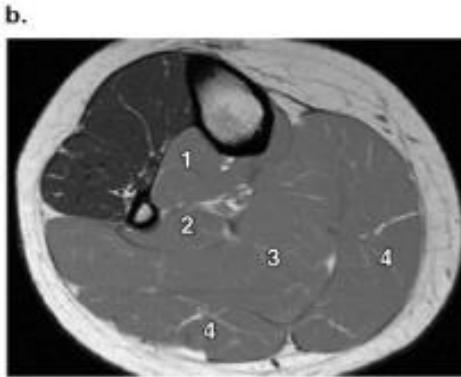
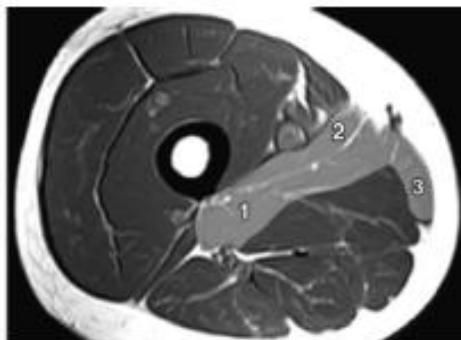
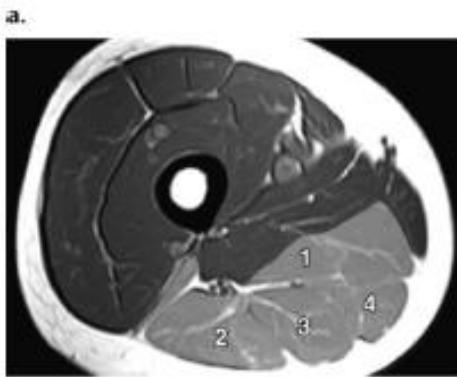
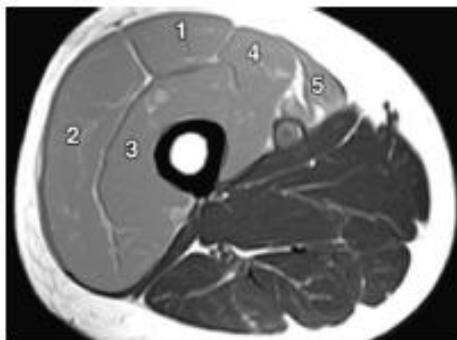
Contrast Gad



# MR Imaging Mapping of Skeletal Muscle Denervation in Entrapment and Neuropathy

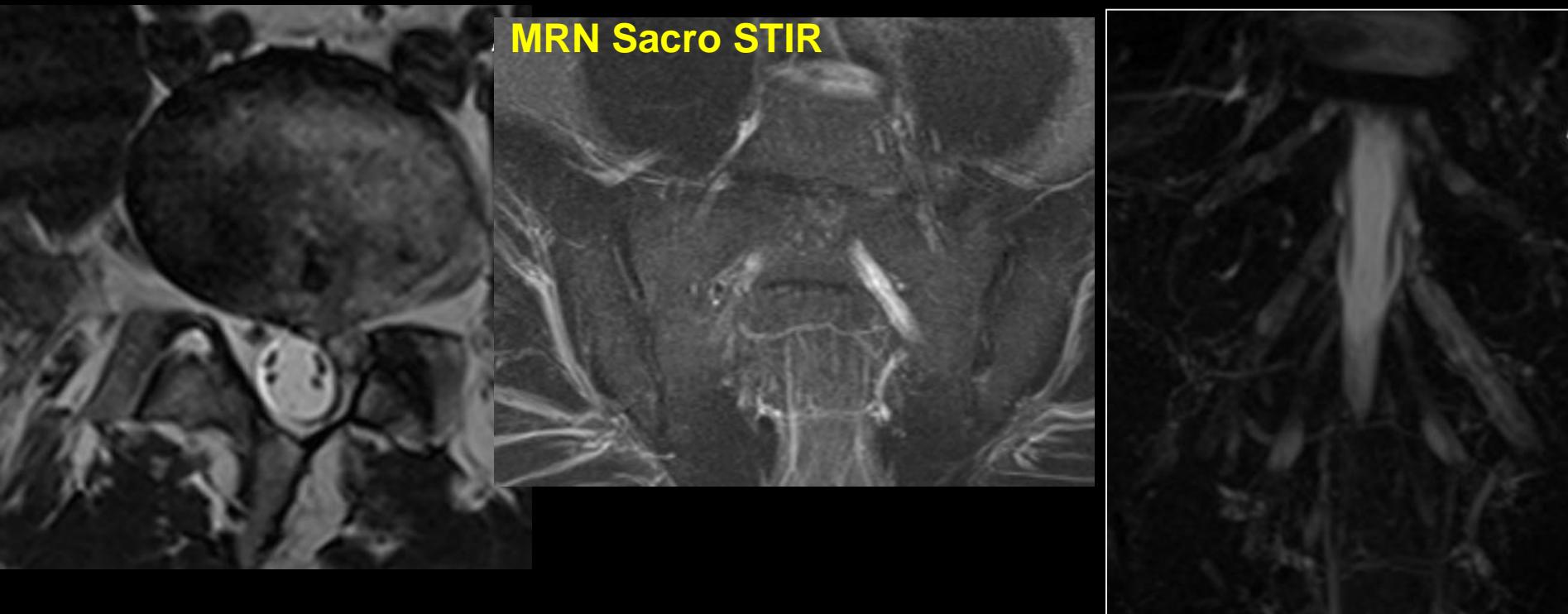
CME FEATURE

Su-Jin Kim, MD • Sung Hwan

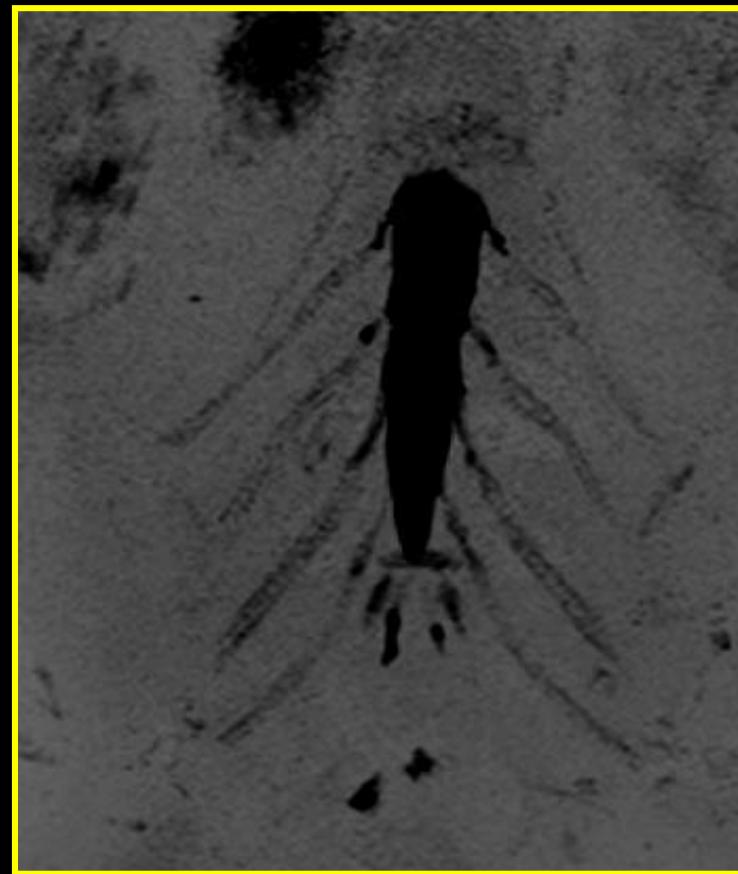


- a. Femoral Nerve
- b. Obturator Nerve
- c. Sciatic Nerve
- d. Tibial Nerve
- e. Com Peroneal

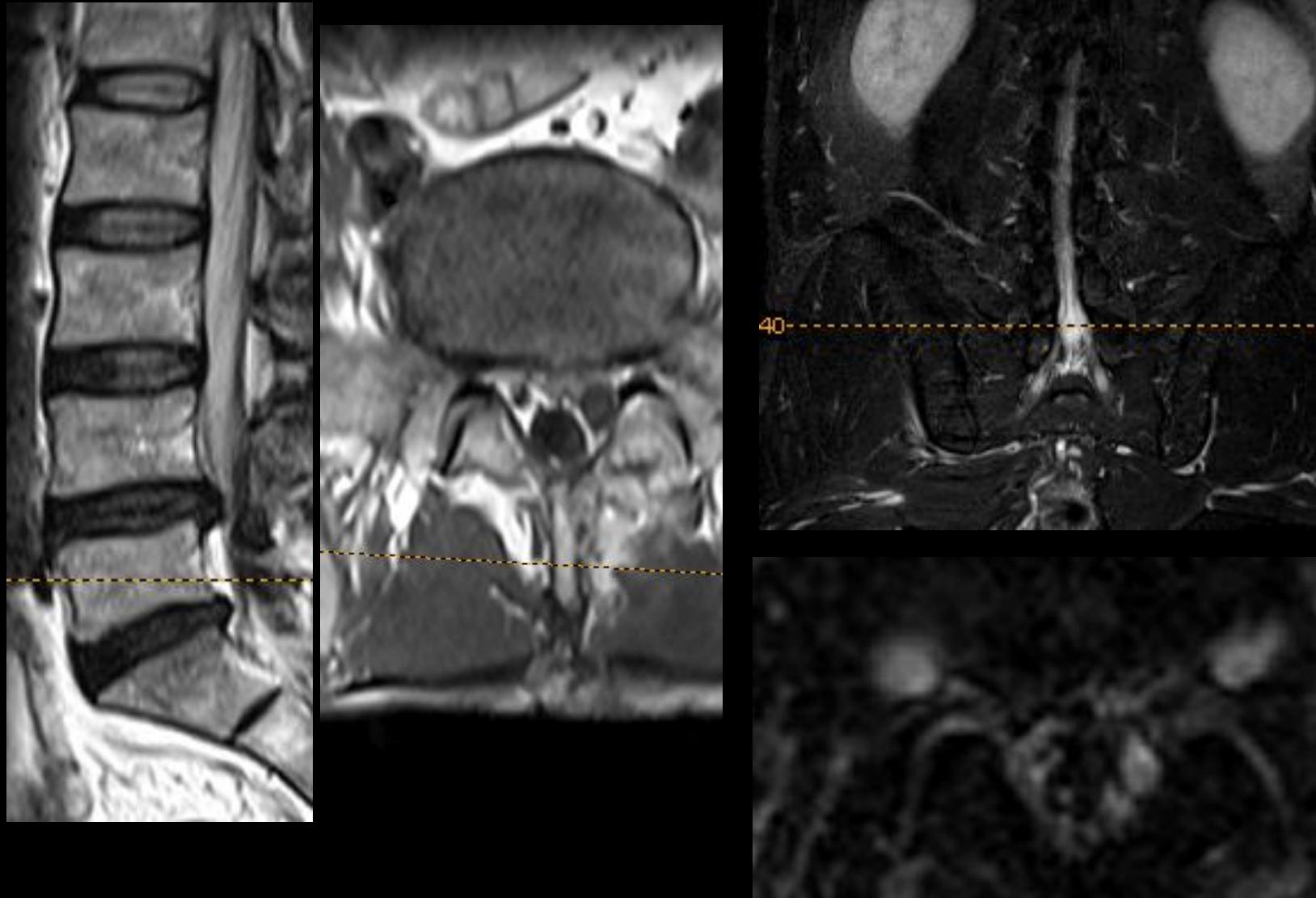
Case 9: 64y M, Pos Op: Fibrosis around S1, left thigh paresthesias and pain.



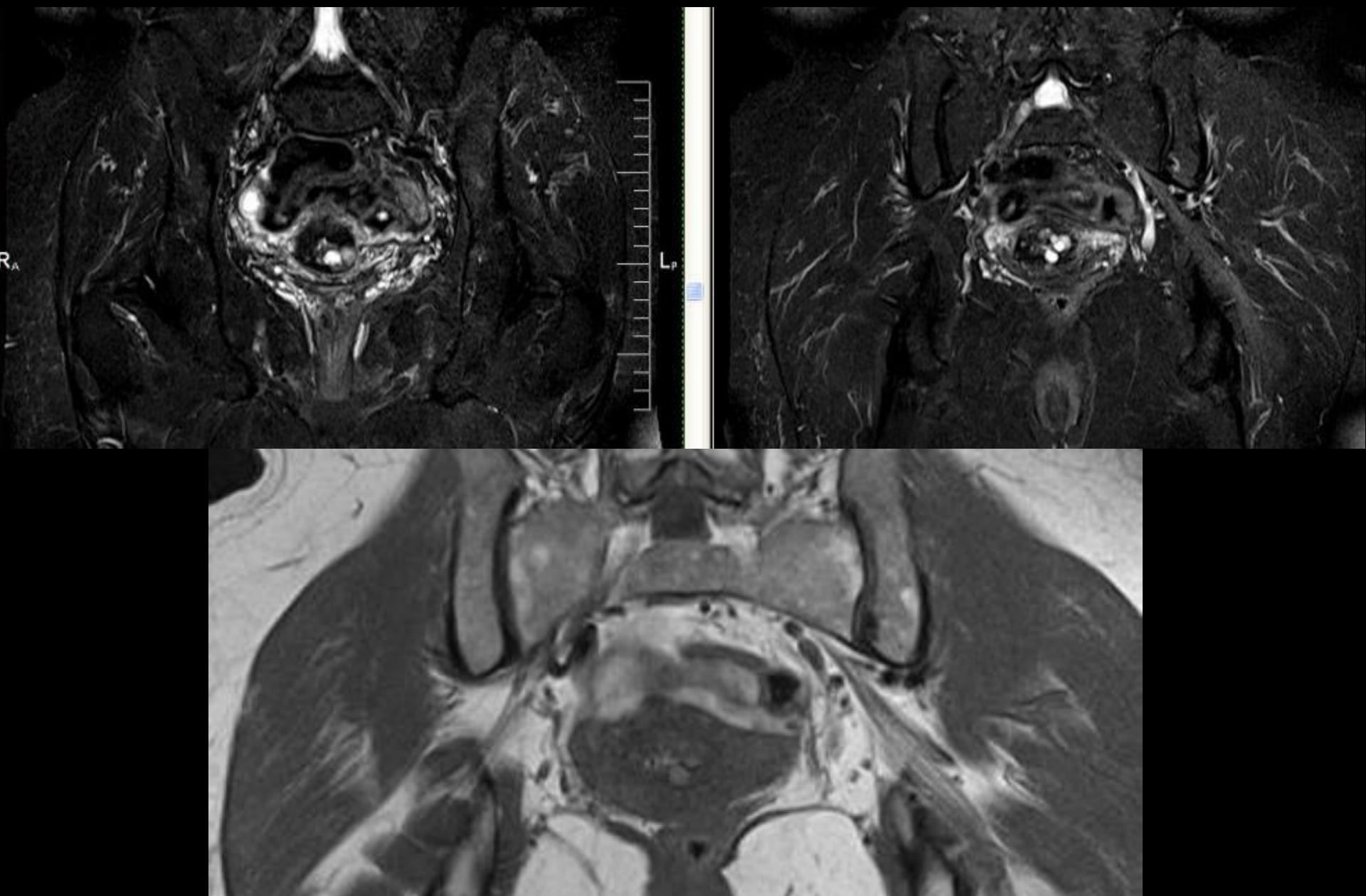
Case 10: 61y M. Left leg pain. Suspect of Tarlov symptomatic cyst. Normal MRN



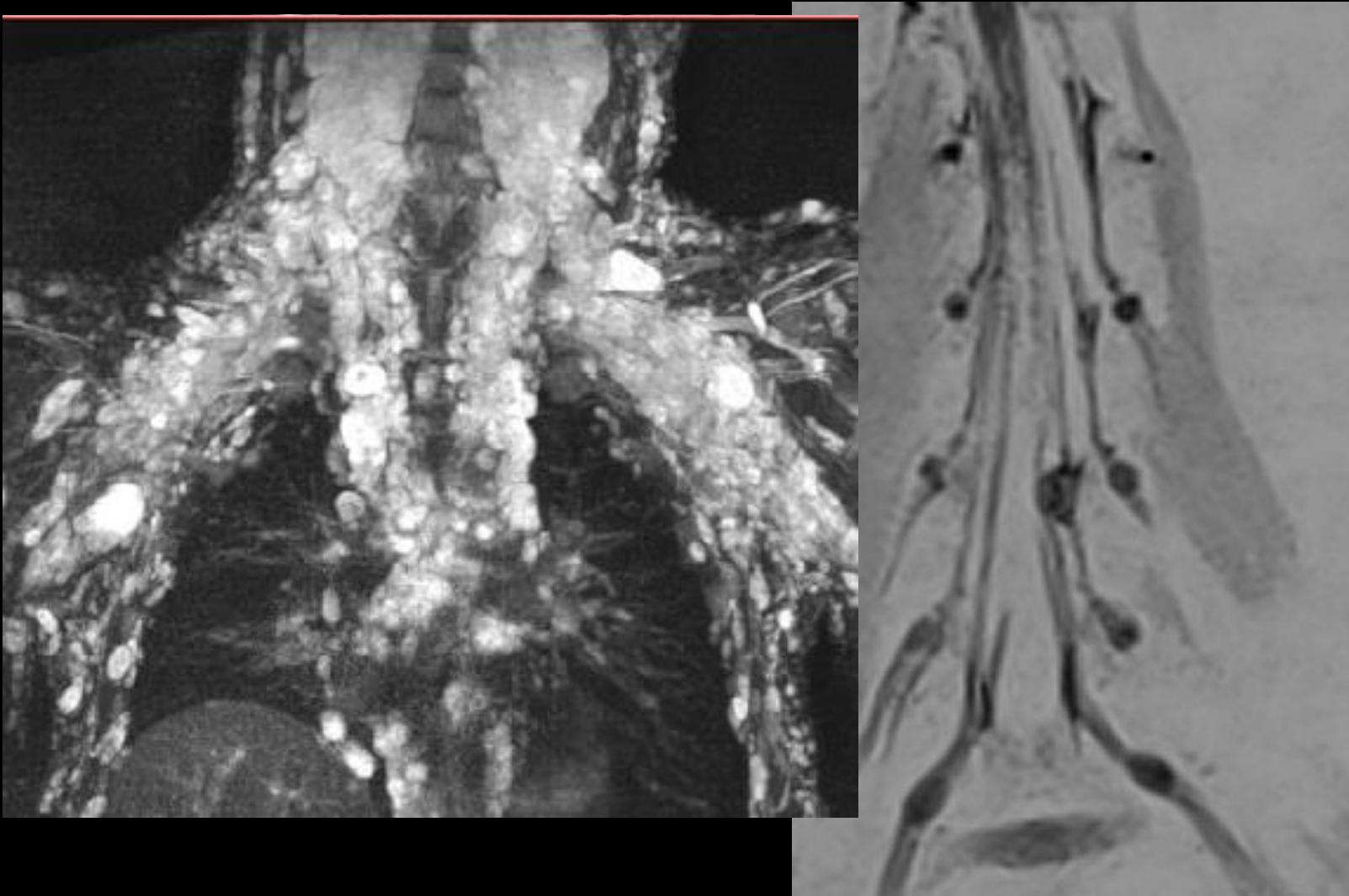
## Case 11. Pos Op: M 51<sup>a</sup>, Lumbar Pain. L5 fibrosis



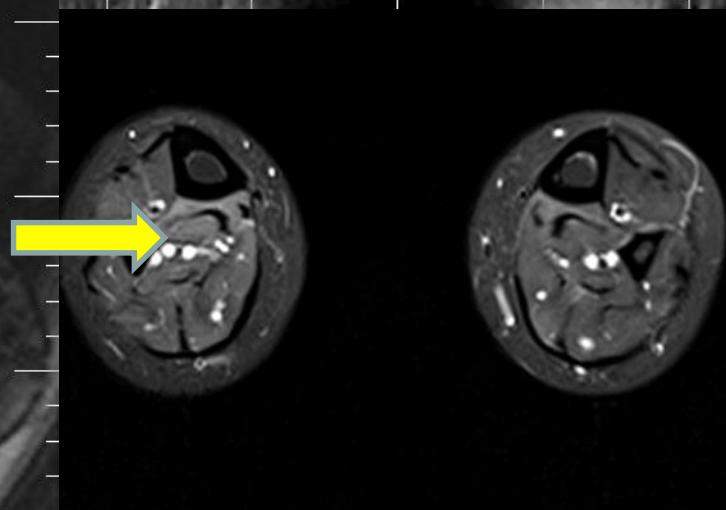
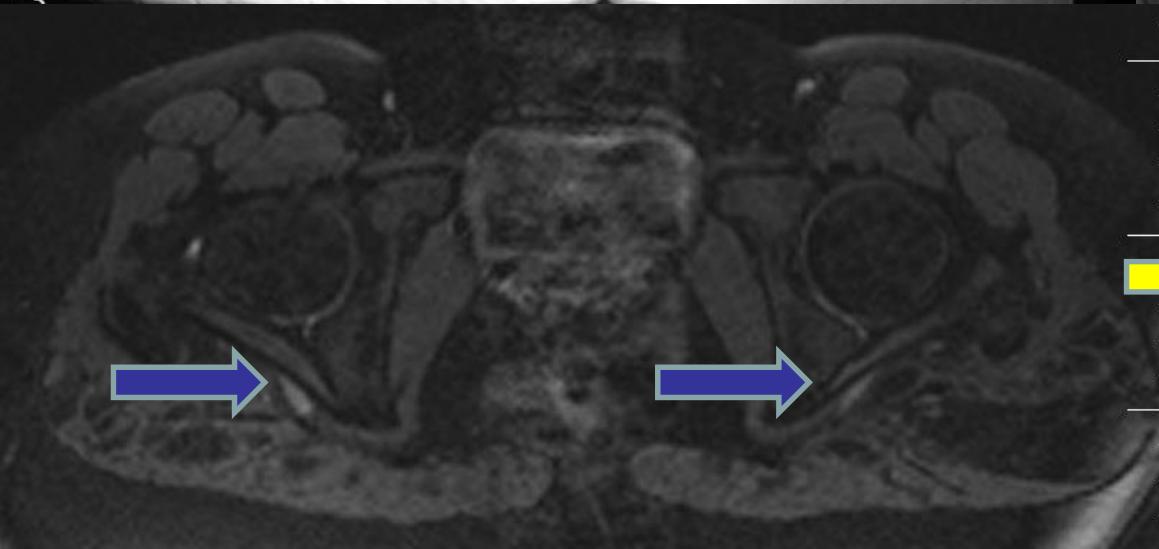
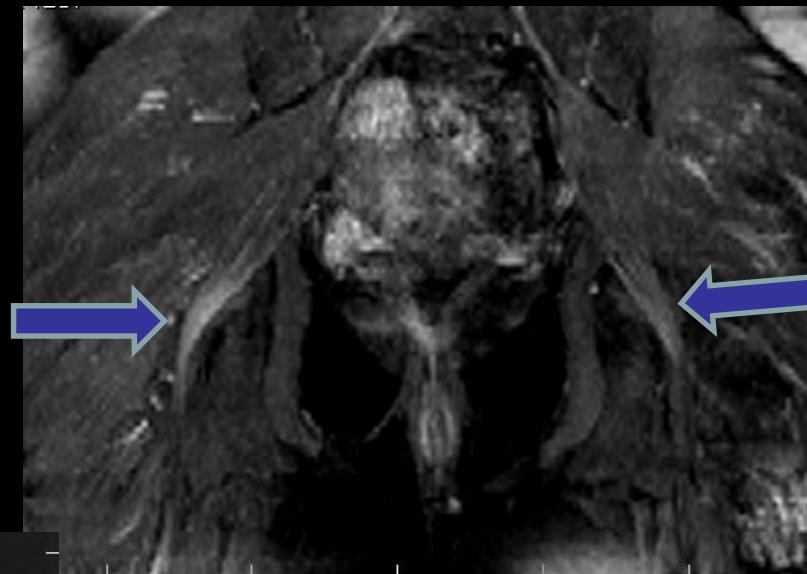
## Case 12. Posterior Thigh Pain. Normal Lumbar MR



## Case 13: DDx: Meningeoma/Neuroma

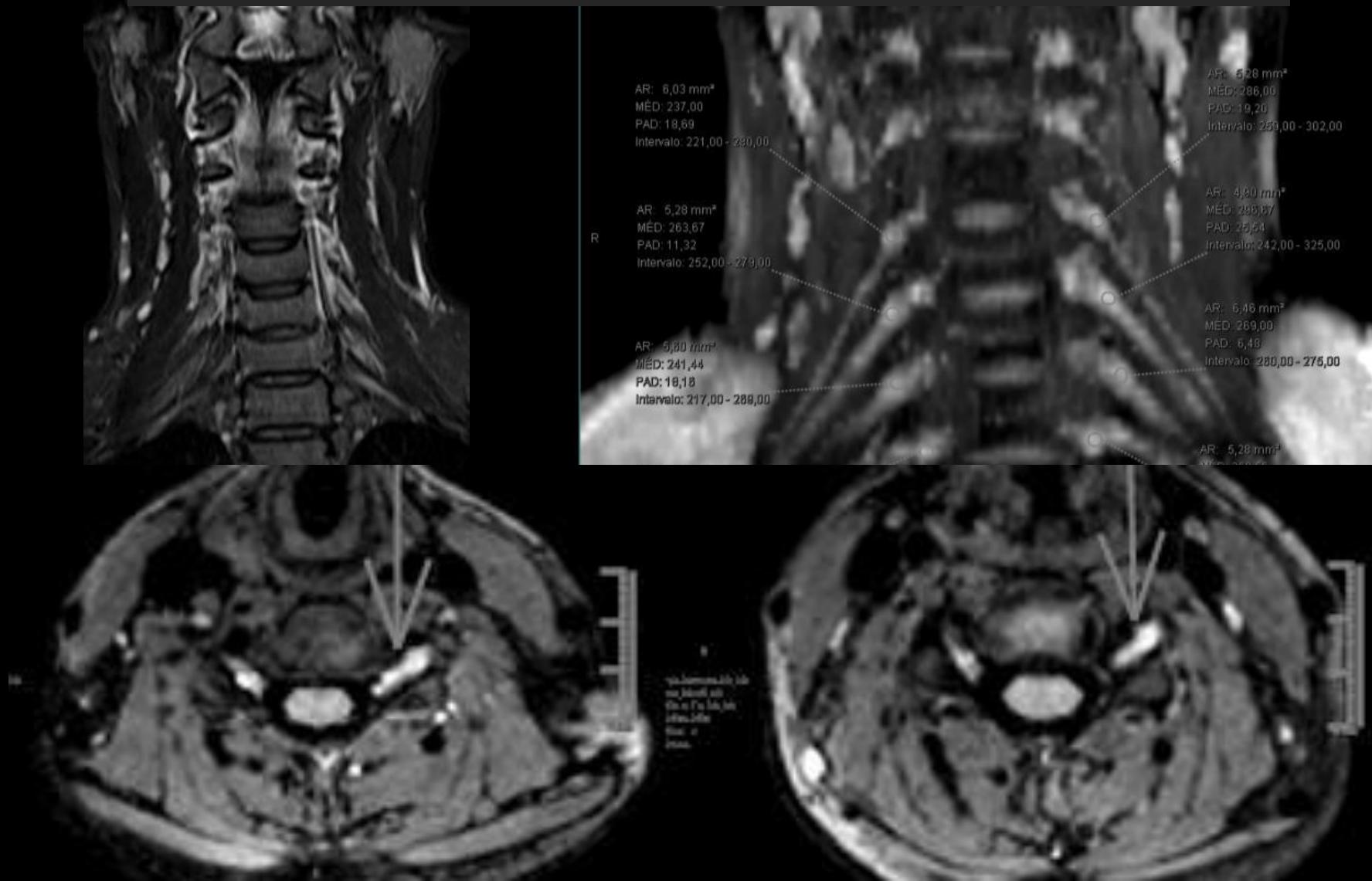


Case 14: 30<sup>a</sup> F, plastic surgery. Pain in both legs and sensibility loss.



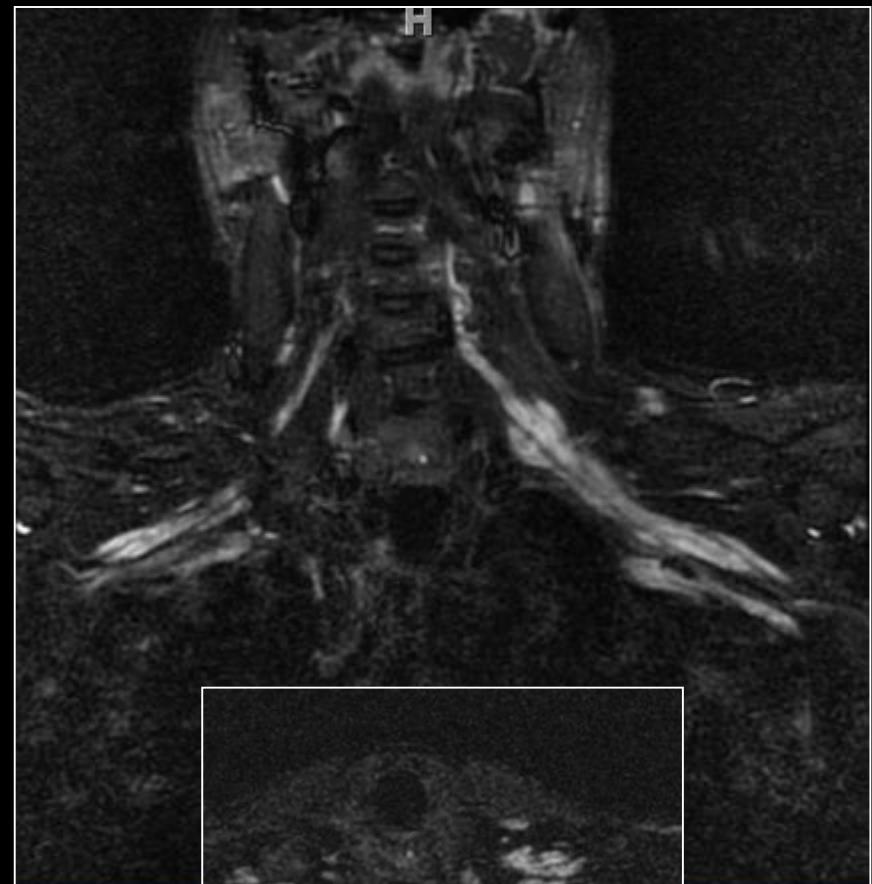
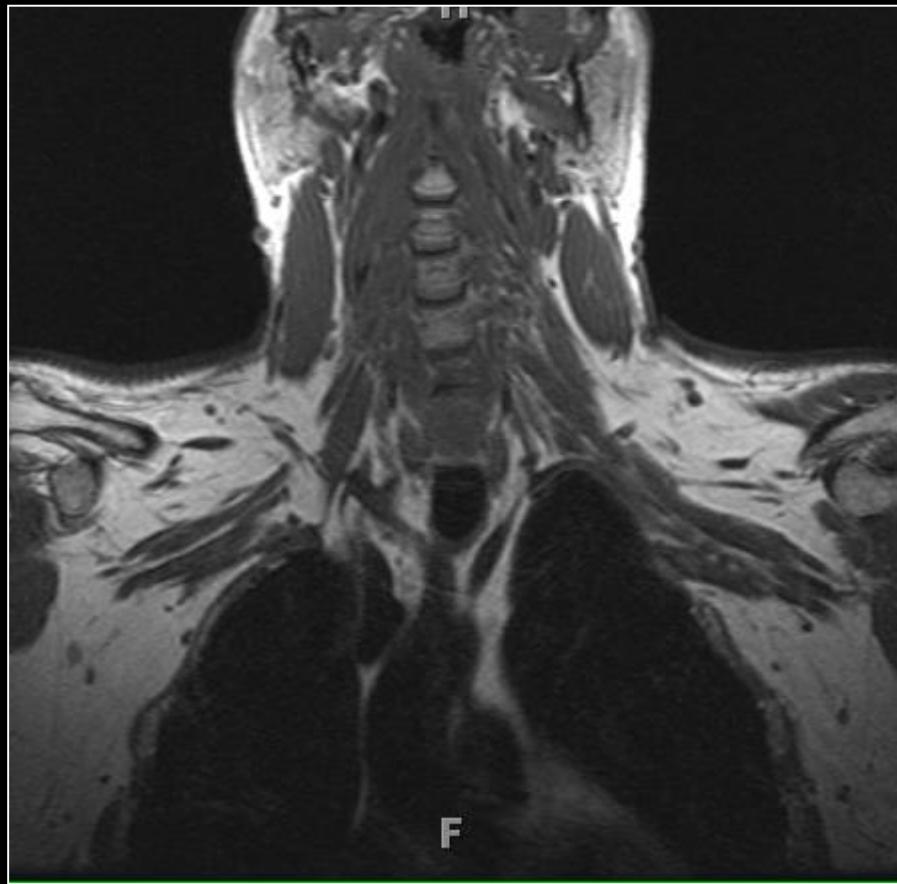
Case 15: left arm pain, paresthesia 3º, 4º e 5º fingers, long airplane flight from Dubai to São Paulo.

## Neuropaxia (pos traumatic plexitis) C5 C6 C7 T1.

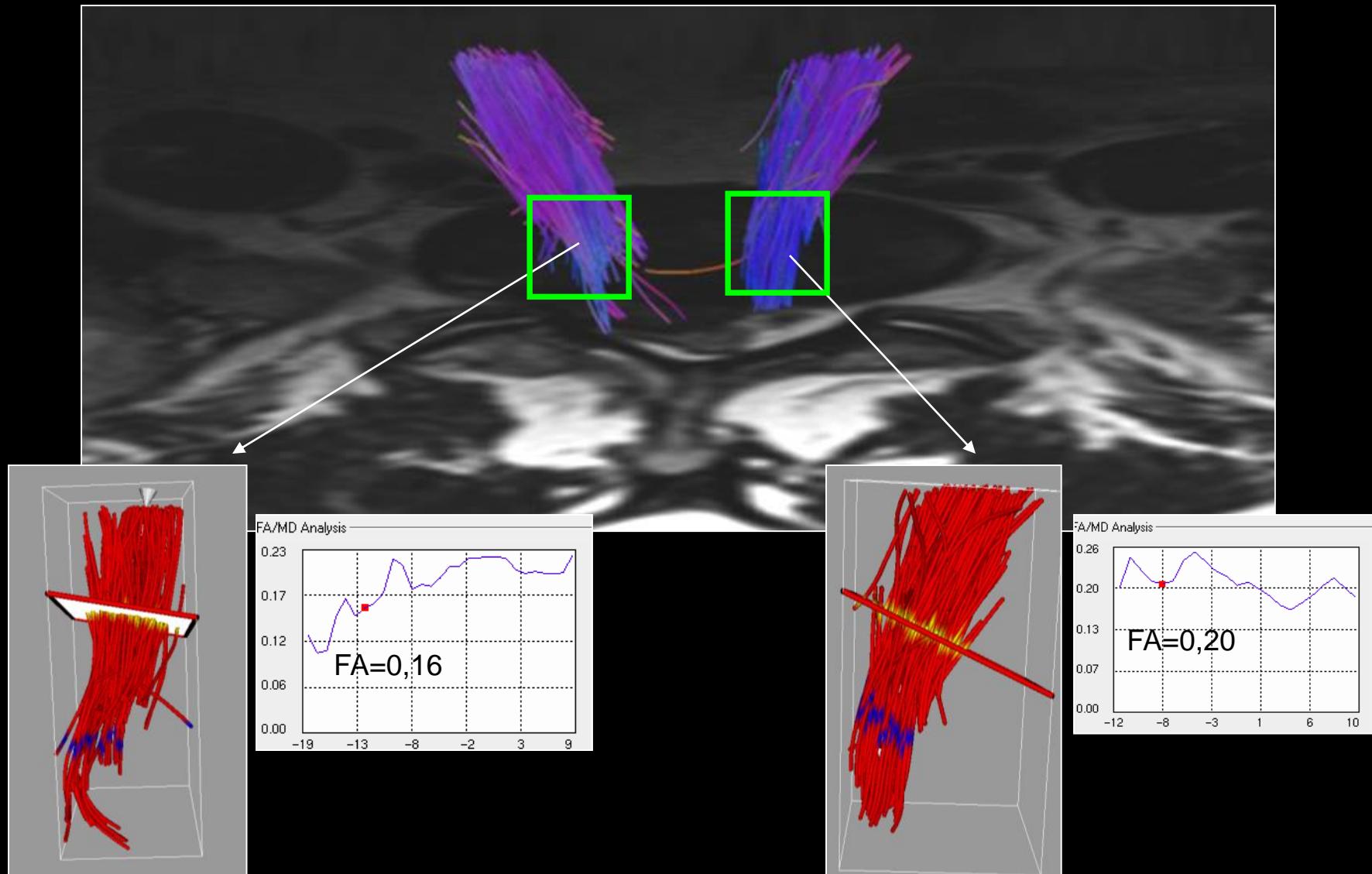


Case16. 49-year-old man referred for progressive left hand and arm weakness and numbness of approximately five years duration

## CIDP Demyelinating Neuropathy



# FUNCTION NEUROGRAPHY- DTI



CORTESY OF DR ANE COTTEN, LILE UNIV FRANCE

# MR Neurography



# Neurografía por RM del Plexo Braquial y Lumbosacro



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