

# The Influence of Sublingual Nitroglycerin on Contrast-Enhanced Whole-Heart Coronary Magnetic Resonance Angiography at 3.0-T

B. Sun<sup>1</sup>, Z. Chen<sup>2</sup>, L. Jin<sup>3</sup>, and Q. Duan<sup>4</sup>

<sup>1</sup>Radiology, Fujian Medical University Union Hospital, FuZhou, Fujian, China, People's Republic of, <sup>2</sup>Radiology, Fujian Medical University Union Hospital, China, People's Republic of, <sup>3</sup>Siemens Healthcare, MR Collaboration NE Asia, China, People's Republic of, <sup>4</sup>Fujian Medical University Union Hospital, China, People's Republic of

**PURPOSE.** This study investigates the influence of sublingual nitroglycerin spray on the lumen diameter, number of side branches visualized, average vessel length shown on 3.0-T contrast-enhanced whole-heart coronary magnetic resonance angiography (WH-CMRA).

**BACKGROUND.** Organic nitrates are potent vasodilators that dilate both normal and abnormal coronary arteries by relaxing vascular smooth muscle. Contrast-enhanced whole-heart coronary magnetic resonance angiography at 3.0-T has been shown to be a promising technique for performing coronary MRA with a high spatial resolution, high SNR and CNR [1]. However, small vessels and side branches and the distal portions of the main coronary arteries are not always optimally visualized. The investigators of several studies on CT angiography (CTA) of the coronary arteries report the use of nitroglycerin to dilate the lumen of the coronary arteries, and it is a widely accepted practice. However, the effects of nitroglycerin on coronary lumen diameter and length and on image quality at 3.0-T contrast-enhanced whole-heart CMRA have not been evaluated and quantified yet.

**PURPOSE.** This study investigates the influence of sublingual nitroglycerin spray on the lumen diameter, number of side branches visualized, average vessel length shown on 3.0-T contrast-enhanced whole-heart coronary magnetic resonance angiography (WH-CMRA).

**METHODS.** Twenty-four patients were prospectively included in this study: 12 were examined without sublingual nitroglycerin (group A), and 12 were examined after the administration of sublingual nitroglycerin (group B). Contrast-enhanced whole-heart coronary magnetic resonance angiography was performed using a 3.0T scanner (MAGNETOM Trio, A Tim System, Siemens, Germany). Two blinded observers quantitatively assessed lumen diameter and length in the right coronary artery (RCA), the left anterior descending artery (LAD) and left circumflex artery (LCX). The number of acute marginal branches and septal branches was counted. The number of clinical side effects was evaluated.

**RESULTS.** The lumen diameters of RCA, LAD and LCX were  $(4.3 \pm 0.5)$  mm,  $(3.6 \pm 0.4)$  mm,  $(3.3 \pm 0.3)$  mm in group A. The lumen diameters of RCA, LAD and LCX were  $(5.7 \pm 0.6)$  mm,  $(4.8 \pm 0.5)$  mm,  $(4.1 \pm 0.5)$  mm in group B. The lumen diameters were significantly larger ( $P < 0.05$ ) in group B than in group A (Figure 1). The average length of RCA, LAD and LCX in the two groups was not significantly different. The number of acute marginal branches and septal branches visualized in group B was significantly higher than in group A. The number of side effects in the two groups was not significantly different.

**CONCLUSION.** Sublingual nitroglycerin spray significantly dilates the coronary arteries and allows more side branches to be visualized at 3.0-T contrast-enhanced WH-CMRA without the need to increase spatial resolution and therefore scan time.

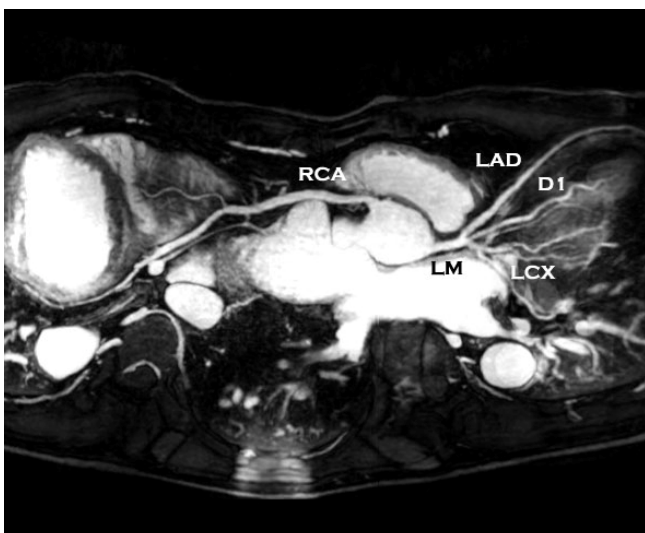


Figure 1 Contrast enhanced WH-CMRA with sublingual Nitroglycerin administration. 58 Years-Old-Man with normal coronary arteries. Curved MPR image shows the RCA, LM, LAD and LCX significantly dilated

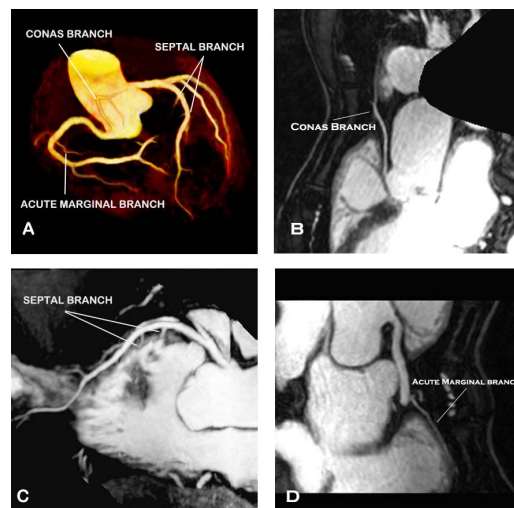


Figure 2 More side branches can be visualized in WH-CMRA with sublingual nitroglycerin spray. VR image (A) provides an overview of coronary anatomy and clearly depicts the conus branch, acute marginal branch and septal branch. Curved multiplanar reformation (B)-(D) images show the conus branch, acute marginal branch and septal branch.