

NeuroTrace Study Guide

Domain: Domain III – EEG Patterns & Clinical Correlation
Section: Ictal EEG Patterns & Seizure Evolution
Style: Temporal, pattern-evolution focused, ABRET-oriented

1. Core Principles (Must Know)

Ictal EEG Reflects Active Seizure Activity

- **Ictal EEG reflects active seizure activity:** During seizure
- Ictal = during seizure
- Represents active seizure
- Different from interictal
- Essential distinction

Defined by Evolution, Not Isolated Sharp Waves

- **Defined by evolution, not isolated sharp waves:** Key characteristic
- Evolution is defining feature
- Not just isolated spikes
- Must show change over time
- Critical distinction

Not All Seizures Produce Clear Ictal EEG Changes

- **Not all seizures produce clear ictal EEG changes:** Important limitation
- Some seizures have minimal EEG changes
- Deep seizures may not show clearly
- Brief seizures may be missed
- Must understand limitation

Key Principle

- **Evolution distinguishes ictal activity from interictal discharges**
- Evolution is key feature
- Interictal = no evolution
- Ictal = shows evolution
- Fundamental distinction

Practical Application

- Look for evolution
 - Don't call isolated spikes ictal
 - Understand limitations
 - Apply correctly
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2. Ictal vs Interictal EEG

Feature	Ictal	Interictal
Timing	During seizure	Between seizures
Evolution	Yes	No

Clinical correlation	Present	May be absent
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Key Distinctions

Timing

- **Ictal:** During active seizure
- **Interictal:** Between seizures
- Different timing
- Different significance
- Must distinguish

Evolution

- **Ictal:** Shows evolution (frequency, amplitude, spread)
- **Interictal:** No evolution (static pattern)
- Evolution is key
- Critical distinction
- Essential feature

Clinical Correlation

- **Ictal:** Clinical seizure present
- **Interictal:** No clinical seizure
- Clinical correlation important
- Helps confirm ictal
- Essential context

Best Practice

- Understand timing difference
- Recognize evolution
- Correlate clinically
- Apply correctly

3. Ictal Onset Patterns

Common Onset Features

Rhythmic Theta or Delta

- **Rhythmic theta or delta:** Common onset
- Rhythmic slow activity
- Focal or generalized
- Builds in amplitude
- Common pattern

Fast Activity (Beta/Gamma)

- **Fast activity (beta/gamma):** Fast onset
- High-frequency activity
- Often focal
- May be subtle
- Common pattern

Focal Attenuation (Electrodecremental Pattern)

- **Focal attenuation (electrodecremental pattern):** Attenuation onset

- Background suppression
- Focal or generalized
- May precede fast activity
- Common pattern

ABRET Emphasis

- **Ictal onset may be subtle and focal**
- Onset may be subtle
- May be focal
- Must look carefully
- Don't miss subtle onset

Best Practice

- Recognize common onset patterns
 - Look for subtle onset
 - Understand focal vs generalized
 - Apply correctly
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4. Seizure Evolution

Changes In

Frequency

- **Frequency:** Changes over time
- May speed up or slow down
- Frequency evolution
- Characteristic of ictal
- Essential feature

Amplitude

- **Amplitude:** Changes over time
- May increase or decrease
- Amplitude evolution
- Characteristic of ictal
- Essential feature

Spatial Spread

- **Spatial spread:** Changes over time
- May spread or remain focal
- Spatial evolution
- Characteristic of ictal
- Essential feature

Progression Helps Localize Seizure Onset Zone

- **Progression helps localize seizure onset zone:** Localization value
- Onset zone = where seizure starts
- Evolution shows spread
- Helps localize onset
- Important for localization

Best Practice

- Recognize evolution features
 - Understand frequency, amplitude, spread changes
 - Use for localization
 - Apply correctly
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5. Ictal Termination & Postictal Changes

Abrupt Cessation or Gradual Slowing

- **Abrupt cessation or gradual slowing:** Termination patterns
- May stop abruptly
- May slow gradually
- Different patterns
- Both normal

Postictal Suppression or Slowing Common

- **Postictal suppression or slowing common:** Postictal changes
- Suppression after seizure
- Slowing after seizure
- Common findings
- Helps confirm ictal

Helps Confirm True Ictal Event

- **Helps confirm true ictal event:** Confirmation value
- Postictal changes confirm seizure
- Supports ictal diagnosis
- Important confirmation
- Essential feature

Best Practice

- Recognize termination patterns
 - Understand postictal changes
 - Use for confirmation
 - Apply correctly
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6. Ictal EEG vs Artifact

Feature	Ictal EEG	Artifact
Evolution	Present	Absent
Field	Physiologic	Non-physiologic
Correlation	Clinical seizure	Movement/noise

Key Distinctions

Evolution

- **Ictal EEG:** Shows evolution
- **Artifact:** No evolution
- Evolution is key

- Critical distinction
- Essential feature

Field

- **Ictal EEG:** Physiologic field
- **Artifact:** Non-physiologic field
- Field characteristics differ
- Important distinction
- Helps differentiate

Correlation

- **Ictal EEG:** Clinical seizure present
- **Artifact:** Movement or noise
- Clinical correlation important
- Helps differentiate
- Essential context

ABRET Trap

- **Rhythmic movement artifact lacks EEG evolution**
- Movement may be rhythmic
- But lacks EEG evolution
- Must distinguish
- Critical distinction

Best Practice

- Look for evolution
- Check field characteristics
- Correlate clinically
- Distinguish correctly

7. Common ABRET Exam Traps

Trap 1: Calling Isolated Spikes Ictal

- **Reality:** Ictal requires evolution
- **Trap:** May call isolated spikes ictal
- **Solution:** Ictal requires evolution, not just spikes
- **ABRET focus:** Evolution requirement

Trap 2: Confusing Muscle Artifact with Ictal Fast Activity

- **Reality:** Muscle artifact lacks evolution
- **Trap:** May call muscle artifact ictal
- **Solution:** Look for evolution, check field
- **ABRET focus:** Artifact vs ictal distinction

Trap 3: Ignoring Lack of Evolution

- **Reality:** Evolution is required for ictal
- **Trap:** May call non-evolving pattern ictal
- **Solution:** Require evolution for ictal
- **ABRET focus:** Evolution requirement

Trap 4: Overinterpreting Brief Rhythmic Patterns

- **Reality:** Brief patterns may not be ictal
- **Trap:** May call brief rhythmic pattern ictal
- **Solution:** Require sufficient duration and evolution
- **ABRET focus:** Duration and evolution requirements

Trap 5: Not Recognizing Postictal Changes

- **Reality:** Postictal changes confirm ictal
 - **Trap:** May miss postictal changes
 - **Solution:** Look for postictal suppression or slowing
 - **ABRET focus:** Postictal recognition
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8. Clinical Correlation

Ictal EEG Assists In

Seizure Classification

- **Seizure classification:** Focal vs generalized
- Ictal pattern helps classify
- Focal vs generalized
- Important for diagnosis
- Clinical value

Localization

- **Localization:** Seizure onset zone
- Ictal onset localizes
- Helps identify focus
- Important for treatment
- Clinical value

Absence of Ictal EEG Does Not Exclude Seizures

- **Absence of ictal EEG does not exclude seizures:** Important limitation
- Some seizures don't show on EEG
- Deep seizures may not show
- Brief seizures may be missed
- Must understand limitation

Best Practice

- Use ictal EEG for classification and localization
 - Understand limitations
 - Correlate clinically
 - Apply correctly
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9. Case-Based Example

Scenario

Clinical Setting: Video-EEG monitoring

EEG Finding: Rhythmic left temporal theta increasing in amplitude and spreading

Question: What does this represent?

Interpretation

- **Left temporal ictal onset**
- Rhythmic theta = ictal pattern
- Left temporal = focal onset
- Evolution (amplitude increase, spread) = confirms ictal
- Ictal diagnosis

Teaching Point

- **Temporal evolution supports ictal diagnosis**
- Evolution is key feature
- Frequency, amplitude, spread changes
- Confirms ictal diagnosis
- Essential for interpretation

ABRET Application

- Given evolving pattern → recognize ictal
 - Given focal onset → localize seizure
 - Given interpretation → require evolution
 - Must know ictal characteristics
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10. Exam Readiness Checklist

Use this checklist to verify your understanding:

- ☐ Can define ictal EEG (active seizure activity with evolution)
 - ☐ Can identify onset and evolution (frequency, amplitude, spread changes)
 - ☐ Can differentiate ictal vs artifact (evolution, field, correlation)
 - ☐ Can apply correct terminology (ictal, interictal, postictal)
 - ☐ Understand that ictal EEG reflects active seizure activity
 - ☐ Know that ictal is defined by evolution, not isolated sharp waves
 - ☐ Recognize that not all seizures produce clear ictal EEG changes
 - ☐ Know that evolution distinguishes ictal from interictal
 - ☐ Can identify common onset patterns (rhythmic theta/delta, fast activity, attenuation)
 - ☐ Understand seizure evolution (frequency, amplitude, spatial spread)
 - ☐ Know postictal changes (suppression, slowing)
 - ☐ Can identify common ABRET exam traps
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11. Internal Cross-Links

Patterns

- **Epileptiform Discharges:** Interictal epileptiform activity
- **Artifacts:** How to distinguish artifact from ictal
- **Focal vs Generalized:** Ictal pattern distribution

Cases

- **Ictal EEG simulations:** Cases involving captured seizures
- **Video-EEG monitoring cases:** Cases with video correlation

- **Localization cases:** Cases involving seizure localization

Quizzes

- **Ictal EEG MCQs:** Questions on ictal patterns and evolution
 - **Seizure evolution questions:** Questions on pattern changes
 - **Ictal vs interictal questions:** Questions on differentiation
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Study Tips

1. **Memorize key distinction:** Ictal = evolution, Interictal = no evolution
 2. **Learn common onset patterns:** Rhythmic theta/delta, fast activity, attenuation
 3. **Understand evolution:** Frequency, amplitude, spatial spread changes
 4. **Know the principle:** Evolution distinguishes ictal from interictal
 5. **Remember the traps:** Isolated spikes, muscle artifact, lack of evolution
 6. **Know postictal changes:** Suppression, slowing after seizure
 7. **ABRET focus:** Expect questions on ictal vs interictal, evolution, and artifact differentiation
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End of Study Guide

For additional practice, complete quiz questions tagged: ictal, seizure, evolution, postictal