

**Scientific Letter**

**In Reply 'Multiple Episodes of Presyncope in a Pacemaker Dependent Patient: What is the Diagnosis?'**

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**Key words:** Presyncope; Pacemaker

We thank Dr Bhargava for careful reading of our article [1]. As highlighted by Dr Bhargava, Non Competitive Atrial Pacing (NCAP) algorithm is designed to prevent atrial arrhythmias by preventing atrial pacing within 300msec after a sensed atrial event in the post ventricular atrial refractory period (PVARP). The varying AV delays and fixed interval of 300msec between sensed atrial event (AR) in PVARP and subsequent paced atrial event (AP) nicely illustrate this algorithm. It is nominally turned on in all Medtronic dual chamber pacemakers as in our patient (Figure 1). Other manufactures call it by different names. In Biotronik devices, the algorithm is termed as Atrial Upper Rate and it delays A-Pace by 250msec after a sensed atrial event in functional refractory period.

Rate Response		Ventricular Lead	
ADL Rate Setpoint	6	Amplitude	3.000 V
Upper Sensor Rate Setpoint	15	Pulse Width	0.52 ms
Atrial Lead		Sensitivity	4.00 mV
Amplitude	3.000 V	Sensing Assurance	On
Pulse Width	0.52 ms	Pace Polarity	Bipolar
Sensitivity	0.70 mV	Sense Polarity	Bipolar
Sensing Assurance	Off	Lead Monitor	Monitor Only
Pace Polarity	Bipolar	Maximum Impedance	2.000 ohms
Sense Polarity	Bipolar	Minimum Impedance	200 ohms
Lead Monitor	Monitor Only	Monitor Sensitivity	8
Maximum Impedance	2.000 ohms	Additional Features	
Minimum Impedance	200 ohms	V. Capture Management	Off
Monitor Sensitivity	8	Sinus Preference	Off
		RDR Detection Type	Off
		Sleep	Off
		Non-Comp. Atrial Pacing	On
		Transtelephonic Monitor	Off
		FAST Indicators	On
		Extended Telemetry	Off

**Figure 1.** Non Competitive Atrial Pacing (NCAP) nominally turned on

We would like to point out few points from the tracing:

1. VA interval can be computed by subtracting AR-AP interval + paced AV delay from VV interval. For each beat the calculated VA interval is 290msec.
2. Despite changes in VV intervals, VA intervals are stable. Changes in VV predict subsequent changes in AA intervals suggestive of VA linking. Presence of VA linking argues against sinus rhythm (**Figure 2**).



**Figure 2.** Tracing showing an episode of RNRVAS. VA intervals are marked in green and sensed inter atrial intervals are marked in red. Presence of VA linking along with dependence of A-A intervals on previous V-V intervals argue against under sensed sinus rhythm.

On ventricular pacing threshold testing, distinct VA conduction was noted. We agree to the fact that complete anterograde AV block localized to the AV node is not associated with retrograde VA conduction. However up to 40% of the patients with complete anterograde AV block localized to the His-Purkinje system can have some degree of retrograde VA conduction as seen in our patient [2]. Turing NCAP off and reducing PVARP would lead to pacemaker mediated tachycardia at the upper tracking rate and may be increased incidence of atrial arrhythmias.

Documentation of retrograde VA conduction is essential for the diagnosis of RNRVAS. It is important to distinguish retrograde VA conduction with functional under sensing of sinus rhythm. We believe that they are two completely different problems with opposite solutions. Careful observations during ventricular pacing threshold testing may help distinguish the two conditions.

## References

1. Mulpuru SK, Saponieri C. Multiple episodes of presyncope in a pacemaker dependent patient: what is the diagnosis? Indian Pacing Electrophysiol J. 2010 May 5;10:233-5.
2. Issa ZF et al. Clinical Arrhythmology and Electrophysiology: A companion to Branwald's Heart Disease. Philadelphia: Saunders Elsevier; 2009. Electrophysiological Testing; p. 51.