

Asian Perspectives in 40 years of PTCA



Yean L. Lim AM

23rd TCT-AP, 30 April 2018, Seoul, S. Korea

EDITORIAL

THE EMERGENCE OF CORONARY INTERVENTION IN THE ASIAN-PACIFIC REGION

*Lim Yean Leng, AM
National Heart Centre
Republic of Singapore*



These simultaneous activities are essential for the formation of the embryonic “Asian-Pacific bloc” for coronary intervention to complement the existing mature “European and North American blocs” The emergence of this Asian-Pacific bloc adds significantly to the globalization of interventional cardiology.



Lim YL: Asia CV & Thoracic J, Vol 7, 1, 1999



tct2016
Annual Scientific Symposium of the
Cardiovascular Research Foundation

europa
PCR
17-20 May 2016 - Palais des Congres, Paris

22nd
TCTAP 2017

asia
PCR.....LIVE
19 - 21 January 2016 - Singapore

CIT2017 15th
China Interventional Therapeutics in Partnership with TCT

中文 About CIT
March 30-31

PCR-CIT
china chengdu valves
17-19 November 2017
Chengdu, China

APSIC and the “Jump-start” of the Asian Interventional Bloc

APSIC Immediate Past President's Page

APSIC, Ready to Jump!

Seung-Jung Park,* MD, PHD, FACC
Course Director, Angioplasty Summit-TCT
Asia Pacific
Director, Asan Heart Institute, Asan Medical Center,
Seoul, Korea
Chairman, CardioVascular Research Foundation

Asian Pacific society of Interventional Cardiology (APSIC) was first conceived by a group of cardiologists from the Asia Pacific region, at a PCI meeting in Sydney, Australia. Four months later in July 1993, the first official meeting of APSIC was convened in Singapore in conjunction with the Third SingLive Course.

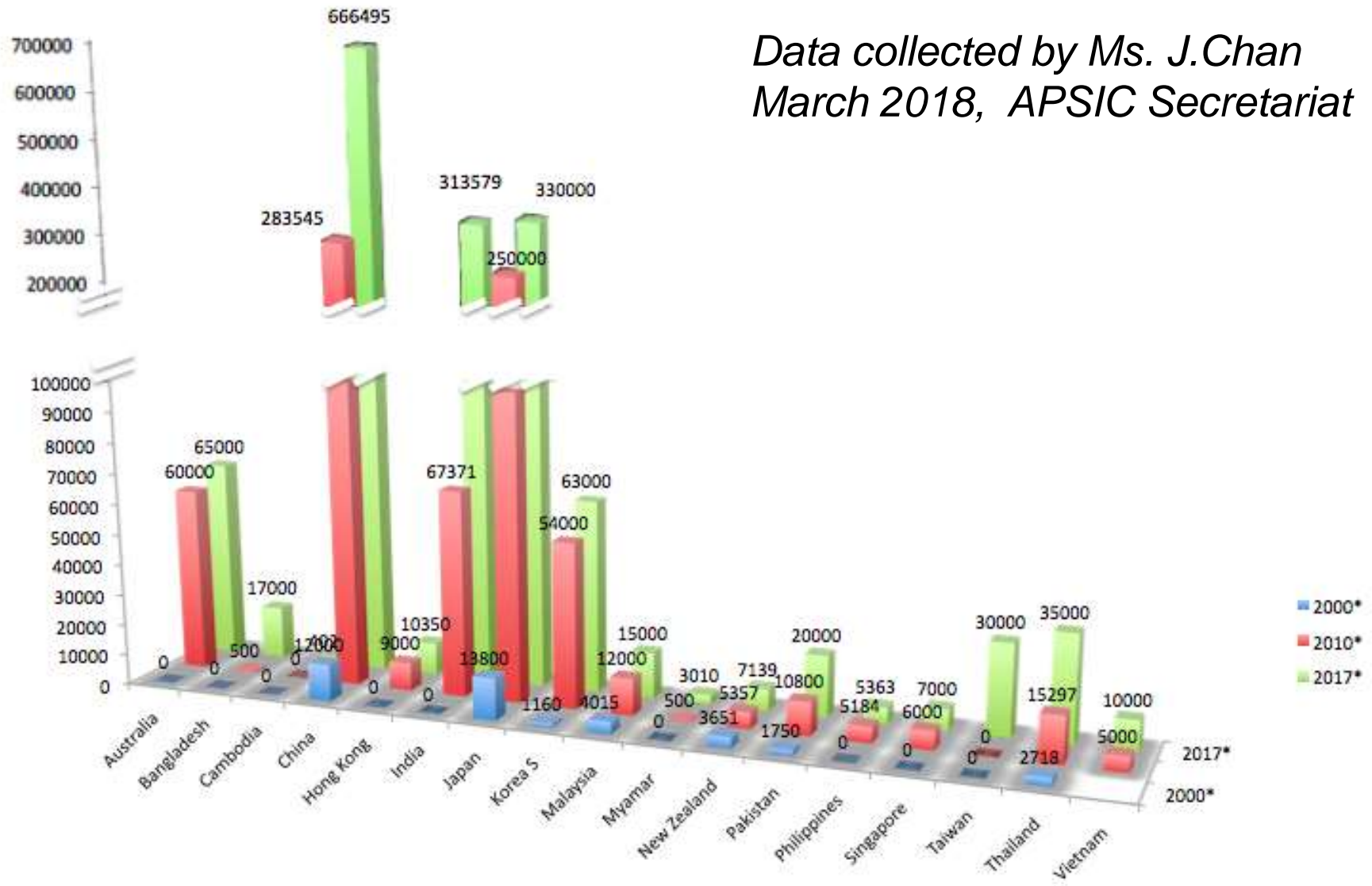


Growth of PCI in Asia 2000-17 (APSID secretariat, 2018)

<u>Country</u>	<u>2000</u>	<u>2010</u>	<u>2017</u>
Australia	-	60000	65000
Bangladesh	-	4137	17000
Cambodia	-	-	402
China	12000	283545	666495
Hong Kong	-	9000	10350
India	-	67371	313579
Japan	13800	250000	330000
Korea S	1160	54000	63000
Malaysia	4015	12000	15000
Myanmar	-	500	3010
New Zealand	3651	5357	7139
Pakistan	1750	10800	20000
Philippines	-	5184	5363
Singapore	-	6000	7000
Taiwan	-	-	30000
Thailand	2718	15297	35000
Vietnam	-	5000	17000

Growth of PCI in Asia 2000-17

Data collected by Ms. J.Chan
 March 2018, APSIC Secretariat



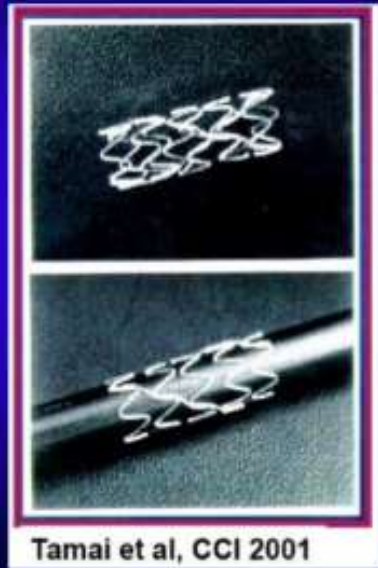
Asian contributions to Global PCI advancement over 40 years

Technical and Clinical PCI advances

- First Biodegradable coronary stent
- Establishing Trans-radial coronary intervention
- Coronary Imaging and physiology-guided PCI
- Asian contributions to global clinical trials for various pharmacologic and device therapies
- Advancing PCI for complex coronary disease, involving LM bifurcation and CTO lesions
- Demonstrating the feasibility of total coronary revascularization by PCI alone

Bioabsorbable Stent

Pioneer: Igaki-Tamai (Japan)



Biodegradable Stent



Igaki-Tamai Stent

- Coil of Poly-L-Lactic Acid monopolymer
- 0.17 mm thick, zigzag helical coil
- 12 mm length, 24% wall coverage
- Self-expanding

Tamai H et al, Circ 102(4),2000;399-404

Long-term (> 10 years) Clinical Outcomes of First-in-Man Biodegradable PLLA Coronary Stents

Ten-year follow-up of 50 Japanese pts (63 lesions) treated with 84 Igaki-Tamai stents.

- Ten-year freedom from death 87%, from cardiac death 98%, from MACE 50%
- There was 1 acute and 1 very late scaffold thrombosis; 10-year TLR and TVR were 28% and 42%, respectively
- The stent was fully absorbed by 3 years, not 6 months as expected

Implications: Acceptable MACE and scaffold thrombosis rates suggest the long-term safety of the fully bioabsorbable Igaki-Tamai stent.

Biodegradable Stent

Biodegradable Stents Four-year follow-up

Department of Cardiology, Shiga Medical Center for Adults

Hideo Tamai, M.D.

Shiga Medical Center for Adults

Nishio S, et al. *Circulation*. 2012;Epub ahead of print.

S. Saito's TRI PASTA & TEMPURA

S. Saito "TEMPURA" Trial CCI 2003:59:26-33

Major Bleeding

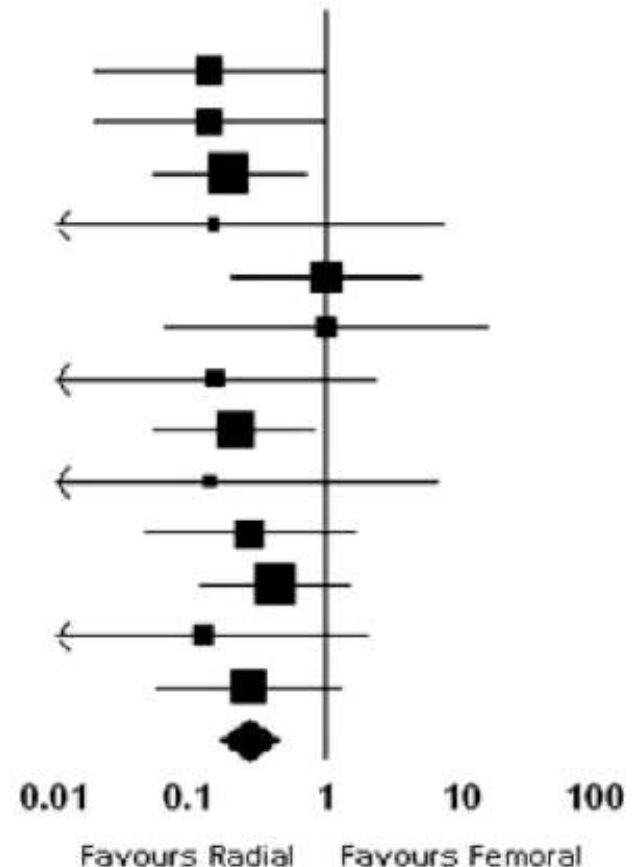
Angioplasty.Org Interview Series:
Transradial Approach

Shigeru Saito MD, FACC, FSCAI,



Study name

	Radial	Femoral	odds ratio
ACCESS	0 / 300	4 / 300	0.13
Achenbach	0 / 152	4 / 155	0.14
Bodi	3 / 666	7 / 332	0.19
BRAFE	0 / 50	1 / 55	0.15
FARMI	3 / 57	3 / 57	1.00
Gorge	1 / 214	1 / 216	1.01
Mann 1998	0 / 68	2 / 77	0.15
OCTOPLUS	1 / 192	7 / 185	0.21
OUTCLAS	0 / 322	1 / 322	0.14
RADIAL AMI	1 / 25	4 / 25	0.27
RADIAMI	3 / 50	7 / 50	0.41
TEMPURA	0 / 77	2 / 72	0.12
Vazquez-Rodriguez	1 / 217	5 / 222	0.27
	13 / 2390	48 / 2068	0.27



OR 0.27 (95% CI 0.16, 0.45) $P < .001$

Jolly AHJ 2009:157:132-140

S. Korean contributions to Coronary Imaging Technology

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Coronary OCT

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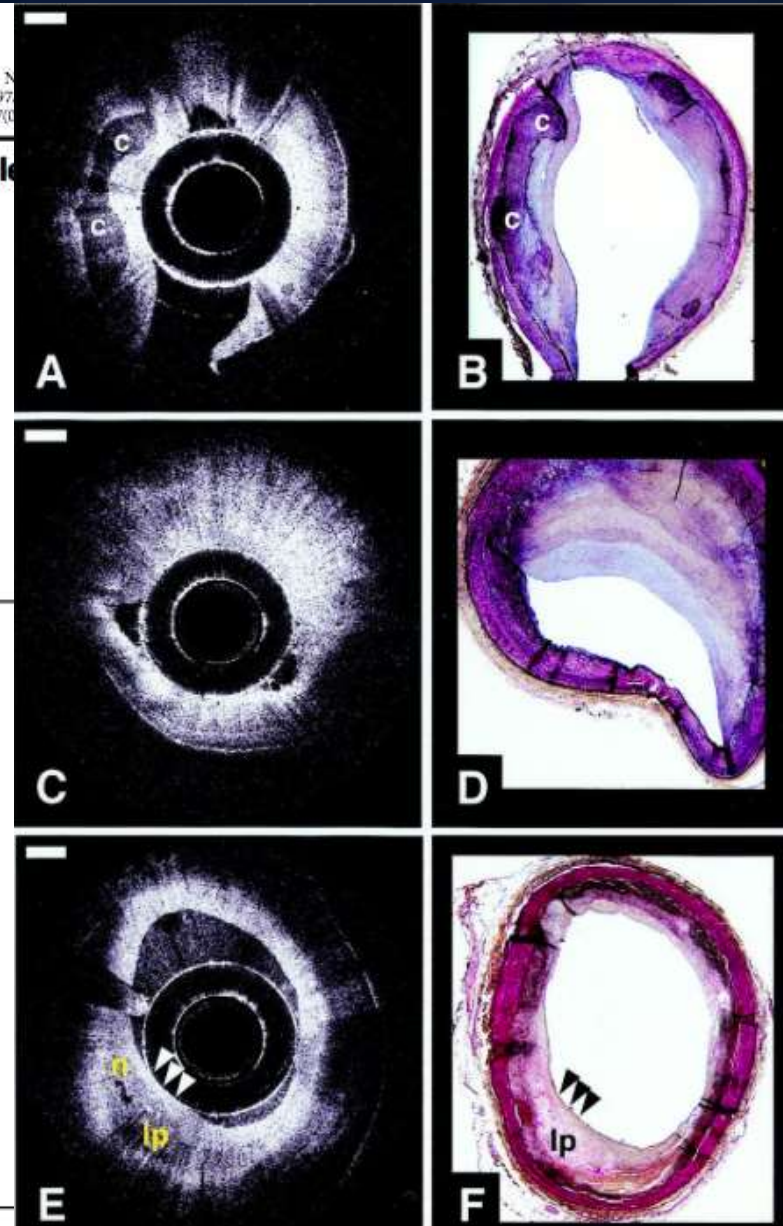
Atherosclerosis

Visualization of Coronary Atherosclerotic Plaques in Patients Using Optical Coherence Tomography: Comparison With Intravascular Ultrasound

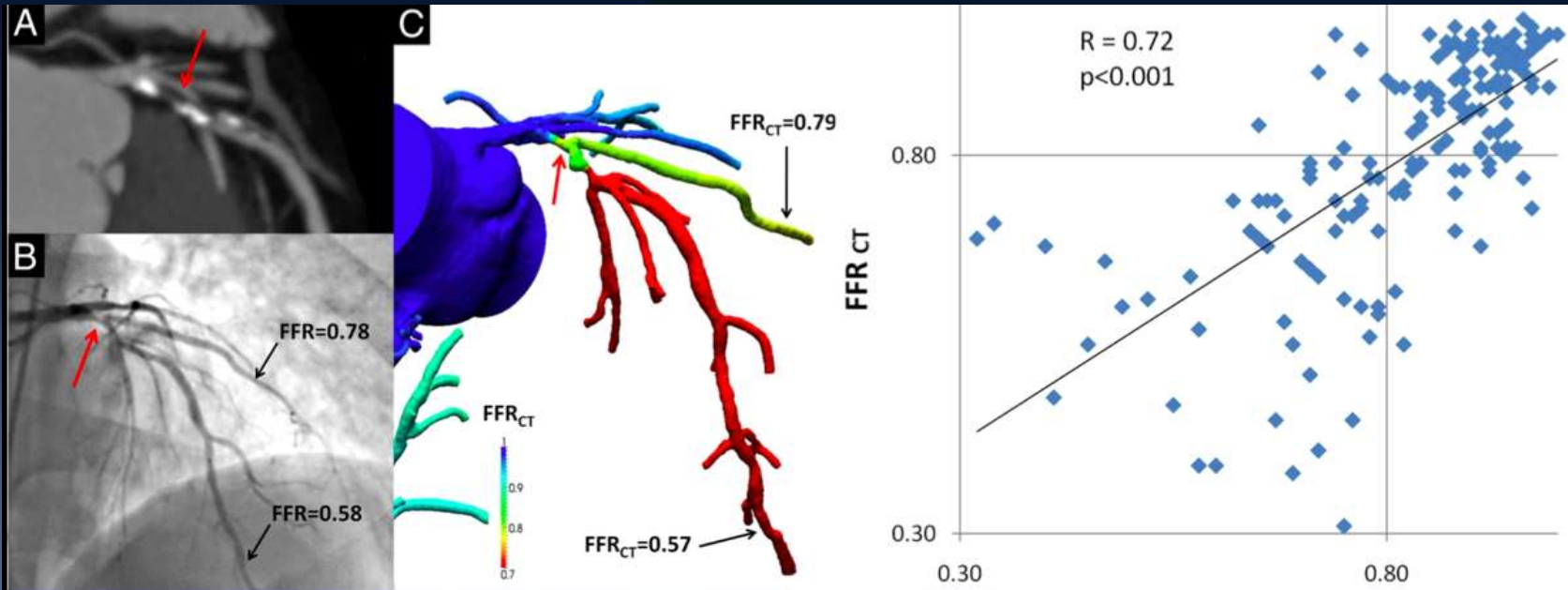
Ik-Kyung Jang, MD, PhD, FACC,* Brett E. Bouma, PhD,† Dong-Heon Kang, MD,*§ Seung-Jung Park, MD, FACC,|| Seong-Wook Park, MD, FACC,|| Ki-Bae Seung, MD,§ Kyu-Bo Choi, MD, FACC,§ Milen Shishkov, PhD,† Kelly Schlendorf, BS,† Eugene Pomerantsev, MD, PhD,* Stuart L. Houser, MD,‡ H. Thomas Aretz, MD,‡ Guillermo J. Tearney, MD, PhD†‡

Boston, Massachusetts and Seoul, Korea

- OBJECTIVES** The aim of this study was to evaluate the feasibility and the ability of intravascular optical coherence tomography (OCT) to visualize the components of coronary plaques in living patients.
- BACKGROUND** Disruption of a vulnerable coronary plaque with subsequent thrombosis is currently recognized as the primary mechanism for acute myocardial infarction. Although such plaques are considered to have a thin fibrous cap overlying a lipid pool, imaging modalities in current clinical practice do not have sufficient resolution to identify thin (<65 μm) fibrous caps. Optical coherence tomography is a new imaging modality capable of obtaining cross-sectional images of coronary vessels at a resolution of approximately 10 μm .
- METHODS** The OCT images and corresponding histology of 42 coronary plaques were compared to establish OCT criteria for different types of plaques. Atherosclerotic lesions with mild to moderate stenosis were identified on angiograms in 10 patients undergoing cardiac catheterization. Optical coherence tomography and intravascular ultrasound (IVUS) images of these sites were obtained in all patients without complication.
- RESULTS** Comparison between OCT and histology demonstrated that lipid-rich plaques and fibrous plaques have distinct OCT characteristics. A total of 17 IVUS and OCT image pairs obtained from patients were compared. Axial resolution measured $13 \pm 3 \mu\text{m}$ with OCT and $98 \pm 19 \mu\text{m}$ with IVUS. All fibrous plaques, macrocalcifications and echolucent regions identified by IVUS were visualized in corresponding OCT images. Intimal hyperplasia and echolucent regions, which may correspond to lipid pools, were identified more frequently by OCT than by IVUS.
- CONCLUSIONS** Intracoronary OCT appears to be feasible and safe. Optical coherence tomography identified most architectural features detected by IVUS and may provide additional detailed structural information. (J Am Coll Cardiol 2002;39:604-9) © 2002 by the American College of Cardiology

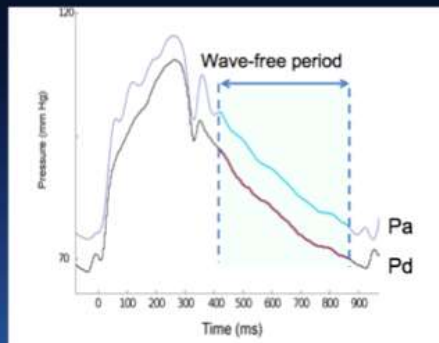


Asian contributions to FFR guided PCI



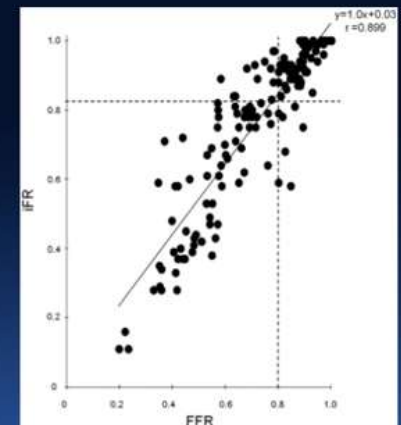
Instantaneous Wave-Free Ratio (iFR)

- iFR is measured with a pressure wire, during a wave free portion of diastole, when microvascular resistance is constant and relatively minimal



Instantaneous Wave-Free Ratio (iFR)

- iFR is a **vasodilator-free pressure-only** measure of the hemodynamic severity of a coronary stenosis
- Outcome studies (DEFINE-FLAIR, SWEDEHEART) are ongoing to determine whether iFR can substitute for FFR across a wider population



Sen et al. JACC 2012

BRIGHT: Bivalirudin vs Heparin With or Without Tirofiban During Primary PCI in Acute MI

2,194 acute MI patients randomized at 82 Chinese hospitals, Aug 2012-June 2013.
Bivalirudin protocol involved bolus followed by postprocedural infusion.

- At 30 days, bivalirudin reduced net adverse clinical events vs heparin alone (RR 0.67; 95% CI 0.50-0.90) and heparin plus tirofiban (RR 0.52; 95% CI 0.39-0.69), driven by less bleeding (4.1% vs 7.5% and 12.3%, respectively; $P < .001$ for both)
- Rates of MACCE and its components were similar for all 3 treatment groups
- There were no differences across groups in rates of acute or 30-day stent thrombosis

Implications: Use of bivalirudin during primary PCI reduces bleeding while maintaining ischemic efficacy, with no increase in stent thrombosis.

Han Y, et al. *JAMA*.
2015;Epub ahead of print.



SJ Park & PCI for LM lesions

1 or 2 Stent for LM Bifurcation When ?

1 Stent Cross Over

Normal Ostial LCX (Medina 1.1.0., 1.0.0)
Normal or Diminutive LCX
Small LCX with < 2.5 mm in diameter
Focal disease in distal LCX

2 Stent

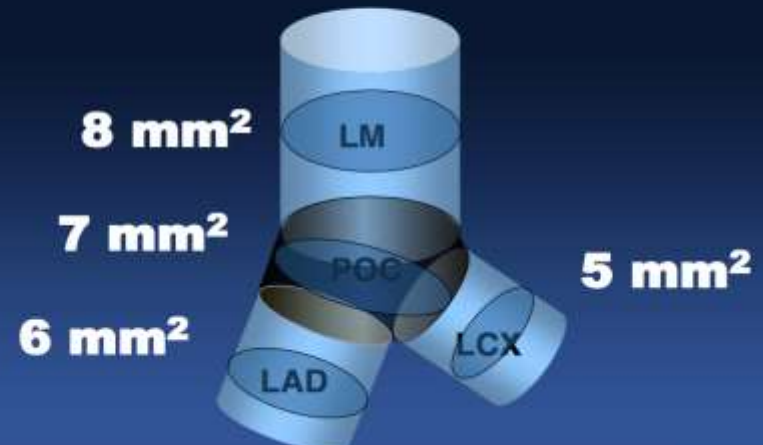
Diseased LCX (Medina 1.1.1., 1.0.1)
Large LCX with ≥ 2.5 mm in diameter
Diseased left dominant coronary system
Concomitant diffuse disease in distal LCX

Updated Meta-analysis of LM DES Trials (5 RCTs, 4,594 pts)

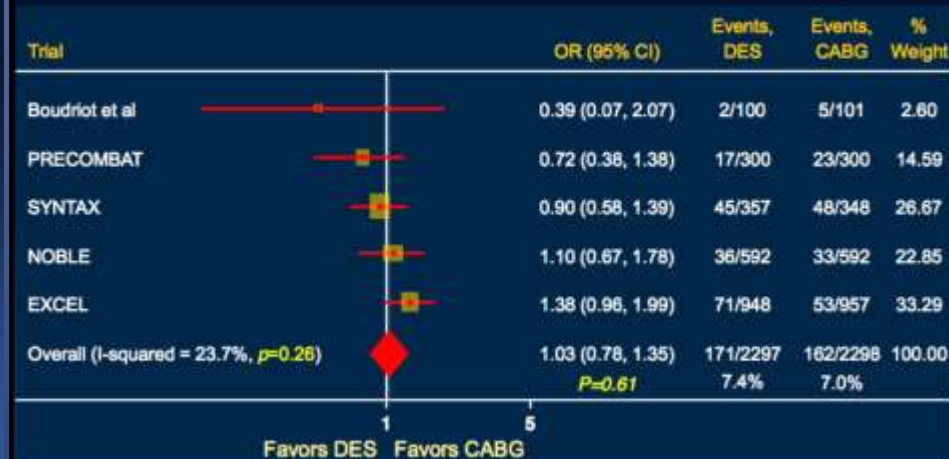
EXCEL,
NOBLE,
SYNTAX,
PRECOMBAT,
Boudriot et al



Effective Stent Area (Rule of 5,6,7,8 mm²)
Restenosis Rate < 5% and TLR < 2%



Death



SL Chen's DK Crush for 2-stent LM stenting



DKCRUSH V

DKCRUSH V

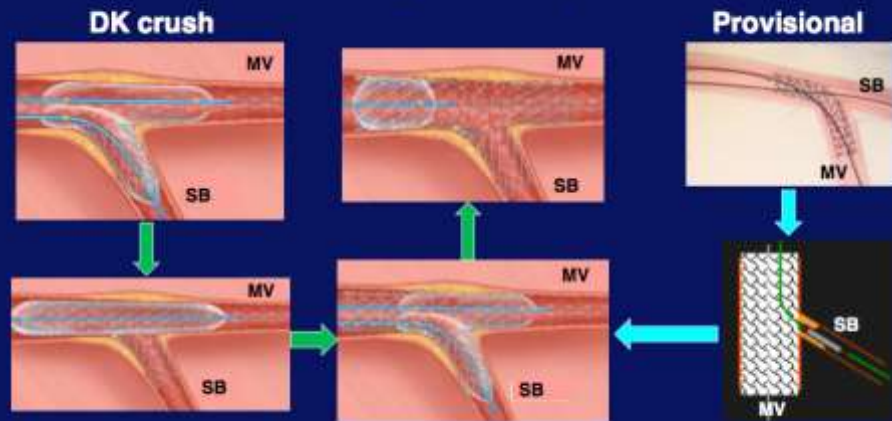
Double Kissing Crush versus Provisional Stenting for Left Main Distal Bifurcation Lesions: The DKCRUSH-V Randomized Trial

Shao-Liang Chen, MD

Jue-Jie Zhang, Yaling Han, Jing Kan, Lianglong Chen, Chunguang Qiu, Tiemin Jiang, Ling Tao, Hesong Zeng, Li Li, Yong Xia, Chuanyu Gao, Teguh Santoso, Chootopol Palboon, Yan Wang, Tak W Kwan, Fei Ye Nailiang Tian, Zhizhong Liu, Song Lin, Chengzhi Lu, Shangyu Wen, Lang Hong, Qi Zhang, Imad Sheiban, Yawei Xu, Lefeng Wang, Tanveer S Rab, Zhanquan Li, Guanchang Cheng, Lianqun Cui, Martin B Leon, Gregg W. Stone

DKCRUSH V

Stenting Techniques



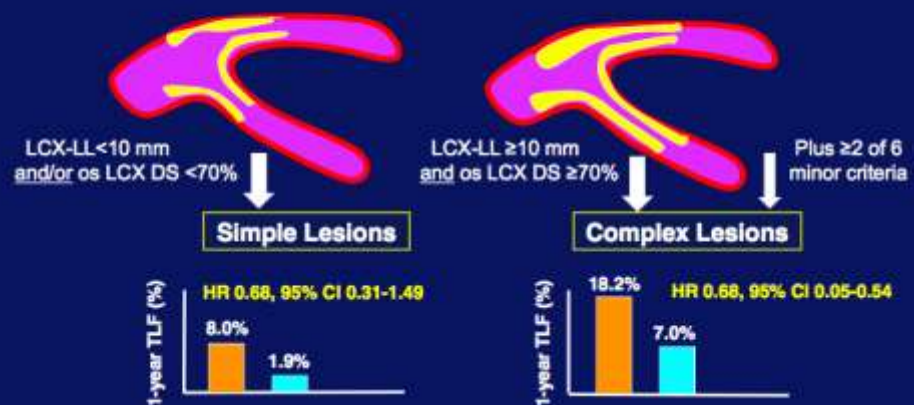
DKCRUSH V

Primary Endpoint Target Lesion Failure



DKCRUSH V

Target Lesion Failure at 1-Year Simple vs. Complex Bifurcation Lesions



O. Katoh's CART & Recersed CART for CTO PCI



JACC: Cardiovascular
Interventions

ELSEVIER Volume 3, Issue 2, February 2010, Pages 155-164



Osamu Katoh

Mini-Focus Issue: Chronic Total Occlusion

A Novel Modification of the Retrograde Approach for the Recanalization of Chronic Total Occlusion of the Coronary Arteries: Intravascular Ultrasound-Guided Reverse Controlled Antegrade and Retrograde Tracking

Sudhir Rathore MD · ʘ ʘ, Osamu Katoh MD ·, Etsuo Tuschikane MD, PhD ·, Akitsugu Oida MD†, Takahiko Suzuki MD ·, Shimichi Takase MD†

Show more

<https://doi.org/10.1016/j.jcin.2009.10.030>

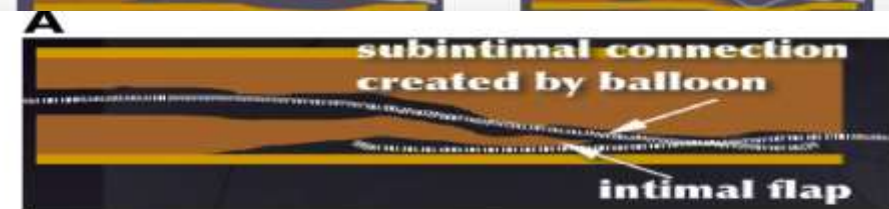
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Objectives

The study evaluates the feasibility and efficacy of the novel modification of the retrograde recanalization of the chronic total occlusion (CTO) of the coronary arteries by using intravascular ultrasound (IVUS)-guided reverse controlled antegrade and retrograde tracking (CART).



Non-equivalent Modalities to achieve Complete Coronary Revascularization



Non-equivalent procedures with equivalent Outcome in Patients with Complex Diseases?

Non-equivalent Access to CABG Revascularization in Asia and the West

Cultural Preference

- Asian cultural reluctance to open chest surgery with resultant PCI to CABG ratio varying from 3 to 100:1

Technical Constrain

- CABG surgical not routinely available in most hospitals in Asia, PCI is often the only coronary revascularization modality available in most Asian hospitals
- In Asia , the lack of surgical expertise and training in CABG surgical team, compared to a single operator training for PCI development

Economic Constrain

Costs remains a prohibitive reason for rapid growth of coronary revascularization therapy in most developing Asian nations

CTO lesions maybe the culprit for Incomplete Coronary Revascularization in MV-PCI

- Interventional risk treatment paradox

Baseline SYNTAX score	7.5 ± 5.6	9.3 ± 6.1	12.6 ± 6.9	21.7 ± 8.6	<.001
Residual SYNTAX score	0	1.5 ± 0.5	5.2 ± 1.6	15.8 ± 6.5	<.001
Delta† SYNTAX score	7.3 ± 5.4	7.5 ± 6.1	6.9 ± 6.3	5.7 ± 6.4	.15

- Untreated Lesions

	rSS >0–2 (n = 523)	rSS >2–8 (n = 578)	rSS >8 (n = 501)	p Value All Groups
Severe calcification	0 (0%)	10 (1.7%)	59 (11.8%)	<0.001
Chronic total occlusion	1 (0.2%)	58 (10.0%)	216 (43.1%)	<0.001
Bifurcation/trifurcation	0 (0%)	179 (30.9%)	287 (57.3%)	<0.001
Aorto-ostial lesion	1 (0.2%)	4 (0.7%)	14 (0.3%)	<0.001
Lesion length >20 mm	3 (0.6%)	143 (24.7%)	351 (70.1%)	<0.001
Small vessel/diffuse disease*	409 (78.2%)	303 (52.4%)	264 (52.7%)	<0.001

Perhaps, a new Operator-Classification incorporating CTO skills for PCI Operators ?

<u>Operator Class*</u>	<u>Lesion Complexity (fSS Score)</u>			
	<u>A(<22)</u>	<u>B(<32)</u>	<u>C(>33)</u>	<u>D(C+CTO)</u>
D	D	D	-	-
C	C	C	-	-
B	B	B	B	-
A	A	A	A	A

* A,B,C: PTCA operator-Classification, SCAI 1993; D new proposed class

Centers#	R U	R U	U T	URT
	Pb Pr	Pb Pr	Pb Pr	Pb Pr

R/U **R**ural/**U**rban hospitals: Pb/Pr **P**ublic/**P**rivate hospitals
 T: **T**raining institutes; R: **R**esearch & Training institutes)

Proposed Asian CBS Trial : Complete Coronary Revascularization by **B**ypass versus **S**tenting Trial

Hypothesis: “Equivalent long-term outcome after Complete Revascularization (rSS <8) by Stenting* versus CABG Surgery

Inclusion:

Complex CAD pts (by FSS>33)

Therapy:

Staged Clin/FFR-guided PCI*
to target Residual rSS < 8
by D-grade operators in Asia
& the West

vs

Inclusion:

Complex CAD pts (FSS>33)

Therapy:

1 CABG with target rSS <8
in selected centers in Asia
& the West

Primary End-point : In-hospital, 30d & annual all-cause mortality & MACCE for at least 5 years

* Sequential Clinical & FFR-guided PCIs for Culprit & Non-culprit lesions

Conclusion

Asian Perspectives in 40 Years of PTCA

- Rapid but heterogeneous growth of PTCA/PCI in Asia
- Significant scientific, technical and clinical contributions were made in Asia towards global PCI advancement
- Asia's routine staged Clinical/FFR guided PCI to achieve complete revascularization must be compared to best Western CABG for complex multi-vessel CAD
- A well-designed trial involving Asia and the West should be designed to prove equivalence of long-term benefits for both therapeutic strategies

Appreciation and acknowledgement of information in this presentation

Prof. Tan Huay Cheem, Ms Joe Chen,
President & Secretary of APSIC

*NB: Data are sourced from personal communications & publications. Presenter takes responsibility for all data inaccuracies and omission of significant Asian scientific contributions

Thank You



Live case, TCT-AP 2014