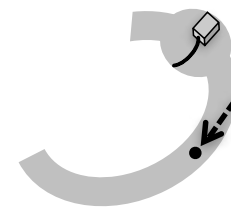
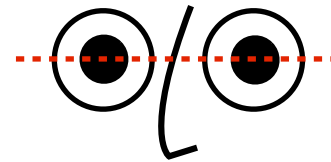
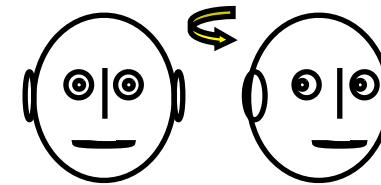


# Schwindel: sinnvolle Abklärung in der Praxis

Dominik Straumann  
Klinik für Neurologie  
Universitätsspital Zürich

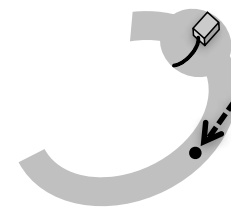
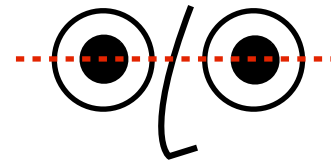
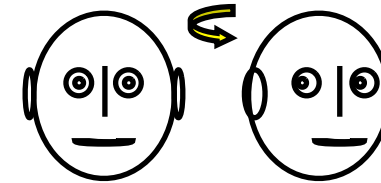
# Untersuchungsgang

- Spontannystagmus?
- Kopfimpulstest
- vertikale Augendeviation?
- dynamischer Visus
- Romberg auf weicher Matte
- Provokationsmanöver
- Vibrationssinn bimalleolär



# Untersuchungsgang

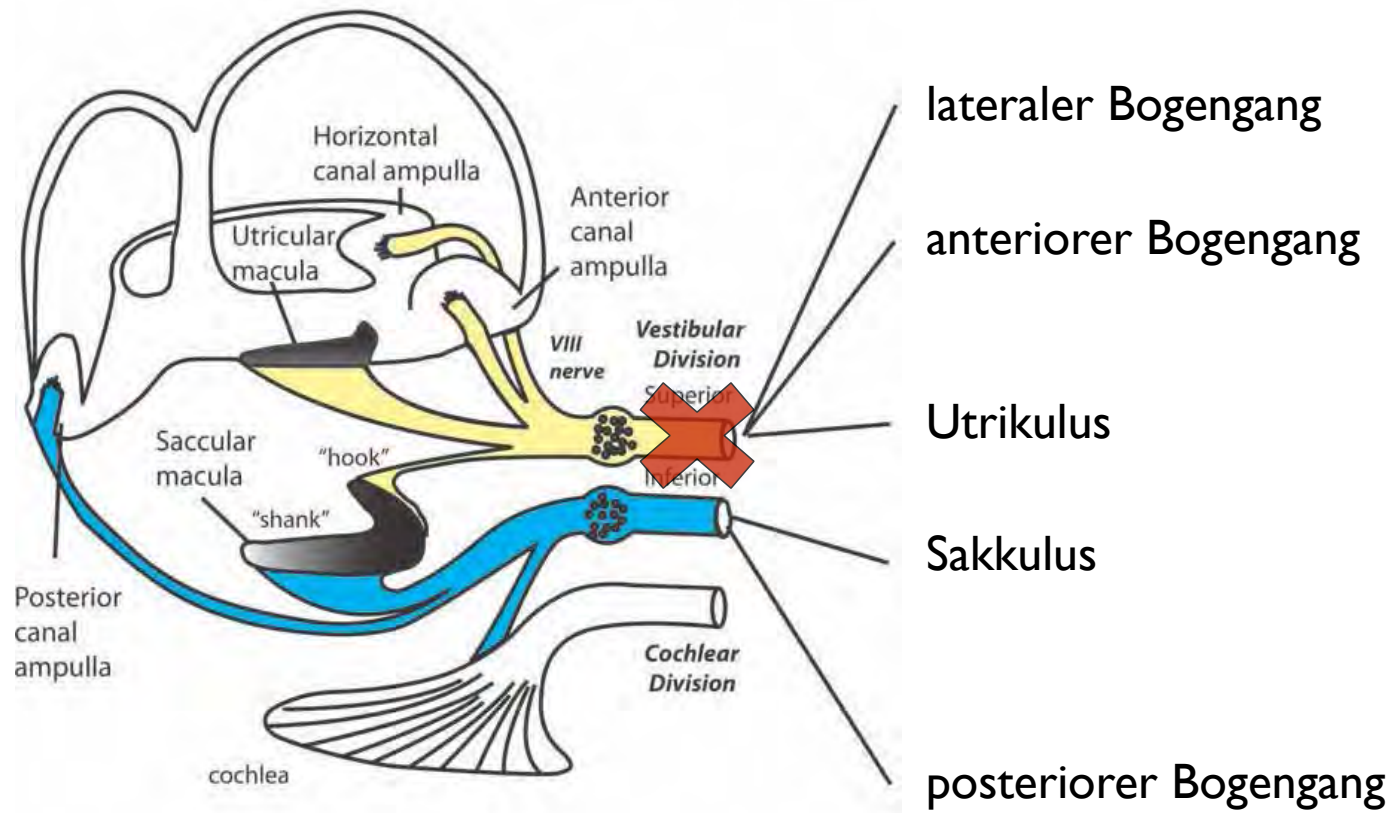
- Spontannystagmus?
- Kopfimpulstest
- vertikale Augendeviation?
- dynamischer Visus
- Romberg auf weicher Matte
- Provokationsmanöver
- Vibrationssinn bimalleolär



# Akutes vestibuläres Syndrom



Subjekt: Prof. Jürg Kesselring, Valens, Switzerland

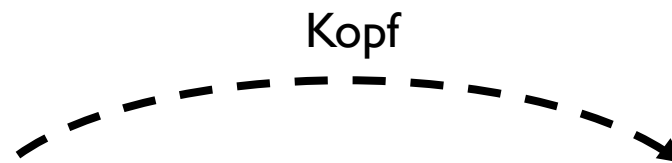
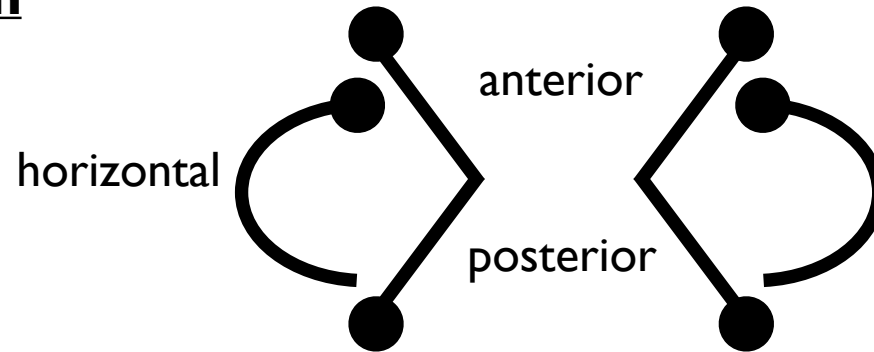


Curthoys (2012)

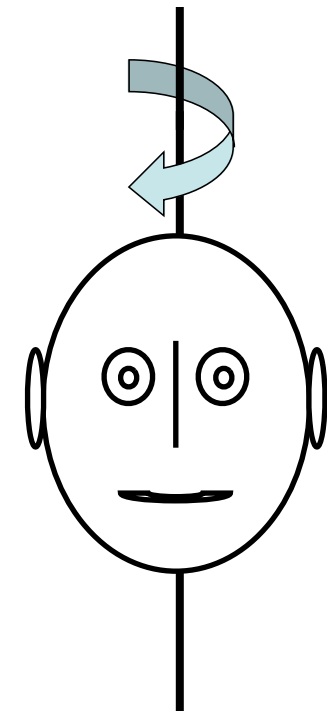
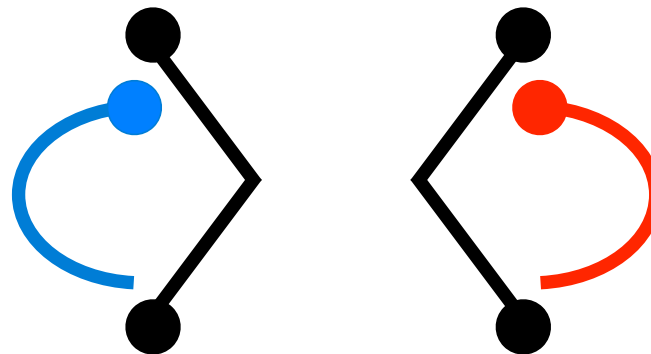
# Push-pull der Bogengänge

von oben

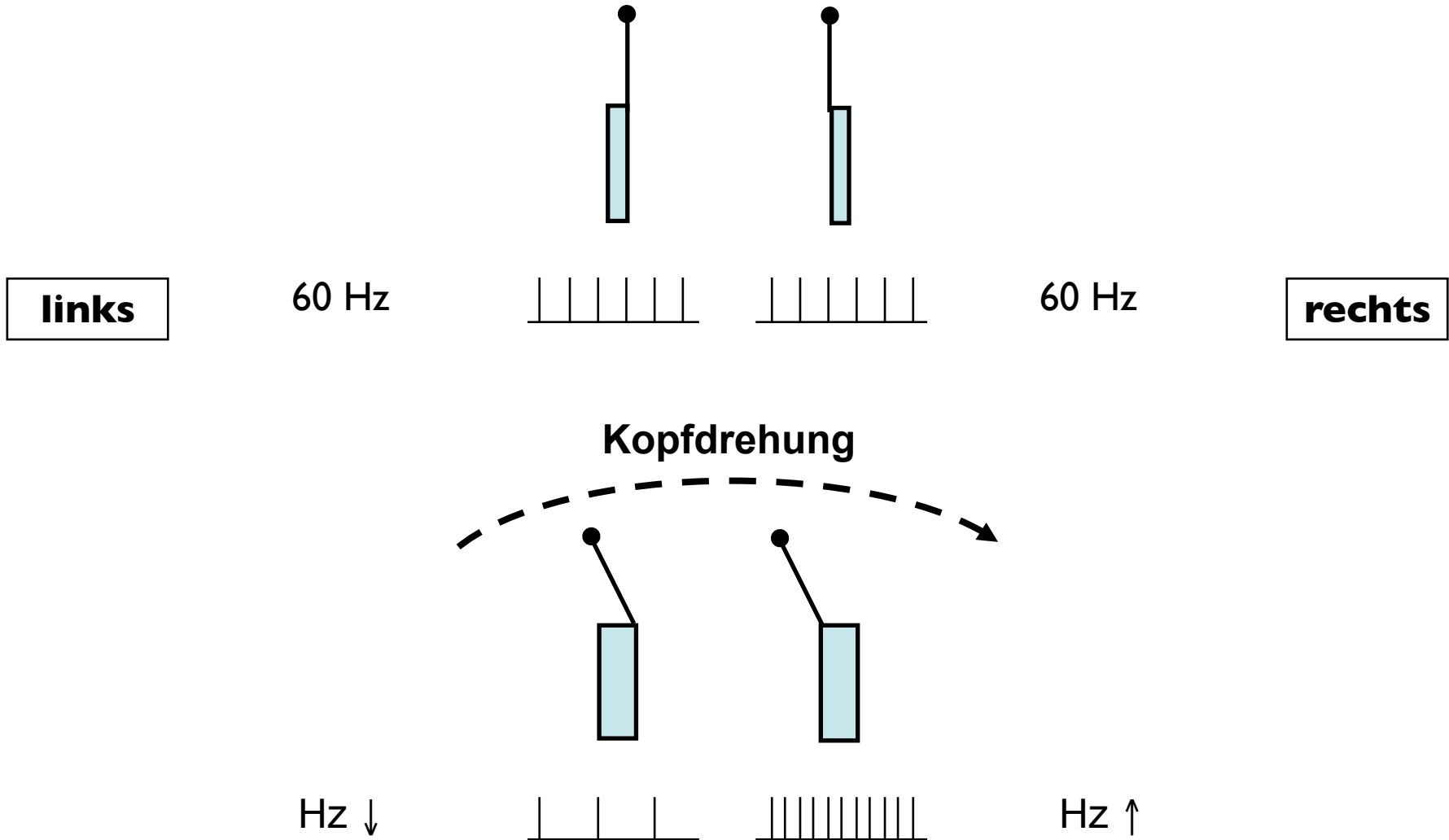
● Ampulla



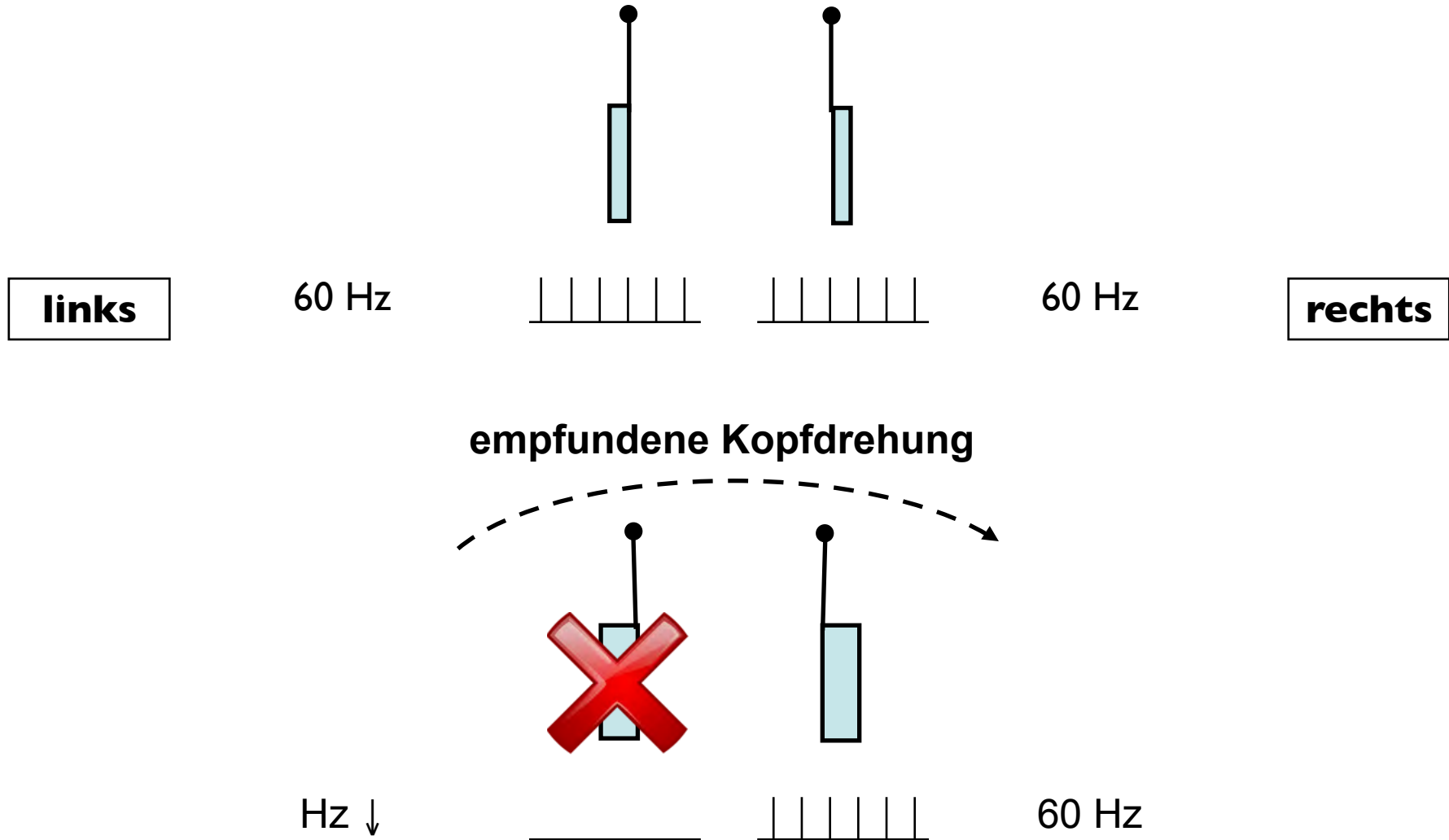
— Exzitation  
— Inhibition



# Ruhefrequenz

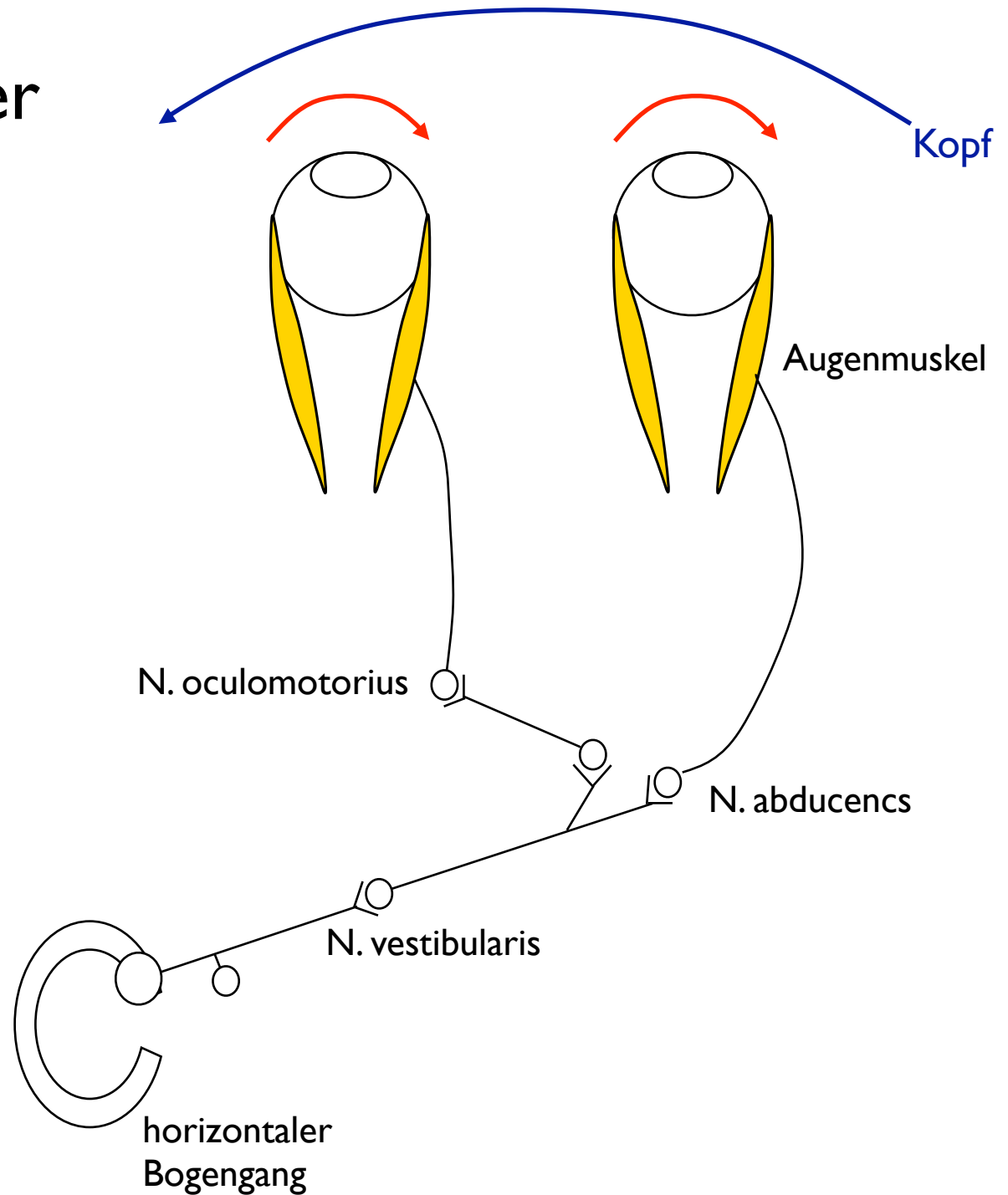


# Vestibuläre Tonus-Asymmetrie

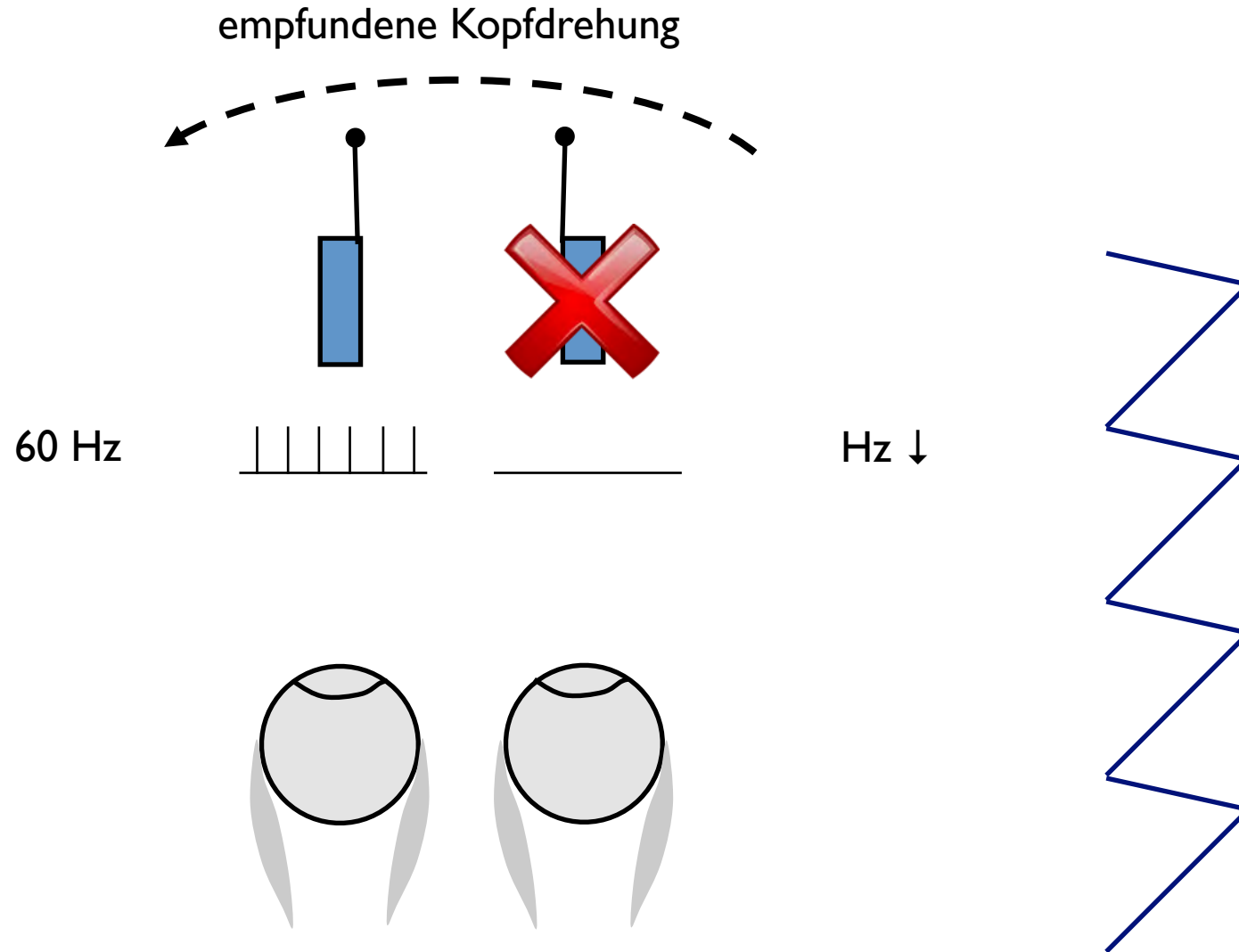




# Vestibulo-okulärer Reflex (VOR) für Kopfdrehung



# Spontannystagmus



# Akute vestibuläre Asymmetrie



ipsiläsionelle Gangabweichung

youtube: UJmAPEO4LIs

# Akute vestibuläre Asymmetrie



ipsiläsionelle Gangabweichung

youtube: UjmAPEO4LI s



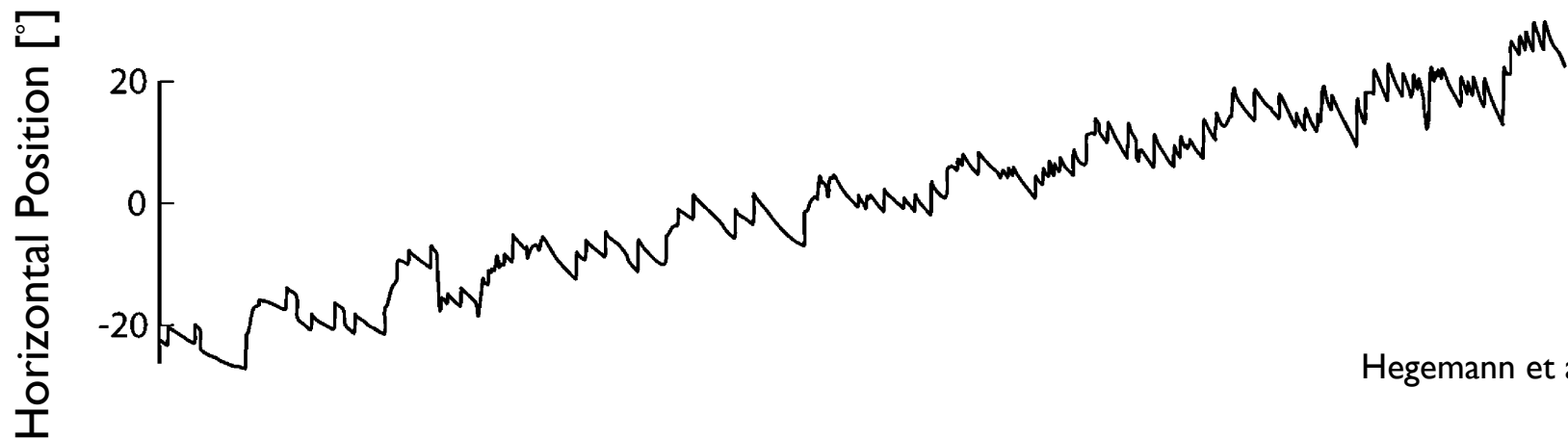
ipsiläsionelle Kopfneigung &  
kontraläsioneller Nystagmus

youtube: Bzl-GzFH8PI

# “peripherer” Nystagmus



# Alexander'sches Gesetz



Hegemann et al. 2007

Driftgeschwindigkeit (und damit Nystagmusfrequenz) nimmt in Richtung der schnellen Phase zu.



I Woche nach akuter Vestibulopathie

## Patient mit akutem Schwindel

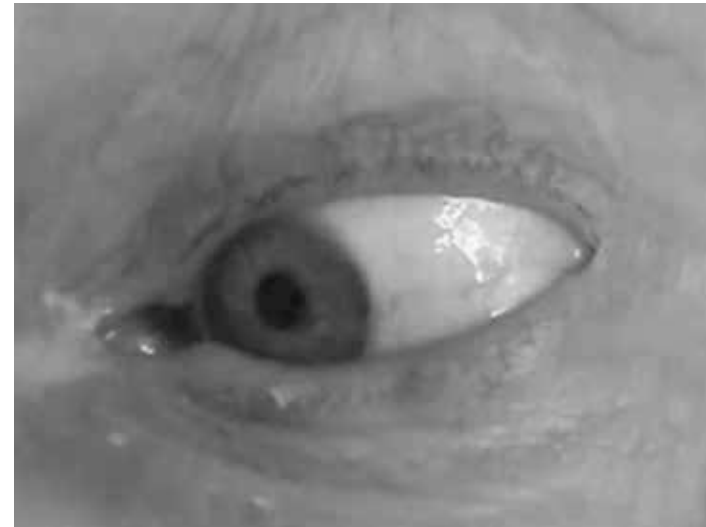




Patient mit akutem Schwindel



Patient mit akutem Schwindel

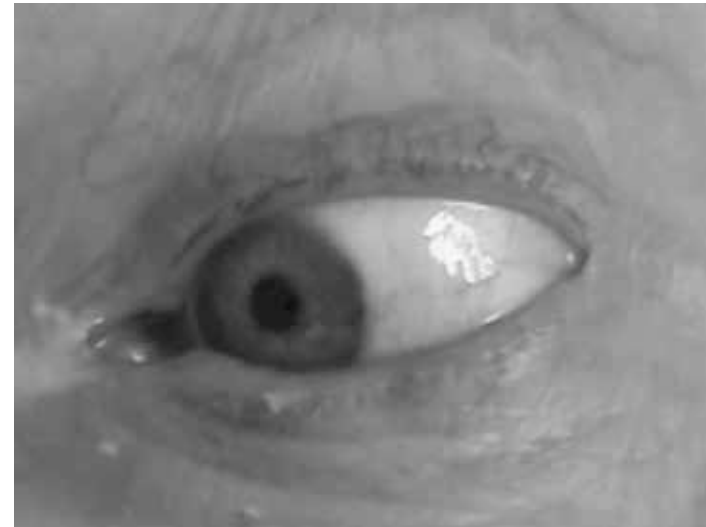


Patient mit akutem Schwindel



*vestibuläre Neuritis links*

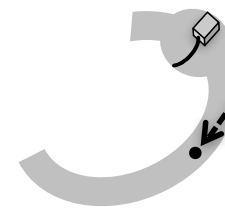
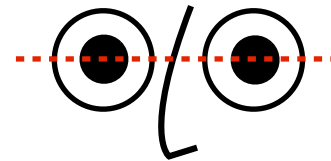
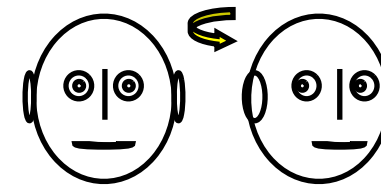
Patient mit akutem Schwindel



*Kleinhirnfarkt rechts*

# Untersuchungsgang

- Spontannystagmus?
- **Kopfimpulstest**
- vertikale Augendeviation?
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- Romberg auf weicher Matte
- Provokationsmanöver
- Vibrationssinn bimalleolär



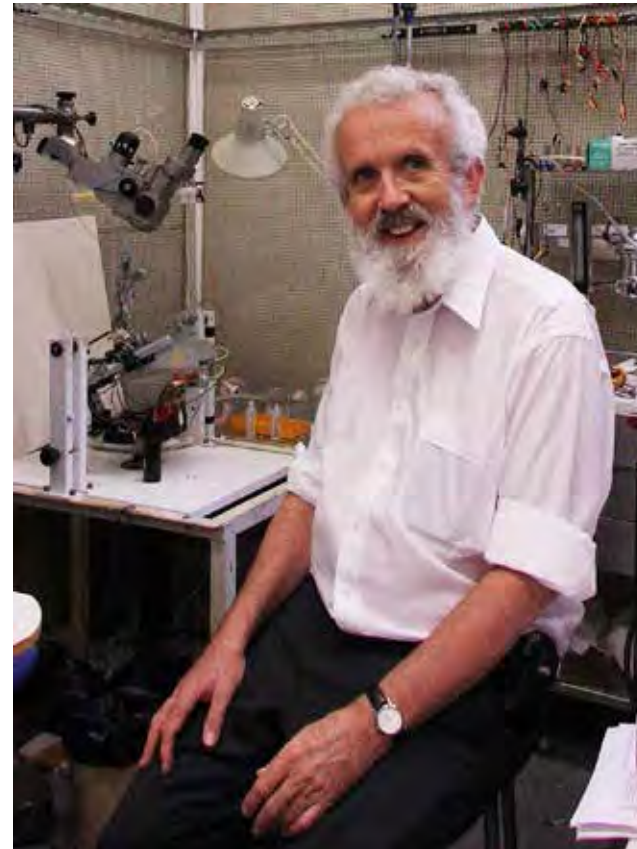
*Reprinted from the Archives of Neurology  
July 1988, Volume 45*

# A Clinical Sign of Canal Paresis

G. Michael Halmagyi, MB, BS, Ian S. Curthoys, PhD



G. Michael Halmagyi



Ian S. Curthoys

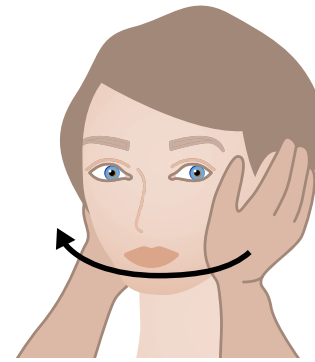
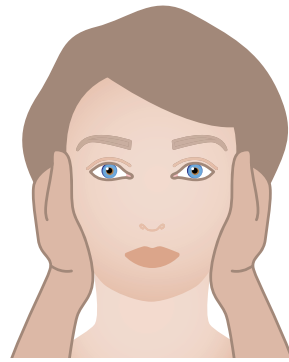
Verdankung K. Weber

# Kopf-Impuls-Test



# Kopf-Impuls-Test (KIT)

negativ

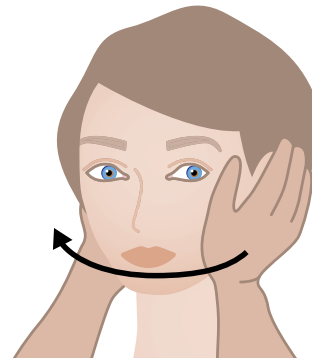
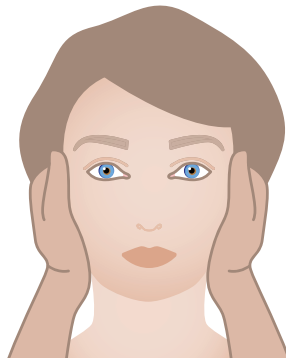


# “negativer” Kopf-Impuls-Test

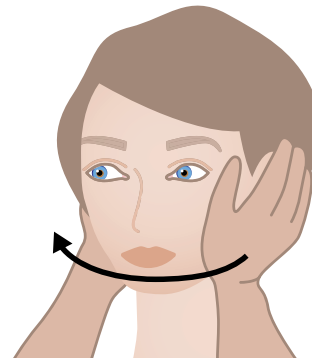
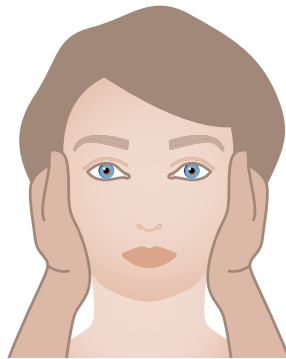


# Kopf-Impuls-Test (KIT)

negativ



positiv



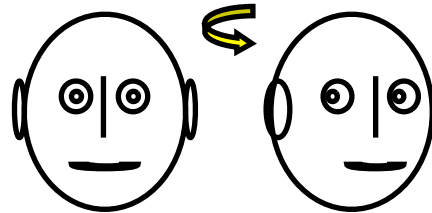
catch-up  
Sakkade



# Peripher-vestibuläres Defizit li



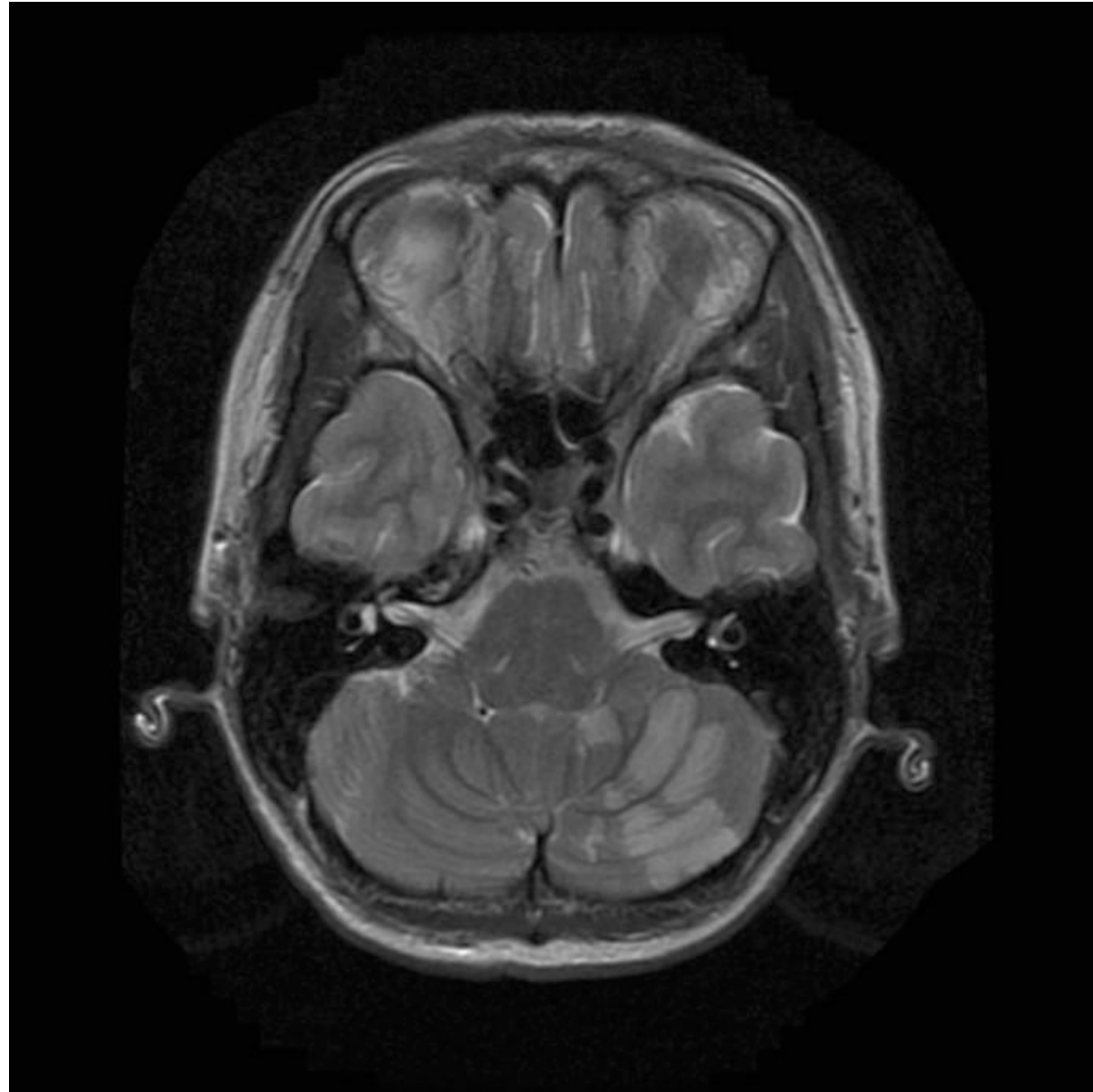
# “negativer” Kopf-Impuls-Test



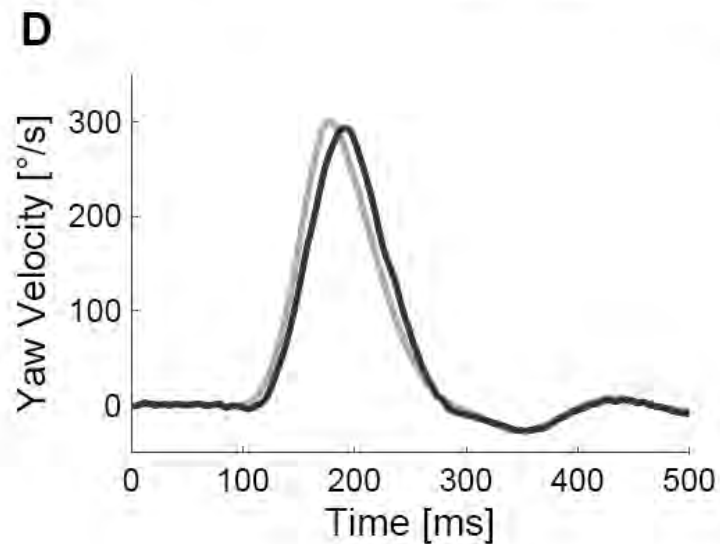
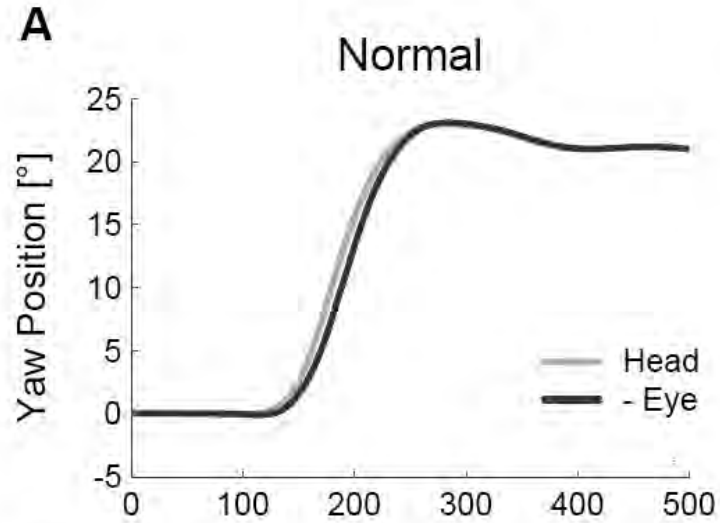
- bester Prädiktor für einen Schlaganfall beim *akuten vestibulären Syndrom*
- “verpasst” 1 von 10 Schlaganfällen

Kattah et al. 2009

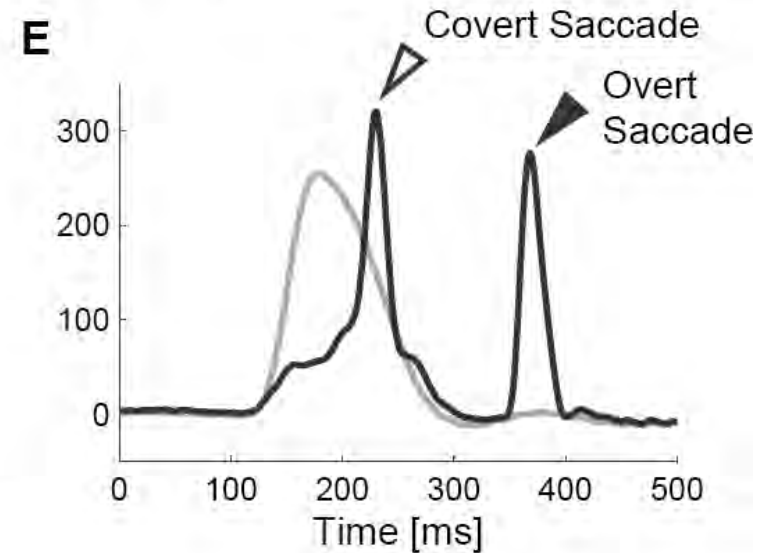
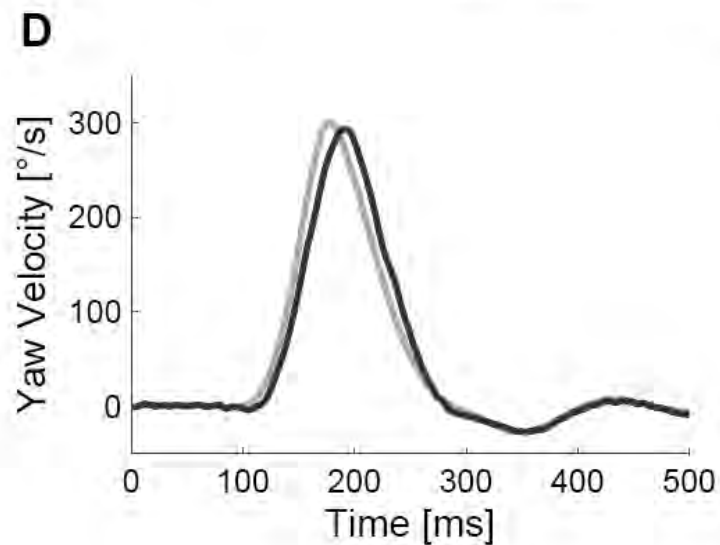
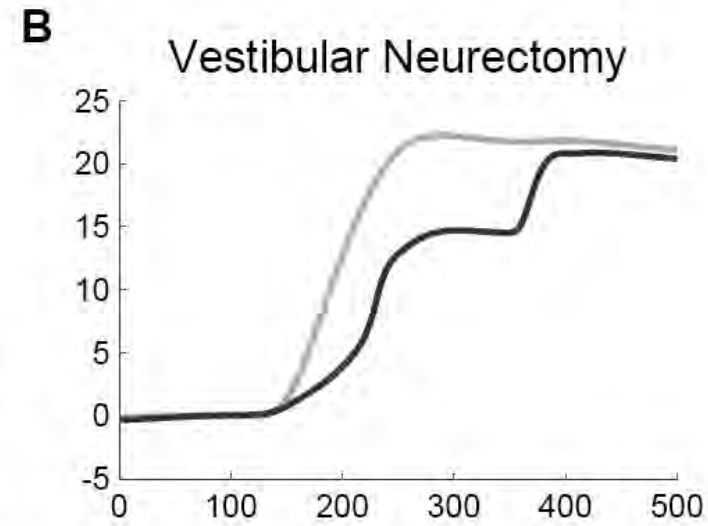
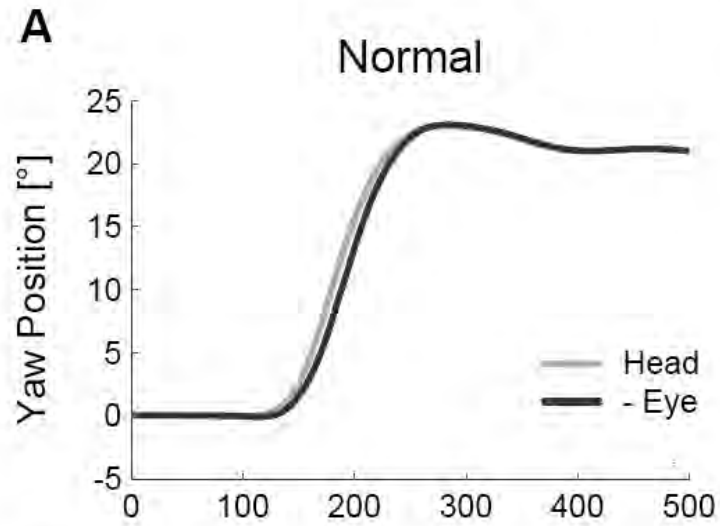
# Spontannystagmus, negativer KIT



# Manifeste vs. verdeckte Sakkaden

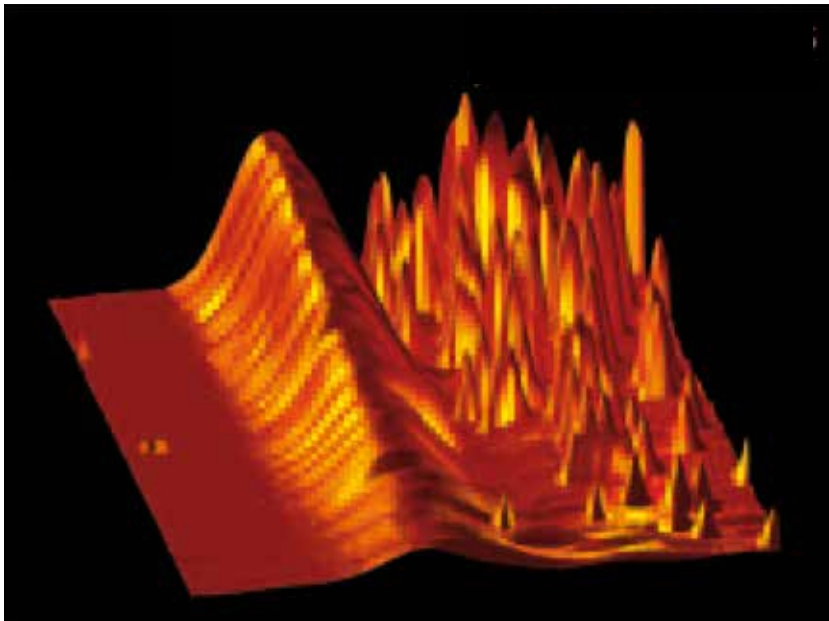


# Manifeste vs. verdeckte Sakkaden



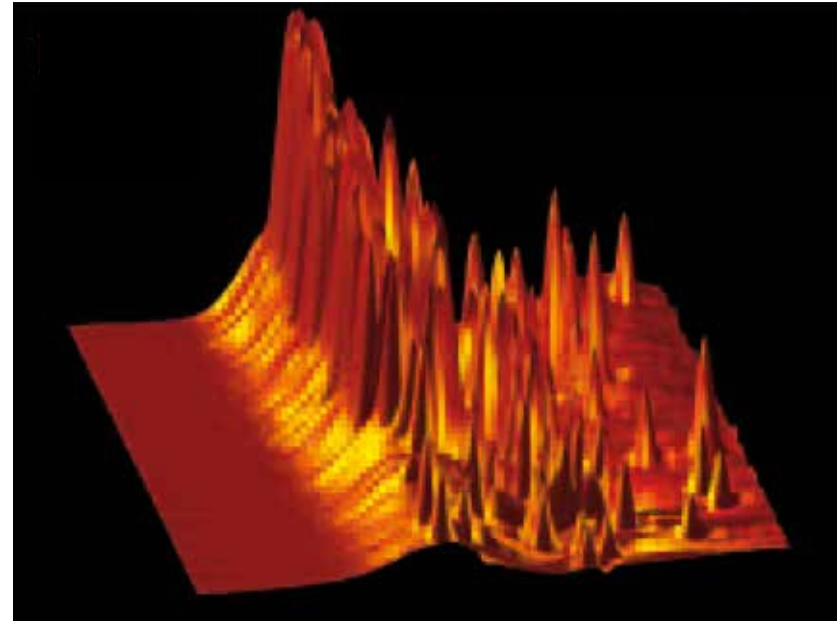
# Vestibuläre catch-up Sakkaden

Overt saccades



**Klinisch sichtbar!**

Covert saccades

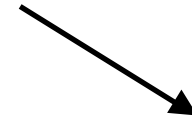


**Klinisch häufig nicht sichtbar!**

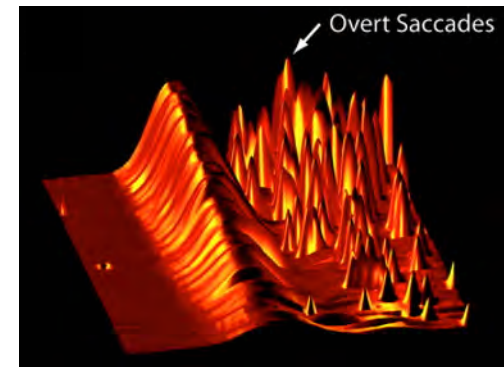
# Red Flag!

## Akutes vestibuläre Syndrom

Kopfimpulstest



positive



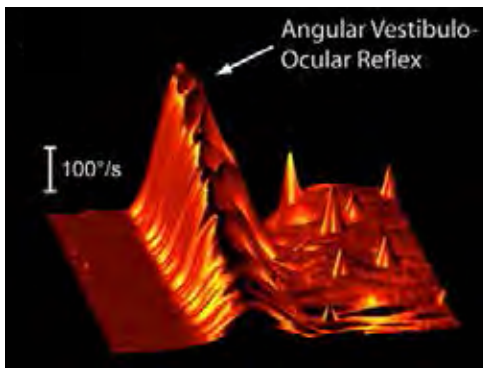
Schlaganfall  
unwahrscheinlich

# Red Flag!

## Akutes vestibuläre Syndrom

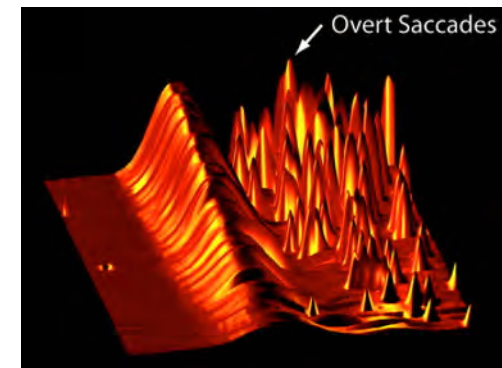
Kopfimpulstest

negativ



Schlaganfall  
wahrscheinlich!

positive



Schlaganfall  
unwahrscheinlich



# Red Flag!

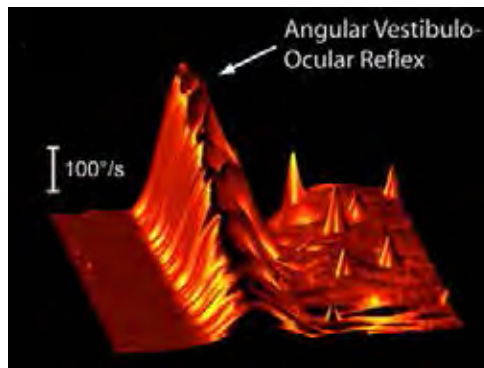
## Akutes vestibuläre Syndrom

Kopfimpulstest

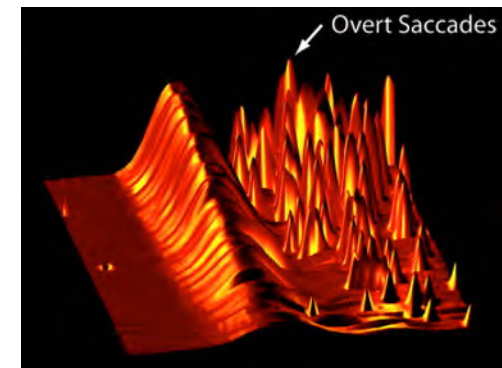
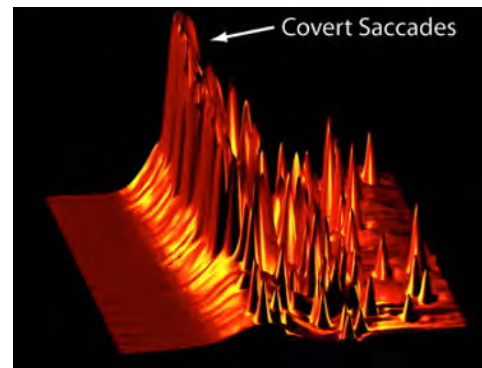
negativ

falsch negativ

positive



Schlaganfall  
wahrscheinlich!



Schlaganfall  
unwahrscheinlich

# How to Uncover the Covert Saccade During the Head Impulse Test

Fredrik Tjernström, Anastasia Nyström, and Måns Magnusson

*Department of Otorhinolaryngology, Head and Neck Surgery Clinical Sciences Skåne University Hospital,  
Lund, Sweden*

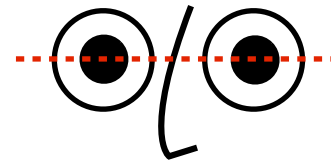
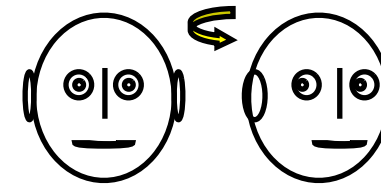




Tjernström, Nyström & Magnusson 2012

# Untersuchungsgang

- Spontannystagmus?
- Kopfimpulstest
- vertikale Augendevisation?
- dynamischer Visus
- Romberg auf weicher Matte
- Provokationsmanöver
- Vibrationssinn bimalleolär



# alternierender Cover-Test



## Patient mit akutem Schwindel



Kattah et al. 2009

Patient mit akutem Schwindel



Kattah et al. 2009

Patient mit akutem Schwindel



Patient mit akutem Schwindel



Kattah et al. 2009

*lateral medullärer Infarkt rechts*

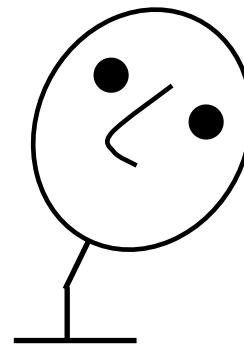
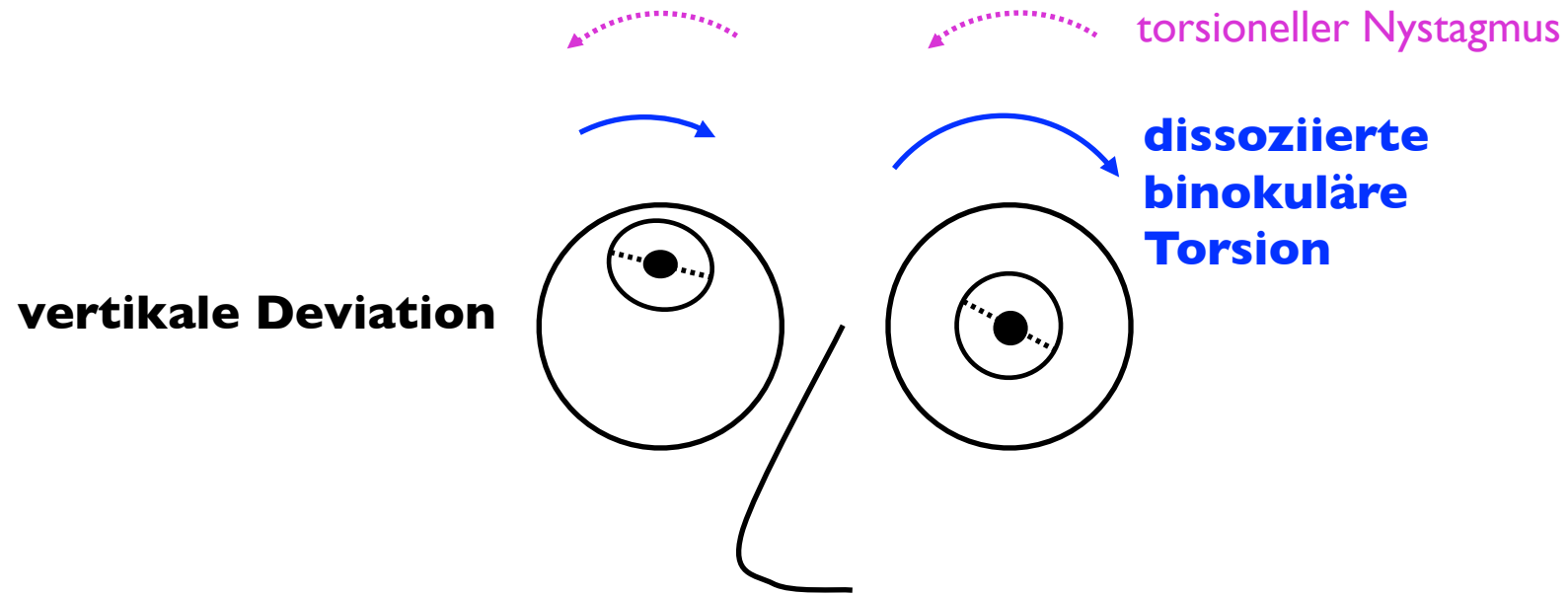
Patient mit akutem Schwindel



*Mittelhirninfarkt, linksbetont*



# Ocular tilt reaction\*



**Kopfneigung**

\* am häufigsten beim Wallenberg-Syndrom

# **HINTS to Diagnose Stroke in the Acute Vestibular Syndrome**

## **Three-Step Bedside Oculomotor Examination More Sensitive Than Early MRI Diffusion-Weighted Imaging**

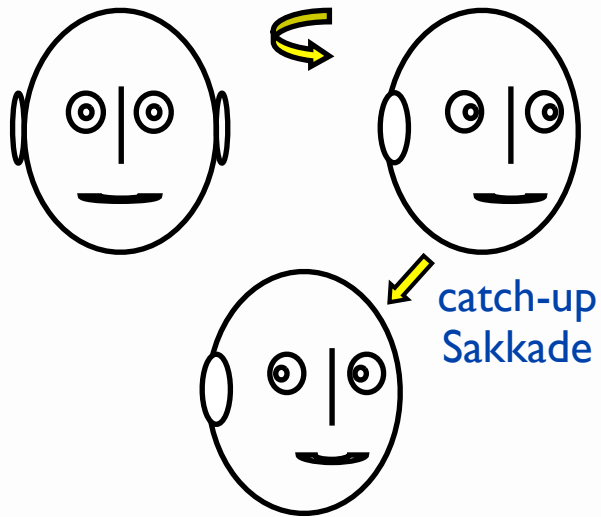
Jorge C. Kattah, MD; Arun V. Talkad, MD; David Z. Wang, DO;  
Yu-Hsiang Hsieh, PhD, MS; David E. Newman-Toker, MD, PhD

**H I** head impulse test (Kopfimpulstest)

**N** nystagmus

**T S** test of skew (vertikale Divergenz)

# Head Impulse



positiver  
Kopf-Impuls-Test +  
= 1

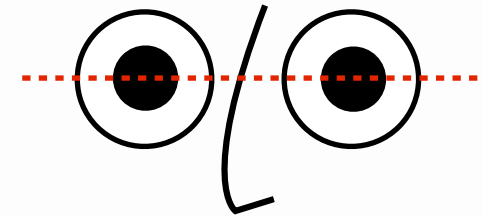
# Nystagmus



Zunahme des  
Spontannystagmus mit Blick  
zur Nystagmusrichtung, aber  
keine Nystagmusumkehr

Alexander-  
Gesetz = 1

# Test of Skew



keine vertikale Diplopie,  
keine skew deviation,  
keine vertikalen  
Einstellbewegungen beim  
alternierenden Cover-Test

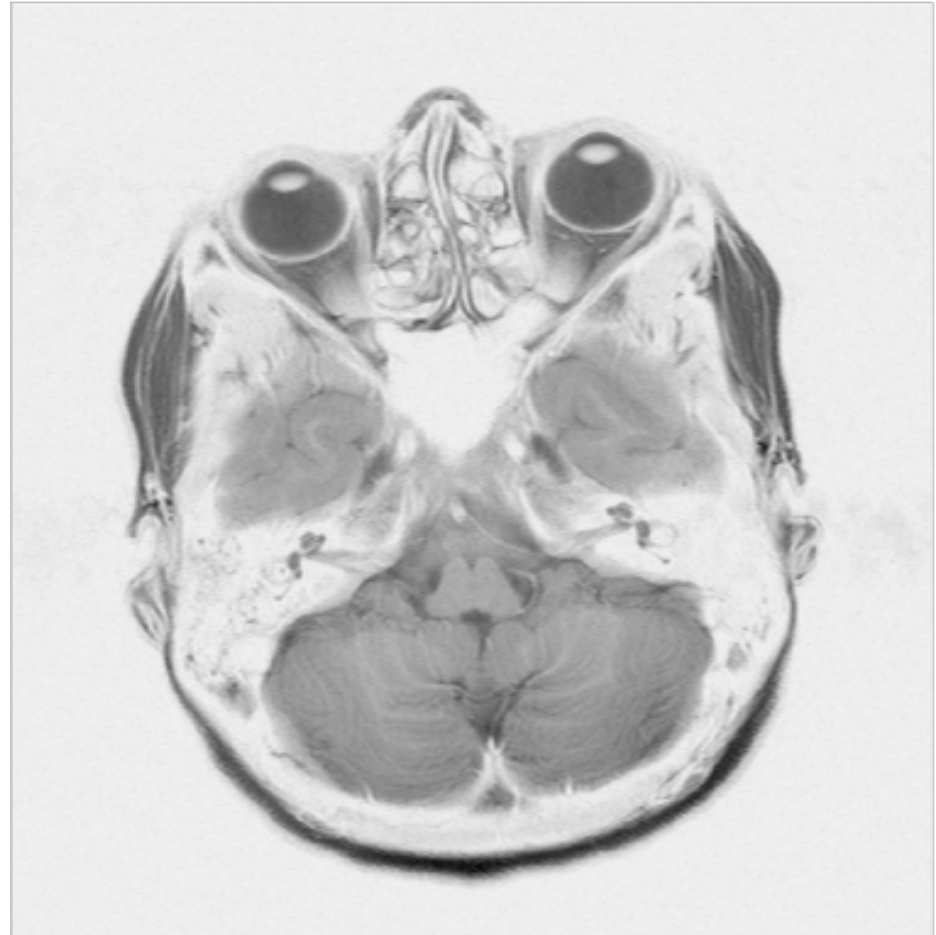
keine vertikale  
Divergenz = 1

$\Sigma = 3 \Rightarrow$  Schlaganfall unwahrscheinlich

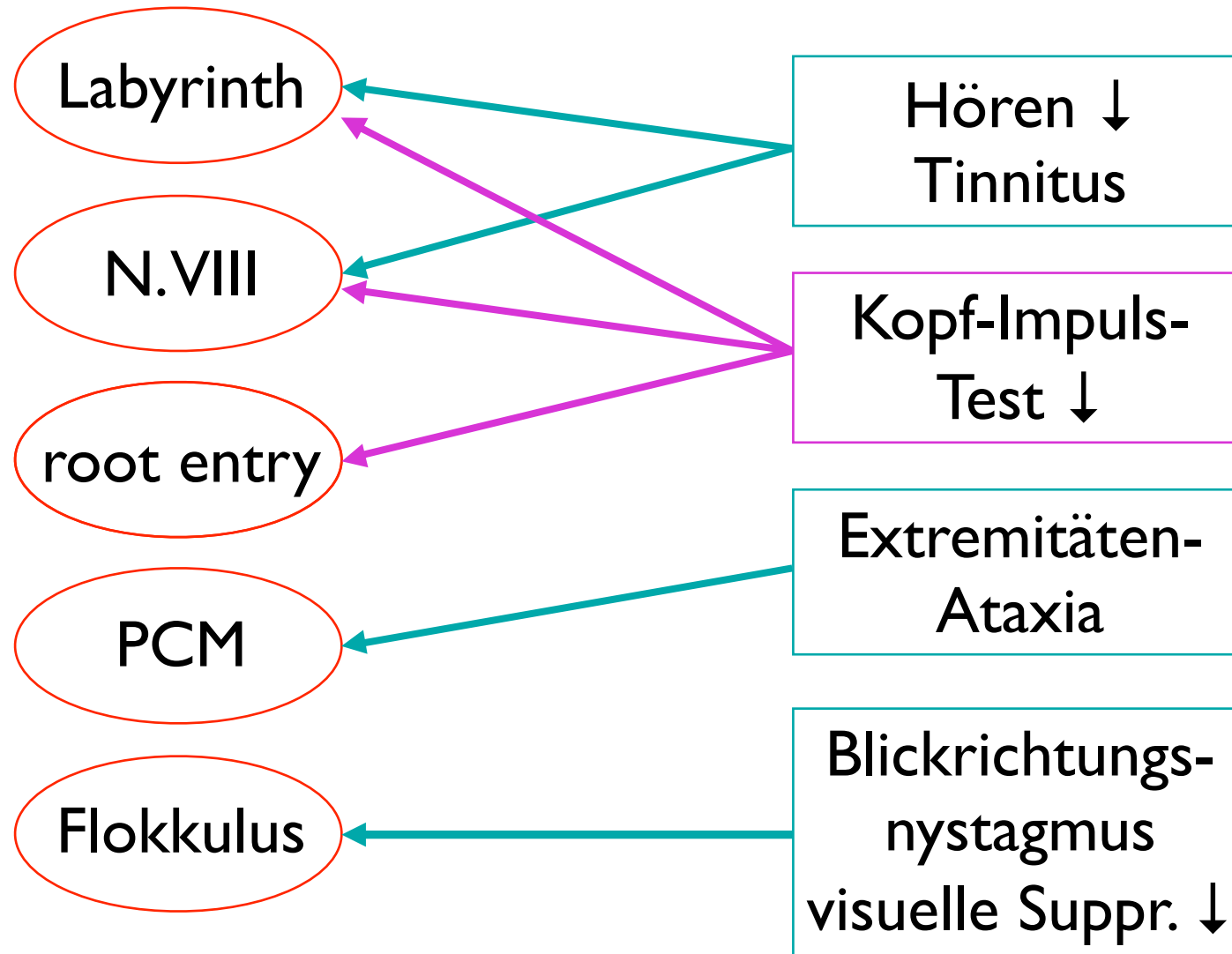
$\Sigma < 3 \Rightarrow$  Schlaganfall wahrscheinlich

# A. cerebelli inferior anterior

- anatomisch peripher
  - ▶ Labyrinth
  - ▶ vestibulärer Nerv
- anatomisch zentral
  - ▶ Wurzeleintrittszone (Pseudoneuritis)
  - ▶ mittlerer zerebellärer Pedunkel
  - ▶ Flocculus



# Spontannystagmus: AICA-Ischämie?



# Chronischer Schwindel



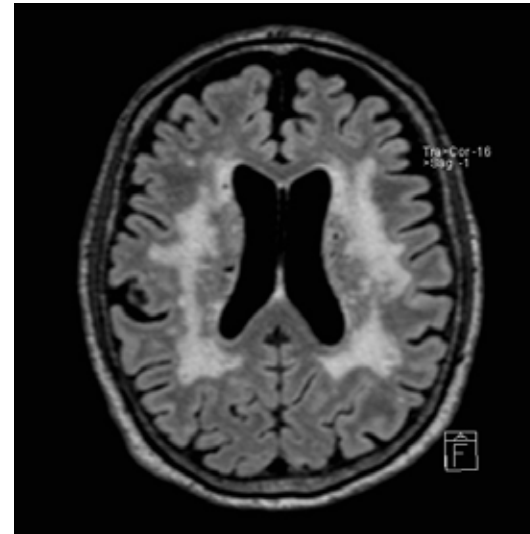
youtube: 0JW\_kKP7alw

zentral oder peripher?

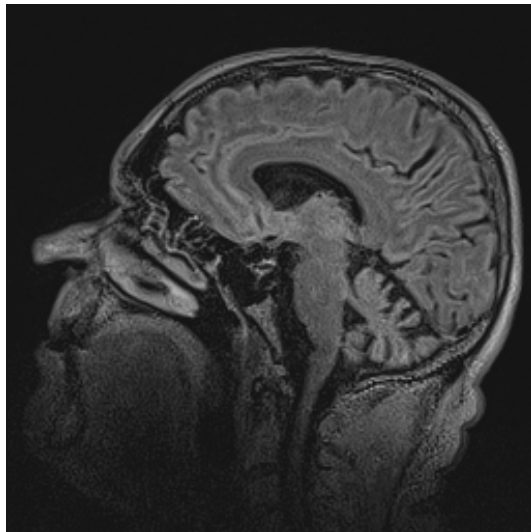
# Zentraler chronischer Schwindel



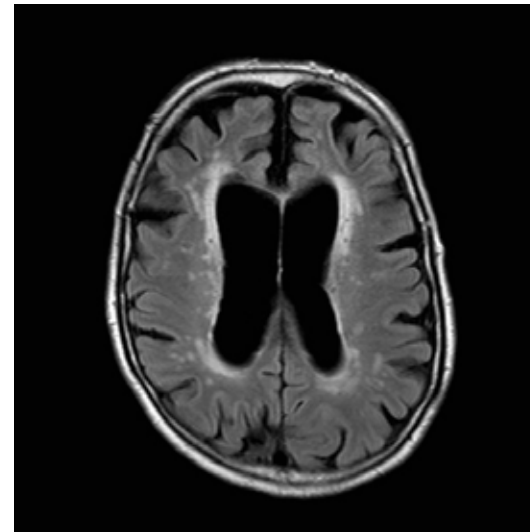
chronisches Subduralhämatom



Leukencephalopathie



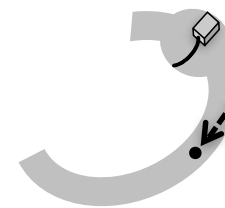
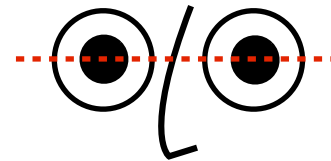
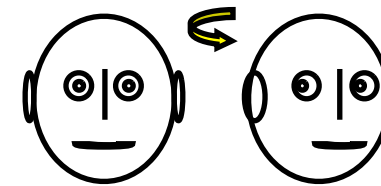
Vermis-Atrophie



Hydrocephalus malresorptivus

# Untersuchungsgang

- Spontannystagmus?
- Kopfimpulstest
- vertikale Augendevisation?
- **dynamischer Visus**
- Romberg auf weicher Matte
- Provokationsmanöver
- Vibrationssinn bimalleolär





# dynamischer Visus



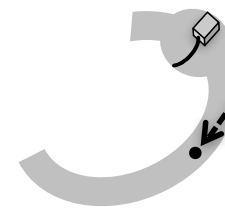
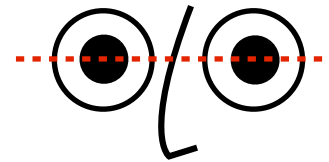
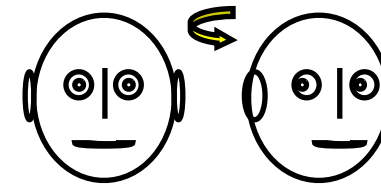
> 2 Zeilen

# dynamischer Visus

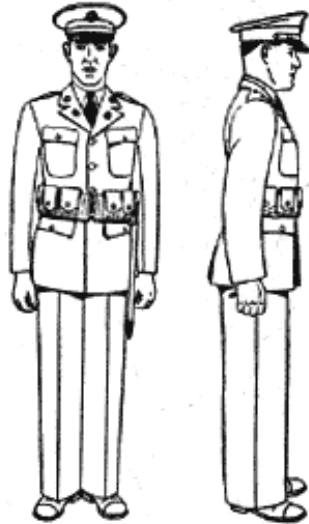


# Untersuchungsgang

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- **Romberg auf weicher Matte**
- Provokationsmanöver
- Vibrationssinn bimalleolär

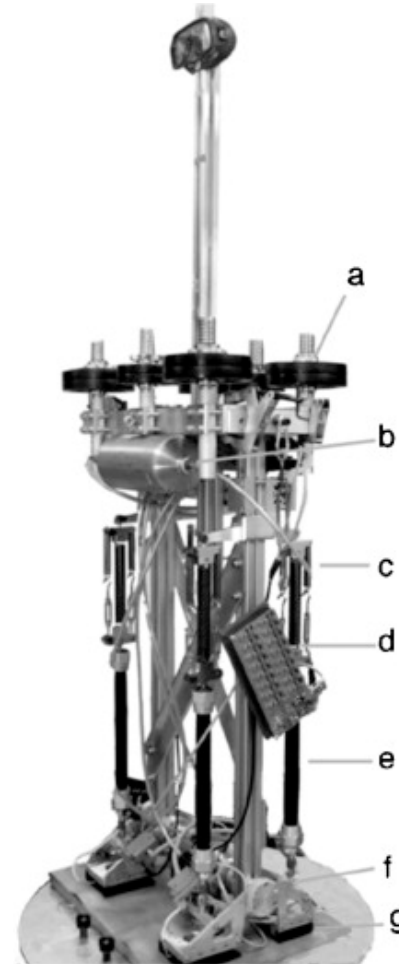


# Sensomotorik der Balance



Position of the Soldier, or of ATTENTION.

- visuell
- propriozeptiv
- vestibulär



Thomas Mergner et al.

# Romberg-Test



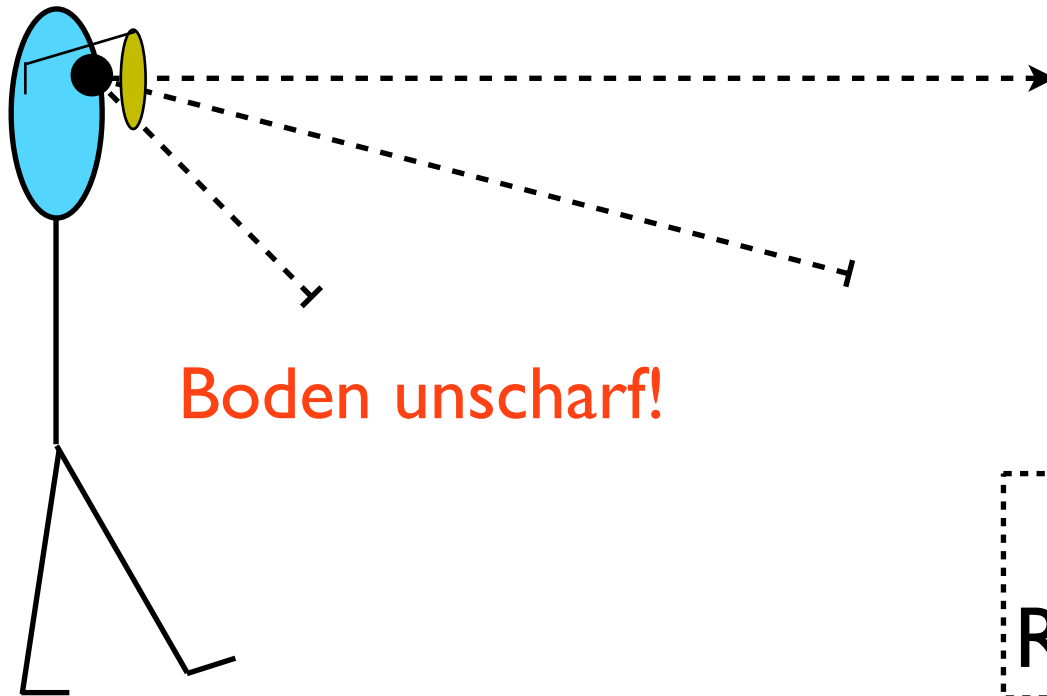
Moritz Heinrich Romberg  
1795-1873

- visuell
- propriozeptiv
- vestibulär



Sensorische Eingänge sind redundant!

# Problem Gleitsichtbrille



Boden unscharf!

“partiieller  
Romberg-Test”



# Romberg + Körperstösse



# Romberg + Kopfposition ↓

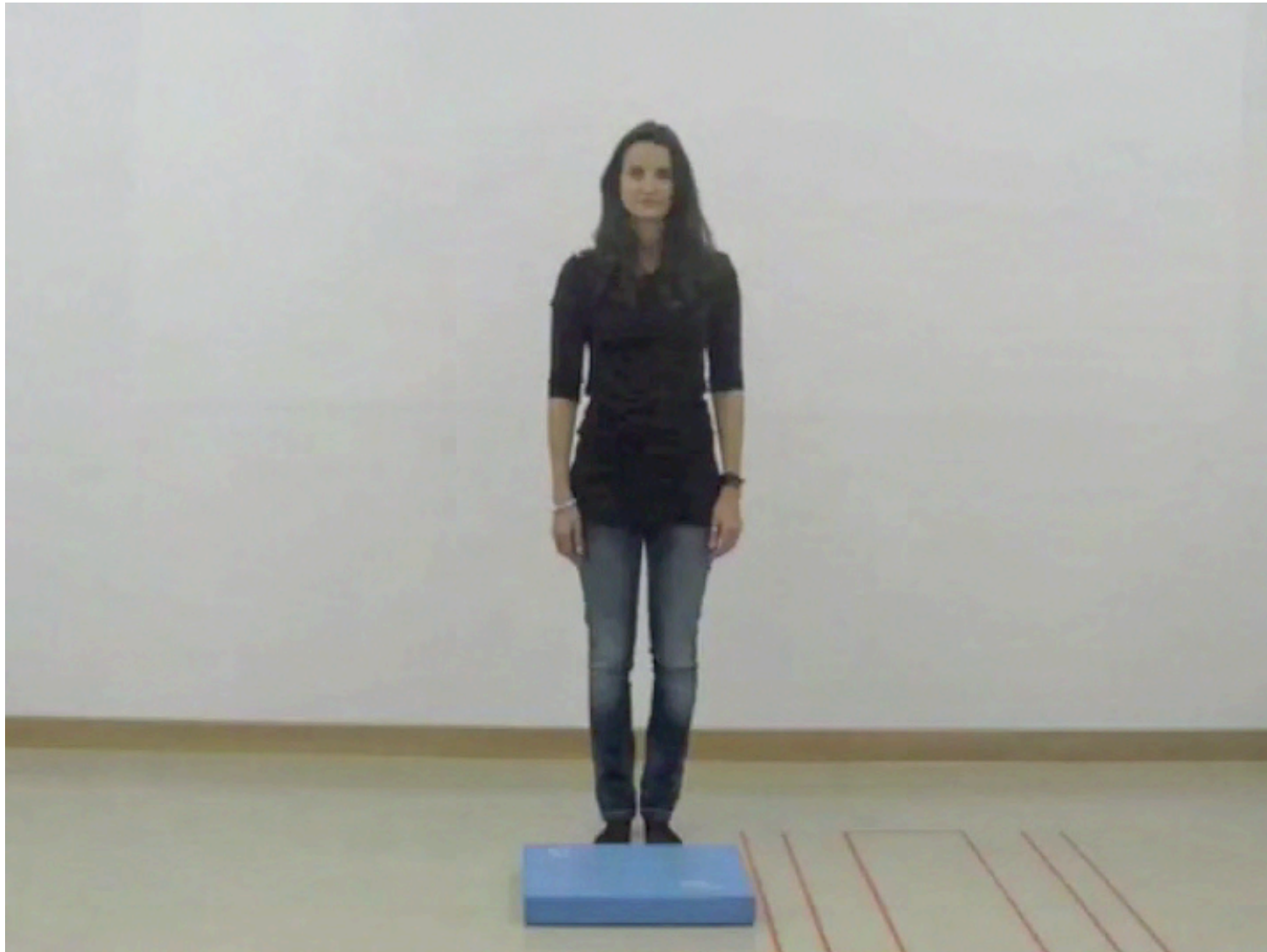




# Romberg + Tandemstand + Kopfposition ↓



# Romberg + Propriozeption ↓



# bilateraler vestibulärer Ausfall

Kopfimpuls-  
Test

positiv



FRomberg  
(Romberg  
on foam)

Fallneigung



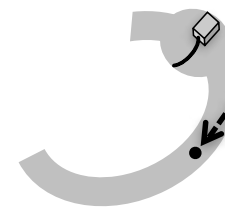
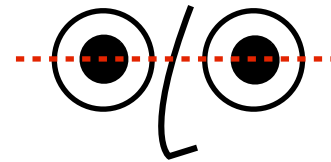
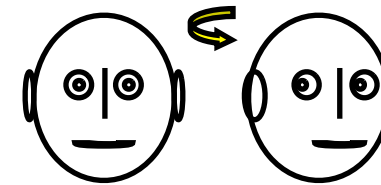
dynamischer  
Visus

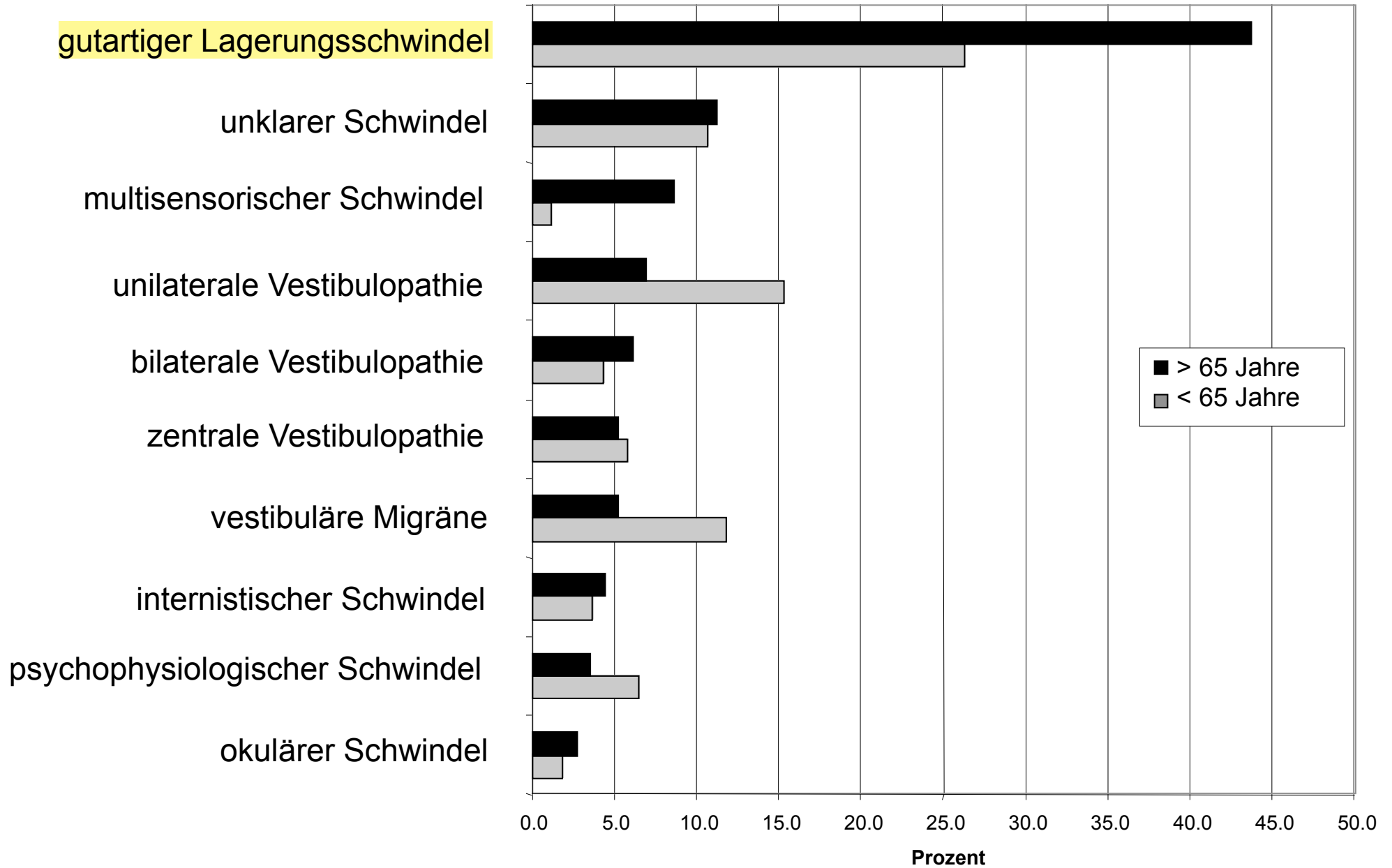
> 2 Zeilen



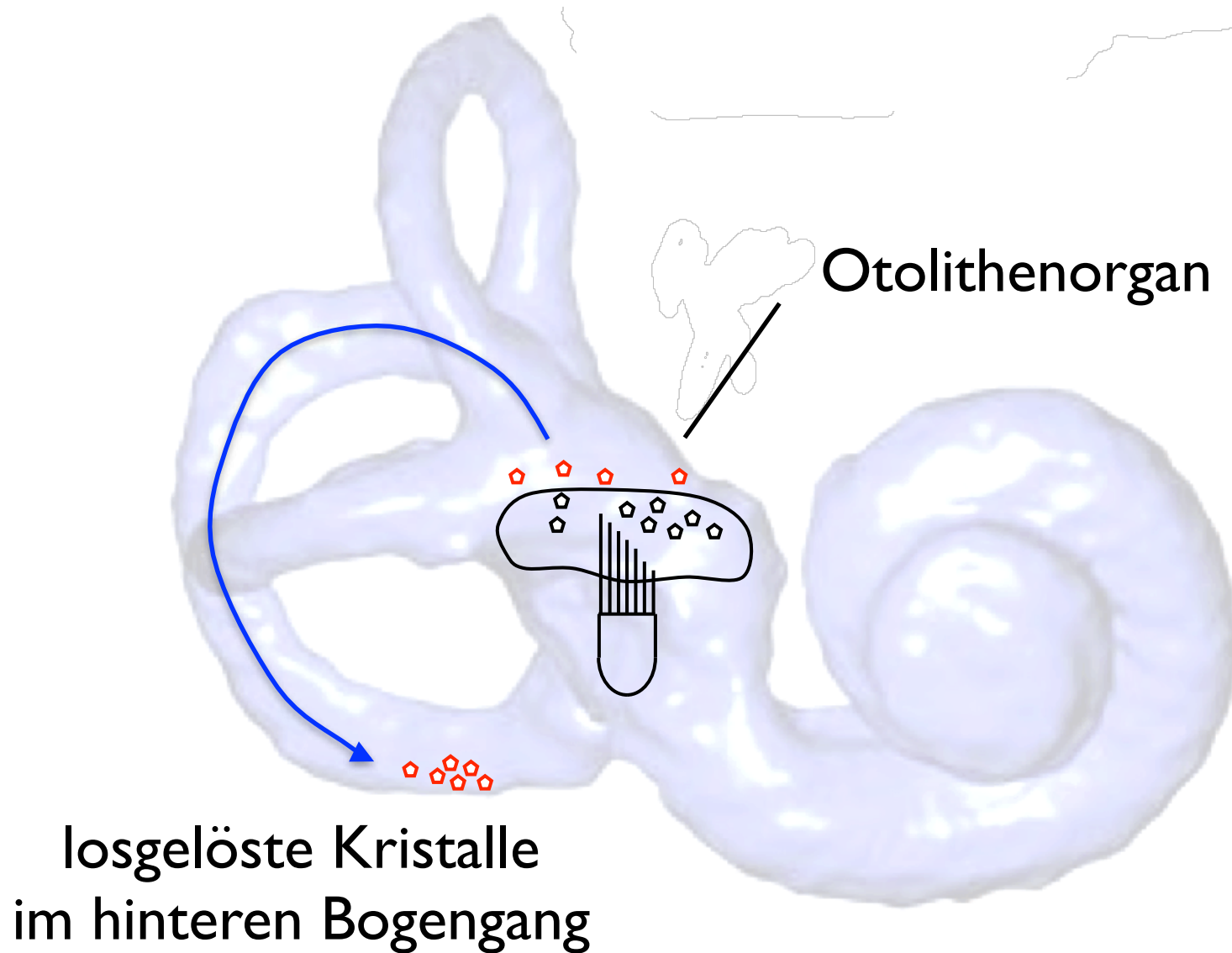
# Untersuchungsgang

- Spontannystagmus?
- Kopfimpulstest
- vertikale Augendeviation?
- dynamischer Visus
- Romberg auf weicher Matte
- Provokationsmanöver
- Vibrationssinn bimalleolär



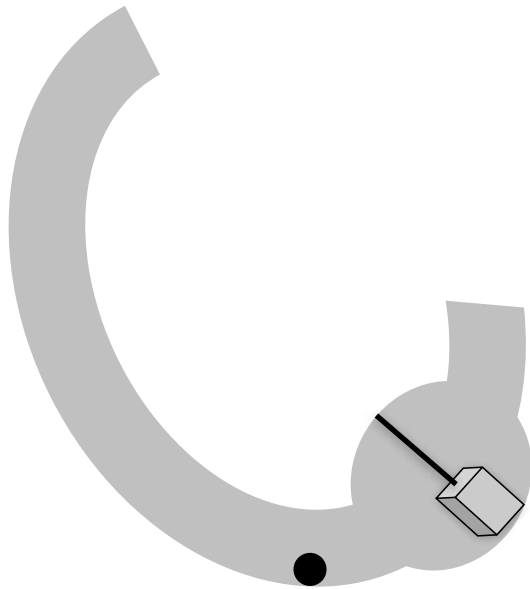


# posteriore Canalolithiasis

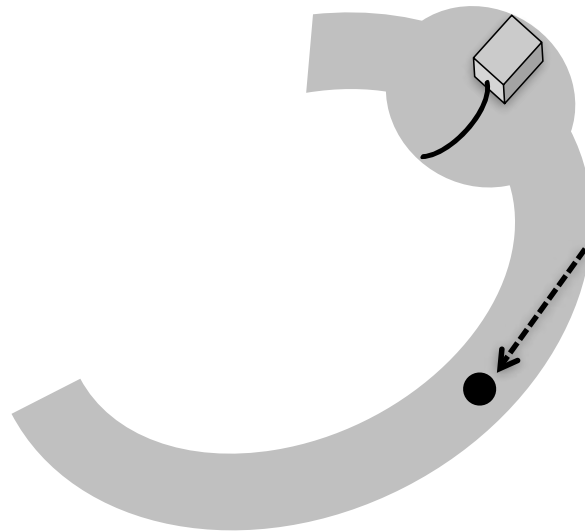


# posteriore Canalolithiasis

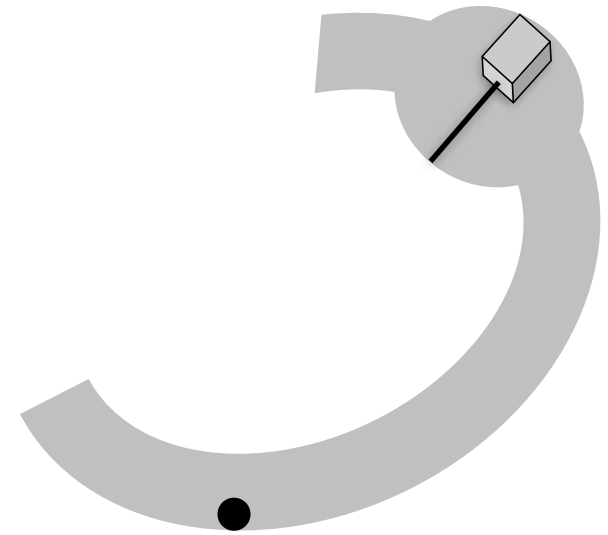
**1**



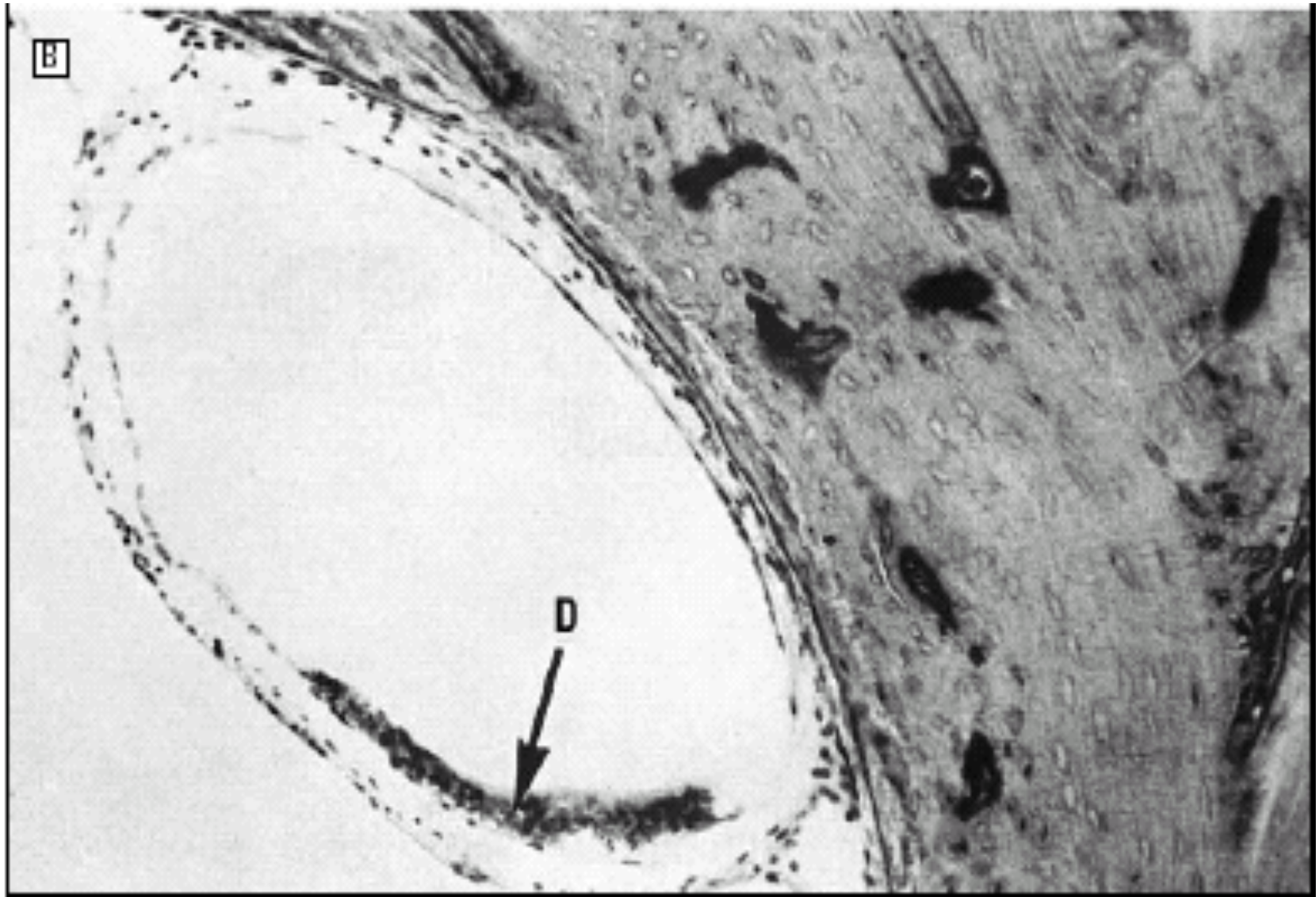
**2**



**3**



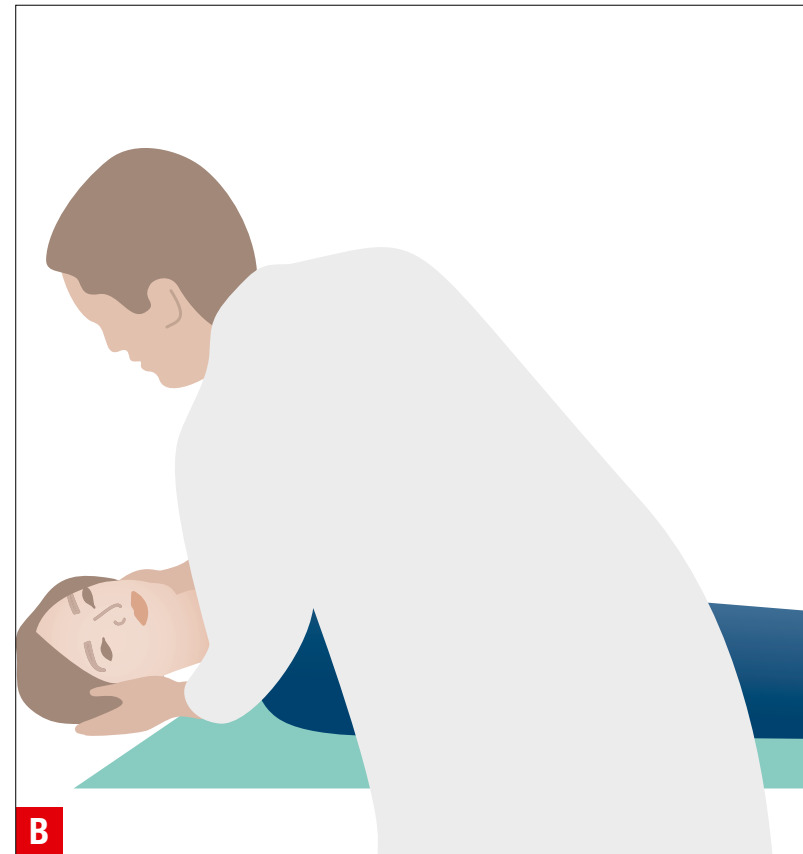
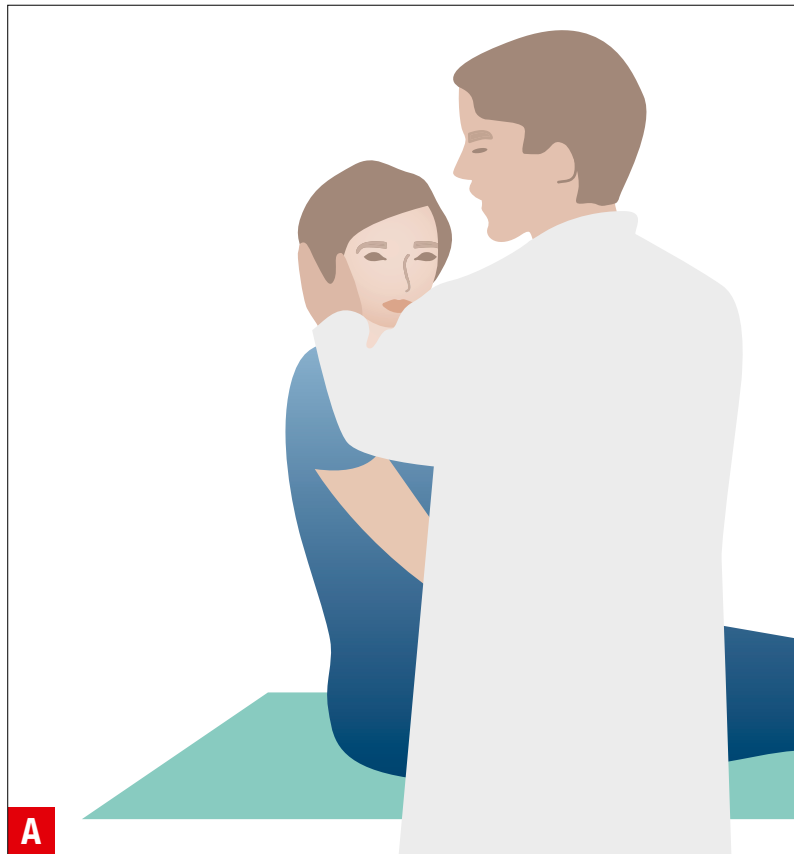
# Canalolithiasis



Hall, Ruby and Mc Clure 1979



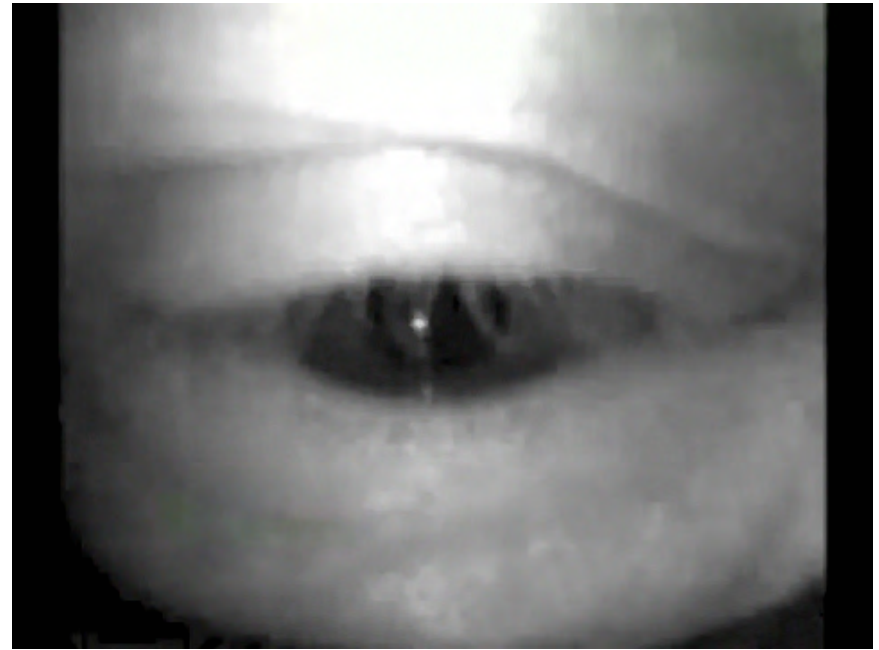
# Hallpike-Provokationsmanöver



# Hallpike-Provokationsmanöver



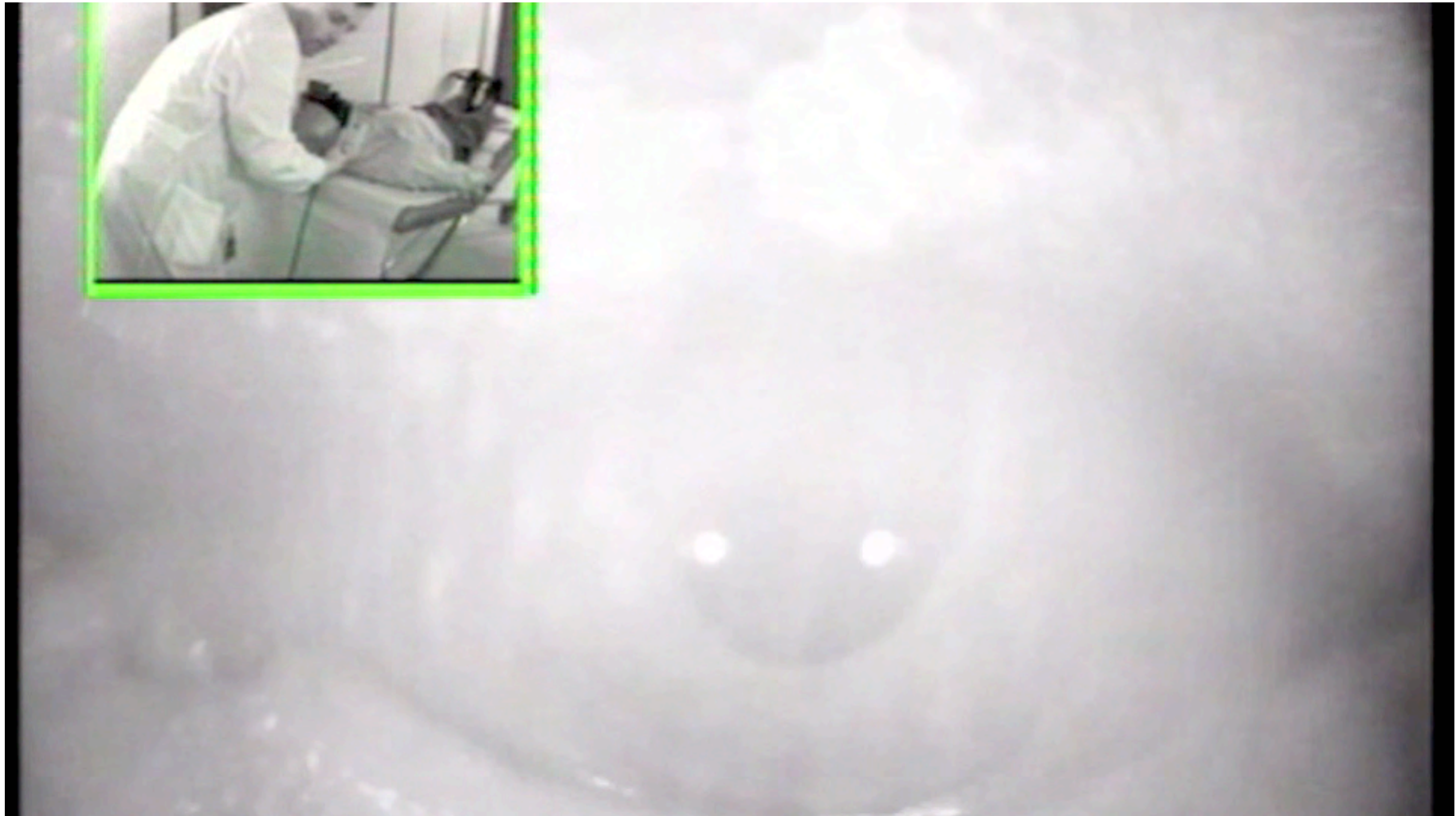
# Lagerungsnystagmus



# Supine roll (Barany)



# Lateral Canalithiasis



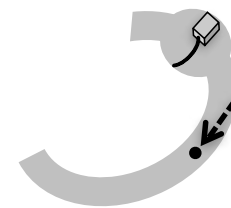
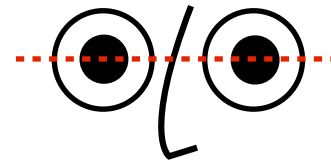
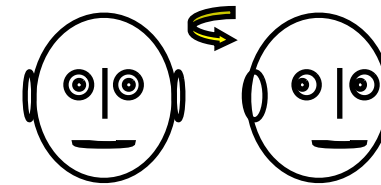
# Provokationsmanöver

1. Hallpike bds.
2. Supine roll bds., je 3 x
3. Hallpike bds.

Lange genug auf den Beginn  
des Nystagmus warten!

# Untersuchungsgang

- Spontannystagmus?
- Kopfpulstest
- vertikale Augendeviation?
- dynamischer Visus
- Romberg auf weicher Matte
- Provokationsmanöver
- **Vibrationssinn bimalleolär**



# Vibrationssinn bimalleolär

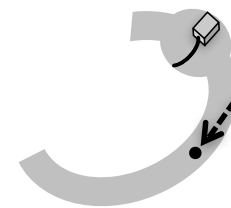
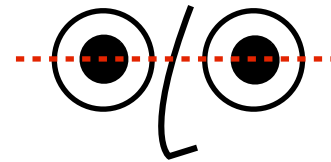
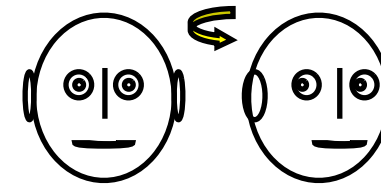


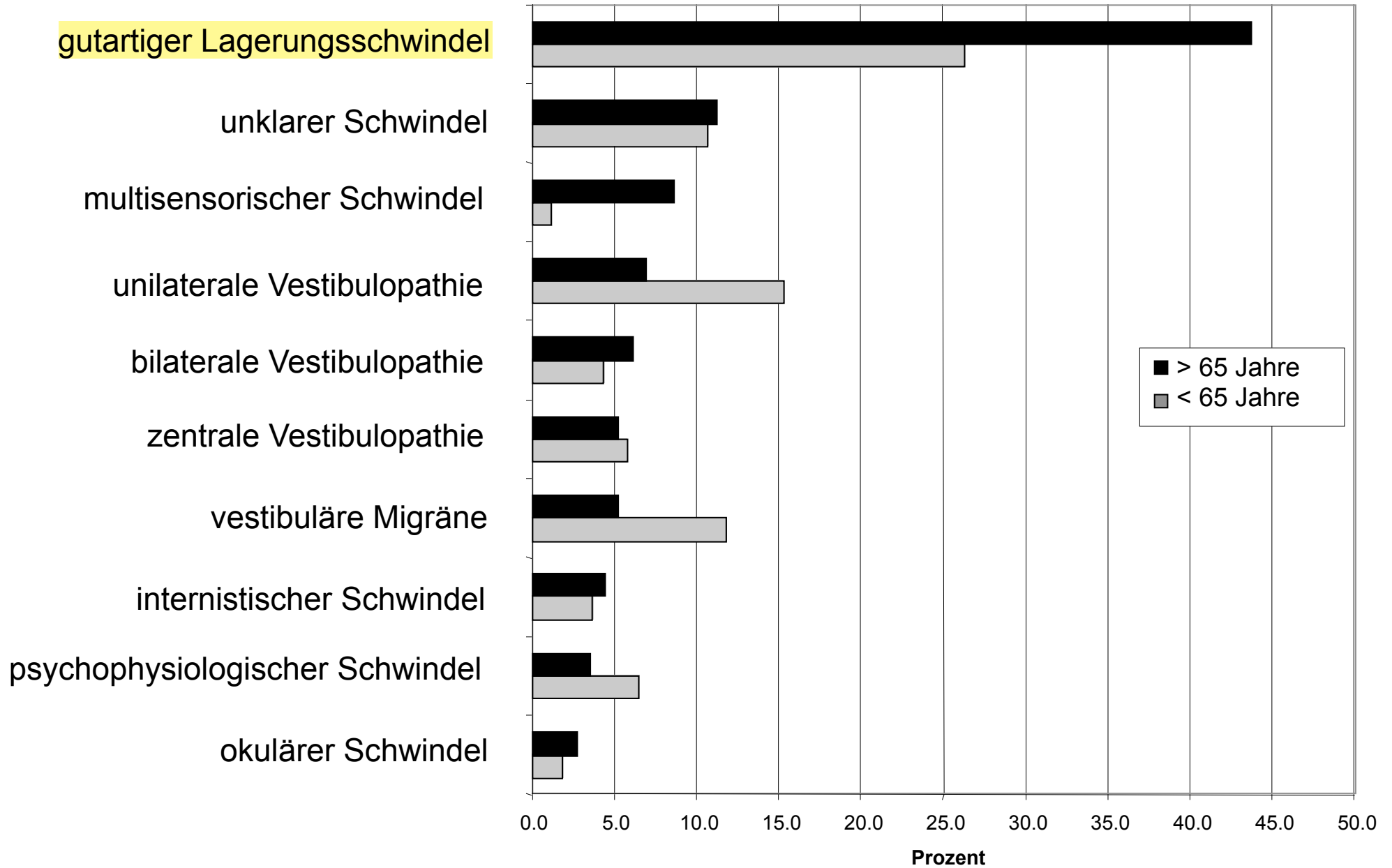
relevant für Dysbalance:  
 $\leq 2/8$



# Untersuchungsgang

- Spontannystagmus?
- Kopfpulstest
- vertikale Augendeviation?
- dynamischer Visus
- Romberg auf weicher Matte
- Provokationsmanöver
- Vibrationssinn bimalleolär

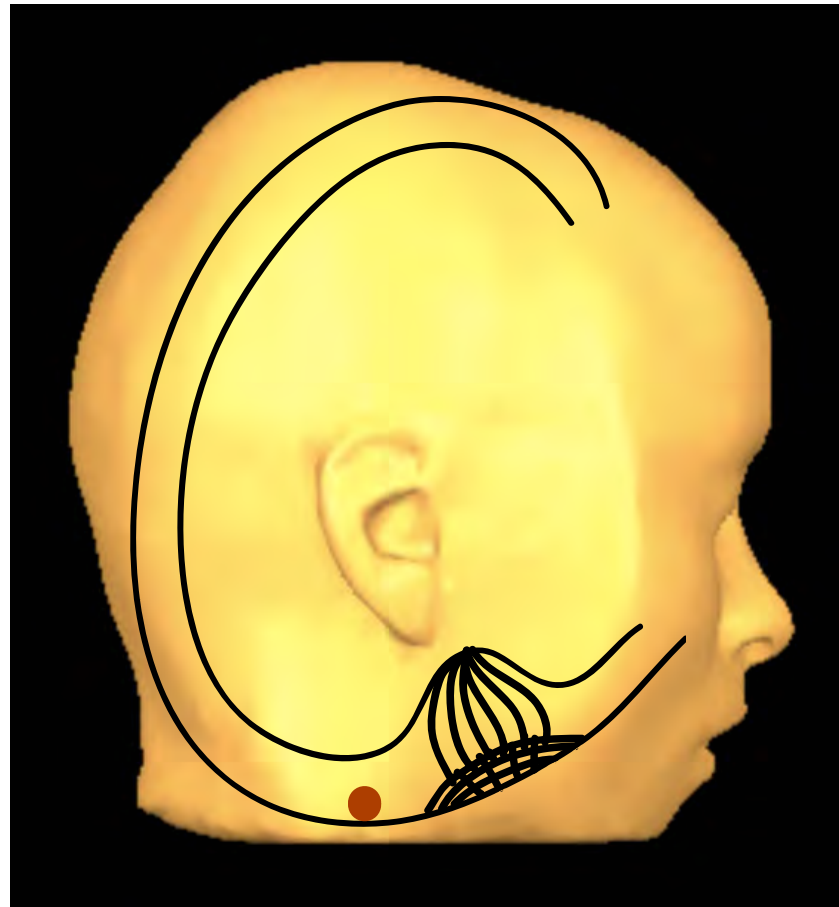




# hinterer Bogengang



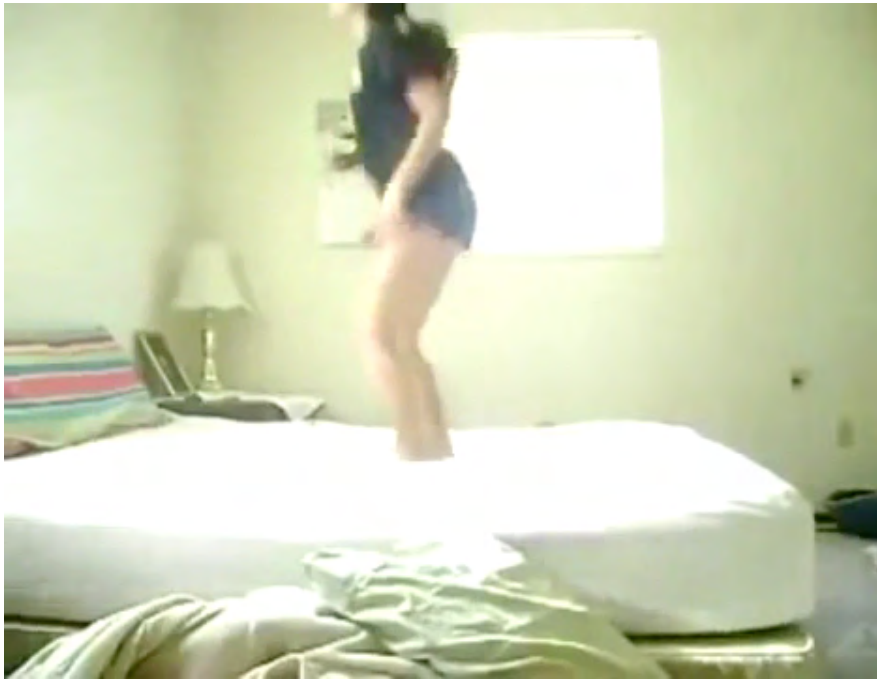
# hinterer Bogengang



# Rückwärtsheubürzli



# Rückwärtsheubürzli



# Rückwärtsheubürzli





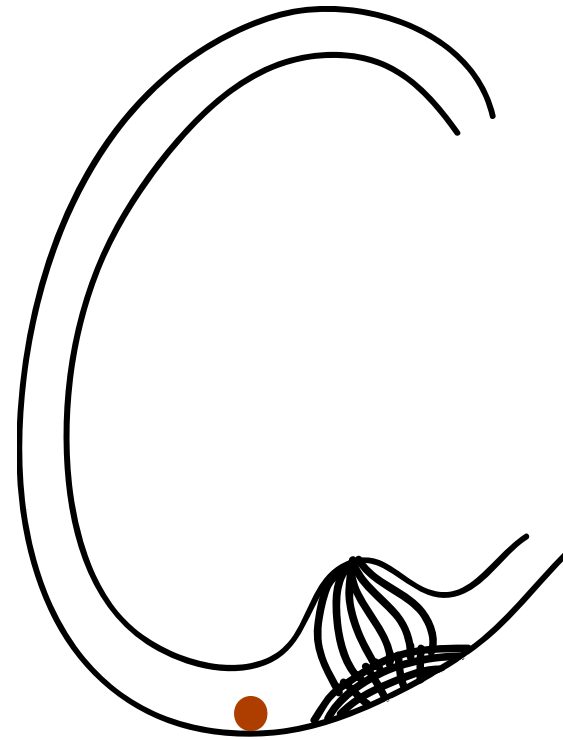
John M. Epley,  
Portland

Back somersault  
with a twist

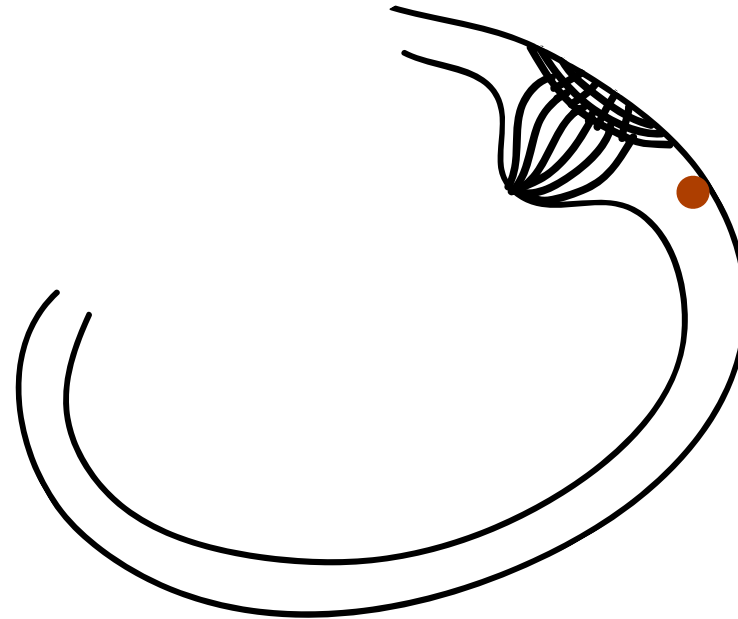




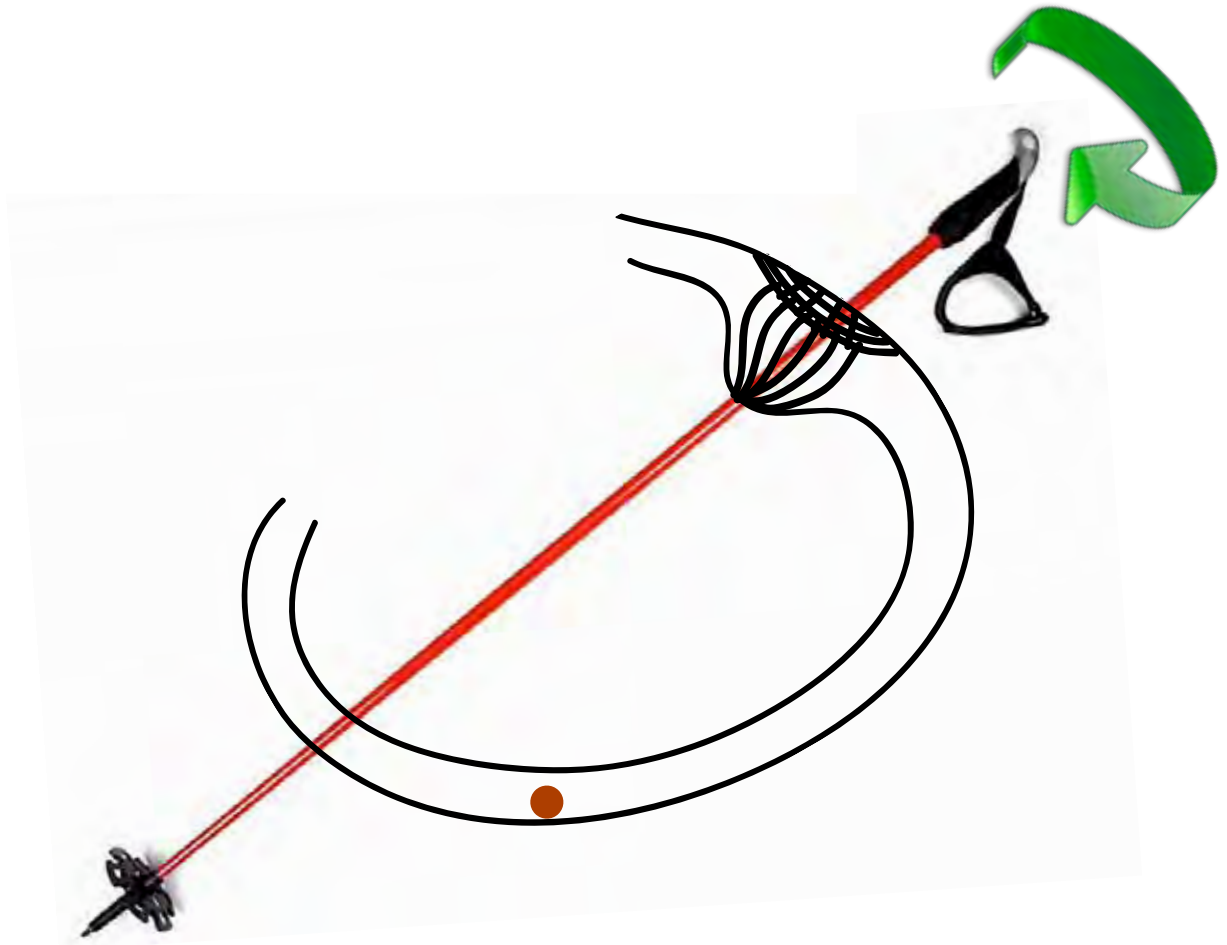
# Epley-Befreiungsmanöver



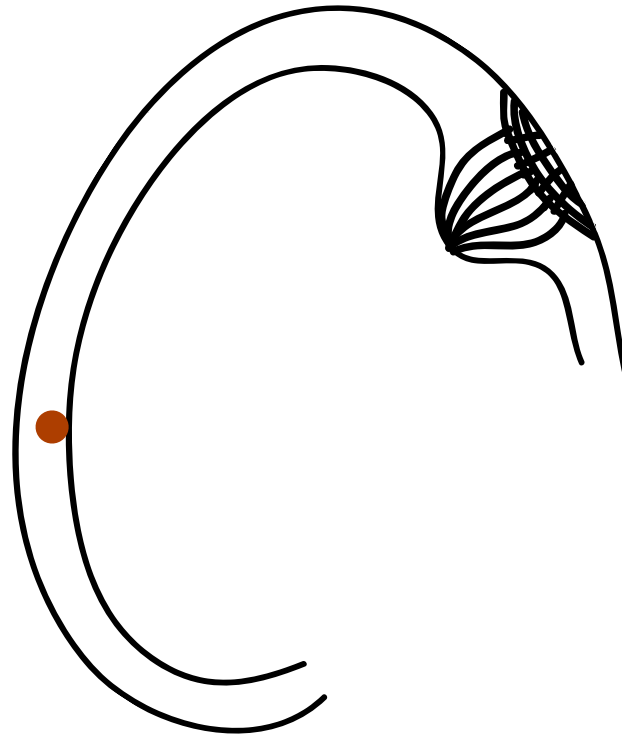
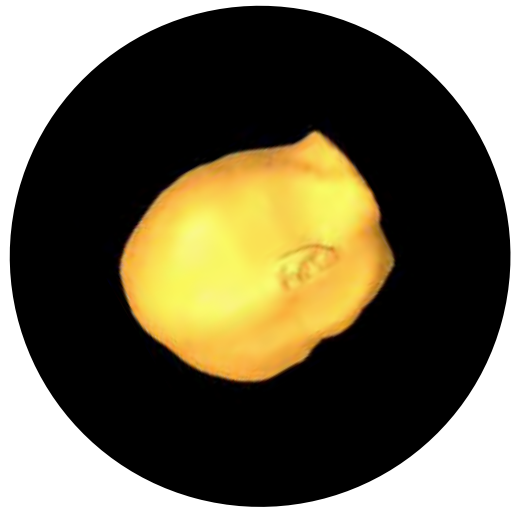
# Epley-Befreiungsmanöver



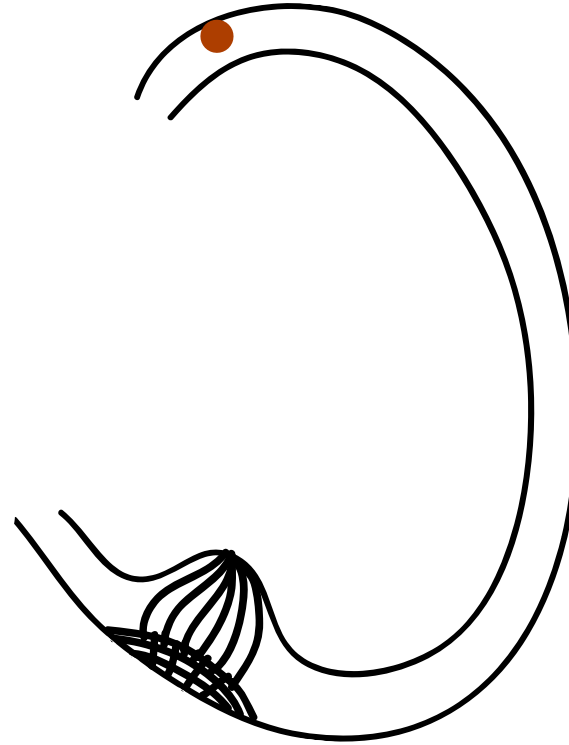
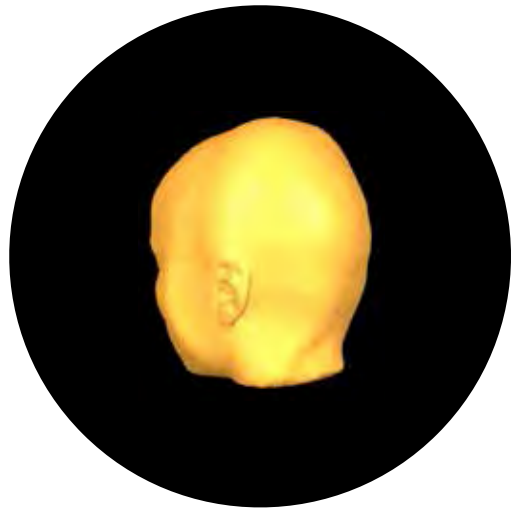
# Epley-Befreiungsmanöver



# Epley-Befreiungsmanöver

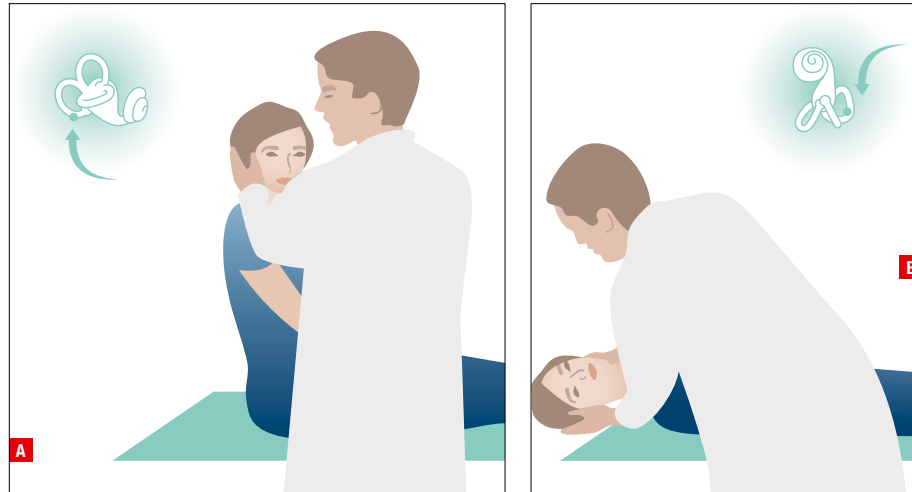


# Epley-Befreiungsmanöver

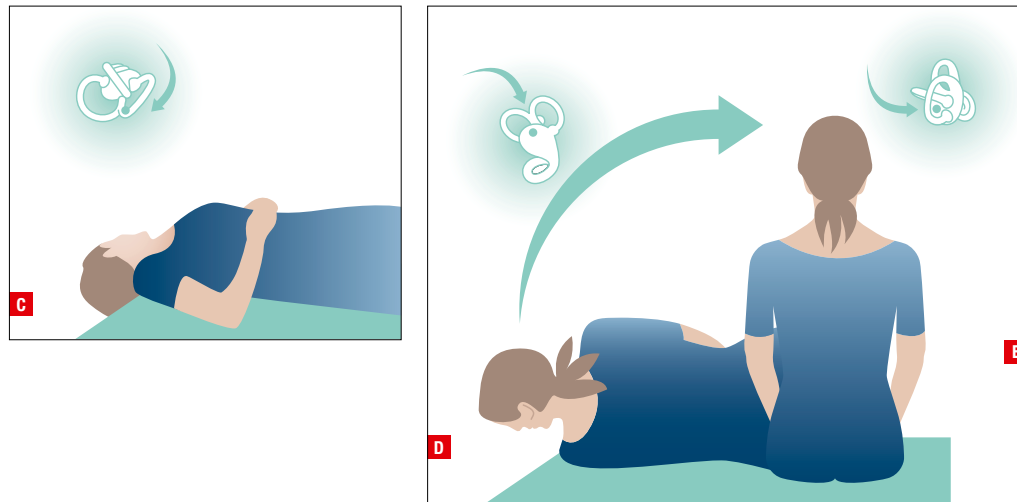


# Epley-Befreiungsmanöver

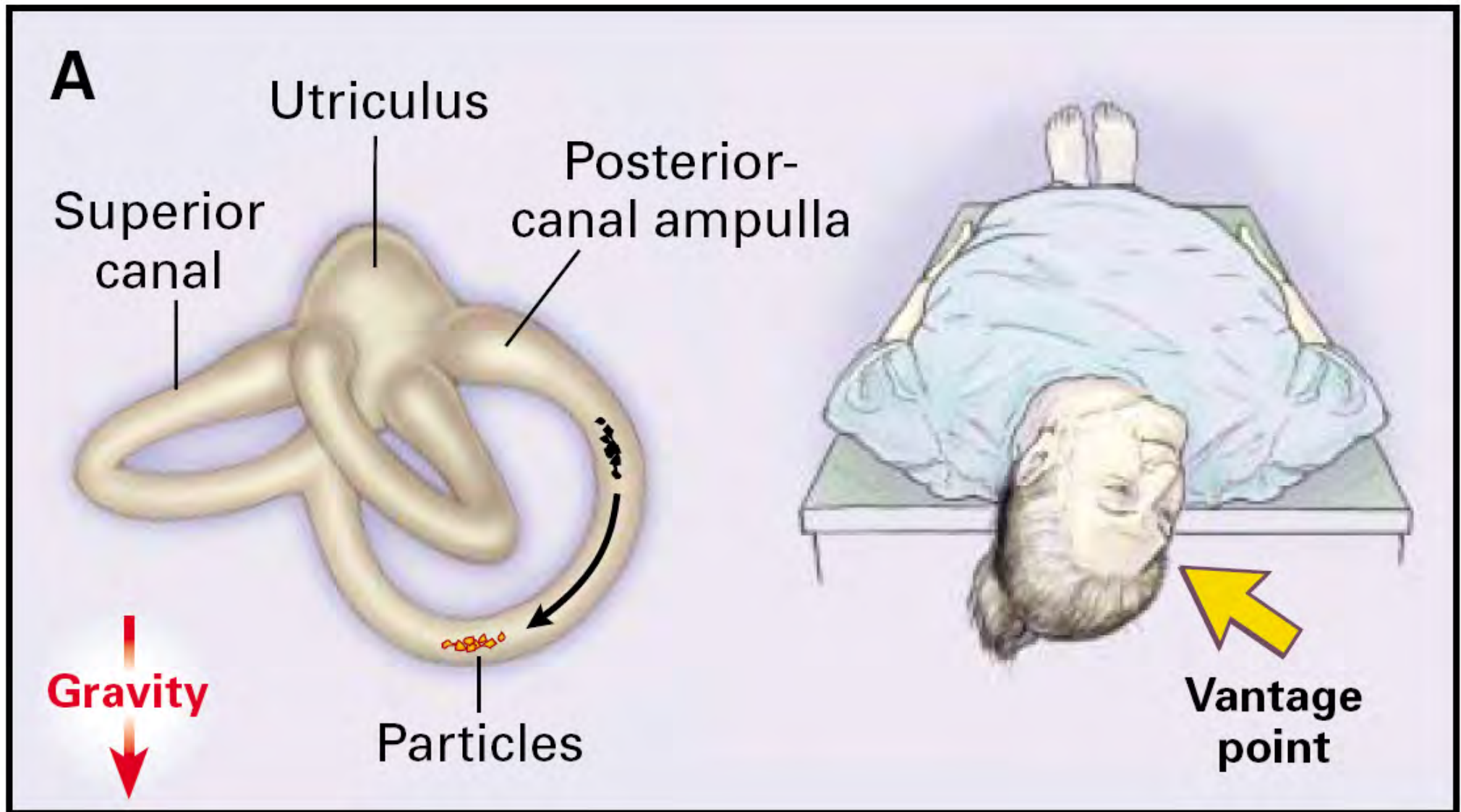
Hallpike



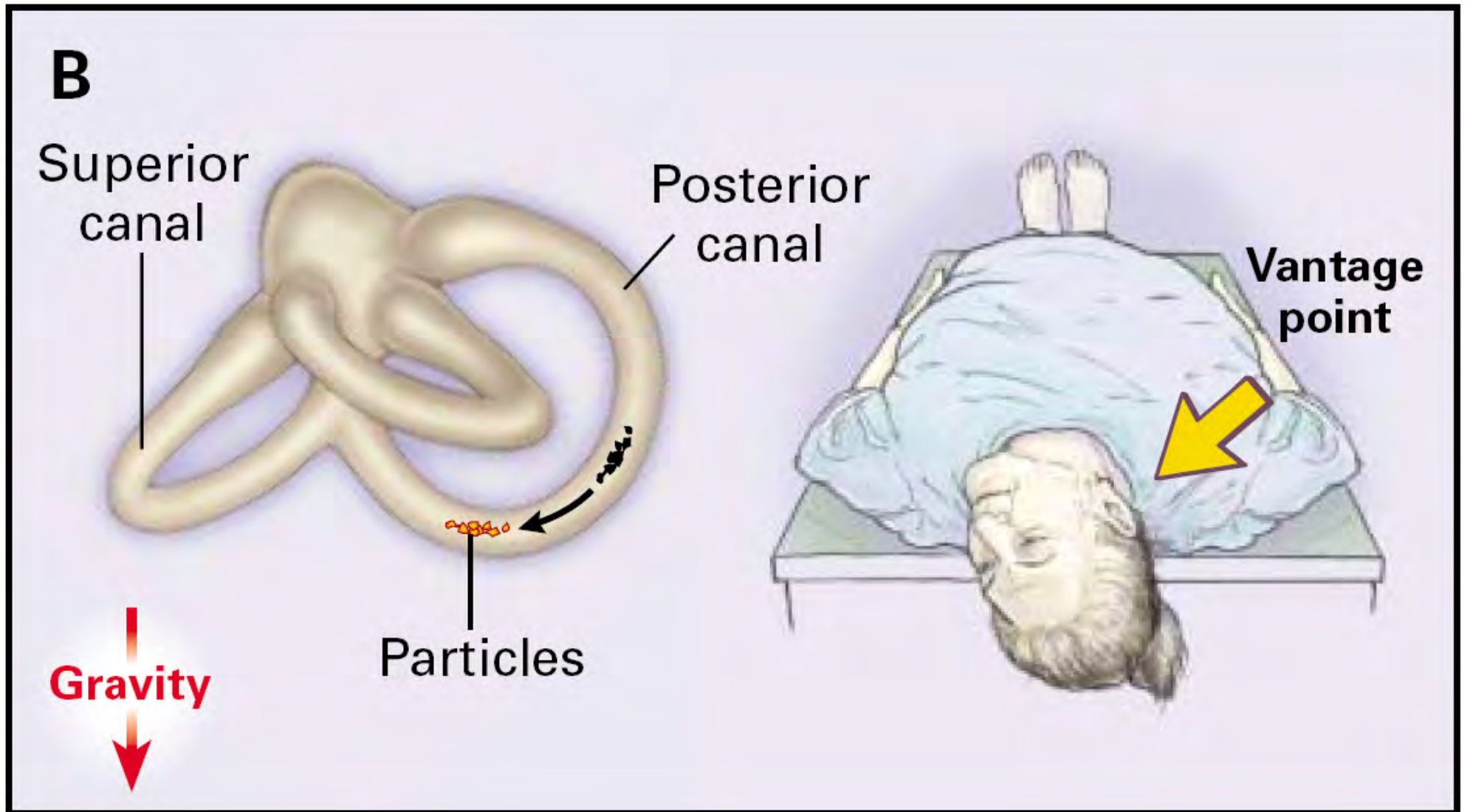
2 x 90°  
und  
aufsitzen



# Epley-Manöver

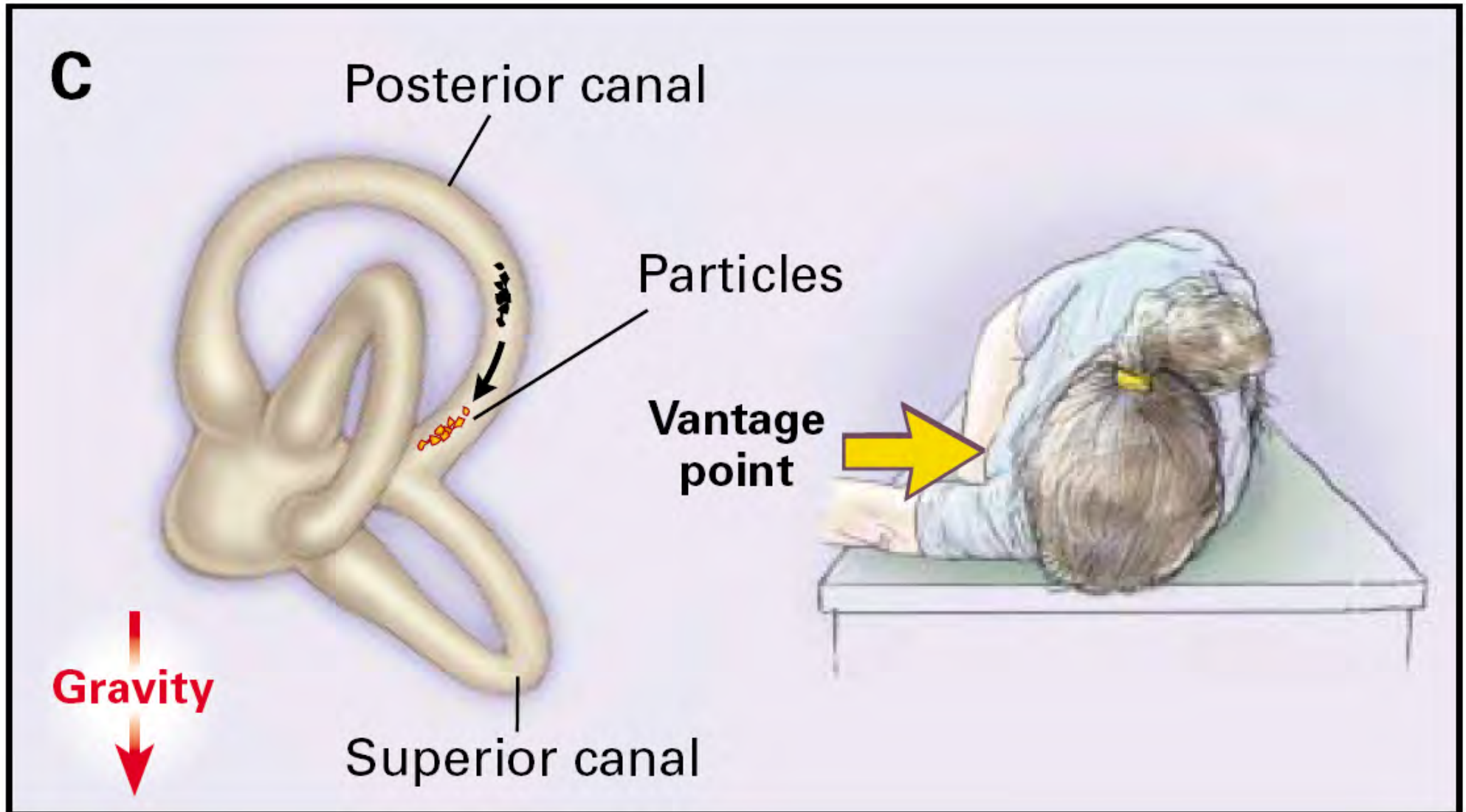


# Epley-Manöver

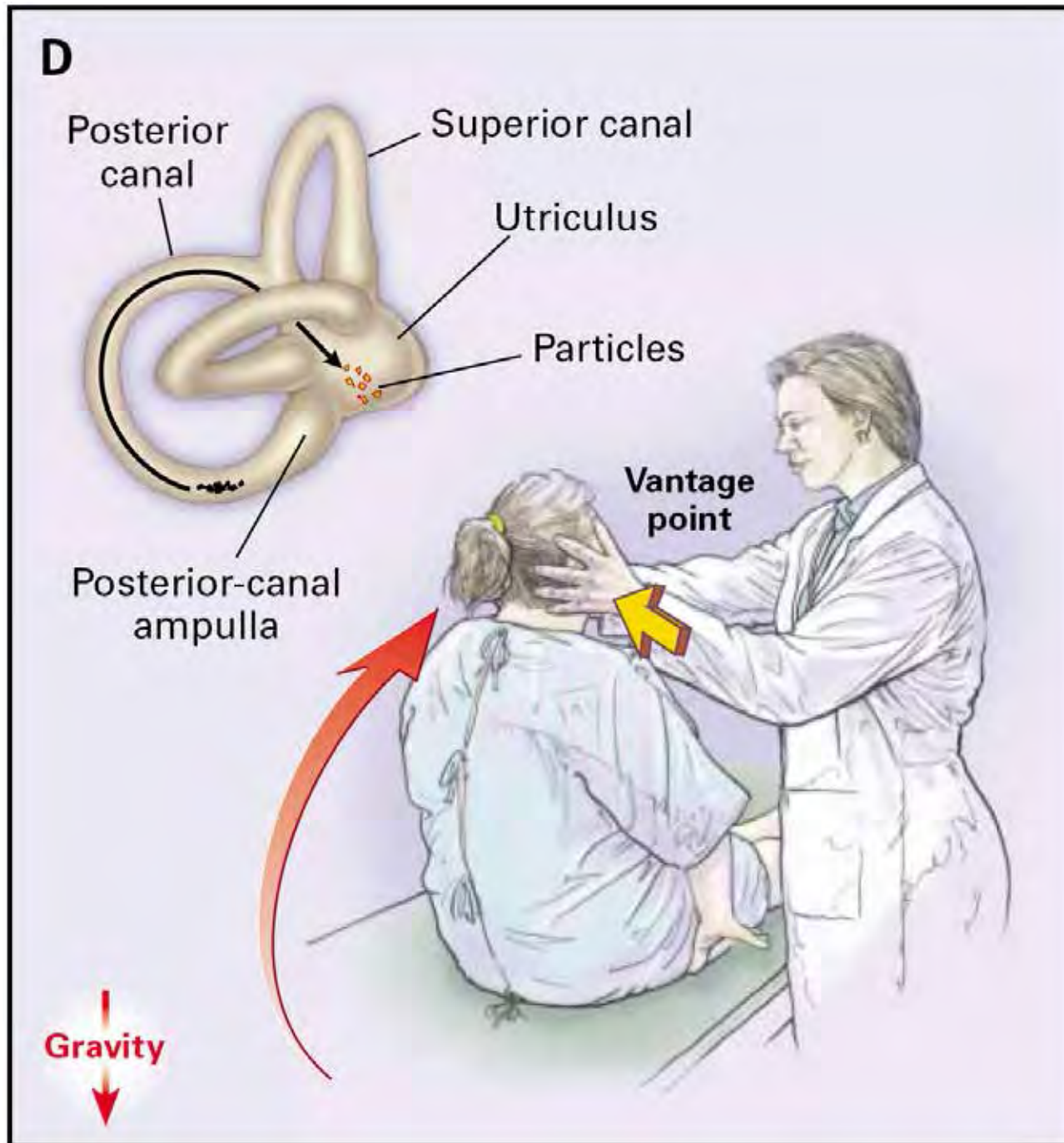




# Epley-Manöver



# Epley- Manöver



Furman 1999



# Befreiungsmanöver



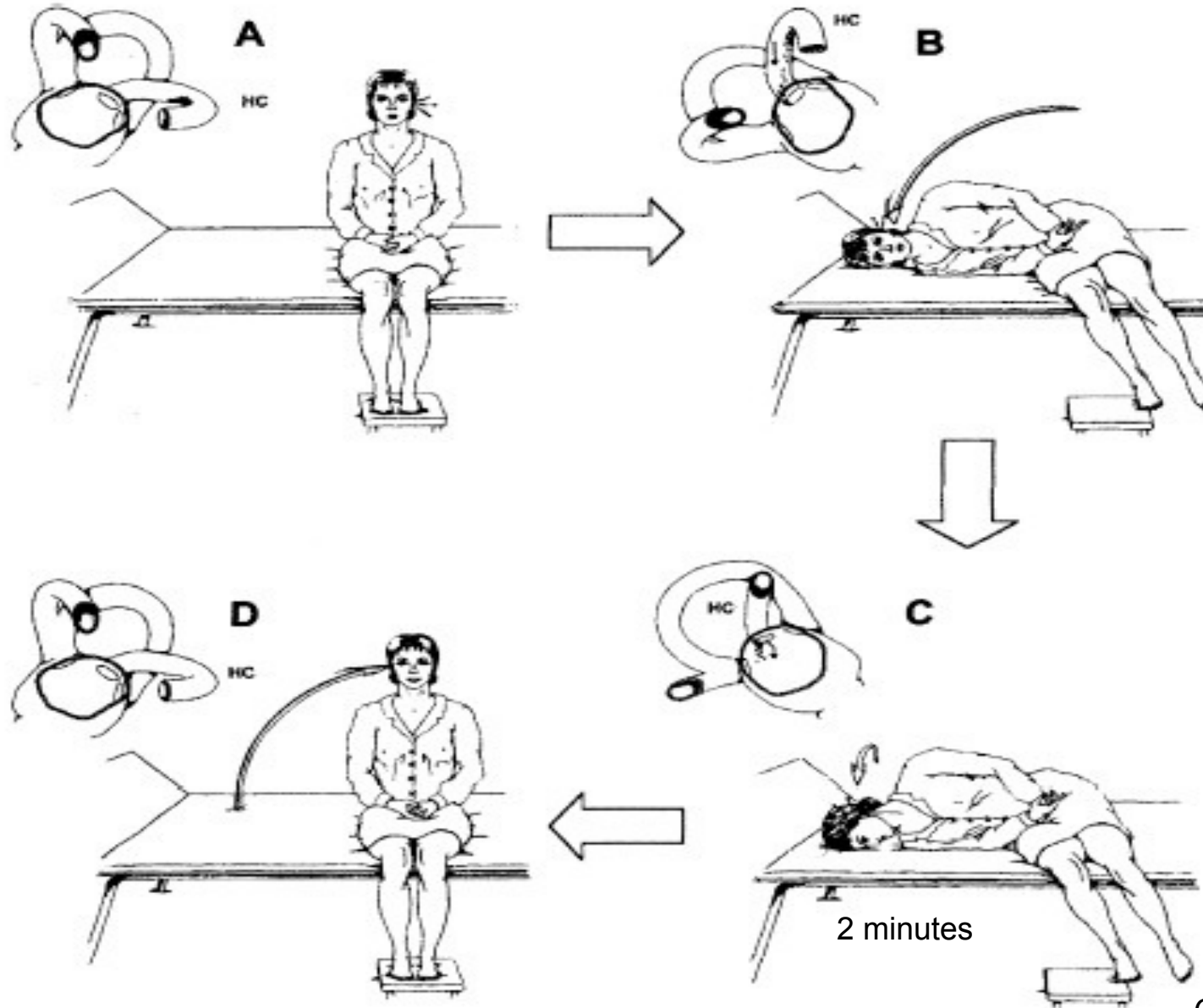
	hinterer Bogengang	lateraler Bogengang geotrop	lateraler Bogengang apogeotrop
Provokationsmanöver	<b>Hallpike</b>	<b>Supine roll</b>	<b>Supine roll</b>
Befreiungsmanöver	<b>Epley</b>	<b>Gufoni head-down</b>	<b>Gufoni head-up</b>

	hinterer Bogengang	lateraler Bogengang geotrop	lateraler Bogengang apogeotrop
Provokations- manöver	<b>Hallpike</b>	<b>Supine roll</b>	<b>Supine roll</b>
Befreiungs- manöver	<b>Epley</b>	<b>Gufoni head-down</b>	<b>Gufoni head-up</b>

**auf der Seite mit  
WENIGER NYSTAGMUS**



# Gufoni-Manöver head-down



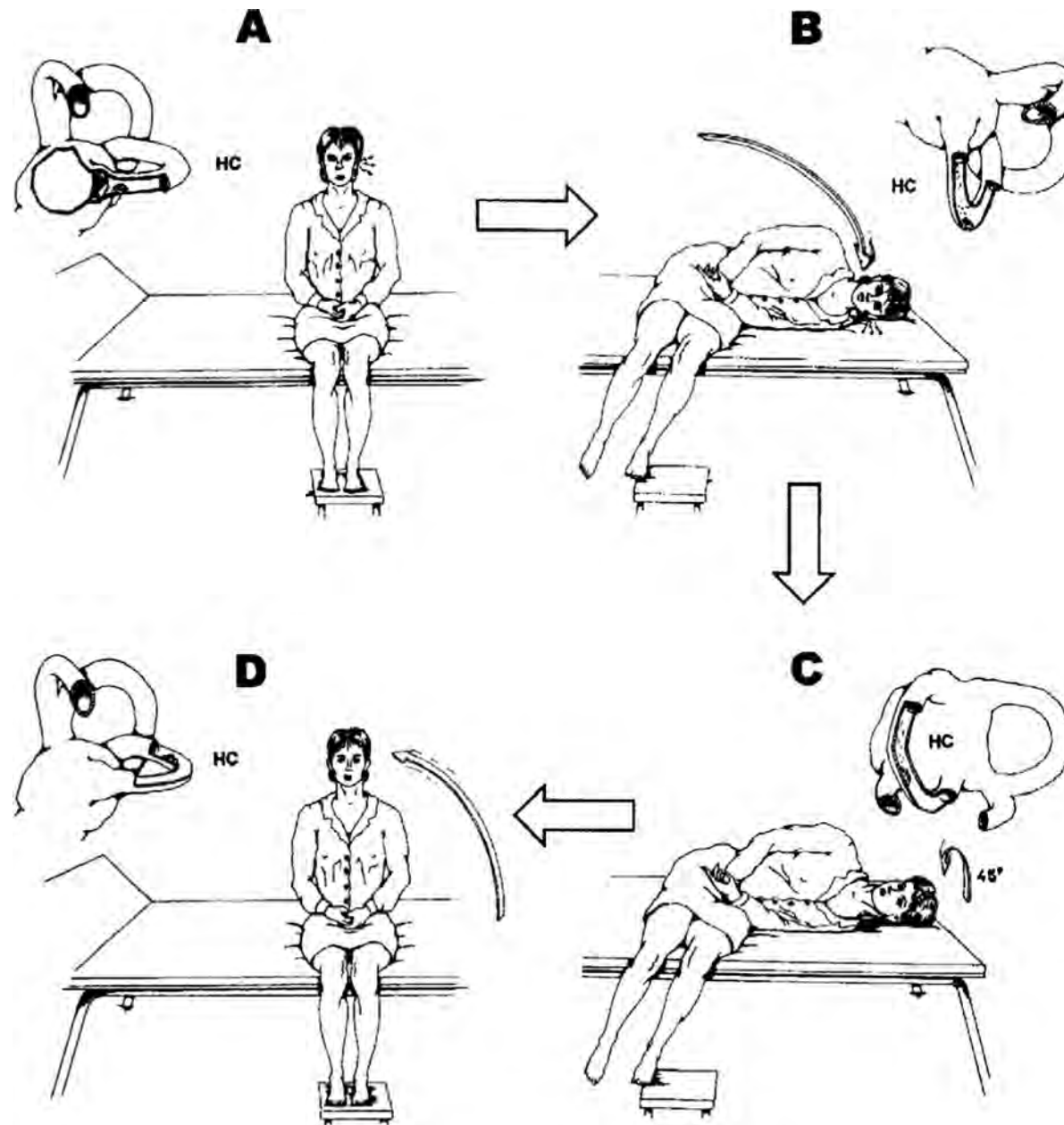
# Gufoni Manöver head-down







# Gufoni-Manöver head-up



# Gufoni Manöver head-up



# Repositionsmanöver: welche Seite?

- Epley: Beginn auf Seite des positiven Hallpike
- Gufoni: auf die Seite mit weniger Lagerungsnystagmus
- Keine Befreiungsmanöver auf die andere Seite am gleichen Tag (Gefahr der Re-Repotion!)
- Bei bilateraler Canalolithiasis:  
Repositionsmanöver an verschiedenen Tagen

# Bemerkungen zu den Canalolith-Befreiungsmanövern (I)

- „Mobilisation“ der Canalolithen mit Beklopfen oder Vibration des Mastoids
- Unmittelbar nach dem Befreiungsmanöver verspüren viele Patienten einen Zug in Richtung des betroffenen Labyrinths (Konkreme auf dem Utriculus?).
- Therapie-Kontrolle: nochmaliges Provokationsmanöver ev. mit weiterem Befreiungsmanöver
- Leichte Gleichgewichtsstörungen während der ersten drei Tage sind üblich.

# Bemerkungen zu den Canalolith-Befreiungsmanövern (2)

- Der Patient soll danach während drei Tagen Erschütterungen (Joggen, Sprünge) und Kopftieflage (Zahnärzte!) vermeiden.
- Nach drei Tagen telefonische Rückmeldung nach vorgängigem selbstständigem Hallpike-Manöver
- Ev. Wiederholung des Manövers bei Persistenz des Lagerungsschwindels
- Therapieerfolge der Befreiungsmanöver: ca. 80-90%

**Danke für die Aufmerksamkeit!**