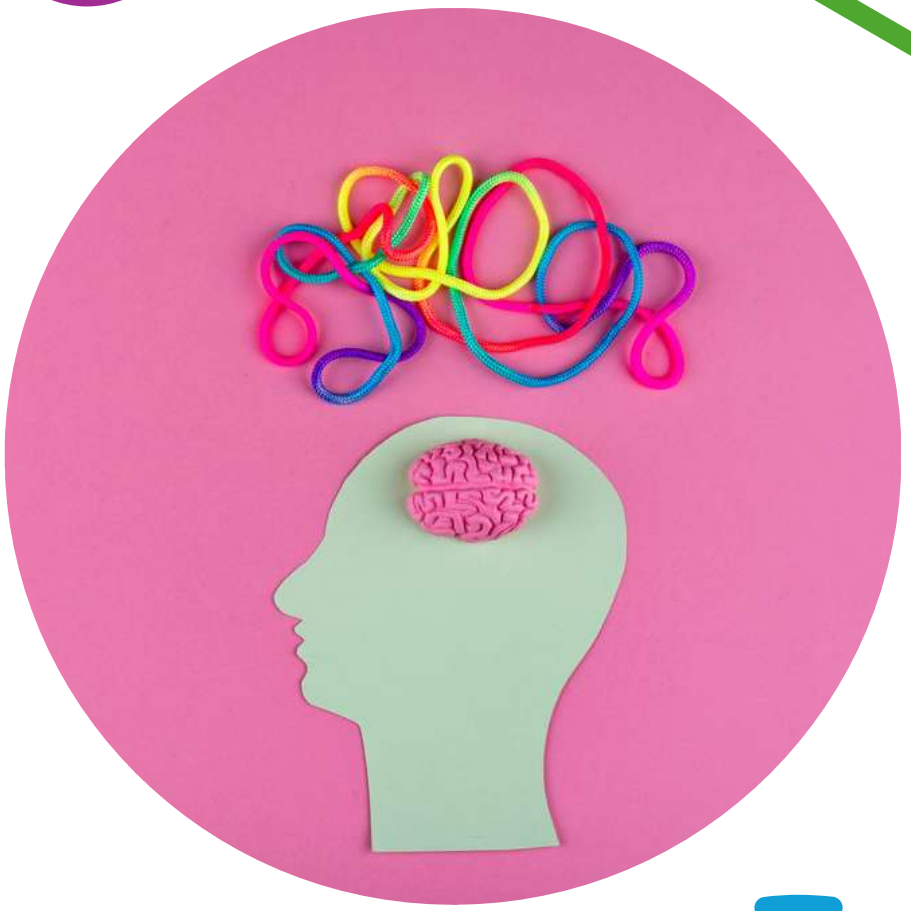


Integrating QEEG and Precision Medicine in Complex Mental Health Care

Jessica Eure, LPC, BCN, BCB, QEEG-DL
Melanie Dorion, MSN, AGNP-BC

2026 AAPB Scientific Meeting

Framing the Clinical Problem

- Complex & chronic cases
- Plateaued progress
- Complicated QEEG findings

“This should be working…”

What if CNS dysregulation is not the primary problem?

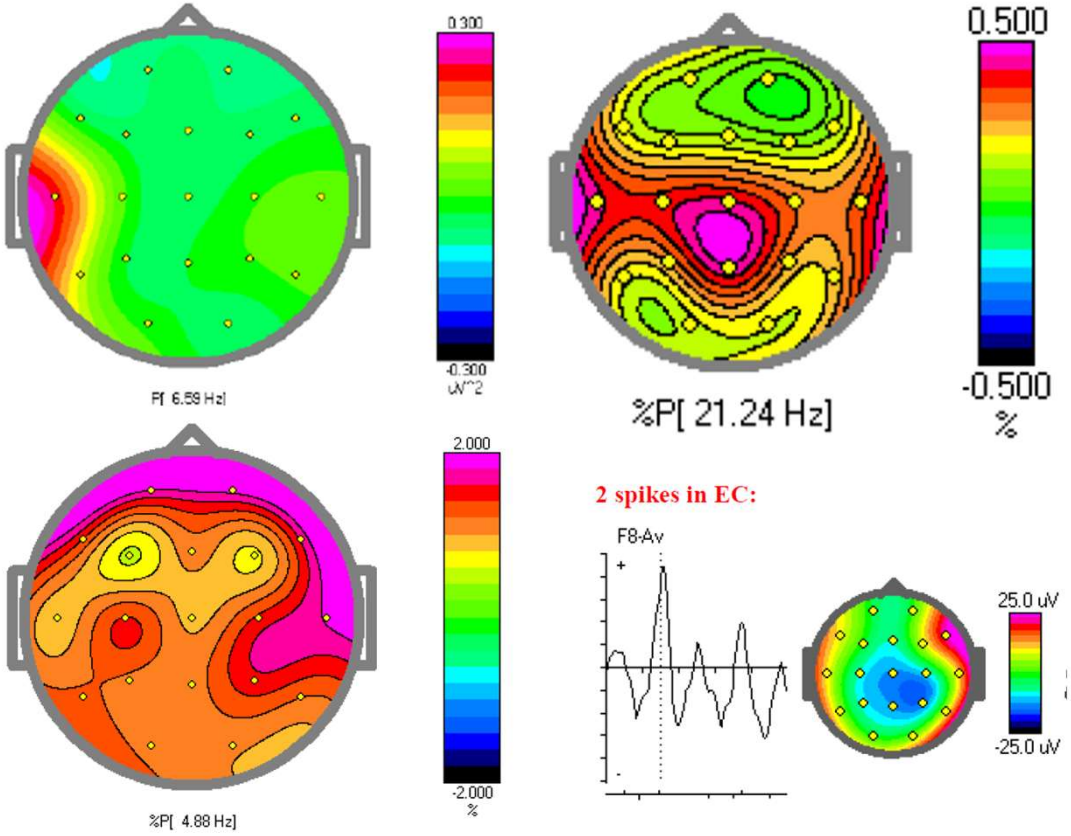
Today's Take-aways

- When to proceed
- When to retest
- When to refer
- How to collaborate

QEEG as Guide

EEG Phenotypes That May Warrant Medical Referral

- Diffuse slowing
- Focal Findings
- Spindling excessive beta
- Instability



Swatzyna, R. J., Morrow, L. M., Collins, D. M., Barr, E. A., Roark, A. J., & Turner, R. P. (2024). **Evidentiary significance of routine EEG in refractory cases: A paradigm shift in psychiatry.** *Clinical EEG and Neuroscience*, *56*(5), 446–456.

Diffuse Slowing

Reflects **global cortical dysregulation**.

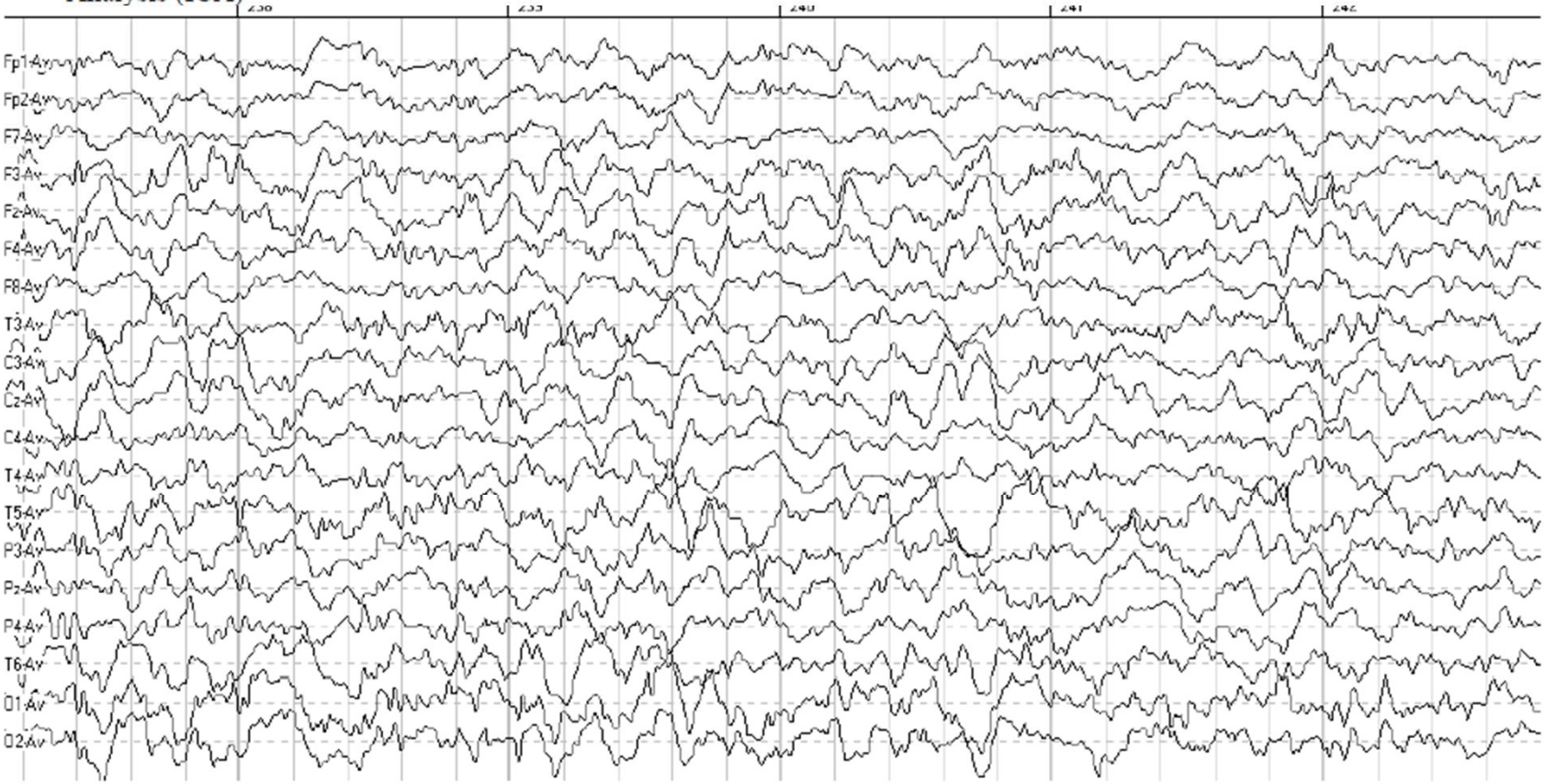
Some of the many causes include:

- Mitochondrial dysfunction
- Metabolic disturbance
- Anoxia
- Toxic exposure
- Infection
- Diffuse brain injury
- **Encephalopathy** can only be identified/diagnosed by a neurologist or a neurophysiologist.

Niedermeyer, E. (2003). **The clinical relevance of EEG interpretation.** *Clinical Electroencephalography*, *34*(3), 93–98.

Diffuse Slowing - Case Example ('SC') - Eyes Open Surface EEG

Scale: 70 mcV/cm, speed – 30mm/sec, time constant – 0.3 sec, low frequency filter – 50 Hz; a notch filter – 45-75 & 105-135 Hz. Vertical and horizontal eye movement artifact correction was done by means of Independent Component Analysis (ICA)



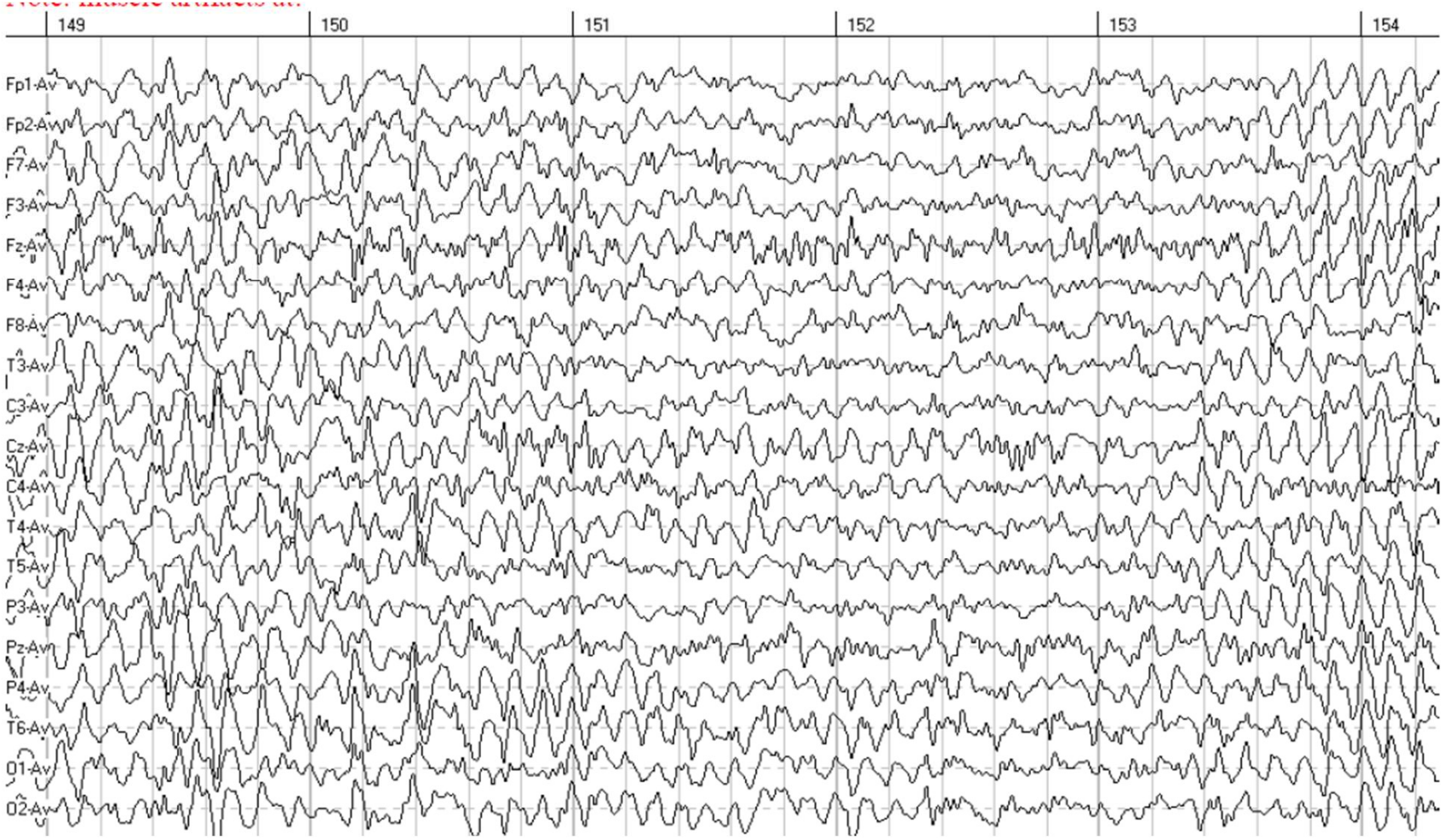
%P[4.88 Hz]

Diffuse Slowing - Case Example (‘SC’)

QEEG Findings

- Lower voltage background alpha (6–10 Hz)
- Excess slow-wave activity
- Elevated theta/beta ratio
- Temporal slow involvement
- Diffuse disturbance of cortical function

Diffuse Slowing - Case Example ('JJ') - Eyes Open Surface EEG 1



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The Brain Doesn't Have to Choose Just One!

✓ Diffuse slowing

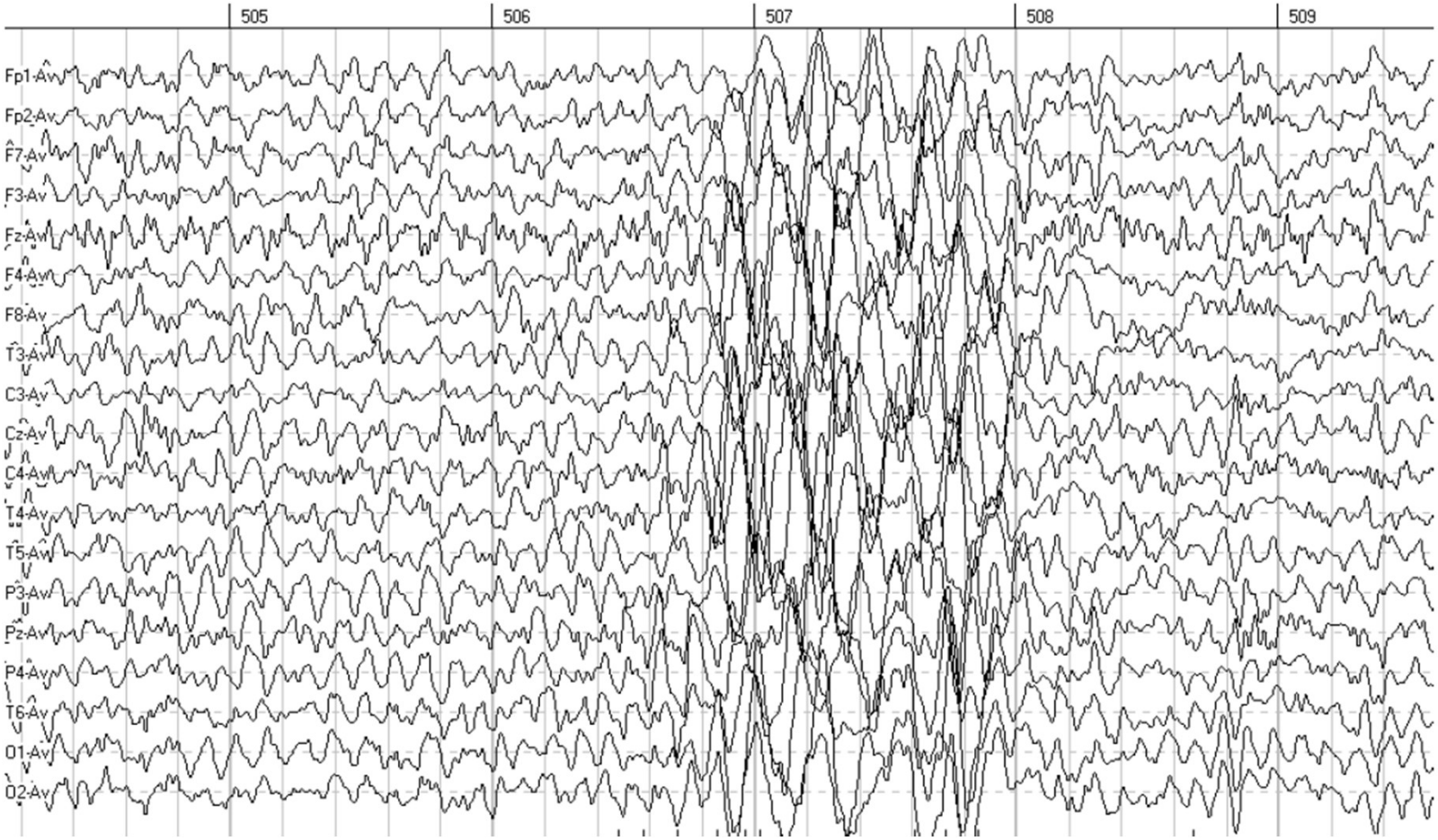
- Focal Findings

✓ Spindling excessive beta

✓ Instability

Johnstone, J., Gunkelman, J., & Lunt, J. (2005). **Clinical database development: Characterization of EEG phenotypes.** *Clinical EEG and Neuroscience*, *36*(2), 99–107.

Diffuse Slowing - Case Example (‘JJ’) - Eyes Open Surface EEG 2

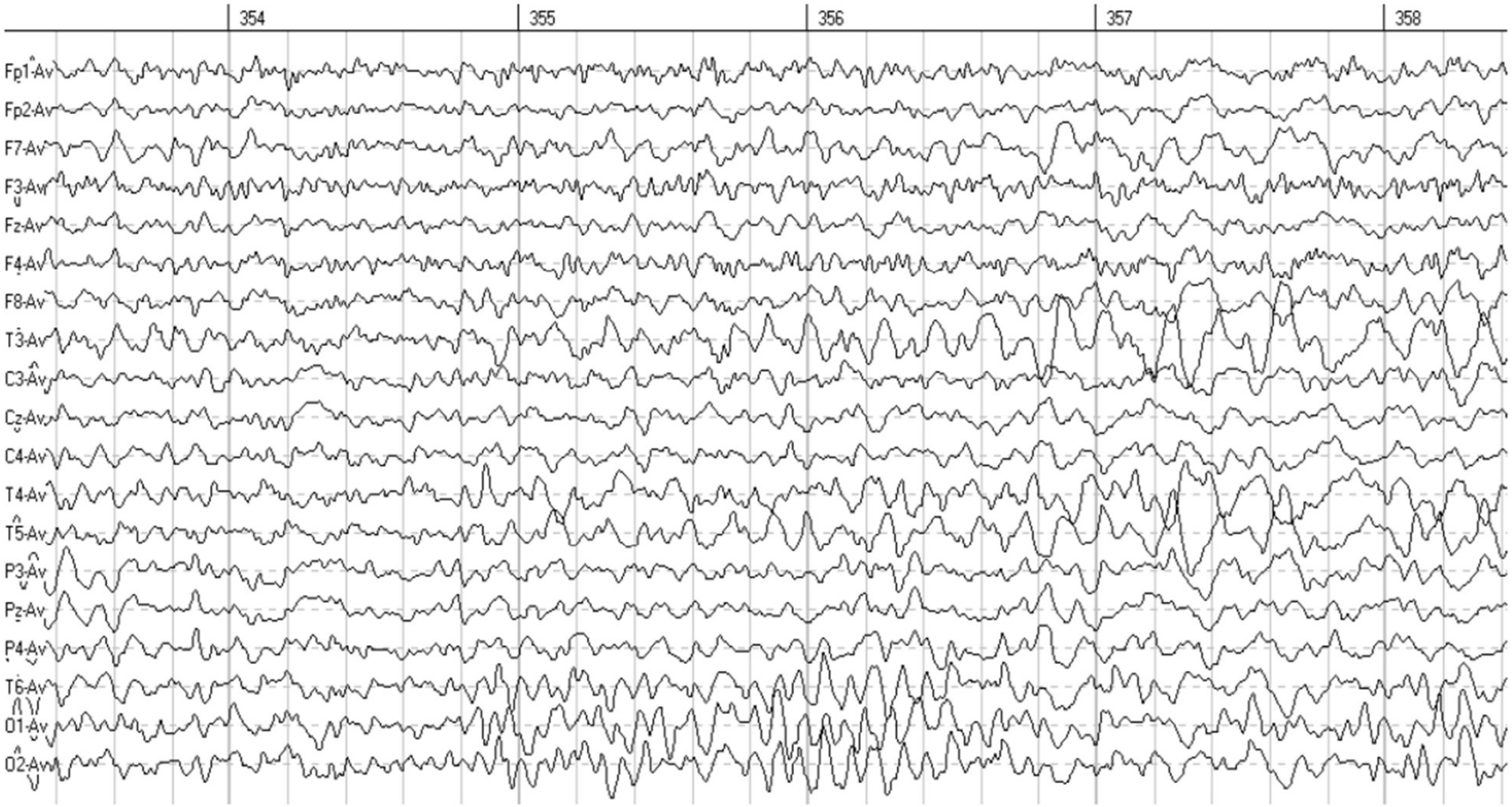


Focal Slowing

Focal slowing is particularly important because it is *not inconsistent with* **localized brain dysfunction**.

- Possible causes include:
  - Traumatic brain injury
  - Stroke
  - Tumor
  - Inflammation
  - White matter disturbance
  - Need for referral for further brain imaging to determine the nature of the finding

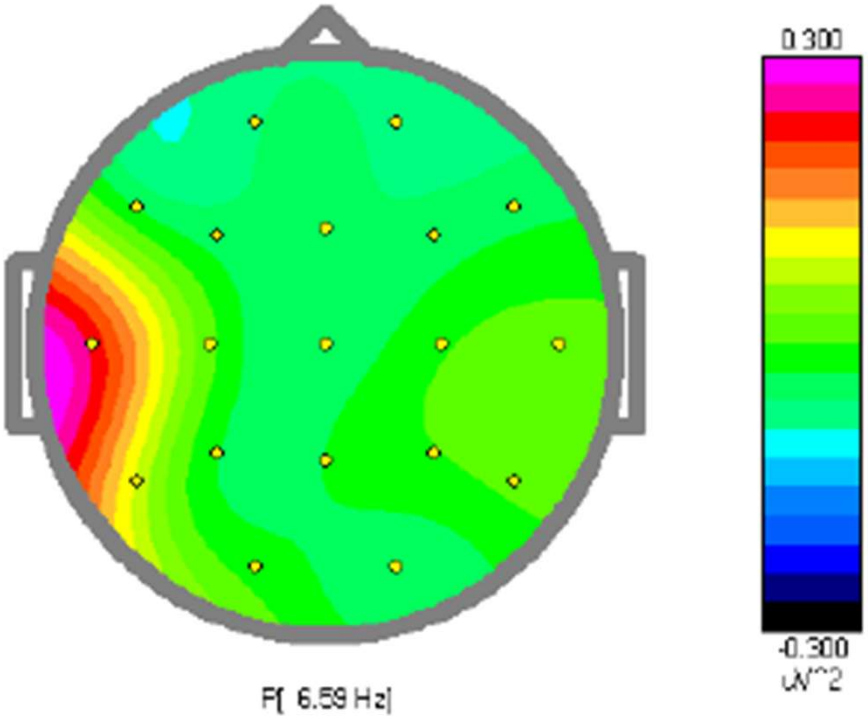
Focal Slowing - Case Example ‘LD’



Focal Slowing - Case Example ‘LD’

QEEG Findings

- Slow rhythmic theta activity in the left temporal lobe
- Elevated alpha peak frequency (11–12 Hz)
- Frontal alpha elevation and hypercoherence



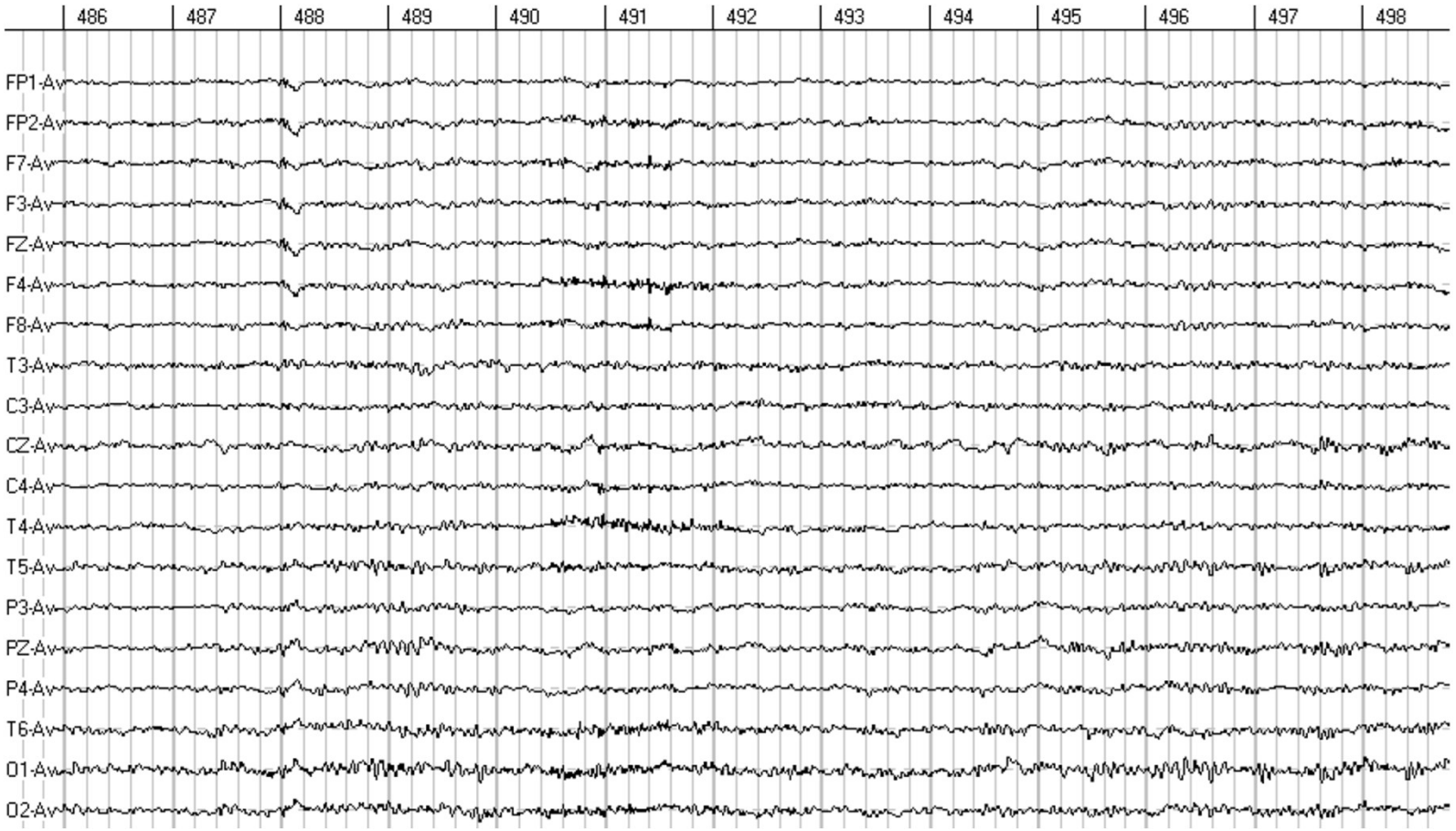
Excess Beta Spindling

Excess beta with spindle morphology may indicate **cortical hyperexcitability or irritability**.

- Psychological/physiological trauma activating neuroimmune system = neuroinflammation
- Toxic/metabolic states
- Seizure vulnerability
- Supersedes DSM Dx categories
- Medication Effects

Morrow, L. M., Barr, E. A., Grossi, E., Pillai, V. K., Kight, K. A., Wright, E. B., Turner, R. P., & Swatzyna, R. J. (2025). **Identifying neuroinflammation: The diagnostic potential of spindling excessive beta in the EEG.** *Clinical EEG and Neuroscience*.

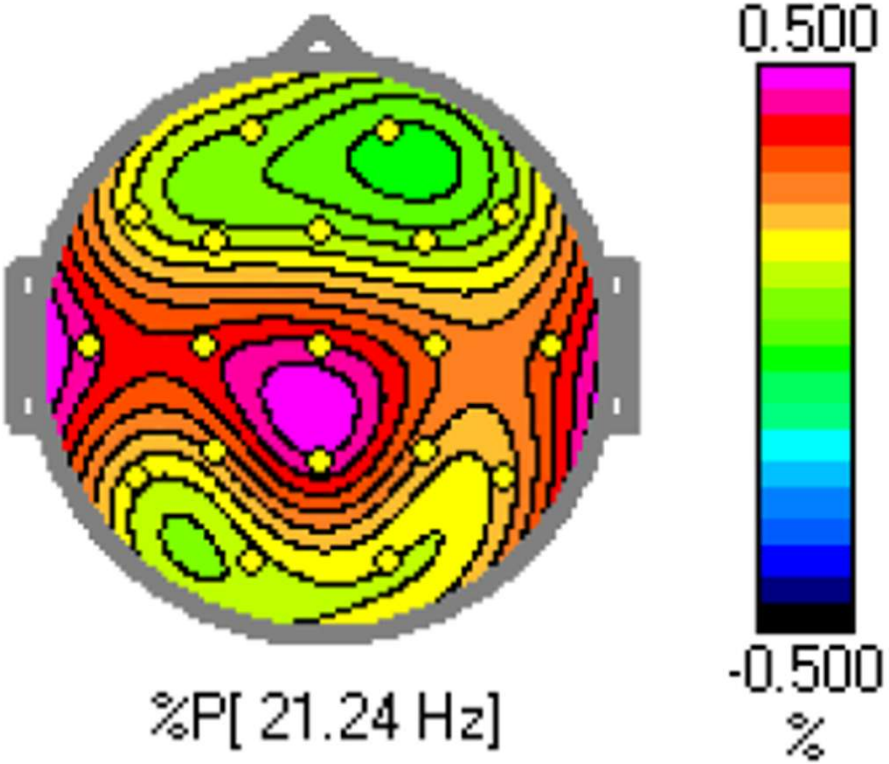
Excess Beta Spindling - Case Example ‘KS’



Excess Beta Spindling - Case Example ‘KS’

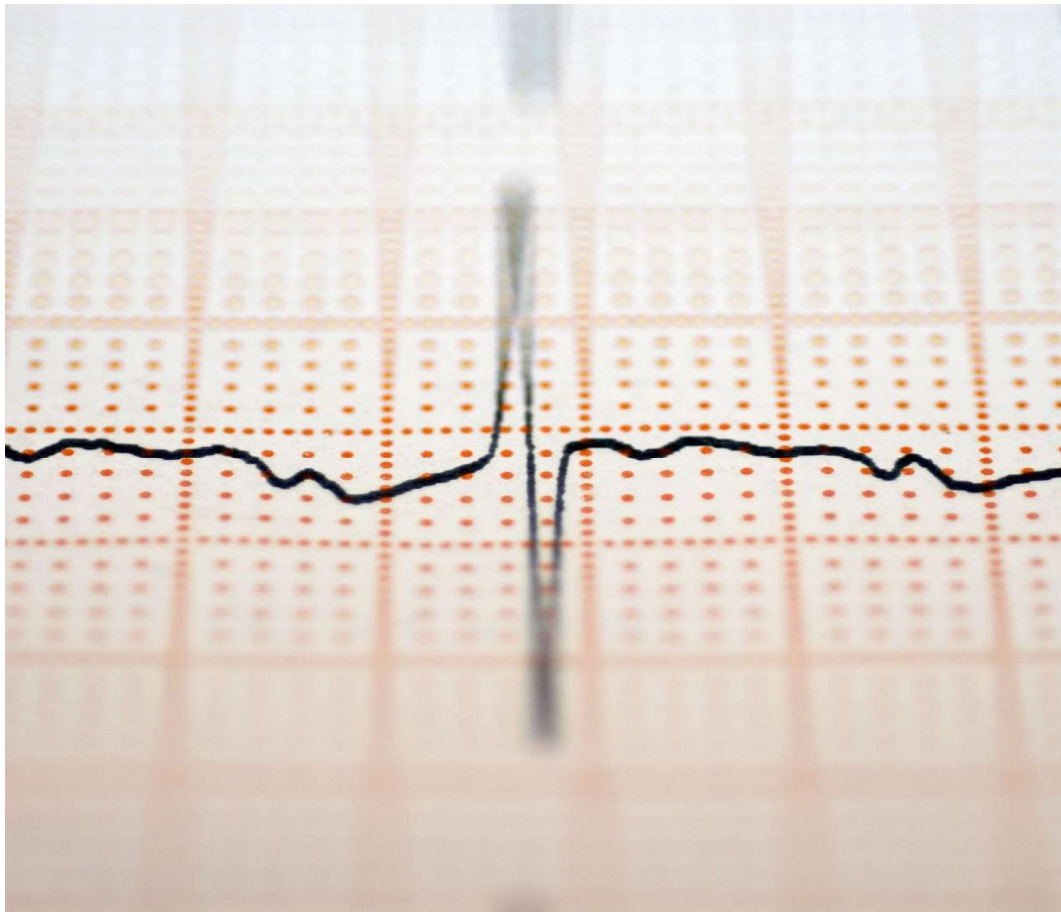
QEEG Findings

- Background alpha 8-13 Hz, alpha peak at 11.5 Hz
- Slower changes at vertex
- Generalized beta activity in the 18–22 Hz range
- Spindling Excessive Beta



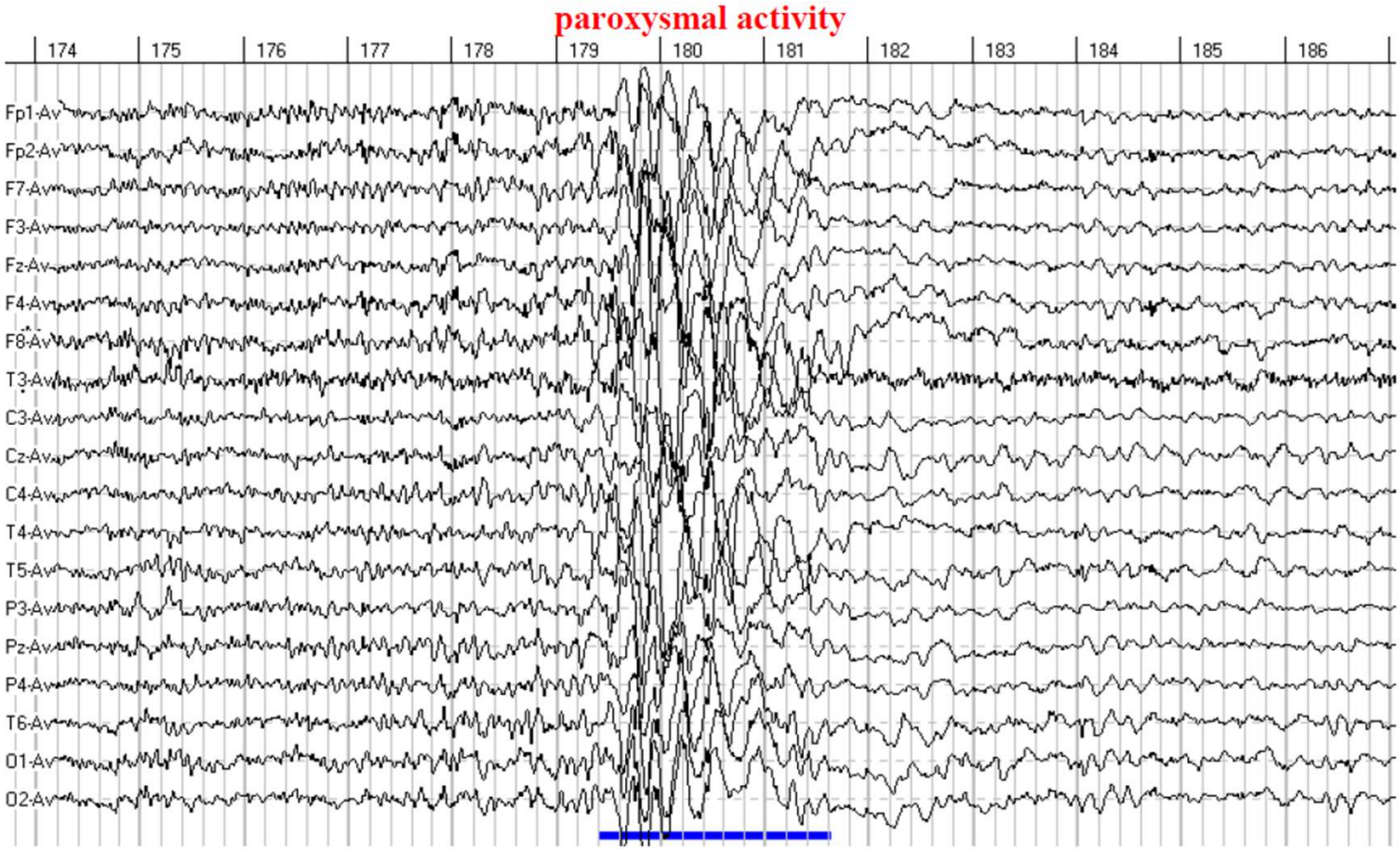
Instability in the EEG

- Spikes
- Sharp waves
- Spike-wave complexes
- Intermittent rhythmic discharges
- Isolated epileptiform discharges/paroxysms
- Can only be identified/diagnosed by a neurologist or a neurophysiologist.



Swatzyna, R. J., Arns, M., Tarnow, J. D., Turner, R. P., Barr, E., MacInerney, E. K., Hoffman, A. M., & Boutros, N. N. (2022). **Isolated epileptiform activity in children and adolescents: Prevalence, relevance, and implications for treatment.** *European Child & Adolescent Psychiatry*, *31*(4), 545–552

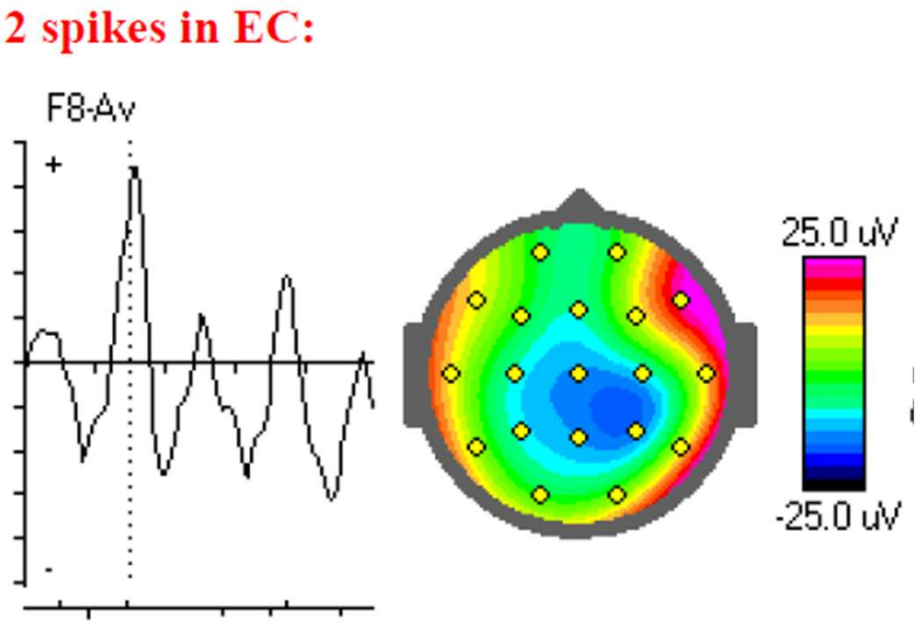
Paroxysmal Activity - Case Example ‘MG’



Spike Activity - Case Example ‘LE’

Spike Activity - Case Example ‘LE’

- **QEEG Findings**
  - Background alpha 8-13 Hz with peak at 10.5 Hz
  - Transient spikes with sharper and slower changes right temporally and frontally



Swatzyna, R. J., Tarnow, J. D., Proler, M. L., Roark, A. J., MacInerney, E. K., & Kozlowski, G. P. (2017). **Retrospective analysis of nonepileptic patients with isolated epileptiform discharges treated with anticonvulsants**. *Clinical EEG and Neuroscience*, *48*(5), 322–326.

- Build transition slide

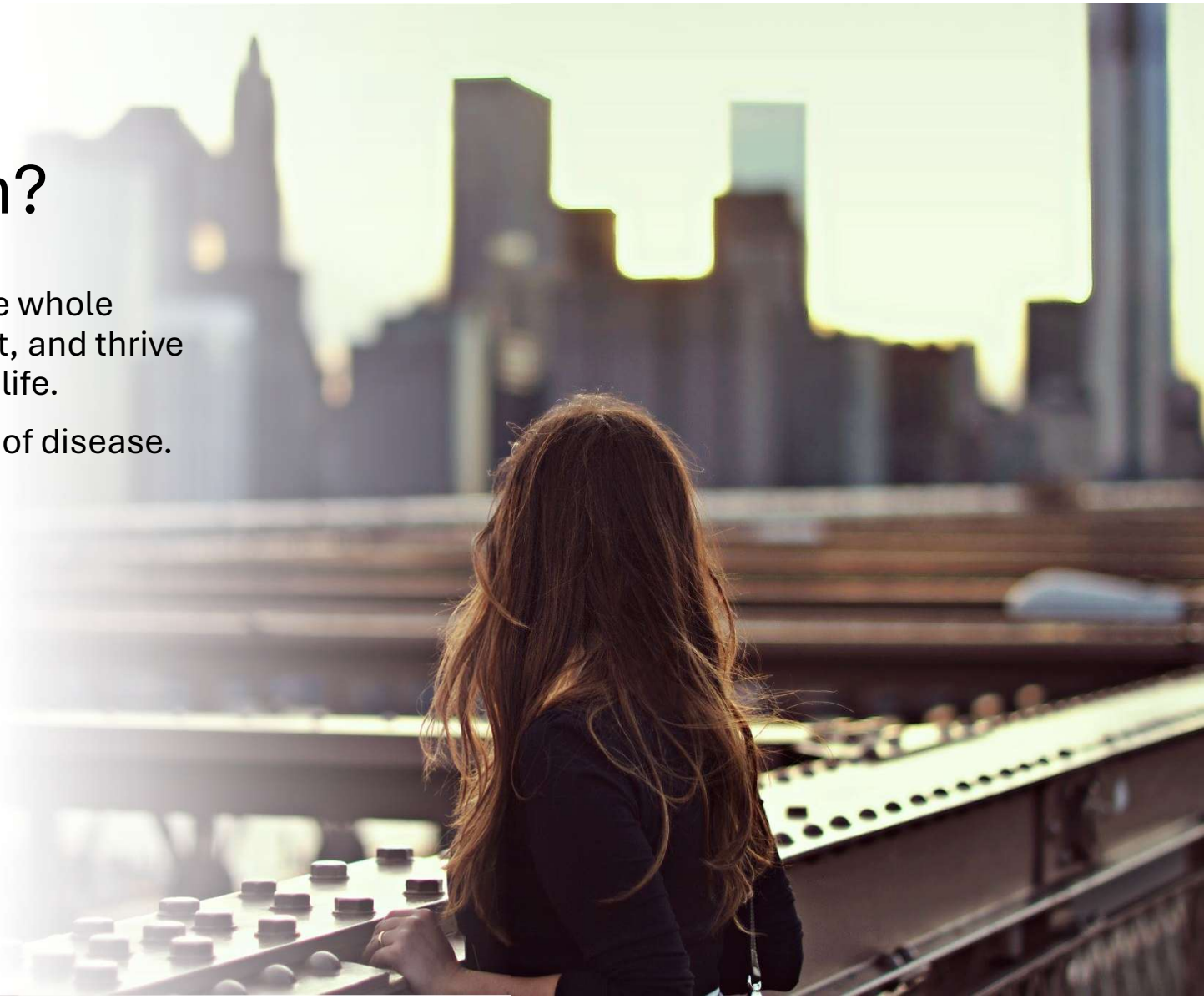
- Break

Precision Medicine

What is Health?

What is Health?

- Health is the ability of the whole person to function, adapt, and thrive across all dimensions of life.
- It is not just the absence of disease.
- Health is dynamic.



The 5 Facets™ of 21st Century Health

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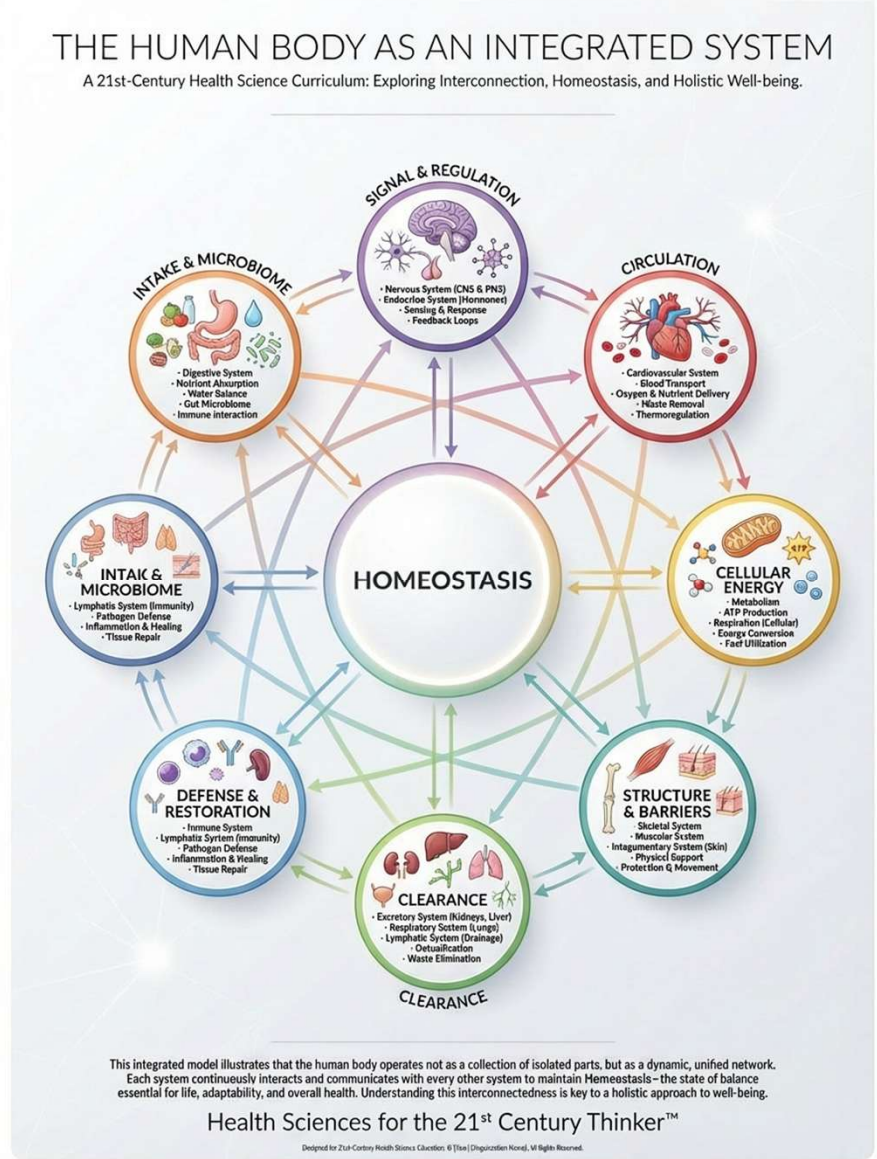
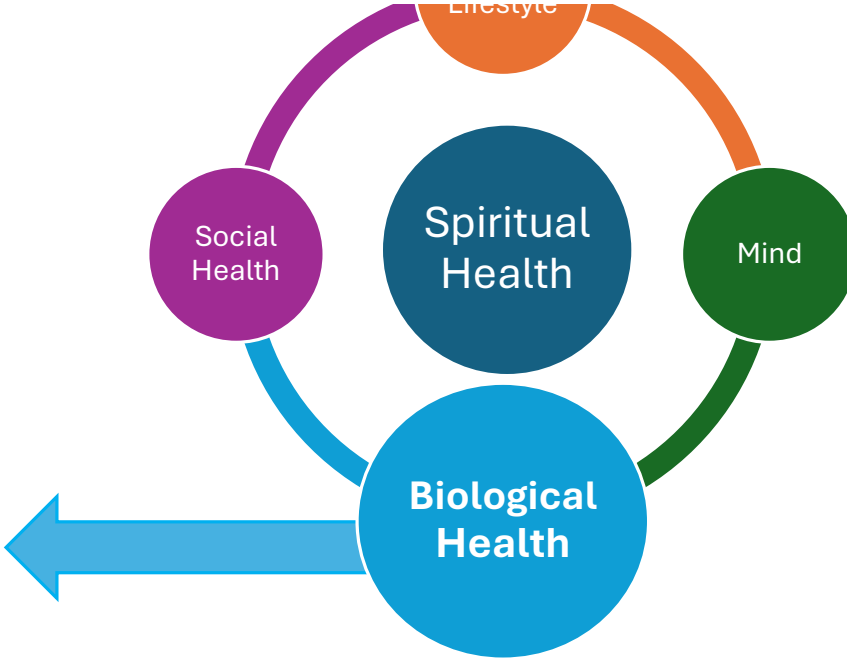
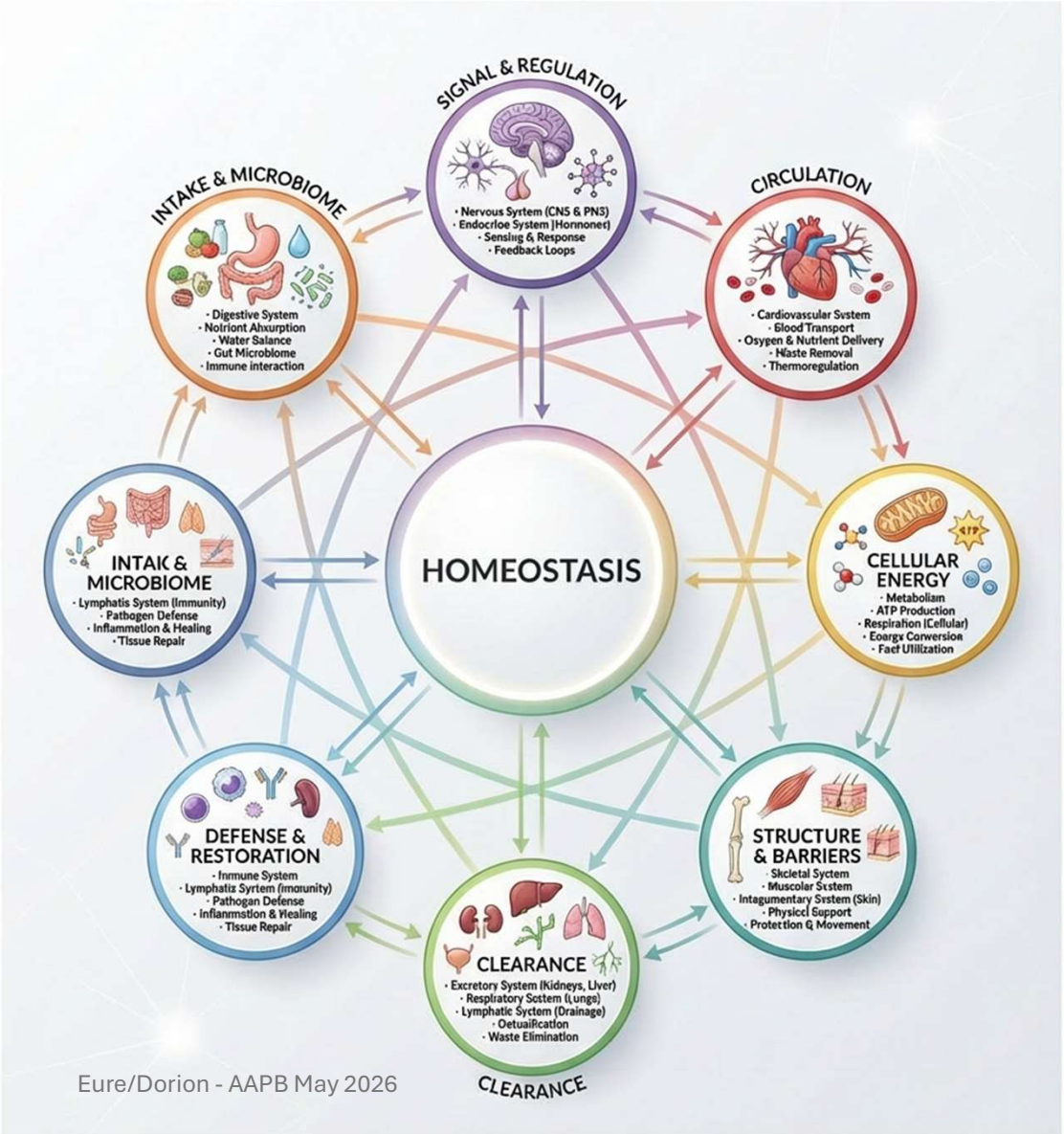
Mental & Emotional Health

The ability to regulate thoughts, emotions, and stress responses in ways that support clarity, resilience, and healthy behavior.


THE HUMAN BODY AS AN INTEGRATED SYSTEM
A 21st-Century Health Science Curriculum: Exploring Interconnection, Homeostasis, and Holistic Well-being.
SIGNAL & REGULATION
• Nervous System (CNS & PNS)
• Endocrine System (Hormones)
• Sensing & Response
• Feedback Loops
CIRCULATION
• Cardiovascular System
• Blood Transport
• Oxygen & Nutrient Delivery
• Waste Removal
• Thermoregulation
INTAKE & MICROBIOME
• Digestive System
• Nutrient Absorption
• Water Balance
• Gut Microbiome
• Immune Interaction
HOMEOSTASIS
INTAKE & MICROBIOME
• Lymphatic System (Immunity)
• Pathogen Defense
• Inflammation & Healing
• Tissue Repair
CELLULAR ENERGY
• Metabolism
• ATP Production
• Respiration (Cellular)
• Energy Conversion
• Fuel Utilization
DEFENSE & RESTORATION
• Immune System
• Lymphatic System (Immunity)
• Pathogen Defense
• Inflammation & Healing
• Tissue Repair
STRUCTURE & BARRIERS
• Skeletal System
• Muscular System
• Integumentary System (Skin)
• Physical Support
• Protection & Movement
CLEARANCE
• Excretory System (Kidneys, Liver)
• Respiratory System (Lungs)
• Lymphatic System (Drainage)
• Detoxification
• Waste Elimination
CLEARANCE
This integrated model illustrates that the human body operates not as a collection of isolated parts, but as a dynamic, unified network. Each system continuously interacts and communicates with every other system to maintain Homeostasis – the state of balance essential for life, adaptability, and overall health. Understanding this interconnectedness is key to a holistic approach to well-being.
Health Sciences for the 21st Century Thinker™


Lifestyle
Social Health
Spiritual Health
Mind
Biological Health

Health is an interconnected system



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Biological Health – 7 Domains

1. Cellular Energy Systems
2. Signal & Regulation Network
3. Circulation & Distribution Network
4. Structural & Barrier Systems
5. Defense & Restoration Systems
6. Transformation & Clearance Systems
7. Intake & Microbiome

19th and 20th Century Thinking

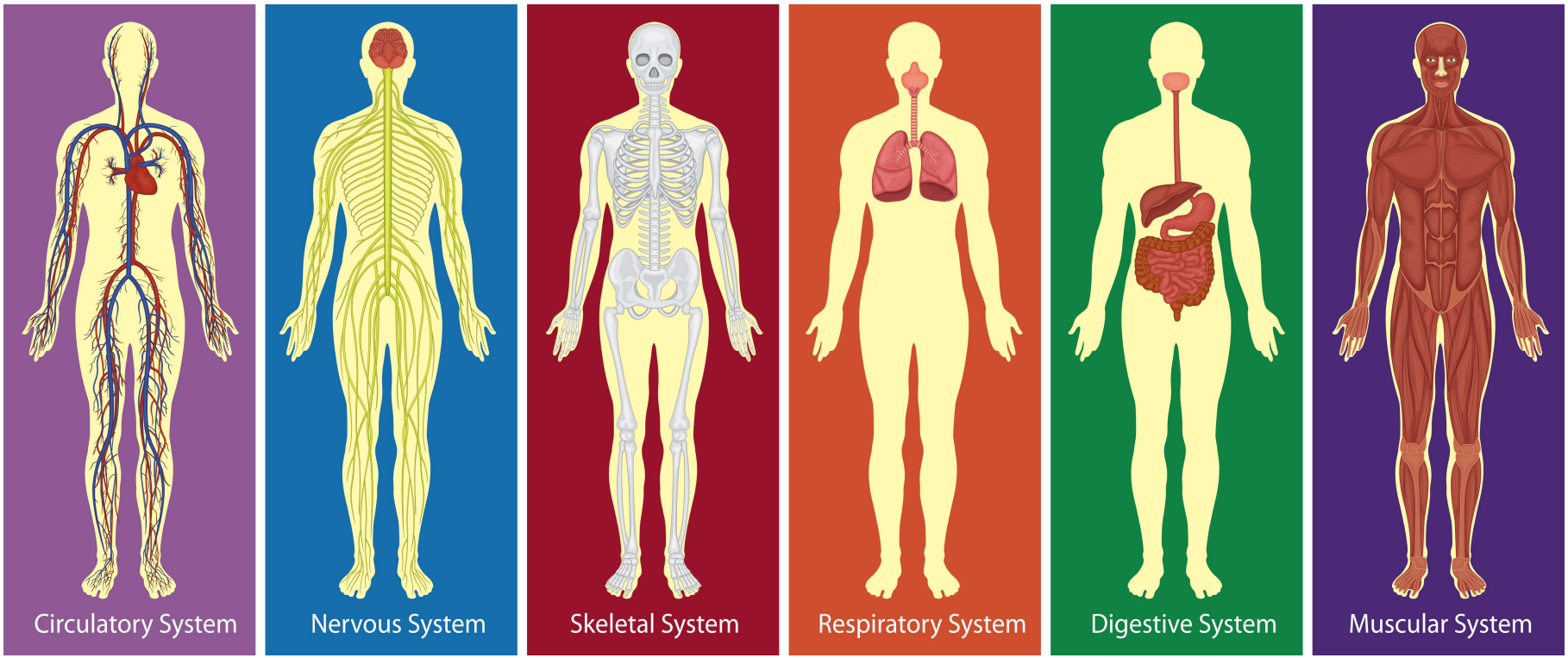
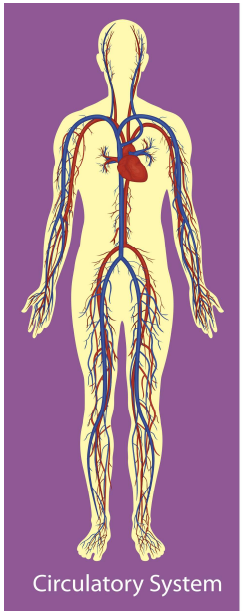
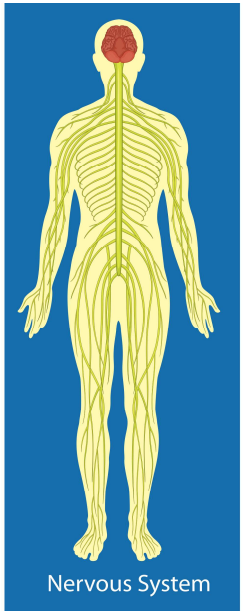
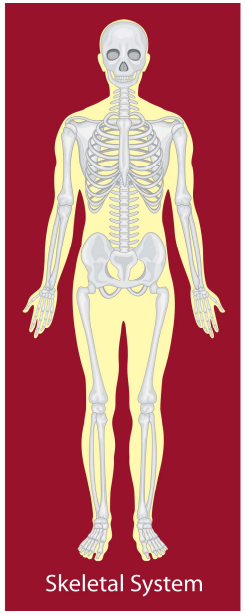


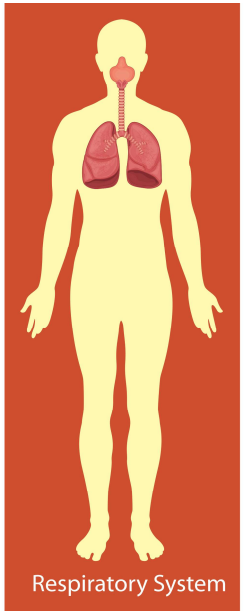
Image Credit: https://www.livescience.com/37009-human-body.html

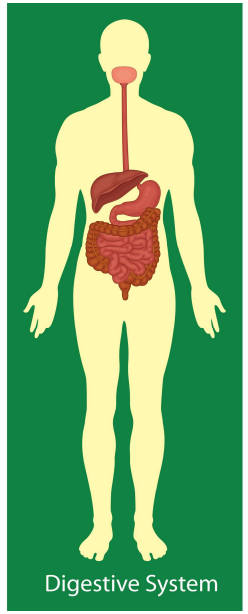
19th and 20th Century Thinking leads to…

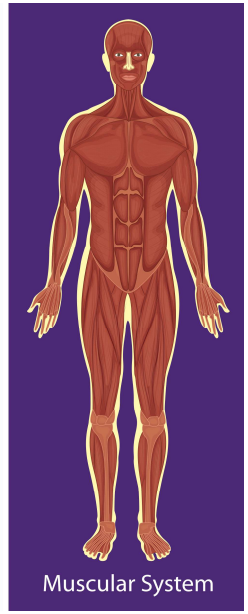












Cardiologist Vascular specialist	Neurologist	Orthopedist Chiropractor	Pulmonologist	Gastroenterologist	Orthopedist Physiatrist Rheumatologist

5 Facets & Neurofeedback

1. **Spiritual health**
2. **Social Health**
3. **Diet and Lifestyle**
4. **Mental & Emotional Health**
5. **Biological Health**

The Brain is Mitochondria-Dense

- The brain is only 2% of body mass
- It demands 20% of resting oxygen for ATP production

What Disrupts Mitochondria

- Toxins!
  - Mold/mycotoxins
  - Pesticides
  - Heavy metals
- Chronic infections
- Autoimmune activation
- Metabolic dysfunction
- Medication effects
- Nutrient imbalances (sub optimal, deficiencies)

How Toxins Cause Damage

Facts About Toxins

- There's a lot!
- CHARGE Study
  - “Childhood Autism Risks from Genetics and the Environment”
  - Neurological susceptibility to environmental toxins

https://pmc.ncbi.nlm.nih.gov/articles/PMC1513329/

How Toxins Cause Damage

Metals

Specific mechanisms of pathogenesis for metals not fully understood

- Oxidative stress
- Excitotoxicity
- Mitochondrial dysfunction

Pesticides

Neurotransmission interference

Leads to:

- Oxidative stress
- Neuroinflammation
- Mitochondrial dysfunction

Mycotoxins

They cross the BBB!

Microglial activation

- Oxidative stress
- Glutamate excitotoxicity
- Mitochondrial dysfunction

https://pubmed.ncbi.nlm.nih.gov/28777965/
https://pubmed.ncbi.nlm.nih.gov/37018859/

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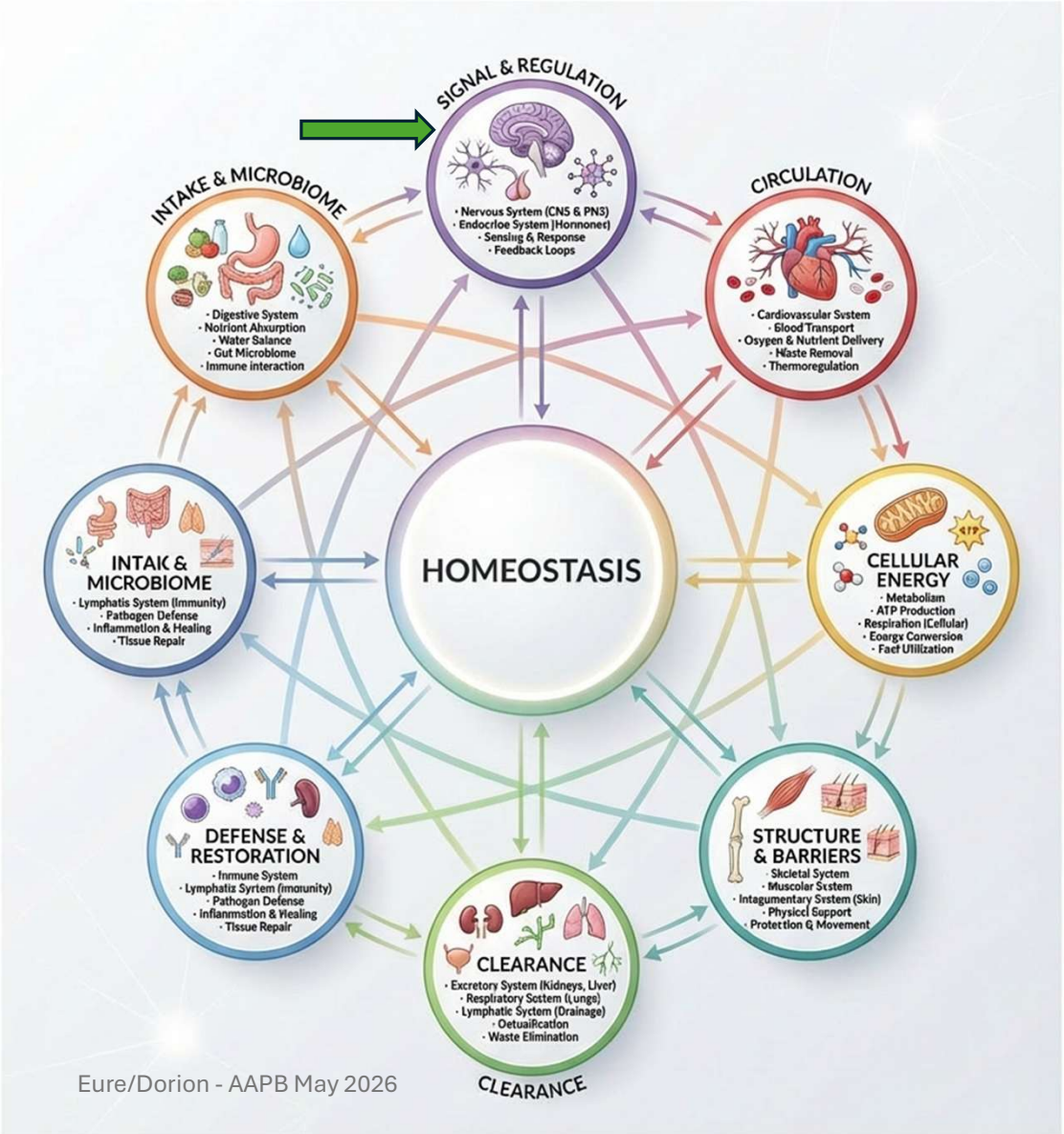
https://pubmed.ncbi.nlm.nih.gov/37018859/

Neuroinflammation & QEEG

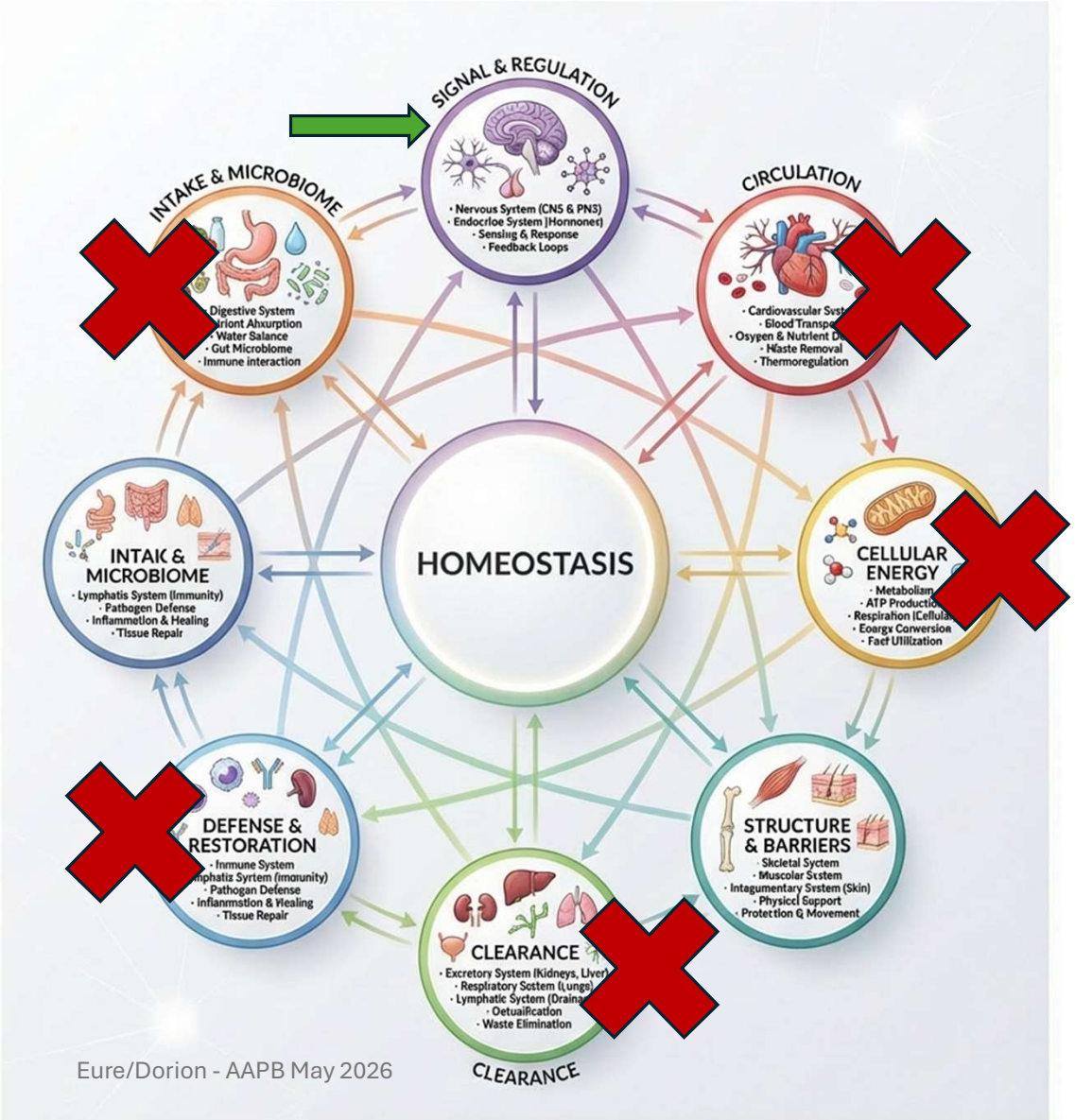
Toxins, chronic infections, gut dysbiosis…

→ Immune activation
→ Mitochondrial dysfunction
→ Neuroinflammation
→ Altered EEG patterns

Neurofeedback Area of Focus



Why Neurofeedback May Plateau



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Break

Infections & Our Nervous System

- Lyme & tick-borne infections

Neurological Symptoms

All tick-borne infections may present with: Fatigue, headache, chills, fever, malaise

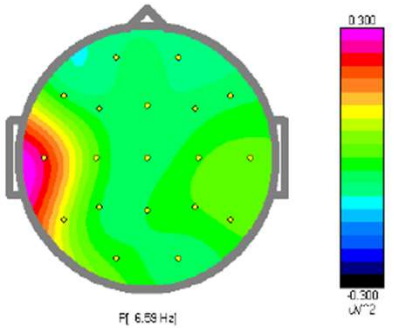
Neuro Lyme
• Cognitive dysfunction • Neuropathy • Cranial nerve dysfunction • Mood & psychiatric changes • Sleep disturbances • Autonomic dysfunction • Movement and motor abnormalities • Sensory hypersensitivity

Who may this be?

List 4 cases from Jessica’s section with their primary symptoms.

Neurological Tick-Borne Infections

Neuro Lyme	LD's Symptoms
• Cognitive dysfunction • Neuropathy • Cranial nerve dysfunction: • Mood & psychiatric changes • Sleep disturbances • Autonomic dysfunction • Movement and motor abnormalities • Sensory hypersensitivity	• Hypersomnia and sleep disturbance • ADD-type distractibility and attention difficulties • Generalized anxiety • Depression and obsessive–compulsive features • Learning and auditory processing difficulties • Memory dysfunction • Longstanding fatigue and joint pain • Hormonal imbalances



Neurological Tick-Borne Infections

Manage the infection(s) and see what remains

Co-Management of Tick-Borne Infections

Pause neurofeedback or continue with lots of education?

Mold & Our Nervous System

- Mycotoxins

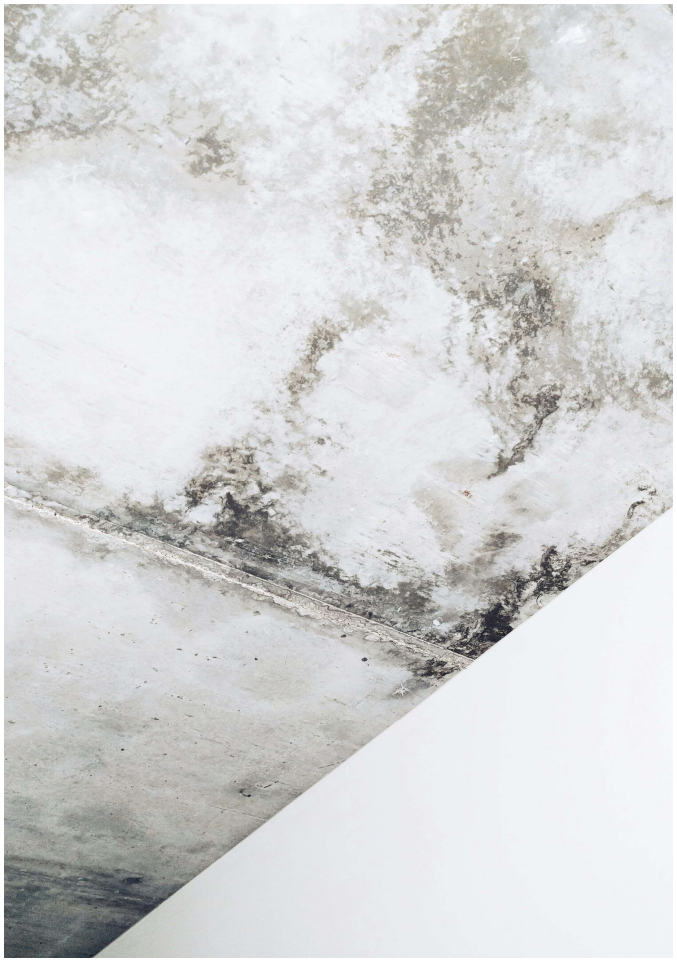


Photo by Olena Shmahalo on Unsplash

Mold Illness Symptoms

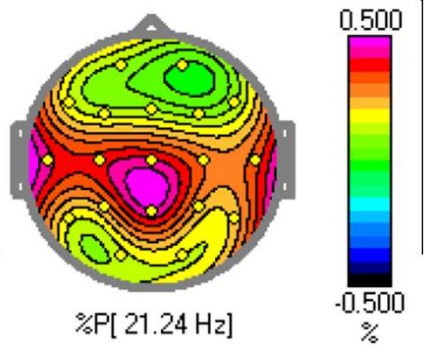
Mold
• Fatigue • EENT (current or past) issues • Asthma (current or past) • Headaches • Weakness • Pain – especially "ice pick" like   • Muscle aches and cramps (hint hint bad PMS) • Sensory hypersensitivity • Numbing and tingling • Digestive issues

Who may this be?

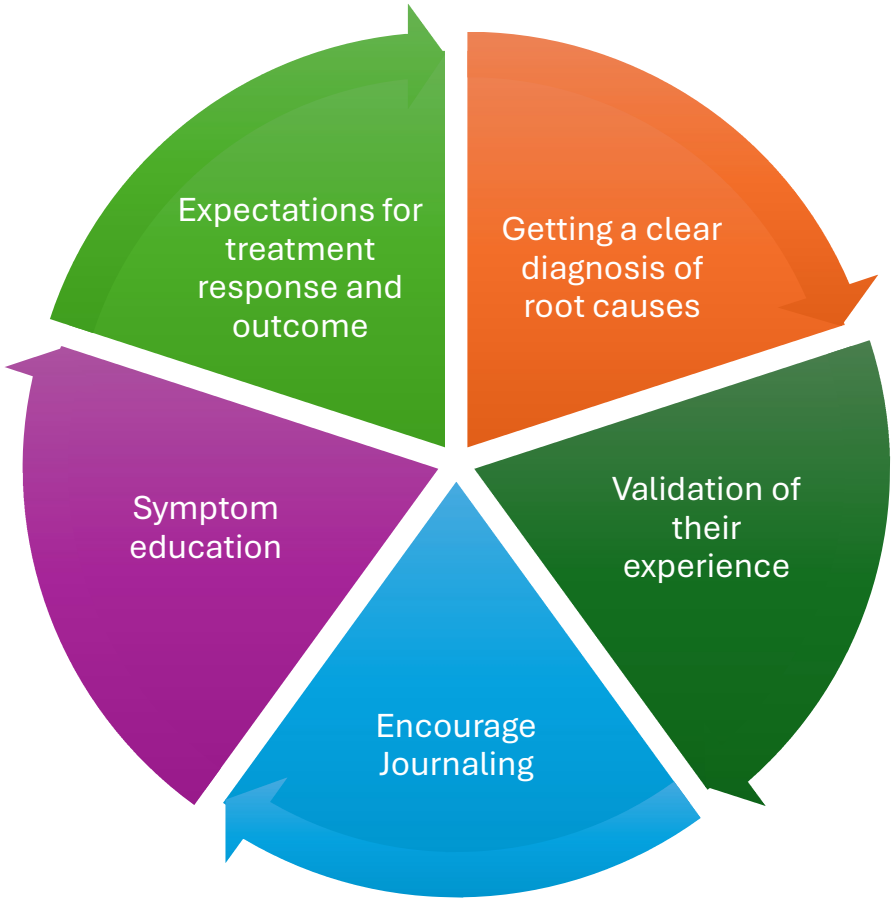
List 4 cases from Jessica’s section with their primary symptoms.

Mold

Mold	KS's Symptoms
• Fatigue • EENT (current or past) issues • Asthma (current or past) • Headaches • Weakness • Pain – especially "ice pick" like • Muscle aches and cramps (hint hint bad PMS) • Sensory hypersensitivity • Numbing and tingling • Digestive issues	• Chronic fatigue • Head pressure and headaches • Brain fog and cognitive slowing • Sensitivity to environmental chemicals and mold exposure



How to Empower our Complex Patients?



Thank you and contact info

- Teaser for September 4 part