

Multi-Vessel Disease Revascularization: Consensus and Gaps in 2023

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ISCHEMIA Trial: Summary

- 5179 patients randomized to INV vs. CON
 - *Largest treatment strategy trial of SIHD*
- Enrolled high-risk subset
 - *54% severe ischemia; 76% with multivessel CAD; 47% with proximal LAD disease (CCTA)*
- Cath and Revascularization
 - *Invasive strategy: 80% revascularized (74% PCI/26% CABG)*
 - *Conservative strategy: 28% cath; 23% revasc at 4-years*
- Medication Therapy
 - *95% statins; 66% high intensity statin; LDL 64 mg/dl; SBP 129 mm Hg*

Which Patients were Not Enrolled in ISCHEMIA?

- ACS within 2 months
- EF < 35%
- NYHA Class III-IV HF
- Unacceptable angina despite medical therapy
- PCI or CABG within 1 year
- Severe left main disease

Potential Reasons for Revascularization in SIHD

- To improve survival
- To prevent other cardiovascular events
- To improve quality of life

Revascularization to Improve Survival in SIHD

- Overall cohort
- High risk subgroups
 - Left main disease
 - LV dysfunction
 - 3-vessel disease
 - Proximal LAD disease
 - Extensive ischemia

Contemporary Revascularization vs. Medicine SIHD Trials

No difference in mortality

2007



No difference in death

2009



No difference in death

2012

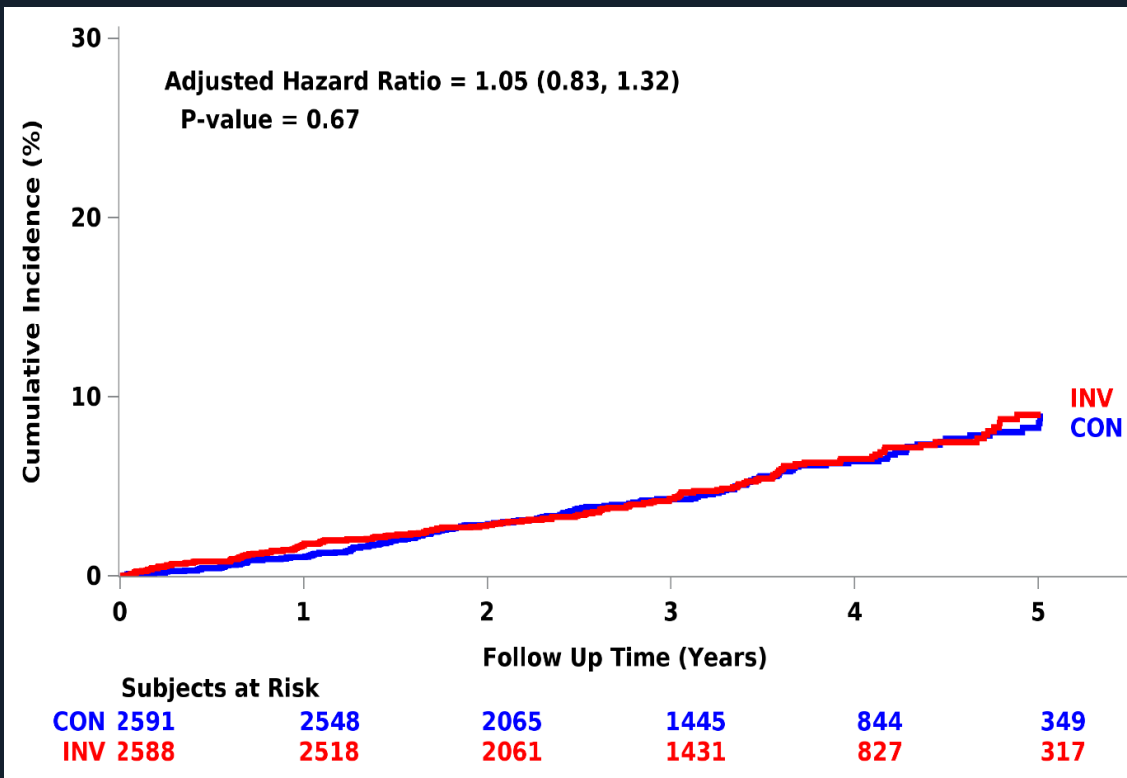
**FAME 2
Trial**

No difference in death

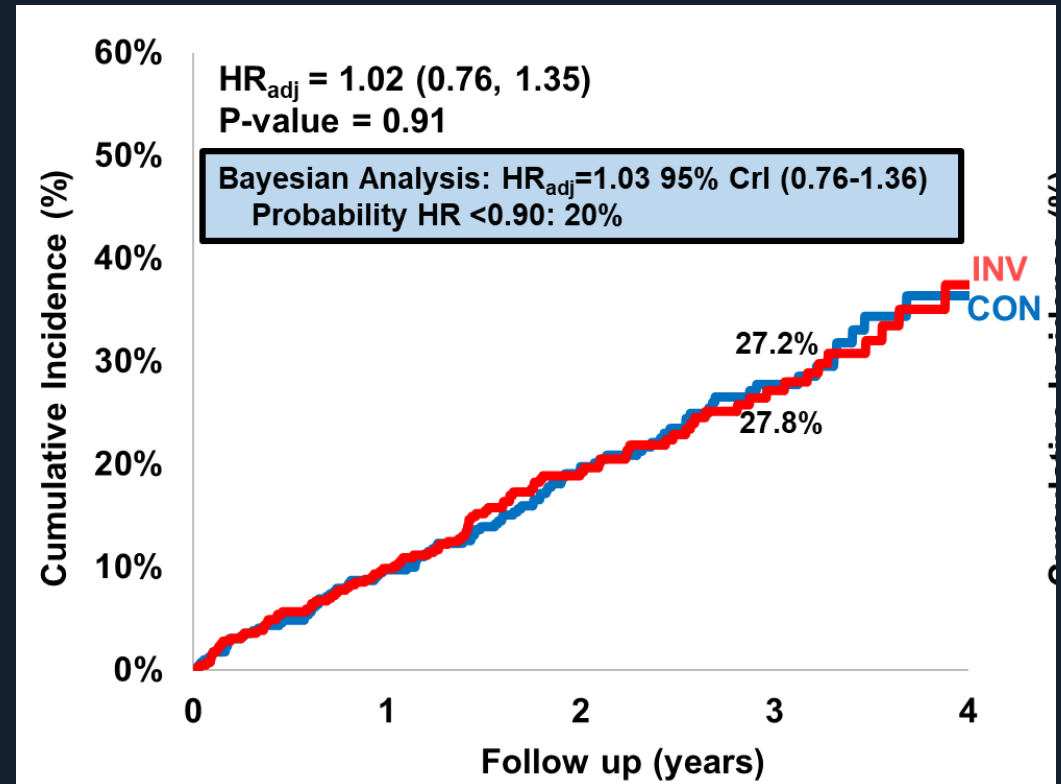
ISCHEMIA and ISCHEMIA-CKD trials

No difference in mortality

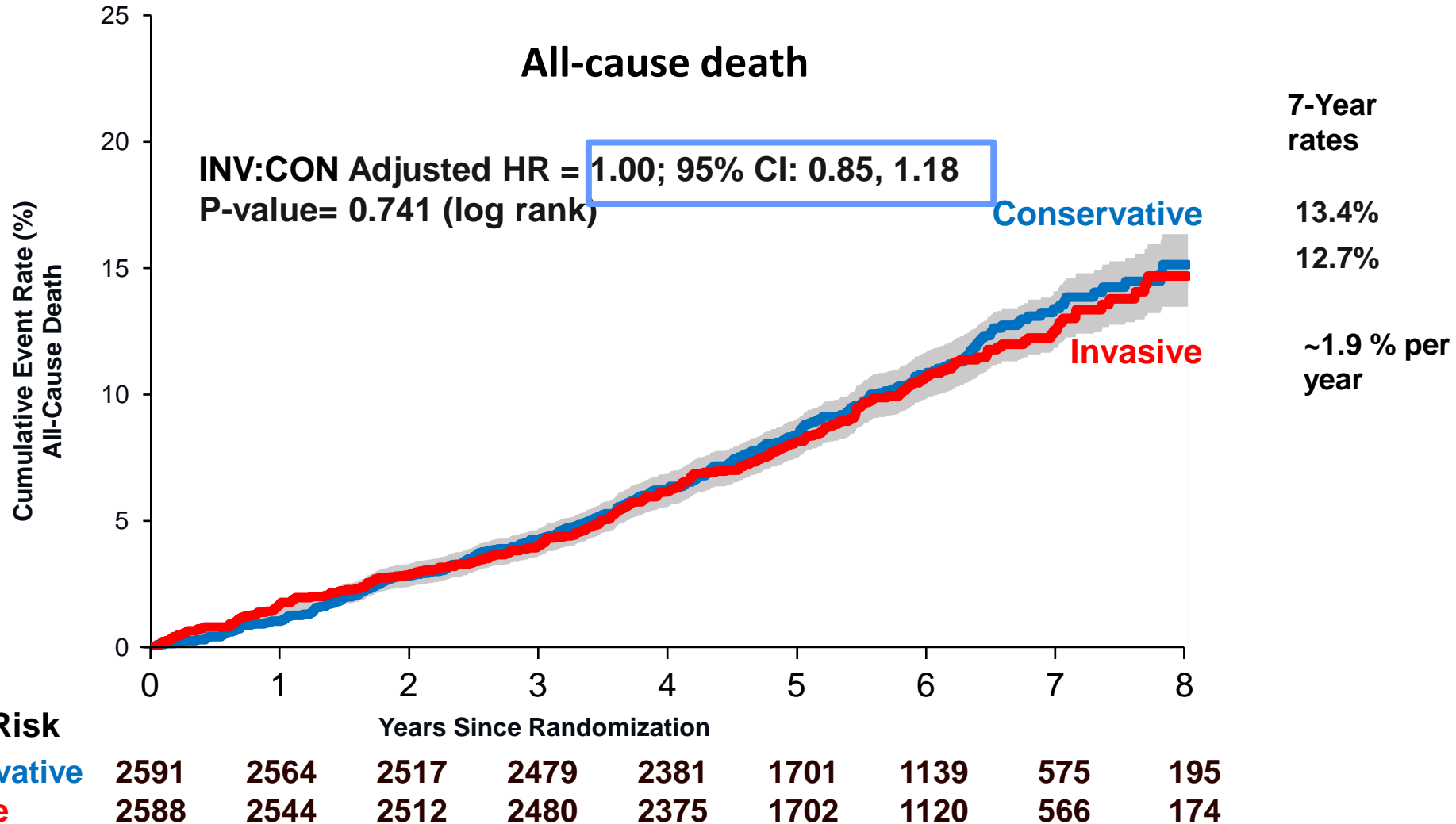
ISCHEMIA



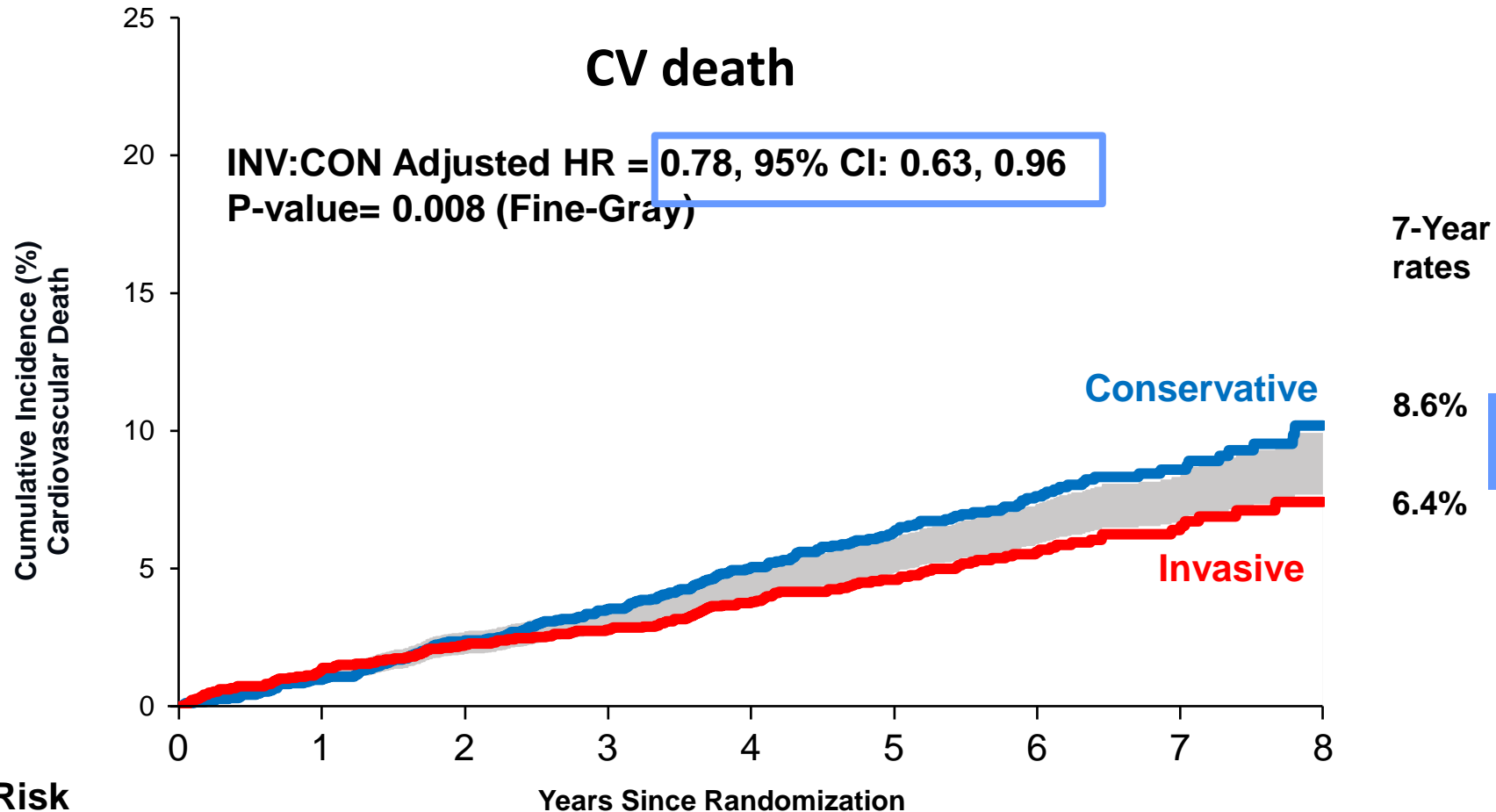
ISCHEMIA-CKD



ISCHEMIA EXTEND: All-cause death



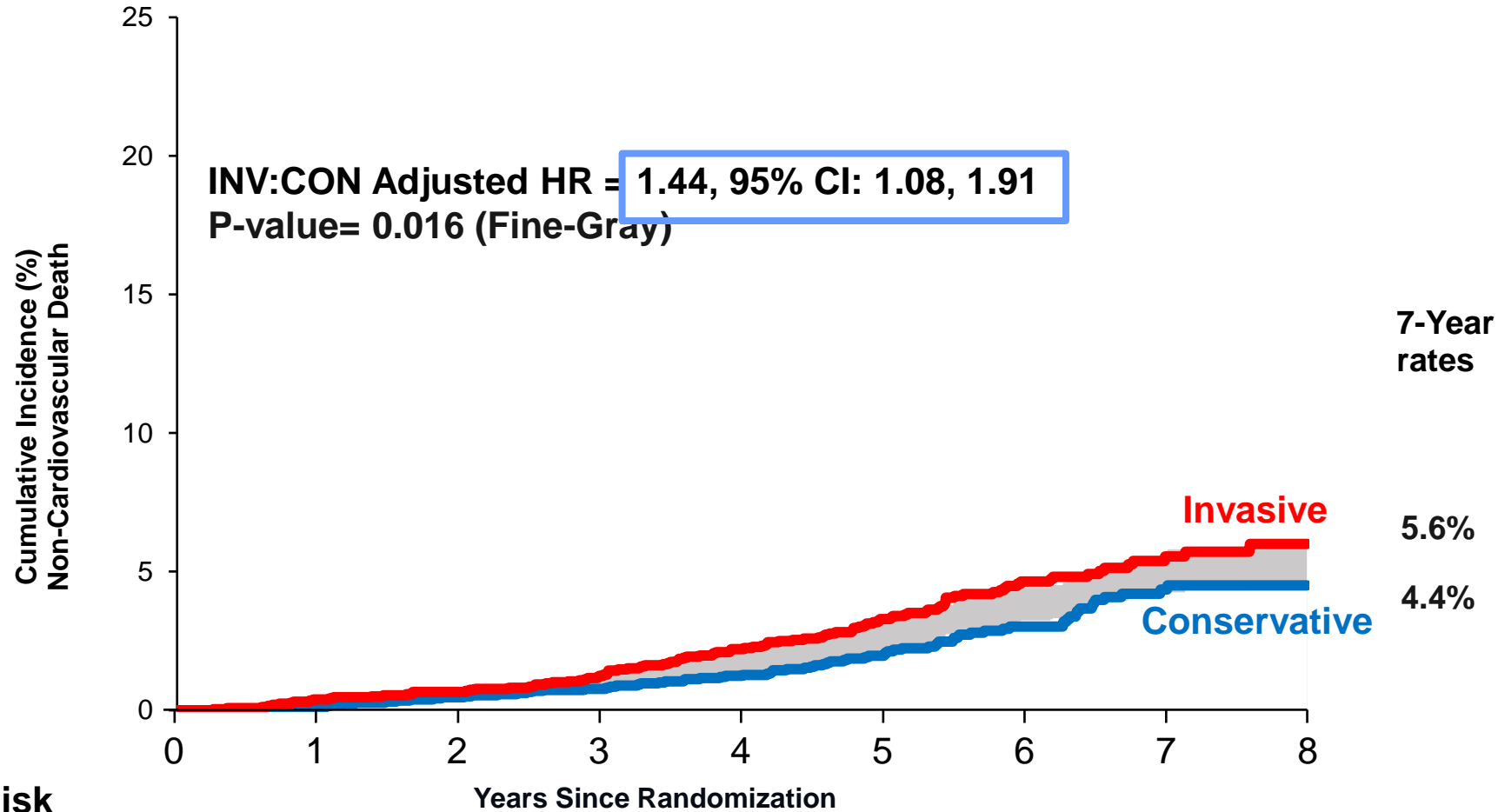
ISCHEMIA EXTEND: CV death



No. at Risk

Conservative	2591	2564	2516	2477	2378	1699	1137	575	195
Invasive	2588	2544	2509	2476	2373	1697	1116	564	174

ISCHEMIA EXTEND: Non CV death



No. at Risk

	0	1	2	3	4	5	6	7	8
Conservative	2591	2564	2516	2477	2378	1699	1137	575	195
Invasive	2588	2544	2509	2476	2373	1697	1116	564	174

Revascularization to Improve Survival in SIHD

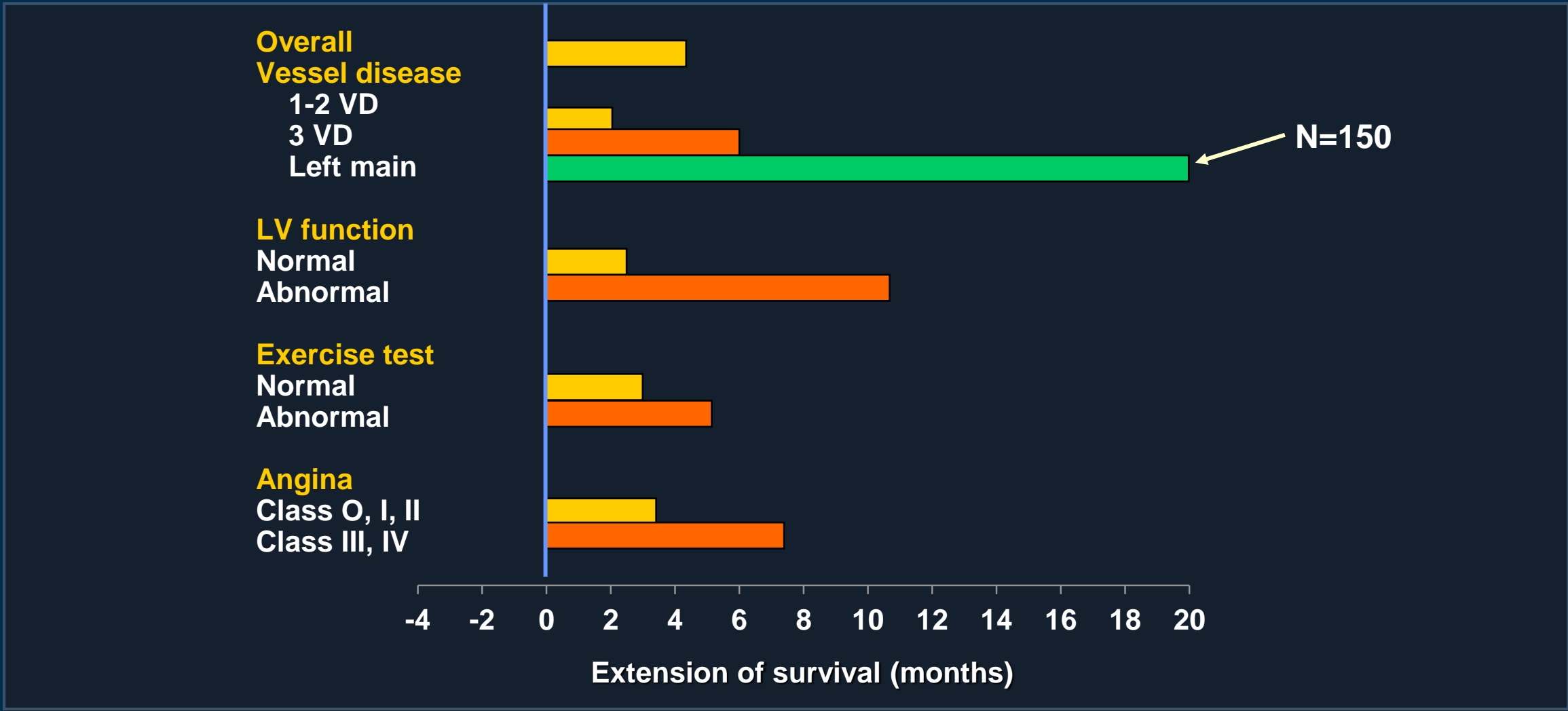
- Overall cohort
 - *Similar survival compared with MT*
 - *Small reduction (0.3%/year) in cardiac death*
- High risk subgroups
 - Left main disease
 - LV dysfunction
 - 3-vessel disease
 - Proximal LAD disease
 - Extensive ischemia

Revascularization to Improve Survival in SIHD

- Overall cohort
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 - Left main disease
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 - Extensive ischemia

Extension of Survival in Left Main Disease with Revascularization

CABG vs. No CABG trials-1980s



Revascularization to Improve Survival in High Risk Subgroups

- Overall cohort
- High risk subgroups
 - Left main disease. *Revasc vs. Med: Survival benefit of CABG (older trials-150 patients)*
 - LV dysfunction
 - 3-vessel disease
 - Proximal LAD disease
 - Extensive ischemia

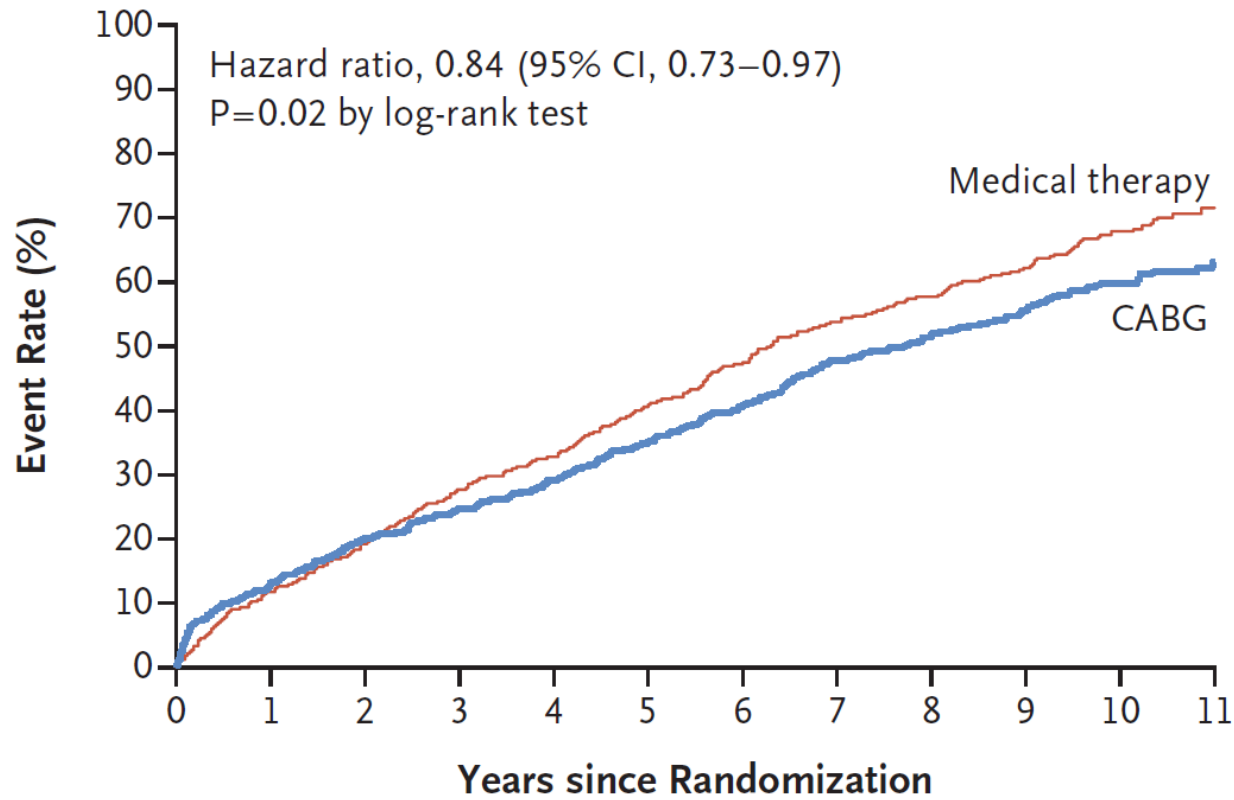
Revascularization to Improve Survival in SIHD

- Overall cohort
- High risk subgroups
 - Left main disease
 - LV dysfunction
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 - Proximal LAD disease
 - Extensive ischemia

Extension of Survival in LV Dysfunction with Revascularization

STICHES trial

A Death from Any Cause (Primary Outcome)

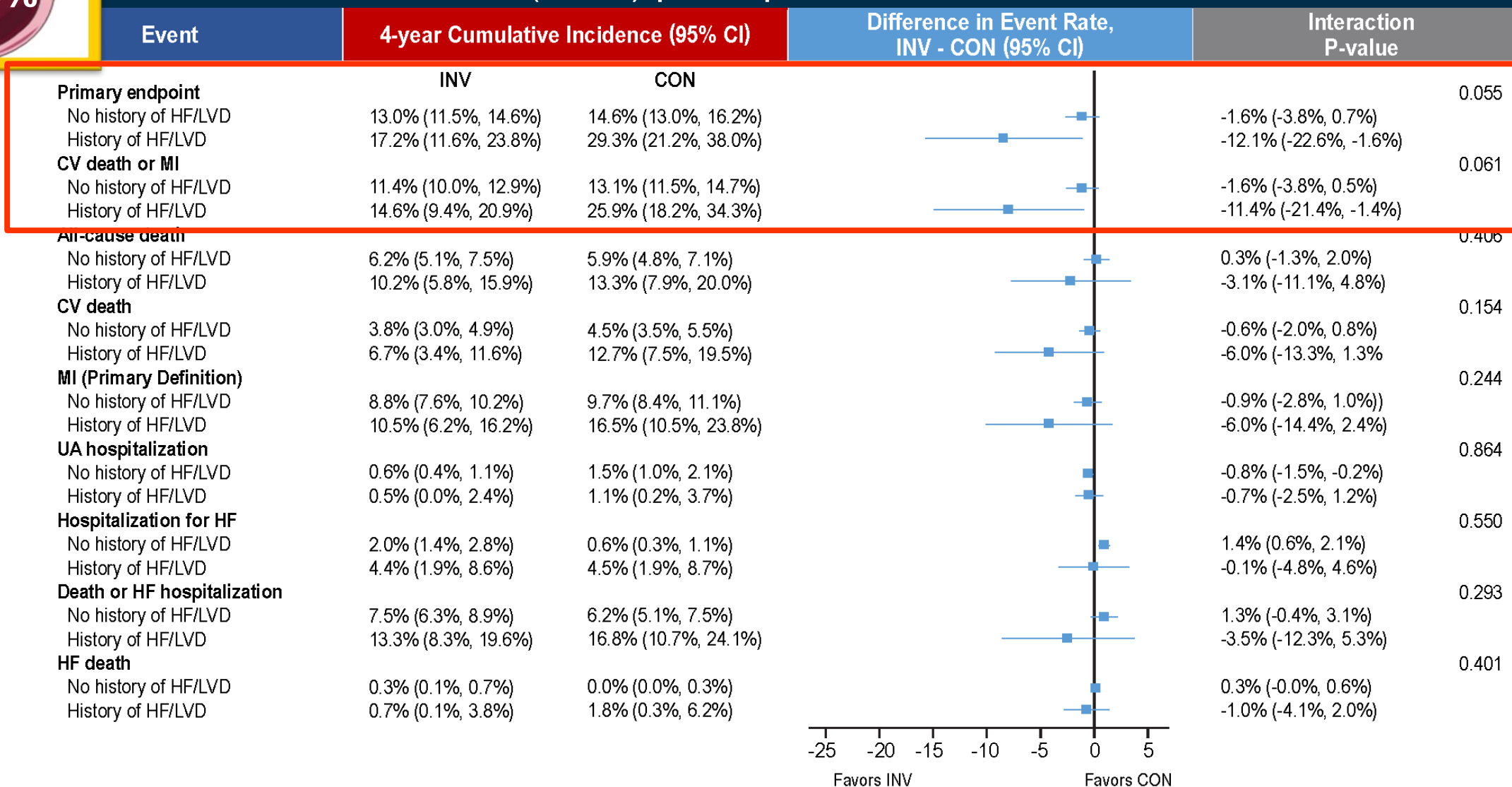


NNT = 14

ISCHEMIA: Heart failure/LVSD

398 (7.7%) participants with HF/LVD

>35%



Revascularization to Improve Survival in SIHD

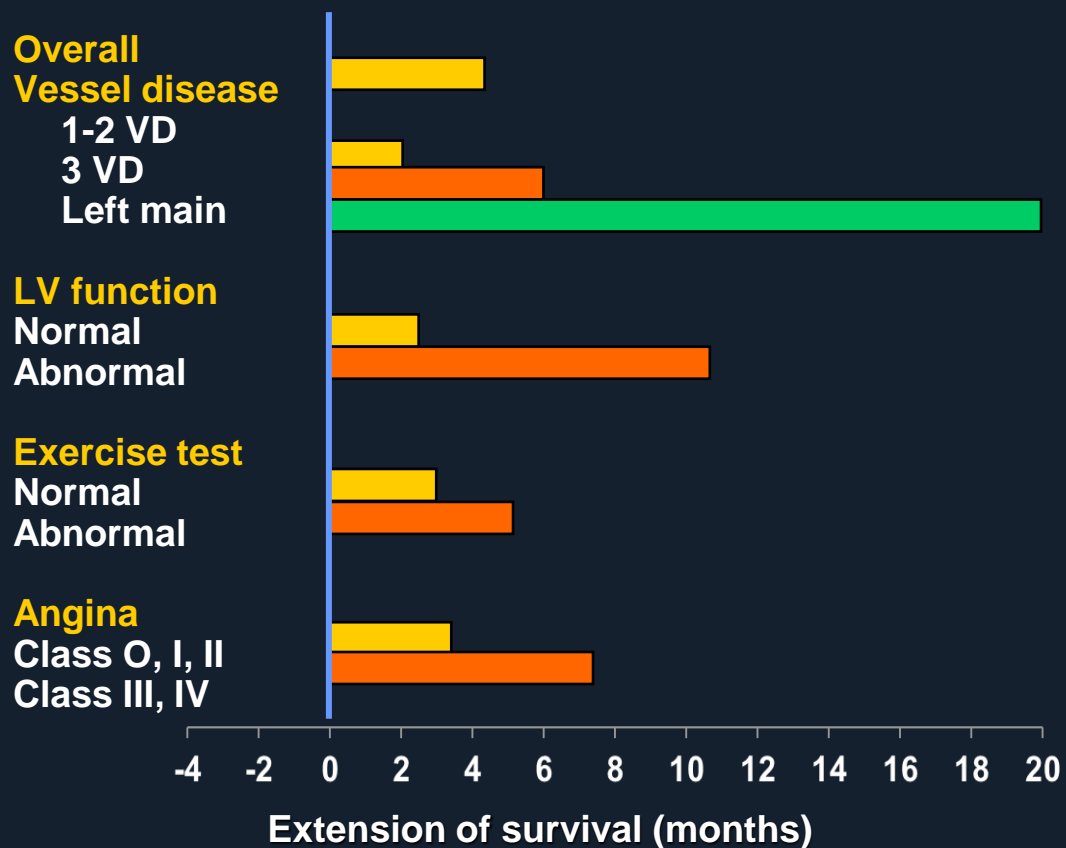
- Overall cohort
- High risk subgroups
 - Left main disease
 - LV dysfunction
 - *CABG vs. Med: Mortality benefit of CABG (STICHES)*
 - *CABG vs. PCI: Need RCT*
 - 3-vessel disease
 - Proximal LAD disease
 - Extensive ischemia

Revascularization to Improve Survival in SIHD

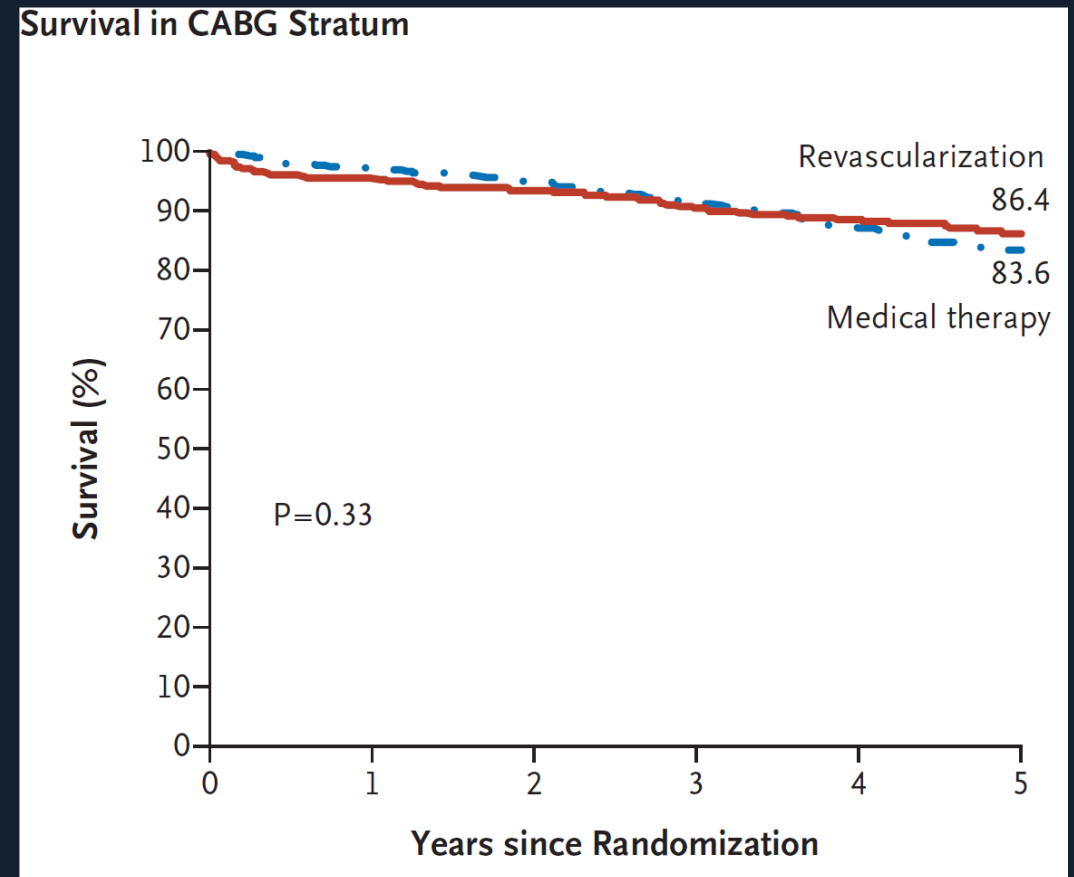
- Overall cohort
- High risk subgroups
 - Left main disease
 - LV dysfunction
 - **3-vessel disease**
 - Proximal LAD disease
 - Extensive ischemia

Extension of Survival with 3-vessel disease with Revascularization 1980s to Present

1980s (CABG vs. No CABG)



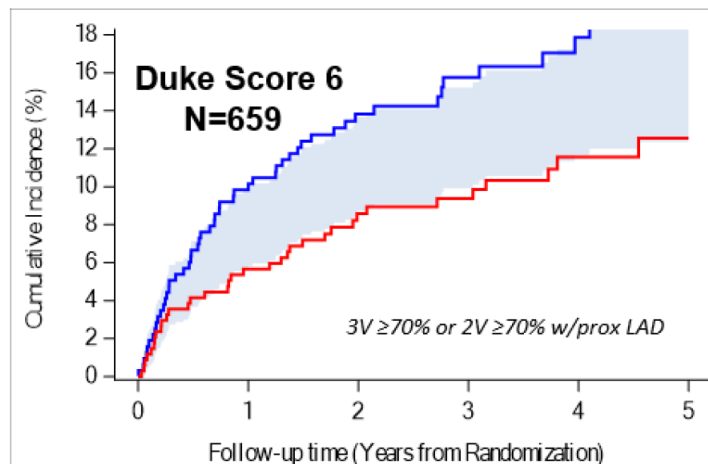
2009 (BARI-2 D: CABG vs. Med)



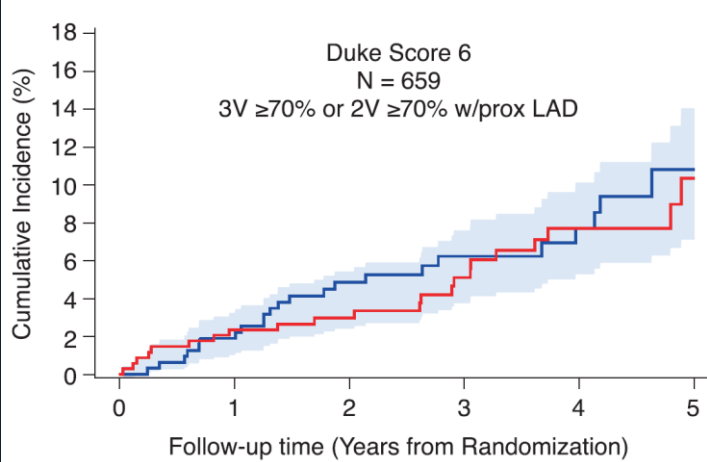
ISCHEMIA: Potential Reduction in CV death/MI in High Anatomic Risk

	Events, n		4-y event rate, %		Difference (95% CI), %	Interaction P value
	Invasive strategy	Conservative strategy	Invasive strategy	Conservative strategy		
Cardiovascular death or myocardial infarction						0.33
1-Vessel CAD $\geq 50\%$	3	4	3.3 (0.9 to 8.6)	8.7 (2.5 to 19.9)	-5.4 (-14.9 to 4.2)	
1-Vessel CAD $\geq 70\%$ or 2-vessel $\geq 50\%$	26	25	8.8 (5.7 to 12.8)	8.7 (5.6 to 12.5)	0.2 (-4.7 to 5.1)	
2-Vessel CAD $\geq 70\%$ or 3-vessel $\geq 50\%$ or 70% proximal LAD	38	48	10.2 (7.2 to 13.9)	12.8 (9.5 to 16.7)	-2.6 (-7.5 to 2.3)	
3-Vessel CAD $\geq 70\%$ or 2-vessel $\geq 70\%$ including proximal LAD	34	50	11.6 (8.1 to 15.7)	17.9 (13.4 to 22.8)	-6.3 (-12.4 to -0.2)	

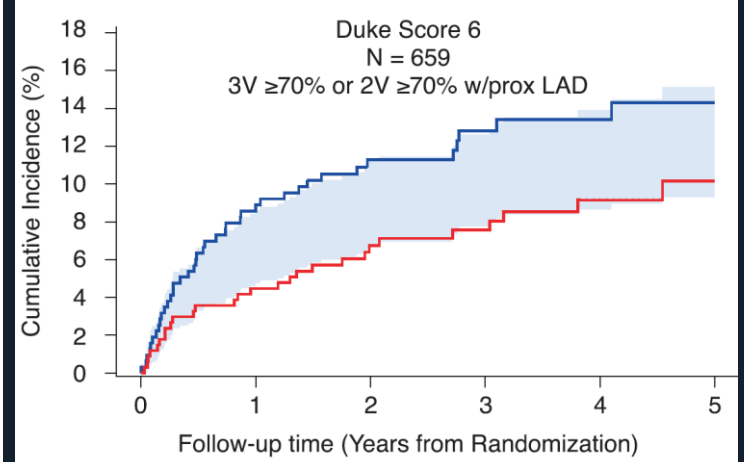
CV Death or MI



All-Cause Mortality



Myocardial Infarction



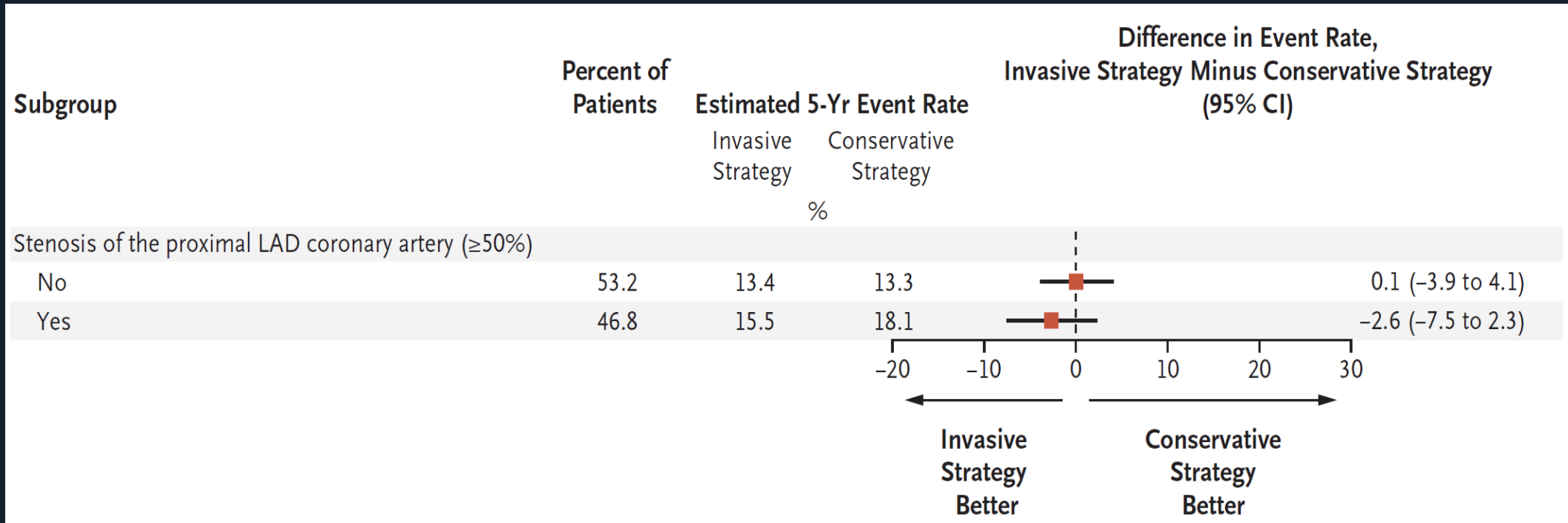
Revascularization to Improve Survival in SIHD

- Overall cohort
- High risk subgroups
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 - 3-vessel disease
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Extension of Survival with Proximal LAD with Revascularization

ISCHEMIA: Invasive vs. Conservative

No heterogeneity of treatment effect based on proximal LAD stenosis status for the primary endpoint



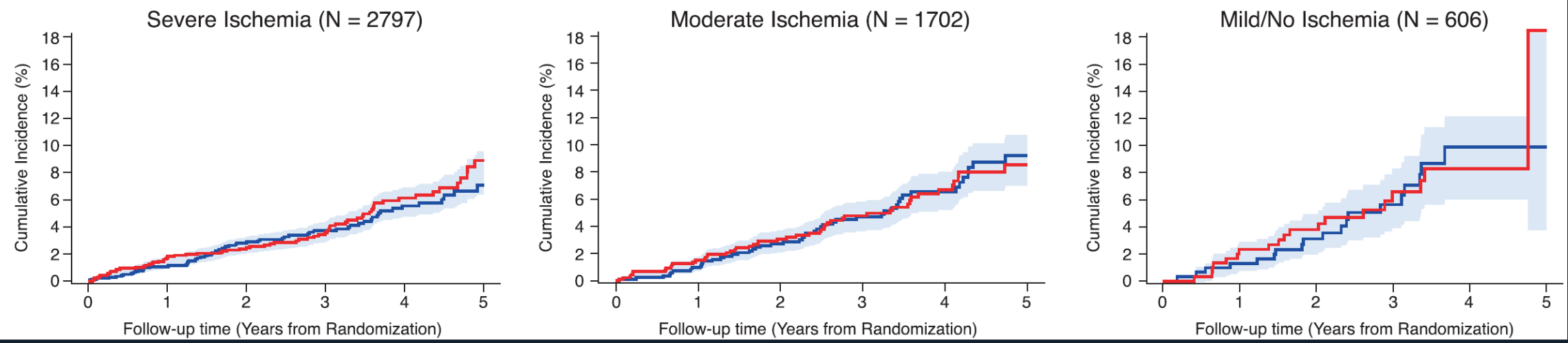
Revascularization to Improve Survival in SIHD

- Overall cohort
- High risk subgroups
 - Left main disease
 - LV dysfunction
 - 3-vessel disease
 - Proximal LAD disease
 - Extensive ischemia

Extension of Survival with Revascularization Based on Ischemia Severity

ISCHEMIA: Invasive vs. Conservative

All-Cause Mortality



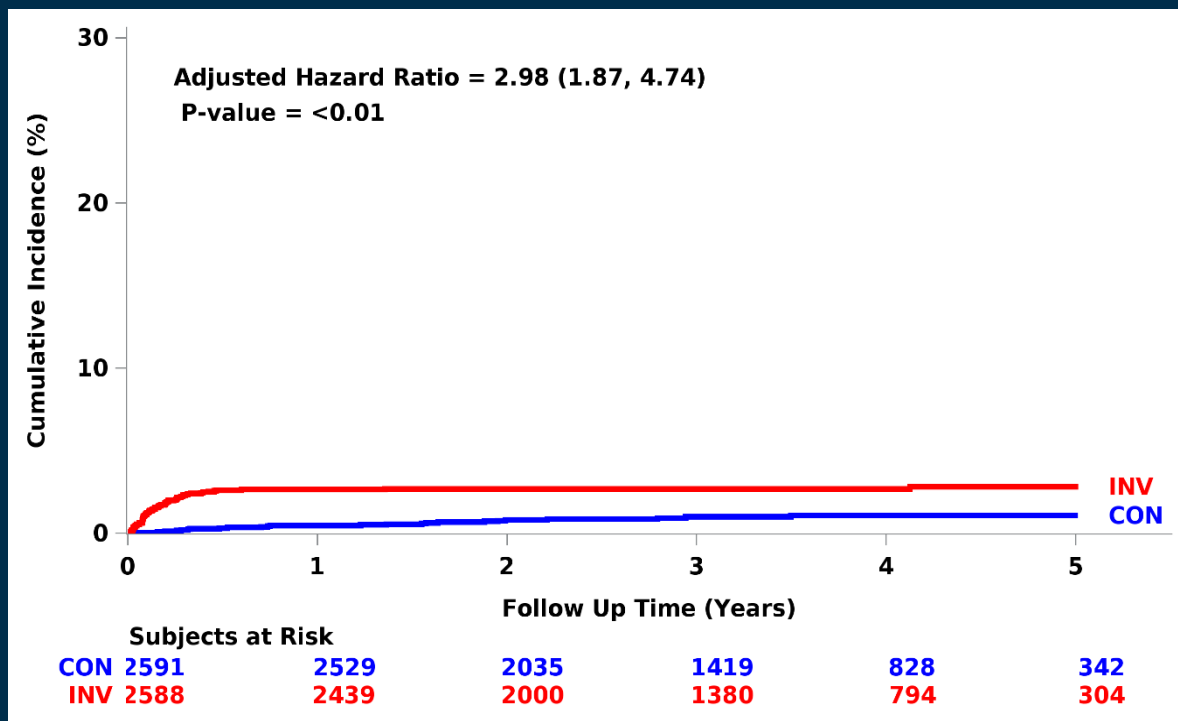
Potential Reasons for Revascularization in SIHD

- To improve survival
- To prevent other cardiovascular events
- To improve quality of life

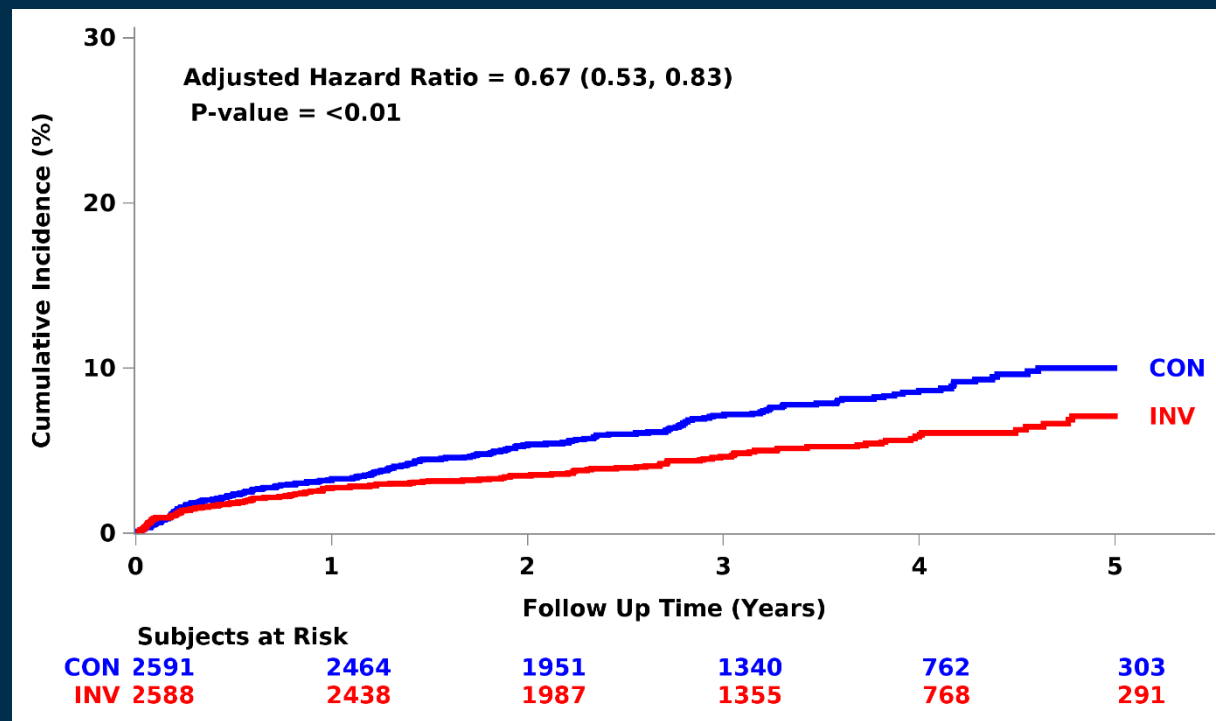
Revascularization Reduces Spontaneous MI

ISCHEMIA: Invasive vs. Conservative

Procedural MI Type 4a or 5 MI



Spontaneous MI Types 1, 2, 4b, or 4c MI



Potential Reasons for Revascularization in SIHD

- To improve survival
- To prevent other cardiovascular events
 - *Reduces spontaneous MI, unstable angina and lowers CV stays*
- To improve quality of life

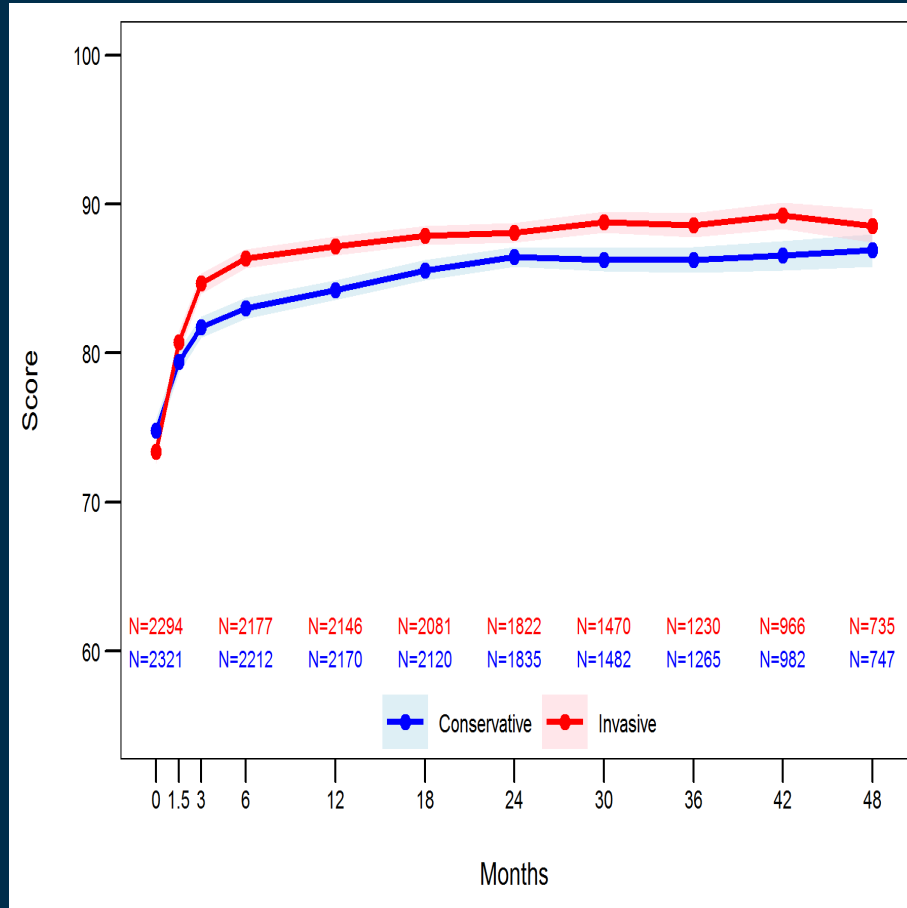
Potential Reasons for Revascularization in SIHD

- To improve survival
- To prevent other cardiovascular events
- To improve quality of life

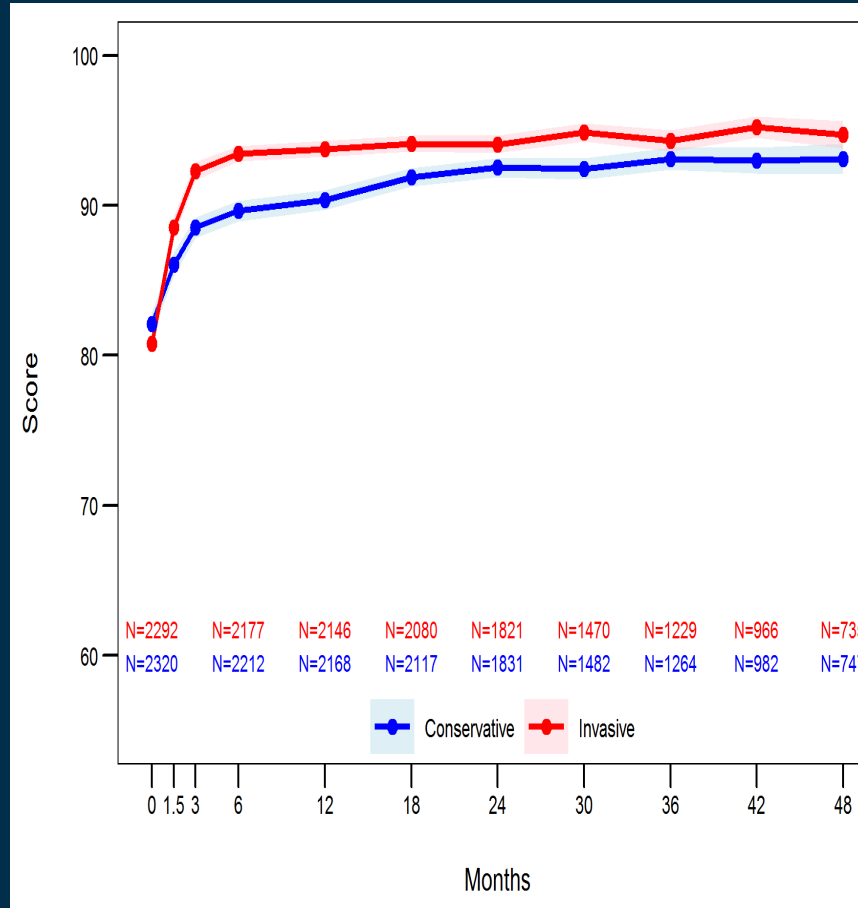
Durable Improvement in Angina Related QoL

ISCHEMIA

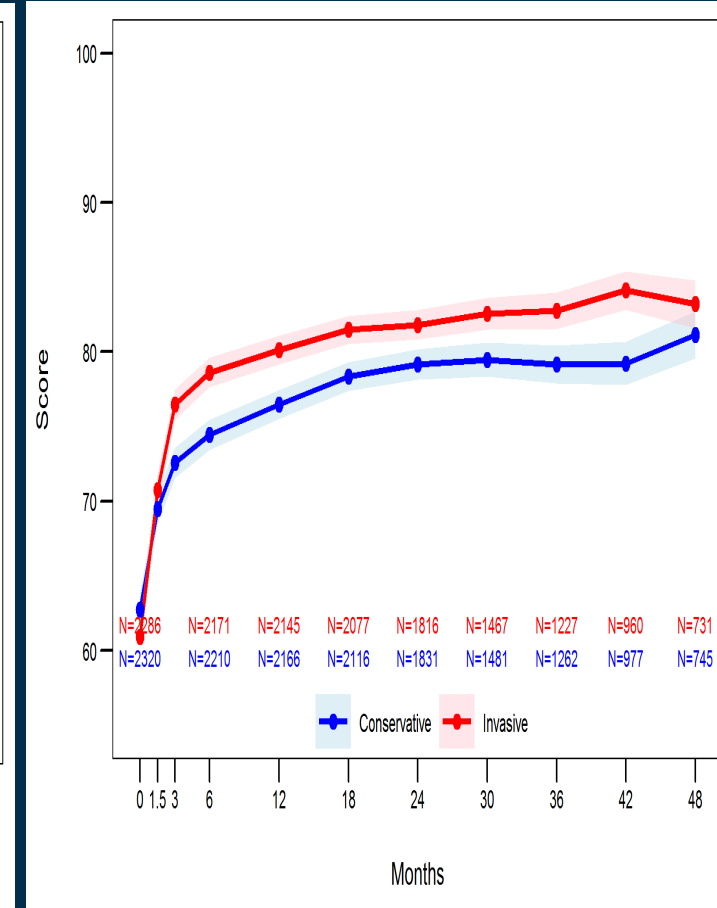
SAQ Summary Score



SAQ Angina Frequency



SAQ Quality of Life



Potential Reasons for Revascularization in SIHD

- To improve survival
- To prevent other cardiovascular events
- To improve quality of life
 - *Yes, but not in the asymptomatic patients*

Potential Reasons for Revascularization in SIHD

Summary

- To improve survival
 - *No improvement in survival compared with MT, except in those with LM disease and LV systolic dysfunction*
 - *Small reduction (0.3%/year) in cardiac death*
- To prevent other cardiovascular events
 - *Reduces spontaneous MI, unstable angina and lowers CV stays*
- To improve quality of life
 - *Faster and more durable relief of angina in symptomatic patients*

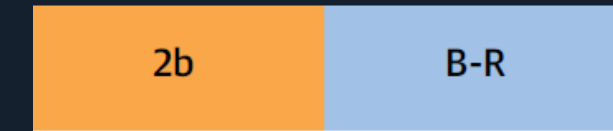
2021 ACC/AHA Revascularization Guidelines

SIHD and Normal EF

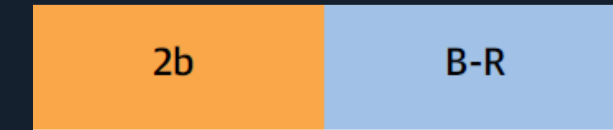
LM: CABG is recommended to improve survival



3V-CAD: CABG maybe reasonable to improve survival



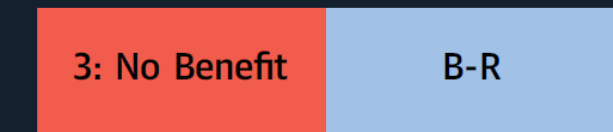
3V-CAD: Usefulness of PCI to improve survival is uncertain



Prox LAD: Usefulness of revasc to improve survival is uncertain



1 or 2VD and no Prox LAD: Revasc is not recommended to improve survival



2021 ACC/AHA Revascularization Guidelines

SIHD and Normal EF

Multivessel-CAD: revascularization is reasonable to lower the risk of cardiovascular events such as spontaneous MI, unplanned urgent revascularizations, or cardiac death

