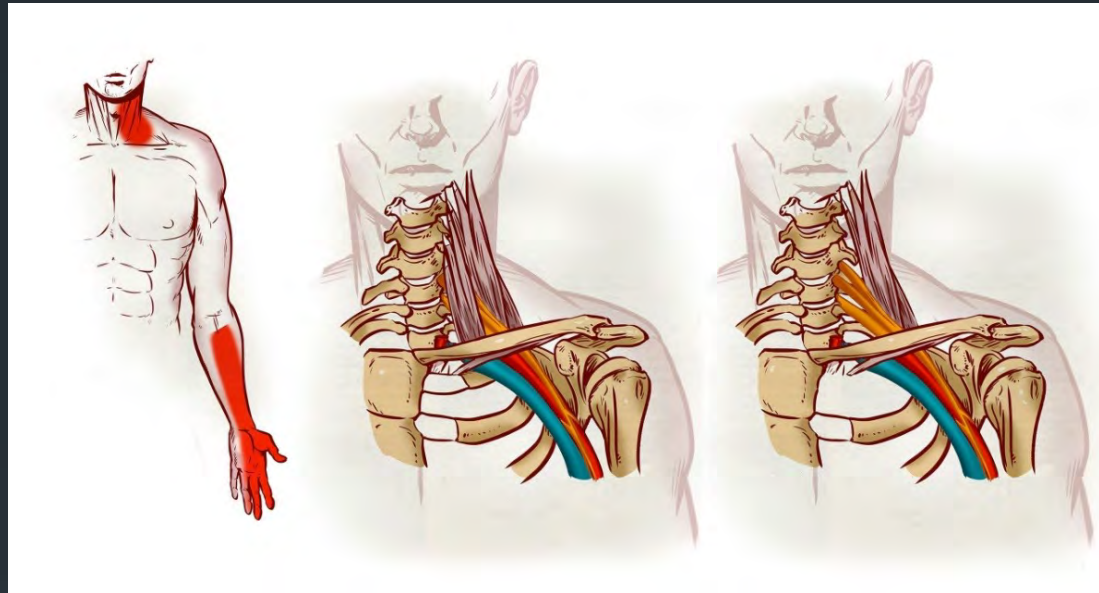
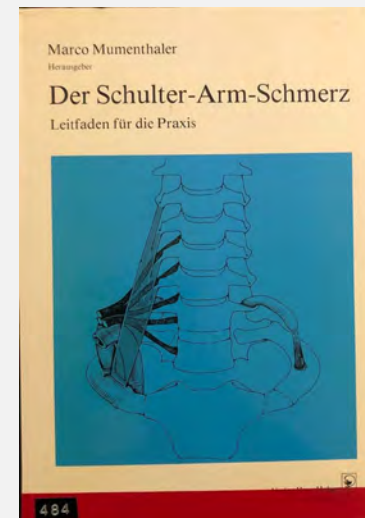
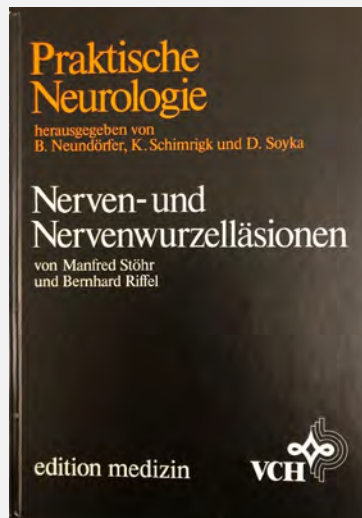
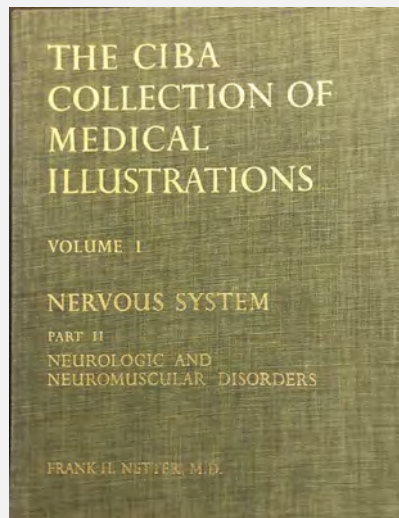
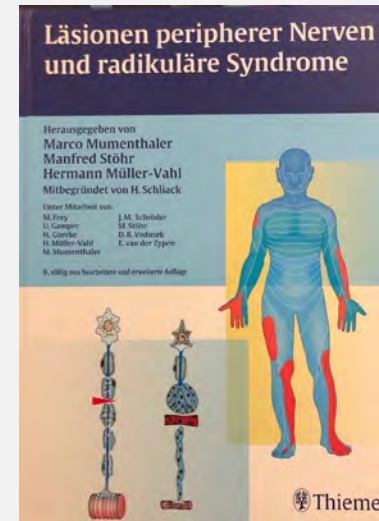
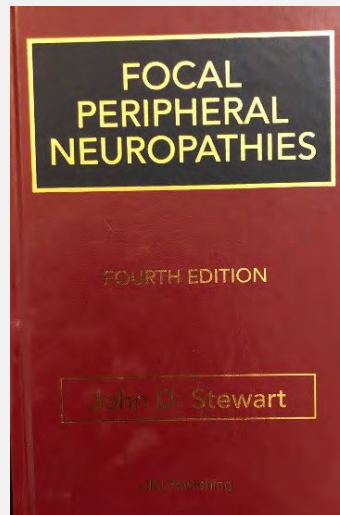
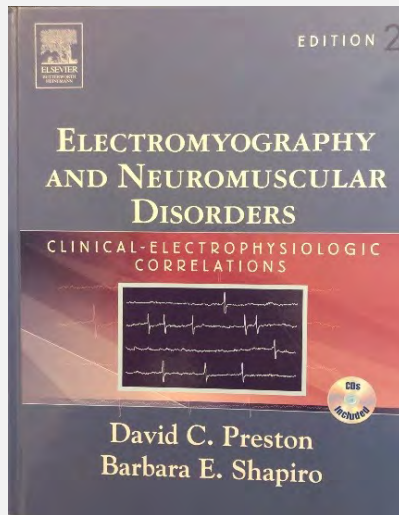


# Neurogene Ursachen für Schmerzen – Diagnostik und Differentialdiagnose



# Referenzen



Marco Mumenthaler

Herausgeber

# Der Schulter-Arm-Schmerz

Leitfaden für die Praxis

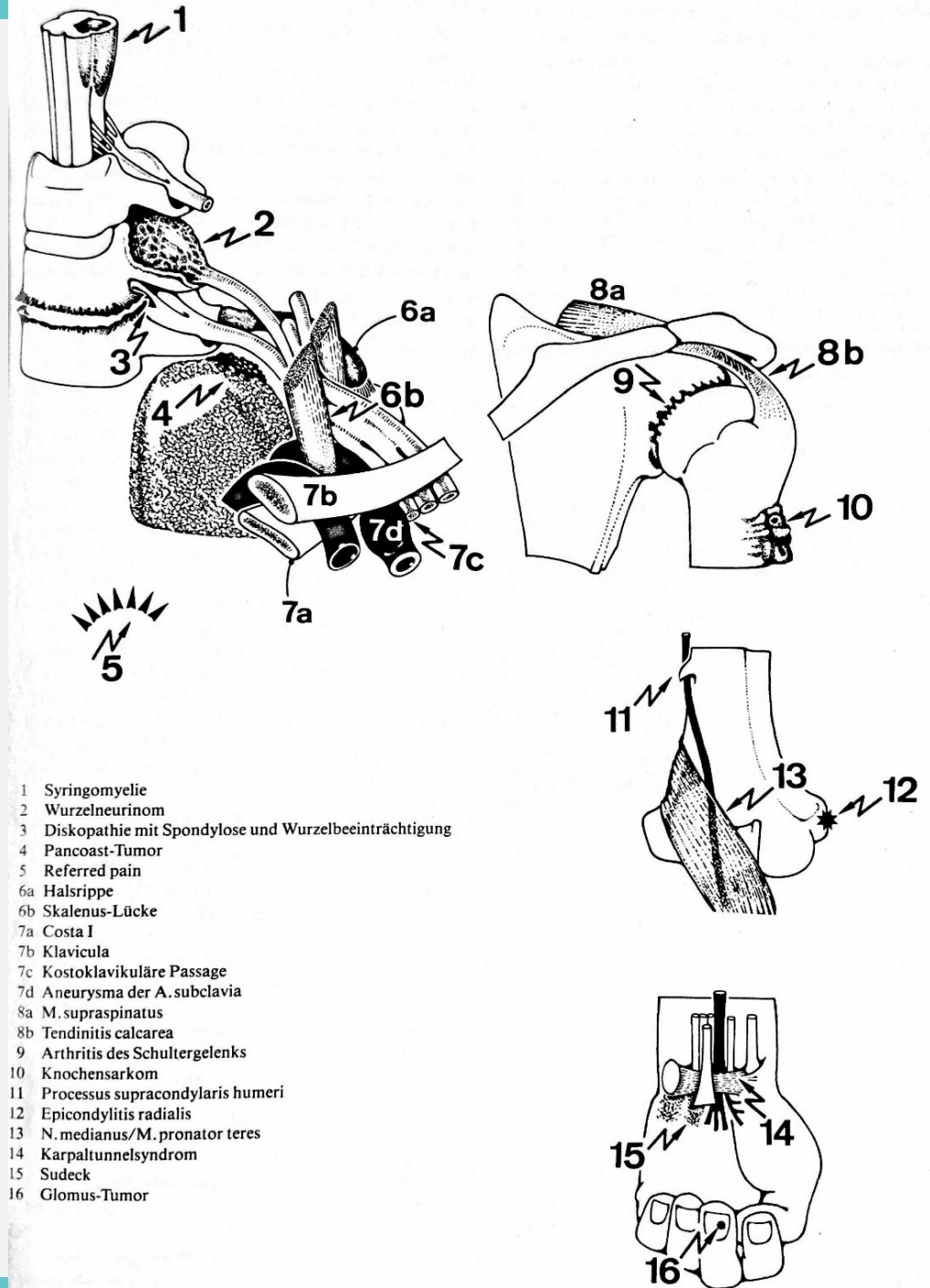
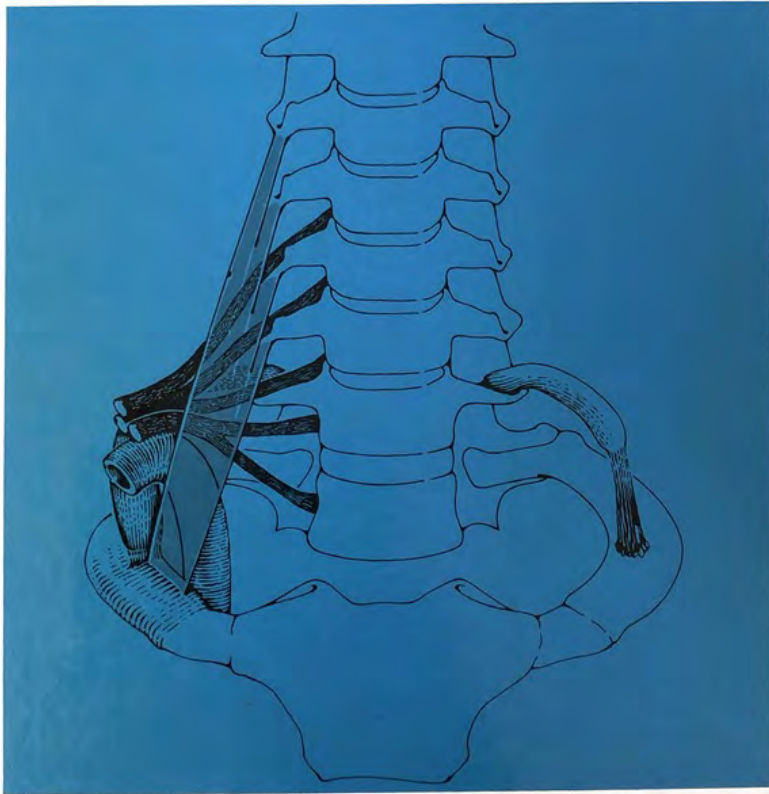
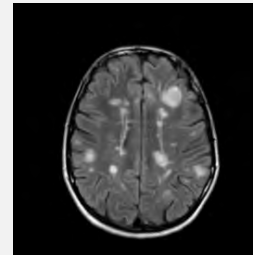


Abb. 2: Die wichtigsten Ursachen von Schulter-Arm-Schmerzen, schematisch dargestellt.

# Zerebrale Ursachen

- Multiple Sklerose



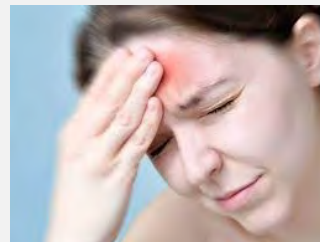
- M. Parkinson



- Hirnschlag - Spastik



- Migräne

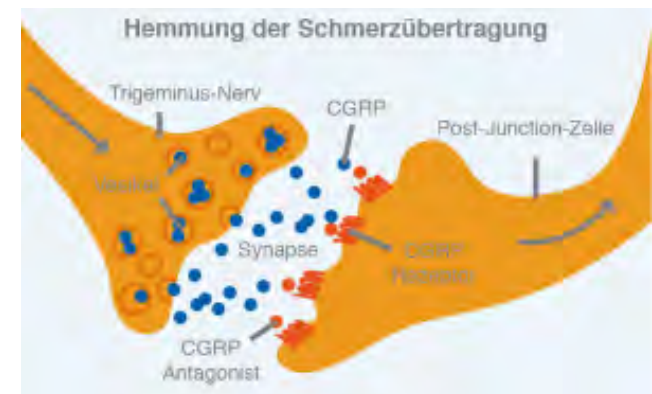
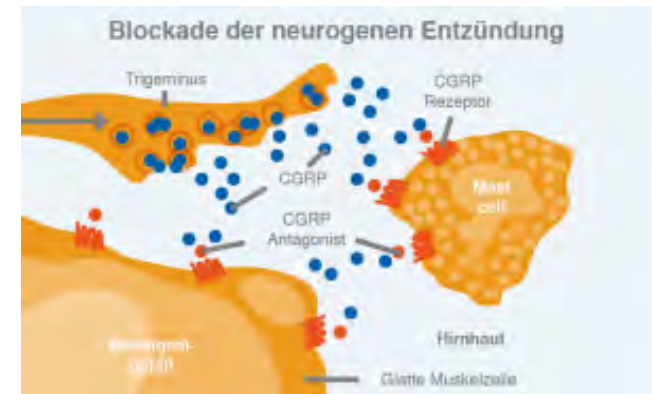


# Rolle von Calcitonin gene-related peptide (CGRP) bei Migräne



CGRP und Erenumab

- Neuropeptid
- Verbreitetes Vorkommen im peripheren und zentralen Nervensystem<sup>21</sup>
- Findet sich häufig in den Nerven des trigeminalen Systems<sup>21</sup>
- Freisetzung in kraniale Meningen bei schmerzhaften Stimuli<sup>22</sup>
- Potenter Dilatator der peripheren und zerebralen Blutgefäße<sup>23</sup>
- Bedeutung in der Migräne Pathophysiologie ist gut untersucht<sup>24</sup>
  - Anstieg im Blut während einer Migräneattacke<sup>25</sup>
  - Akute Therapie (Sumatriptan) normalisiert CGRP-Spiegel<sup>26</sup>
  - CGRP-Infusionen können in Studien Migräne-ähnliche Kopfschmerzen auslösen<sup>27</sup>



<sup>21</sup> Ho et al 2010; <sup>22</sup> Messlinger et al 2011; <sup>23</sup> Durham 2006; <sup>24</sup> Russo 2015; <sup>25</sup> Goadsby et al 1990; <sup>26</sup> Goadsby et al 1993; <sup>27</sup> Lassen et al 2002

| Tag | N | M | Vn | Nm | A | Weitere Angaben            | Therapie        |
|-----|---|---|----|----|---|----------------------------|-----------------|
| 1   | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 2   | 3 |   |    |    |   | stress                     | Eletriptan      |
| 3   | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 4   | 3 |   |    |    |   | stress                     | Eletriptan      |
| 5   | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 6   | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 7   | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 8   | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 9   | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 10  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 11  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 12  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 13  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 14  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 15  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 16  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 17  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 18  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 19  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 20  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 21  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 22  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 23  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 24  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 25  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 26  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 27  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 28  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 29  | 3 |   |    |    |   | stress                     | Eletriptan 10mg |
| 30  | 3 |   |    |    |   | stress, nicht gut schlafen | Eletriptan 10mg |
| 31  | 3 |   |    |    |   | stress, nicht gut schlafen | Eletriptan 10mg |

| Tag | N | M | Vn | Nm | A | Weitere Angaben | Therapie        |
|-----|---|---|----|----|---|-----------------|-----------------|
| 1   |   |   |    |    |   |                 |                 |
| 2   |   |   |    |    |   |                 |                 |
| 3   | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 4   | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 5   | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 6   | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 7   |   |   |    |    |   |                 |                 |
| 8   | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 9   | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 10  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 11  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 12  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 13  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 14  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 15  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 16  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 17  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 18  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 19  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 20  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 21  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 22  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 23  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 24  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 25  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 26  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 27  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 28  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 29  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 30  | 2 |   |    |    |   | stress          | Eletriptan 10mg |
| 31  |   |   |    |    |   |                 |                 |

6

| Tag | N | M | Vn | Nm | A | Weitere Angaben | Therapie        |
|-----|---|---|----|----|---|-----------------|-----------------|
| 1   | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 2   | 3 |   |    |    |   |                 | Topamax 2x 75mg |
| 3   | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 4   | 3 |   |    |    |   |                 | Topamax 2x 75mg |
| 5   | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 6   | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 7   | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 8   | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 9   | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 10  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 11  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 12  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 13  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 14  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 15  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 16  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 17  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 18  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 19  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 20  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 21  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 22  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 23  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 24  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 25  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 26  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 27  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 28  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 29  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 30  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |
| 31  | 3 |   |    |    |   |                 | Maxalt 2 Tabl.  |

| Tag | N | M | Vn | Nm | A | Weitere Angaben | Therapie |
|-----|---|---|----|----|---|-----------------|----------|
| 1   |   |   |    |    |   |                 |          |
| 2   |   |   |    |    |   |                 |          |
| 3   |   |   |    |    |   |                 |          |
| 4   |   |   |    |    |   |                 |          |
| 5   |   |   |    |    |   |                 |          |
| 6   |   |   |    |    |   |                 |          |
| 7   |   |   |    |    |   |                 |          |
| 8   |   |   |    |    |   |                 |          |
| 9   |   |   |    |    |   |                 |          |
| 10  |   |   |    |    |   |                 |          |
| 11  |   |   |    |    |   |                 |          |
| 12  |   |   |    |    |   |                 |          |
| 13  |   |   |    |    |   |                 |          |
| 14  |   |   |    |    |   |                 |          |
| 15  |   |   |    |    |   |                 |          |
| 16  |   |   |    |    |   |                 |          |
| 17  |   |   |    |    |   |                 |          |
| 18  |   |   |    |    |   |                 |          |
| 19  |   |   |    |    |   |                 |          |
| 20  |   |   |    |    |   |                 |          |
| 21  |   |   |    |    |   |                 |          |
| 22  |   |   |    |    |   |                 |          |
| 23  |   |   |    |    |   |                 |          |
| 24  |   |   |    |    |   |                 |          |
| 25  |   |   |    |    |   |                 |          |
| 26  |   |   |    |    |   |                 |          |
| 27  |   |   |    |    |   |                 |          |
| 28  |   |   |    |    |   |                 |          |
| 29  |   |   |    |    |   |                 |          |
| 30  |   |   |    |    |   |                 |          |
| 31  |   |   |    |    |   |                 |          |

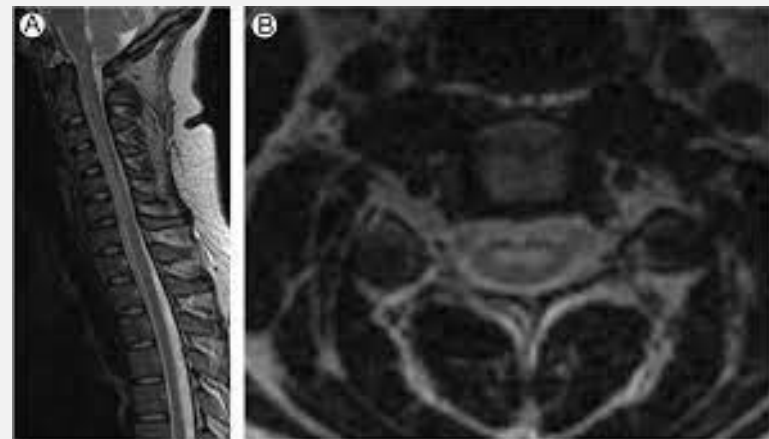
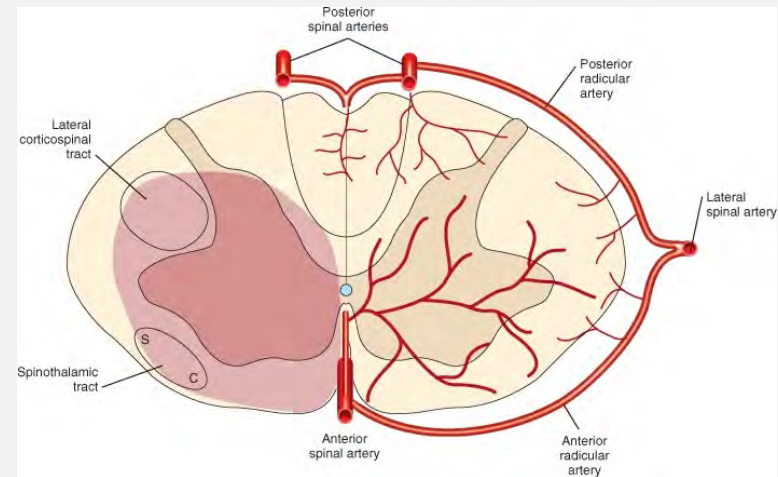
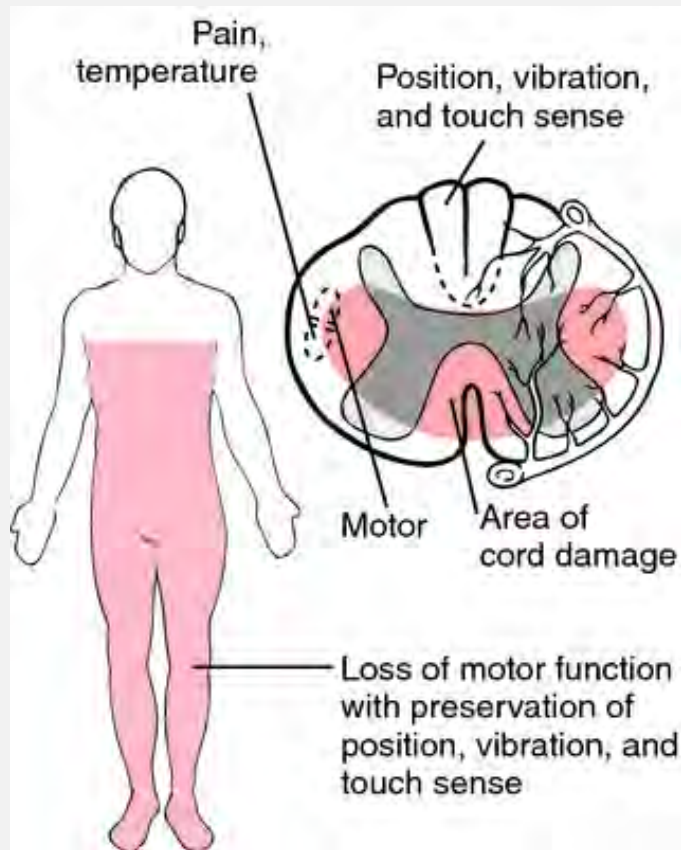
| Tag | N   | M | Vn | Nm | A | Weitere Angaben | Therapie        |
|-----|-----|---|----|----|---|-----------------|-----------------|
| 1   | 3   |   |    |    |   |                 | Zonig Nasal 5mg |
| 2   | 3   |   |    |    |   |                 | Zonig Nasal 5mg |
| 3   | 3   |   |    |    |   |                 | Zonig Nasal 5mg |
| 4   |     |   |    |    |   |                 |                 |
| 5   |     |   |    |    |   |                 |                 |
| 6   | 2-3 |   |    |    |   |                 | Zonig "         |
| 7   |     |   |    |    |   |                 |                 |
| 8   |     |   |    |    |   |                 |                 |
| 9   |     |   |    |    |   |                 |                 |
| 10  |     |   |    |    |   |                 |                 |
| 11  |     |   |    |    |   |                 |                 |
| 12  | 2   |   |    |    |   | Autofahrt       | Panstan 500     |
| 13  | 2   |   |    |    |   |                 | Zonig Nasal 5mg |
| 14  | 3   |   |    |    |   |                 | Zonig Nasal 5mg |
| 15  | 3   |   |    |    |   |                 | Zonig Nasal 5mg |
| 16  |     |   |    |    |   |                 |                 |
| 17  |     |   |    |    |   |                 |                 |
| 18  |     |   |    |    |   |                 |                 |
| 19  | 2-3 |   |    |    |   |                 | Zonig Nasal 5mg |
| 20  |     |   |    |    |   |                 |                 |
| 21  | 3   |   |    |    |   |                 | Zonig Nasal 5mg |
| 22  |     |   |    |    |   |                 |                 |
| 23  |     |   |    |    |   |                 |                 |
| 24  | 3   |   |    |    |   | Ferien          | Zonig Nasal 5mg |
| 25  |     |   |    |    |   |                 | Zonig Nasal "   |
| 26  | 2-3 |   |    |    |   |                 | Zonig Nasal "   |
| 27  |     |   |    |    |   |                 |                 |
| 28  |     |   |    |    |   |                 |                 |
| 29  | 3   |   |    |    |   |                 | Zonig Nasal "   |
| 30  | 3   |   |    |    |   |                 | Zonig "         |
| 31  |     |   |    |    |   |                 |                 |

Totd: 10x Zonig 5mg

| Tag | N | M | Vn | Nm | A | Weitere Angaben | Therapie |
|-----|---|---|----|----|---|-----------------|----------|
| 1   |   |   |    |    |   |                 |          |
| 2   |   |   |    |    |   |                 |          |
| 3   |   |   |    |    |   |                 |          |
| 4   |   |   |    |    |   |                 |          |
| 5   |   |   |    |    |   |                 |          |
| 6   |   |   |    |    |   |                 |          |
| 7   |   |   |    |    |   |                 |          |
| 8   |   |   |    |    |   |                 |          |
| 9   |   |   |    |    |   |                 |          |
| 10  |   |   |    |    |   |                 |          |
| 11  |   |   |    |    |   |                 |          |
| 12  |   |   |    |    |   |                 |          |
| 13  |   |   |    |    |   |                 |          |
| 14  |   |   |    |    |   |                 |          |
| 15  |   |   |    |    |   |                 |          |
| 16  |   |   |    |    |   |                 |          |
| 17  |   |   |    |    |   |                 |          |
| 18  |   |   |    |    |   |                 |          |
| 19  |   |   |    |    |   |                 |          |
| 20  |   |   |    |    |   |                 |          |
| 21  |   |   |    |    |   |                 |          |
| 22  |   |   |    |    |   |                 |          |
| 23  |   |   |    |    |   |                 |          |
| 24  |   |   |    |    |   |                 |          |
| 25  |   |   |    |    |   |                 |          |
| 26  |   |   |    |    |   |                 |          |
| 27  |   |   |    |    |   |                 |          |
| 28  |   |   |    |    |   |                 |          |
| 29  |   |   |    |    |   |                 |          |
| 30  |   |   |    |    |   |                 |          |
| 31  |   |   |    |    |   |                 |          |

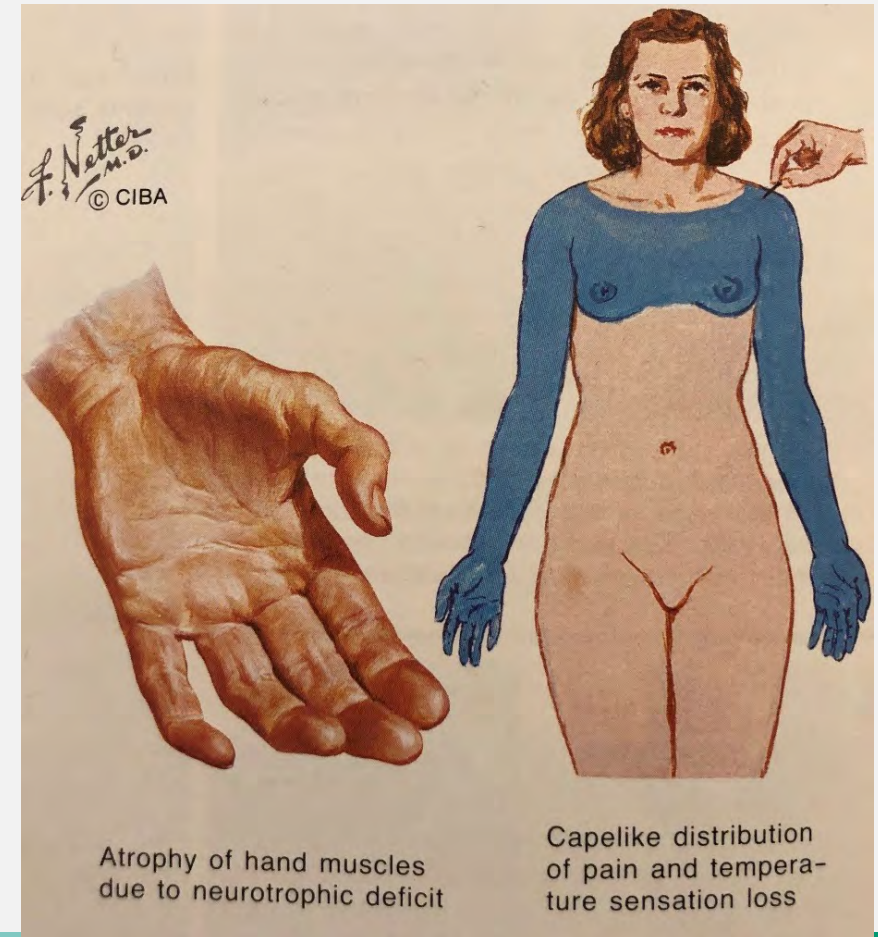
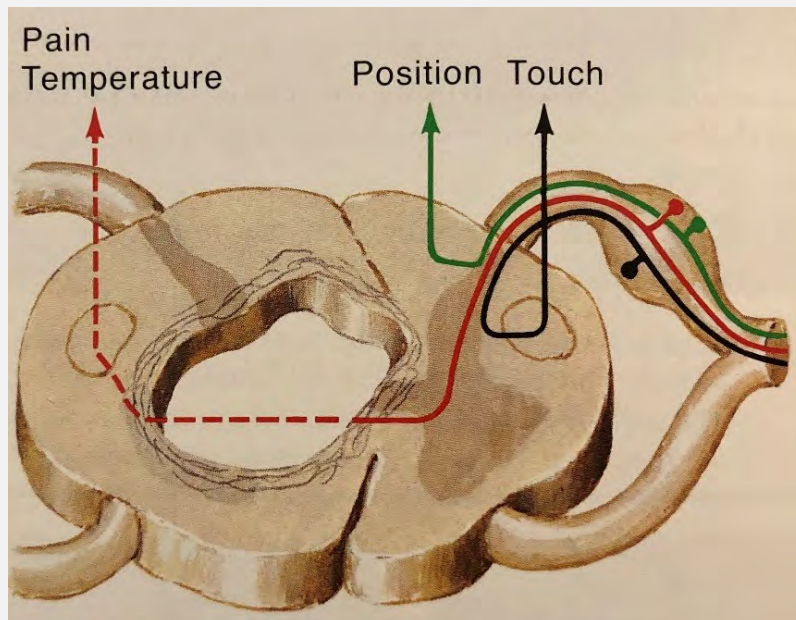
# Spinale Ursachen

## Rückenmarksinfarkt



# Spinale Ursachen

Syringomyelie

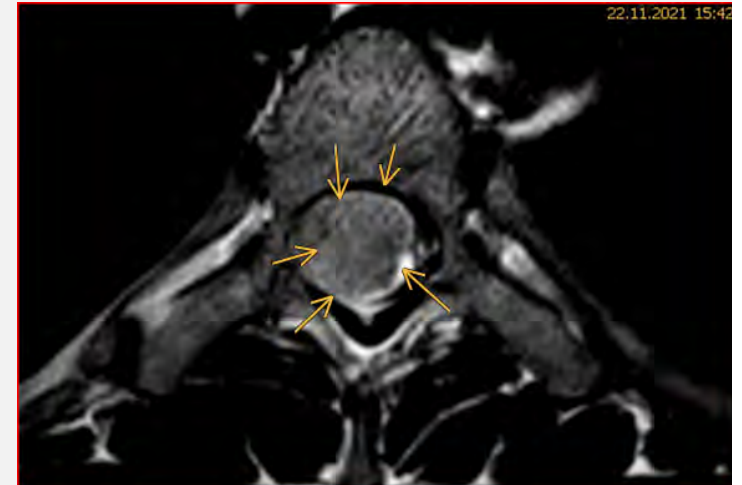




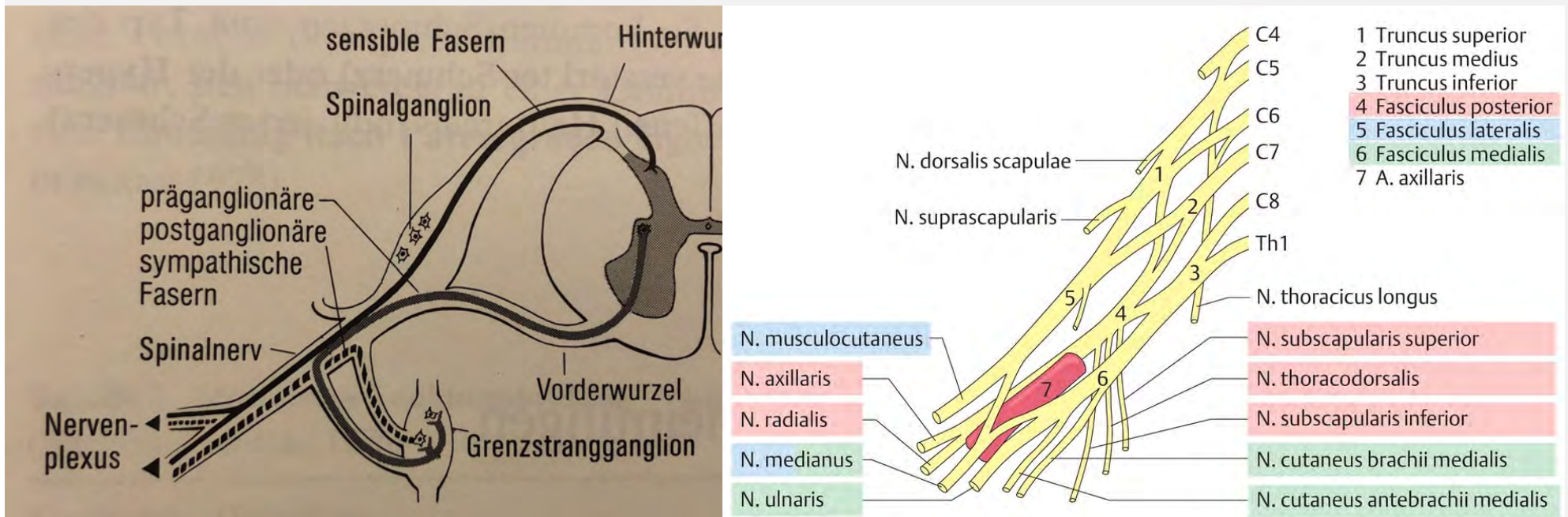
# Fallbsp. I

33 j. w. in 35. SSW mit Fussheberschwäche li seit 3-4 Mte

- MER ↑↑
- Babinski pos.
- Sens.störung zirkulär (≠ peripheres Muster)
- ENMG: io
- Keine Gesichts-/Armbeteiligung



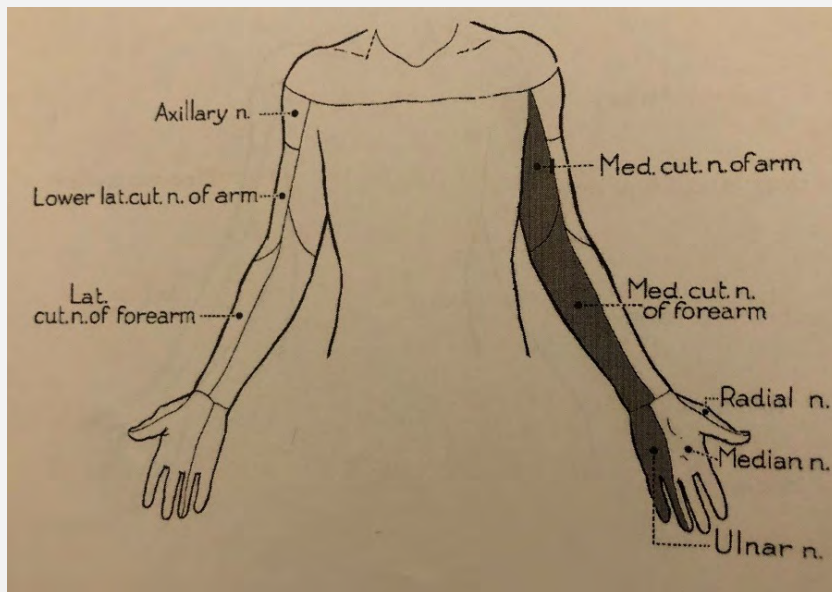
# Plexusläsion - Anatomie I



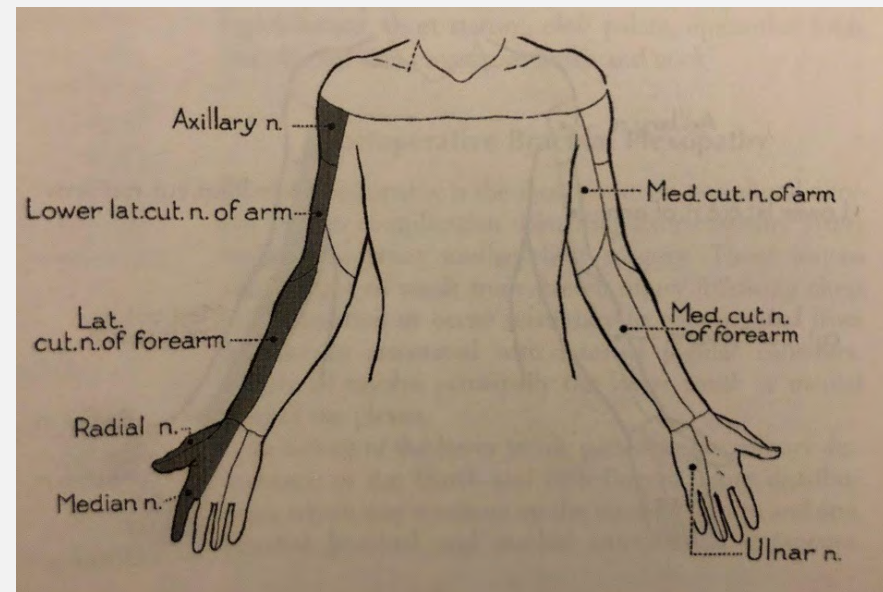
**Radikulopathie (prä-ganglionär): Schweißsekretion normal**  
**Plexus (post-ganglionär): Schweißsekretion reduziert**

# Plexusläsion - Anatomie II

## Untere Plexusläsion

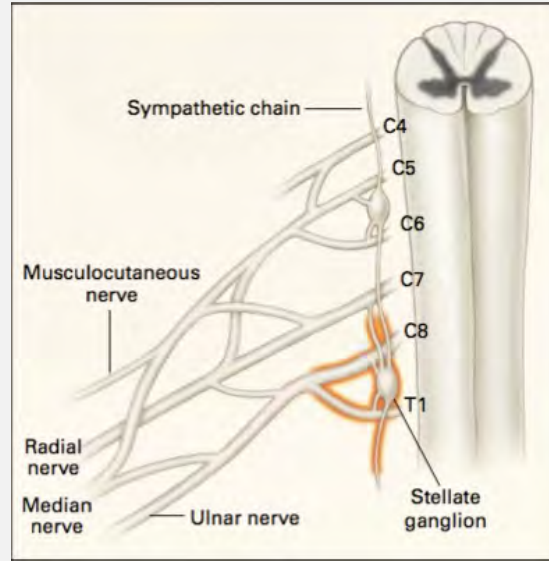
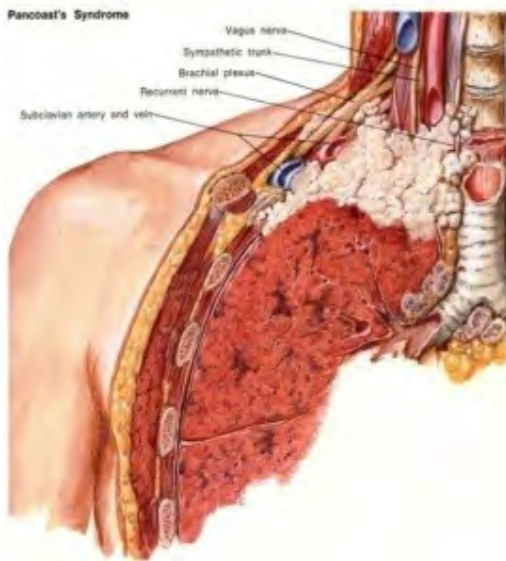


## Obere Plexusläsion

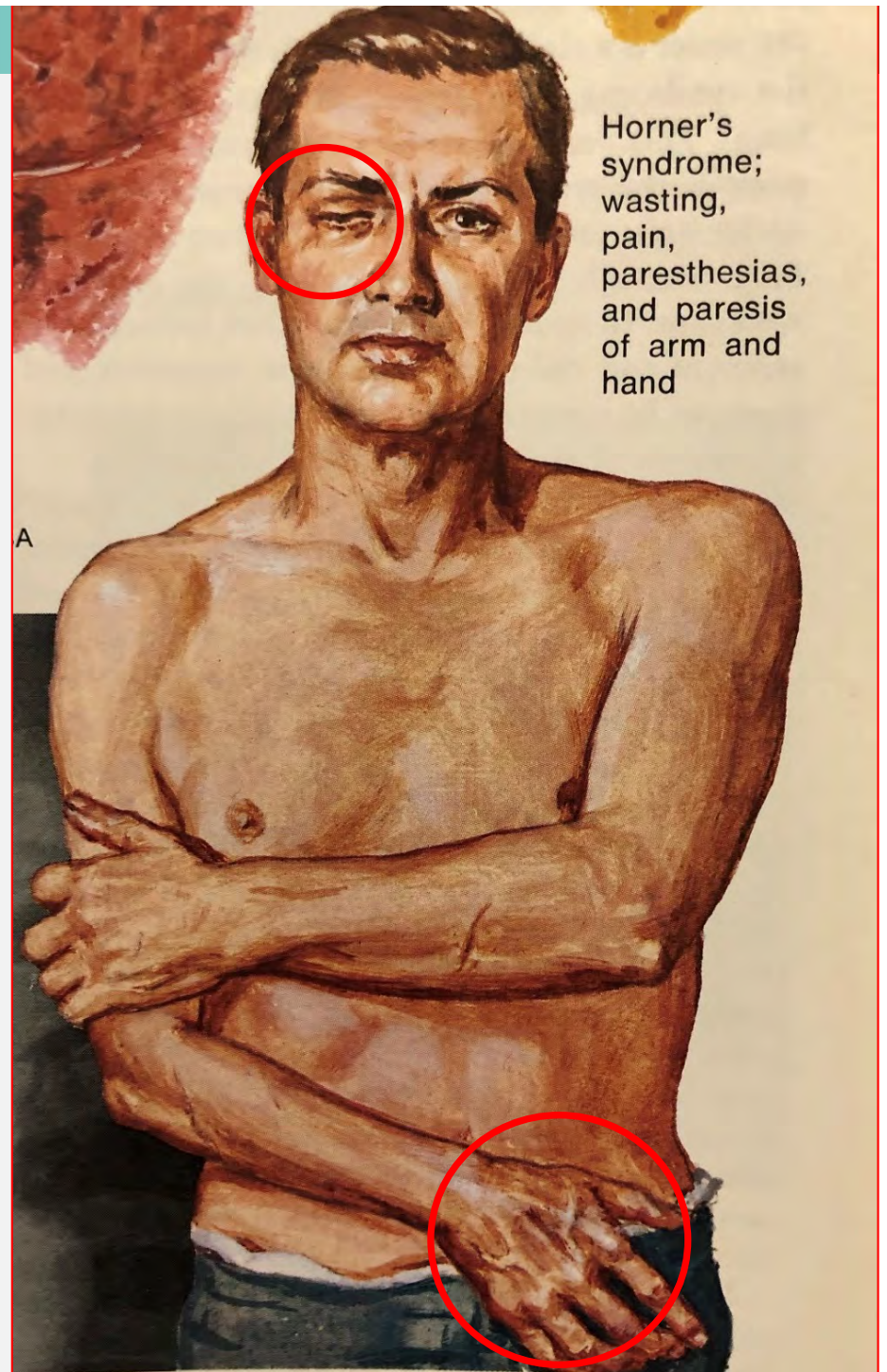


# Plexusläsion

## Infiltration (Pancoast Tumor)



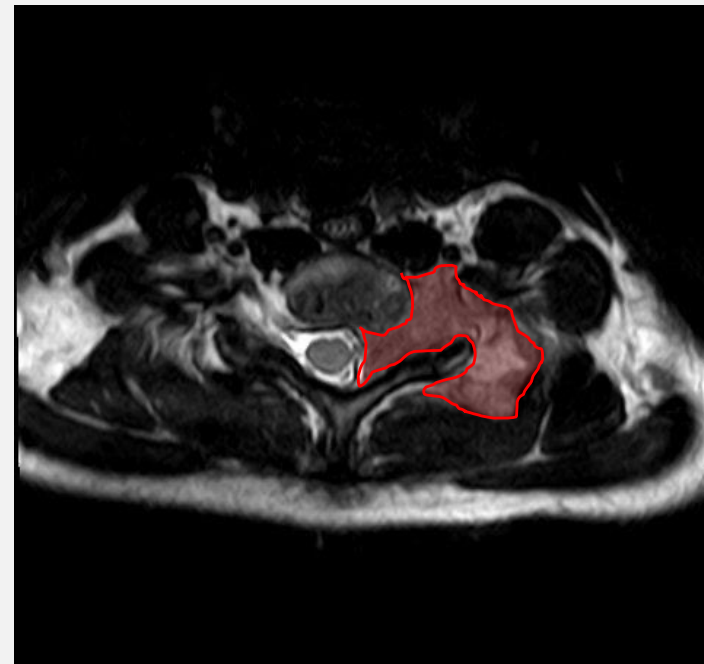
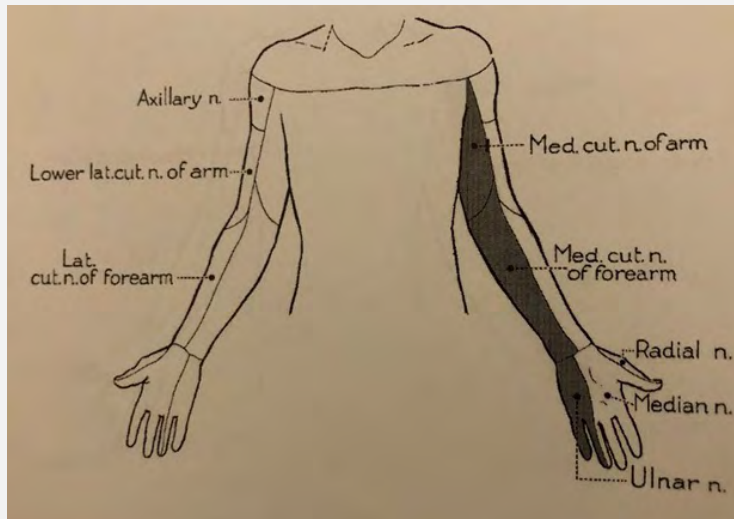
Arcasoy & Jett 1997, p. 1370



# Fallbsp. II

23 j. w. Zuweisung wg Schulter-Arm-Syndrom links

- 02/20: Scapula-Sz li.
- 04/20: MRI HWS Ø Neurokompression
- 05/20: starke nächtl. Sz. + Ausstrahlung in li Arm
- -> **Gefühlstörung li UA medial + Dig III-V & Handschwäche li**  
Fingerflexion, Daumenabduktion, Handgelenks- und Fingerextension, sowie Fingerspreizen M3
- -> **EMG: Denervation !!**



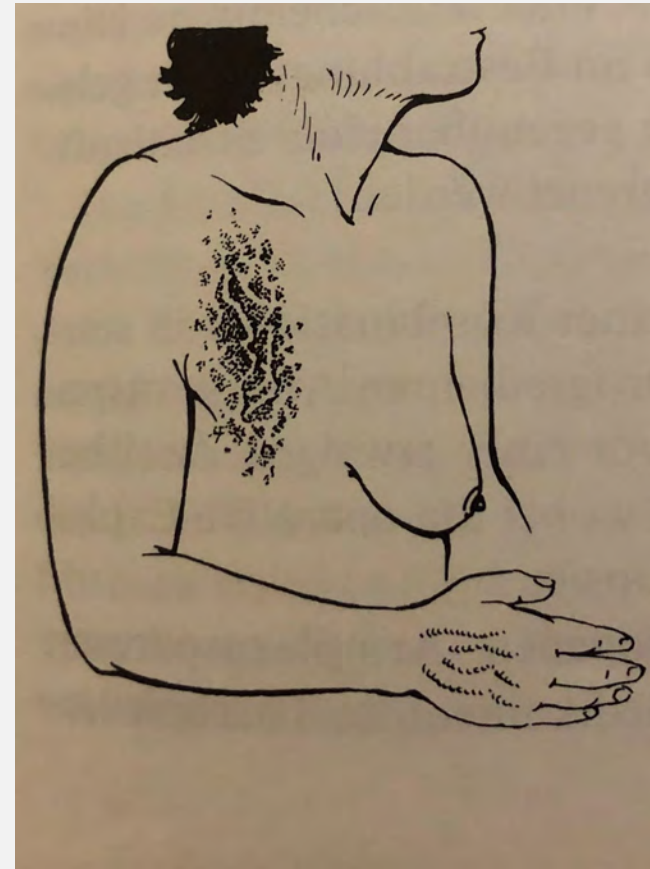
# Plexusläsion

## Radiogen

- Mamma-CA oder M. Hodgkin
- Latenz: Monate bis 25 J (peak 2-3 J)
- Sy: Beginn mit Schmerzen & Parästhesien  
-> Atrophien, Paresen, Myokymien  
+ trophische Störungen

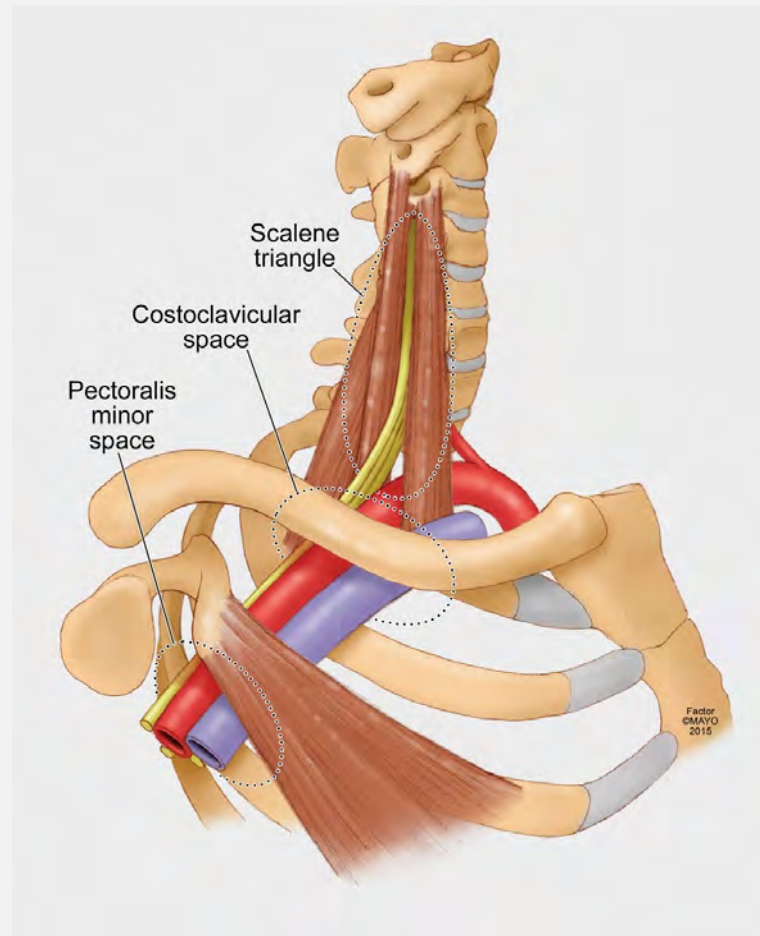
## DD Tumorrezidiv?

- Intervall < 6 Mte
- Rasche Progredienz
- Läsion symp. Grenzstrang & unterer Plexus
- Starke Schmerzen



# Plexusläsion

## Engpass-Syndrom («Thoracic outlet» Syndrom, TOS)



### Arterial TOS

- cervical rib -> poststenotic dilatation of SA
- ischemia & emboli of fingers/hand

### Venous TOS

- stenosis or occlusion of SV -> arm swelling

### Nonspecific TOS

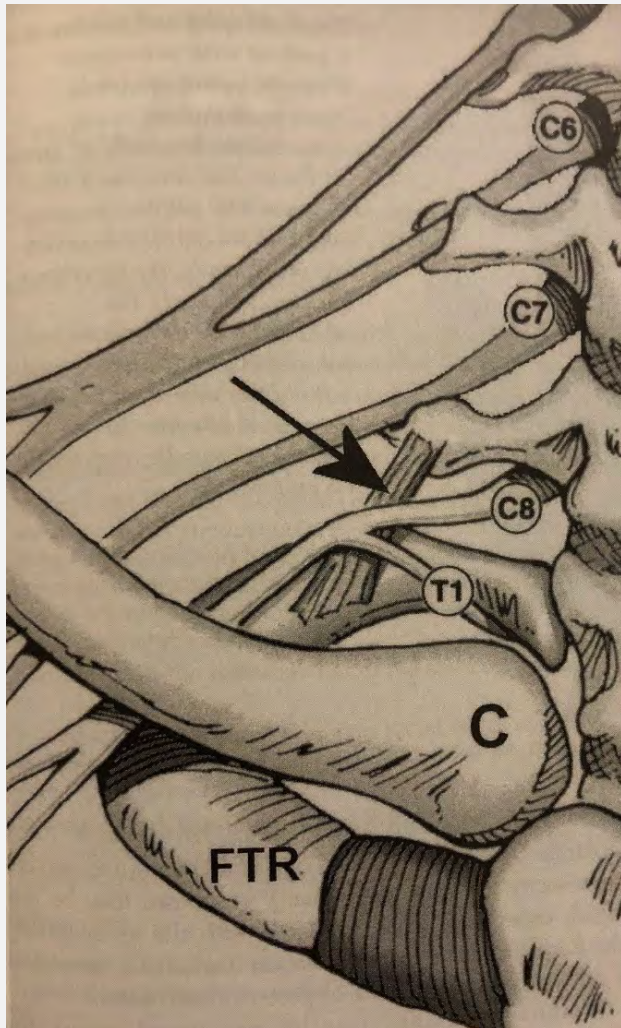
### Neurologic TOS

Halsrippe: 0.5 - 1% in Bevölkerung

Symptomatisch in 10% aller Fälle

# Plexusläsion

## Neurogenes TOS



### «Pseudo-Karpaltunnelsyndrom»

- Atrophie Thenar > Hypothenar
- Normale Sens. Dig I-III
- Hypästhesie Hypothenar & UA medial

### Gilliat-Sumner hand





# Fallbsp. III

40 j. w.

Brachialgie rechts seit 3 Wo

Thenaratrophie rechts, normale Sens

Medianus-Neurographie: mot. Kein Potential, sens. io  
Nervensonographie: kein CTS

## MRI HWS:

Keine Halsrippe, keine akzessorischen Bänder, Plexus unauffällig  
N.B. Leichte dorsale Deviation der C8 Wurzel

# Fallbsp. III

40 j. w.

Brachialgie rechts seit 3 Wo

Thenaratrophie rechts, normale Sens

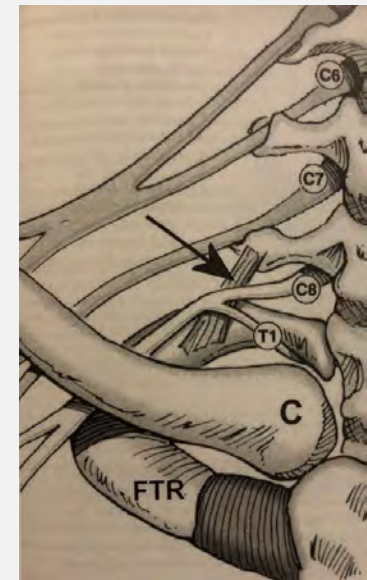
Medianus-Neurographie: mot. Kein Potential, sens. io

Nervensonographie: kein CTS

**MRI HWS:**

Keine Halsrippe, keine akzessorischen Bänder, Plexus unauffällig

**N.B. Leichte dorsale Deviation der C8 Wurzel**



# Plexusläsion

Entzündlich (Plexusneuritis)

- «Parsonage-Turner-Syndrom»
- «Neuralgische Schulteramyotrophie»
- «Acute brachial plexus neuropathy (ABPN)»
- «idiopathic brachial plexus neuropathy»

## **NEURALGIC AMYOTROPHY: AN UPDATE ON DIAGNOSIS, PATHOPHYSIOLOGY, AND TREATMENT**

JEROEN J.J. VAN EIJK, MD,<sup>1,2</sup> JAN T. GROOTHUIS, MD, PhD,<sup>3</sup> and NENS VAN ALFEN, MD, PhD<sup>2</sup>

<sup>1</sup> Department of Neurology, Jeroen Bosch Hospital, 's-Hertogenbosch, The Netherlands

<sup>2</sup> Department of Neurology and Clinical Neurophysiology, Donders Centre for Neuroscience, Radboud University Medical Center, Nijmegen, The Netherlands

<sup>3</sup> Department of Rehabilitation, Donders Centre for Neuroscience, Radboud University Medical Center, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands

MUSCLE & NERVE 2016

# Acute Brachial Plexus Neuropathy (ABPN)

Unilateral (1/3: bilateral and asymmetric)

1. **Acute severe continuous** pain in shoulder area **at night** after moving /manipulating arm or shoulder analgesic-resistant
2. **Muscle weakness** within 24h of pain onset (1/3) or up to 4 weeks -> 3. **Muscle atrophy**

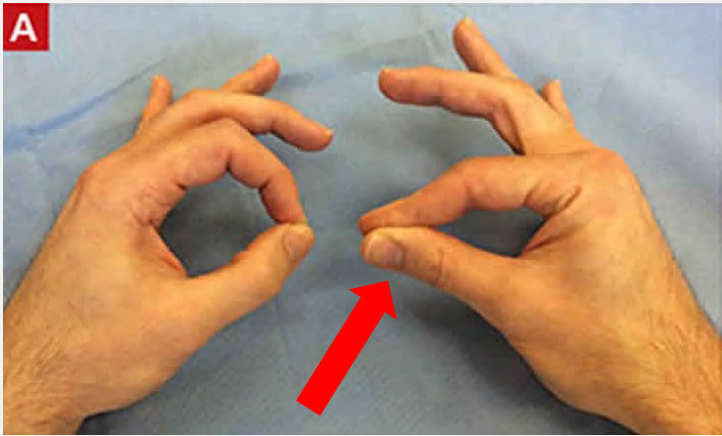
Often patchy involvement of (upper) plexus:

Serratus anterior, Biceps, Brachioradialis, Deltoid, Supra-/infraspinatus  
or single nerves: long thoracic, suprascapular or anterior interosseus

**Sensory:** much less marked. 2/3 paresthesias.

n. axillaris, n. cut. antebrachii lat. or n. radialis superficialis

**Variants:** phrenic nerve (acute onset of orthopnoe)



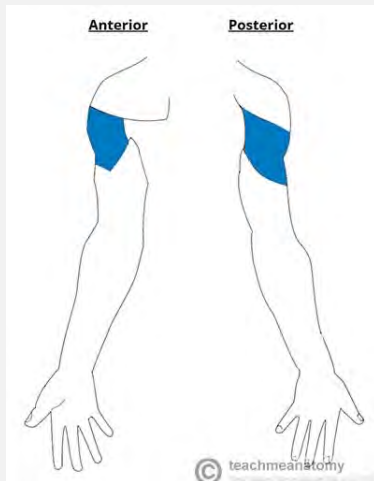
**N. Interosseus anterior**



**Scapula alata**



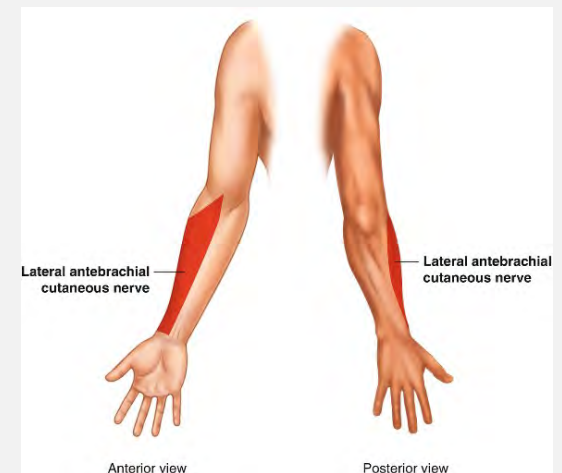
**N. suprascapularis**



**N. axillaris**



**N. Radialis superficialis**



**N. cut. antebrachii lat**

# Acute Brachial Plexus Neuropathy (ABPN)

Pathogenesis: demyelination + remyelination, microvasculitis  
-> immune-mediated nerve damage

## Treatment: Prednisolone ?

Day 1-7: 60 mg/d

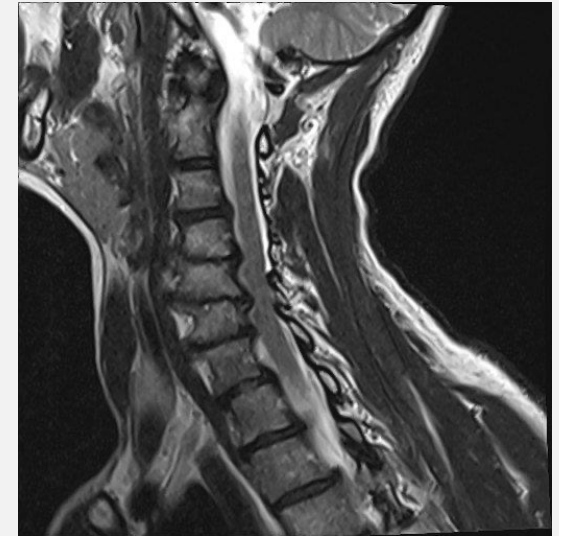
Day 8-12: Tapering by 10 mg/d

Day 13: 5 mg

Pain treatment: NSAID + long acting opioids (pain relief 60%)

Prognosis

# Fallbsp. IV



60j. w.

Zuweisung: Spinal- und Foraminalstenose C 5/6  
**Rezidivierende Cervicobrachialgie rechts**

MRI HWS: schwere Osteochondrose C 5/6 mit  
medialer Protrusion & deutlicher Spinalkanalstenose  
Neuroforamina C 5/6 bds. deutlich eingengt

Klinik: Neurostatus io, Spurling Test & Lhermitte sign neg.

Re-Anamnese: wegen Schmerzausstrahlung in die rechte Hand bediene  
sie die Maus nun links, sie trage keine Taschen mehr mit der rechten  
Hand, konstantes Kribbeln in Dig I-IV rechte Hand v.a. morgens

ENMG: CTS rechts

# Summary

- Neurogen: sensible + motorische symptome
- Sensibilitätsprüfung: Temperatur/Sz.diskrimination
- Blick aufs Auge (Horner-Syndrom)
- **Red flag**: Nächtliche Sz + sensomot. Sy + Horner-Sy
- Neurogenes TOS: Gilliatt Sumner Hand
- ENMG: Denervation (ab 2.-3. Woche)
- ABPN: typischer klinischer Verlauf & Befundkonstellation
- Brachialgie auch bei fortgeschrittenem CTS
- **Interdisziplinäre Zusammenarbeit**