

# Ripple Frequency Determined via a Novel Algorithm is Associated with Atrial Fibrillation Termination and Freedom from Atrial Fibrillation

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## Abstract

Background: Persistent atrial fibrillation (PsAF) is a complex arrhythmia and achieving a high rate of freedom from recurrence of AF by catheter ablation has been challenging. CARTO® Ripple map has previously been identified as one possible method to improve ablation outcomes. Objective: To evaluate the relationship of AF termination and 18-month freedom from AF with Ripple Frequency measured via a novel CARTO® software algorithm. Methods: PsAF patients who underwent first time ablation were included. PV antral isolation was performed followed by locations with visually identified fast Ripple activations until AF termination. Patients were followed for 18 months. Retrospective analysis was performed using a novel CARTO® software algorithm to analyze Ripple Frequency. The Ripple Frequency algorithm quantifies amplitude changes in the bipolar electrogram over time. Results: 82 maps from 54 patients (mean age 65.4, 67% male) were analyzed. The top quartile of Ripple Frequency corresponded to a visual reference with 96.1% sensitivity and 84.7% specificity. AF terminated during ablation in 90.7% of patients: PV antrum alone (14.8%), or PV plus non-antral sites (85.2%). The top quartile of Ripple frequency was present in non-antral sites associated with AF termination with an 89.6% sensitivity and 87.7% specificity. After 18 months and a mean of 1.2 ablations, 53/54 patients (98.1%) were free of AF and 85.2% were free of any atrial arrhythmia. Conclusion: Automated analysis of CARTO® Ripple Frequency demonstrated good sensitivity and specificity for detecting atrial regions in PsAF where ablation is associated with AF termination and freedom from AF after 18 months.

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