



Ten Years Survival Benefit and Appropriateness of CABG or PCI: individual predicted all-cause mortality in patients with complex CAD

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Disclosure

- Dr. Serruys reports personal consultancy fees from Sino Medical Sciences Technology, Philips/Volcano, Xeltis, Heartflow, outside the submitted work.

Average Treatment Effect as a Summary Result for 10-year All-cause Death in the SYNTAXES

HR 1.19, 95% CI (0.99-1.43), $P = 0.066$

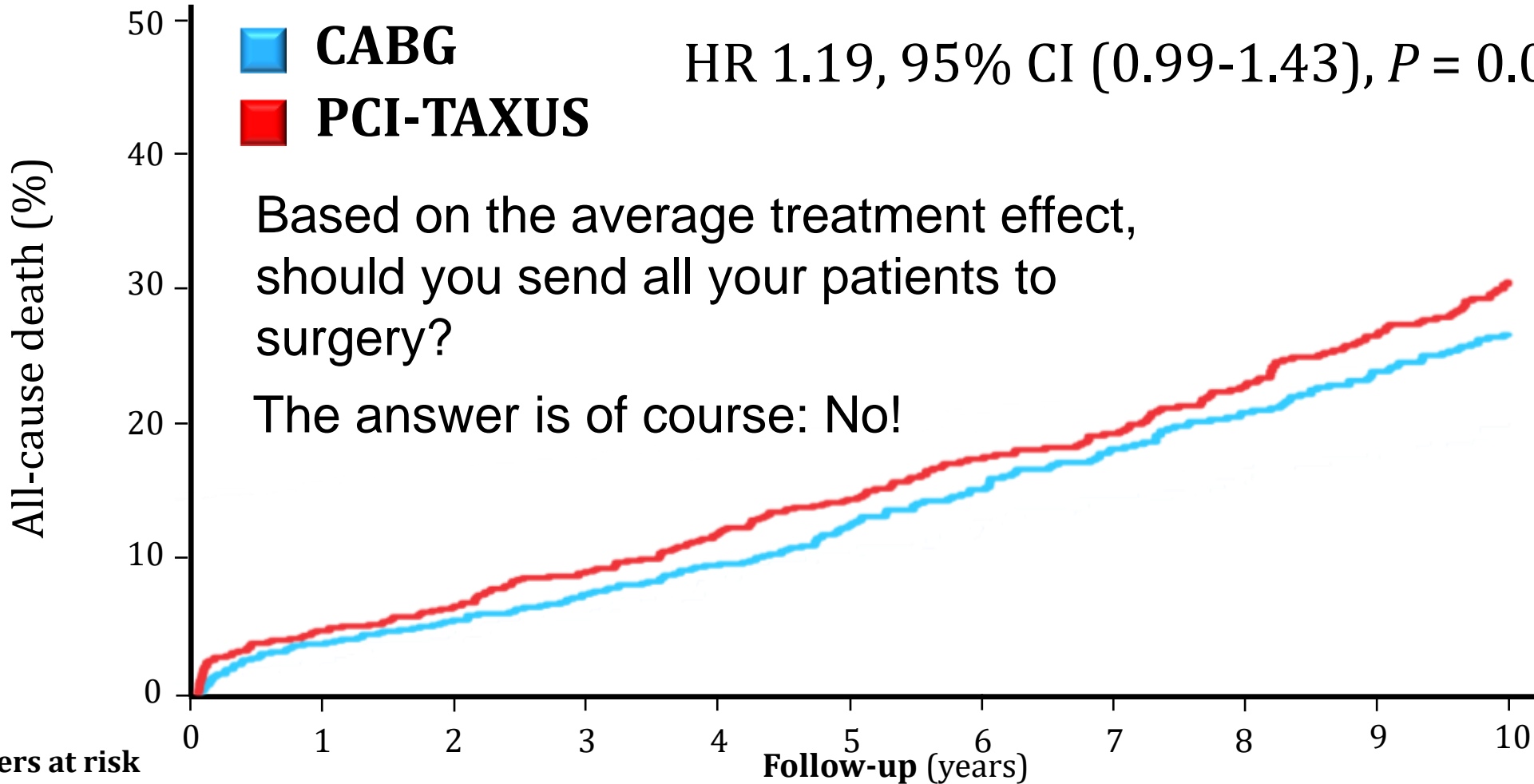
CABG
PCI-TAXUS

Based on the average treatment effect, should you send all your patients to surgery?

The answer is of course: No!

28.4%

24.5%



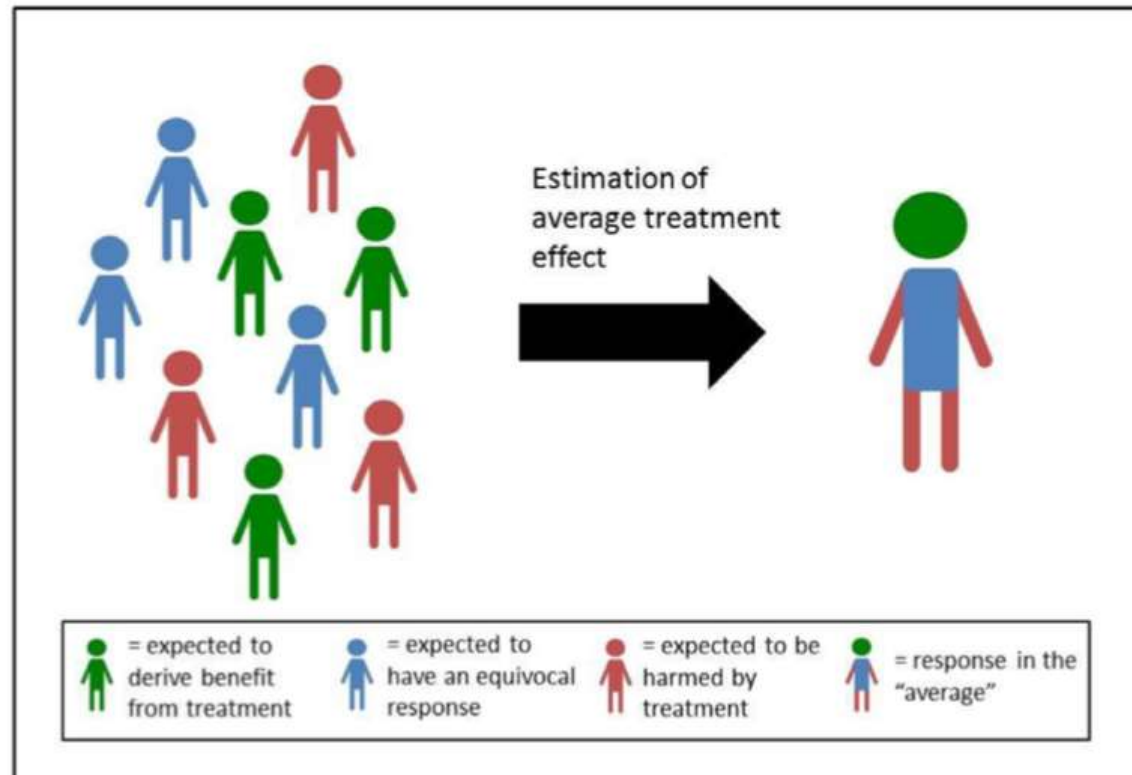
Numbers at risk

	0	1	2	3	4	5	6	7	8	9	10
PCI	903	860	844	822	795	744	699	680	651	621	583
CABG	897	856	838	820	799	753	711	687	666	644	620

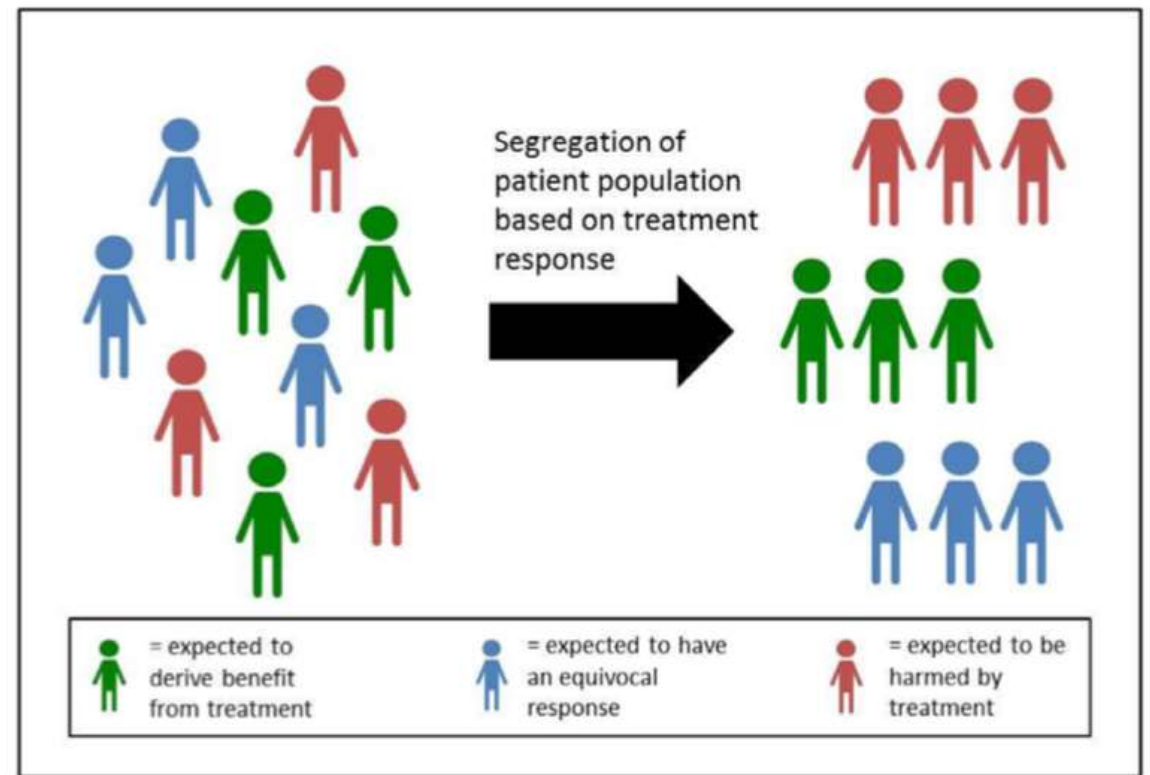
Decision Tools to Improve Personalized Care in Cardiovascular Disease

Moving the Art of Medicine Toward Science

A Average Treatment Effect Assessed in a Heterogeneous Population



B Identification of Heterogeneous Responses to Treatment



SYNTAX Score II (2013)

SYNTAX Score II was developed by applying a **Cox proportional hazards model** to the 4-year results of SYNTAX trial resulting in a combination of 6 clinical and 2 anatomical independent **predictors of 4 years all-cause mortality**:

Anatomical
SYNTAX Score

LMCAD

Age

Cr Clearance

LVEF

Female

PVD

COPD

SYNTAX Score II 2020

SYNTAX Score II 2020 was redeveloped to predict **10-year mortality** and **5-year MACE** in the SYNTAX(ES) trial and externally validated in the FREEDOM, BEST, and PRECOMBAT trials:

Anatomical
SYNTAX Score

Disease type
(3VD or LMCAD)

Current smoking

Age

Cr Clearance

LVEF

Diabetes

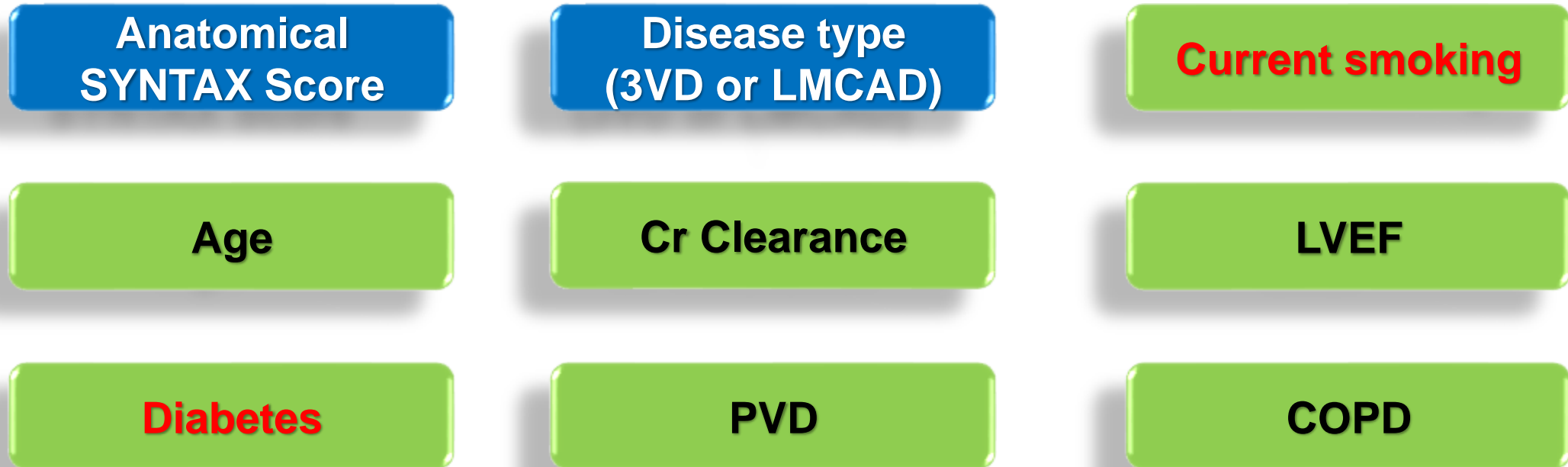
PVD

COPD

Pr (10-year mortality) = $1 - \exp(-0.243 * \exp(0.99 * (0.72 * \text{Age}/10 - 0.07 * \min(\text{CrCl}, 90)/10 - 0.31 * \text{Min}(\text{LVEF}, 50)/10 + 0.48 * \text{COPD} + 0.73 * \text{PVD} + 0.20 * \text{Medically treated diabetes} + 0.46 * \text{on insulin} + 0.66 * \text{Current smoking}) - 0.10 * \text{LMCAD} - 0.40 * \text{CABG} * 3\text{VD} + 0.02 * \text{CABG} * \text{LMCAD} + 0.16 * \text{PCI} * (\text{SYNTAX Score} - 29)/10 - 2.80))$.

SYNTAX Score II 2020

SYNTAX Score II 2020 was redeveloped to predict **10-year mortality** and **5-year MACE** in the SYNTAX(ES) trial and externally validated in the FREEDOM, BEST, and PRECOMBAT trials:



$$\text{Pr (5-year MACE)} = 1 - \exp(-0.175 * \exp(0.74 * (0.72 * \text{Age}/10 - 0.07 * \min(\text{CrCl}, 90)/10 - 0.31 * \min(\text{LVEF}, 50)/10 + 0.48 * \text{COPD} + 0.73 * \text{PVD} + 0.2 * \text{Medically treated diabetes} + 0.46 * \text{On insulin} + 0.66 * \text{Current smoking}) - 0.23 * \text{LMCAD} - 0.48 * \text{CABG} * 3\text{VD} + 0.13 * \text{CABG} * \text{LMCAD} + 0.19 * \text{PCI} * (\text{SYNTAX Score} - 29)/10 - 2.00)).$$

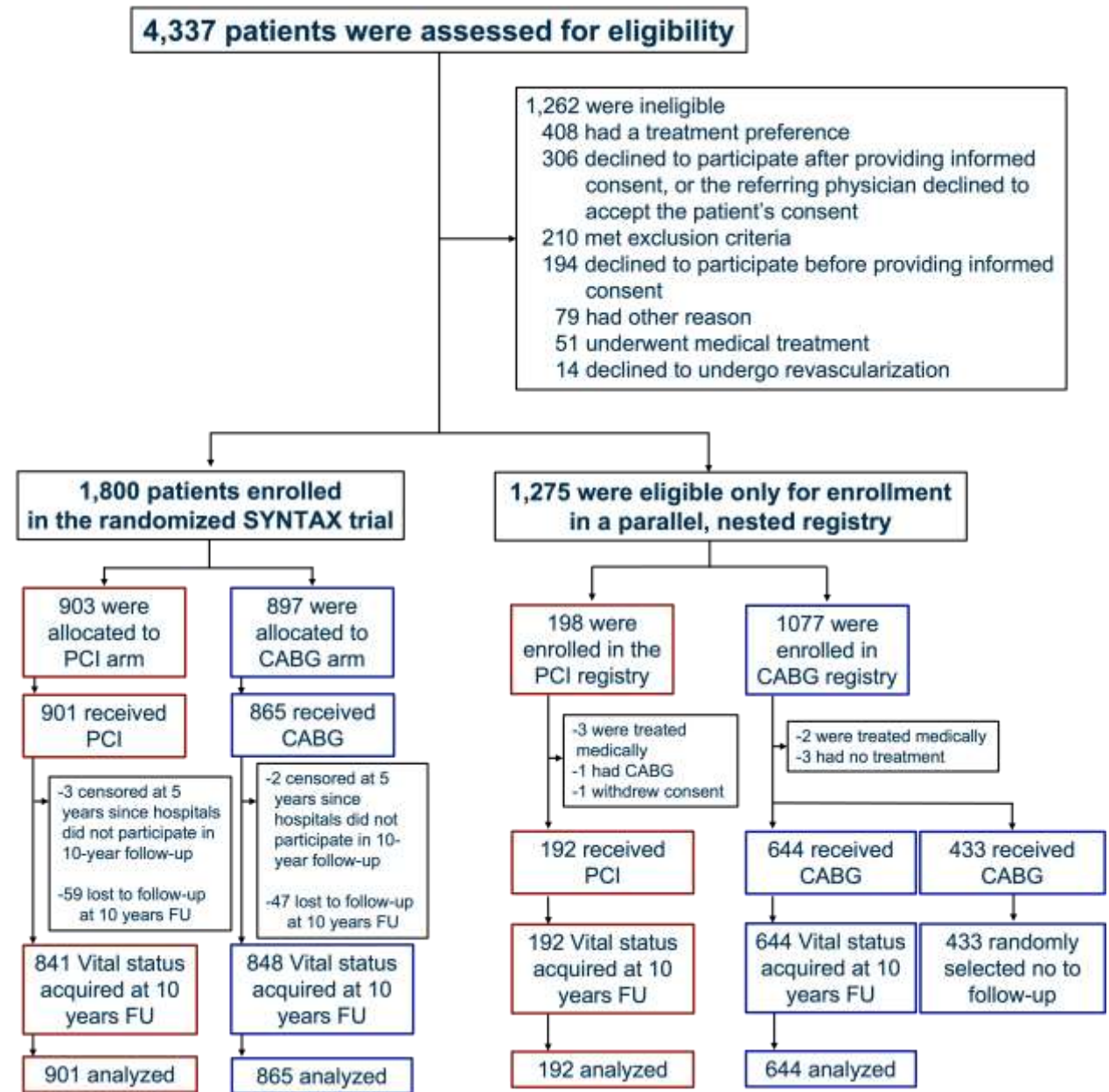
The SYNTAX randomized cohort and registry cohort

Reasons for inclusion in the CABG registry:

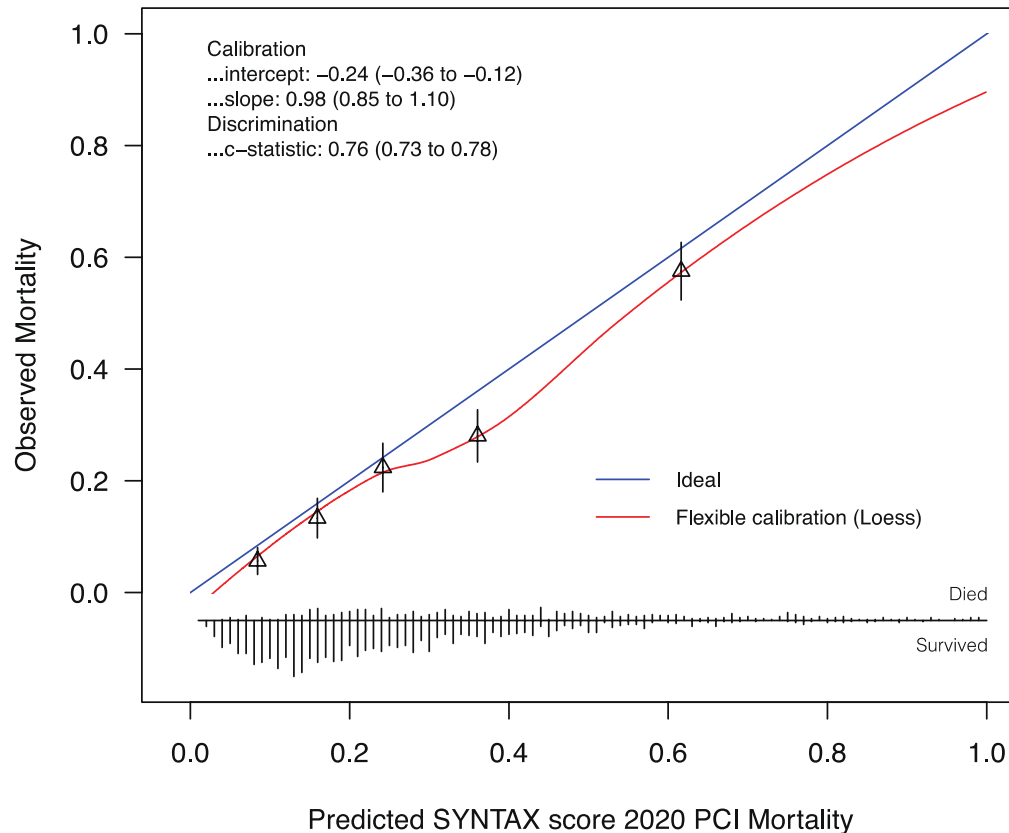
- Complex anatomy unamenable to PCI (70.9%)
- CTO untreatable with PCI (22.0%)
- Inability to take antiplatelet medication (0.9%)
- Refusal to PCI (0.5%)
- Other reasons (5.7%)

Reasons for inclusion in the PCI registry:

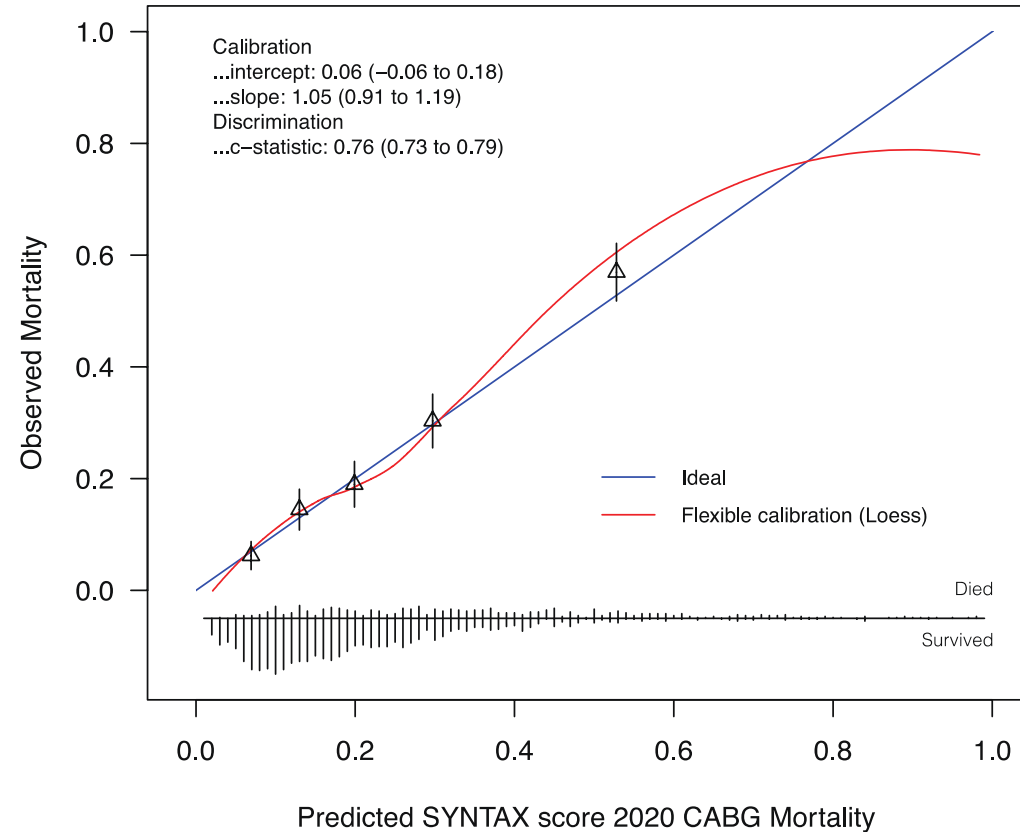
- High-risk for CABG (70.7%)
- No graft material for anastomosis (9.1%)
- Refused CABG (5.6%)
- Small or poor quality of distal vessels (1.5%)
- Other reasons (13.1%)



Calibration plots of 10-year observed versus predicted mortality according to the SSI-2020



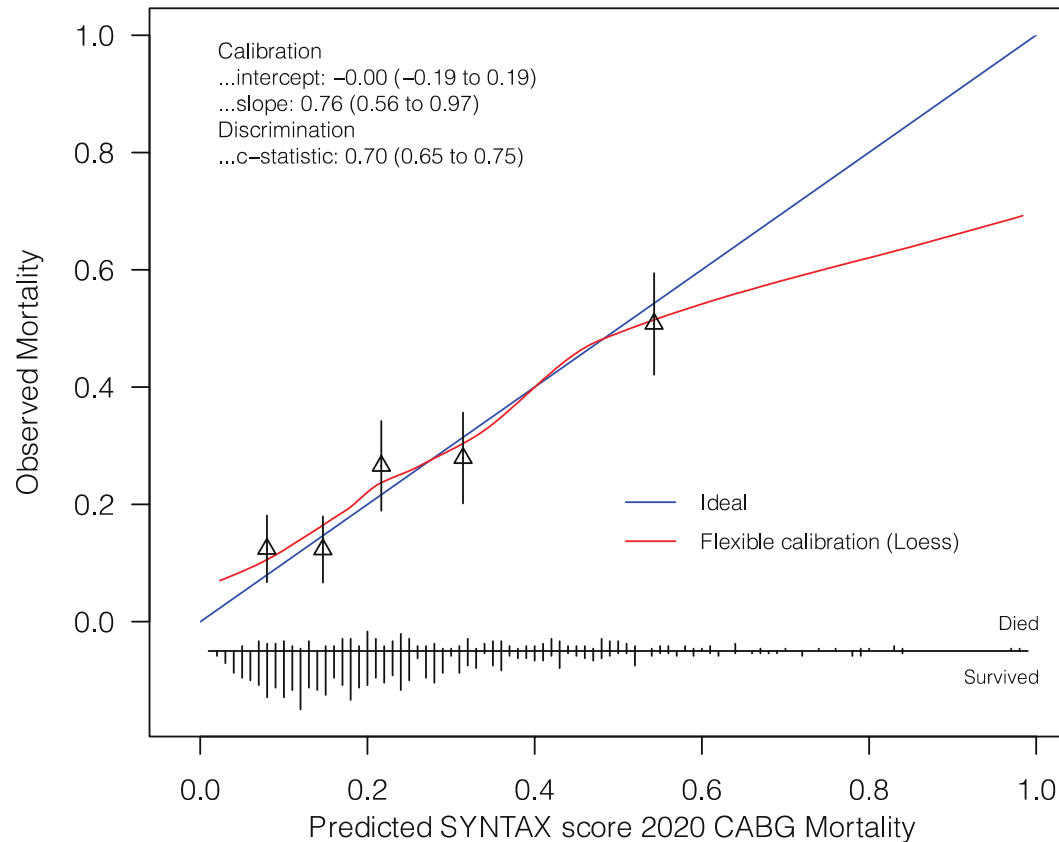
PCI population



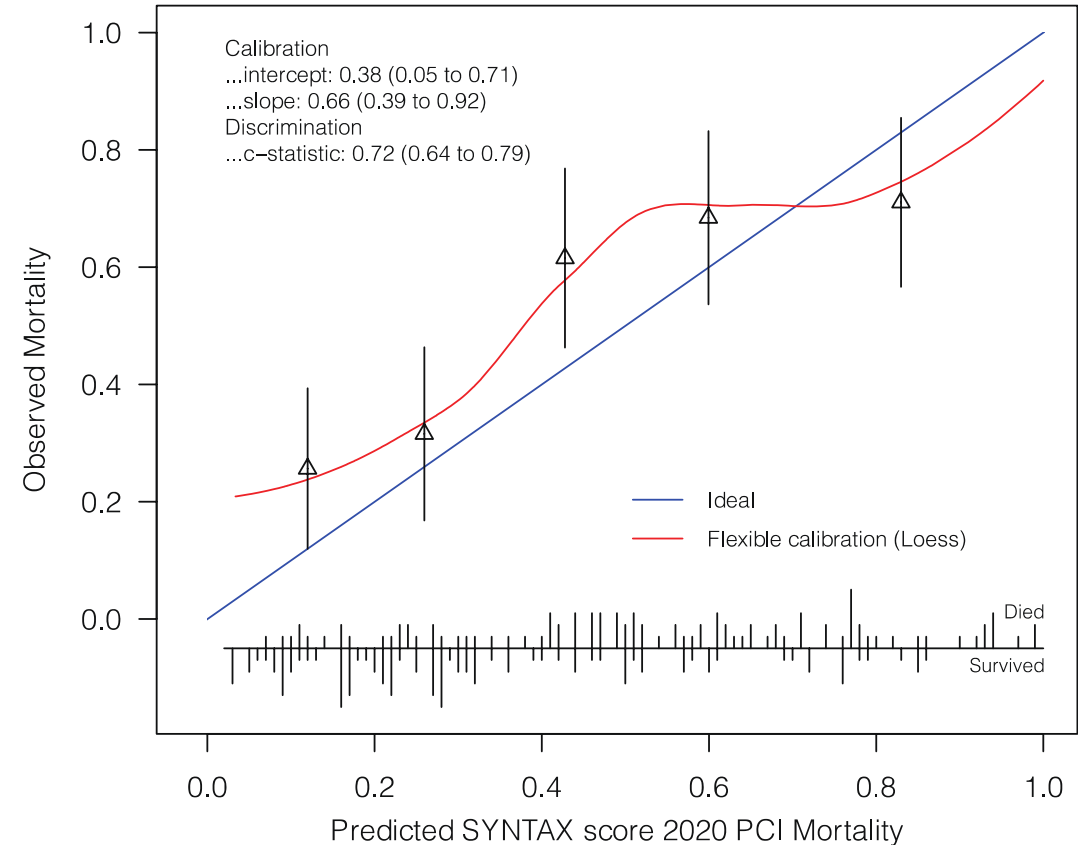
CABG population

Randomized cohorts

Calibration plots of 10-year observed versus predicted mortality according to the SSI-2020



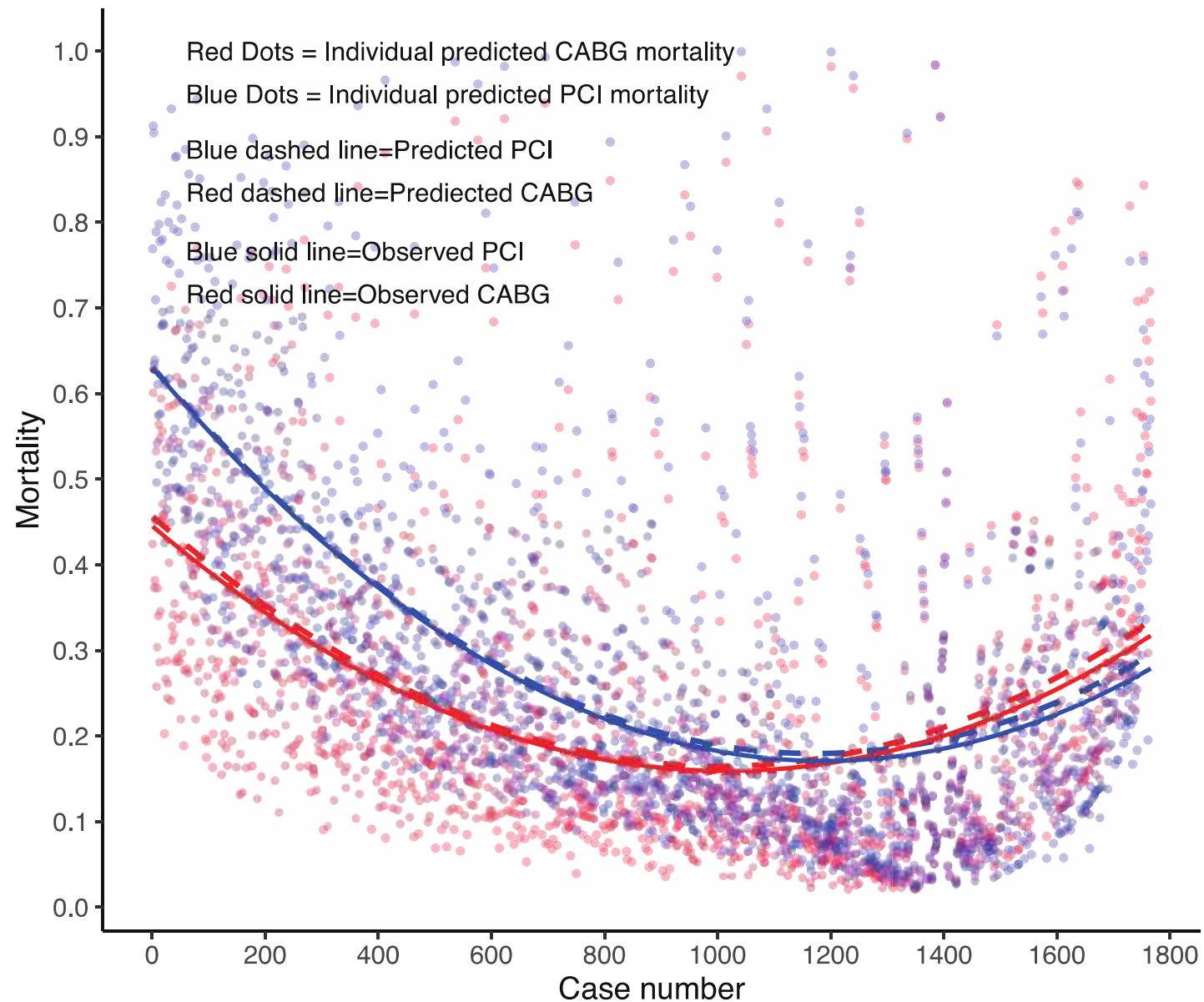
PCI population



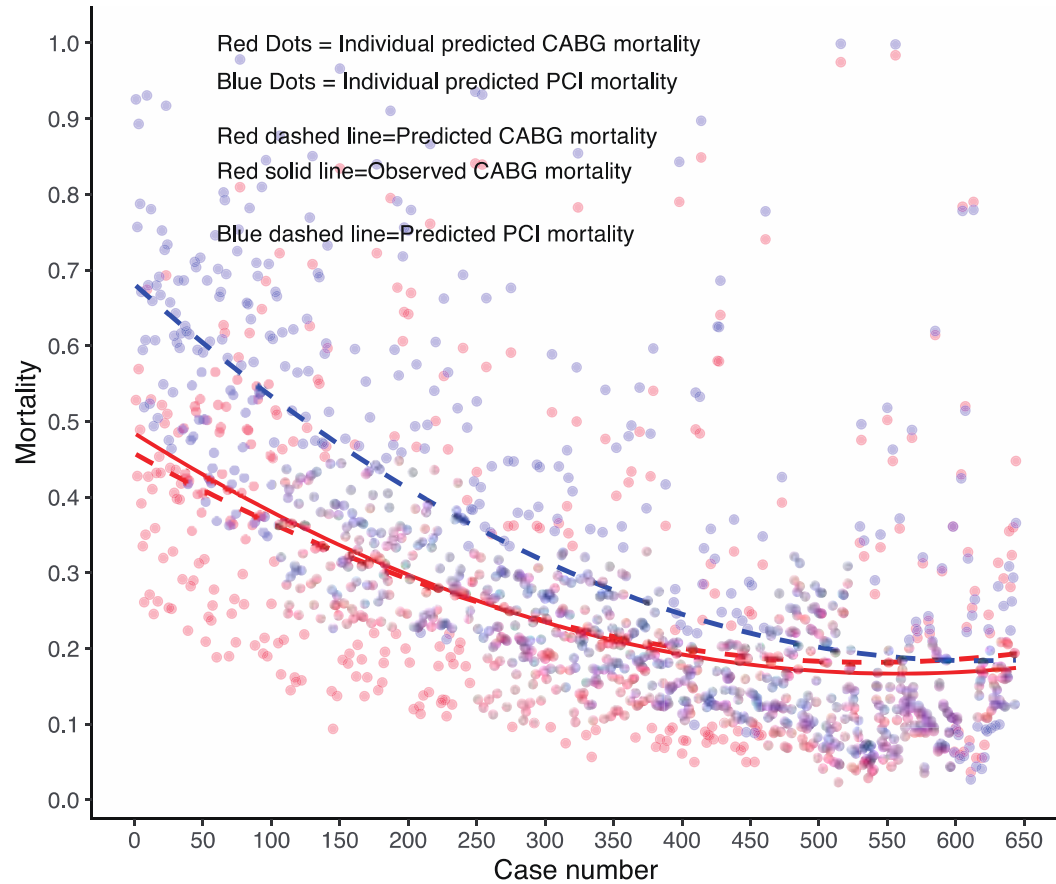
CABG population

Registry cohorts

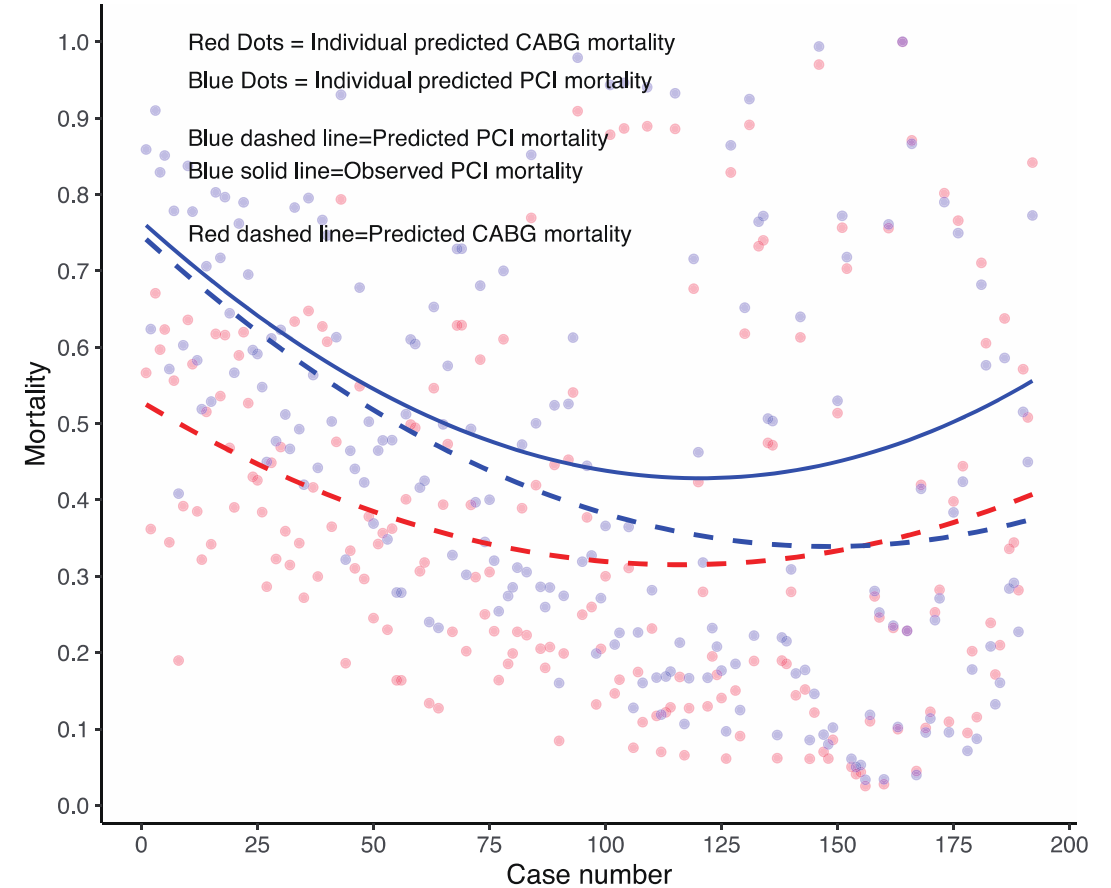
SYNTAX randomized population individual benefit plot



SYNTAX registry population individual benefit plot



PCI population

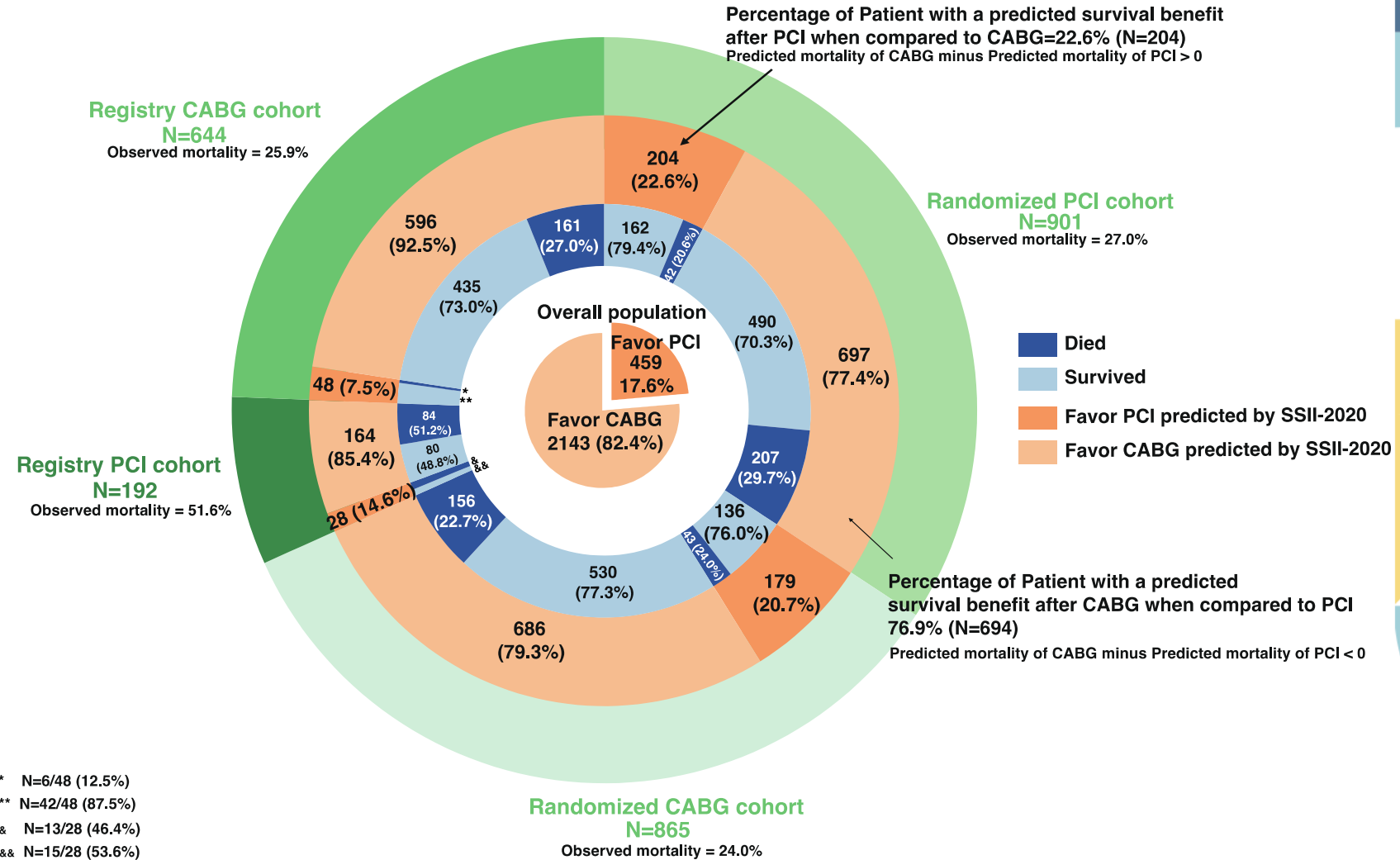


CABG population

Registry cohorts

Predicted survival benefit following CABG and PCI

- 78.3% (1383/1766) and 21.7% (383/1766) in the randomized cohort
- 82.4% (2143/2602) and 17.7% (459/2602) in the whole SYNTAX trial population.



* N=6/48 (12.5%)
 ** N=42/48 (87.5%)
 & N=13/28 (46.4%)
 && N=15/28 (53.6%)

Conclusion

- Selection of a revascularization modality has to rely on individual long-term prognosis. The average treatment effect observed in trials that do not include the full spectrum of patients with complex coronary artery disease seen in daily practice.
- The concordance between individual predicted and observed mortalities (SSII-2020) allows us to retrospectively establish the appropriateness of treatment in an all-comers population
- The appropriate treatment ratio between PCI and CABG (1 to 4.7) in these patients, who could expect a long-term survival benefit with percutaneous over surgical revascularization.