

Cingulate Cortex Seizures

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Chapter contents

Goals of This Chapter 634

Cingulate Cortex Seizures: Clinical Phenomenology 635

- Animal studies 635
- Human observations 635
- Simple and complex partial seizures 636
- Skeletomotor symptoms and automatisms 638
- Emotional automatisms 639

Diagnosis of Cingulate Cortex Epilepsy 643

- Laboratory studies and etiologies 643
- Electroencephalographic recordings 643
- Neuroimaging: MRI 644
- Neuroimaging: SPECT 645
- Positron-emission tomography 645
- Magnetoencephalography 645
- Neurosurgical therapy 646

Pathogenesis and Neuropsychiatric Comorbidity 647

Overview of Structure–Function Correlations for Seizures in Cingulate Cortex 648

References 649

Epileptic seizures provide a complex contrast to lesions. Destructive lesions typically cause functional deficits. However, the activities of preserved cortical and subcortical areas, released from the influences of the destroyed or impaired tissue, can paradoxically cause focal hyperactivities. Seizures result from excessive synchronous neural discharges that can cause positive (hyperactive such as jerking) or negative (functional impairment such as weakness) changes. Lesions and seizures both provide valuable, but often not straightforward, insights into brain function. While the correlation between disease and abnormal function is often easily made, the extrapolation from disease to normal function is much more tenuous.

Hughling Jackson's localization of focal motor seizures to primary motor cortex was a remarkable leap for neurology, but his localization of *déjà vu*, olfactory hallucinations, and dreamy states to the mesial temporal lobe was a larger jump (Jackson, 1931). He recognized in the dreamy states the dual nature of a seizure's effects on mind. "There is not always *loss*, but there is, I believe, always, at least *defect*, of consciousness coexisting with over-consciousness ("dreamy state"). Just as motor seizures can be excitatory and cause clonic or tonic activity, seizures arising from limbic and associational cortices can cause positive or negative symptoms. When a seizure evokes fear, the paroxysmal occurrence of the emotion without an environmental context is readily identified by the patient. However, a transient impairment of the experience of fear would be much more difficult to detect. It would require that a fearful stimulus occur during the seizure and that the lack of responsiveness be recognized. Not surprisingly, many ictal deficits are often difficult to recognize. Motor and language deficits are most commonly detected, yet negative motor seizures may impair only complex movements, similar to effects of electrical stimulation (Luders *et al.*, 1988). Thus, if the seizure occurs while