

# Imaging of the Canine Heart Using Non ECG-Gated and ECG-Gated 64 Multidetector Computed Tomography.

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Abstract

ECG-gated multidetector computed tomography (MDCT) is an imaging modality widely utilized for the evaluation of cardiac pathology by physicians. However, there has been little research of cardiac MDCT imaging in veterinary patients. Presently, ECG-gating is an upgrade for MDCT, which few veterinary institutions currently possess. The purpose of this study was to compare image quality between a 16 non ECG-gated and 64 ECG-gated MDCT for clinically important cardiac anatomy in dogs. In a crossover trial, six dogs were scanned using 16 non

ECG-gated and 64 ECG-gated MDCT. A standardized anesthetic protocol, designed to induce bradycardia (mean HR 45 bpm  $\hat{\pm}$  12.6) was used. Five post-contrast sequential scans through the heart were performed for each patient when utilizing the 16 non ECG-gated MDCT, in attempt to obtain a motion free series of images of the heart. For each scan, assessment of cardiac morphology was performed by evaluating a group of 21 cardiac structures, using a 3-point scale. Each of the images were scored as 0 (motion present, scan non-diagnostic), 1 (motion present, scan diagnostic), and 2 (no motion, therefore diagnostic scan of high quality). Quality scores (QS) from all scans within a dog (30 scans total) were assigned for each cardiac structure. QS from the six ECG-gated MDCT scans were of high diagnostic quality, generating diagnostic images for all of the 21 cardiac structures evaluated for each of the 6 scans. Individual non ECG-gated scans were of variable quality, primarily generating QS of 1 or 2. A complete set of diagnostic images for all 21 structures was not achieved from an individual scan. Minimum number of non ECG-gated scans to identify a single structure was calculated, and ranged from 1-2 scans for all structures. Cumulative number of sequential non ECG-gated scans needed to achieve images of all cardiac structures was calculated and determined to be 5. A 16 non ECG-gated MDCT scanner can produce cardiac images that are similar in quality, to those of 64 ECG-gated MDCT. Cardiac motion negatively impacts image quality in studies acquired without ECG-gating. However, this can be overcome by performing multiple sequential scans through the heart.

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