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Pearls and Pitfalls of T1-Weighted Neuroimaging: A Primer for the Clinical Radiologist

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Abstract

All T1-weighted images are built upon one of two fundamental pulse sequences, spin-echo and gradient echo, each of which has distinct signal characteristics and clinical applications. Moreover, within each broadly defined category of T1-weighting, acquisition parameters can be modified to affect image quality, contrast, and scan duration; each tailored sequence has unique advantages, drawbacks, clinical indications, and potential artifacts. In this review, we describe key features that distinguish different types of T1-weighted sequences and discuss the utility of each sequence for specific clinical settings, including neuro-oncology, vasculopathy, and pediatric neuroradiology. In addition, we provide case examples from our institution that illustrate common artifacts and pitfalls associated with image interpretation. The findings described herein provide a framework to individualize the imaging protocol based on patient presentation and clinical indication.

Keywords: Artifacts; Clinical applications; MRI physics; Optimal protocols; T1-weighted imaging.