



# Vertigo and Dizziness

Common Complaints

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*Third Edition*

## Chapter 15 - Functional Dizziness and Vertigo

# Introduction

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1. Current Classification
2. Epidemiology and Comorbidities

# Current Classification (1)

Year	Name
~1970	<b>Psychogenic vertigo</b> <b>Functional vertigo/dizziness</b>
1986	<b>Brandt &amp; Dieterich</b> Phobic postural vertigo (PPV)
1989/1993	<b>Jacob</b> Space-motion discomfort (SMD)
1995	<b>Bronstein</b> Visual vertigo (VV)
~2000	<b>Psychosomatic vertigo/dizziness</b>
2004	<b>Staab</b> Chronic subjective dizziness (CSD)
2004	<b>Somatoform vertigo</b>
2015	actual (WHO 2015: ICD 11)
2017	<b>Functional dizziness</b> <b>New: PPPD (persistent postural-perceptual dizziness)</b>

2017 ICVD/Bárány Society  
consensus document: PPPD

- ★ A functional, not a structural or psychiatric, vestibular disorder
- ★ Can and has to be diagnosed positively by typical symptom constellations (not only negatively by exclusion)

Table 1  
Features of PPV, SMD, VV, and CSD that informed the definition of PPPD

	PPV [13]	SMD [39]	VV [15]	CSD [79, 81]
Primary Symptoms (criteria A.1–3)				
Dizziness	✓✓	✓	✓✓ [22, 23]	✓✓
Unsteadiness	✓✓	✓✓	✓✓	✓✓
Non-spinning vertigo	✓✓	✓✓	✓✓	✓
Temporal profile (Criteria A.1–3)	Fluctuating with momentary flares	Situational (provoked)	Situational (provoked), Persistent [23]	Persistent with diurnal variability [27]
Provocative factors (Criteria B.1–3)				
Upright posture	✓✓			✓ [75]
Active or passive motion	✓	✓	✓	✓✓
Moving visual stimuli or complex patterns	✓	✓	✓✓	✓✓
Precipitants (Criterion C.1)				
Vestibular syndromes	✓	✓	✓	✓
Other medical illnesses	✓			✓
Psychological distress	✓	✓		✓
Course of illness (Criteria C.1.a-b)	Long-standing, waxing/waning [18]	May be long-standing	May be long-standing	Chronic
Physical exam and laboratory findings (Criterion E)	Normal	Somatosensory dependence on posturography [41]	Central or peripheral vestibular deficits	Abnormalities related to comorbid conditions [75]
Features not incorporated into PPPD				
Anxiety	Part of PPV	Associated with SMD [41]	Associated with prolonged VV [23]	May be comorbid with CSD [80]
Depression	Part of PPV			May be comorbid with CSD [80]
Personality traits	Obsessive-compulsive traits are part of PPV			Neurotic, introverted traits may be risk factors for CSD [76]

# Diagnostic Criteria (5/5)

## Box 15.1 Diagnostic Criteria of Persistent Postural-Perceptual Dizziness (PPPD or 3PD) (Staab et al. 2017)

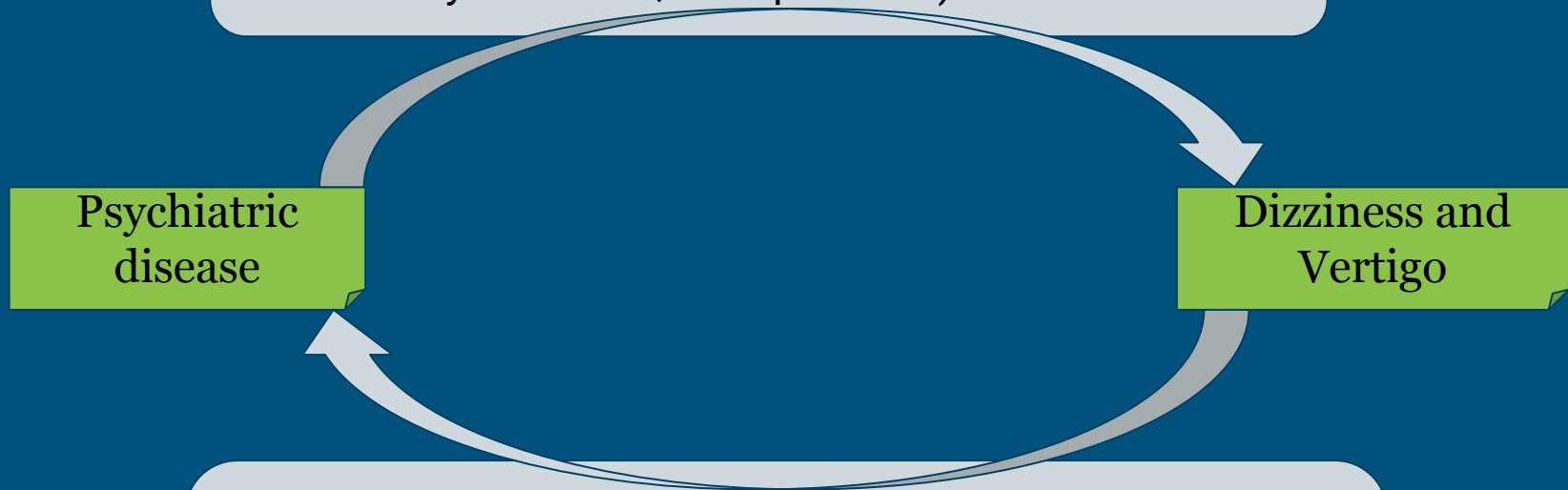
1. One or more symptoms of dizziness, unsteadiness, or non-spinning vertigo are present on most days for 3 months or more. Symptoms may be present for hours but not during the whole day, nearly every day (for more than 15 of 30 days), and tend to increase over the day.
2. Persistent symptoms occur spontaneously without provocation but are exacerbated by 3 factors: (1) upright posture, (2) active or passive motion without regard to direction or position, and (3) exposure to moving visual stimuli or complex visual patterns.
3. The disorder is precipitated by conditions that cause vertigo, unsteadiness, dizziness, or problems with balance including acute, episodic, or chronic vestibular syndromes, other neurological or medical illness, or psychological distress.
4. Symptoms cause significant distress or functional impairment.
5. Symptoms are not better accounted for by another disease or disorder.

# Epidemiology and Comorbidities (1)

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- Large proportion of the complex forms of vertigo/dizziness syndromes in OPD (prevalence 8-10%)
  - Primary functional dizziness and vertigo syndromes
  - Secondary (develop after acute structural vestibular vertigo, another neurological or medical illness, or psychological distress)
- Primary psychiatric disorders accompanied by dizziness
- Psychiatric comorbidities in patients with structural organic vestibular syndromes: 50%

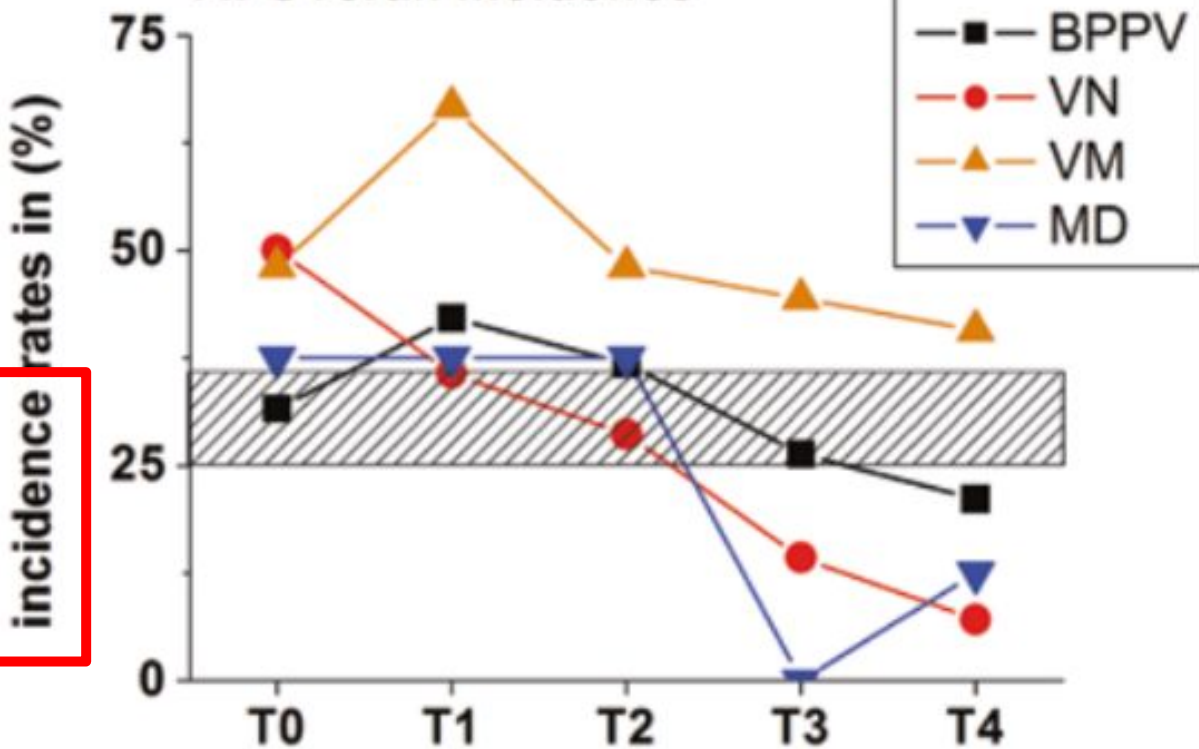
★ **Primary psychiatric disorders** accompanied by dizziness (panic attacks, chronic fluctuating anxiety disorders, or depression)



★ **Psychiatric comorbidities** in patients with structural organic vestibular syndromes: **50%**

- 65% of VM, 57% of MD, 51% of VP
- 15% of BPPV, 22% of VN, 20% in normal control groups

A: Overall incidence



Onset

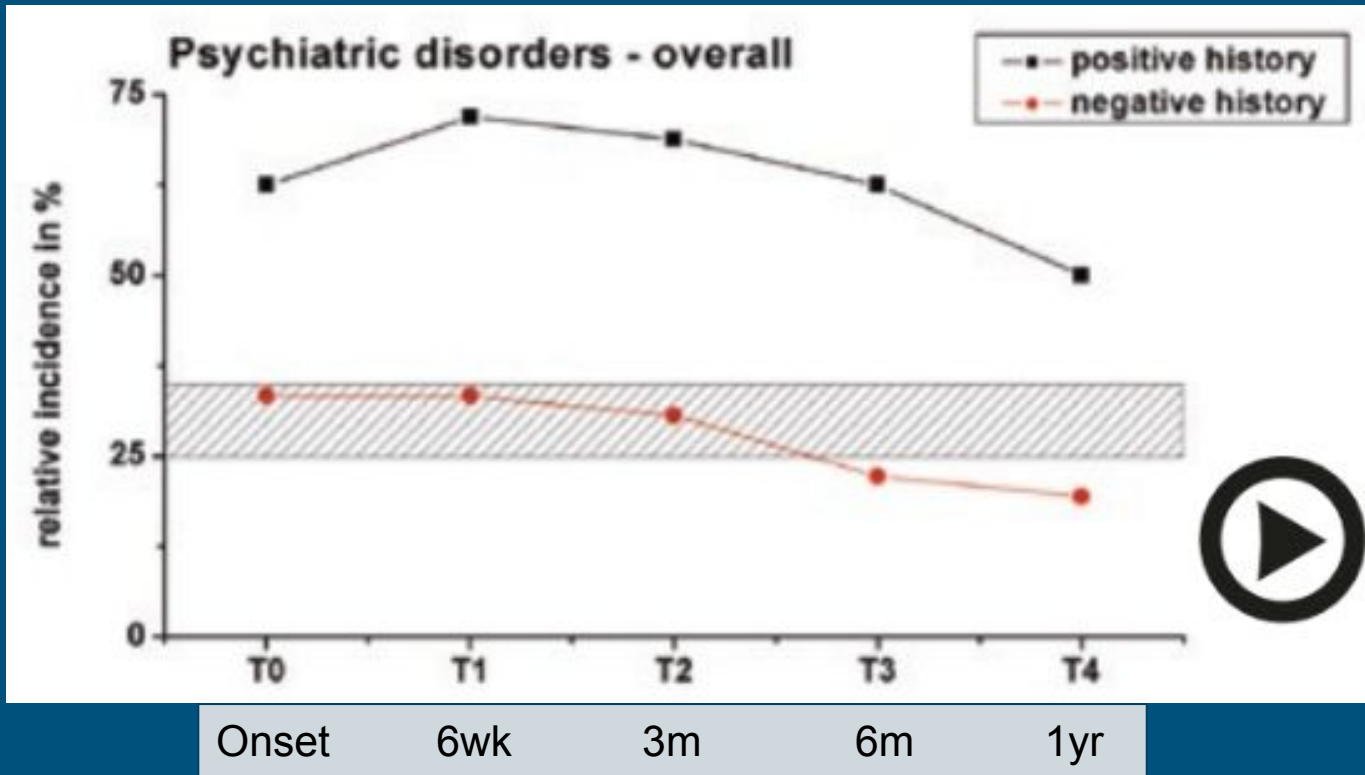
6wk

3m

6m

1yr





# Epidemiology and Comorbidities (2)

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- Predict for development of functional dizziness:
  - Prehistory of a mental illness
  - The extent of vestibular damage or vestibular dysfunction: no influence
  - The degree of the initially experienced vertigo: VN(+); BPPV(-)
  - Persistent anxiety about a renewed episode of vertigo: VN(+)
  - Vestibular migraine: high risk; the possibility should be considered early

# Epidemiology and Comorbidities (3)

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- Comorbidities for anxiety disorders and depression:
  - Exist in patients with organic vestibular syndromes
  - Also in patients with functional dizziness
  - In patients with CSD, 60% had clinically relevant symptoms of an anxiety disorder and 45% of a depression, but 25% showed no psychiatric comorbidity
- In patients with **functional dizziness and concomitant vestibular migraine or Ménière's disease**, the acute attacks of structural vestibular dysfunction overlay a persisting basal unsteadiness, swaying dizziness, or light-headedness

# Diagnosis

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1. History
2. Clinical and Technical Examinations
3. Further Clinical Aspects and Course of the Illness

# History (1)

The patients describe experiencing frequent

- ★ Postural imbalance or a diffuse feeling of dizziness 走路偏偏
- ★ Light-headedness 飄飄的
- ★ An emptiness in the head 腦袋空空
- ★ Unsteadiness when walking
- ★ A feeling of toppling over or of losing touch with the ground 感覺快跌倒
- ★ Very rarely rotatory vertigo with accompanying vegetative symptoms and nausea 較少旋轉

Depending on the underlying psychiatric disease (see above), the following additional symptoms can be present

- ★ Disorders of motivation and concentration 注意力不集中
- ★ Decline in performance 影響工作生活
- ★ Subjectively experienced restrictions in professional and daily activities
- ★ **Vegetative symptoms** that accompany the dizziness (**accelerated heart rate, nausea, sweats, apnea, fear of suffocating, loss of appetite, weight loss**)
- ★ Emotional and mood disorders
- ★ Sleep disturbances
- ★ Symptoms of anxiety

# History (2)

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- First seems to occur without psychopathological symptoms
  - ENT doctors, neurologists or internists
- Seldom spontaneously report conflict and stress
  - Unaware?
  - Difficult to establish the diagnosis
  - Has firstly to be worked out together with the patient

# History (3) Positive symptoms of PPV Brandt & Dieterich

- Dizziness, unsteadiness or light-headed-ness: 時好時壞、怕跌倒
- Dissociation between complaints and objective findings 自述症狀很嚴重 客觀檢查時還好(不會跌倒/耳神經檢查正常)
- Situational triggers or enhancement:
  - Phobic triggers; visual stimulation
- Improvement during distraction (dual task) 運動、談話時改善
- Fewer complaints in the morning, increasing over day 剛起床時症狀較少
- Generalization and chronification
- Vegetative disturbances and anxiety 通常問了才有
- Relaxation effect 酒精或鎮靜劑
- Precipitants:
  - Organic vestibular illness, other medical illness in the individual or the family, special psychosocial stress situations
- Personality traits: 強迫症、追求完美

## 1996 PPV

- ★ Subjective imbalance
- ★ Fluctuating
- ★ Spontaneously; perceptual or social situation
- ★ With or without anxiety (57%)
- ★ Personality trait (OCD, depression, labile affect)
- ★ Following emotional stress, serious illness, or organic vestibular disorder (precipitants)

# History (4)

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Major complaint:  
dizziness



Better in morning,  
worsening after 4-5 hours

Alcohol/sports: better

Shopping/crowd: avoid



# History (5)

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Major complaint:  
dizziness



Shopping (supermarkets,  
wide open space)

Avoid: social life,  
sports, crowds

Alcohol: better

Personality trait:  
responsible,  
detail-oriented

# Clinical and Technical Examinations

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- A detailed neurological, neurotological, and neuroophthalmological examination
- Technical vestibular testing: is necessary
  - Exclude structural
  - Secondary FD
- **“Increased self-observation”** careful examination (ex: by posturography)

# Further Clinical Aspects and Course of the Illness

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- Most common in the 2nd & 5th decade, female = male
- 姿勢性(站及走)頭暈、主觀不穩、前庭及平衡檢查正常、強迫性人格(控制一切)、attack-like worsening 可能找不到 triggers 或無伴隨焦慮 → 難診斷、惡化不敢出門
- Healthy control MRI: 神經質 higher connectivity of visual-vestibular and anxiety networks → higher risk
- 傾向認為自己有器質性疾病而到處就醫做檢查 (平均花三年)
  - “cervicogenic vertigo” “vestibular paroxysmia” “recurrent vertebrobasilar ischemia(no longer use)”
- 若正確診斷, 很大比例會改善
  - After careful examination and detailed explanation of the mechanisms 75%
  - Psychoeducative cognitive behavioral therapy 78%
  - “Integrative psychotherapy” (manualized intervention containing elements of education, cognitive behavior therapy and psychodynamic therapy), or a moderated self-help group: significant improvements

# Differential Diagnosis

Seldom any  
doubt!!!

## Psychiatric syndromes

- ★ Functional dizziness, anxiety, depression, dissociative, and somatoform disorders
- ★ Panic disorder with or without agoraphobia
- ★ Space phobia
- ★ Mal-de-Debarquement syndrome

## Vestibular and non-vestibular organic

- ★ Vestibular migraine
- ★ Cerebellar dizziness and episodic ataxia type 2
- ★ Orthostatic tremor (pathognomonic frequency peak of 13–18 Hz in EMG and posturography)

# Pathophysiology and Therapeutic Principles

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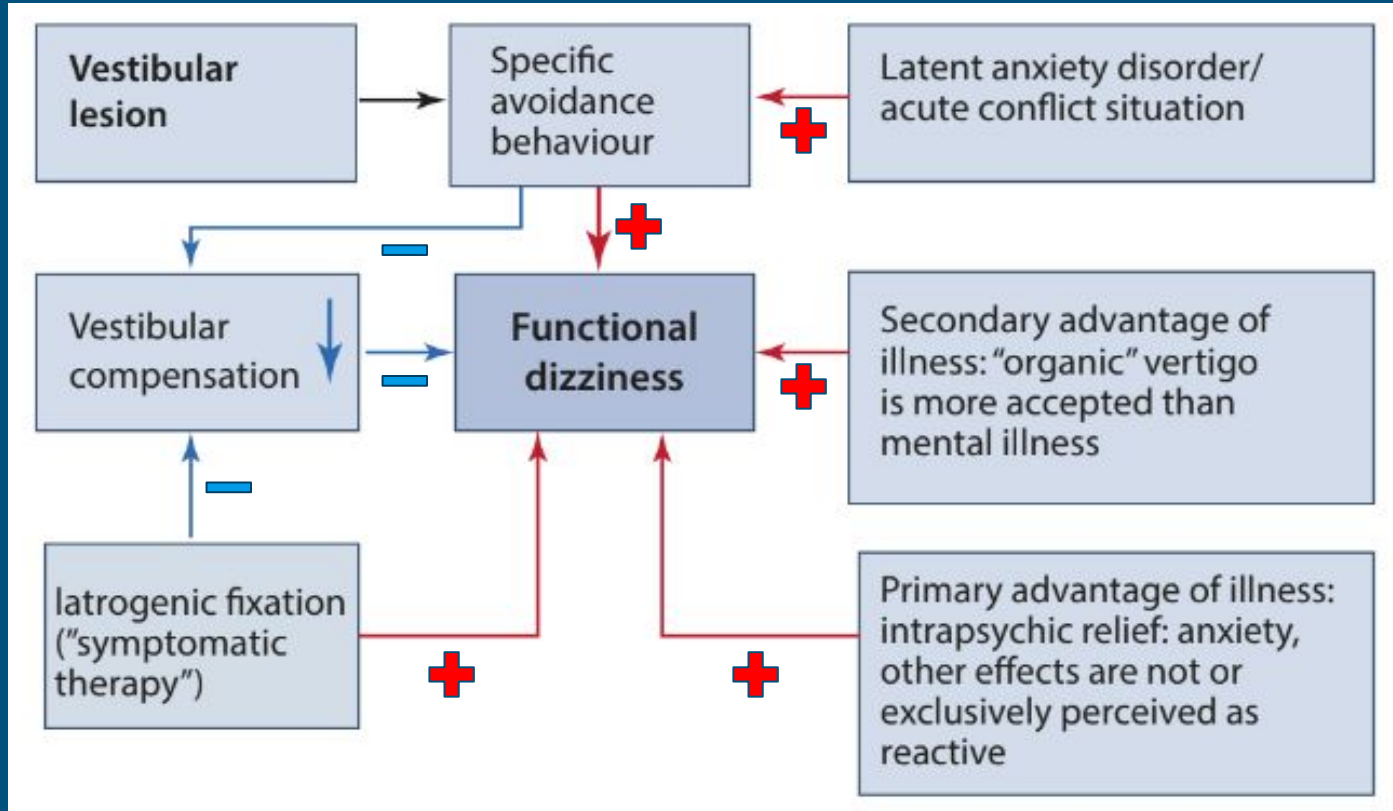
1. Efference-Copy Model
2. Analysis of Stance and Gait
3. Brain Imaging

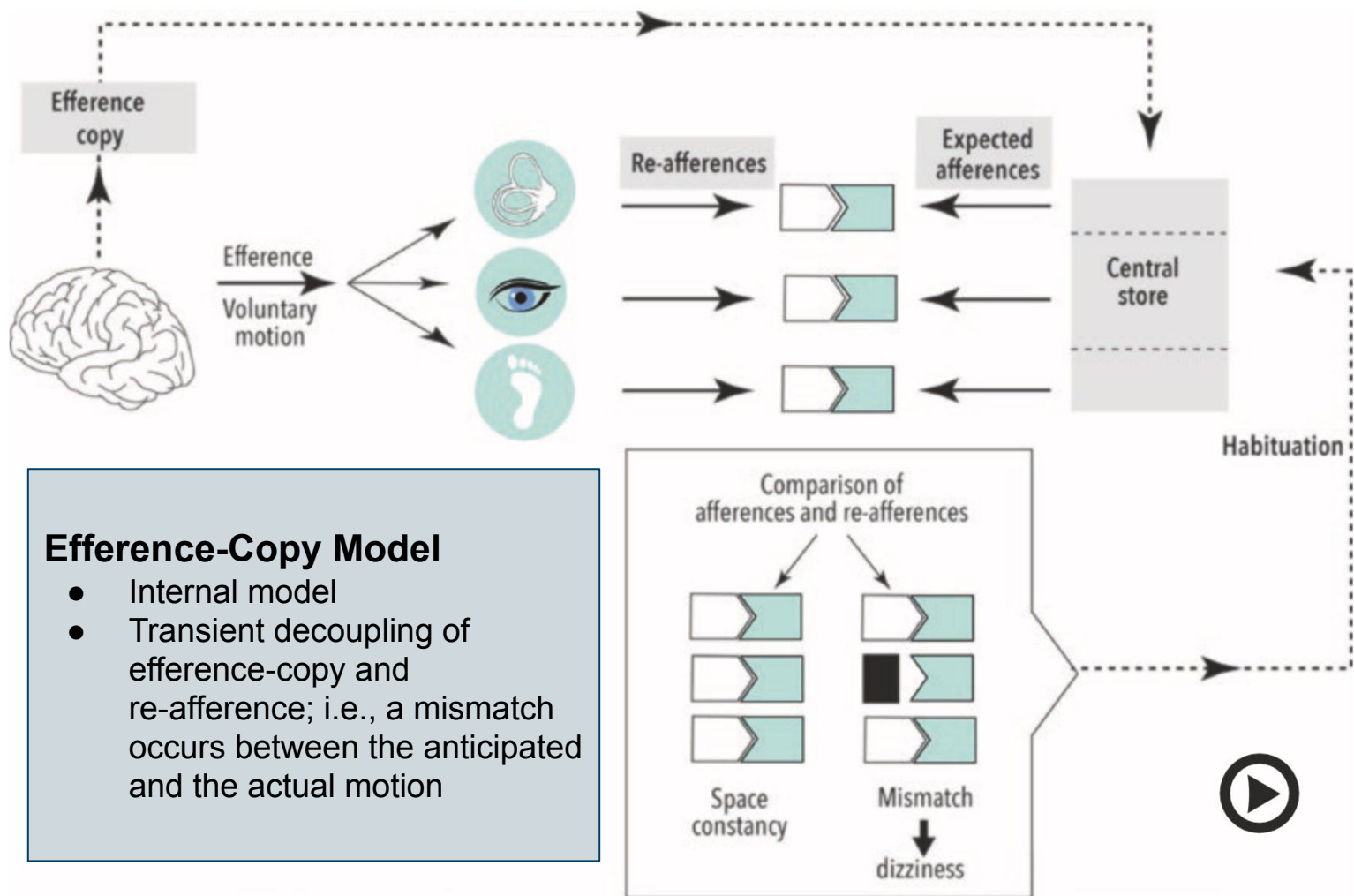
# Pathophysiology and Therapeutic Principles

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- Primary functional (somatoform) vertigo and dizziness syndromes:
  - Similar pathogenetic mechanisms like those of psychiatric disorders (anxiety or phobic, depressive, dissociative, or somatoform disorders)
  - Should be differentiated from psychiatric vestibular syndromes
- Secondary functional (somatoform) vertigo and dizziness syndromes:
  - Occur during or after
    - A structural organic vertigo syndrome
    - Another neurological or medical illness, or
    - Psychological distress

Pathogenetic model of **secondary** functional dizziness/vertigo  
(cognitive-catastrophizing interpretation)





## Efference-Copy Model

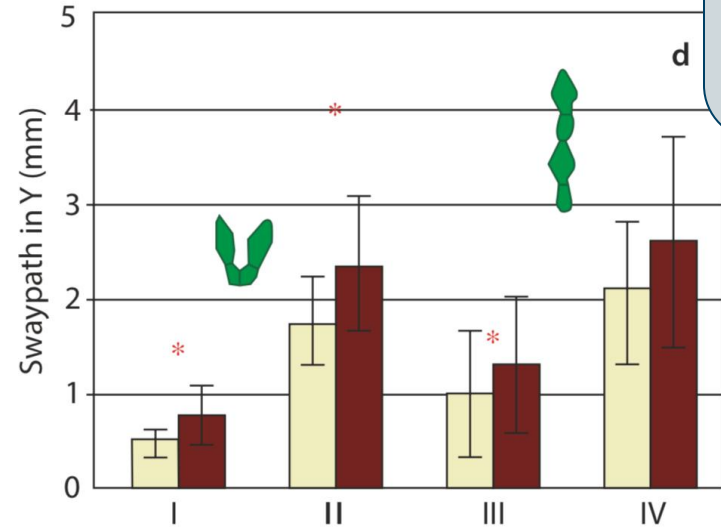
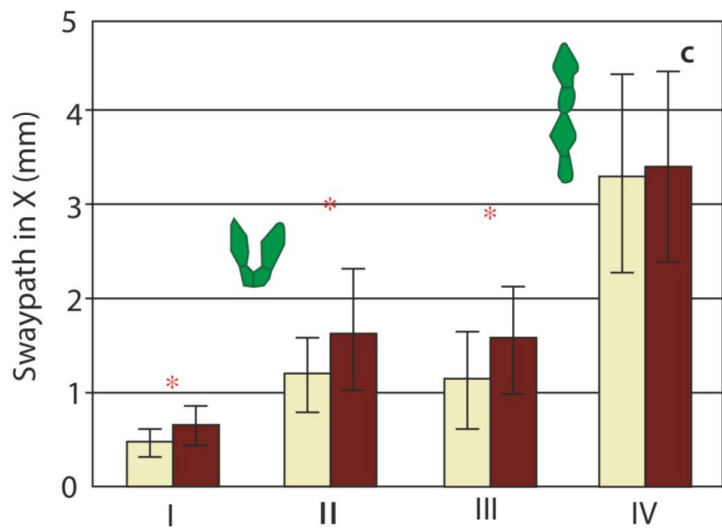
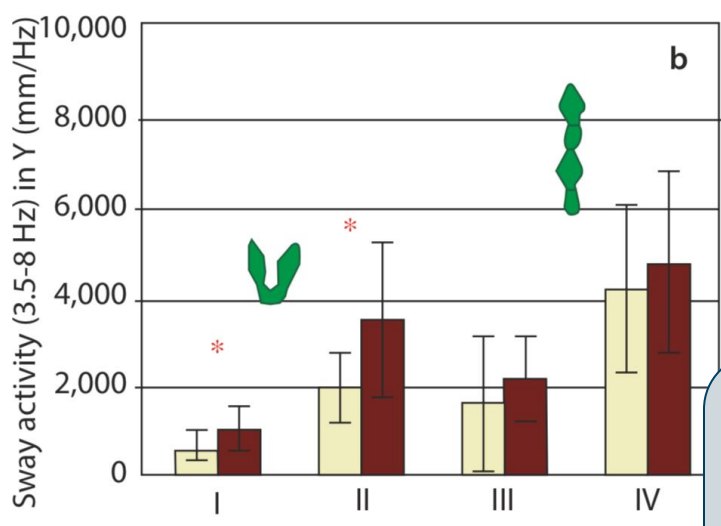
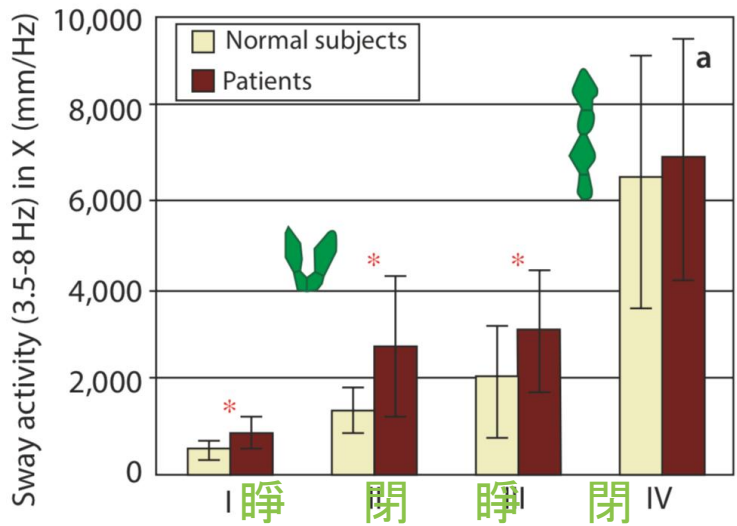
- Internal model
- Transient decoupling of efference-copy and re-afference; i.e., a mismatch occurs between the anticipated and the actual motion



# Analysis of Stance and Gait (1)

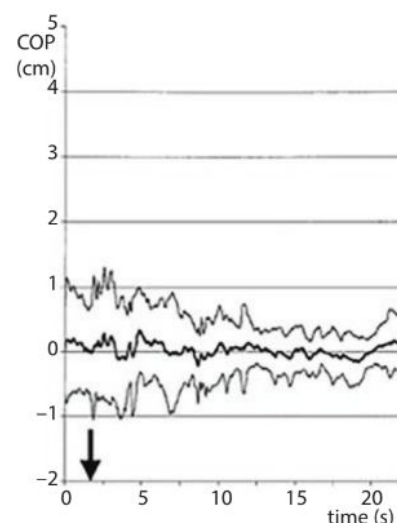
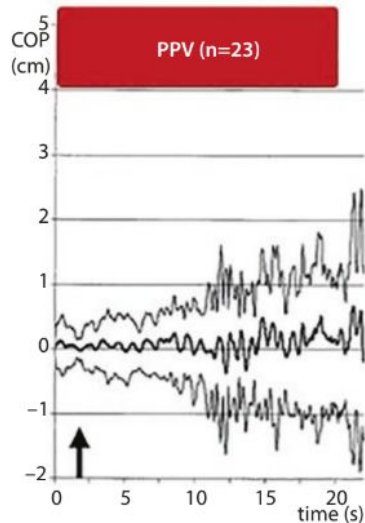
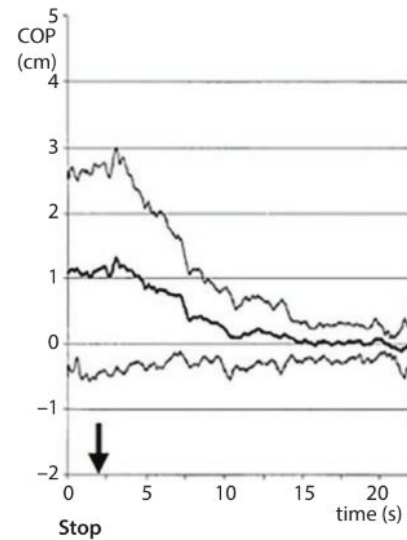
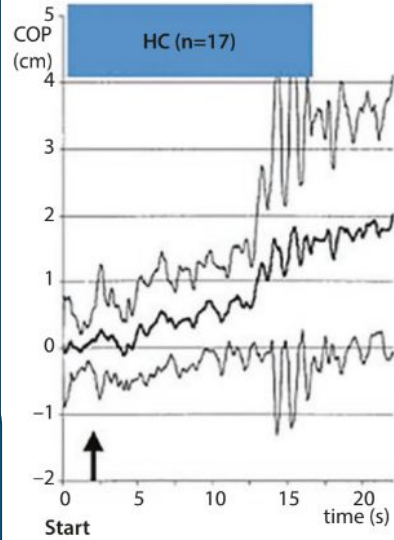
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- Unnecessary fearful strategy
  - Increase postural sway during normal stance by co-contracting the flexor and extensor muscles of the foot
  - Healthy subjects use this strategy only when in real danger of falling
  - The more difficult the demands of balance, the more “healthy” the balance performance of the patients with functional dizziness
- Visual motion stimulation
  - When exposed to large-field visual motion stimulation in the roll plane, body sway did not exhibit any increased risk of falling, but – in contrast to healthy volunteers – the stimulation-induced body sway was suppressed early



Unnecessary fearful strategy  
 測試越難  
 表現越好

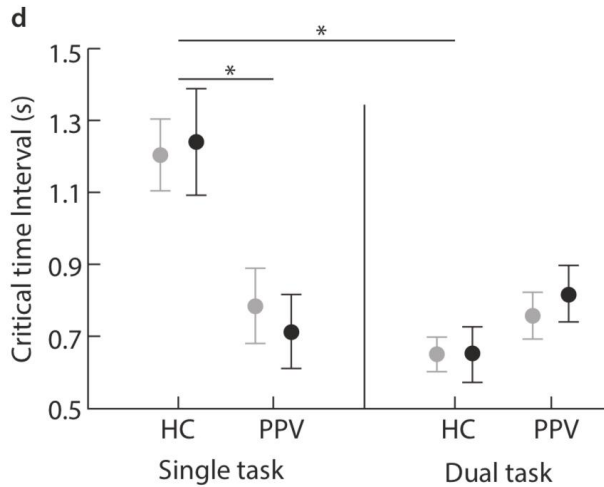
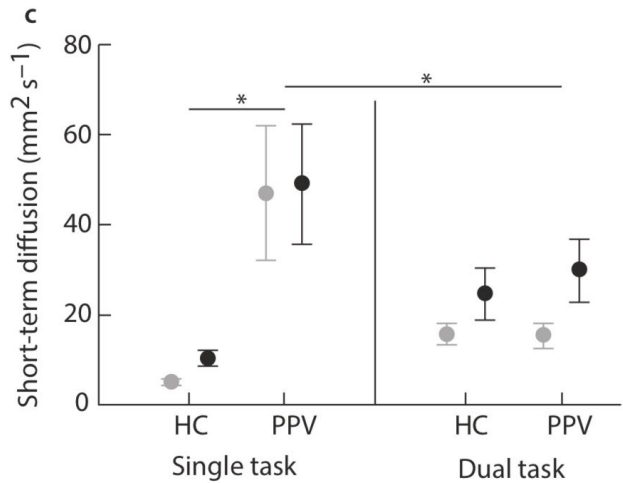
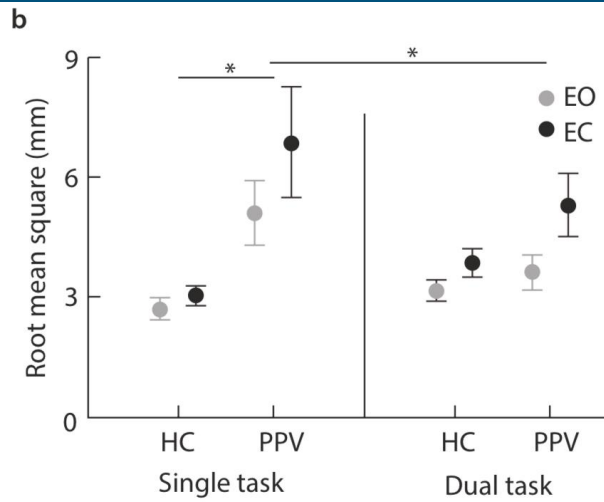
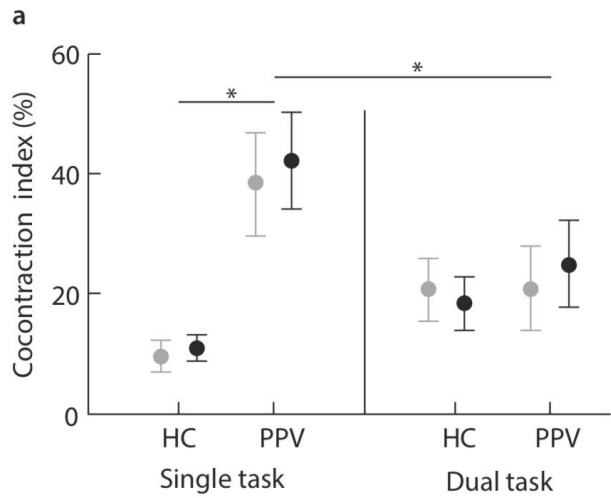
Stimulation-induced  
body sway was  
suppressed early



# Analysis of Stance and Gait (2)

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- These findings support the view that the gait characteristics of patients with functional dizziness can be attributed to an **inadequate, cautious gait control**
- In particular, distracting attention (by e.g. sensory or sensorimotor dual task) normalized leg muscle activity and balance parameters
- Distraction can be included in a therapeutic concept



Distracting attention normalized leg muscle activity and balance parameters

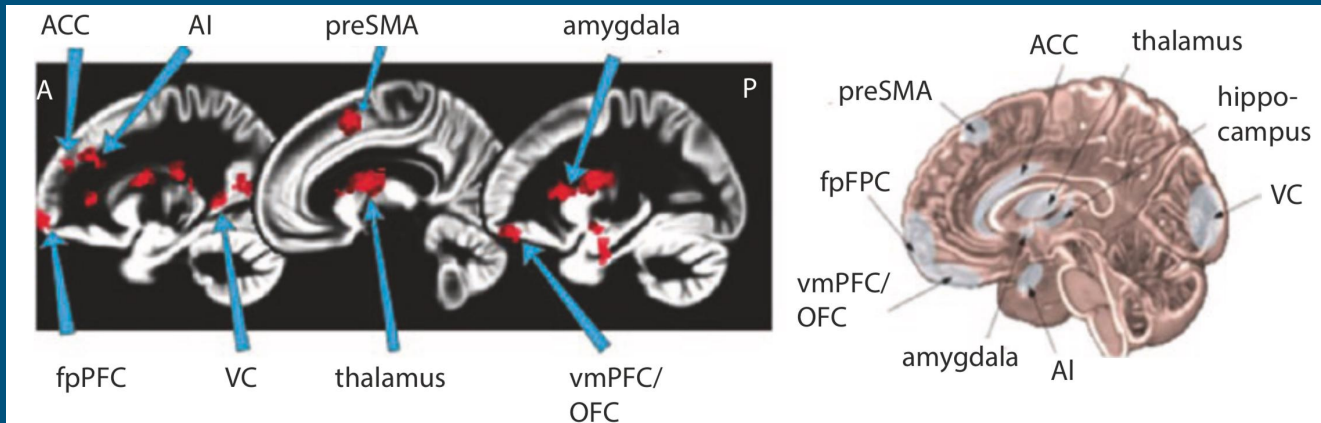
# Analysis of Stance and Gait (3)

- A stronger anxious control of stance and gait with a co-contraction of antagonistic leg muscles
- Transition of a normal automated control of stance (open loop) to a continuous voluntary regulation (closed loop)
- The enhanced body control again leads to a subjective sensation of swaying which exacerbates the vicious circle



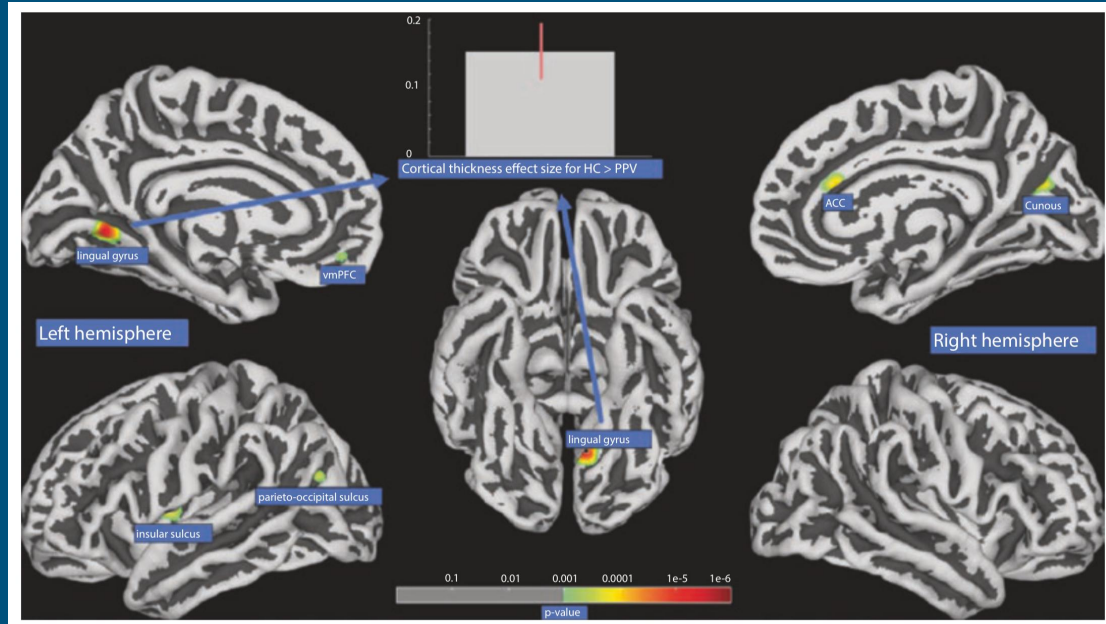
# Brain Imaging (1)

- On study of PPV, fMRI:
  - Volume reduction of gray matter in the cerebellum
    - Reduced automated sensorimotor control (cerebellum)
  - Volume increase in the bilateral thalamus and motor cortex
    - Enhanced voluntary motor control (cortex)
  - Functional connectivity
    - Reduction of fibers from the prefrontal cortex to the cerebellum bilaterally
    - Strong increase of fibers to the thalamus, anterior insula, parahippocampus, amygdala, and anterior cingulum (emotions)



# Brain Imaging (2)

- On study of PPV, fMRI:
  - Cortical thickness HC>PPV:
    - Lt hemisphere: ventromedial prefrontal cortex, the insular sulcus, and the lingual gyrus
    - Rt hemisphere: a region bordering the anterior cingulate gyrus and the cuneus





# Brain Imaging (3)

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- Other studies of PPPD:
  - Altered functional brain connectivity between the cerebellum and the thalamus
  - Decreased connectivity between the left hippocampus and right inferior frontal gyrus, bilateral temporal lobes, bilateral insular and parietal opercular cortices, bilateral occipital lobes, and cerebellum
  - Reduced connectivity among areas involved in multisensory vestibular processing and spatial cognition, but increased connectivity in networks linking visual and emotional processing
- A dysfunction of precuneus and cuneus in the resting state with altered intra-and inter-network functional connectivity
  - Spontaneous functional activity of cuneus and precuneus could potentially lead to an abnormal integration of visual and vestibular information and abnormalities in external environment monitoring

# Treatment

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# Treatment (1)

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- “Increased self-observation”
- Relaxation techniques
- Regular physical training
- Vestibular rehabilitation with balance exercises
- Desensitization
- Helpful to give the patient confidence in his/her own sense of balance

# Treatment (2)

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- Alone or combined, individualized
- Cognitive-psychoeducational and behavioral therapy
- Pharmacotherapy
  - Especially SSRIs, such as: escitalopram, paroxetine, citalopram, fluvoxamine, or sertraline
  - Depending on the psychiatric comorbidity: tri-/tetracyclic antidepressants such as opipramol or alternatively in concurrent sleep disorders amitriptyline and mirtazapine are possible
- Regular exercises
  - For some months
  - Can be combined with optokinetic stimulation