

# To Pace or Not to Pace?

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**A** 75-year-old man with a medical history of sick sinus syndrome and left bundle branch block presented for evaluation of chest pain. The patient had a dual-chamber permanent pacemaker. Figure 1 shows his electrocardiogram (ECG).

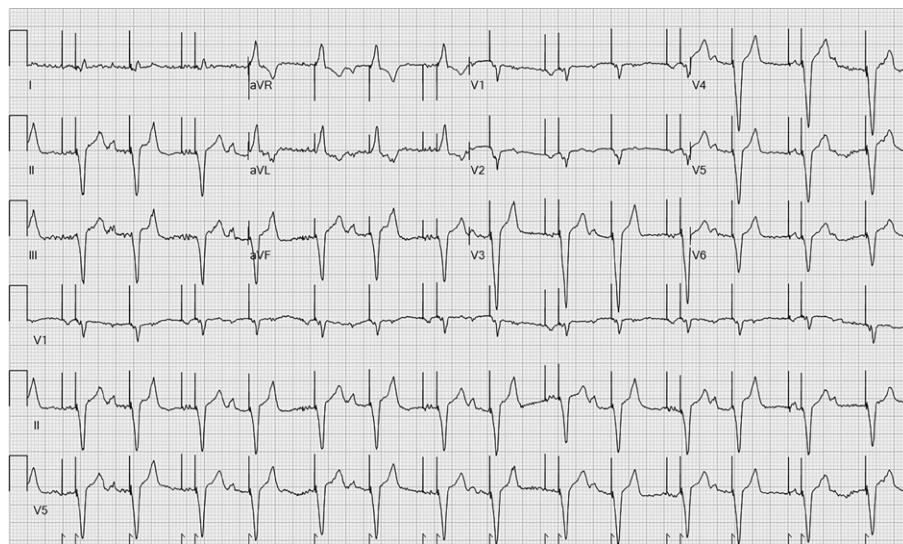


Fig. 1

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## How can the ECG pattern be explained?

- A) Atrial lead undersensing
- B) End-of-life battery
- C) Normal algorithm to reduce right ventricular pacing
- D) Atrial tachycardia with normal pacemaker function

See next page for the answer, as well as a link to the Focus on ECGs blog, where you can participate in a moderated discussion.

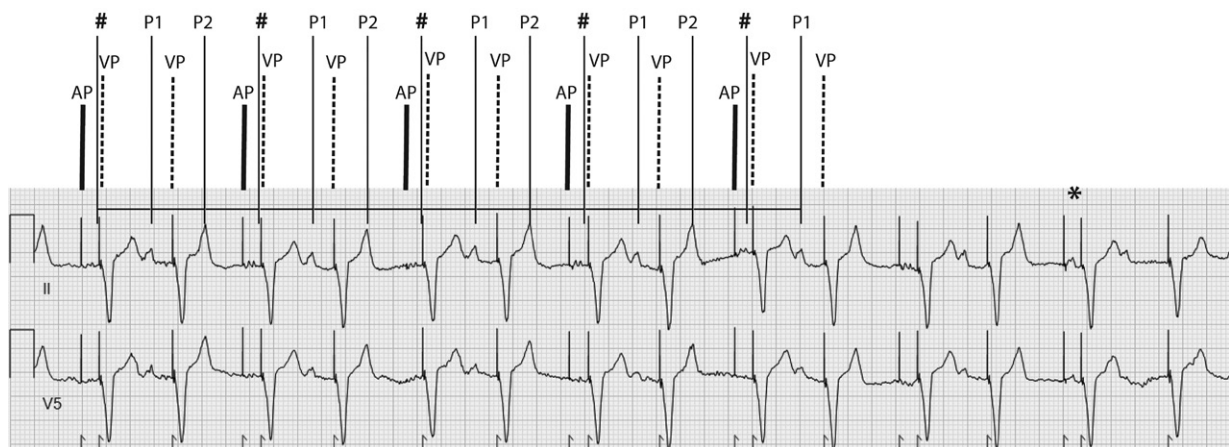
# FOCUS ON ECGs: ANSWER #5

## Answer

### D) Atrial tachycardia with normal pacemaker function.

The ECG reveals atrial tachycardia at a rate of 135 beats/min, with normal pacemaker function showing upper rate behavior and pacemaker Wenckebach phenomenon. The atrial tachycardia occurs at a rate faster than the pacemaker's tracking limit (Figs. 1 and 2). The first P wave is an atrial paced beat (AP) that has a wide-notched morphology in lead II and negative deflection in lead V<sub>1</sub> (Fig. 1). It is followed by ventricular pacing (VP). The next P wave has a different morphology (P1) that is caused by the underlying atrial tachycardia. It is sensed by the pacemaker and is followed by VP. The third P wave is also caused by the atrial tachycardia and is buried in the T wave following it, causing the T waves to appear taller and peaked in leads II and V<sub>5</sub> (P2). Because P2 occurs in the postventricular atrial refractory period, it is ignored by the pacemaker and does not result in VP. Instead, AP and VP stimuli with appropriate capture are seen next. After the AP–VP, another P1 is evident. The timing of this P wave is exactly 2 times the previous P1–P2 interval. This suggests that the atrial tachycardia was overdrive-inhibited by AP but was not reset (#). In addition, the morphology of the P wave after the last AP (\*) is similar to the intrinsic P wave (P1) of the atrial tachycardia and not to the P waves induced by AP, suggesting pseudofusion.

To participate in a moderated discussion of this case, go to [THIJournal.blogspot.com](http://THIJournal.blogspot.com). Two weeks from the original posting date, the discussion will close, but the comments will remain online for reference.



**Fig. 2** AP is the electronic atrial pacing beat; P1 is the spontaneous atrial activation by the atrial tachycardia. The P wave is sensed by the pacemaker and is followed by ventricular pacing (VP). At P2 (spontaneous atrial activation by the atrial tachycardia during the post-ventricular activation refractory period), the P wave is ignored by the pacemaker. During the refractory period after AP, atrial tachycardia discharge (#) is not conducted to the atria, is not followed by a P wave, and is not sensed by the pacemaker.

\* = last atrial-paced beat