Published in final edited form as:

Heart Rhythm. 2007 March ; 4(3): 384–385.

Letter to the Editor: Topography of the AV node and the left-sided His bundle recordings

Darlene K. Racker, PhD

darkrac@northwestern.edu, Cardiology, Medicine, Northwestern University Feinberg Medical School, Chicago, Illinois

AV node reentrant tachycardia (AVNRT) is the most common cause of supraventricular tachycardia seen in clinical practice, yet the “precise” pathways are still unknown.¹ Misconceptions regarding the topography of the AV node, its environs, and its transmission pathways may relate to differences in data among anatomic and electrical studies.²

The report by Katritsis et al., in *Heart Rhythm*, 2006;3:993–1000 considers the AV node a septal structure (p. 993). However, as illustrated by Tawara a century ago for different species including dog and human in histologic sections, whole heart and schematics,^{4: Figs. A, B} the AV node is located within the central fibrous body, and deep to the posterior noncoronary aortic cusp, thus it cannot be in the atrial septum. I have verified these associations in dog^{5: Fig. 3; 6–9} and human (unpublished data) hearts. The AV node is an intracardiac structure. Its topography is just superior to the anterior half of the medial tricuspid leaflet, and at the ventricular outflow tract deep to the posterior aortic cusp, the “*atrioventricular septum of the ventricular outflow tract*” in the human heart. Therefore neither the AV node nor the His bundle are associated with atrial septum, which correlates with the fossa ovalis, and in the human heart is two centimeters removed from these structures.^{10: Fig} They also considered 1) that the so-called left-sided His bundle catheter, placed in the pocket of the posterior aortic cusp³, is located on the left side of the septum, and 2) that His bundle potentials are recorded here. However the posterior aortic pocket is attached to the right atrium at the level of the “*medial atrial wall*” and the “*atrio-aortic septum*,” and not atrial septum; and the so-called His potential is likely from the AV node. A full report on these associations in human heart is in preparation. These details suggest that a clear understanding of AVNRT will have to take into account the true anatomy.

References

1. Scheinman MM, Yang Y. The history of AV nodal reentry. *PACE* 2005;28:1232–1237. [PubMed: 16359294]
2. Goldberger JJ. Unraveling the mysteries of the AV node. *Heart Rhythm* 2006;3:1001–1002. [PubMed: 16945789]
3. Katritsis DG, Ellenbogen KA, Becker AE. Atrial activation during atrioventricular nodal reentrant tachycardia: studies on retrograde fast pathway conduction. *Heart Rhythm* 2006;3:993–1000. [PubMed: 16945788]
4. Suma, K.; Shimada, M. *The Conduction System of the Mammalian Heart*. London: Imperial College Press; 2000.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

5. Racker DK. The atrioventricular node and input pathways: A correlated gross anatomical and histological study of the canine AV junctional region. *Anat Rec* 1989;224:336–354. [PubMed: 2782619]
6. Racker DK. Sinoventricular transmission in 10 mM K⁺ by the canine atrioventricular inputs, the superior atrionodal bundle and the proximal atrioventricular bundle. *Circulation* 1991;83:1745–1758.
7. Racker DK. The AV junction region of the heart: a comprehensive study correlating gross anatomy and direct three-dimensional analysis. Part I. Architecture and topography. *Anat Rec* 1999;256:49–63. [PubMed: 10456985]
8. Racker DK. The AV junction region of the heart: a comprehensive study correlating gross anatomy and direct three-dimensional analysis. Part II. Morphology and cytoarchitecture. *Am J Physiol Heart Circ Physiol* 2004;286:H1853–H1871. [PubMed: 15072972]
9. Racker DK, Ursell PC, Hoffman BF. Anatomy of the tricuspid annulus: The circumferential myofibers as the structural basis for atrial flutter in a canine model. *Circulation* 1991;84:841–851. [PubMed: 1860226]
10. Racker DK, Schlessinger S, Li X, Kadish AH. The atrioaortic, atrioventricular, ventriculoaortic septae, the medial atrial wall and fossa ovalis in the human heart. *FASEB J* 2006;20:A324.