

## **ADVANCED ELECTROCARDIOGRAPHY CAN IDENTIFY OCCULT CARDIOMYOPATHY IN DOBERMAN PINSCHERS**

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Recently, multiple advanced resting electrocardiographic (A-ECG) techniques have improved the diagnostic value of short-duration ECG in detection of dilated cardiomyopathy (DCM) in humans. This study investigated whether 12-lead A-ECG recordings could accurately identify the occult phase of DCM in dogs.

Short-duration (3-5 min) high-fidelity 12-lead ECG recordings were obtained from 31 privately-owned, clinically healthy Doberman Pinschers ( $5.4 \pm 1.7$  years, 11/20 males/females). Dogs were divided into 2 groups: 1) 19 healthy dogs with normal echocardiographic M-mode measurements: left ventricular internal diameter in diastole (LVIDd  $\leq 47$ mm) and in systole (LVIDs  $\leq 38$ mm) and normal 24-hour ECG recordings ( $<50$  ventricular premature complexes, VPCs); and 2) 12 dogs with occult DCM: 11/12 dogs had increased M-mode measurements (LVIDd  $\geq 49$ mm and/or LVIDs  $\geq 40$ mm) and 5/11 dogs had also  $>100$  VPCs/24h; 1/12 dogs had only abnormal 24-hour ECG recordings ( $>100$  VPCs/24h).

ECG recordings were evaluated via custom software programs to calculate multiple parameters of high-frequency (HF) QRS ECG, heart rate variability, QT variability, waveform complexity and 3-D ECG. Student's *t*-tests determined 19 ECG parameters that were significantly different ( $P < 0.05$ ) between groups. Principal component factor analysis identified a 5-factor model with 81.4% explained variance. QRS dipolar and non-dipolar voltages, Cornell voltage criteria and QRS waveform residuum were increased significantly ( $P < 0.05$ ), whereas mean HF QRS amplitude was decreased significantly ( $P < 0.05$ ) in dogs with occult DCM. For the 5 selected parameters the prediction of occult DCM was performed using a binary logistic regression model with Chi-square tested significance ( $P < 0.01$ ). ROC analyses showed that the five selected ECG parameters could identify occult ECG with sensitivity 89% and specificity 83%.

Results suggest that 12-lead A-ECG might improve diagnostic value of short-duration ECG in earlier detection of canine DCM as five selected ECG parameters can with reasonable accuracy identify occult DCM in Doberman Pinschers. Future extensive clinical studies need to clarify if 12-lead A-ECG could be useful as an additional screening test for canine DCM.