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## NEUROLOGY BOARD REVIEW MANUAL

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## Diagnosis of Ischemic Stroke

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## Diagnosis of Ischemic Stroke

Steven K. Feske, MD

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### I. INTRODUCTION

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Stroke is the third leading cause of death in the United States. Approximately 150,000 patients die from stroke each year, and about 600,000 are left with disabilities.<sup>1</sup> It is the most common neurologic diagnosis prompting hospital admission and the disease on which the understanding of topographic neurologic localization in the central nervous system is largely based. Accurate clinical diagnosis of patients with ischemic stroke is based on an understanding of basic neuroanatomy, cerebrovascular anatomy, and the pathophysiologic mechanisms by which vascular occlusions and ischemia can occur.

This article provides an organized approach to the diagnosis of ischemic stroke. The focus is on the clinical diagnosis of stroke syndromes along with the application of imaging and laboratory testing to establish a clear understanding of the pathophysiology that underpins the proper application of available therapies. Five case patients are presented to illustrate essential features of the diagnosis of stroke. Subsequent articles for Volume 7 will address acute therapy and prevention.

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### II. ORGANIZING PRINCIPLES

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When assessing a patient with acute ischemic stroke, the goal is to establish quickly whether a stroke has occurred and to determine the vascular distribution, disease mechanism, and expected time course of its evolution. Using this information, the physician can plan optimal diagnostic evaluation and therapy.

#### TOPOGRAPHIC AND VASCULAR LOCALIZATION

Principles of classic clinical neurologic localization allow the physician to correlate particular neurologic deficits with specific lobes and deep structures. It is then possible to conclude that a focal deficit is present and to draw conclusions about its pathogenesis. Based on the localization, extent, and character of a deficit, it is possible to narrow the possible sites of vascular occlusion or

stenosis. This vascular localization allows an imaging evaluation to be designed that demonstrates the vascular lesion in many cases.

#### PATHOPHYSIOLOGIC MECHANISMS CAUSING STROKE

With the knowledge of the vascular lesion and additional clues drawn from the nature of the underlying disease and time course, the pathophysiologic mechanism by which the stroke occurred can be inferred. Major mechanisms include embolism, large vessel stenosis, occlusion with compromised flow or embolism, and small vessel stenosis or occlusion. These categories are overlapping; they can be further refined and elaborated.

#### TIME COURSE

In most cases, the operational definition of *acute ischemic stroke* depends on the description of the onset of the event as sudden. Acute ischemic stroke can be further categorized as *transient ischemic attack (TIA)*, *completed stroke*, and *stroke-in-evolution*; these categories have evolved in recent years with the added knowledge conveyed by modern neuroimaging. Although often difficult to establish at the point of contact, it remains important to establish the expected early future development of a stroke when planning therapy and its pace.

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### III. EMBOLIC STROKE

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#### ANTERIOR CIRCULATION<sup>1</sup>

The middle cerebral artery (MCA) supplies the major motor and sensory cortex for the face and upper extremity in the frontal and parietal lobes; the deep white matter from the lower extremities' cortical territory in the anterior cerebral artery (ACA) field; the frontal eye fields in the frontal cortex; and the temporal and parietal optic radiations. On the left, the major language areas in the frontal (Broca's area) and temporal (Wernicke's area) lobes and, on the right, the frontal and parietal centers for directed attention are supplied by the MCA. Arising from the proximal stem