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## ECG Quiz

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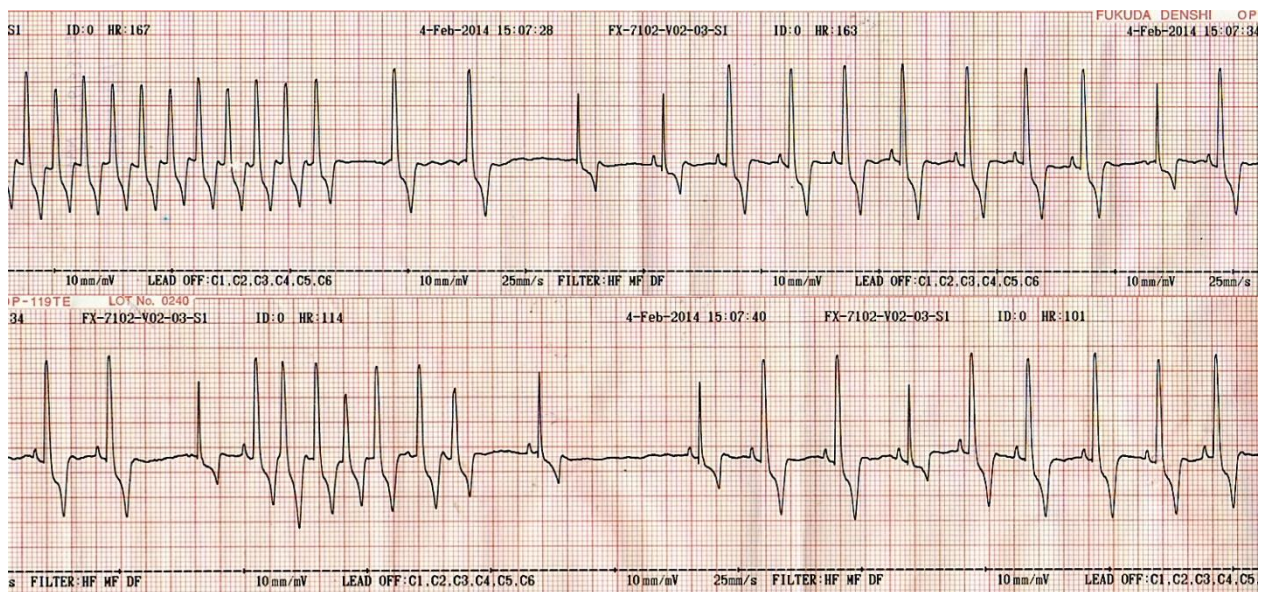
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## ECG Quiz

**Chollada Buranakarl<sup>1\*</sup> Anusak Kijawornrat<sup>1</sup> Thanusorn Phakhawambodee<sup>2</sup>  
Robert L. Hamlin<sup>3</sup>**



An 11-year old intact male Yorkshire terrier weighing 6.6 kg was presented to the Small Animal Teaching Hospital, Chulalongkorn University for physical checkup due to elevated ALT (128 units/L) while other blood chemistries and complete blood count were still in normal limits. No abnormal clinical signs were found when presenting in the hospital. The thoracic radiograph revealed normal heart size and shape, normal lung appearance while abdominal

radiography showed spondylosis and narrowing disc space between L4-5, prostatomegaly with normal limits of spleen, liver, and GI tract. The electrocardiography was performed as shown in the above figure. The echocardiography showed mild left ventricular wall enlargement with mild thickening of mitral valve. The fractional shortening was 31%. The atrial contractions were rapid and inconsistent.

Please answer before turning to the next page.

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## Interpretation

### *Periodic atrial fibrillation with junctional escape beats, aberrant ventricular conduction and paroxysmal ventricular tachycardia*

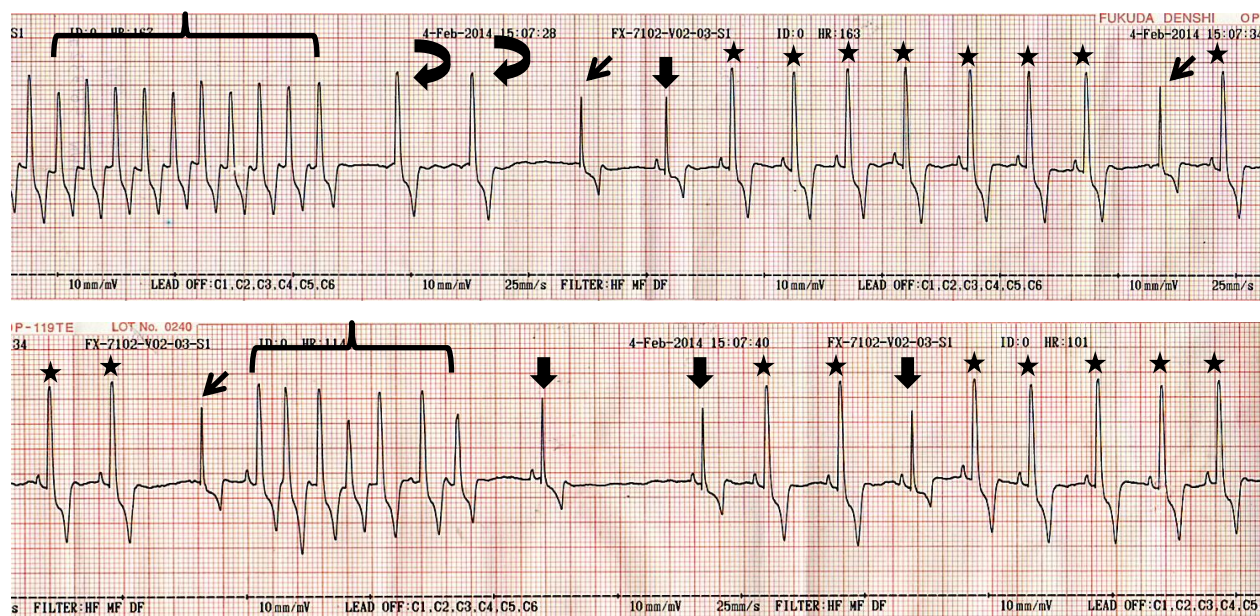
*Big straight arrows* - Normal conduction sandwiched between rate dependent left bundle branch block

*Small arrows* - Escape junctional complex after a pause

*Stars* - Sinus rhythm with rate-dependent left bundle branch block

*Curve arrows* - atrial fibrillation with junctional escape beats

*Parentheses* - Paroxysmal ventricular tachycardia or paroxysmal supraventricular tachycardia with rate-dependent left bundle branch block



The normal sinus complexes with a short QRS in duration were seen (big straight arrows). Some complexes had a similar shape without preceding P-wave as shown by small arrows. These complexes were seen after periods of pause which possibly became the escape beats originating from AV node (junctional escape beats). Some P-QRS complexes with wider QRS duration (stars) emerged in alternating with normal complexes with the rate of approximated 115 beats/minutes (R-R interval = 0.44 - 0.52 second). The presence of preceding P-wave in all beats suggested the impulse travelling through atrium, AV node and transmitted with aberrant conduction into the ventricles. The long period of ventricular conduction suggested the left bundle branch block existed in alternating to the normal conduction pathway. The rhythm of left bundle branch block was rate-dependency since the block disappeared (QRS was normal) when the heart rate slowed down (R-R interval > 0.56 second). The shape of these complexes corresponding to left bundle branch block was similar to the complexes originated from ventricular ectopic foci, and may be confused with accelerating idioventricular rhythm. However, the presence of P-wave can be used to differentiate this phenomenon since the complexes originated from

ventricles did not follow P-wave and the fusion beats (wide QRS with preceding P-wave) could be seen just before and after the transition of pacemaker from sinus to ventricle.

The aberrant QRS complexes without P-wave (curve arrows) could be escape beats after a long pause that originated from junction but travelling along the left bundle branch block pathway. The unstable baseline in front of the 2nd QRS complex with the curve arrow was a period of atrial fibrillation. The Holter recording for a longer period of time along with echocardiography may be a resolution for this answer. Two trains of complex shown in parenthesis with abrupt acceleration and deceleration in rate made the arrhythmia called "paroxysm". The heart rate was speeded up to 250 beats per minute during tachycardia. The shapes were corresponded to the complexes which either originated from ventricular or supraventricular foci with rate-dependent left bundle branch block. The blood pressures recorded in this dog should be unstable as a result of varying amount of venous blood return during diastole due to arrhythmia. Since the breed of the dog was predisposed to SA node disease, he should be evaluated thoroughly for a possible need of pacemaker implantation.