Coronary artery motion and cardiac phases:
dependency on heart rate -- implications for CT image reconstruction

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This study had institutional review board approval; written informed consent was obtained. The purpose was to prospectively determine the heart rate (HR) dependency of three-dimensional (3D) coronary artery motion by incorporating into analysis the durations of systole and diastole. Thirty patients (seven women, 23 men; mean age, 56.6 years +/- 12.7 [standard deviation]; HR: 45-100 beats per minute) underwent electrocardiographically gated 64-section computed tomographic (CT) coronary angiography to determine coronary motion velocities at bifurcation points. Significance of velocity differences (P < .05) was determined by using analysis of variance for repeated measures and Bonferroni post hoc tests. HR dependency was determined by using linear regression analysis. HR significantly affected 3D coronary motion (r = 0.47, P < .009) through nonproportional shortening of systole and diastole (r = -0.82, P < .001), leading to percentage reconstruction interval shifts of coronary velocity troughs and peaks (P < .01). Results suggest that image reconstruction algorithms at CT coronary angiography be adapted to the individual patient's HR.