

The relationship of the underlying lipidic plaque at the implanted newer-generation drug-eluting stents with future stent-related events: insights from the REASSURE-NIRS registry

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Background: Lipid-rich plaque is an important substrate causing acute coronary events. Near-infrared spectroscopy (NIRS) imaging has been shown to visualize lipidic coronary plaque at non-culprit site associated with future coronary events. Given that histopathological studies reported that the unstable plaque underlying the implanted drug-eluting stent (DES) could cause neoatherosclerosis formation, we hypothesized that NIRS-based evaluation of lipidic plaque burden behind the implanted DES may clinically predict the occurrence of stent failure in patients with CAD receiving PCI.

Purpose: We aimed to investigate the relationship of stent-related events' risk with lipidic plaque materials behind the implanted DES imaged by NIRS/intravascular ultrasound (NIRS/IVUS) imaging.

Methods: The REASSURE-NIRS registry is an on-going multi-center registry to enroll CAD subjects receiving NIRS/IVUS-guided PCI. In this registry data, 406 lesions in 379 CAD subjects (ACS/non-ACS=150/229) receiving new-generation DES were analyzed. Minimum stent area (MSA) after PCI and maximum lipid-core-burden index in any 4mm-segment within the implanted stents (in-stent maxLCBI4mm) were measured. A 3-year lesion-oriented composite outcome [LOCO: culprit lesion-related MI + ischemia-driven target lesion revascularization (ID-TLR)] was compared in subjects stratified according to the tertile of in-stent maxLCBI4mm.

Results: The mean value of in-stent maxLCBI4mm was 221, and 17% of lesions exhibited in-stent maxLCBI4mm >400. Patients with a greater in-stent maxLCBI4mm were more likely to exhibit a higher LDL-C level ($p=0.026$) with a longer stent length ($p<0.001$) and a smaller MSA ($p=0.033$) (Picture 1). Over 95% of entire study subjects received a statin. During the observational period (median=726 days), the frequency of LOCO up to 3 years was 3.4% in entire study subjects (culprit lesion-related MI=1.0%, ID-TLR=2.8%). Kaplan-Meier curve analysis demonstrated that the occurrence of LOCO did not increase in association with in-stent maxLCBI4mm (log-rank p -value=0.25, Picture 2). In addition, in-stent maxLCBI4mm did not associate with each component of LOCO (culprit lesion-related MI: $p=0.502$, ID-TLR: $p=0.872$). Receiver Operating Characteristic analysis revealed that the predictive ability of in-stent maxLCBI4mm for the occurrence of LOCO was unsatisfactorily (c-statistics=0.486).

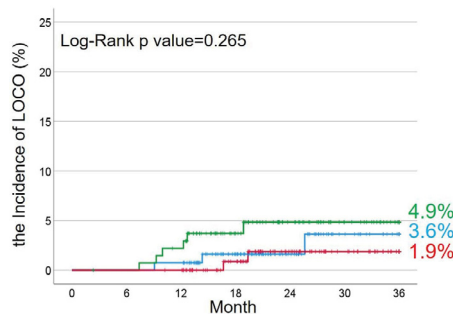
Conclusion: The amount of underlying lipidic materials at culprit lesions receiving new-generation DES implantation did not necessarily predict future stent-related events. Clinical significance of maxLCBI4mm behind the implanted DES may be different from that at naïve non-culprit plaques.

	in-stent maxLCBI4mm			p value
	Low tertile (0-124)	Middle tertile (126-272)	High tertile (276-799)	
Background characteristics				
Age, years	70 ± 10	68 ± 11	69 ± 11	0.415
Male	79%	81%	80%	0.940
ACS	36%	37%	45%	0.309
Statin use at discharge	95%	95%	97%	0.579
Laboratory data at administration				
LDL-C, mg/dL	94 ± 35	95 ± 37	105 ± 35	0.026
HbA1c, %	6.2 ± 0.7	6.3 ± 0.9	6.3 ± 0.9	0.622
Angiographical findings after PCI				
LAD	52%	64%	62%	0.100
Total stent length, mm	25.6 ± 11.1	30.9 ± 14.4	32.7 ± 15.8	<0.001
Percent diameter stenosis, %	7 (2-12)	7 (3-14)	7 (1-14)	0.815
Intravascular ultrasound findings after PCI				
Minimum stent area, mm ²	6.34 ± 2.26	5.80 ± 2.18	5.69 ± 2.07	0.033

LAD; left anterior-descending artery, LCBI; lipid-core burden index, PCI; percutaneous coronary intervention

Background and lesion characteristics

LOCO; Lesion-oriented clinical outcomes
=culprit lesion-related MI + ischemia-driven target lesion revascularization



in-stent maxLCBI4mm
Low (0-124) Middle (126-272) High (276-799)

LCBI; lipid-core burden index

Kaplan-Meier analysis for LOCO