Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.

eTable 1. Angiography Results

	Patients with at least one SVG	Device Supported	Device Unsupported
Vein Graft Occlusion	85/203 (41.9%)	55/203 (27.1%)	56/203 (27.6%)
100% Occlusion	74/203 (36.5%)	47/203 (23.2%)	45/203 (22.2%)
Severe Disease	18/203 (8.9%)	8/203 (3.9%)	11/203 (5.4%)
Vein Graft Failure	87/202 (43.1%)	61/202 (30.2%)	53/202 (26.2%)

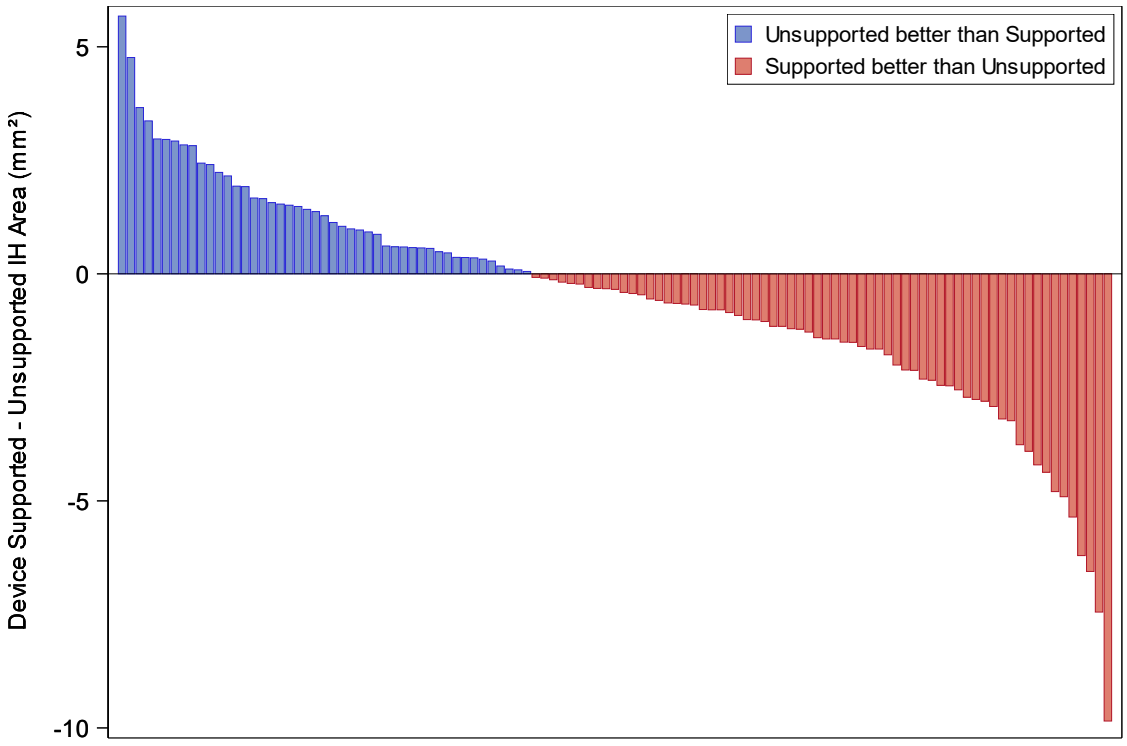
Abbreviations: SVG, saphenous vein grafts

eTable 2. IVUS Results

	Device Supported (N=203)	Device Unsupported (N=203)	Missing value imputation
IVUS performed	143 (70.4%)	142 (70.0%)	None
100% Graft Occlusion	47 (23.2%)	45 (22.2%)	Not missing at random
Graft Severe Disease	8 (3.9%)	11 (5.4%)	Not missing at random
Technical Issues	5 (2.5%)	5 (2.5%)	Missing at random

Abbreviations: IVUS, intravascular ultrasound

eFigure. Within-Patient Differences in IH Area



Waterfall plot of the differences in intimal hyperplasia (IH) area between device supported and unsupported grafts within each of 113 patients for which both graft were evaluable with IVUS at 12 months post-randomization. A positive difference indicates higher IH area in supported graft compared to unsupported graft. A negative difference indicates higher IH area in unsupported graft compared to supported graft.

eTable 3. Secondary Endpoints

Secondary Outcomes	Analysis Population	Device Supported	Device Unsupported	Mixed Model[a] Difference (95% CI)
Intimal Hyperplasia Thickness, mean (SD), mm	All Available (n=285 vessels)	0.38 (0.14)	0.43 (0.16)	-.044 (-.075, -.013)
Lumen Diameter Uniformity by CV, mean (SD)	All Available (n=307 vessels)	0.13 (0.06)	0.13 (0.07)	0.001 (-.011, 0.014)
Ratio SVG Lumen Diam. to Target Artery Lumen Diam., mean (SD)	All Available (n=305 vessels)	1.64 (0.37)	1.62 (0.37)	0.015 (-.057, 0.088)
Blood Flow, mean (SD), mL/s	All Available (n=297 vessels)	1.05 (0.63)	1.00 (0.58)	0.064 (-.067, 0.196)
Blood Velocity, mean (SD), cm/s	All Available (n=297 vessels)	15.15 (7.19)	14.74 (6.63)	0.561 (-.844, 1.966)
TIMI Flow Grade, No. (%)	Completer (n=199 patients)			
0		46 (23.1)	42 (21.1)	
1		0 (0)	1 (0.5)	
2		14 (7.0)	9 (4.5)	
3		139 (69.8)	147 (73.9)	
Ectasia, No. (%)	Completer (n=126 patients)	21 (16.7)	27 (21.4)	
Graft Failure (Supported on left, Unsupported on right), No. (%)	Completer (n=99 patients)	30 (30.3)	32 (32.3)	
Graft Failure (Supported on right, Unsupported on left), No. (%)	Completer (n=91 patients)	28 (30.8)	18 (19.8)	

Abbreviations: CV, coefficient of variation; Diam., diameter; SVG, saphenous vein grafts; TIMI, Thrombolysis in Myocardial Infarction

[a] Point and interval estimates based on linear mixed effects model with random subject effect and device supported vs. unsupported as fixed effect.

eMethods. Sensitivity Analyses of the Primary Endpoint

The Statistical Analysis Plan (SAP) included sensitivity analyses of the primary endpoint. One of them was evaluating the primary endpoint in different analysis populations. We considered the completer analysis set and intent-to-treat analysis set, and per-protocol analysis set.

A complete case analysis was performed on the primary endpoint and included all vessels of patients with non-missing 12-month intimal hyperplasia area for both the supported and unsupported grafts (n=113 patients; 226 vessels). The analysis employed the standard Wilcoxon signed-rank test and assumed that unmeasured intimal hyperplasia area was missing completely at random.

An intent-to-treat analysis was performed on the primary endpoint and included all randomized vessels (n=224 patients; 448 vessels). Missing values of vessels for patients who refused the 12-month visit or who were lost to follow-up (including withdrawals) prior to the 12-month assessment were considered missing at random. Missing values of vessels for patients who died prior to the 12-month assessment were considered as equivalent for the supported and unsupported vessel and received a 0 in the computation of the test statistic for the Wilcoxon signed-rank test. Missingness due to occlusion/severe disease or technical issues were handled similarly as in the primary analysis in which technical issues was assumed missing at random while occlusion/severe disease was considered not missing at random with occluded/severely diseased vessels penalized with higher imputed values. The analysis employed a modified form of the Wilcoxon signed-rank test, similar to the analysis of the primary endpoint.

Another sensitivity analysis performed on the primary endpoint in the full analysis set (n=203 patients; 406 vessels) was to assume that missing intimal hyperplasia area due to occlusion/severe disease was missing at random. This implied that imputed values for occluded/severely diseased vessels were not shifted higher and were not penalized in the calculation of the test statistic for the Wilcoxon signed-rank test. Therefore, the analysis employed the standard Wilcoxon signed-rank test.

Lastly, a per protocol analysis was performed on the primary endpoint. The per protocol set was a subset of the full analysis set with the additional following exclusions: (1) patients whose 12-month primary endpoint visit was not completed within ±90 days of the expected date (2) patients with missing TTFM flow data during the index procedure (3) patients who did not have the study device implanted and (4) patients with a deviation of "Investigational Device not used per Instructions for Use" (n=191 patients; 382 vessels). Missing intimal hyperplasia area was handled similarly as the primary analysis and the modified form of the Wilcoxon signed-rank test was used.

eTable 4. Different analysis populations and missing data assumption for primary endpoint

Analysis Set	Missing Assumption Occluded/Diseased Grafts	No. Patients	Device Supported	Device Unsupported	P Value
Full Analysis Set Estimated mean ± SE	Not missing at random (Primary Analysis)	203	5.11 ± 0.16	5.79 ± 0.20	0.07
Completer Set Observed mean ± SE	Completely at random	113	4.58 ± 0.18	5.12 ± 0.23	0.04
Intent-to-Treat Set Estimated mean ± SE	Not missing at random	224	5.08 ± 0.17	5.69 ± 0.19	0.08
Full Analysis Set Estimated mean ± SE	Missing at random	203	4.64 ± 0.15	5.32 ± 0.19	0.006
Per Protocol Set Estimated mean ± SE	Not missing at random	191	5.07 ± 0.18	5.66 ± 0.19	0.06

Abbreviations: SE, standard error

In the analysis of the primary endpoint, we assumed that the mean for non-observed values due to occlusion/severe disease was shifted higher than the mean for observed values (not missing at random assumption) and equal to the 90th percentile of the distribution of intimal hyperplasia area. The value of the shift parameter, 1.70, was based on previous studies and values drawn from a normal distribution with mean=1.70 and standard deviation=0.25 were added to the imputed values of occluded/severely diseased grafts. Data from the current trial showed that the value of the shift parameter was closer to the 83.5th percentile rather than the 90th percentile.

We varied the shift parameter to correspond to different percentiles of intimal hyperplasia area to determine how large the shift had to be to change the outcome of the primary analysis with respect to statistical significance of the treatment effect in the full analysis set (n=203 patients; 406 vessels). We did not go below the 65th percentile since the shift parameter would be smaller than the assumed standard deviation of 0.25 (or because the percentile was smaller than the aggregate mean).

eTable 5. Varying penalty for occluded/severely diseased grafts in primary endpoint

Percentile of IH Area	Shift	P Value
65th percentile	0.50	0.093
70th percentile	0.69	0.087
75th percentile	0.95	0.085
83.5th percentile	1.70	0.072
85th percentile	1.93	0.074
90th percentile	2.80	0.072
95th percentile	4.10	0.087

Abbreviations: IH, intimal hyperplasia

The p-values follow a U shape trajectory because our modified Wilcoxon signed-rank test changed the sign of the ranks of the paired differences in favor of the non-occluded graft. Consider the following scenario. That observed intimal hyperplasia area appeared higher in the unsupported grafts than supported grafts and small shifts penalized occluded/diseased grafts less, if the supported graft were occluded/diseased, its imputed intimal hyperplasia area after accounting for not missing at random under a small shift may not be larger than the observed intimal hyperplasia area from its unsupported counterpart. This would be compensated by switching the sign of the difference in favor of the non-occluded/non-diseased unsupported graft in the modified Wilcoxon signed-rank test, yielding a conservative p-value.

Patient- and vessel-level factors for occluded/severely diseased grafts

eTable 6. Characteristics of patients with occluded/severely diseased graft(s)

	Total (N=85)
Current smoker or ex-smoker	39 (45.9)
Diabetes	49 (57.6)
Hypertension	70 (82.4)
Hyperlipidemia	71 (83.5)
SVG harvesting technique, No. (%)	
Direct	9 (10.6)
Endoscopic	69 (81.2)
Bridge	7 (8.2)
Vein preservation, No. (%)	
Saline/Heparinized saline	50 (58.8)
pH-buffered/Heparinized pH-buffered	21 (24.7)
Autologous blood	3 (3.5)
More than one method	11 (12.9)

Abbreviations: SVG, saphenous vein grafts

eTable 7. Characteristics of occluded/severely diseased grafts by randomization arm

	Device Supported (N=55)	Device Unsupported (N=56)
Native artery % stenosis, No. (%)		
50%-74% stenosis	1 (1.8)	0 (0.0)
75%-99% occlusion	44 (80.0)	46 (82.1)
100% occlusion	10 (18.2)	10 (17.9)
Graft length, median (IQR), cm	14.0 (12.0-15.0)	15.0 (13.0-18.0)
Final TTFM flow, median (IQR), mL/min	32.0 (26.0-45.0)	28.0 (20.0-50.0)
Final TTFM pulsatility index, median (IQR)	2.5 (1.9-3.6)	3.4 (2.1-5.0)
Coronary territory, No. (%)		
Left	31 (56.4)	21 (37.5)
Right	24 (43.6)	35 (62.5)

Abbreviations: TTFM, transit time flow measurement