



Role of 128-slice, dual-source CT coronary angiography as a novel imaging technique in assessment of in-stent restenosis

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

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List of Abbreviations

Abb.	Full term
3D.....	Three-dimensional
ALCAPA	Anomalous origin of the LCA from the pulmonary artery
AM	Acute marginal
AVN	Atrioventricular node artery
CS.....	Coronary sinus
CT	Computed tomography
DECT.....	Dual-energy CT
DES.....	Drug-eluting stents
ER	Elastic recoil
GCV	Great cardiac vein
ISR	In-stent restenosis
LAD.....	Left anterior descending
LCX.....	Left circumflex
LDL.....	Low-density lipoprotein
LMCA	Left main coronary artery
MCV.....	Middle cardiac vein
MDCT	Multi- detector row CT
NIH.....	Neointimal hyperplasia
OM	Obtuse marginal
PCI.....	Percutaneous coronary intervention
PDA.....	Posterior descending artery
PLV	Posterolateral left ventricular
RCA.....	Right coronary artery
ROI.....	Region of interest

List of Abbreviations Cont...

Abb.	Full term
SA.....	Sinoatrial
SAN.....	Sinoatrial node artery
SMC.....	Smooth muscle cell
TCFA	Thin-cap fibroatheroma
TR	Temporal resolution



Introduction

INTRODUCTION

Stenting is a nonsurgical treatment of coronary artery disease. However, there is increase incidence of in-stent restenosis. To evaluate stent patency, patients are sent for invasive coronary angiography (*Park et al., 2012*).

Conventional coronary angiography is considered the gold standard diagnostic investigation for evaluating in-stent restenosis, but it's an invasive technique and has complications, a non-invasive tool for assessing in-stent restenosis would be of great importance to follow up patients with implanted coronary stents (*Oncel et al., 2013*).

Evaluation of coronary artery disease by a non-invasive MSCT angiography, provides excellent image quality, decreases patient exposure to contrast media and radiation dose is also reduced when using a prospective ECG-gated coronary CT scan and low tube voltage (*Sun et al., 2012*).

Assessment of coronary arteries especially small peripheral vessel and the coronary stents(particularly when stent caliber is less than 3 mm) with standard coronary CT angiography is limited due to relatively poor spatial resolution, insufficient temporal resolution(which causes motion and stair step artifacts) and marked coronary calcification. So to overcome these problems, multiple new imaging techniques are developed (*Haruhiko et al., 2015*).

Radiation dose can be reduced by the use of step and shoot scan, iterative reconstruction, and a high pitch dual-source helical scan. Spatial resolution and diagnostic evaluation of small or peripheral coronary vessels and coronary stents can be improved by the use of high definition CT scanners. Coronary motion artifacts and temporal resolution can be improved by dual-source CT scanners and a motion correction algorithm (*Haruhiko et al., 2015*).

The state of the art dual-source CT scanner that was recently introduced, achieves the currently highest temporal resolution. This improvement in temporal resolution decreases motion artifacts of the coronary arteries and provides excellent image quality (*Nazir et al., 2014*).