

## IMPAIRED SINUS NODE FUNCTION AND GLOBAL ATRIAL CONDUCTION TIME AFTER HIGH RATE ATRIAL PACING IN DOGS

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**Abstract:** In animal and human studies, it has been shown that atrial fibrillation shortens the atrial refractory period and impairs its rate adaptation. The objective of this study was to evaluate the effects of high-rate pacing on sinus node function and intra-atrial conduction. Eight dogs were subjected to rapid atrial pacing (AP) at 400 bpm for 16 days. Sinus node recovery time (SNRT) and P-wave duration were measured at baseline, immediately after AP and four weeks after the termination of AP. SNRT immediately after AP was significantly prolonged at all pacing rates compared to the baseline values. P-wave duration was significantly longer after AP relative to the baseline values. All the variables were completely reversible four weeks after the termination of pacing. Rapid AP induces sinus node dysfunction and prolongs the intra-atrial conduction time. It is possible that the electrical remodelling extends to the sinus node as well.

**Key Words:** Impaired Sinus Node Function, Global Atrial Conduction Time, High Rate Atrial Pacing, Dog

### INTRODUCTION

Rapid atrial activation causes electrical remodeling that promotes the occurrence and maintenance of atrial fibrillation (AF). In animal and human studies, it has been shown that AF shortens the atrial refractory period and impairs its rate adaptation [1, 2]. The objective of this study was to evaluate the effects of high-rate pacing on sinus node function and intra-atrial conduction.

### METHODS

Eight dogs (beagles) were subjected to rapid atrial pacing (AP) at 400 bpm for 16 days. Sinus node recovery time (SNRT) was obtained in a right atrial site at pacing rates of 150, 160 and 170 beats/min. P-wave duration was obtained from the surface ECG at a paper speed of 200 mm/s. Measurements were performed on sedated dogs at baseline, immediately after AP and four weeks after the termination of AP.

## RESULTS AND DISCUSSION

The results are presented in Table 1.

Tab. 1. The effects of rapid 16-day atrial pacing (400 bpm) on atrial conduction properties in dogs.

	BASAL	AFTER AP	AFTER 4 WEEKS	P*
SNRT (ms)				
150 bpm	466 ± 47	673 ± 235*	457 ± 69	0.03
160 bpm	480 ± 47	710 ± 217*	466 ± 90	0.01
170 bpm	498 ± 56	746 ± 209*	490 ± 78	0.01
P-wave dur. (ms)	60.6 ± 6.2	74.3 ± 6.4*	62.3 ± 8.1	0.05

All data represent means ± SD. n = 8. SNRT, sinus node recovery time; AP, atrial pacing; P\* (compared with basal).

Previous findings have shown that AF is associated with abnormal intra-atrial conduction [3, 4]. We have expanded on these observations by showing that sinus node dysfunction follows a prolonged period of rapid AP. It is possible that the electrical remodelling of the atria extends to the sinus node as well, resulting in sinus node dysfunction. We found that the effects of sustained AP on the sinus node function and on the atrial myocardium reversed towards the control values four weeks after termination of pacing. We postulate that reversible electrical remodelling occurs in the sinus node as well as in the atrial myocardium. Our observations may have an impact on therapeutic strategy to avoid early AF recurrences.

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