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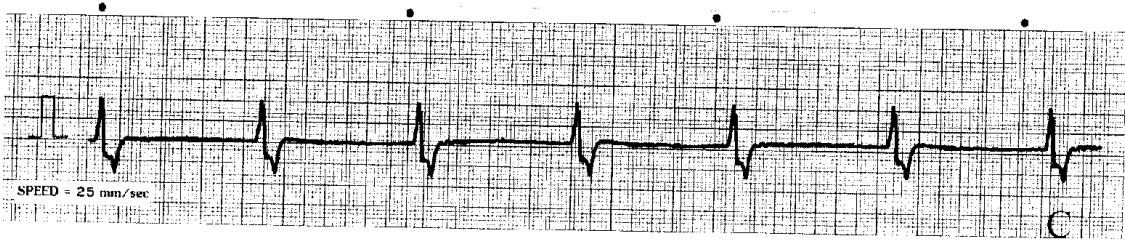
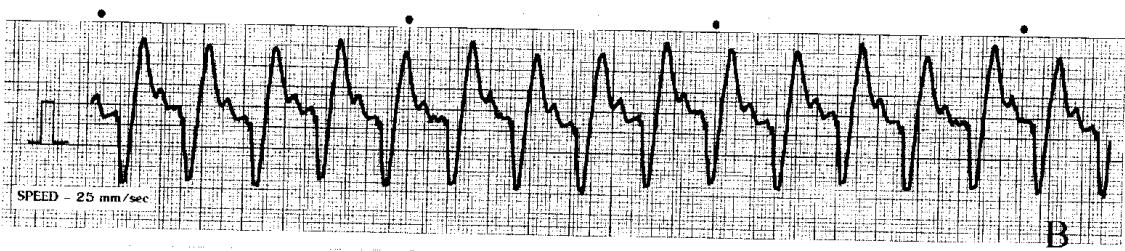
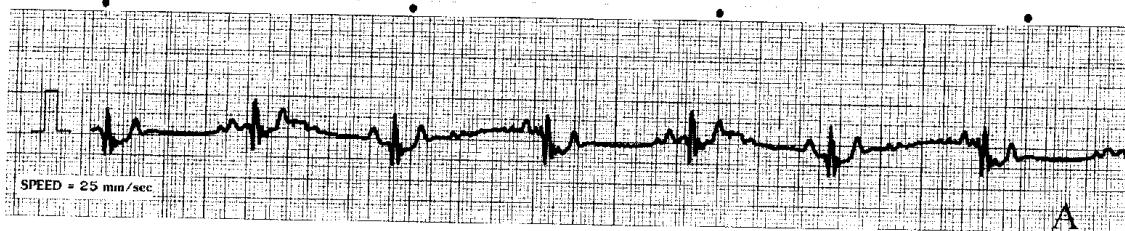
**Diagnostic Forum**

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## **ECG Quiz**

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A 16 year-old, male, Poodle, weighing 10 kg, came to the emergency room of the Small Animal Hospital, Chulalongkorn University with acute dyspnea. The dog had history of exercise intolerance and weakness over the past two years. A productive cough and mild ascites were the chief complaint given to the veterinarian as well as two episodes of syncope. The dog had been given heart medication which consisted of methyl digoxin, enalapril and furosemide. A radiograph showed whole heart enlargement, brochopneumonia, pericardial effusion and enlargement of the cranial mediastinal lymph node. Physical examination revealed pale mucus membranes, prolonged CRT (2.5 seconds), labored respiration and a lack of awareness. A complete blood count was normal while blood chemistry profiles showed normal Na, K, ALT, ALKP and creatinine concentrations. Blood urea nitrogen was 51 mg % and blood glucose was 231 mg%. Blood

gas analysis revealed an acidosis with a pH of 7.047 and low  $\text{PO}_2$  (72 mmHg) and  $\text{HCO}_3^-$  (11.4 mmol/L). The dog was treated with  $\text{O}_2$  therapy, intravenous fluids and sodium bicarbonate to correct acidosis. Furosemide and aminophylline was given intravenously every 1/2 hour and four hours, respectively. A nitroglycerine pad was applied to the thoracic wall whilst an ECG was recorded continuously. The ECG at the beginning of admission is shown on tracing A. Eight hours after treatment, the dog was unconscious and showed no response to therapy. A second ECG was recorded (tracing B) and lidocaine was infused intravenously. The dog had apnea a few minutes later and the cardiopulmonary resuscitation (CPR) was initiated. The ECG during CPR is shown in tracing C.

Please make your interpretation before turning to the next page.

### Tracing A - Sinus rhythm

The ECG showed a normal waveform consisting of P, QRS and T. The heart rate was 100 beats/min.

### Tracing B - Sustained ventricular tachycardia.

The heart rate is 188 beats/min. This pattern of ECG shows an unstable electrical activity which can proceed to ventricular fibrillation. Wide and bizarre QRS complexes, that have no fixed relationship to the P wave, are characteristic. The P waves can be visible or may be hidden in the QRS complexes or T waves. Lidocaine is the drug of choice to convert ventricular tachycardia back to normal sinus rhythm which did not succeed in this case.

### Tracing C - Atrial standstill. Heart rate is 40 beats/minutes

Atrial standstill is characterized by a regular rhythm with no P waves and bizarre QRS complexes. The ST segment may be elevated or depressed and the T wave is large. Bradycardia would be expected, resulting in poor cardiac output leading to the fatal outcome. The causes of atrial standstill might be due to severe hyperkalemia, diabetic ketoacidosis or acute renal failure. These characteristics can eventually proceed to ventricular fibrillation and ventricular asystole. The CPR was initiated and a complex with an existing inverted P wave which have been generated from the AV node was present. However, the CPR failed and the dog died.