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MODERN RADIOLOGICAL DIAGNOSIS OF STROKE IN EMERGENCY MEDICINE

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Introduction: Acute stroke is a major global health challenge where the time factor is critical for management ("time is brain"). In recent years, neuroradiology has shifted from traditional structural imaging to multimodal functional assessment, driving revolutionary changes in patient diagnosis and treatment.

Objective: The aim of this study is to analyze the diagnostic value of modern radiological algorithms—specifically multiparametric computed tomography (CT) and magnetic resonance imaging (MRI)—in the management of acute ischemic stroke, including their sensitivity statistics and the role of artificial intelligence (AI).

Methods: Based on a systematic review of scientific literature, imaging protocols implemented in clinical practice were evaluated. Non-contrast CT and CT angiography (CTA) were compared with magnetic resonance imaging techniques (DWI, FLAIR). Results: The study demonstrated that non-contrast CT maintains nearly 100% sensitivity for ruling out acute hemorrhage; however, its sensitivity during the early hours of hyperacute ischemia is low, ranging from 40% to 60%. CTA shows high sensitivity (92–98%) in identifying large vessel occlusions. Meanwhile, MRI diffusion-weighted imaging (DWI) is considered the gold standard, with sensitivity reaching 94–99% within the very first hours of acute ischemia. The DWI/FLAIR mismatch concept, with a specificity exceeding 83%, accurately determines the time of symptom onset in "wake-up" strokes.

Conclusion: Modern radiological management of stroke relies on a personalized approach. CT and MRI do not exclude but rather complement each other: CT is optimal for rapid triage during the ultra-acute phase (due to high availability), whereas MRI is indispensable for early diagnosis and complex clinical cases. The integration of neuroimaging and artificial intelligence maximizes the chances of effective treatment and significantly improves functional outcomes for patients.

Keywords: Acute ischemic stroke; CT; MRI DWI/FLAIR mismatch; artificial intelligence; diagnostic sensitivity.