

Update on Functional Movement Disorders

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January 17-20, 2026
JUPITER, FLORIDA



**Clinical
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Disclosures

I have no disclosures related to functional movement disorders.

I have received industry-related research funding from the below companies:

- Alterity Therapeutics (MSA)
- CHDI (HD)
- F. Hoffmann-La Roche (HD)
- Lundbeck (MSA)
- Neurocrine Biosciences (HD)
- Novartis (PSP, HD)
- Ono Pharmaceutical (MSA)
- Orphalan (Wilson's disease)
- Sage Therapeutics (PD, HD)
- Teva Pharmaceuticals (HD, MSA)
- UniQure (HD)
- Yoda Therapeutics (MSA)

Objectives

1. Brief history of functional movement disorders
2. Key Elements of the Clinical History and Examination needed to diagnosis functional movement disorders
3. Current understanding of Pathophysiology
4. Treatment for functional movement disorders

Test: Is this functional?



Functional Movement Disorders (FMD)

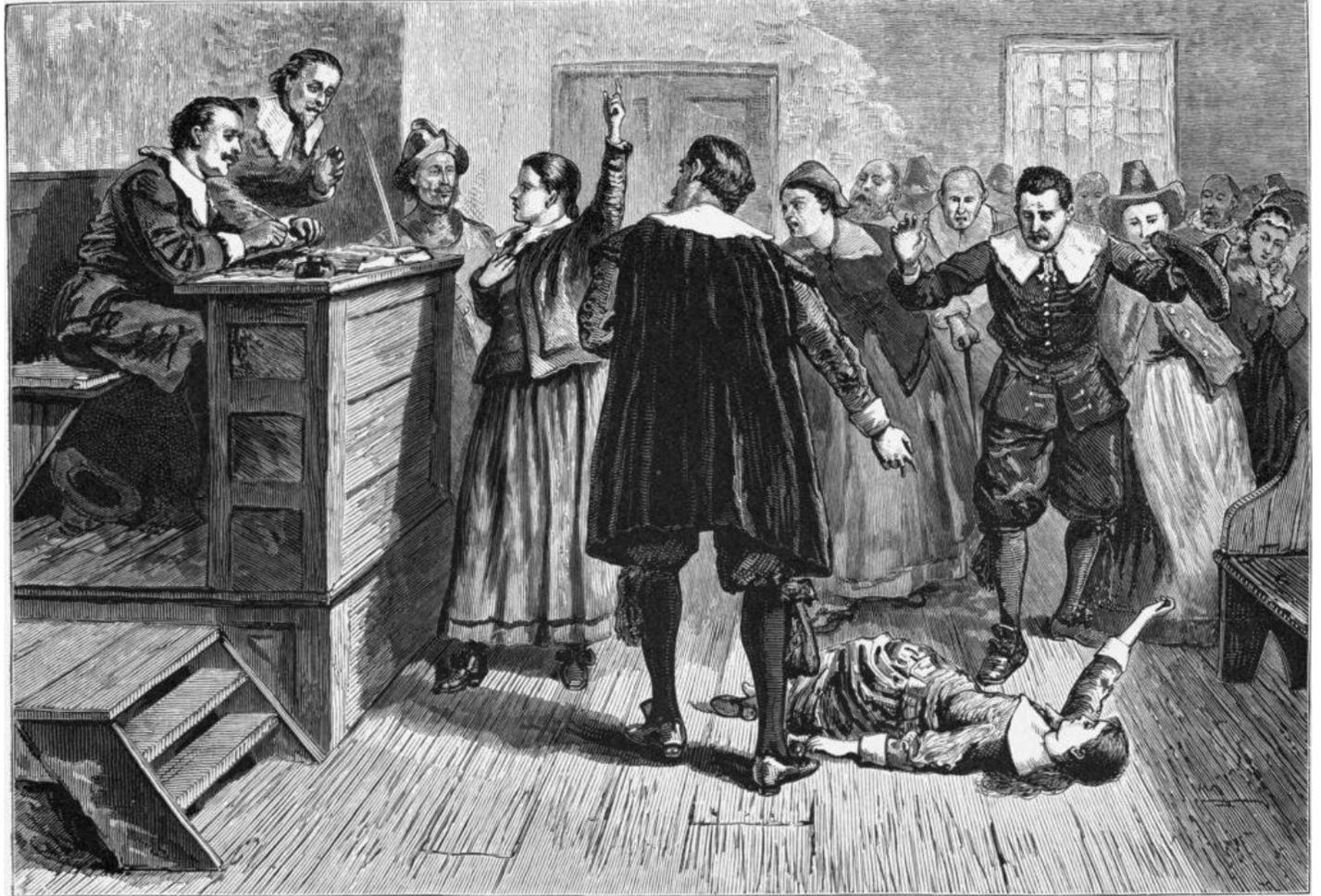
Group of disorders associated with *distressing* and *disabling* neurological *signs and symptoms* that cannot be accounted for by other known entities (*organic*)

Symptoms are **inconsistent** and **incongruent**, which are seen as **positive diagnostic features** typically seen with FMD

FMD is no longer a diagnosis of exclusion, but rather a **rule in** diagnosis

History of “Hysteria”

- 400 B.C.: Ancient Greek theory of the Wandering womb
- Middle Ages: witchcraft and “demonic possession”
- 1700S: First description of hysteria as psychological origin; described as “melancholy” or “nervous disease” (Robert Burton)



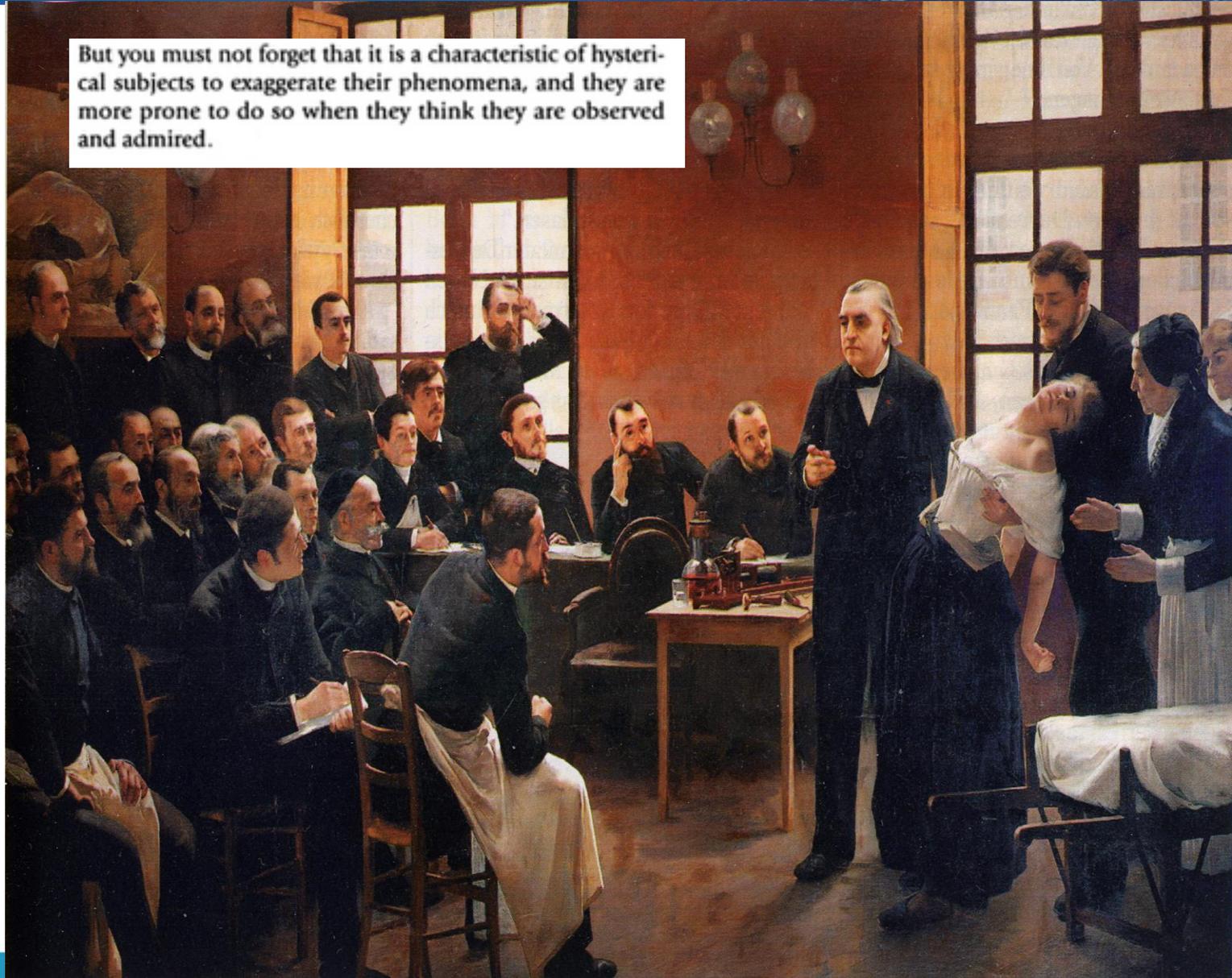
1700-1800s

Névrose (neurosis)

- New category of neurological disorders
- Classified the numerous neurological conditions that were *well-characterized clinically*, but without an identifiable lesion

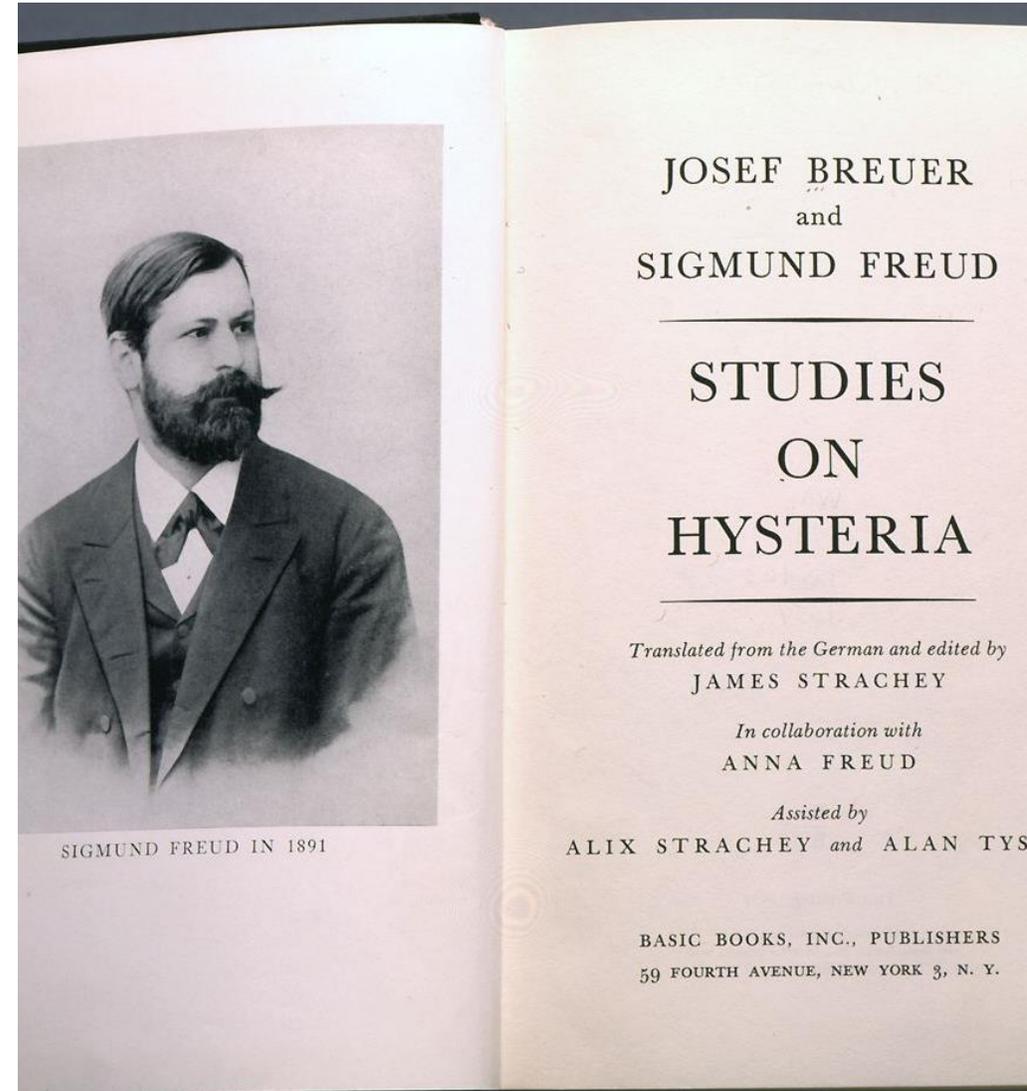
Une leçon clinique à la Salpêtrière
(A Clinical Lesson at the Salpêtrière) by Brouillet

But you must not forget that it is a characteristic of hysterical subjects to exaggerate their phenomena, and they are more prone to do so when they think they are observed and admired.



1890-Present

- Freud: “Conversion Disorder”
 - Reframes mechanism as psychological and the treatment to be with psychoanalysis
 - Form of neurosis from a traumatic experience (must have had a physical trauma) that leads to process of unconscious symptom-formation
- Hysteria removed from DSM-3 (1980); now functional neurological disorder DSM-5 (2013)



Why the term “functional”?

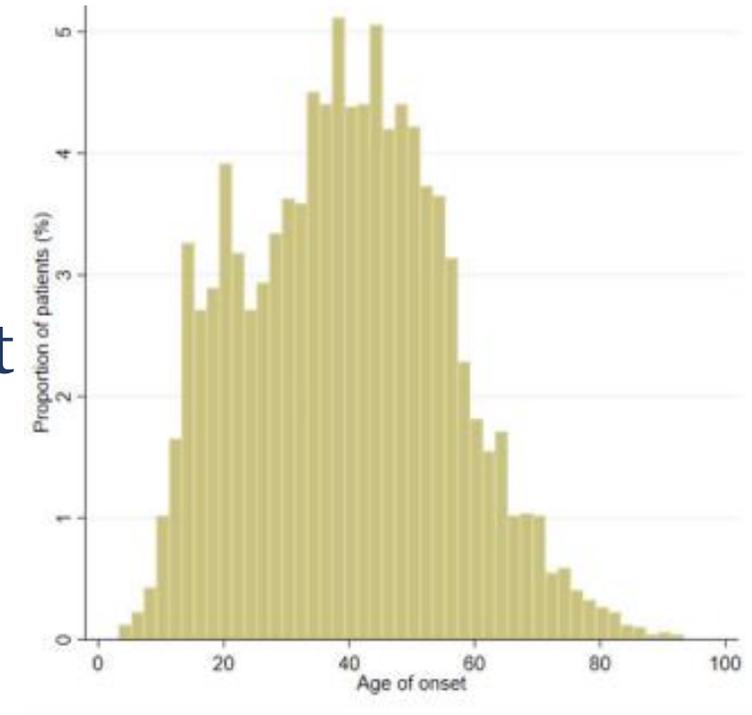
Shift in terminology from psychogenic to functional

The term functional is **not** a synonym for psychogenic, but instead is a way of describing a group of disorders in which there is a **functional** rather than a structural disturbance in nervous system functioning

Psychological factors no longer required for the diagnosis

Epidemiology

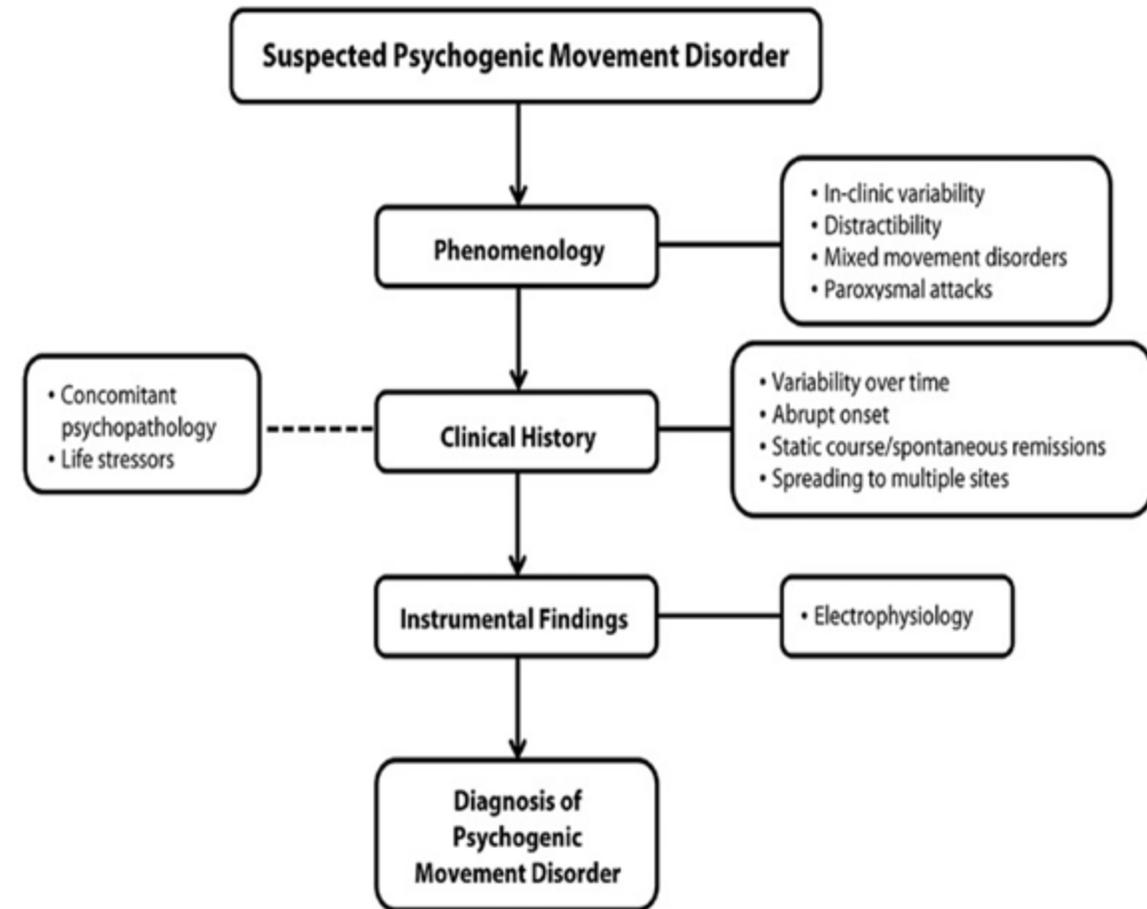
- Gender: Women (72.6-87%)
- Mean age: late 30s
- Phenotypes: Mixed FMD (23%), tremor (21.6%), weakness (18%)
- 10-15% with an organic component
- Rate of disability and occupational impairment that match their counterparts with defined disease processes
- Typically have a higher rate of psychological comorbidity



Diagnosing FMD

Model to predict if patient had FMD found these important variables:

- Female Sex
- Psychiatric history
- Negative family history
- More than one motor phenotype
- Pain
- Fatigue
- Abrupt onset
- Waxing and waning over long term
- Fluctuations during the day



Clinical Features of FMD

Inconsistency

- *Variability*: Observing the movement of interest in different situations and different timepoints (frequency, direction, entrainment)
- *Distractibility*: Observing the patient by having them perform various mental or motor tasks
- *Suggestibility*: Engaging in conversation with the patient about the symptoms, and watching how the movements change
- *Selectivity*: Watching to see if the movement occurs in certain situations, but disappears in others

Clinical Features of FMD

Incongruity

- *Entrainment*: Tremor aligns with the rhythm of voluntary movement in another limb
- *Hoover's sign*: Weakness of the hip extension returns to normal with contralateral hip flexion against resistance
- *Psychogenic toe sign*: Fixed posturing and resistance to manipulation are noted
- *Whack-a-mole sign*: When examiner suppresses a moving body part, movement in another body part occurs
- *Swivel chair sign*: Patient with functional gait disorder is able to propel a chair while seated normally

Functional Tremor



Tremor Other Hyperkinet Mov. 2014



Tremor Other Hyperkinet Mov. 2014



Tremor Other Hyperkinet Mov. 2014



Tremor Other Hyperkinet Mov. 2014



Tremor Other Hyperkinet Mov. 2014



Tremor Other Hyperkinet Mov. 2014

Functional gait

No single walking pattern is pathognomonic for a functional gait disorder

- Inconsistency and incongruity
- Positive clinic features:
 - Antalgic, Buckling, Waddling gait
 - Seeking support of walls that are far away
 - Exaggerated performance
 - No falling, or incongruent falling
 - Huffing and Puffing sign



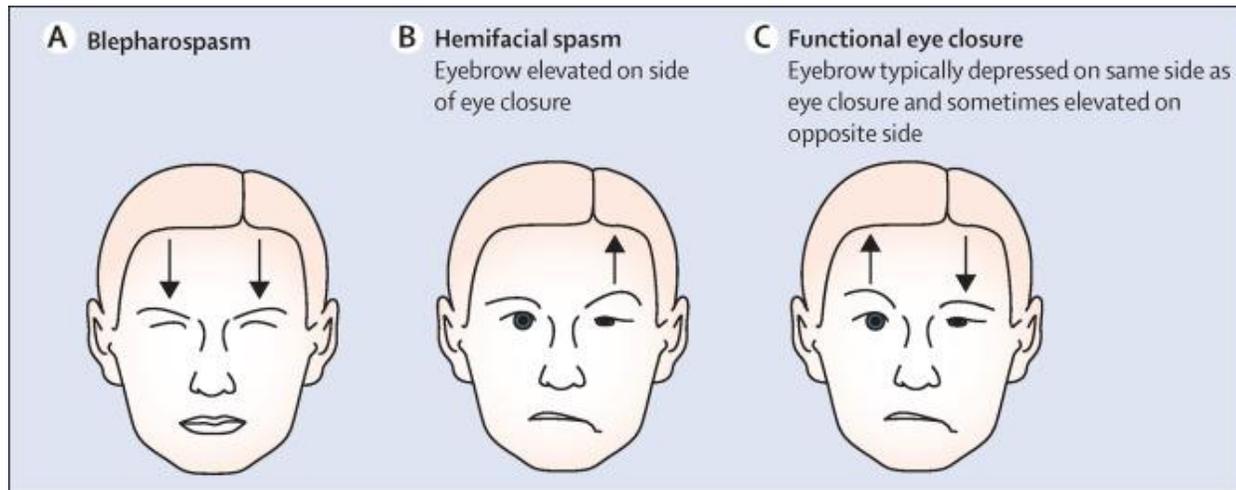






Functional dystonia

Idiopathic torsion dystonias have often been *mistaken* as a manifestation of a psychiatric disturbance



Positive Signs



Both tests demonstrated high specificity (means, 78% and 96%), but their sensitivity was low (means, 52% and 37%)

Movement Disorders Clin. Pract. 2024

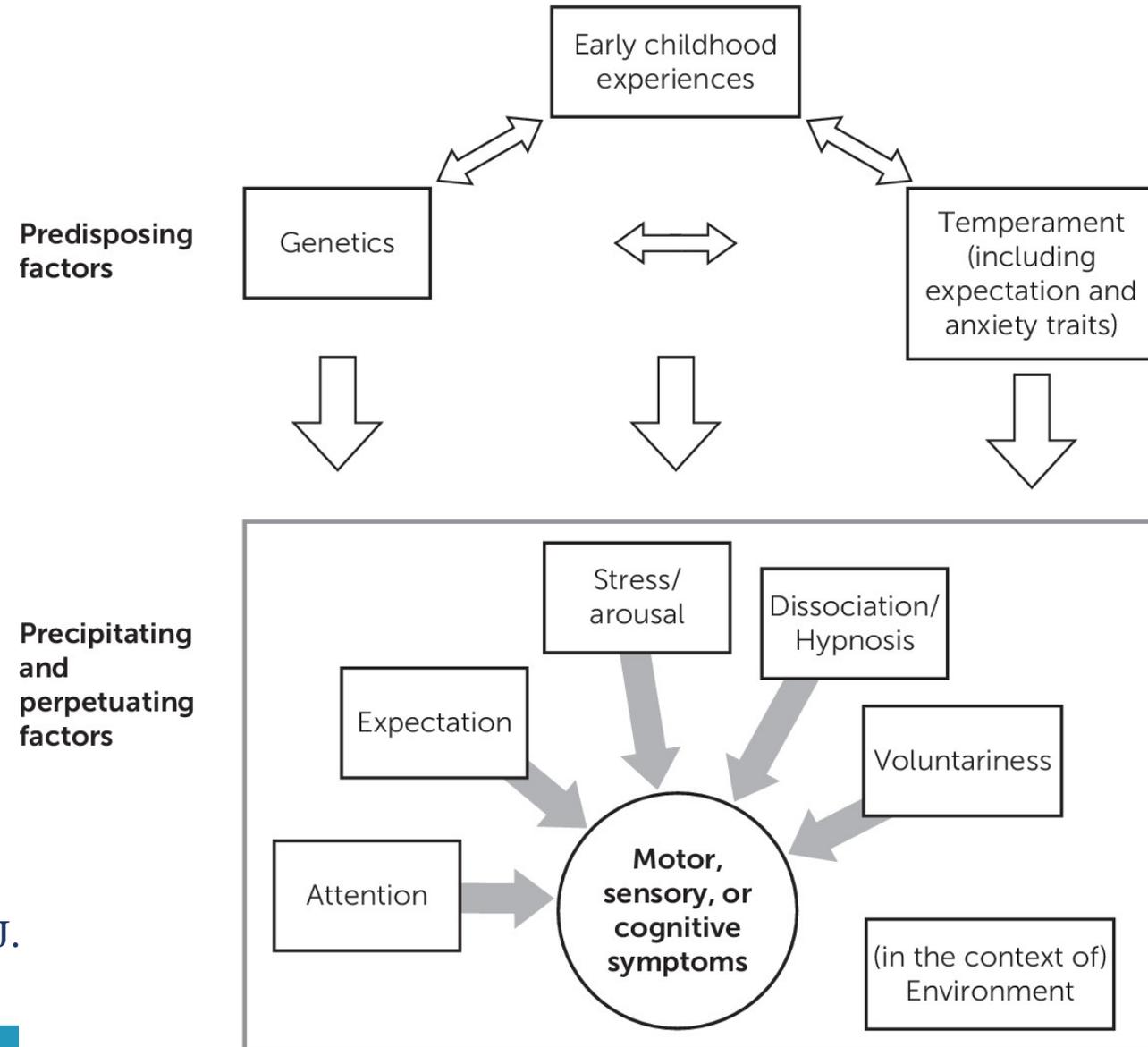
Pathophysiology

Psychological perspective

- Physiological distress converted into a physical symptom

Limitations:

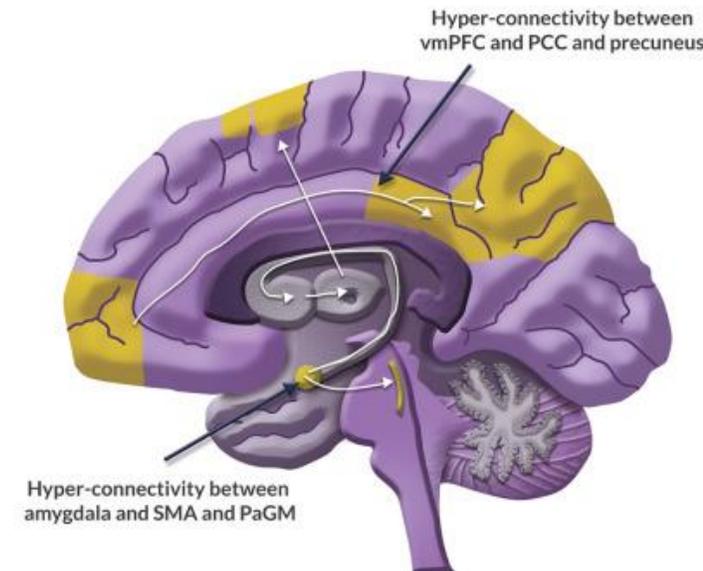
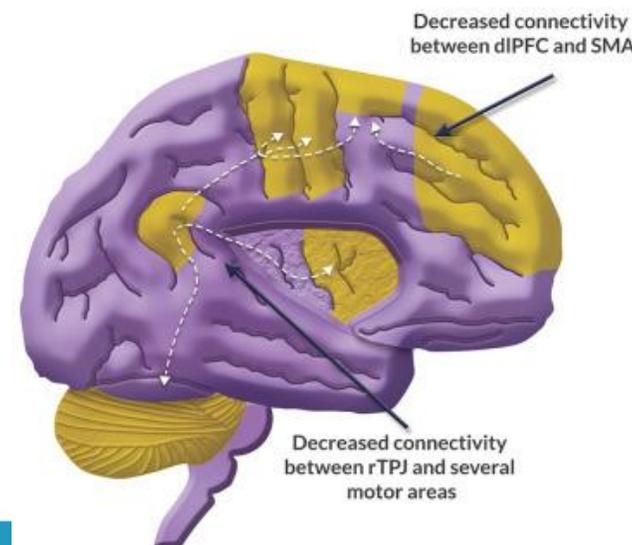
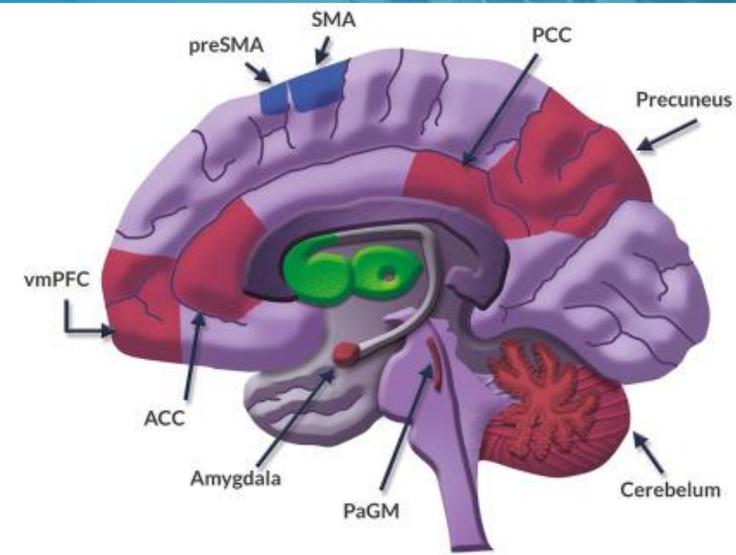
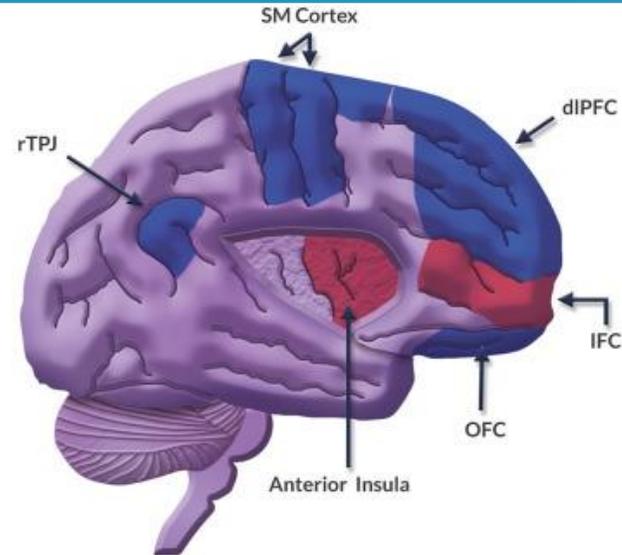
- *Why now?* Dilemma
- Absence of aversion events in many patients



Pathophysiology

Neurobiology perspective

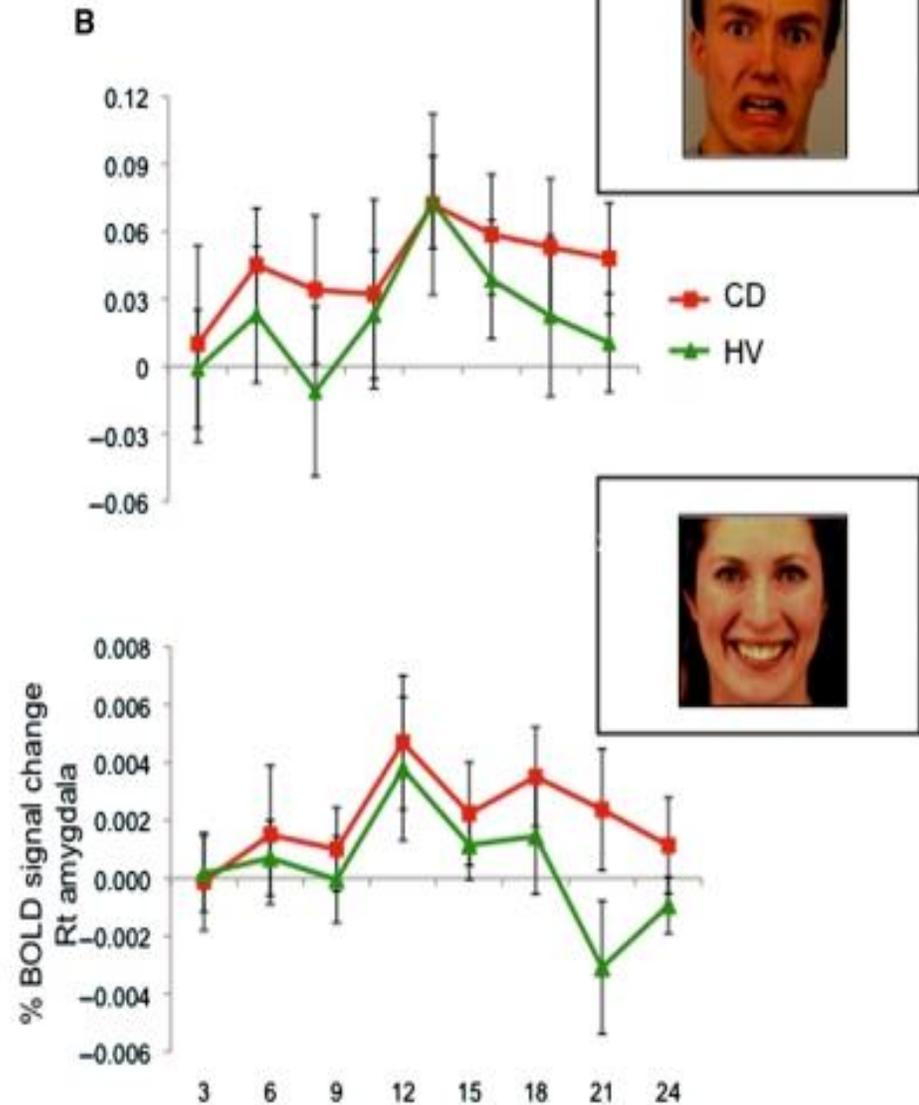
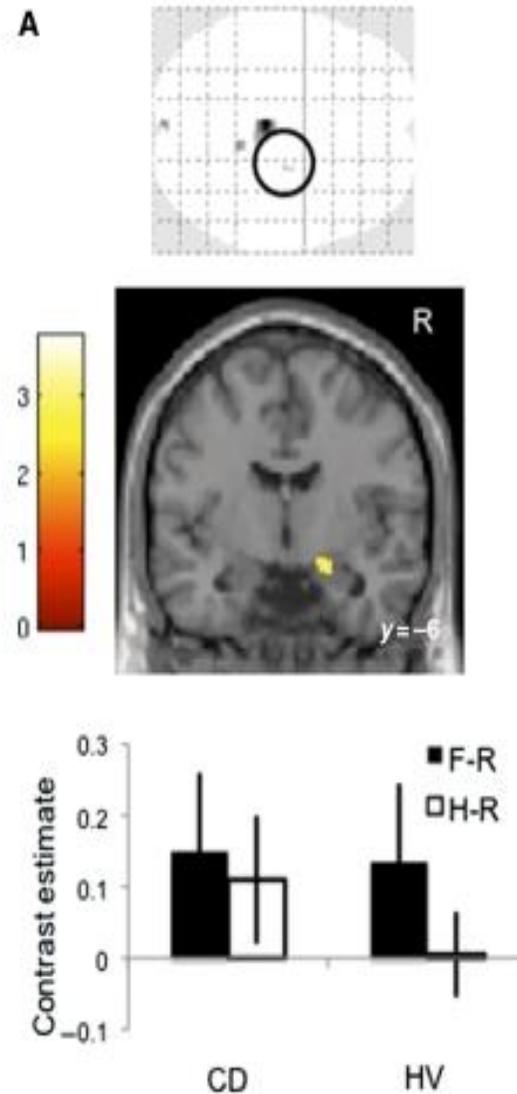
- Use of functional neuro-imaging to demonstrate dysfunction in FND at the level of:
 - Brain network activity
 - Connectivity
 - Specific anatomic areas of altered metabolic demand during tasks



Pathophysiology

Emotional Processing

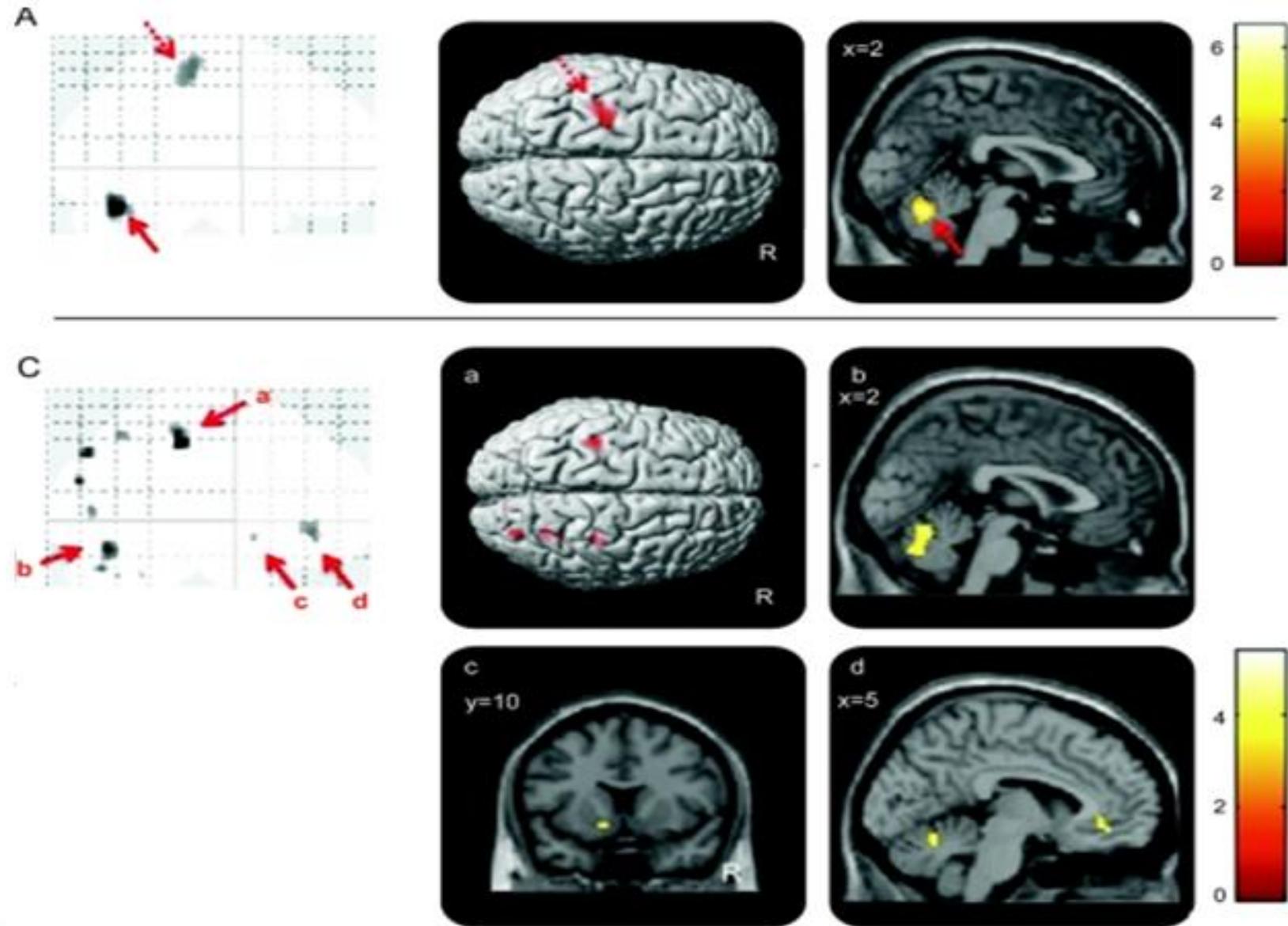
- Dysfunction in FMD
- Continue right amygdala activation with conversion disorder
- Failure to habituate/sensitizes



Pathophysiology

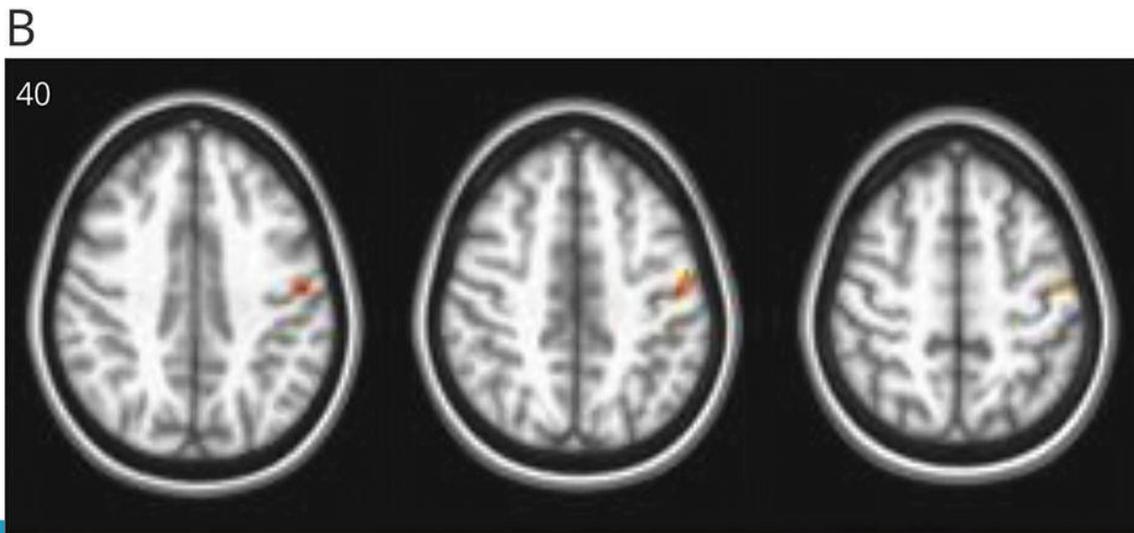
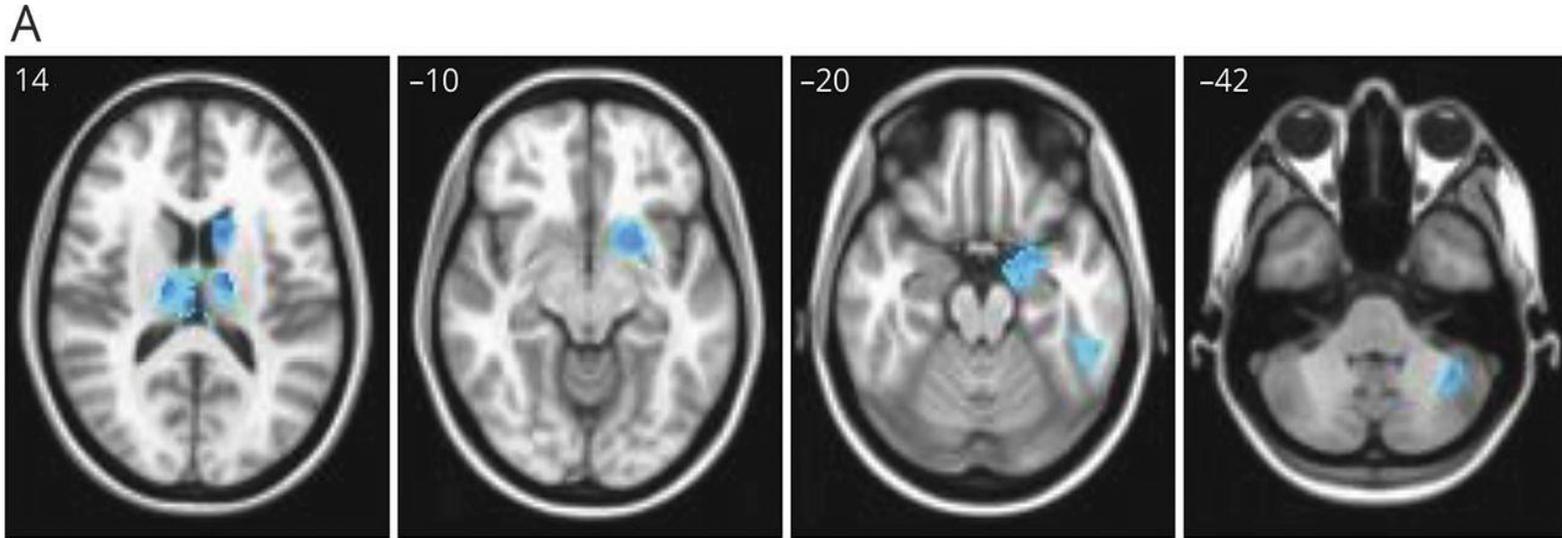
Sense of Agency

- Hypoactivity in the temporo-parietal junction in FMD which is a relevant region in generating the sense of self-agency of movements

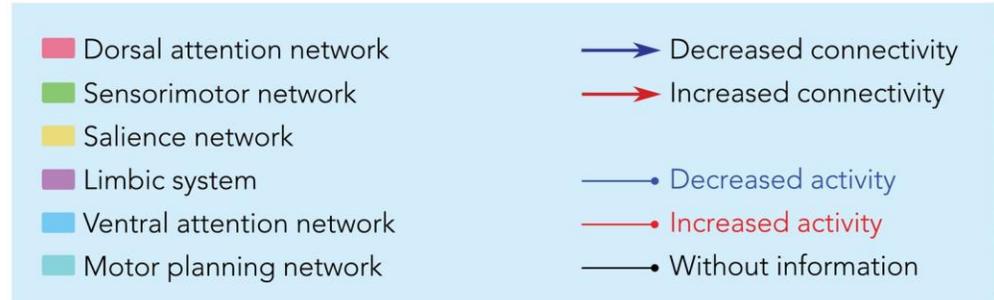
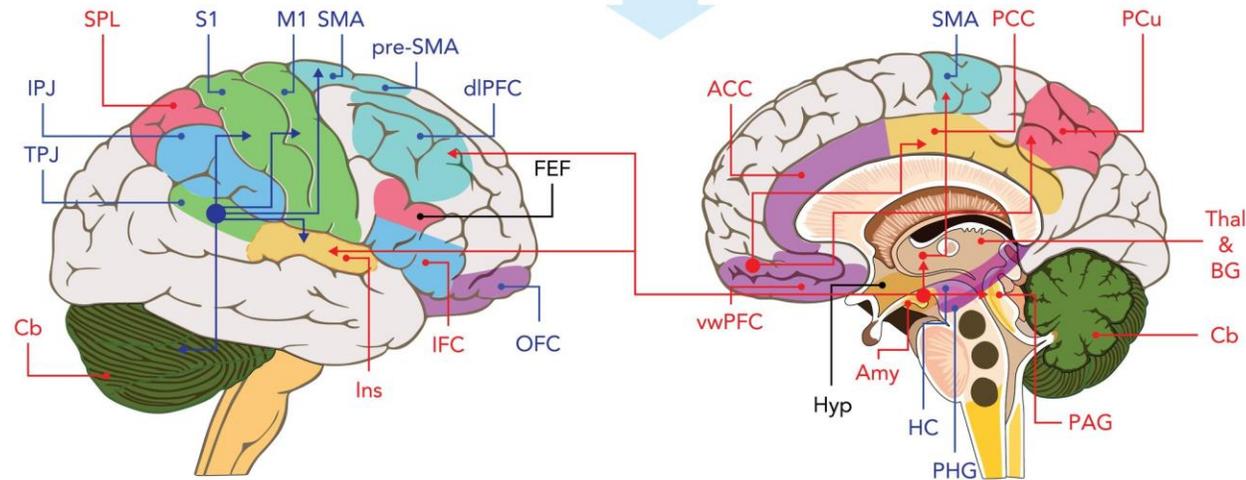
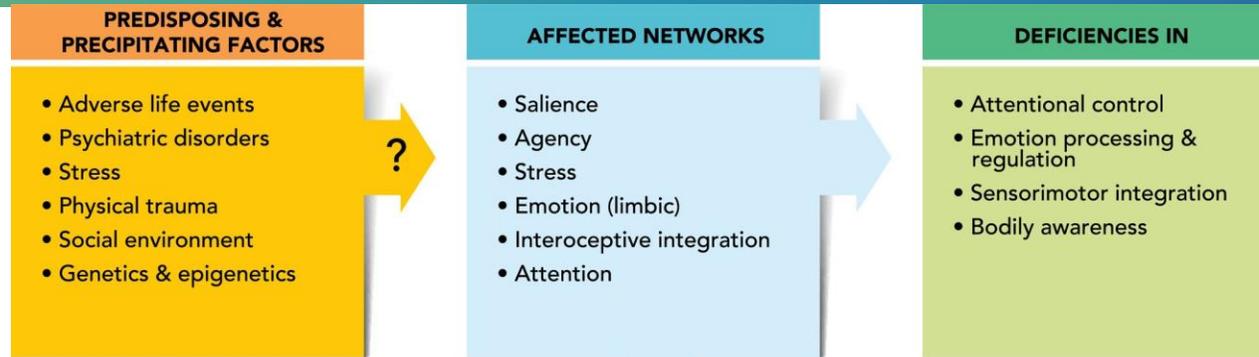


Pathophysiology

Structural Brain Changes



Pathophysiology



Management: Sharing the diagnosis

Establish diagnosis and engage the patient

- Provide a straightforward and clear diagnosis
 - “Based on my examination, you appear to have a functional movement disorder”
- Showing positive signs found on examination
- Being honest about expectations
- Discuss the potential for recovery

Misdiagnosis: 4%

- Only 0.4% later had a true neurological diagnosis at 18 months of follow up

Management: Rehabilitation

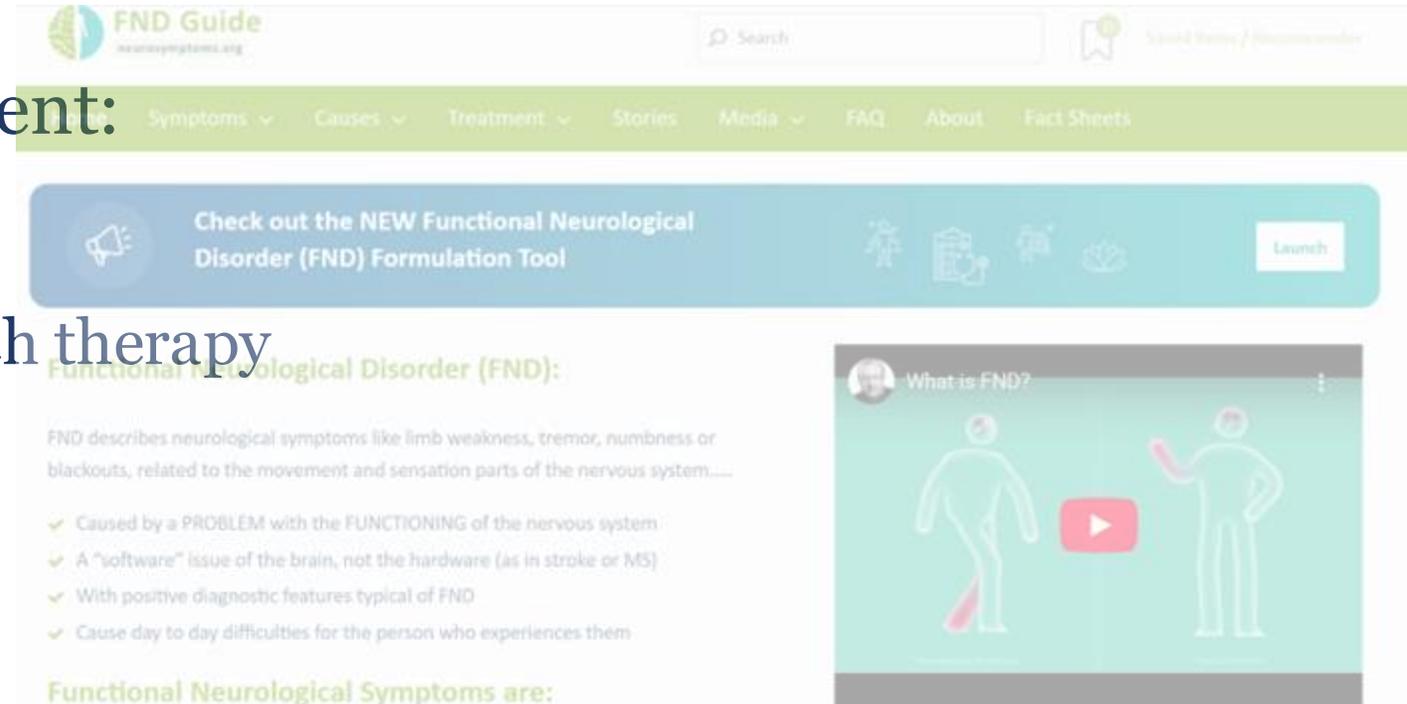
Formulate an integrative treatment plan

Multidisciplinary team/treatment:

- Neurology
- Psychiatry and Psychology
- Physical, occupational and speech therapy
- Active patient involvement

Websites:

- FND Hope
- Neurosymptoms.org



Management: Rehabilitation

- Physiotherapy
- Psychotherapeutic/psychosomatic interventions
 - *Cognitive behavioral therapy (CBT). Target maladaptive beliefs, stress response, emotional dysregulation. Trauma based therapies if appropriate*
- *Neuromodulation techniques*
 - Repetitive TMS, intermittent theta burst stimulation
- *Digital and technology-assisted therapies*
 - Virtual reality based interventions
- Body awareness and relaxation practices (eg, mindfulness, yoga)
 - Use expressive therapies (eg, music, dance, or art therapy) to support emotional processing. Biofeedback or hypnosis for symptom regulation
- Limited evidence of pharmacological treatments

Management: Follow Up

Long-Term Monitoring

- Sustained follow-up is essential to reinforce the diagnosis, monitor progress, and adjust treatment.
- Regular visits help identify barriers to recovery and prevent relapse.
Reviewing positive signs
- An open-door policy for re-evaluation fosters trust and accommodates changing patient perspectives.

Prognosis

Varies widely and is influenced by multiple factors, including access to appropriate treatment

- 83% with persistent disabling symptoms at 8 years
- Improvement with targeted intervention
 - Symptom resolution in 25-35% of patients at 2 years
- Predictors of poor prognosis:
 - Older age at diagnosis and/or at symptom onset
 - Strong belief in the permanence of symptoms
 - Delayed or missed diagnosis, longer symptom duration
 - Psychiatric comorbidities
 - Traumatic or psychological precipitating events
 - Prominent non-motor symptoms (pain, fatigue, cognitive dysfunction)
 - Negative perception of social support

Test: Is this a functional gait?

Video

Conclusion

FMD is a growing field of neurology

Diagnosis: Positive Signs and Symptoms

- Inconsistency of movements
- Incongruence with organic movement

Several neurobiology abnormalities have been identified in patients with FMDs

- FMD may be viewed as disorders of networks implicated in volition, emotion, and motor control

Increasing recognition of this disorder will help facilitate diagnosis and treatment



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Questions

